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Statement of Perspective. The word *zygon* means the yoking of two entities or processes that must work together. It is related to *zygote*—meaning the union of genetic heritage from sperm and egg, a union that is vital in higher species for the continuation of advancement of life. The journal *Zygon* provides a forum for exploring ways to unite what in modern times has been disconnected—values from knowledge, goodness from truth, religion from science. Traditional religions, which have transmitted wisdom about what is of essential value and ultimate meaning as a guide for human living, were expressed in terms of the best understandings of their times about human nature, society, and the world. Religious expression in our time, however, has not drawn similarly on modern science, which has superseded the ancient forms of understanding. As a result religions have lost credibility in the modern mind. Nevertheless some recent scientific studies of human evolution and development have indicated how long-standing religions have evolved well-winnowed wisdom, still essential for the best life. *Zygon's* hypothesis is that when long-evolved religious wisdom is yoked with significant recent scientific discoveries about the world and human nature, there results credible expression of basic meaning, values, and moral convictions that provides valid and effective guidance for enhancing human life. *Zygon* also publishes manuscripts that are critical of this perspective, as long as such papers contribute to a constructive reflection on scientific knowledge, human values, and existential meaning.

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Editorial

Climate Change and Blockchain

The first issue with the new publisher, Open Library of Humanities, is out! We delayed the release of the March 2024 a bit since we wanted to include a complete thematic section from the sixty-eighth annual summer conference of the Institute on Religion in an Age of Science (IRAS) entitled “The Wizards of Climate Change: How Can Technology Serve Hope and Justice?” at Star Island, New Hampshire, from June 25 to July 2, 2023. In this Editorial for the March 2024 issue, you will find brief introductions to the articles included in the issue, as well as an overview of books reviewed in the latest edition of *Reviews in Science, Religion and Theology*.

Articles

This issue contains two general articles. Adam Chin critiques conceptual analysis as used in the religion-and-science literature as a means of determining how to characterize the relationship between religion and science. And Pieter Slootweg assesses what the Bible says about God’s way with the animals and what it could mean for human ideas about God’s moral character.

The Wizards of Climate Change: How Can Technology Serve Hope and Justice?

(by Arthur Petersen and Connie Bertka)

Technological wizardry has been pitched against prophecies of environmental catastrophe since at least the mid-20th century. *Innovate! Create! Only then can everyone win!—Simplify! Change your ways! Or all will be lost!* The scientists on the U.N. Intergovernmental Panel on Climate Change, for example, tell us that large-scale deployment of carbon dioxide removal technologies is “unavoidable” if we are to prevent further dangerous temperature increases. They also argue that we must live less energy-intensive lifestyles to substantially reduce emissions. Addressing the many dimensions of climate change—such as energy and industrial production, urban and infrastructure planning, building construction and design, and land use—will require *both* new technologies *and* lifestyle changes.

In the 2024 IRAS conference, organized by Arthur Petersen, Connie Bertka, and Bruce Naylor, we critically examined how technology can be developed, deployed and governed responsibly, to address climate change in ways that foster hope and justice. We respectfully engaged a multiplicity of world views, including religious perspectives, as we learned how countries throughout the world determine and apply climate and technology policies.

The eleven articles that are included in this thematic section cover the breadth and depth of the conference and we are very happy to be able to publish them. Wim Drees contrasts the ambitions of wizards with the warnings of prophets and asks what, if any, guidance religions can provide on climate change. Leonisa Ardizzone explores how peace education encourages technological responses to climate chaos to be cognizant of the root causes of systemic violence in all its forms via intersectional, interspiritual, and interreligious lenses. Connie Bertka addresses public perceptions and communication challenges pertaining to climate change and climate technologies, and she identifies an opportunity to encourage responsible societal discussions about the risks and benefits of climate intervention technologies. Billy Williams, Mark Shimamoto, and Lisa Graumlich describe an ethical framework for climate intervention research that they have been working on from the American Geophysical Union—what is it and why should one care?—organizing global engagement on this topic, including with leaders and members of faith communities. Lenny Smith draws an analogy between myths and scientific simulation models; “wizards of climate science” and the decision-makers informed by them need to grapple with the fact that the models do not reflect real-world targets perfectly. Chuck Fowler, Larry Hobbs, and Megan Rodden suggest implementing systemic thinking in dealing with our species-level problems by using other species as role models; they argue that replacing conventional thinking with systemic thinking leads to holistic approaches to global problems. Eric Orts draws on two novels to imagine possible global climate solutions; he discusses how both envision effective social change over the next few decades (which involves public opinion, new religious movements, politics at the global scale, tweaking the global economic system, geoengineering, various roles that people from all walks of life can play, and love). Bonnie Nadzam investigates how climate fiction may engage elements of craft, in particular Enlightenment iterations of selfhood, that may contribute, regardless of a story’s content, to destructive dynamics of the Anthropocene. Fran Flannery argues why we must stop saying “climate apocalypse,” and analyzes the links between symbols, religious social memory, and effective climate action. Robert Sarracino and Margery Dixon outline Bahá’í approaches to climate change, focusing on three components for dealing with the crisis of anthropogenic climate change: embracing of justice and equity, full embracing of sound science, and consultation at all levels of society. Finally, Noreen Herzfeld offers a case for hope in a warming world; she emphasizes that hope is an active verb, one that calls for courage, solidarity, a clear vision, and hard work: humanity is called not to despair but to use every technology and

means, we can be encouraged by a vision of a new world and society that works for everyone, and we can be heartened by nature's resilience and an evolutionary theology that looks toward the future.

Blockchain, Religious Imaginaries, and Theology (by Franck Damour)

Studies related to blockchain technology have become increasingly popular in the past few years. These studies generally address the economic, social and legal implications of this new technology, which is often regarded as a means to renew or rethink the social contract. Because of its allegedly disruptive nature, blockchain technology has motivated a large variety of actors and communities to draft manifestos, engage in radical discourses, create new schools of thought centered on a few charismatic figures or referring to an unknown prophetic figure. Like all emerging technologies, the blockchain mobilizes a feverish imagination, which influences not only its adoption but also its development. By challenging the need for any trusted third party, blockchain technology proposes an ideal of immediate communion and communication, an opportunity to overturn the monetary system (whose religious dimensions have been emphasized many times), a tool capable of transforming the relationship with time, while questioning the notion of faith and truthfulness (through a "trustless" system). It is, thus, not surprising that religious references or theological discourses abound in that context.

This thematic section addresses the corpus of discourses and manifestos in the blockchain space, with a view to decipher the imaginaries of different blockchain communities, particularly as regards their religious or even theological dimensions. The articles in this section examine the religious dimension of blockchain and cryptocurrencies by looking at the cultural context that made them possible (Pucheu), by investigating the representations of the creators of Bitcoin, the first blockchain in operation (Damour), and by looking at the imaginaries that are mobilized in blockchain communities (Brunton, Dana and Schneider).

In his article, David Pucheu seeks to take this religious dimension seriously by revealing the various Judeo-Christian archetypes that permeate the discourses framing the development of Blockchain (millenarianism, evangelism, conversionism, etc.) and by taking a particular interest in the post-Christian spiritualities (New Age in particular) that have accompanied the deployment of network computing in the United States, and California in particular, from the outset (notably around the ambivalent notion of the 'New Edge').

When a technology mobilizes religious motives around it, this can be explained by its original context. But we also need to investigate the technology itself: what are the motivations of its inventors and developers? What religious or theological elements are incorporated into this technical device? Here, Franck Damour

examines the theological elements invested in the development of the initial blockchain: Bitcoin.

In their article, Cassandra Dana and Nathan Schneider examine the instrumentalization of perversion as a springboard for networked infrastructure on the internet. They consider the mobilization of a religious strategy, which they describe as perverse attraction: the inversion of dominant moral hierarchies as a means of cultivating a faithful practice around an as yet unfinished infrastructure project. This article considers a pair of experiments in the context of blockchain infrastructure, led by entrepreneur Ameen Soleimani: MolochDAO and SpankChain, a grant fund and a sex-worker payments network, respectively. Their thinking builds on previous work exploring the interrelationships between religious phenomena and mediation technologies. Their study provides an original angle on the mobilization of religious schemas in the singular technical device that is the blockchain.

Finn Brunton explores a millenarian belief that drives some networks around cryptocurrencies. As a financial technology with a millenarian attitude, cryptocurrencies were bound to produce their own heretics and schismatics and a coming apocalypse—the revelation of hidden knowledge by which our earthly life is transformed. Far below the public evangelists and prophets (self-described) of the blockchain, an apocalyptic movement is bubbling away, communicating over Telegram channels, conference calls and YouTube videos. In this doctrine, Bitcoin and Ethereum are the exoteric forms of the hidden “chosen one” (as the believers put it): XRP, a crypto internal to a settlement network called Ripple. For initiates, XRP is the financial infrastructure of a total economic and social transformation under the Global Economic Security and Recovery/Reform Act, or GESARA, a secret set of laws and policies soon to be revealed to the world. The planet’s economies will experience the “Great Revaluation,” when the mighty—hedge fund managers, central banks, elites—will be brought low, believers will become rich, and the global financial infrastructure will be rebased on transparent blockchain tools in a jubilee of debt and hidden capital. The author uses this case to offer a broader reflection on the context and future of religious imaginaries in the blockchain space.

This thematic section is the result of a seminar at the Collège des Bernardins (Paris) directed by Primavera de Filippi (CNRS and Harvard University), Gemma Serrano (Département Humanisme numérique, Collège des Bernardins), and Franck Damour (ETHICS EA 7446, Université catholique de Lille).

Books reviewed in *Reviews in Science, Religion and Theology*

Reviews in Science, Religion and Theology is a quarterly joint publication of the European Society for the Study of Science and Theology (ESSSAT) and the International Society for Science and Religion (ISSR) and is distributed free to all members of ESSSAT and ISSR. In order to give readers of *Zygon: Journal of*

Religion and Science an overview of recent publications, we include the list of books reviewed in the latest *Reviews* issue (in this case, March 2024):

- Paul Tyson, *A Christian Theology of Science: Reimagining a Theological Vision of Natural Knowledge*, Grand Rapids, MI: Baker Academic, 2022
- Mary-Jane Rubenstein, *Astrotopia: The Dangerous Religion of the Corporate Space Race*, Chicago: University of Chicago Press, 2022
- Sal Restivo, *Beyond New Atheism and Theism: A Sociology of Science, Secularism and Religiosity*, London: Routledge, 2024
- Joseph E. LeDoux, *The Four Realms of Existence: A New Theory of Being Human*, Cambridge, MA: Harvard University Press, 2023
- Matthew Chrisman, *Belief, Agency, and Knowledge: Essays on Epistemic Normativity*, Oxford: Oxford University Press, 2022
- Seung Chul Kim, *The Centre is Everywhere: Christianity in Dialogue with Religion and Science*, Eugene, OR: Pickwick, 2022

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Contents

ARTICLES

On the Method of Conceptual Analysis in Religion-and-Science ADAM J. CHIN 3

An Inconvenient Truth: What the Bible Tells about God's Ways to the Animals PIETER SLOOTWEG 25

THE WIZARDS OF CLIMATE CHANGE: HOW CAN TECHNOLOGY SERVE HOPE AND JUSTICE?

The Ambitions of Wizards and the Warnings of Prophets: Religious Guidance on Climate Change? WILLEM B. DREES 37

Three-Legged Stool: A Peace Education Framework for Weaving Together Spirituality, Science, and Technology LEONISA ARDIZZONE 52

Climate Change and Climate Technologies: Public Perceptions and Communication Challenges CONSTANCE M. BERTKA 68

An Ethical Framework for Climate Intervention Research: What It Is and Why You Should Care BILLY M. WILLIAMS, MARK SHIMAMOTO, AND LISA J. GRAUMLICH 82

Wizards of Climate Science: Ancient Magicians in the Court of Big Science LEONARD A. SMITH 97

Holism in Dealing with Global Problems CHARLES W. FOWLER, LARRY HOBBS, AND MEGAN RODDEN 126

Imagining Global Climate Solutions: Reflections on *The Ministry for the Future* and *Eleutheria* ERIC W. ORTS 155

Storytelling in the Anthropocene	BONNIE NADZAM	178
Why We Must Stop Saying “Climate Apocalypse”: Symbols, Religious Social Memory, and Effective Climate Action	FRANCES FLANNERY	195
Pathways to Equity in Addressing Climate Change: A Bahá’í Perspective	ROBERT SINCLAIR SARRACINO AND MARGERY DIXON	220
A Case for Hope in a Warming World	NOREEN HERZFELD	245
BLOCKCHAIN, RELIGIOUS IMAGINARIES, AND THEOLOGY		
Network, Cryptography, and the Next World to Come: An Everlasting American Techno-Millenarianism?	DAVID PUCHEU	258
The First Blockchain: Bitcoin, Entropy, Religion	FRANCK DAMOUR	280
Perverse Attraction: Idolatry, Pornography, and the Making of Infrastructure	CASSANDRA DANA & NATHAN SCHNEIDER	302
The Financial Millennium	FINN BRUNTON	321



On the Method of Conceptual Analysis in Religion-and-Science

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In this paper, I critique conceptual analysis as used in the religion-and-science literature as a means of determining how to characterize the relationship between religion and science. "Conceptual analysis," as discussed in this paper, begins by defining the terms "religion" and "science" and then derives their relation logically on the basis of those definitions. Scholars from a variety of disciplinary backgrounds (not just philosophers!) employ this method. Although it is widely criticized, I argue that the method should not be abandoned, and the critiques can instead be read as providing ways of improving conceptual analysis. The paper starts by explaining the method and canvassing some exemplars. I then consider three general issues with the method—it employs monolithic conceptions, over-essentializes religion/science, and ignores whose conceptions are analyzed—and show how it ought to be reformed. I close with a discussion of what public audiences might find conceptual analysis especially useful.



In characterizing the religion–science relationship (RSR), scholars in “religion-and-science” employ a variety of methods to argue their positions (Chin 2023). One common method is conceptual analysis, roughly: define the terms “religion” and “science,” then derive their relationship. This method has been subject to a wide range of criticisms from practitioners of other methods: it tends towards monolithism, it falsely essentializes the relata, it fails to take into account religion-as-practiced. Considering these issues, should it be abandoned entirely?

I do not think so. In this article, I critique the method of conceptual analysis, clarifying what exactly it is and how it might be improved. I begin by specifying what I mean by “conceptual analysis” and providing a few illustrative examples. I then consider several problems with the method and its extant implementation. These issues, however, are not to be understood as reasons to reject the method completely; instead, I rework them into suggestions for its improvement. I conclude with a discussion of what kinds of public, non-scholarly audiences might find conceptual analytic studies useful, since religion-and-science scholarship often aims to be public facing.

Varieties of Conceptual Analysis

By “conceptual analysis” in religion-and-science, I mean the method that proceeds as follows: 1) define “religion” (or a particular religion) and “science” (or a particular science), then 2) on the basis of those definitions alone, derive their relationship.

For instance, one might define “religion” as a system of knowledge about the world that relies on faith and “science” as a system of knowledge about the world that relies on empirical observation. Given these definitions, one might then claim that religion and science are in conflict, since they are both systems of knowledge about the world but rely on opposing methodologies (granting, of course, that faith and empirical observation are antithetical; this is essentially the argument of Tiddy Smith (2019)). Importantly, the method does not constrain any particular characterization of the RSR. While Smith might use it to argue for a form of conflict, others might use it to argue for separation (e.g., Stephen J. Gould) or even harmony (e.g., Alvin Plantinga).

There are a number of things to note about my characterization of conceptual analysis. First, it involves definitions. In some philosophical circles, definitions carry significant baggage. For our purposes, I do not require the definition(s) in step one of the method to satisfy any stringent requirements—if the reader would prefer to replace “define” with “analyze” or “characterize,” they are free to do so. In religion-and-science literature, however, many authors go so far as to provide explicit definitions (see, e.g., Stark 2003, 4, 124). Furthermore, many authors talk of defining religion (or a particular religion) and science (or

a particular science) at the start of their works, even if they do not provide an explicit definition. Here, for example, is John Hedley Brooke in his famous work *Science and Religion: Some Historical Perspectives*:

How can one speak about the relationship between science and religion, either as practices or as systems of belief, without first **defining** terms? It is possible to go only so far in meeting this objection . . . Too restrictive a **definition** can, however, be counterproductive because it may exclude too many questions before they have been asked. If the study of history is to be instructive, it is important not to establish foregone conclusions through the rigidity of definitions. (Brooke 1991, 6; emphasis added)

Thus, in this article I will follow the conventions of the literature and refer to authors' "definitions" without the more sophisticated connotations of especially picky philosophers.

Second, step one can proceed in any number of ways. Conceptual analysis often implies an a priori method; one might think of the canonical armchair philosopher pontificating from their ivory tower. But conceptual analysis can be done in a variety of ways and need not be done by philosophers. Although some—like Leo Tolstoy (Tolstoy [1902] 1987)—do indeed employ a priori methods when defining religion and science, many do not. The anthropologist James Frazer provides a good example of an empirical form of conceptual analysis. After surveying ancient forms of worship, Frazer felt he could extract a general characterization of religion as an explanatory system of the natural world that appeals to agential wills (Frazer 1922). Gregory Dawes employs a similar empirical approach in his much more recent *Deprovincializing Science and Religion* (2021).

Analysis, of course, can isolate different aspects of religion/science (or their species); the definitions arrived at by different scholars can vary radically. As discussed, Smith focuses on the methods he deems characteristic of religious and scientific ways of knowing. But one could instead focus on the social structures, endorsed propositions, or aims of religious/scientific communities, just to name a few. Furthermore, a conceptual analyzer could also generate definitions that mix these aspects, as suggested by Mikael Stenmark (2004), whose work and recommendations I discuss later in this article.

Finally, regarding step one: the qualifiers are important. Some scholars talk of Religion and Science as capitalized, global, seemingly monolithic categories; others discuss more local species. Interestingly, whether a scholar analyzes religion in general or one religion in particular seems to be highly correlated with the aims of the scholar, and ultimately their view of the RSR. The trends seem to be as follows: those with a negative view of the RSR (e.g., conflict theorists) tend to take a more global approach, as seen with Smith and Frazer.

Also in the globalizing camp are separatists like Gould and Michael Ruse. On the other hand, apologists tend to focus on their religion in particular—Plantinga, for instance, is only concerned with a particular form of Christianity (though at times he speaks of a generalized “theistic religion”). This global/local focus does not often spill over to the science side, however. Even when authors offer definitions of particular religions, they tend to still seek a general definition of science. There are a few exceptions, of course. Evolutionary biology is often singled out for discussion, as are relativity and quantum mechanics. No one, though, seems to be interested in chemistry, environmental science, agricultural science, or any of the industrial or “non-research-oriented” sciences (like routine genome sequencing). I return to this lacuna in a later section.

Regarding step two, I should clarify that the derivation involved is strictly (purportedly) logical, not empirical. Thus, after Frazer arrives empirically at his definitions of religion and (via some other process, perhaps armchair pontificating) science, he arrives at their relationship logically: religion appeals to wills and science does not; thus, they are in conflict because they try to explain the same thing (Frazer 1922). Frazer does not present historical examples of religion–science interaction and then arrive at their relationship via induction (this would be using what I have called the “method of case studies” (Chin 2023)).

Finally, the “then” between steps one and two need not be explicit. That is, the definitions in step one need not be laid out plainly for the reader to see; they may instead be implicit. The key, however, is that the derivation in step one is made on the assumption of the definitions in step one, even if they are not formally spelled out.

Thus, the method of conceptual analysis proceeds by defining the terms and “then” deriving their relationship based on those definitions. The method is used widely by philosophers, historians, social scientists, and scientists alike (among others). To be clear, this method is just one among others scholars may use to characterize the RSR. I previously outlined three other methods scholars tend to use, which I labeled “case studies,” “relativizing,” and “fieldwork” (Chin 2023). These methods do not start by defining the terms science and religion and deriving their relation on the basis of those definitions. Instead, they may refer to particular historical interactions between religious and scientific forces and perform a kind of induction over those episodes to reach their conclusions (the method of case studies). Other accounts (e.g., Harrison 2015) begin with demonstrating the historical or cultural contingency of the concepts of science and religion and draw their conclusion from the shown instability (the method of relativizing, although it is perhaps better termed “deconstruction”). Still others try to extract the proper understanding of the RSR from the interviews and ethnographies of scientists and religious folk (the method of fieldwork). These methods are not necessarily incompatible with conceptual analysis.

However, many scholars believe that the method of conceptual analysis suffers from major issues; some even advocate it be abandoned entirely. I do not think abandonment is warranted, but scholars employing conceptual analysis have much they can learn from their critics. Before turning to the criticisms, though, I will lay out some examples of conceptual analysis in action.

Some Exemplars

We will start with Frazer's *Golden Bough* (1922), a historical example chosen to illustrate the method's long pedigree. As briefly discussed, Frazer's approach to characterizing the RSR is arguably empirical. In the *Golden Bough*, Frazer reconstructs the practices of dozens of ancient and medieval cultic forms of worship (mostly European and Middle Eastern). Presumably on the basis of his vast research, Frazer then generates his definition¹ of religion as "a propitiation or conciliation of powers superior to man which are believed to direct and control the course of nature and of human life" (Frazer 1922). As Frazer points out, his definition is twofold, containing both theoretical (belief in superior powers) and practical (propitiation of said powers) elements. An implication of this definition is that "the course of nature is to some extent elastic or variable" (Frazer 1922); propitiatory acts can alter "the current of events from the channel in which they would otherwise flow" (Frazer 1922).

Frazer's conception of science is more difficult to pick out. He never explicitly defines it as he does religion. However, from his discussions of magic and science, a Frazerian science can be pieced together. As in magic, so too in science "the succession of events is assumed to be perfectly regular and certain, being determined by immutable laws, the operation of which can be foreseen and calculated precisely; the elements of caprice, of chance, and of accident are banished from the course of nature" (Frazer 1922). But where magic misapplies the "fundamental laws of thought, namely, the association of ideas by similarity and the association of ideas by contiguity in space or time" (Frazer 1922), science does not. So Frazerian science involves both a theoretical aspect (assumption of the regularity of events) as well as a practical one (proper application of the laws of thought).

Once Frazer has established his conceptions of religion and science (his definition of religion actually comes after his discussion of science and magic), he moves on to assess the RSR: the "implied elasticity or variability of nature [in the definition of religion] is directly opposed to the principles of magic as well as of science, both of which assume that the processes of nature are rigid and invariable in their operation, and that they can as little be turned from their course by persuasion and entreaty as by threats and intimidation" (Frazer 1922). For Frazer, religion and science disagree in both their theoretical and practical parts—a classic case of Barbourian conflict. But the locus of disagreement can be more accurately pinpointed in the explanations they offer. Frazer goes on

to explain that the real distinction between “the two conflicting views of the universe turns on their answer to the crucial question, Are the forces which govern the world conscious and personal, or unconscious and impersonal?” (Frazer 1922). Religious explanations feature the former, scientific the latter. We thus have, in Frazer, an epistemic methodological conflict between religion and science arrived at via conceptual analysis.

A modern example of conceptual analysis is Plantinga’s widely read *Where the Conflict Really Lies* (2011). As an Evangelical Christian, Plantinga seeks to demonstrate the compatibility of Christian faith with science and further advances the controversial claim that science is in fact incompatible with philosophical naturalism. The overarching slogan of the book is “there is superficial conflict but deep concord between science and theistic religion, but superficial concord and deep conflict between science and naturalism” (Plantinga 2011, e.g. 265).

Plantinga’s thesis is at once local and global. Although he talks at times of (theistic) religion as a whole, he is clear that he means Christianity in particular, and a very particular form of Christianity at that. On the other hand, when he speaks of science, he seems to speak of science writ large—the total institution of modern science—although he focuses on particular cases from the special sciences (especially quantum mechanics and evolutionary biology). Regardless, the argument is straightforwardly conceptual analytic: he defines his terms and derives their relationship. Plantinga’s Christianity is “defined or circumscribed by the rough intersection of the great Christian creeds: the Apostle’s Creed, the Nicene Creed, and the Athanasian Creed, but also more particular creeds such as the Catholic Baltimore Catechism, the Reformed Heidelberg Catechism, the Belgic Confession, and the Anglican Thirty-Nine Articles” (Plantinga 2011, 8). His science, as with Frazer’s, is a bit more nebulously defined but largely reduced to the method it employs. It is that enterprise that takes as its starting place first that the world is regular, predictable, and constant (in its operations) and second that we as humans/scientists believe in that regularity (Plantinga 2011, 282–83). Once these definitions are on the table, the argument for Plantinga’s positive thesis is relatively straightforward. The prerequisites of science are eminently compatible with the beliefs of Christianity. In fact, those religious beliefs offer justification for the pre-conditions of science, since theistic religion gives reason to expect the world’s regularity (given God’s character) and human belief in that regularity, since humans are created in God’s image. Thus, there is “deep concord between science and theistic religion” (Plantinga 2011). The conceptual analytic form of the argument is clear.

Using the same method to reach an almost opposite characterization of the RSR, Dawes, in his recent *Deprovincializing Science and Religion* (2021), argues for an irreconcilable form of conflict between religion and science—or at least between specific forms of the two. Dawes explicitly notes, however, that “it

would be foolish to try to make general claims about ‘science’ and ‘religion,’” and that any claims made must be conditional: “They will state that if the religion [in] question is of kind x , and the *scientia* in question is of kind y , then they will be related in manner z ” (Dawes 2021, 12). It should be noted immediately that Dawes speaks here of “*scientia*” rather than “science”—a linguistic convention he adopts in order to help readers ignore some of the connotations “science” carries in modern discourse. But despite his opposition to generalities, Dawes is nonetheless comfortable offering some very general initial characterizations of these “two different ways in which humans have thought about what we call ‘the natural world’” (Dawes 2021, 1). On a first gloss, *scientia* “explains . . . by reference to a set of principles, which are derived from observations of the way the world regularly operates,” religion “by reference to what we may call ‘metapersons’” (Dawes 2021, 1). These initial definitions are precisified soon after, however. For *scientia* he presents the following:

A communal tradition of inquiry whose aim is to create a systematic account of the principles governing a set of regularly observable phenomena within the natural or human world. (Dawes 2021, 6)

And for religion:

A communal tradition of ritual action that seeks to make contact with a hidden realm of metapersons and powers and whose goal is to bring this-worldly and/or other-worldly benefits to the individuals or community in question. (Dawes 2021, 8)

These are both explicitly definitions (or attempts at definitions). They are important because Dawes then uses them to generate characterizations of the RSR (qua the religion–*scientia* relationship).

Dawes is quick to point out, however, that these definitions manifest differently depending on time and place. He considers four time periods that correlate roughly with different societal forms: ancient China (c. fifth century BCE to ninth century CE); medieval European and Muslim worlds; modernity (stretching from the early modern era to the present); and small-scale societies, seemingly whenever and wherever they exist. According to Dawes, ancient China had an integral cosmology interacting with a large-scale diffused religion (i.e., religion was an integral part of community life and other not-uniquely-religious social structures); medieval Europe and the Islamic Golden Age had natural philosophy mixed with institutionalized religion (wherein religious affiliation was not typically a matter of individual choice); in the modern period, “modern science” intermingles with “modern religion” (wherein religious affiliation is

seen as a matter of individual choice—it is “privatized”); and in small-scale societies, indigenous knowledge, or “ethnoscience,” presents alongside small-scale diffused religion (often “coextensive with some ‘natural’ grouping, such as that of the family or the tribe”) (Dawes 2021, 9). In addition to time, place, and social structure, Dawes makes a further qualification: the RSR is not monolithic but instead multifaceted, a fact that the other authors mentioned do not seem to recognize and that serves as the basis of a large-scale critique of much conceptual analysis in religion-and-science, as I discuss later in this article. For Dawes, there are four main “dimensions”: the cognitive (what is claimed), teleological (what is aimed at), organizational (what norms of behaviour exist), and epistemological (how knowledge is generated). Ultimately, Dawes argues that, given the ways in which religion and *scientia* have been defined, they must always find themselves in epistemological conflict.

Dawes’ argument is an exemplary application of conceptual analysis that avoids many of the issues I discuss in the following section.² It can thus serve as a kind of aspirational model towards which employers of conceptual analysis should aim, although as I show, it can still be improved in an important respect for use by scholars in public-facing work.

Having laid out several exemplars of the method of conceptual analysis in the religion-and-science literature, I now consider some of its critiques. In doing so, I aim to provide concrete recommendations for how to improve applications of conceptual analysis. So, while I will discuss its shortcomings—both those recognized by others and novel issues of my own—my aim is ultimately constructive: by outlining its shortcomings, I propose how conceptual analysis may be improved.

Some Problems with Conceptual Analysis and Its Use

The method of conceptual analysis has been widely critiqued in the religion-and-science literature. In this section, I bring together the various heads of the critical hydra and discuss their merits and drawbacks. While some critics of conceptual analysis claim that the method is hopelessly mired with difficulties and so ought to be abandoned, this is overstating the situation. That said, conceptual analysis in the style of most extant scholarship is surely in need of improvement, recommendations for which can be extracted from the critiques.

I start with a discussion of monolithism and Stenmark’s suggestions for a more nuanced, dynamic conceptual analytic approach to the RSR. I then look at anti-essentialist objections to conceptual analysis, which often call for a radical abandonment of the method. Finally, I propose my own critique and recommendations based on the need to consider the non-research-oriented sciences.

Monolithism

One issue often faced by conceptual analytic accounts is their focus on only a single aspect of religion and/or science (often both), treating them each as monolithic entities. Paul Tyson puts it this way:

It is typically assumed that this mode of philosophising can bring clarity and precision to the discussion and provide a neutral bridging language that facilitates conversation between [religion and science]. But for this very reason, the approach of some analytic philosophers has the potential to exacerbate the distortions inherent in the categories themselves, often reducing “religion” and “science” to their propositional contents or their approaches to knowledge, and thereby disembedding them from their real-life contexts. (Tyson 2022, 4)

Given that religion and science are dynamic, multifaceted institutions, monolithic treatments may fail to engage with reality—the conclusions reached are conclusions about scholarly constructs rather than real-world entities. Frazer and Plantinga both fall prey to this kind of critique.

So how to avoid monolithism? Stenmark 2004 suggests taking an explicitly multidimensional approach, recognizing that religion and science are far more than their epistemic content and methods. In particular, Stenmark recommends scholars consider four broad dimensions—the social, teleological, theoretical, and epistemic (though these are not meant to be exhaustive)—along various subdimensions (though he does not use that term).

The latter two dimensions constitute the focus of most scholarship: the propositions claimed and the methods employed, respectively. While Stenmark considers the theoretical dimension relatively flat, he unpacks a number of subdimensions contained in the epistemic—belief/theory formation, regulation, and/or reformation (Stenmark 2004, 52; these subdimensions also form the basis for Stenmark 2010). But even within the theoretical dimension, it seems scholars would be well-served by considering the different kinds of propositions contained within religious/scientific doctrine. One relevant distinction might be between general and particular claims. For instance, a biologist might claim that speciation occurs via random genetic mutation paired with natural selection (a general claim) and that seahorse and pipefish morphology diverged because of differential foraging behaviours³ (a specific claim). I suspect that characterizations of the RSR along theoretical lines might differ based on whether general or specific scientific claims are compared with general or specific religious claims. Perhaps conflict is more easily found between general claims from both fields. Another theoretical subdimension to explore would be the difference between claims found in official doctrine and the actual beliefs held by religious/scientific practitioners. Too often, conceptual

analytic approaches privilege the established doctrines found in elite sources—scriptures, textbooks, etc. (see Barrett 1999 for a discussion of this difference in the case of theology).⁴ But insofar as scholars would like to engage with religion/science-as-practiced, they would do well to look elsewhere, perhaps following leads in experimental philosophy of science, sociology of religion, and media studies.

Stenmark's social and teleological dimensions are less frequently encountered. The social dimension consists of the processes by which new members are enculturated, such as trust in authority and the diversity of practice on both individual and collective levels generated by non-epistemic factors (e.g., rejecting certain methods or theories on a moral basis). I return to a discussion of the social dimension later in this article. On the other hand, the teleological dimension involves the goals—individual or collective, practical or epistemic, held manifestly or latently—that scholars recognize for religion/science. Stenmark asks scholars to be explicit about our views, since “[t]he reason why [scholars] sometimes come to different conclusions and seem to be talking past each other is often that they are, in fact, committed to different accounts of the goals of religion and science, which are not clearly stated” (Stenmark 2004, 50). Further, Stenmark points out that many scholars fail to be explicit about whether they think these goals are static or change over time. Thus, while Frazer, Plantinga, and Dawes are all quite explicit about the goals of religion and science, they seem to be only implicitly committed to the diachronic stability of those goals.

While Stenmark recommends trying to embrace all the dimensions of religion and science at once, conceptual analyzers have another option to avoid monolithism: simply be very explicit about the single dimension analyzed. Smith 2019 is a clear example of this: “This book is about epistemology: the theory of knowledge. And the questions that this book seeks to answer are primarily about knowledge, not history” (Smith 2019, 1). Surely not all studies can cover all aspects of religion/science, for a host of good reasons. But scholars—and especially their readers—would be well-served being explicit about their focus to avoid being misleading. This can be difficult; scholars may often wish to discuss *The Religion-Science Relationship*, writ large with capitalization, and exploit one aspect/dimension to make a broader claim about the whole. But the point of this critique is that such generalizations are illicit—indeed the epistemic and theoretical dimensions are radically different from the social and teleological, and so generalizing about the RSR from the former is a classic fallacy of illicit concept change. Being clear and consistent about one's focus throughout one's work—whether by embracing many dimensions at once or not—is thus essential for fruitful applications of conceptual analysis. Dawes 2021, drawing inspiration from Stenmark, is an excellent example of the former.

Essentializing

A related but distinct critique of conceptual analysis is its tendency to over-essentialize the notions of religion and science. Advocates of different methods, especially historical methods, often bring up both weaker and stronger forms of this criticism. The former simply points out the difficulty of finding satisfactory definitions of religion and science that will unify our⁵ intuitions about the various cases they are supposed to cover, as seen in Brooke 1991 discussed previously. Perhaps one could generate relevant and useful definitions, but doing so would be incredibly difficult, and our time is better spent using other methods. Of course, the difficulty of a task is neither a sign that it should not be undertaken nor an indictment of the product produced, so this weaker version of the critique has no real bite.

The stronger anti-essentializing critique claims that conceptual analysis of religion and science—and deductions about the RSR on the basis of that analysis—is impossible. This critique features in one part of Geoffrey Cantor and Chris Kenny's attack on Barbour's fourfold typology and the use of the "copula" "religion *and* science":

[N]either science nor religion (nor the conjunction "science and religion") possesses clear historical continuity . . . in spite of the unbounded and fluid extensions of the categories, *science* and *religion*, many writers treat them as distinct classes with fixed, temporally independent, and self-evident meanings . . . We suggest that [historical episodes] cannot be analyzed in terms of the interactions between broad categories—for example, between science and religion—no matter how subtly we redefine the boundaries between them. (Cantor and Kenny 2001, 771–73)

The problem is stated even more explicitly by Stephen P. Weldon:

The greatest problem is that the very terms "science" and "religion" encourage an *essentialist* approach to history, an approach that tries to describe all events in the past in terms of the two modern categories of science and religion. Yet these terms are inadequate to describe the nature of the historical topics that are covered under that rubric because both terms refer to Western institutions and ideas that assumed their current form after 1800. (Weldon 2017, 3)⁶

Weldon's characterization of the issue indicates two separate strands of the essentialist critique: historicism and cultural relativism. Since religion and science are neither diachronically nor cross-culturally stable concepts, they cannot be usefully analyzed in a way that will allow broad claims to be made about the RSR that are representative across time periods and cultures. Instead,

these scholars argue, we must only proceed in a piecemeal fashion, discussing religion–science relations in particular time-places.

If taken seriously, this strong form of anti-essentializing poses a problem for conceptual analysis—not just within religion-and-science, but more generally. Religion and science are not unique in having varied ancestries; almost all concepts which we might subject to analysis have diverse, often tortured, pasts. This universality of the critique calls into question its applicability.

Consider, for example, the concept of race. Like science (and religion), race has been used in a variety of incompatible ways since its origins as a technical “anthropological/biological” term in the late seventeenth century (Smedley and Smedley 2005). The number of races, their geographic distribution, and the particular attributes said to constitute or follow from racial membership have all varied significantly both temporally and culturally. On this basis, the hardline anti-essentialist should dispute the cogency of discussions of race, let alone relations between different races—neither, say, “white” nor “black” refer to diachronically and/or transculturally stable groups.

Clearly, however, we cannot dispose of the concept of race. Scholars believe (for the most part) that race has no biological basis; it is rather a social construct. Like all social constructs, race can change, often quite significantly, based on the social groups that construct it. But its status as such does not mean that race is, in general, an empty concept. Race still has real-world effects. Witness differential healthcare treatment and policing experiences in the US. Even if race is not biologically real, it is still socially real (and very much so). Because of this, it is still quite meaningful to talk of race, and even the relationships between different races/racial groups.

So too with religion and science. Even if there are no meaningful diachronic or transcultural characterizations of the concepts, they still exist as entities in contemporary discourse that have actual impacts on real-world actors. Medicines are given to patients when they are backed by the label science; institutions receive money for doing or producing science; organizations get special tax treatment for being religious (at least in certain countries). If religion and science can have real influence in these ways, it is not clear how anti-essentialist critiques can do away with analyses of these concepts—or subsequent discussions of their relationship(s).

Some may balk at this kind of deflationary response. If religion and science are not stable concepts, is there anything at all in the world beyond mere use that such terms pick out? And if there are no referents, then how can we even have definitions, let alone derive relations on the basis of those definitions? Readers with these worries may be comforted by recent work in social ontology by Jason Ānanda Josephson Storm. Seeking a kind of middle ground between overblown essentialism and socially irresponsible deconstruction, Josephson Storm offers a new way of conceiving social kinds like race and religion

(Josephson Storm 2021). Race and religion, he argues, are best understood as process-power-clusters: they refer to clusters of powers (the ability to impact/change something), but what particular powers are always subject to change. Such changes are due to dynamic social forces—“anchoring processes”—that cause groups to settle on/select different powers as relevant at different times (Josephson-Storm 2021, 118–26). Understanding race and religion in this way allows their continued use as unified, existing concepts but is responsive to the fact that they are unstable. Their real relations with other social kinds—and real-world-effects—can still be referred to since they are “anchored” by real social forces. Thus, when speaking of the RSR, we can understand ourselves as referring to particular underlying social forces—e.g., the professionalizing of certain endeavors—which led contemporary discourse to conceive of religion/science as it does, a move that seems in line with Harrison 2015. That said, Josephson Storm’s “metamodernist” take on social kinds faces some issues—for instance, whether the anchoring mechanisms are themselves best understood as process-power-clusters and what might anchor those. However, it does provide a reasonable middle ground for productively thinking using social concepts. Of course, this account requires staying away from universal, global characterizations of the RSR—but that does not mean we cannot use conceptual analysis to arrive at our characterization.

This aligns with an issue with the strong version of the anti-essentialist critique that emerges from the relevance of race, religion, and science to ordinary folk today. While it might be true that these concepts cannot be analyzed in a way that reduces them to diachronically stable and still useful cores, that does not mean they cannot be analyzed at all, and in particular that they cannot be analyzed *now* (whether or not Josephson Storm’s account is accepted). In fact, historicists like Peter Harrison (see especially Harrison 2015 and the After Science and Religion project it started (Tyson 2022)) are still committed to there being concepts-at-a-time that are stable enough to compare diachronically. This more piecemeal approach still requires distinct pieces to examine. That is, Harrison must be comfortable isolating, say, 1800s science and 2000s science, for he must be comfortable claiming that they are not the same; analyzing either term is a precondition for determining their difference. So why can a conceptual analyzer not simply talk of 2000s science and its relation to 2000s religion? Similarly, for the cultural-relativizing branch of the critique, why not analyze Western religion/science? The anti-essentialist critique does not seem to pose a problem for this much more local discussion. It does, of course, limit the scope of any conclusions drawn about the RSR. But local discussions are useful nonetheless. In fact, to a large extent, local discussions are the most useful that could be had. Insofar as the authors discussed in this article are public facing, their goal is to talk to local audiences, folks who live in a particular time—the now—and place, for the authors, the anglophone West. Such authors presumably hope to

influence current opinions concerning the RSR to enact (or resist) real change in the ways people interact with religion/religious folk and science/scientists, be it as everyday lay individuals, as members of religions/scientific communities, or as policymakers. To that extent, limiting discussion to 2000s Western religion and 2000s Western science to make a claim about the 2000s Western RSR seems eminently reasonable. Those are the concepts with which people living in the 2000s in the global West are actually engaging.

The strong anti-essentialist critique should not force us to abandon conceptual analysis. Of course, recognizing the historical/cultural contingency of our concepts is important. A major lesson conceptual analyzers could learn is to explicitly localize their analyses and be clear about having done so, or at least be up-front about the limits of the analysis presented. It should be noted that this more piecemeal approach to the RSR is not giving up on the method of conceptual analysis. Limiting oneself to a particular time-place does not mean that one cannot start with definitions of religion and science and derive the RSR logically from those definitions. It simply means that the concepts examined are more confined, more specific. Moving from universal, general conclusions about the RSR to more piecemeal ones is not abandoning the conceptual analytic method. It is simply changing the kind of conclusion made. But even if it were the case that some claim could be made about how religion and science have been related, on average, since the beginning of time throughout the world (which is doubtful), a further argument would be needed that this was relevant to the RSR as it is here-now, i.e., that current concepts are not unique. But, as far as I can tell, no such further argument has been offered. Again, none of this rules out a discussion of the contemporary RSR based on contemporary conceptions of religion and science. We ought not essentialize overmuch, but we *can* still talk—and usefully at that—about concepts and their relations at a particular time-place.

Whose Science, Whose Religion?

While the aforementioned critiques focused on internal features of religion and science, this section considers external features; that is, the ways in which religion and science interact as a result of their being institutions embedded in broader sociocultural contexts. In particular, I argue that conceptual analyses of the RSR need to recognize the multiple different conceptions of religion/science operating within the same time-place. A pithy way of putting this is that scholars ought to pay greater attention to just whose religion and whose science is being analyzed.

Calls under this exact heading have been sounded by scholars within the literature (e.g., Brooke and Cantor 2000). But they do not consider the fact that just what religion/science is depends on who one asks within the historico-cultural frame. Surely, the lay Buddhist conceives of Buddhism differently than the theologian (an expert–lay distinction), just as the industrial chemist may conceive

of science differently from her research-university peer (a research-oriented-or-not distinction). Insofar as scholars of religion-and-science want to discuss the RSR as an object of real public concern, they will need to pay attention to these different conceptions as they play out in the public sphere. In this section, I consider three distinctions among conceptions of religion/science related to external factors shaping them that conceptual analysis should take seriously.

First, scholars should pay more attention to the fact that religion and science are mutually interacting social institutions—what we might call an external social dimension (akin to Josephson Storm’s anchoring mechanisms) in contrast to Stenmark’s internal ones. I mean this not only in the Harrison-esque sense of understanding how religion and science have co-constructed one another—and continue to (Harrison 2015)—but in a much more everyday sense. When a young adult enters the wider world, they must decide what to do with their life. Many forces compete for their time, and though perhaps religion and science are never in zero-sum competition, their mere separation does pose an allocation problem. Should one get a PhD or go to seminary? Should they go on a mission or take up the post-doc? Scientific jobs can be temporally demanding in ways essential to the scientific process, but not clearly in opposition to religious practice. Consider a biologist who must care for her cells every day, including on Saturdays. Such a career is closed to conservative Orthodox Jews and Seventh Day Adventists. Yet, it is hard to accept that this state of affairs points to any hard incompatibility between religion and science, or even between some particular religion and some particular science. But still, it must be recognized that individual cases like these do contribute to a larger impression of a tension between religious and scientific commitments. This tension results simply from the fact that religion and science are not the same social institutions. Other professions pose these same resource-management problems—as do familial obligations—and so the potential tension between religion and science perceived by ordinary folk may not stem from anything specific to religion/science qua religion/science themselves. When discussing the RSR, especially in public contexts, conceptual analysis should take these non-epistemic aspects of religion and science more seriously.

Second—but intimately related—conceptual analysis should track the expert–non expert (or elite–non-elite) distinction. Most conceptual analyses—including all those cited in this article—focus on elite, scholarly notions of religion and science: the Creeds developed by theologians, the ideas thought up by philosophers, etc. This need not be problematic if the intent is to discuss the relationship between elite/expert religion and elite/expert science. But very often scholars wish to engage in larger projects relevant to non-theologians and non-scientists; in those cases, more attention must be paid to non-elite/non-expert conceptions. The sociologist John Evans has demonstrated one way this might be done, illustrating how sociological data indicates that

everyday American conservative Evangelicals' opposition to science is in fact limited to particular claims and determined by morals not knowledge (Evans 2018).⁷ Conceptual analyses that start with the actual views of the publics with which they wish to engage may thus come to surprising conclusions.

Sometimes, of course, scholars do pay attention to more everyday conceptions. However, it is often done asymmetrically, in that scientists—experts—are used as the exemplars for the science side, while everyday religious folk—non-experts—are taken as the representatives for the religion side. Thus, for instance, Richard Dawkins famously refuses to consider the works of theologians, “engaging” only with popular conceptions of Christianity and Islam (see, e.g., McGrath 2005, 83, 99).

But there are in fact four possible general relationships when discussing the RSR: elite–elite, elite–quotidian, quotidian–elite, and quotidian–quotidian—though of course the distinction between elite and quotidian is not absolute but a spectrum.⁸ Much academic discussion focuses on either the elite–elite or quotidian–elite forms of the RSR. Often, those who believe that there is tension between religion and science (e.g., Dawkins) or that the two are entirely separate/non-interacting (e.g., Gould) focus on the quotidian–elite relationship. By contrast, the elite–elite relationship tends to feature in apologetic works in which scholars try to demonstrate the compatibility of their religion with science writ large or some particular sciences (e.g., Plantinga). The elite–quotidian and quotidian–quotidian relationships are almost never discussed—though there are no in-principal reasons not to. Further, as just mentioned, exploring these areas of the conceptual matrix would help scholars produce work that speaks more directly to the experiences of the publics they so often wish to reach. Being explicit about the particular conceptions analyzed may clarify exactly what is at stake in discussions of the RSR and so help scholars avoid talking past one another.

Third and finally, conceptual analyses would do well to consider what might be called the non-research-oriented, or non-theory-oriented, sciences. Scholars of science—whether in religion-and-science or not—almost always assume that (a particular) science is a theoretical enterprise, one focused on the production of knowledge, often in the form of theories or deductions from theories. But—and this is important—the vast majority of people classed as scientists do not engage in this kind of practice. According to the May 2022 Occupational Employment and Wage Statistics survey of the US Bureau of Labor Statistics (published in 2023), there are about 1.3 million individuals with “life, physical, and social science occupations” in the US. Of these, only about 24% are found in research-oriented industries (or about 305,910 individuals, combining those who work in “scientific research and development services” and “colleges, universities, and professional schools”—assuming (problematically) that those in the latter do research (Bureau of Labor Statistics 2023)). The remaining 76% majority do not engage in research-oriented science. Instead, the vast majority of people

identified, at least by the Bureau of Labor Statistics, as scientists are engaged in other endeavors: sequencing genomes for ancestry tests, doing routine analyses of commercial products, assessing the soil composition of fields, etc. In none of these cases is the goal theory production, nor is the work of these scientists easily classified as something like Kuhnian normal science, for theory does not even play a controlling role: they are not solving puzzles framed by some paradigm.

But scholars across the board ignore these kinds of science. This is especially the case among those who employ conceptual analyses of science, like philosophers. One might point out rather trivially that philosophers of science are interested in basic metaphysical and epistemological questions—what is out there and how we know about it—and so are predisposed to theory-oriented science. It may also be relevant that, embedded as they are within academic spaces, philosophers do not have as ready access to non-research science. On the historical side, there is also the fact that much analytic philosophy of science had its origins in reactions to the physics of the early twentieth century, a historical accident that has resulted in almost all subsequent philosophical models of science taking theoretical physics as the base model for all other forms of inquiry. But these are not reasons to neglect the non-research-, non-theory-oriented sciences. After all, if we wish our accounts of science to be accurate, then we should accommodate all science—not just the 24% minority with which we are familiar.

Furthermore, insofar as contributors to the religion-and-science literature wish to engage with the RSR as an object of public, not just scholarly concern, they should heed the fact that it is much more likely for individuals to encounter non-research-oriented science/scientists. As such, their quotidian conception of science is likely to be shaped by those encounters. This is not to say that research-oriented science is not a part of the public conception of science; any perusal of the streaming service of your choice will demonstrate it is. But even looking to popular movies shows that public conceptions of science often go far beyond the laboratory, as in the *Jurassic Park* series and *The Martian* (2015), wherein the titular character declares he will “science the shit out of this”—by which he means applying principles from chemistry and botany to produce water and grow potatoes—a far cry from traditional philosophical accounts of science as falsifiable claims or paradigm-building puzzle solving.

So how to incorporate these other sciences into conceptual analyses? One way would be to treat the two kinds of science—research-oriented and non-research-oriented—separately and be very clear about which is being talked about. This could then be an additional index scholars add to their conclusions, joining the temporal and cultural (and possibly dimensional) indices discussed previously. Treating research-oriented and non-research-oriented science separately could reveal some interesting facets of a more general RSR, especially if the different forms of science relate differently to religion. Of course, if bifurcating the conception of science is too messy, scholars could instead try

to develop more general accounts of science that encompass both research-oriented and non-research-oriented forms. This more general approach may be more in line with public conceptions of science, since I doubt that everyday individuals work with a divided conception of science (though this is open to empirical verification). Therefore, conclusions about the RSR based on a combined notion may be more relevant to more audiences.

Regardless of how it is done, conceptual analysis has much to gain in taking the non-research, non-theory-oriented sciences into account. Not only will such analysis thus work with conceptions of science that better match reality, but it will also more likely better reflect public conceptions of science and thus vastly enrich the existing literature.

The Relevancy of Conceptual Analysis

In previous work, I claimed that certain methods are likely more or less relevant to different audiences/publics based on the latter's values and reasons for caring about the RSR (Chin 2023). So, what publics might find conceptual analysis—when suitably reformed, as discussed—useful? Here, I briefly consider three public contexts where conceptual analysis is likely useful: apologetics, funding/hiring of religious/scientific professionals, and certain legal contexts.

Apologetists—be they religious or non/anti-religious—are likely primed to find conceptual analysis useful. After all, showing a fundamental compatibility between religion and science along some particular dimension(s) is an especially powerful way of convincing possible skeptics that religion and its practitioners ought not be dismissed outright on the basis of the RSR. This is the case for those advocating very general religious toleration (e.g., the US-based National Academies of Sciences Engineering, and Medicine 2023) as well as in those cases where the apologist is embedded within a particular tradition. By the same token, conceptual analysis is also useful for religious anti-apologists (or apologists for non-religion), as seen in some humanist literature (e.g., Hall and Hall 1986). One other place conceptual analysis might be especially useful is in what might be termed “redemptive” contexts, wherein the apologist feels compelled to defend the credibility of their religion in a largely hostile environment—as is often the case with religious minorities. Indeed, historically, this strategy has been employed by Christian missionaries in new colonial encounters (Stenhouse 2019) and by East Asian Buddhists against such missionaries in slightly later colonial contexts (Lopez 2011).

Perhaps more controversially, funding and hiring committees may find conceptual analysis useful when determining which projects/scholars to back. For instance, a grant committee deciding among many applicants might think it relevant if a certain religious tradition is fundamentally incompatible with the particular science being done. Likewise, a religious organization seeking to hire

an advocate could reasonably think it important to know if an individual trained in a particular science is thus primed to be in tension with the organization's beliefs and/or practices. Put more concretely, committees might worry whether, say, a team of Hare Krishnas should be given funding for their early cosmology project or if an epidemiologist is well-suited to be elected to the year's Christian Science Board of Lectureship. In this context, taking the non-research-oriented science seriously might be especially relevant. For even if an epidemiologist is not well-suited as a Christian Science lecturer by virtue of their training, perhaps a cosmetic chemist would be—if there is conflict, say, only with the research-oriented sciences. In these more practical cases, conceptual analyses, regardless of the resultant analysis of the RSR, might be an appealing resource.

One might expect that the clearest place conceptual analysis could be relevant is in the courts. After all, conceptual clarity is especially relevant in the legal arena, where the nuances of definitions often determine outcomes. Indeed, perhaps the most obvious cases of public religion–science interaction have taken place in the courthouse, e.g., in the famous US trials focused on evolution in public schools. But the way conceptual analysis of the RSR—at least as discussed in this article—enters into the judicial context is not obvious, for most court cases concerning religion and science are not typically about the RSR. Instead, they are about particular theories or books and whether these count as scientific or religious. It is true that courts deal in general with conceptual analysis: they must define religion and define science. But the courts do not then, on the basis of those definitions, derive general characterizations of the RSR, nor do they take interest in such characterizations. Instead, they focus on classifying particular other objects (theories, books, practices) as religion/religious or science/scientific and, to put it roughly, plugging them into the law: if it is religion/religious, it cannot be in the (science) classroom; if it is science/scientific, it can be. Thus, when Michael Ruse acted as an expert in *McLean v. Arkansas* (1981), his conclusion to Judge Overton was not “[t] herefore religion and science are entirely separate endeavors,” but rather “[b]y every mark of what constitutes science, creation-science fails” (Ruse 1982). In this sense, conceptual analysis as discussed in this article is not actually relevant to these rather famous judicial contexts.

Where conceptual analysis of the RSR does enter the legal sphere is where that context overlaps with the apologetic context. It is at least conceivable that an apologist could try to leverage a conceptual analytic characterization of the RSR to demonstrate that their religion is a science and therefore should be afforded a place in the science classroom. Notice how this differs from the argumentative strategy employed by Ruse: the apologist's argument does make reference to the RSR—it is an equivalency relation. In most legal cases, however, the relationship is sidestepped; the arguments occur in the context of an unargued assumption that religion (in particular or in general) and science are

not identical. But, again, for apologists at work in the legal arena, the method of conceptual analysis—especially focused on particular religious traditions—may be a useful tool.

Conclusion

In this article, I have offered a general critique of the method of conceptual analysis as used to characterize the RSR. The method begins by defining religion and science and then, on the basis of those definitions alone, derives the RSR. After reviewing some examples of the method in the literature, I discussed three general issues the method faces: it tends to embrace monolithic conceptions of religion, science, and the RSR; it often over-essentializes the concepts; and it fails to pay attention to the different notions of religion/science often at work in the same socio-historical setting. Despite these issues, conceptual analysis of the RSR should not be abandoned. By addressing these shortcomings, taking care to recognize the multidimensionality of religion/science, being clear about the time-place of the discussions, and acknowledging and incorporating non-elite conceptions of religion/science, scholars can more fruitfully employ the method of conceptual analysis. After all, as I argued in the final part of this article, conceptual analysis may be especially relevant to a variety of publics. As with so many things, the key is reform, not rejection.

Notes

- ¹ Frazer himself calls it a definition, although he cautiously acknowledges that “[t]here is probably no subject in the world about which opinions differ so much as the nature of religion, and to frame a definition of it which would satisfy everyone must obviously be impossible. All that a writer can do is, first, to say clearly what he means by religion, and afterwards to employ the word consistently in that sense throughout his work” (Frazer 1922).
- ² This is in part because Dawes’s “multifaceted” approach is highly influenced by Mikael Stenmark’s “multi-dimensional” approach (as Dawes himself notes; Dawes 2021, 4), discussed later in this article.
- ³ Thanks to Jaehyun Lee for this example.
- ⁴ Thanks to an anonymous referee for this reference.
- ⁵ That is, those who investigate the RSR.
- ⁶ See also Harrison and Milbank 2022 for a very recent development of this view.
- ⁷ This is not to say that Evans employs conceptual analysis. He does not and in fact argues that extant conceptual analyses fail to capture reality.
- ⁸ What matters is that there is not just one religion or science concept at play in the wide religion-and-science discourse that encompasses university-entrenched academics, temple-tied religionists, and ordinary members of society. Dividing the concepts into general classes of “elite” and “quotidian” is certainly a simplifying device but is nonetheless useful for highlighting the quite different conceptions at play.

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An Inconvenient Truth: What the Bible Says About God's Way with the Animals

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At first sight, the philosophical concept of a God characterized by omnipotence, omniscience, and benevolence is incompatible with a creation in which animals suffer. One possible way out of this is to assume that different moral standards apply to God than to humans. Whether this really offers a solution is the subject of much debate in which one's ideas about God's character determine one's position. The grounds on which the authors participating in this discussion determine their thoughts about the character of God are rarely made explicit. In this article, I discuss what the Bible says about God's way with the animals and what it could mean for human ideas about God's moral character. Do the same moral principles apply to God as to humans, or are they different? The answer to this question appears to depend on the status assigned to animals.



Introduction

Many people today are convinced that all the evil and suffering in nature, including the vast amount of suffering and death that occur in the animal world—proverbially summed up as “nature red in tooth and claw” (Tennyson 1850)—is incompatible with the belief in a benevolent God who takes care of all living beings.

This view has been contradicted by theologians, philosophers, and other scholars who have argued that the suffering of animals does not threaten belief in the existence of God, not only after Darwin published his theory of evolution but long before (Slootweg 2022). In this discussion, the emphasis is on justifying God by condoning animal suffering as less intense than it initially appears (Aguti 2017), by assuming it serves a higher purpose (Rolston 2018), by viewing it as a temporary evil for which victims will receive compensation on the renewed earth (Sollereder 2019, 156–82), by believing it is the effect of evil counterforces thwarting God’s purposes and intentions (Lloyd 2018, 262–79), or by supposing that God could not have created the present world in any other way (Attfield 2000; see also Schneider 2020; Southgate 2023 for critical analysis of the different views).

In this debate, the belief that God intends the best for everything and everyone and takes special pity on the weak and vulnerable is seldom doubted. Only a few dare to assume that different moral standards apply to God than to humans (Geach 1977, 67–83; Maller 2009; Gasser 2021, 2022), an assumption that generally evokes objections (Ferré 1986; Cordeiro-Rodrigues 2022), where terms such as “blasphemous” or “libelous” are not shunned (Dougherty 2014, 17n). Apparently, the belief that divine and human moral principles should be the same (Cordeiro-Rodrigues 2022, 5–8) is so engrained that it is illicit to doubt.

However, the fact that a view is considered beyond doubt does not mean that such a view is right. To gain clarity on this point, it is not a matter of exchanging arguments or judgments but of thinking about how God can be known (Southgate 2018a). The church has traditionally confessed that there are two sources for this: nature and scripture (Tanzella-Nitti 2005; *Belgic Confession*, Article 2). It is evident that, thus far, the revelation of God through nature—through divine attributes like goodness and love—has not led to agreement on the moral character of God. The purpose of this article is to investigate whether an examination of what the Bible reveals about God provides more clarity.

Little research has been done in this area. Most authors who pay attention to the role of animals in the Bible discuss God’s care for creation in general terms, focusing on the guidelines God gives about how animals should be treated or referring to the moral lessons animals provide (Preece and Fraser 2000; Bauckham 2012, 1–13; Gilmour 2014, 26–55; Van den Brink 2020, 101–6). How God deals with animals is rarely discussed apart from a few exceptions (Clough 2012, 31–43), hence the need to examine in more detail what the Bible

says about the relationship between God and non-human animals. Does the description of God's way with animals revealed in the Bible indeed support the view that God wants to protect all creatures from evil, thereby taking special care of the weak and vulnerable?

To answer this question, I have examined what the Bible says about God's dealings with animals. The danger of such studies is a biased selection of biblical texts and a neglect of their contexts; historical, prophetic, and poetic texts each deserve their own interpretation tailored to their character. Awareness of these pitfalls will help to avoid them and, moreover, my research was exploratory without the aim of finding biblical arguments to reject or confirm a preconceived hypothesis, which also reduces the risk of selective Bible reading. The so-called divine-human-animal triad proposed by Gilmour (2014, 38–40) proved a useful aid in the interpretation of the texts. This triadic pattern is helpful to assess how divine, human, and animal characters interact with each other in a particular text, what message the author intends to convey, and how the animals contribute to the impact of that message. For the purpose of my study, the role of humans in this triad was primarily passive—sinner, spectator, beneficiary, or victim—as my goal was to explore what the Bible says about God's interactions with animals. Because of this focus on God's way with the animals apart from active human participation, I did not address the guidelines the Bible gives on how to treat the animals and the significance of animals as a sacrifice in the cult of Old Testament Israel. The same applies to texts in which the animals are presented as a metaphor for humans. An example of this is the often-debated text in Deuteronomy 25:4 in which God forbids the muzzling of a threshing ox, a text the apostle Paul applies to people in 1 Corinthians 9:9–10 (Gilmour 2014, 28–36). Such texts are not included, because God focuses on people rather than animals as well as because it is uncertain whether the animals are only used as metaphors.

Animals in the Bible

The poetic texts—the Book of Job and the Psalms—that deal with God's relationship with animals emphasize that animals are the objects of a continuing providential care. All animals expect their food from their Maker, and their dependence on God's sustaining care is shown by their returning to the dust from which they were taken when God takes their breath away (Psalm 104:27–29; Psalm 145:15–16; Psalm 147:9). The poetic texts also provide grounds for the belief that God is glorified through animals. The beasts of the wild, the cattle of the field, everything that creeps and takes wing are urged to praise the Lord (Bauckham 2012, 147–62). Natural phenomena such as hail and snow are also included (Psalm 148:7–10). The destructive power of those natural phenomena does not detract from the fact that they glorify God; in the violence of the storm, God's majesty is acknowledged (Psalm 29:8–9). In return, God

takes pleasure in what is created; the fire-breathing Leviathan (Job 41:18–21) is God's plaything (Psalm 104:26).

The exaltation of God as Creator, to which the poetic texts testify, should move humans to humility. Can we hunt prey for the lion and satisfy the hunger of the cubs? The answer is given with the question: we cannot, any more than we are capable of supplying the raven with the food its young call for (Job 39:1–3; Psalm 147:9). The falcon that spreads its wings and the eagle that builds its nest high in the mountains are living proofs of God's power and wisdom far beyond human comprehension (Job 39:29–33). That this should bring us to praise and worship is underlined by the poet of Psalm 104. The fact that young lions roar and ask God for food is not a reason to ask God why such beasts of prey were created but a reason to offer praise through our songs (Psalm 104:21, 33).

The prophetic texts also show that God made animals to honor their Creator: "The wild animals will honor me, the jackals and the ostriches" (Isaiah 43:20 NRSV). The choice of jackal and ostrich is striking. Of the ostrich, it is said that God has "made it forget wisdom and given it no share in understanding" (Job 39:17 NRSV); it is a bad place for humans where jackals dwell (Isaiah 13:21–22, 34:11–15, 35:7). They are not the first animals that come to mind when looking for examples to support the belief that creation glorifies its maker. Yet they are assigned this role.

When reading the writings of the prophets carefully, we also encounter other messages. God not only uses animals as examples for humans when it comes to praise and trust but also uses them to admonish, punish, and chastise us when we go astray. The prophets repeatedly emphasize that God may use animals to punish the Israelites either by destroying the harvest—successive swarms of locusts will leave a stripped land (Joel 1:4)—or giving the area they inhabit to the wild animals. Texts that mention the latter in particular can be found from the prophet Isaiah, who writes of regions in which hyenas, jackals, ostriches, and snakes dwell (Isaiah 13:21–22, 18:6, 34:11–15). The prophet Ezekiel conveys a similar message when he speaks of a land through which no one passes because of the wild beasts (Ezekiel 14:15). The other side of this is the absence of wild animals as a sign of God's favor. In Exodus, God promises Israel that he will drive out the inhabitants of Canaan gradually rather than all at once, otherwise the wild animals would take control of the depopulated land (Exodus 23:29; Deuteronomy 7:22). But when Israel turns away from its God, its land becomes inhabited by wild beasts.

The prophetic texts not only speak about animals as executors of divine punishment but also describe how animals suffer when people ignore divinely ordered laws. Because of Israel's transgressions, the beasts of the field, the birds of the air, and even the fish in the sea perish (Hosea 4:3). It is not only the wild animals that suffer but also the tame ones. The cattle wander because they have nowhere to graze, and the sheep and goats are also punished (Joel

1:18–20). That animals suffer because of their owners—in this, case not the Israelites but their enemies—is also found in the prophet Zechariah (14:12, 15 NRSV): “This shall be the plague with which the Lord will strike all the peoples who wage war against Jerusalem: their flesh shall rot while they are still on their feet, their eyes shall rot in their sockets, and their tongues shall rot in their mouths;” “And a plague like this plague shall fall on the horses, the mules, the camels, the donkeys, and whatever animals may be in those camps.”

The linkage of the fates of humans and animals is also repeatedly mentioned by the prophets when they warn the Israelites not to stray from the right path. Jeremiah foretells that God will pour out anger and wrath on humans and animals alike (7:20) and that God will cause both humans and beasts to die of a great pestilence (21:6); Ezekiel speaks of the extermination of both by a famine (14:13–21). That God strikes humans and beasts in the same way not only applies to Israel but also to the surrounding nations. When the wrath of the Lord strikes these nations, his sword “is sated with blood; it is gorged with fat, with the blood of lambs and goats, with the fat of the kidneys of rams” (Isaiah 34:6 NRSV). On the other hand, the linkage of the fates of humans and animals also appears from the fact that God wants to be merciful to both as is witnessed by the admonition that Jonah receives when he complains about the withering of the tree that protected him from the striking sun (Isaiah 4:11).

Animals also play a role in the historical texts. On his journey to the king of Moab, the soothsayer Balaam is confronted by an unwilling donkey (Numbers 22:23–33; 2 Peter 2:16). A lion kills the prophet from Judah who, contrary to God’s clear and explicit command, did not return immediately after completing his task but complied with the request of his brother in office from Bethel to have something to eat and drink at his home (1 Kings 13:11–32). In another example, two bears tear apart forty-two children as punishment for their mockery of Elisha (2 Kings 2:23–24).

Furthermore, animals are discussed extensively in the historical record of the plagues that struck Egypt prior to the exodus of Jacob’s descendants. These plagues affect not only the pharaoh and his subjects but also the animals (Exodus 7–12). The first plague takes the lives of countless fish, and the second plague ends with so many dead frogs that the land stinks. In the third plague, humans and animals suffer because of gnats. The flies in the fourth plague seem to affect only the Egyptians, but in the plague that follows, a pestilence claims the lives of “horses, donkeys, camels, the herds and the flocks” (Exodus 9:3 NRSV). The sixth plague, boils, and the seventh, hail, again strike both humans and animals. The eighth plague takes the lives of countless locusts, which God destroys from the Earth by throwing them into the sea after they have devoured everything, and the tenth plague affects not only all the firstborn among the people, but also those of cattle. In this series of plagues, God kills animals after first using them as instruments of punishment—frogs, locusts—or

make animals suffer to punish humans: fish die, animals suffer from gnats, a contagious disease takes the lives of many animals, hail strikes humans and beasts, and all the firstborn of the cattle die.

In the events prior to Israel's deliverance from slavery in Egypt, God uses the animals to punish people for their disobedience, and the animals suffer because of a sinful people. Examples of the latter can also be found elsewhere in the historical Old Testament texts. God orders the stoning to death of Achan with all that belonged to him—including "oxen, donkeys, and sheep" (Joshua 7:24 NRSV)—because he took of the spoils of Jericho against the divine commandment and commands King Saul's to destroy Amalek, including "ox and sheep, camel and donkey" (1 Samuel 15:3 NRSV).

There are also historical texts that suggest that animals have their own responsibility towards God independent from humanity. In Genesis 6:12–13, God complains that all flesh has a corrupt way of life and has filled the earth with violence. If "all flesh" includes the animal world in addition to corrupt humanity, the conclusion is obvious that God also considers the animals guilty; therefore, it is not unjust that God also punishes them with the flood. Elsewhere are allusions to punishable animal behavior. In Genesis 9:5, God states that retribution will be exacted from the animals for the lives of humans, and in Exodus 21:28–32, an ox that mortally wounds a human being must be stoned. In the legislation at Sinai, God warns Moses that both people and animals who dare to climb or even touch the mountain should be killed (Exodus 19:12–13).

In the New Testament, passages that concern animals are scarce. Jesus mentions them not so much because of their inherent value but mainly to illustrate God's care for us humans. If God takes care of the birds and does not forget the sparrows, will God not also provide us, who are far above those sparrows in value, with everything we need (Matthew 6:26; Matthew 10:29–31; Luke 12:6–7)? Animals also become victims in the battle between Jesus and the demons. The healing of a man possessed by evil spirits results in the death of 2,000 pigs (Matthew 8:28–32; Mark 5:1–16; Luke 8:26–33). God's ways with animals are manifold.

Evaluation

When the biblical passages that tell about God's way with animals are considered, it is clear that they are objects of God's providential care and contribute to God's glory; the Book of Job and the Psalms bear witness to this. Animals have their own relationship with God in which humans play no role (Page 1996). But it also appears that this providential care does not imply that God protects every creature against a violent death. The Bible says that God sustains all that lives, but it also says that young lions roar for prey—that is, other animals—and demand their food from God. God's care for one animal requires the life of another. The sustenance of the creation does not mean that each individual

creature is protected from suffering. Jesus mentions sparrows but mainly to emphasize that nothing escapes God's notice and to illustrate God's concern for mankind; if God cares for sparrows, how much more must he care for us? And whoever wants to take the care for birds mentioned in the Sermon on the Mount as proof of God's goodness must also recognize that such care takes the lives of uncountable numbers of insects.

The observation that animals kill each other does not conflict with the image of God revealed in the Bible. On the contrary, that is how God created them.¹ Scripture provides no basis for the supposition that death and violence in the animal world do not fit the image of God. One can argue that allowing animals to suffer is contrary to the image of God, but such a statement ignores what the Bible mentions about God's dealings with animals, a view shared by several contemporary authors (Snoke 2004; Blocher 2009; Edgar 2014).

Nor can it be maintained that, contrary to popular belief, scripture supports the view that God's dealings with animals are characterized by a preference for those that are weak and vulnerable. This is not to say that God does not take pity on the weak and vulnerable, but the texts often referred to in this context are not about animals but people. That this is not generally recognized is evidenced by a recently published survey of biblical texts compiled by Rik Peels, in which all the passages quoted to support the belief that the Bible teaches a preference by God for the weak and vulnerable are about people, not animals (Peels 2018, 550–51). What applies to God's dealings with humans does not automatically apply to God's dealings with animals. A fallacy of composition is lurking here; properties of one part of creation—humanity—should not be attributed to creation in its entirety.

It cannot be denied that the Bible speaks of God's care for animals, nor can it be denied that this care does not guarantee a paradisiacal life for each of them individually. Rather, the Bible texts enumerated in this article demonstrate that God does not hesitate to make animals suffer if God deems it necessary for the wellbeing of inhabitants of the Promised Land; in the historical and prophetic texts, God uses animals to keep the nation of Israel on the right path, something that often did not benefit the animals themselves.

Nowadays, humans think differently; we have come to see animals as creatures of God whose value is not derived from their use to us (Clough 2012, 6–15, 22–25). However, the question is whether this changed view on the status of the animal does justice to what the Bible says about this. After all, the scriptures give countless examples of situations in which animals suffer and die when God uses them to punish or correct humans going astray. Apparently, God's care for humans outweighs God's care for animals. It is Jesus's own words that humans are worth more than sparrows and sheep. Such a view explains why in the past, people had no trouble with the view that God created animals for our benefit: "God also sustains and governs them all, according to his eternal

providence and by his infinite power, that they may serve humanity, in order that humanity may serve God” (*Belgic Confession*, Article 12).

To current human understanding, it is unjust for God to make animals suffer or take their lives because of the sins of the people, but the Bible has no such scruples as can be inferred from the texts mentioned previously. When cities of enemies are conquered, God sometimes expressly commands that both the humans and animals be exterminated, and when drought afflicts the land of Canaan because of the idolatry of its inhabitants, the cattle also suffer. The animals share in the punishment that befalls Israel.

From this biblical data, it must be concluded that the way God deals with animals does not conform to current human ideas of justice; according to the Bible, the interests of humans are apparently more important than those of animals. God not only uses animals for our physical wellbeing but also to keep us on the right path. Animal suffering is not, as in the thoughts of Hick ([1966] 1968, 345–53), Swinburne (1998, 189–92, 217–19), and Corey (2000, 151–66), to enable us to grow in virtues that we would not develop without confrontation with that suffering but rather to teach us to let go of our vices.

The idea that humans occupy a special position in creation is not popular in our time (Clough 2012, 35–43). This is not surprising, as this view has contributed to the unlimited exploitation of creation from which humanity reaps the bitter fruits today (McKibben 1990). On the other hand, it cannot be ignored that the biblical data is more in favor of humanity having a special position than against it. That we abuse this position is no reason to deny this truth unless we throw the proverbial baby out with the bath water. That the Bible shows animals and humans as equal objects of God’s providential care and equally caught up in manifestations of God’s wrath does not imply that the Bible assigns them equal value: “Look at the birds of the air ... Are you not of more value than they?” (Matthew 6:26 NRSV, see also Matthew 10:29–31; Luke 12:7; Luke 12:24). People and animals have a lot in common, but God nevertheless values the lives of people more than those of animals (cf. Clough 2012, 75).

Human interests exceed those of animals, and that justifies why they suffer; it serves a purpose that can be deduced from the aforementioned Bible passages. The physical and spiritual wellbeing of humans is so dear to God’s heart that when it comes to people and their salvation, God does not spare the non-human animals. To do justice to the biblical data about God’s dealings with animals, it must be recognized that God cares for the creation, but not always in a gentle way; animals compete for food and prey upon each other. That is how they are made, a conclusion that goes all the way back to the early days of Christianity. Already at that time, Church Father Augustine (1966, 17–19) and many other theologians from the early Church were convinced that animals were not created to show divine benevolence or righteousness but rather divine

power and majesty (Slootweg 2022, 30–52); the confessions from the time of the Reformation convey the same message (*Belgic Confession*, Article 2; *Westminster Confession of Faith*, IV.1). Animals have their own role in this theatre, and that is not always to their advantage. A telling example of this is the course of events surrounding the plagues prior to the departure of the people of Israel from Egypt. The pharaoh's stubbornness cost the lives of countless animals.

Philosophers may argue that God should prevent all evil unless there are good reasons to allow it (Murray [2008] 2011, 11–19), but the Bible offers no grounds for that demand, an inconvenient truth that may be hard to swallow. God disposes of the animals as God deems appropriate, a privilege not granted to humans in our use of animals. The Reformer John Calvin was deeply aware of this. In a sermon on Genesis 7 in which he addresses the question of why animals also had to perish in the flood, he puts it clearly: "It would be greatly presumptuous of us to raise our voice against God for perpetrating such harsh rigor on the animals, for everything is in His hands ... For who are we to judge and condemn him" (Calvin 2009a). This reluctance to criticize God also comes up in his sermon on Genesis 9, in which dealing with animals that kill people is addressed: "[I]f we find it strange that He punishes the animals, which are not guilty in our way of thinking, let us realize that it is not our role to oversee His judgments, which surpass all human understanding" (Calvin 2009b).

The picture that emerges from the biblical data indicates that God does not conform to human moral principles unless it is assumed that God places human interests above those of the animals. If God values non-human animals equally to humans, then God is not dealing with the animals according to human moral principles, as in that case the benefit humans derive from the suffering God inflicts on animals falls short of God's justice. On the other hand, if the biblical message that human interests prevail is accepted, God has the right to use animals to promote human wellbeing without violating common moral principles, because in that case, a greater good—human wellbeing—justifies the lesser evil of animal suffering.

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Note

- ¹ In this I differ from Neil Messer, who argues that the way animals interact with each other today is not the way God originally intended. For him, the goodness of creation mentioned in Genesis 1 should be understood as a situation of “plenty and peace” without any violence (Messer 2009, 141), similar to the situation described in Isaiah 11:6–8 and 65:25 (Messer 2009, 148). Both assumptions are questionable. It is generally accepted that the goodness of creation should be interpreted as fit for the purpose God intended (Collins 2006, 69–70; Southgate 2018b, 918); to what extent the future peaceful coexistence of wolf and lamb and lion and goat prophesied by Isaiah represents the restoration of a lost prehistoric golden age is also disputable, if only in view of the varying interpretations given to these prophecies—symbolic or literal (Van Ee 2018; Garvey 2019, 49–51).

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The Ambitions of Wizards and the Warnings of Prophets: Religious Guidance on Climate Change?

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Secular wizardry and secular prophecy are two responses to climate change. Secular wizardry involves implementing technological solutions. Prophecy involves demanding conversion to a different way of life, warning against the hubris of "playing God." Prophets do not predict the future but speak truth to power. Wizards are not playing God but striving for morally responsible action. What to do about climate change? Can religions provide guidance? Traditions are reformed when used to address current concerns, as scholars may see in the greening of religions. Replacing religions with a science-based cosmic epic has its own weaknesses, as do experiential green religions. Philosophical justification for addressing climate change is limited too, unless there is another underlying commitment, whether articulated in religious, humanist, or political terms. Humanity needs smart technology, but also appropriate pluralistic politics. The alternative is not prophecy but lament for the conditions that our grandchildren and their offspring will face.



This article is not about climate change but about humans. Why are humans concerned about the climate? Where can we find guidance? Can we draw on our religious traditions? What may we expect of technological wizardry, scientific knowledge, and philosophical arguments? Or, in a pluralistic society, is a political process unavoidable?

Some local conditions on Earth, such as farmland and cities, have been created intentionally by humans. Other conditions have been created unintentionally. Some of these are global in kind. Our actions have changed the biosphere. Thereby, humans have changed the conditions for all living beings, future generations included. Temperatures on Earth have risen, ice sheets and glaciers are melting, and droughts and floods have become more devastating. Other authors in this thematic section may address the underlying science, substantially and methodologically, and discuss what might happen if our societies continue on their current path. They may argue about technologies and policies that might slow this process or help us adapt. Here, I focus on religious and philosophical thought. How can the two key terms used here, prophecy and wizardry, be understood in the context of climate change? Can religions be helpful resources in arguing the need to address climate change? If so, is it by being normative or by being formative and expressive? Does humanity need a green religion or the greening of all religions? What about secular, scientific, and philosophical arguments to address climate change? In humanity's pluralistic context, can we have a constructive political process for the climate?

The Ambitions of Wizards and the Warnings of Prophets

Wizardry and Prophecy

“Wizardry” and “prophecy” are two words people associate with magic and religion. Let us first consider these terms as the vocabulary of magic, drawing on fiction. When speaking of wizards, readers may think of Albus Dumbledore of Harry Potter fame and Gandalf the Grey of Tolkien's Middle-earth. Remarkable figures, apparently wise and in the possession of awesome powers. Prophecies also appear in the Harry Potter books. A central one is about a baby who will defeat Voldemort, the dark power. Seen thus, prophecies are predictions, insights into the future.

However, that is not how I have come to understand these terms from a religious studies perspective. In the Hebrew Bible, the Old Testament, prophets are not in the business of predicting the future but of speaking truth to power. They offer judgment. They challenge the king or the people on behalf of God, on behalf of that which is of ultimate value. One of the heresies criticized in early Christianity was docetism, the idea that Jesus was human in appearance only. Believers may be tempted to elevate him to the level of a wizard if not higher, someone in possession of extraordinary powers. But historians see

him as a human to be understood in the context of Palestinian Judaism in the Roman Empire. A figure about whom scholars rely on testimony from his fans given decades after his death.

When I use the term “prophet” here for those who express contemporary concerns about the climate, two forms may be distinguished. There are radical prophets, warning us, calling upon us to repent our industrial and capitalist ways and convert to a new religion or worldview and purer, simpler lives. And there are pragmatic prophets, who draw on science to analyze possible scenarios. This style of prophecy is exemplified by the Intergovernmental Panel on Climate Change (IPCC), which seeks insight into what is going on, what the consequences might be, and the options for mitigation and adaptation. The reports of the IPCC are the work of humans. The synthesis, the judgment, is negotiated between scientists and governments (Petersen 2006, 7.2 and Appendix; Broome 2020). Nonetheless, these reports speak truth to power: to governments, corporations, and all of us. When I speak of “wizardry,” of technological interventions, this refers to a range of actions, from the more pragmatic to the radical, from promoting electric cars to carbon capture and beyond towards more drastic forms of geo-engineering, or even building a new home elsewhere in outer space.

The terminology of prophecy and wizardry evokes the sphere of magic and religion, but those terms also refer to our understanding and powers. Prophets may be critical of some wizards, as their actions are not necessarily for the best. In this vein is also the story of Frankenstein, who could not control the technology he released. Which brings me to a particular concern about wizardry. Is it not hubris, “playing God”?

Playing God?

A concern might be that we humans go too far in our wizardry; that we are “playing God.” This expression may be used in two ways. The more traditional is when a human acts in a way judged to be immoral, such as killing someone. But it also may arise when new technologies undermine a distinction vital to ethics: the distinction between that which has been given and that which is a matter of choice and responsibility (Dworkin 2000, 442–46; Drees 2002). What is given is the stable background of human actions. Traditionally, this has been referred to as fate, nature, or creation: domains of the gods or God. We assume a clear demarcation between who we are and what we do in the situation we find ourselves in.

When new technologies shift the boundary between what is given and what is open to human actions, we become insecure and concerned. The reference to “God” in the expression signals that something that used to be beyond our powers is now on our side of the boundary. The fear of hubris, of “playing God,” may be the fear of losing grip on responsibility as the boundary dissolves.

Dworkin argues that such fear is not necessary; humans have always played with fire, and we ought to do so too. The alternative is an irresponsible cowardice towards the unknown, a weak surrender to fate.

The idea that humans should not be “playing God” can be challenged morally, as cowardice, but also theologically. If God is associated exclusively with that which has been given, our technological activity is seen as pushing God to the margins. In conversations on religion and science, the critical expression “God of the gaps” refers to the view that gaps in our knowledge are the places where God’s action may have taken place. This is a risky belief, wherein whenever humans become blessed with greater understanding, the role of such a God will be diminished. With technology, humans may be tempted to fall back on a God of the gaps, though with respect to actions not knowledge. We often use the fruits of science and technology—such as antibiotics, electrical light, sewage systems, computers, contraceptives, and much more—without paying much attention or gratitude. Praying to God, especially when technology fails, like when the plane goes down or the doctors cannot restore our health, is an instrumental type of religiosity: God is supposed to help us when we need help but keep out of our way as long as we are doing well. It seems preferable to appreciate the efforts of professionals, not only commercially but also religiously. It is appropriate that we look to engineers for our salvation. This is not an anti-religious move. Their knowledge and skills may be appreciated as gifts from God, as means by which they serve their neighbors “with all [their] heart, and with all [their] soul, and with all [their] strength, and with all [their] mind,” to quote the gospel of Luke (10:27).

Unintended Consequences?

Concerns about “playing God” regard not merely right and wrong. There may also be a fear of unintended consequences. Humans do not always anticipate correctly what the consequences of our actions, and hence of our technologies, may be. In his book *Earth in Human Hands*, the planetary scientist David Grinspoon discusses as an example the hole in the ozone layer caused by the use of chlorofluorocarbons (CFCs) in refrigerators and aerosol cans. In the 1970s, it was discovered that on the planet Venus traces of chlorine prevent the formation of ozone in the upper atmosphere. The decline of the Earth’s ozone layer was discovered in the 1980s. CFCs turned out to be the cause; their use had unintended consequences. “We did not intend to destroy the ozone layer, any more than the cyanobacteria intended to create it in the first place. Unlike them, however, we had the ability to see what we had begun, and to choose not to finish it” (Grinspoon 2016, 137).

Treaties were made in Vienna in 1988 and in Montreal in 1989 phasing out the use of CFCs. “So while the ozone story began as an example of . . . inadvertent catastrophe, it became an example of something else: an intentional planetary

change” (Grinspoon 2016, 138). This sets an example for dealing with climate change. Humans should intentionally counter changes we do not wish to see. Grinspoon makes this central to his definition of “true intelligence”: “There is a kind of cognitive activity that results in rampant, unchecked, unplanned global change of the kind we’re seeing today, and there is another level, what we might call true intelligence, or planetary intelligence, of more globally coordinated cognitive activity, that can result in more stabilizing behavior” (Grinspoon 2016, 138). Such intelligence would be essential for long-lasting intelligent civilizations in the universe, but Grinspoon’s definition “leaves it undetermined whether intelligent life has arrived on Earth” (Grinspoon 2016, 142).

In the context of discussions on religion and climate change, prophecy may be understood, in both its radical and analytical forms, as speaking truth to power. Wizardry may refer to human actions such as developing and applying new technologies that move the boundary between fate and responsibility. What are our resources to know which judgments to make and which technologies to develop? Can religious traditions provide normative guidance? Or is their contribution of a different kind?

Religion: Normative or Formative and Expressive?

Some believers envisage as the source of ultimate authority an eternal God who is almighty, omniscient, and benevolent. They see humans as creatures, limited beings, and sinners who do not live according to God’s commands. As sinners, humans bear responsibility for what they have done and still are doing. But as creatures, humans are not responsible for the moral law—as these norms come from God—just as humans are not responsible for the laws of nature. This is heteronomy: the law (*nomos*) is set by God, not by humans.

Readers may be more familiar with the opposite term, autonomy: individuals decide the goals they will pursue and the norms they accept as valid. Secularization can be understood as a cultural shift away from heteronomy, that is, away from the authority of the church, the state, and persons privileged by class, gender, or age. In 1784, the German philosopher Immanuel Kant made this the main message of his essay “An Answer to the Question: What is Enlightenment?” He used a Latin phrase to encourage people to have the audacity to be wise: “*Sapere aude!* Have courage to make use of your *own* understanding!” (Kant 1996, 17). Since all authorities are human, each may be challenged, as they all are provisional and fallible.

Such a view of authorities need not do away with religious beliefs and practices, but it does require a more modest view of the authority of religions. One such understanding of religions—as formative and expressive rather than normative—is conveyed by a definition from the anthropologist Clifford Geertz (1966, 3): “A religion is (1) a system of symbols [and rituals] which acts to (2) establish powerful, pervasive, and long-lasting moods and motivations

in men by (3) formulating conceptions of a general order of existence, and (4) clothing these conceptions with such an aura of factuality that (5) the moods and motivations seem uniquely realistic.” Seen thus, religions are similar to languages and other forms of cultural repertoire, shaping how humans understand and experience our world, helping us express how we experience the world (moods), and motivating us to act in ways we consider right.

People who value autonomy and accept historical and empirical knowledge may still disagree on its consequences for our worldview and ethos. Should humans discard any idea of God and become naturalists? Or are there meaningful ways of using religious symbols and rituals that are not at odds with autonomy? This question about the use of ideas and words is central to many conversations on “religion in an age of science” (Drees 2021a). Another question focuses on practices: how may religious and non-religious views inspire us towards right action, in this case on climate care? Let me, as a roughly sketched map, distinguish a few different strategies: the use of existing religious legacies, or their replacement by a shared cosmic narrative or experiences with nature.

Reform: The Greening of Faiths

A particular tradition, Christianity, is central to Lynn White’s article “The Historical Roots of Our Ecological Crisis.” White, a historian of medieval culture and technology, finds that innovations in agriculture, in particular the plough, facilitated an exploitative attitude that had been encouraged by Western Christianity. Guilt brings him to an argument for the contemporary relevance of religions: “Since the roots of our trouble are so largely religious, the remedy must also be essentially religious, whether we call it that or not” (White 1967, 1207). Within the Christian tradition, White highlights Saint Francis, who substituted the idea of humanity’s rule over creation with the equality of all creatures. Thus, White proposes “Francis as a patron saint for ecologists” (White 1967, 1207). Pointing out resources within one’s own tradition is not exclusive to Christianity. Consider the ten books that emerged from a series of conferences at Harvard on Religions of the World and Ecology, initiated by religious studies scholars Mary Evelyn Tucker and John Grimm. Each volume considers the religious resources for a particular religious tradition that may be drawn upon to promote an eco-friendly orientation (e.g., Tucker and Williams 1997).

Saint Francis can be considered the opposite of Benedict of Nursia, the founder of monastic orders that combine prayer and work, *ora et labora*. In the European Middle Ages, Benedictine monasteries transformed swamps into farmland, while Francis is associated with wilderness. It is fine to choose Francis of Assisi as a role model of nature-friendly attitudes, as White advocates. But if there are multiple potential exemplary figures, “the tradition” does not function as a normative moral resource but as a repository of exemplars. The moral message is not justified by the tradition but rather the tradition is selectively appropriated, interpreted, and revised in light of our concerns. Such a strategy

may speak to persons who have affinity with a particular moral message and are at home in that tradition. Texts are read in selective and creative ways. Questions arise such as: Who has been invited to contribute at the Religions of the World and Ecology conferences? Who speaks for Islam? Who for Christianity? Will Francis or Benedict be held up as an example? In a formative and expressive understanding of religion, engagement with traditions is appropriation and transformation in service of interests at a later time.

There is pluralism within each tradition. In new circumstances, religious traditions are used to provide images and symbols that express that which is deemed valuable at that later time. A religious repertoire may allow us to express our worldview and ethos, and may be drawn upon to motivate us. Religion is formative, even when it is presented as normative. It serves as a language that allows for the expression and nourishment of an ethos. Reading religions in eco-friendly ways is not uncovering relevant elements that have been there since the beginning of time. It is reformist and creative, a greening of faith (Carroll, Brockelman, and Westfall 1997), offering new imaginations and a different arrangement of beliefs and practices.

Furthermore, what once was embedded in a particular local context now is used in service of a global message. On this global stage, humanity faces another form of pluralism: the plurality of cultural and religious practices around the world. Given the plurality of religions, how to address issues that are genuinely global and thus may be in need of a collective response?

Replacement: A Cosmic Epic?

As ecological challenges are global, it may seem desirable to develop a shared framework to address them, to aim for consensus on a worldview that will provide guidance for all. For this purpose, the natural sciences might be a better resource than particular religious or cultural traditions, as the aspiration for the natural sciences is to develop insight that is valid everywhere, at all times. There is a rise of naturalistic visions, such as “the evolutionary epic,” that combine an evolutionary perspective (biology) with a desire for stories that may provide orientation (Wilson 1978, 201; Hefner 2009, 3; Goodenough 1998, 272). An example is *Journey of the Universe*, a film and multimedia project overseen by Mary Evelyn Tucker and Brian Swimme, an evolutionary cosmologist. They present scientific information in the form of a grand evolutionary narrative, weaving together scientific knowledge and humanistic concerns, thereby seeking to evoke wonder and a sense of connectedness and responsibility. They thus present a science-based creation story for our time (e.g., Tucker 2019).

Is it possible to build a morally motivating message on scientific insights? The idea that a science-based, morally motivating creation story would be adequate to justify a particular moral stance has been challenged by Lisa Sideris in her book *Consecrating Science: Wonder, Knowledge and the Natural World* (2017). Philosophers have argued that there is a fundamental difference between

descriptive and prescriptive language, between the effort to describe what “is” and the message as to what “ought” to be. Grand narratives that draw on scientific knowledge put scientists in a priestly role, which expects more of them than their disciplinary expertise justifies. One may challenge the way the humanities are used in such narratives. Tucker, herself a scholar in the humanities, treats religions as repositories of myths and metaphors. In contrast, Sideris positions the humanities as critical discourse, as posing questions, as probing beyond the general “humanity” to the plurality of humans, showing conflicting interests, views, and values. In religious terms, Sideris gives priority to prophetic voices rather than priestly ones.

Sideris also holds that humans should be far more modest in envisaging our place in the cosmos. Tucker calls her own view not anthropocentric but anthropocosmic, envisaging the human as the being who completes the cosmos. Sideris finds this too grandiose a perspective on humans: “Anthropocosmism, then, is no garden variety anthropocentrism. It is anthropocentrism on steroids” (2019, 446).

In such grand narratives, science is used to offer moral orientation and motivation. To speak of a journey or an epic gives the presentation coherence and focus, a sense of a destiny. But this passes by the marginal position of humans and the contingent nature of evolutionary development. By anchoring its message in a naturalistic understanding of reality, such a religious vision is asking more of the scientific image than it can provide. Though aspiring to transcend the particularity of various religious traditions, such a creative proposal becomes in practice one more religious option. This is a fairly typical development; religions aspiring to be universal again and again become new particular ones alongside others.

Science-based cosmic religiosity may be politically problematic as well, as it treats disagreements as if they regard our understanding of the way the world is, thereby passing by underlying differences in values and interests. It treats this challenge as a theoretical one to be resolved by a better view of reality rather than as a practical one about our actions and the values and preferences that guide them in a messy world.

An alternative strategy, also avoiding reliance on historic traditions, focuses on experiences, such as those discussed by Bron Taylor in his book *Dark Green Religion: Nature Spirituality and the Planetary Future*. Taylor defines dark green religion as “religion that considers nature to be sacred, imbued with intrinsic value, and worthy of reverent care” (2010, ix). Experiences with nature “may even inspire the emergence of a global, civic, earth religion” (Taylor 2010, x). He refers to environmental saints such as Henry David Thoreau, John Muir, Aldo Leopold, and Rachel Carson. Regarding radical environmentalism, Taylor considers “the sport of surfing a new, global manifestation of it”, “motion pictures, documentaries, and theme parks an influential expression of it . . . and the United Nations its global champion” (Taylor 2010, xi). This “dark

green religion” makes human experience and perception its prime resource, in contrast to the previously discussed approach, which leans more on science. Dark green religion may tend to see nature itself as sacred and has elements of animism, seeing “the world as full of spiritual intelligences with whom one can be in relationship” (Taylor 2020, 4) and pantheism, perceiving the earth to be alive or even divine.

Experience seems to me less a global resource than science. Some phenomena of environmental concern become known, at least at first, via careful scientific observations and modelling rather than appearing first in common sense experience. Experiential religious approaches also still pass by the difference between descriptive and normative language.

In the ecological arena, many people of good will seek to draw on religious traditions or advocate new, eco-friendly forms of religion. Their contributions may be of great value to those who feel at home within those traditions, whether old or new. But scholarly and politically, these contributions fall short as reasonable bases for a well-founded and shared global stance on ecological challenges such as climate change. So, which religion should one draw upon? And within each religious tradition, which interpretation does one endorse? How to select from the many voices within a particular religious tradition?

What does a religion contribute to addressing environmental concerns? Let me quote once more Clifford Geertz (1966, 3) to make clear some of the dynamics: “Sacred symbols function to synthesize a people’s ethos—the tone, character, and quality of their life, its moral and aesthetic style and mood—and their world view—the picture of the way things in their sheer actuality are, their most comprehensive ideas of order.” In the context of ecological concerns, this ethos seems to justify a particular interpretation of a religion. Religious imagery and convictions are not the sources of ecological engagement but rather expressions of it. So far, my reflections have focused on the role of religions in addressing ecological concerns. The next section focuses on whether there are scientific or philosophical arguments that justify why humans should address climate change.

Why Should We, Humans, Address Climate Change?

By itself, science does not seem to provide a basis for caring about the climate. A geologist might say that in the 4.5-billion-year history of the Earth variation in the climate is natural. So why care about the climate as it currently is? Does that not show a particular bias in favor of conditions for human life? What is special about humans? Aren’t we organisms, just like other organisms? Other organisms might flourish when the climate changes. Concern about climate change regards the suitability of conditions for future humans, beyond those currently alive. But should there be future generations of humans? Can a commitment to the continued existence of humans be justified on the basis of science and philosophical ethics, or does such a justification need something

else, something more like a religious motivation? In relation to our need to address climate change, I think it may be helpful to consider such questions about human nature and the future we might care about.

Humans: Just Organisms among Others?

Humans are biological organisms, part of the web of nature. Can such a view be a sufficient perspective on humans when talking about human responsibilities? I hold that there is something exceptional about humans that justifies prioritizing conditions humans need over other potential climates. The same feature also grounds the idea that humans have responsibility for their actions and determines the character of the humanities as human self-reflection (Drees 2021b).

Humans are natural beings but happen to be endowed with categorically significant qualities that may not be present in other natural beings on Earth, at least not to the same extent. Because we are natural beings, our constitution and the causal consequences of our existence can be objects of study in geology, biology, medicine, and other disciplines. We are also subjects. That is, we are beings who study the world, who analyze those causal processes as if we can be observers of them, that is, consider them from outside. As subjects, we also are beings who act within the world upon the world.

The German philosopher Helmuth Plessner introduced in his book *Levels of Organic Life and the Human: An Introduction to Philosophical Anthropology* ([1928] 2019) a conceptual language to speak of the particular richness of human experience, understanding, and agency. As a first step, one might say that each living organism is characterized by a metabolism, taking food in and pushing waste out, and with that comes a permeable boundary between inside and outside. Thus, with life there arises an inner world, while each organism is within its environment. Positionality becomes a characteristic of life.

Positionality works differently for different kinds of organisms. Schematically, Plessner distinguishes plants, animals, and humans. Plants have no center that coordinates actions and hence no relationship to their own positionality. Animals are aware of their environment and their own position in it; they have a centric positionality. Human positionality goes a step further with the emergence of awareness of the possibility that one could have been at a different place or time. Humans not only have experiences, but they also experience that they have experiences. Plessner speaks of persons as having an ex-centric positionality, given their ability to engage in self-reflection, to consider their own actions as if from an external perspective. In this self-reflective process as ex-centric beings, humans also encounter others and hence come to participate in a shared historical, cultural, and social world. We are products of this shared world, but we are also creators of its future.

Plessner's imagery and language is just one conceptual vocabulary for philosophical anthropology; others have expressed it differently. The point is that natural and reflective forms of existence can be distinguished. Whatever

the vocabulary used, when we as humans reflect upon our knowledge of the world and ourselves in that world and upon our ability to transform the world intentionally—and hence upon the choices we have to make—we cannot avoid envisaging humans as a special kind of animal. We are organisms within the web of nature, but we are also reflective, as if humans might step outside of it, consider it, and act upon it.

To link this insight about human nature to climate change: it would be nonsensical to suggest that earlier organisms deserve credit or blame for introducing photosynthesis and thereby transforming the atmosphere. They did not exhibit the kind of insight and intentional action that we humans assume when assigning credit and blame. But current developments cannot be ignored as if such transformations just happen. We humans deserve blame, and we need to study the climate and act intentionally upon it.

A further distinction may be made between the human ability to understand reality and our ability to act upon the world. This implies two types of reason: theoretical reason and practical reason, the one exemplified by science, the other by ethics. This distinction is central to two major works of the late eighteenth century by the philosopher Immanuel Kant. His 1781 *Critique of Pure Reason* (1997) considers the conditions for the development of knowledge of reality. In that context, determinism is assumed. When explaining phenomena, scientists and scholars assume natural laws to be valid. A few years later, Kant published his *Critique of Practical Reason*. “Practical reason” means that this branch of philosophy reflects on practices, on humans as actors, and in particular on morality, the ideas that should guide our actions. In this context, a basic assumption is human freedom; we are free to act in ways guided by reason, by moral convictions, rather than as puppets.

The distinction between theoretical reason, which treats humans as elements of the natural world, and practical reason, which considers humans as actors in the world, is fundamental to philosophical anthropology. In the context of science—theoretical reason—we are naturalists, but when we are moral actors, we must consider ourselves to be persons driven by reason.

At the end of his 1788 *Critique of Practical Reason*, Immanuel Kant writes of two awe-inspiring themes: our knowledge of nature and our awareness of moral obligations. Those lines have been inscribed on his grave in Königsberg, now Kaliningrad: “Two things fill the mind with ever new and increasing admiration and reverence, the more often and more steadily one reflects on them: *the starry heavens above me and the moral law within me*” (Kant 1996, 269). The starry heavens do not depend upon our existence. The starry heavens would remain as natural and as awesome if the Earth were to become uninhabitable to humans. But then, the human study of those starry heavens, and of reality on Earth, would be lost. The two forms of human reason, involved in analysis and understanding on the one hand and in intentional action on the other, would be lost. This is a loss worth countering, if we can.

Should There Be Future Generations?

The existence of future generations is, abstractly speaking, not anybody's moral obligation. There are moral obligations to existing persons, but not to persons who do not exist. A young couple that voluntarily decides not to have children is not failing morally. This results in a tension in arguments for climate care: the existence of future persons is not a moral obligation for anyone, but the case for sustainability needs future persons.

One argument for the existence of future generations is pragmatic, naturalist in kind. Given human biology and psychology, future generations will come into being as long as is possible. And if they will exist, those alive now are responsible for the conditions within which they will live.

Is there also a more positive argument, aside from the messy tendencies of human procreation? An argument that future generations are desirable? One such argument may be the one I just presented: humans are the beings who may engage in theoretical and practical reasoning, as we have created a rich understanding of the world, and may be guided by "the moral law within" (Kant 1996, 269). Hence, if one values those features in general, one values conditions that would allow for the continued existence of humans over conditions under which beings with substantial ability to engage in theoretical and practical reason would not survive.

Another argument is more personal, tied to issues of identity and "reasons of love" that are neither selfish nor universally moral (Wolf 2010, 4). Just as I care about my children and grandchildren, about nieces and nephews, I also care about the continuity of human history across generations. This seems to be a particular love and not a conclusion that fits general theories in philosophical ethics. Moral reflection requires more than moral theory; it needs human commitment to a human future, whether articulated in religious, humanistic, or political terms.

Earlier in this article, I suggested that it is hard to make a convincing case that religions can justify moral responsibility in the context of climate change. Here, I conclude that such a justification needs something like a religious commitment. Humanity needs to intertwine its knowledge *of* nature and its ideals *for* nature with concern for the lives of future humans and future generations of species with which we share this planet, beyond the interests of those currently alive.

I have cautioned not to expect too much from science as a resource for a collectively shared normative vision. A theoretical interest is widespread in "religion and science" (Drees 2010), but perhaps scholars should not succumb to the theoretical temptation when considering issues that are primarily about action, or inaction, rather than knowledge. Though agreement in the sciences is more widespread than in almost any other domain of human activity, this is less the case when it comes to interpretations of science or the articulation of worldviews that aspire to be science-based, or at least consistent with the best available knowledge. A similar problem, of the underdetermination of moral and metaphysical convictions by science and worldviews, whether religious

or secular, also regards religious views. Pluralism within traditions and across traditions is a given, and one that is to be appreciated.

Rather than seeking agreement on ideas (theoretical philosophy), the best option might be to live with disagreements, pragmatically solving problems one by one. In this process, sustainability may be called for, given the urgency of issues and their potential impact, even though we as humans cannot have a theoretical justification for this concern. Not everything humans may find important needs to be philosophically justified.

Pluralism and Politics

In this pluralistic social world, it seems to me that alongside knowledge and technology, politics cannot be avoided. I do not mean politics in the disappointingly dysfunctional way currently seen in some countries. The call for politics should take as its point of departure a more ideal version: a deliberative process that involves all, respects the concerns and values of minorities, and is intertwined with a judicial system that arbitrates conflict in an accessible, impartial, and predictable way.

One author who has argued for such an approach in the context of discussions on climate change is Mike Hulme, the British author of *Why We Disagree on Climate Change* (2009) and the *Zygon: Journal of Religion and Science* article “(Still) Disagreeing about Climate Change: Which Way Forward?” (2015). As he argues, the most appropriate venue for addressing climate change seems to be a deliberative, democratic, political process that draws on science to develop scenarios and in relation to which humanity can articulate and develop its moral intuitions while seeking conclusions on appropriate actions, even though underlying views, interests, and preferences may differ.

By way of summary, humanity needs:

1. prophecy, both as careful analysis, such as provided by the IPCC, and as speeches and images that motivate us to address climate issues and change our behavior
2. wizardry (technologies) to counter climate change and adapt to changes, for ourselves and for others
3. politics, ways of living with disagreements and setting goals in a deliberative process, thereby solving problems one by one.

I hope there will be smart technological options to address climate change, but also that we may develop an intelligent democratic global order. To speak in religious terms, the alternative is disappointment, lament—not for a temple that has been destroyed, but for the conditions that our grandchildren and others will have to face.

Acknowledgments

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Three-Legged Stool: A Peace Education Framework for Weaving Together Spirituality, Science, and Technology

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Technological advancements and political-economic shifts are necessary to meaningfully address climate change. However, there is a difference between addressing climate change and transforming underlying behaviors to allow mass support of these changes, sustain the efforts of those working for change, and remodel global society so that changes are lasting and impactful. While technology is central, spirituality should be its companion. The spiritual component allows people to reimagine their relationship to the planet, to one another, and to global inhabitants who may be more devastatingly impacted by climate change. Grounded in the core values of holistic Earth care, relational existence, and global consciousness, this article explores how peace education encourages technological responses to climate chaos to be cognizant of the root causes of systemic violence in all its forms via intersectional, interspiritual, and interreligious lenses. The “three-legged stool” framework includes science, which imparts knowledge and evidence; technology, which offers solutions and adaptations; and spirituality, which provides grounding and transformational thinking.



Introduction

The mission of the Institute on Religion in an Age of Science (IRAS), to “cultivate a community of informed and respectful inquiry and dialogue at the intersections of science with religion, spirituality and philosophy in service of global, societal and personal well-being” (IRAS 2023), is deeply aligned with the aims of peace education, which include promoting “the development of an authentic planetary consciousness that will enable us to function as global citizens and to transform the present human condition by changing the social structures and the patterns of thought that have created it” (Reardon 1986). Raising questions of how science and religion can be used together to address existential crises is a worthy endeavor and one I have explored for many years as a peace educator. It is quite clear that humanity is firmly living in climate crisis, or more accurately, climate chaos. The numerous manifestations and downstream repercussions of this existential crisis hit hardest for the poorest and most historically oppressed societies—an oppression that is the direct result of the hegemonic practices of colonization, resource extraction, and slaughter of people and land, as well as the excuse of “bringing people into modernity.” Thus, people of conscience and creativity are called to imagine solutions to stem the tide of suffering. This call is necessary. However, it must be remembered that this crisis cannot be solved with the same mindset that created it. This existential crisis calls for a paradigm shift.

In my work as a peace educator, scientist, science educator, theologian, and Unitarian Universalist minister, I have grappled with how to facilitate this paradigm shift. The IRAS annual conference theme for 2023—The Wizards of Climate Change: How Can Technology Serve Hope and Justice?—is compelling and begs the question: can scientists and technology really “fix” the climate crisis? In numerous venues and conversations around climate chaos, a regular response is that technology has the solutions. However, this response gives me great pause.

In this article, I share my “three-legged stool” framework for considering planetary health and imagining solutions for the climate chaos and environmental injustice in which humanity is mired. The three-legged stool analogy is often used when describing a conceptual structure because it represents balance. While many are more practically acquainted with stools (and chairs and tables) with four legs, the three-legged stool has existed for ages simply because it provides balance on uneven ground, which can be quite handy when, say, milking a cow. The balance analogy, however, goes beyond functional usage, as it also implies that the three legs of the stool must be of the same length, meaning that each leg of a conceptual three-legged stool must be examined and applied equally. For my purposes in discussing climate chaos, peace education is the overarching paradigm and the seat of the stool is supported by the following three legs that will be interwoven throughout this discussion: science, which provides data and understanding; technology, which provides possibilities and solutions; and spirituality, which provides grounding and the tools for holistic transformation.

Why a Peace Education Framework

To set the stage, I want to share some foundational aspects of peace education: “Originally a study of the causes of war and its prevention, peace education has evolved into the study of violence in all its manifestations and educating to counteract the war system for the creation of a peace system; a peace system on both the structural and individual level. The content and the methodology of peace education are progressive; promoting egalitarian learning environments, open inquiry, and significant learner participation” (Ardizzone 2002, 16). Peace education has been implemented around the world from early childhood to post-graduate formal education settings, various informal education settings, and non-governmental organizations, as well as more formally through international treaties and documents. Peace education focuses on uncovering the root causes of small and large issues and conflicts utilizing a broad definition of violence drawn from peace researcher Johann Galtung (1969). According to Galtung, existence is deeply mired in a culture of violence, the three forms of which are structural violence, cultural violence, and direct violence. Structural violence is the violence embedded in institutions that manifests as oppression, marginalization, the deliberate withholding of resources, wealth disparity, etc. Cultural violence is the violence that makes structural violence acceptable and/or invisible and is largely perpetuated through education, organized religion, and mass culture. Direct violence is the form of violence most commonly understood since it involves actors perpetrating violence directly on others. Using a planetary or environmentally aware lens, structural violence can be seen as colonial practices that subjugated (or obliterated) millions of people and as exploitative resource extraction, which gives Earth value only as something that can be commodified. Cultural violence is seen as scriptural interpretations that give humans dominion over the Earth and peoples viewed as less than. It is also seen in the subpar to non-existent science and environmental education provided in schools and in the inculcation of materialism and consumerist disposability as the only acceptable lifestyle. Direct violence is the physical harm caused to the planet from acts of war, deforestation, pollution, mining, extraction, and folks committed to having nice, green lawns. A cursory review of the recent news stories sharing images and stories of environmental destruction around the globe illustrates the interconnected ways that the violence done to people and place yields more violence in the form of destruction, displacement, and death.

To critically examine manifestations of violence beyond the headlines, peace education invites learners of all ages into an analysis of root causes. This is done in peace education to organize what the world is facing and take a temperature check on how individuals and communities are feeling about these issues. Oftentimes in environmental science or eco-justice spaces, discussion heads directly to problems and solutions and ignores the emotional toll that climate

chaos takes on people, both those directly impacted and those who carry fear and woe for the future. Thus, digging into this core work of peace education and identifying root causes also allows for the naming and sharing of the fear, grief, worry, and despair people are carrying (see Figure 1). This also is a reminder of how central pedagogy is to peace education; peace educators not only educate about peace, but for peace. Thus, activities such as determining root causes use a dialogical pedagogy, a model of teaching necessary for transformation. In any setting, a peace education pedagogy, which is grounded in the revolutionary work of Brazilian educator Paulo Freire (1970), calls practitioners into various practices: problem posing, multiple perspective analysis, and acknowledgment that oppression wreaks havoc on both the oppressed and the oppressor.

The root causes activity invites an analysis of the manifestations of violence in order to name the foundational (and thus also the historical and philosophical) aspects of current crises. The root cause analysis can be applied in any education setting to identify all barriers to peace, but in the context of this year's IRAS conference theme, I focus on climate chaos and environmental injustice. This deracination engages participants in connection-making and demands going past surface-level arguments—which, when tied to manifestations of violence, can make it easy for some to dismiss data and facts. In undertaking systemic deracination in order to illuminate what lies at the core of the issues being faced, the root causes of the climate crisis and its co-ills of racism and environmental justice are capitalism, colonialism, white supremacy, white Christianity, heterosexual-patriarchy, greed, and a historic separation from nature. Naming these structural and systemic factors allows for a deeper analysis of their many manifestations, the interconnections between them, and their impacts downstream.

Addressing Violence, Grounding in Values

One of the founders of the field of peace education, Dr Betty Reardon (1986), put forth three core values to

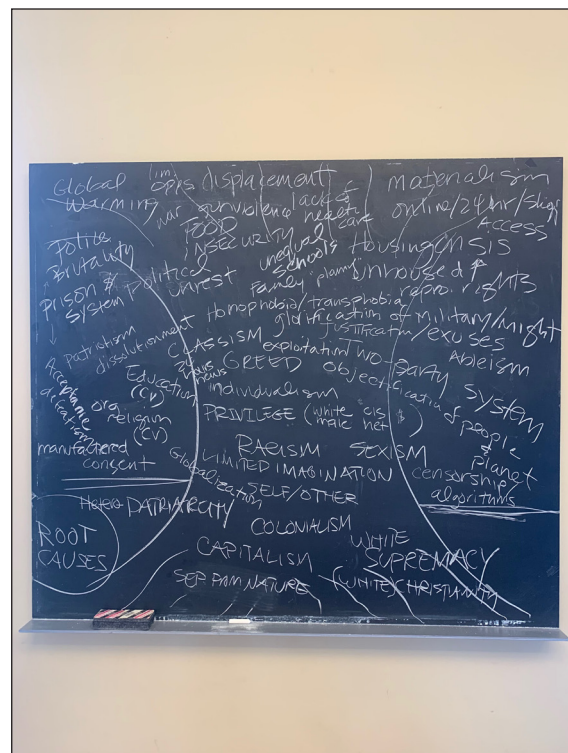


Figure 1: Root causes as well as manifestations of violence as developed by my students in the course Science, Spirituality, and Peace Education: Addressing Climate Change. Photograph by author (2023).

guide her peace education work: planetary stewardship, humane relationship, and global citizenship. These three overlapping values guided my work for many years. However, just this year, at the urging of a student who pointed out the problems and limitations—and anthropocentrism—of these terms, as well as based on discussions I had with colleagues at IRAS in the summer of 2023, I have reformulated these core values to better capture and guide my work moving forward: holistic Earth care, relational existence, and global consciousness.¹ These updated core values provide a framework for knowing, learning, and acting to support the creation of positive peace as well as provide a structure that can be applied in any setting to address climate chaos.

Holistic Earth Care

Holistic Earth care calls for an acknowledgment of interdependence, interconnection, and interbeing as described by Vietnamese Buddhist Monk Thich Nhat Hahn. All are responsible for caring for the planet on local and global levels, not as “stewards” in any traditional sense but rather because humans are of the Earth and all its component parts are within us. Humans are not separate but deeply dependent. Think of the Buddhist concept of dependent co-arising, wherein it must be acknowledged that any sense of “individualness” is impossible because all existence is connected to and/or arises from other members of the Earthly and universal sphere. Without understanding that Earth care requires seeing all life, including things typically deemed non-living or abiotic, as fundamentally one or united, humans will continue to fall into a trap of separation or of superiority—that humans are above all other life forms. A value of holistic Earth care serves to mitigate the effects of structural, cultural, and direct violence as they show up in a culture that views the planet as a commodity to be exploited. Simply, to paraphrase Unitarian Universalism’s seventh principle, all people have a responsibility for the interconnected web of life of which everyone is a part.

Relational Existence

Relational existence is an invitation to consider how one relates to and interact with all members of their community on a variety of planes and scales, spanning from the interpersonal and communal to the global. By remembering that one’s existence is grounded in and founded upon relationships, one is called to interact with others more mindfully and to cultivate reciprocity. This requires a few things. First, one must see oneself as a relational being. Second, one has to make peace with or at the very least acknowledge the fact that the current state of affairs is a result of creating hierarchies in relationships and deeming certain peoples beneath the need for relation. This has made and continues to make it perfectly acceptable to exploit and kill without regard to the inherent

dignity of those deemed “other.” Finally, a true sense of relational existence seeks to right the wrongs of the past and thus requires deferring to voices who have historically been marginalized, many of whom demonstrate a relational spirituality and/or model of living in a relational community with all beings. In other words, the inherent worth and dignity of all beings must be seen and honored and all must act in accordance with their rights, whether as humans, other mammals, or other forms of being. Relational existence diminishes manifestations of violence by inviting mindful, compassionate relationships via authentic communication.

Global Consciousness

Global consciousness invites people to see themselves as part of a global system, not merely as an individual or members of an exclusionary definition of community. If, as Carl Sagan (1973, 189) is famous for saying, “we are all star stuff,” then it would serve humanity to call into question the barriers and deleterious forms of separation we cling to, including notions of borders, private property, and the NIMBY (not in my back yard) mindset. People must see themselves as co-travelers of the cosmos and thus live with a sense of responsibility to all inhabitants of said cosmos, not only those who think or look like them or who live next door. Climate change has proven that local choices—primarily lives lived in excess that require fossil fuels and extractive, exploitative capitalism—have global impacts. Global consciousness can counteract the manifestations of violence by expanding understanding of the human condition and the interdependent nature of existence.

Using these interconnected and overlapping core values as a framework and putting them into action provides not only the opportunity to address the root causes of crises but also the chance to create a framework for a reorientation of the very ground of existence, which is what is needed if the damaging forces humanity has unleashed are to be addressed.

Core Problematics

In peace education, after or concurrent with the naming of root causes, it is helpful to name core problematics—manifestations of violence and/or barriers to true positive peace. Unlike negative peace, which means removing violence and war, positive peace is a lasting peace based on creating a society wherein structural oppressions and barriers to human rights and equity are removed and replaced with an orientation towards fostering true peace. Positive peace is only possible if society is reshaped with justice, equality, and a full menu of rights and responsibilities. With this in mind, and analyzing the realm of the current climate chaos, I see at least six core problematics that are manifestations of various forms of violence and root causes, and that indicate primary sites of

action. Furthermore, I believe that each of these problematics appear because the interplay among science, spirituality, and technology—my aforementioned three legs of a stool—is out of balance.

The first problematic is climate misinformation and climate denial, especially the denial of anthropogenic climate change. Misinformation has its roots in poor science education, a lack of environmental education, and the fossil fuel lobby, whose efforts to secure society's addiction to carbon as they line their pockets are well known and well documented. In her book, *Miseducation*, Katie Worth (2021) explores the role education has played in the current climate crisis, concluding that although there is a deep history of both scientific and popular awareness of global warming, when the American Petroleum Institute, whose original aim was to address the amount of carbon dioxide being added to the atmosphere, chose to move from advocacy to secrecy in the 1980s, science education became a conduit for the maligning of global warming. Worth (2021, 27) states, "They adopted the same tactics that the tobacco industry had used to hide their products' link to cancer. The idea was to raise questions about the validity of the science, which would cause the public to doubt whether government regulation was warranted." Versions of this obfuscation continue through today. Meanwhile, teachers feel increasingly disempowered by the top-down "reforms" that limit what can effectively be taught in science. While the Next Generation Science Standards explicitly include content and standards around climate change, they are implemented differently from state to state depending on political orientation, demonstrating the power of the fossil fuel lobby. Furthermore, even when science teachers do want to make climate change part of their curriculum, they often come up against antagonistic colleagues (or administrators) who not only do not support scientific data being disseminated but also go so far as to teach "alternative perspectives," one of which being that climate change is a hoax.

The second problematic is apocalyptic religious thinking. In many Christian traditions, the focus on the afterlife—the true Kingdom of Heaven—creates a wholesale ethic of acceptable uncaring about what happens to life on this planet. There is a rejection of anthropogenic thinking since scripture foretold these circumstances, or perhaps more accurately, things are "simply unfolding as God planned," and believers are heading to Heaven or an idyllic afterlife anyway; caring for the here and now is unnecessary. Jonathan McPhetres and Miron Zuckerman (2018, 17) found that "religiosity is negatively related to science knowledge and is associated with more negative attitudes towards science" and "religiosity is associated with less interest in science and the belief that science is less important." The damage can be seen when scientific understanding is replaced with religious zealotry. This lack of responsibility for the planet and all her inhabitants is a formidable obstacle to overcome but it is not the only religious mindset that works against taking action to ensure planetary survival. In many

traditions, doctrines of separation and dualism create us/them thinking among peoples and, perhaps more fundamentally, between humans and all other forms of life. Nature is viewed as “external” and “not of us,” while the reality is that we humans, as primates, are in fact part of nature. Many organized religions see humankind as superior, different than, separate from, and independent of the cycles and manifestations of nature. Dualism—the separation of self and other, humans and other life, self and an external god—is pervasive in many organized religions. Finding a way to rectify this is part of humanity’s task.

The third problematic is a bit more challenging to articulate and what I will call the purely heart-centered work of Earth care, or what some folks dismiss as “woo-woo” spirituality. While I see in them deep resonance with spirituality that is strongly linked to pre-Christian ideologies, these beliefs and practices are often dismissed—by organized religions, through the mainstream media, by scientists and techno-progress types—because they harken back to ideologies of true connection such as indigenous thought and religious practices, deep ecology, or even, in some cases, forest fairies and other marginalized spiritual ways of connecting to all life on Earth. The challenge here is that since the current culture is steeped in a paradigm that values reason and empirical data, these Earth-centered spiritual folks are easily ignored or name-called. Clearly, their hearts are in the right place, but as Elizabeth Minnich (2017, 36) reminds us, “Doing good is also more than a matter of feeling.” To sustain this work and to bring others along, grounding is needed.

The fourth problematic represents the other side of the previous problematic: the response to the hardcore scientific mindset. As a person deeply steeped in the sciences and drawn to the value of empirical research, I have learned that, given the limits of science education in the United States educational system and the deliberate dumbing down of the educational system, anything “jargony” will be misunderstood and/or ignored, which means in many cases that scientists also get ignored or dismissed. Perhaps even more harmfully, reliance on data and facts actually scares people, and it has become quite clear that such fear motivates no one. Scientists do no good giving people data only because data does not necessarily change hearts and minds. To be clear, data is important, compelling, and necessary, but how it is disseminated is the issue here. Science has a communication problem—in part due to the active misinformation campaigns previously mentioned, but also of the science community’s own making—that must be addressed, especially in the realm of climate change.

The fifth problematic is the individual responsibility versus wholesale structural change discussion and debate. The carbon footprint game, introduced thirty-plus years ago, seemed on the surface an invitation to individuals or families to learn how to live in greater alignment with an ecological or conservation mindset. However, it was created by British Petroleum as a targeted effort to

shift attention away from the fossil fuel industry writ large and instead make the average consumer question all their choices as they relate to their carbon usage. A result has been circular arguments about whether individual action or structural change matters more. Thus, for many, a heightened sense of apathy or ineffectiveness arises, with regular folks saying, and believing, that their individual acts do not matter. Coupled with this is the judgmental mindset pervasive in the climate movement, admonishing folks who do not do “all the things.” Just as unhelpful, this attitude and its attendant squabbling breeds resentment, division, and disengagement among the folks who allegedly care about the situations being faced. Shame is not a motivator. Individual acts are indeed important, as are collective actions. At the very least, individual acts encourage individuals, families, and communities to live more in alignment with planetary consciousness and, hopefully, to live more simply and mindfully. However, this models ways of being that run counter to the current dominant mindset of accumulation and disposability. Thus, this modeling/witnessing can lead to alternative collective ways of living. However, even as individuals make better personal choices, the structural and systemic issues at hand cannot be dismissed. Fossil fuel entities, corporations, banks, lobbyists, educators, and governments must be held accountable. To get trapped in this false duality of individual versus collective only serves to empower the puppet masters of destruction.

Finally, the sixth problematic brings me to the theme of this year’s IRAS conference—the selling of the notion that technology will fix everything. I have had this conversation numerous times with people who truly believe that all will be well because technology has the needed solutions. Some have said flippant things like, “Everyone just needs to buy an electric car or put solar panels on their house,” which completely discounts socio-economics and how class and pervasive poverty make these actions impossible for most. Even more importantly, statements such as these ignore the environmental and human costs of extracting the elements needed to build all those electric cars and batteries and photovoltaics as well as other technological inventions. Technology has answers but technology that remains steeped in exploitative capitalism and a colonialist mindset will not fix anything. Furthermore, one could argue that the pervasiveness of certain current forms of technology should serve as a warning for the deeper psychological and spiritual impacts of relying on technology for answers. A cursory review of research on anxiety and depression in pre-teen and teenage girls, among others, shows that technology in any form is far from a panacea. Increased incidences of cyberbullying, depression, and suicide should give pause in the assumption that technology is always a good thing. Pair this with the materialism and disposability omnipresent in the tech world via designed obsolescence and societal pressure to have the newest technology and one has to wonder if the harms done to ecosystems and the people who are

exploited to extract necessary components to support technological products can actually be “solutions.”

I share these problematics in no particular order, recognizing that each can be contextual; the extent of their presence may vary upon location and community. Furthermore, many of them are interconnected; one could argue that extreme religious thinking is directly connected to misinformation and educational weakness, which in turn connects to misguided efforts (or non-efforts) related to personal responsibility. The naming of problematics remains a valuable practice, even if it only serves as a reminder that root causes and downstream manifestations are deeply connected and thus climate work in various settings requires a systemic analysis.

Facilitating Transformation

As an educator and minister, I have been grappling with this core question for years: How can a transformation from extraction to regeneration, from exploitation to reciprocity, from separation to interconnection be facilitated? I believe this question needs to undergird thinking about solutions to the climate crisis, especially if some believe that technology is the only answer.

While solutions that cut down on greenhouse gas emissions, promote carbon capture, and assist those who are the most and first impacted (who not so incidentally contribute least to global warming) must certainly be focused on, the question of wholesale transformation must be engaged with if “green technology” and “green capitalism” are not to perpetuate the current mode of existence. The false narrative of green capitalism—itself an oxymoron—is already underway as seen through the marketing efforts to convince people to buy LEDs, eco-friendly detergents and products, and anything labeled “green.” These products, to be sure, are better for the planet, but the drive for unmitigated consumption is still there. Products are just being replaced without questioning what is needed (versus what is wanted) in the first place. Thus, if the transformative work is not done before the tech-based interventions, humans will still be wasteful, still be mindless, and will still treat resources and labor as if they are inexhaustible. Imagine for a moment all the people in the United States, who already live so wastefully, being told, “Go on, keep doing your thing because now we are using the sun for energy!” without encouraging a conservation or Earth-care mindset. What is needed is a transformation in hearts and minds, and I believe that the integration of science and spirituality can guide people to that. In 1967, Pierre Teilhard de Chardin made the effort to “lay before both the world of science and the world of religion the controversial proposition that there is and can be no real opposition between the two. Each needs the other” (Aller 1967, 16). IRAS is an example of the imaginative possibilities that can develop when these two areas, so often deemed opposites or even enemies, come together. And now, the climate crisis is precisely the moment when these

two areas—connected with a real analysis of technology and technological solutions—can provide much-needed guiding principles.

In my work with children (grades kindergarten through twelve as a science educator), young adults (at the university level), and members of the clergy (through interfaith work and dedicated programs for Unitarian Universalists), I generally focus on three fundamental ideas: promoting greater connection with what is commonly called nature; implementing practical changes at all levels; and calling upon faith (or the spiritual and/or religious beliefs that ground people) to serve as impetus, practice, and sustenance. In the next section, I discuss these in conjunction with other ideas that can address the previously mentioned core problematics all within the three-legged stool framework.

Reconnection

Regardless of one's role in society, one of our central aims should be promoting biophilia, or a love of the life that fills the planet. E. O. Wilson invited people so many years ago to engage in biophilia, to find love for the natural world and experience the pleasure of being surrounded by living organisms. Ideally, this reconnection will facilitate a shift to an understanding that Earth is a living, breathing, complex organism, an intricate web of life in which humans are a small part. Through biophilia, learners can see Earth as a member of an extended and intricate family and recalibrate how they think about and interact with living things. To initiate this process and counteract the separation and othering of nature, children (learners of all ages, actually) need not only exposure to the natural world but an opportunity to explore and connect with the hows and whys of their biome. Experiences fostering this connection will have a two-fold impact: a greater affinity for the flourishing of all life, inspiring a call to connection and care, and an active subverting of the limitations of science education in formal education. One activity I have used with learners of all ages is an outdoor scavenger hunt that utilizes a multi-page field guide inviting explorers to use their senses to engage with specimens ranging from rocks to trees to scat and other evidence of living things. Observing, listening, drawing, writing, sharing, and even collecting allow for connection and questioning. Children invited into a world of wonder at a young age will not be so ready to relinquish this way of knowing and exploring even if schooling attempts to actively undermine this type of epistemology. The creation of a more scientifically literate citizenry will override the religious zealotry that demeans nature by refusing to steward the planet here and now. I would argue that this connection with all life can and should occur in religious settings as well. Religious education settings could also add an experiential component that invites children into a connection with Earth. As can be seen from the growth of environmental programming in a variety of religious traditions, creation care is becoming central. From individual movements by Catholics, Unitarian Universalists, Muslims, Jews, and

even Evangelical Christians to interfaith coalitions such as Interfaith Power and Light and GreenFaith, religious folk are attempting to foster reconnection with all forms of life on Earth. Furthermore, interfaith coalitions are deeply impactful. The Unitarian Universalist Ministry for Earth, for example, offers year-round programming that weaves questions of science, spirituality, and solutions together for activists and seekers alike. GreenFaith is an organization that has deftly brought the scientific data that supports the urgency of climate action to the global interfaith religious community.

By meeting religious folks where they are and creating inroads for dialogue on how religious texts and scientific knowledge call people to greater relation, GreenFaith has fomented a global movement to address local issues as well as promote the end of human reliance on fossil fuels. To bring together science, spirituality, and technology, several years ago I developed a method for preaching that integrates scriptural text with climate data and action steps. I have shared this model with interfaith clergy members. The 4Es model starts with entry (theology/spiritual grounding), a reading chosen based on the faith tradition that sets the theological stage for a transformational encounter with scripture via an exegesis grounded in my second E: empathy (eco-theology). For this second E, an ecological lens is used to exegete or analyze the reading. To ground this and connect to current experience, the third E is utilized: evidence (global climate change data), which invites the inclusion of relevant climate change data and/or manifestations to make the connection impactful. Finally, the sermon (or talk or teaching) closes with the fourth E, engagement (accountable action steps), where leaders inspire their listeners to take an action, small or big, ideally something that is directly and specifically related to the evidence provided. This model is one example of how, in religious settings, science and spirituality can be integrated with an eye toward increasing scientific understanding and developing action strategies that are spiritually rooted and possibly connected to technological solutions.

Core Values Framework and Peace Education Practice

Since the temptation is great to rely on technology as the panacea for climate chaos, having core values to frame our work—whether as educators, researchers, ministers, or activists—provides the necessary grounding to analyze problems and solutions from an intersectional lens. The values put forth in this article, holistic Earth care, relational existence, and global consciousness, are just one example that can be applied. Once a values-informed framework has been established, peace education pedagogy can be utilized. Beginning with a sharing of assumptions ensures that all ideas and voices are part of the conversation. I find that this activity—which I have done with teenagers, college students, adults, and clergy members—can be done as a “popcorn-style” sharing (and written on a board). This allows participants to name all they know, want to know, have heard, are worried about, are curious about, etc., creating a visual starting

point of their perceptions about a given issue. If looking at climate change, the responses will be many and varied and may also include wonderings about solutions. I like to categorize this initial “brain dump” via discussion, creating thematic groupings so that any assumptions attached to what they shared can be unpacked. Following this with the root cause practice allows for a deeper analysis: what is at the core of these issues? How are they interconnected? What about the roots can be addressed? Can technology even address these root causes? Interestingly, when looking at some of the root causes of the climate crisis, one must realize that colonialism, capitalism, white supremacy, and greed cannot be solved by technology. Rather, they need to be analyzed and addressed through sociocultural, economic, and spiritual lenses.

The root cause activity can lead to another peace education model: the use of problem posing and analysis of an issue through multiple perspectives and stakeholders (what I like to call the “fly-eye analysis”). This intersectional lens can also be used to examine possible solutions so that learners can, in essence, do a planetary cost-benefit analysis of the ideas they are generating or studying.

Another aspect of peace education pedagogy that could prove useful is the use of “futures-orientation” work as put forth by David Hicks (2004). Not unlike the seven generations mindset of indigenous peoples, peace educator Hicks invites learners to imagine the future they want to see and then consider the steps it will take to get there. In doing so, a variety of eventualities can be explored, thus limiting the possibility of overwhelm or apathy and eliminating outcomes that maintain the status quo. As Hick states:

Students also need to explore the range of solutions that have been put into place or are being proposed for such issues. Not to do this can lead to a sense of alienation and despair. Doing this appropriately can lead to a growing sense of empowerment and encourage the first steps in responsible global citizenship. (Hicks 2004, 166)

Radical Inclusivity

Since it has already been established that the developed-ness of what is commonly referred to as the “developed world” is only due to the exploitation of peoples and lands around the globe by colonizers, it would behoove all those committed to change to practice radical inclusivity as part of the work of imagining alternative futures and developing solutions to this wicked problem of climate change. In this sense, I am referring to including the voices of those who are feeling the effects of climate change first and most devastatingly (such as inhabitants of island nations, the global south, former colonies, and the poor and disenfranchised); indigenous societies whose worldview, in almost all cases,

is oriented around living in reciprocal relationship with all life forms rather than trying to overpower them; and persons and communities that offer economic, social, cultural, and religious models that counter capitalism, regardless of scale.

Replicable Versus Scalable

As previously mentioned, the primary root cause humanity is up against and where the transformation needs to start is an acknowledgment of the ills of capitalism. Through peace education pedagogy, how inconsistent capitalism is with democracy and egalitarian ideals can be analyzed. I would also remind folks to examine internalized capitalism or attachment to the dominant paradigm, as it may limit one's ability to openly explore the suggestions of others, especially younger learners. I have heard critiques among my own colleagues of students' creative, local, sustainable responses to climate chaos. They deem them "not scalable," which is the language of exploitative capitalism. The solutions the world needs now need not be scalable or profitable but rather replicable, especially in local communities. This shift in language is a signifier of the paradigm shift needed to move away from a competitive capitalist consumption model of life on Earth to a communal collaborative model that sustains all life on Earth. Replicability over scalability also reminds those involved in climate action to balance the three legs of our stool.

Spiritual (or Religious) Grounding

Finally, I truly believe that the shift needed will be guided by a connection to a spiritual calling to do better. For my own grounding and to promote an ethic that calls on everyone to collectively address climate chaos, I coined the phrase: "Science provides us with the data, *our* faith compels us to act." I chose the collective terminology since I believe that individualism is one of the root causes of climate chaos. Therefore, all of humanity—regardless of how we define faith or what religious teachings we follow or spiritual practices we adhere to—have to work collectively to care for all life, for the planet, for place, for people. Spiritual guidance coupled with a regular spiritual practice that calls people into connection, that nourishes the work of educators, advocates, and activists, is needed on the personal and global scale. Spirituality as a concept is in many ways a moving target as various definitions of spirituality exist and not everyone has either an interest in or an adherence to something they would deem spiritual. For some, religious ideologies supersede a sense of personal spirituality—following the norms of a religion may or may not include a true connection to the spiritual. For others, including members of my Unitarian Universalist community, humanists, and non-theists, rationality can either override or completely dismiss the notion of spirituality. Thus, in a previously published article, I utilized this characterization of spirituality:

My current working definition of spirituality is: a personal connection to that which is greater than yourself. It's ambiguous in form —this connection could be to nature, God, gods, Buddha, love, the collective, wonder, the ineffable, or a call to change the world through good works. What matters is how this spirituality manifests in how we act and live our lives. Spiritual people often take part in some form of self-improvement through reflection. Led by the feeling of connection spirituality generates, they seek to do good in the world by helping others or working for justice, peace, equity, and environmental health. The spirituality discussion gets muddy because of the tension in relation to religion. Crucially, one can be spiritual without being religious and vice versa. Religion—if we go to the root word—is about being bound together, being tied to one another or a specific community by a shared belief system. This need not include god or creed or dogma—as is the example of Unitarian Universalism—rather focusing on an identifiable commonality. Within any religious system, we may all have our own forms of spirituality and our own connections to the divine or holy or unknown (or whatever you'd like to call it), which gives us our path and our callings. (Ardizzone 2022, 4)

However one defines spirituality, and however one chooses to embody it, the spiritual aspect of humanity's collective transformation cannot be understated.

Moving Forward with Accountability

Implementing practices that address the climate chaos humans have unleashed and exploring technological solutions to ameliorate suffering invites the following questions, which should be applied consistently: 1) Am I using an intersectional lens to examine assumptions to ensure that all points of view are included? 2) Who is helped? Who is harmed? 3) Have I centered the voices of those most impacted? 4) Have I looked to ancestors or First Nations/indigenous/native people for wisdom and models? 5) Am I considering seven generations into the future? 6) What is my spiritual practice teaching me or calling me to do?

The work those of us committed to planetary change are called to do right now is urgent and daunting and will not be remedied by any quick fixes. If we see ourselves as members of a collective, called to care for creation in a way that ensures a healthy flourishing of all life for generations to come, we must act.

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Climate Change and Climate Technologies: Public Perceptions and Communication Challenges

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Numerous survey studies reveal insight into the public's attitudes about climate change. These indicate that the majority of people around the world, including in the United States, do not deny that climate change is happening, but a smaller majority believe human activity is either partially or mostly to blame. In the United States, peoples' attitudes about climate change are politically polarized, leading some science communicators to suggest appealing to identity-affirming cultural meanings when discussing climate change. Studying the public's attitudes about climate technologies, or geoengineering, is a growing field. Most people have never heard of geoengineering or know very little about it. The topic is not yet politically polarized, creating an opportunity to encourage responsible societal discussions about the risks and benefits of climate intervention technologies. Given the possibility that every tenth or hundredth of a degree of warming avoided can matter in terms of the magnitude of climate impacts, these discussions are vital.



Introduction

Whether through personal experience with weather extremes or through the barrage of world news reports drawing attention to the aftermath of these extremes, it seems that the impacts of climate change are becoming increasingly difficult to deny. How large a role does the denial of climate change play in hindering the necessary but difficult work of climate change mitigation? Does the promise of climate intervention technologies further endanger the likelihood of action? To begin to answer these questions, a review of what is known about the public perceptions of climate change and climate technologies and the challenges of communication on these topics provides a useful starting point. This article summarizes recent public survey research on these topics and insights from science communicators. The research reviewed includes a world public, however the focus of this article is on public understanding and attitudes in the United States.

Global Perceptions of Climate Change

In 2019, the Lloyd's Register Foundation and Gallup conducted a World Risk Poll to help understand how people view a range of risks that may impact them (Lloyd's Register Foundation 2019). The poll was unique in that much of the data was collected through in-person interviews in places where people have never before been surveyed. One of the risks the survey explored was climate change (Lloyd's Register Foundation 2019, chapter 6). The poll surveyed 150,000 people in 142 countries, asking them, "Do you think that climate change is a very serious threat, a somewhat serious threat, or not a threat at all to the people in this country in the next twenty years? If you don't know, please just say so" (Lloyd's Register Foundation 2019, 110). Nearly 70 percent of people surveyed agreed that climate change is a "very" or "somewhat" serious threat, however less than half of these, 41 percent, believed the threat was "very serious." Answers varied at the regional and country levels, but at least 60 percent of people in every region agreed that climate change is a threat (from a high of 93 percent of people in southern Europe to a low of 60 percent of people in Northern Africa) (Lloyd's Register Foundation 2019, 109).

Respondents from the world's three largest carbon emitters—China (28 percent of the world's CO₂), the United States (14 percent of the world's CO₂), and India (7 percent of the world's CO₂)—described the risk from climate change differently than the overall responses from the rest of the world. Worldwide, only 13 percent of the people surveyed indicated that climate change is "not a threat at all." The United States, however, had the highest percentage of individuals among high income countries who chose this response at 21 percent. Individuals from India had a response similar to the United States at 19 percent. Only 12 percent of Chinese survey respondents indicated that climate change is

“not a threat at all,” but 29 percent indicated they “don’t know,” a much higher percentage than the overall worldwide response, 18 percent (Lloyd’s Register Foundation 2019, 117).

The demographic factor that most impacted people’s risk perception was education level (Lloyd’s Register Foundation 2019, 109). People with higher education levels were most likely to see climate change as a serious threat to their country. Other influences were whether or not the individual had experienced a severe weather event, how they felt about their local air and water quality, and whether or not the issue was ideologically politicized in their country (Lloyd’s Register Foundation 2019, 120). Despite these variations, it can be concluded that worldwide, people are aware of the risk from climate change and that the majority of people in all regions surveyed in 2019 do not deny this risk is real. How do people’s concerns about climate change in 2019 compare with their concerns about climate change in previous years?

The Pew Research Center’s Global Attitudes Project surveys, conducted in 2013, 2017, 2018, and 2022, suggest that climate change topped the list of people’s perceived global threats over these years and that their concern has been increasing with time. In 2013, 2017, and 2018, Pew surveyed people from twenty-three countries to determine how their concerns about a range of global threats—namely, China’s power and influence, Russia’s power and influence, the United States’s power and influence, the global economy, North Korea’s nuclear program, cyberattacks, and global climate change—ranked. In all survey years, global climate change was seen as the greatest international threat, with the median across the twenty-three countries surveyed increasing from 56 percent in 2013 to 67 percent in 2018. The closest threat competitors in people’s view in 2018 were cyberattacks at 61 percent and ISIS at 62 percent. In thirteen of the countries surveyed, worries about climate change increased significantly over this time, with double digit rises (Poushter and Huang 2019). In 2022, Pew Research Center’s Global Attitudes Project survey reported on the concerns of citizens in advanced economies in nineteen countries in North America, Europe, and the Asia-Pacific region. Citizens were surveyed about concerns related to the spread of infectious diseases, the condition of the global economy, cyberattacks from other countries, the spread of false information online, and global climate change. Once again, concerns about global climate change topped the list with a median of 75 percent of respondents across these nineteen countries describing it as a major threat. The spread of false information ranked the next highest with 70 percent (Poushter et al. 2022).

The majority of people around the world, including those in the most advanced economies, do not deny that climate change is happening, and they are concerned about the threat it poses to their countries. The United States distinguishes itself among high income countries as having the greatest number of climate change skeptics, though they are still a minority voice.

American Perceptions of Climate Change

The Political Psychology Research group at Stanford University conducted a series of national surveys from 1997 through 2020, all of which included twenty-two questions designed to reveal the American public's fundamental beliefs about climate change, their engagement on the issue, and their policy preferences. The results were reported for each state (McDonald et al. 2020). As noted, while the United States has the greatest number of climate change skeptics among high income countries, these skeptics are in the minority, and the same is true for the percentage of skeptics in each state. In 2020, more than 70 percent of residents in all states, and more than 80 percent in the majority of states, believed that global warming has been happening. Massachusetts had the largest majority at 88 percent and Utah the lowest at 71 percent.

In another report, the Stanford University researchers focused on what the survey data reveals about the certainty of Americans' beliefs about climate change (Krosnick and MacInnis 2020). Overall, the percentage of Americans who believe global warming has been happening over the past 100 years rose from 77 percent in 1997 to 81 percent in 2020. Looking towards the future, the overall percentage of Americans who think Earth's temperature will "probably go up" over the next 100 years if nothing is done to stop it remained unchanged at 75 percent. However, of this 75 percent, the percentage who are "extremely sure" or "very sure" temperatures will continue to rise increased from 45 percent in 1997 to 68 percent in 2020.

While acceptance of climate change is the norm, does the United States public also accept that human activity is the driver of global warming? In 2020, the percentage of individuals in each state who believed that past warming was caused by humans was not below 70 percent of the residents in any state but, overall, there was more skepticism around this question than whether or not global warming has been happening. Rhode Island and New Hampshire had the largest majority of citizens who believed that past warming was caused by humans at 91 percent, and Utah the lowest majority of citizens who accepted this at 71 percent (McDonald et al. 2020). From 1998 to 2020, the overall percentage of Americans who believe "human activity has been at least partially causing global warming" changed very little, from 81 percent to 82 percent (Krosnick and MacInnis 2020). What has changed is that from 2006 to 2018 this opinion has become highly politically polarized in the United States. The percentage of Democrats who accept that human activity has played at least a partial role rose from 83 percent to 91 percent during this time frame, whereas the percentage of Republicans fell from 77 percent to 66 percent (MacInnis and Krosnick 2020). Much to the frustration of climate scientists, Americans' views on climate change and its causes are often determined by political party identification. Making progress on this issue in the United States will require moving beyond partisanship, but science communication researchers are not in

agreement about how best to address the problem. This article discusses two contrasting suggestions.

Navigating Climate Change Communication

There is no significant disagreement within the scientific community as to whether climate change is happening or whether human activity is the driver of global warming. Scientists overwhelmingly agree that global warming is happening and that the burning of fossil fuels by humans is the reason. John Cook et al. (2013) analyzed peer-reviewed published studies on climate change and determined that the consensus among scientists that humans are causing global warming is greater than 97 percent. Cook (2023) also collected public perception data in the United States with the survey question “how many climate experts agree that the global warming we are witnessing is a direct consequence of the burning of fossil fuels by humans?” He found that only 12 percent of Americans are aware that the scientific consensus on humans causing global warming is higher than 95 percent. The most common answer, given by 45 percent of respondents, was that only 30 to 50 percent of scientists agree with this statement (Cook 2023). Cook suggests that communication efforts with the public should focus on closing the gap between the public perception of the scientific consensus and the reality of the scientific consensus. He and others argue that understanding the consensus among scientists is a gateway to accepting climate change and its cause (Cook et al. 2017). However, another school of thought, led by Dan Kahan, suggests that focusing on correcting knowledge deficits can be a polarizing message.

Kahan (2010) argues that the public will fit any evidence into their group identities, so successful science communication hinges on communicating identity-affirming cultural meanings, not just facts. Science communicators are advised to be cognizant of “cultural cognition,” recognizing that when positions on facts become associated with opposing social groups, individuals are likely to selectively assess evidence in patterns that reflect their group identity (Kahan 2015). The significance of cultural cognition for peoples’ opinions about climate change and its causes is clearly illustrated by the results of a 2019 Pew Research Center survey.

In 2019, Pew Research Center designed a survey with eleven questions to measure an individual’s general understanding of scientific facts and processes. They reported their findings as a function of the individual’s political ideology (Kennedy and Hefferon 2019). The mean score for the number of questions answered correctly by all who completed the survey was 6.7. Overall, Republicans and Democrats had similar levels of science knowledge, with mean scores of 7.0 and 6.6, respectively. Those who scored the highest were both the most conservative Republicans, mean score 7.4, and the most liberal Democrats,

mean score 7.8. Based on this survey, neither Republicans nor Democrats can claim that their political party, in general, has a greater understanding of science than the other party.

Pew then compared this general measure of science understanding based on test score (high 9–11, medium 5–8, and low 0–4) to agreement with the statement “human activity contributes a great deal to global climate change,” and once again reported the results as a function of the respondent’s political ideology (Funk and Kennedy 2020). For Democrats, agreement with the statement correlates to their score on the general understanding of science test, with results ranging from a low score and 41 percent agreement with the statement to a high score and 89 percent agreement. Democrats who scored highest on the general understanding test have the highest percentage of individuals agreeing with the statement “human activity contributes a great deal to global climate change.” There is no such correlation for Republicans, and those who scored highest on the general understanding test actually had less agreement with the statement, 17 percent, than their Republican peers, 25 percent of whom agreed with the statement. This is an example of why science communication researchers like Kahan argue that focusing on fixing an information deficit or closing the consensus gap by communicating what scientists know may not be as effective as appealing to identity-affirming cultural meanings, for example, showing a connection between climate change and what a person values. In the United States, one way many individuals identify themselves is in reference to their religious beliefs. Does religious commitment impact Americans’ views on climate change and its causes?

Religious Commitment and Climate Change Attitudes

The Pew Research Center approached the preceding question with a 2022 survey that explored climate attitudes as a function of both different religious affiliations and varying levels of religious commitment (Alper 2022). Individuals were asked about the frequency with which they pray and attend religious services and the degree to which they consider religion very important in their lives. A “high religious commitment” was assigned to those who pray daily, regularly attend religious services, and consider religion very important in their lives. Those who seldom or never pray, seldom or never attend religious services, and report that they do not consider religion important in their lives were categorized as having a “low religious commitment.” The survey also asked respondents if they agreed with four statements: “Earth is sacred”; “completely/mostly agree that God gave humans a duty to protect and care for the Earth”; “climate change is an extremely/very serious problem”; and “Earth is getting warmer because of human activity.” The “highly religious” had the greatest percentage of individuals who agree that “Earth is sacred,”

68 percent, and “completely/mostly agree that God gave humans a duty to protect and care for the Earth,” 92 percent, compared to those with a “low religious commitment,” 64 percent and 24 percent, respectively. However, the “highly religious” were least likely to agree that “climate change is an extremely/very serious problem,” 42 percent, compared to those with a “low religious commitment,” 72 percent. They were also least likely to agree that “Earth is getting warmer because of human activity,” 39 percent, compared to those with a “low religious commitment,” 70 percent.

The survey also asked individuals to identify themselves within a range of religious affiliations. There is a variation among religious affiliations as to whether individuals believe “climate change is an extremely/very serious problem” and the “Earth is getting warmer because of human activity.” For example, evangelicals are least likely to report that “climate change is an extremely/very serious problem,” 34 percent, or that “Earth is getting warmer because of human activity,” 32 percent. Catholics had the highest percentage of individuals who agreed with both these statements, 57 percent and 54 percent, respectively. However, those who described themselves as religiously unaffiliated had greater agreement with the statements, 70 percent and 66 percent, respectively, than those who identified with any religious affiliation.

At first glance, these results might suggest that religious affiliation is a key predictor of climate change attitude. However, the survey also reported responses to the aforementioned questions by members of each religious affiliation as a function of their political ideology. Within all religious affiliations, Republicans were more likely than Democrats to disagree with the two questions; this held for those who identified as religiously unaffiliated as well. For example, in response to the statement “climate change is an extremely/very serious problem,” only 17 percent of Republican evangelicals agreed, whereas 78 percent of Democratic evangelicals agreed. Likewise, for those who identified as religiously unaffiliated Republicans, 34 percent agreed with the statement versus 88 percent of religiously unaffiliated Democrats. Political party identification is the crucial factor in determining views toward climate change.

Finally, the survey asked all individuals who answered that “climate change is not/not too serious problem,” 20 percent of overall respondents, to choose among five options as to why they believed that to be the case: “there are much bigger problems in the world today”; “God is in control of the environment”; “climate change will not have a big impact on most people”; “I don’t believe it’s happening”; and “new technologies will fix problems created by climate change.” There was variation among religious affiliations as to the popularity of those options; for example, 29 percent of evangelicals said their reason was because “God is in control of the climate,” whereas only 8 percent of Catholics chose that option. However, the most common answer chosen by all

affiliations, including those who identified as religiously unaffiliated, was that “there are much bigger problems in the world today.” This option was chosen by 17 percent of all respondents followed by “God is in control of the climate,” chosen by 11 percent. The remaining options each accounted for less than 10 percent of the overall responses. Even among those who do not believe climate change is a serious problem, it seems the greatest barrier is not climate denial but a failure to see how climate change impacts their life. An important way to reach these individuals then would be to show a linkage between climate change and their values or the issues they worry about. This approach supports the work of Kahan (2010, 2015), who suggested appealing to identity-affirming cultural meanings when discussing climate change.

Public Perceptions of Climate Technologies

The studies reviewed indicate that the majority of people around the world, including in the United States, do not deny that climate change is happening, but a smaller majority believe human activity is either partially or mostly to blame. In the United States, people’s attitudes towards climate change are very politically polarized. Regardless of these varying attitudes, temperatures continue to rise, and many experts are concerned that given the current adoption rates of mitigation efforts, these efforts will not be enough to avoid disastrous climate impacts. Therefore, climate intervention technologies, or “geoengineering,” as a companion to mitigation are increasingly being considered as a way to manipulate the Earth’s climate and lessen the impact of climate change (e.g., Smith 2022). Geoengineering here refers to both solar radiation modification (SRM), technologies proposed to reflect sunlight back into space to prevent the atmosphere from absorbing the sun’s heat, and carbon dioxide removal (CDR), technologies aimed at the capture and storage of CO₂ from the atmosphere to slow further warming.

What is known about the public’s attitudes regarding the use of geoengineering to impact the climate? In 2021, the journal *Current Opinion in Psychology* published a themed issue on the psychology of climate change. This special issue included a review paper by Kaitlin Raimi (2021) that summarized the growing literature from the social sciences on public understandings of, and initial reactions to, geoengineering. Several points from this literature review are noteworthy and summarized here. First, most people have never heard of geoengineering or know very little about it. As noted, the survey that examined climate change attitudes as a function of religious affiliation asked the 20 percent of respondents who did not believe climate change was a problem to choose among five options as to why they felt that way. The response chosen the least, by only 4 percent of the respondents, was “new technologies will fix problems

created by climate change” (Alper 2022). This result might reflect the reality that the general public is not familiar with geoengineering techniques or the role they might play in impacting climate.

When people are introduced to CDR and SRM technologies, their initial reactions range from neutral to negative. Generally, more people are wary of SRM than of CDR. In regards to SRM, people are more supportive of laboratory research than deployment. This wariness extends beyond laypeople to experts, who perceive the risks to be even larger than laypeople do, especially regarding SRM. The CDR techniques people are most supportive of are afforestation or reforestation, in large part because these are seen as “natural” approaches. Finally, the lack of public awareness about geoengineering can be viewed through a lens of opportunity for early engagement. For a social scientist with a research goal, there is an opportunity to design their study in a way that avoids setting a particular agenda. The way the technologies are initially presented can have a large framing effect. For example, SRM portrayed as a way to address a climate emergency increases support for rather than opposition of the technology because the alternative is seen as a worse choice. Of course, the lens of opportunity is also there for those who are interested in marketing geoengineering techniques rather than collecting data on peoples’ attitudes toward these techniques once they are familiarized with them. That said, from a science communication point of view, the lack of public awareness about geoengineering can be advantageous because it is currently uncorrelated to any large degree with political ideologies. This keeps the possibility alive for the careful and inclusive dialogues that need to take place in regards to both the research and potential deployment of these technologies.

As the public learns more about geoengineering, a growing concern is the potential threat of moral hazard, namely, that learning about geoengineering and believing it could solve climate change will result in decreased support for reducing emissions. Alternatively, learning about the need for geoengineering might also result in an increase in the perceived threat of climate change and lead to an increase in support for reducing emissions. To explore these possibilities, one United States study looked at the influence of learning about CDR on support for mitigation policies (Campbell-Arvai et al. 2017). This study used a detailed online survey that began by introducing all participants to climate change then continued with five subsets of participants. One subset received no additional information, one subset read text that described the idea of CDR broadly, and the other three subsets read a description of just one type of CDR (reforestation, bioenergy plus carbon capture and sequestration, or direct air carbon capture). The participants then answered questions to determine if they perceived climate change as a threat, if they supported climate change mitigation, and what their political leanings were. The researchers discovered that learning about CDR did reduce the participants perceived risk of climate

change and that this was the case for all CDR messages except reforestation. This reduction in perceived risk correlated with a reduction in support for climate mitigation policies. While this was true for all political ideologies, it was most pronounced for conservatives. This study suggests that moral hazard will be a problem as the United States public learns more about CDR technologies.

However, things may be different for SRM: a study conducted with German citizens who were introduced to SRM resulted in a very different outcome. All participants in the online survey conducted in Germany received information about the effects of greenhouse gases on the climate, currently observed climate change, and mitigation and adaption as two ways of dealing with climate change. One group also received information about a specific SRM technique, the injection of aerosols into the stratosphere (SAI), as a third way of dealing with climate change alongside mitigation and adaption (Merk et al. 2016). In this unique study, all participants were also told about the possibility of supporting climate mitigation projects by purchasing voluntary carbon offsets and given funds that they could either keep for themselves or use to purchase offsets at a reduced rate. The researchers found that of those who learned about SAI, 42 percent reported being more alarmed about climate change and 3 percent less alarmed, and 55 percent stated no change in their perceptions. Those who were more alarmed used their funds to purchase more offsets than those in the control group who did not learn about SAI, but even those whose level of alarm did not increase after learning about SAI bought more carbon offsets than the control group. Participants were also asked whether they thought research about SAI in the lab or with computer models should take place. Those who disagreed that this research should go forward, or who were not sure, bought the most carbon offsets, but even those who were in favor of lab research bought more carbon offsets than the control group who received no information about SAI. Researchers concluded there was no evidence of moral hazard as a reaction to information on SAI. Even participants who perceived SAI to be an effective response to climate change did not reduce their support for mitigation efforts. Being informed about SAI technology led participants to choose mitigation. It seems the question of moral hazard remains an open one that can depend on the specific technology being considered (CDR or SRM), how the technology is framed, and who the audience is. For all the technologies being considered, policymakers or interest groups may react differently than individual citizens.

Public Engagement on Climate Technologies

The necessity for society to make difficult decisions concerning the regulation of research on, or the deployment of, geoengineering technologies is only going to increase in the future. At the same time, the window of opportunity for responsibly engaging the public on this topic, one with which they are largely

unfamiliar and opinions about which are not strongly associated with a political ideology, will close sooner rather than later. Colvin et al. (2020) urge science communicators to take advantage of this time frame to encourage “functional discourse” about geoengineering, where the goal of discussions is movement toward resolutions rather than defeating opponents.

With the public debate that has taken place around the topic of climate change in hindsight, Colvin et al. (2020) offer suggestions for moving forward with public engagement on climate technologies. First and foremost, they suggest that ideological bundling, that is, the technologies becoming associated with one political party over another, must be avoided. To do this, they advise that communication frames are chosen carefully. Most importantly, technologies should be presented as a complement to mitigation actions not a substitute for them. The possibility of co-benefits for both the environment and the economy should be noted. These benefits can appeal to a range of ideologies. Positive impacts are possible for both human and non-human wellbeing now and into the future. Old industries can be revitalized and new industries developed. To help convey these messages, Colvin et al. (2020) advise involving non-partisan trusted messengers and developing strategic alliances with individuals and organizations with diverse ideological leanings. Beyond avoiding ideological bundling, responsible functional discourse will also require differentiating among the numerous geoengineering technologies that exist under the umbrella of both CDR and SRM technologies. The risks and benefits of each will need to be considered in context. In addition to these guidelines, I suggest that science communicators also need to be cognizant of the psychological toll that the general topic of climate change is taking on many people.

The surveys reviewed show that the majority of both a worldwide and a United States public view climate change as a threat. In fact, there are a growing number of people, dubbed climate doomers, who believe that the climate problem cannot be solved in time to stop societal collapse. For many climate scientists and activists, this defeatist attitude, one that can undermine efforts to take action, is just as dangerous as the attitude of climate denialists (Osaka 2023). Recent research suggests that these scientists and activists have reason to be concerned.

Marlon et al. (2019) conducted an online study with Americans who accepted that global warming is happening. They first asked an open-ended question: “what if anything makes you hopeful/doubtful that global warming can be reduced?” They categorized the answers from that study and used those categories in a second study to see how the hopes and doubts identified impacted the respondents’ potential political engagement on the topic and their support of policies to address climate change. Marlon et al. (2019) discovered that those most likely to take action were those who possessed both a “constructive hope” and a “constructive doubt.” Those with constructive hope recognized that both

awareness of the problem and efforts to address it were on the rise, whereas those with “false hope” believed the problem would be solved without human action. Those with constructive doubt understood that humanity was not doing enough to address climate change, whereas those with “fatalistic doubt” believed humanity could never address the problem. Those who reported they would address climate change with both political engagement and policy support expressed both constructive hope and constructive doubt. Both of these are key to climate change action. When inviting the public to be part of a functional discourse about climate technologies, the importance of both constructive hope and constructive doubt to the success of those discussions should also be recognized. While climate technologies promise benefits, they also come with risks, and both need to be acknowledged.

In 2018, the Intergovernmental Panel on Climate Change published *Global Warming of 1.5°C*. The report outlines the potential impacts of global warming 1.5°C above preindustrial levels on natural and human systems and compares those to the impacts of global warming 2°C above preindustrial levels. One striking conclusion from the modeling is that every tenth or hundredth of a degree of warming avoided can matter in terms of the magnitude of the impact on natural and human systems. For example, model-based projections of mean sea-level rise by 2100 at 1.5°C of global warming are 0.1 meter less than those projected for 2°C global warming. That 0.1 meter could translate into ten million less people being impacted by the related risks of sea-level rise (IPCC 2018, B.2.1.) Efforts towards decreasing global warming must be focused on increasing mitigation. However, if climate technologies can also contribute to avoiding even a tenth or hundredth of a degree of warming, then working to encourage functional discourse around the research and potential application of these technologies, especially in the context of climate justice considerations, seems a prudent choice.

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An Ethical Framework for Climate Intervention Research: What It Is and Why You Should Care

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Climate change poses significant threats to ecosystems, human health, and global stability. Despite international efforts to reduce greenhouse gas emissions, the Earth's climate continues to warm, leading to extreme weather events, rising sea levels, and other detrimental impacts. In response to this crisis, scientists have begun exploring various strategies to mitigate climate change through geoengineering, which involves deliberate interventions in the Earth's climate system. This article provides an overview of climate geoengineering research, focusing on key techniques, challenges, and ethical considerations, including actions being taken by the American Geophysical Union (AGU), a nonprofit professional scientific society, to develop an ethical framework to help guide research in this important area. AGU also is driving global engagement on this topic, including with leaders and members of faith communities.



The Case for Change

Our planet is at risk. The urgency and impact of global warming is bad and is getting worse. Increasingly severe harmful impacts in many forms can be seen across the globe, including human suffering, societal disruption, and reduced ecological health. Impacts such as record-high global temperatures, more severe storms, increased drought, a warming and rising ocean, more health risks, increased poverty, and displacement are all reported in authoritative reports by global climate scientists (United Nations, n.d.-a).

One hope for reversing this trend was the 2016 Paris Agreement, a legally binding international treaty on climate change. It was adopted by 196 parties (independent countries) at the Twenty-First Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) in Paris, France, in December 2015 and entered into force in November 2016.

The overarching goal of the Paris Agreement was to “hold the increase in the global average temperature to well below 2°C above pre-industrial levels” and pursue efforts “to limit the temperature increase to 1.5°C above pre-industrial levels” (United Nations, n.d.-b.). However, in recent years, world leaders have stressed the need to limit global warming to 1.5°C by the end of this century. This is because the United Nations Intergovernmental Panel on Climate Change indicates that crossing the 1.5°C threshold risks unleashing far more severe climate change impacts, including more frequent and severe droughts, heatwaves, and rainfall. To limit global warming to 1.5°C, greenhouse gas emissions must peak before 2025 at the latest, decline 43 percent by 2030, and target reaching net-zero emissions by 2050. The agreement also called for each country to establish and report goals for reducing its annual greenhouse gas emissions (United Nations, n.d.-a).

The climate action urgency is this: emission-reduction goals are not being met; in fact, global greenhouse gas emissions are actually increasing! There is now general scientific agreement that dramatic reductions in global CO₂ emissions combined with the active removal of CO₂ from the atmosphere may be needed (IPCC 2023). This consensus has resulted in an expansion of climate intervention research. The likelihood that global average temperatures will overshoot the targets agreed to by the world’s nations (1.5–2.0 degrees Celsius) has led the Intergovernmental Panel on Climate Change to consider climate intervention as a potential pathway to reduce, remove, or offset some of the effects of climate change, with risks and trade-offs that need to be better understood. In some cases, limited outdoor testing is already underway and growing—attracting much attention—but in many cases without ethical guidelines (National Academies of Sciences, Engineering, and Medicine 2021).

What Is Climate Intervention and Why the Concern?

Climate intervention and climate geoengineering are used interchangeably in this article. Climate geoengineering refers to large-scale schemes for intervention in

the Earth's oceans, soils, and atmosphere with the aim of reducing the effects of climate change, usually temporarily (Grantham Research Institute 2018). While some argue that climate intervention should be a last resort, others argue that Earth is rapidly approaching a climate emergency, requiring the consideration of all options (Robock 2020). The *Sixth Assessment Report* of the Intergovernmental Panel on Climate Change stated that the risk of reaching climate tipping points becomes high by around 2°C above preindustrial temperatures and very high between 2.5°C to 4°C (IPCC 2023).

The two primary techniques of climate intervention being researched are solar radiation modification (SRM) and carbon dioxide removal. SRM aims to reduce the amount of sunlight reaching the Earth's surface, thereby counteracting global warming. One proposed method involves injecting aerosols into the stratosphere to reflect sunlight back into space, mimicking the cooling effect of volcanic eruptions. Research suggests that SRM could effectively lower global temperatures and offset some of the effects of greenhouse gas emissions.

Solar radiation modification (SRM) is a deliberate and large-scale intervention in the Earth's climatic system, with the aim of reducing global warming. It attempts to offset the effects of greenhouse gases by causing the Earth to absorb less solar radiation. The idea that the climate could be artificially cooled emerged in the 1960s at the same time as the potential risks of climate change were first being taken seriously. SRM is an umbrella term for proposed technologies that would reflect more sunlight back into space, or allow more infrared radiation to escape into space, thereby creating a net cooling effect on the earth's climate. SRM technology options include stratospheric aerosol interventions (SAI — the most studied option), marine cloud brightening (MCB), ground-based albedo modifications (GBAM), ocean albedo change (OAC) and cirrus cloud thinning (CCT). Modeling studies have shown SRM could potentially offset some climate change risks, including the increase in frequency and intensity of extremes of temperature and precipitation. However, it could also introduce a range of new risks related to the change of global weather pattern. (European Commission 2023)

Carbon dioxide removal techniques seek to remove CO₂ from the atmosphere and store it in various reservoirs, such as oceans, forests, or geological formations. Examples of carbon dioxide removal methods include afforestation/reforestation, ocean fertilization, direct air capture, enhanced weathering, and direct ocean capture, among others. These potentially could be deployed at a range of scales and currently vary widely in their scientific and market readiness.

While these approaches hold promise for reducing atmospheric CO₂ concentrations, they present technical, economic, and environmental challenges (Kulkarni 2022).

While carbon dioxide removal research and testing are more advanced than for SRM, many other climate geoengineering techniques remain largely theoretical or untested at scale. Implementing large-scale interventions could have unforeseen consequences and unintended side effects on ecosystems and weather patterns. Additionally, the long-term effectiveness of these strategies is uncertain, as they may only provide temporary relief from climate change. More research is needed.

The governance of climate geoengineering also poses significant challenges due to its global scale and potential geopolitical implications. The lack of international agreements and regulations governing geoengineering research and deployment raises concerns about accountability, equity, and unintended consequences. Balancing the need for innovation with ethical considerations remains a critical issue in the field of climate geoengineering.

Proponents of geoengineering state that:

[t]he primary challenges of geoengineering are conducting field experiments to accurately assess potential consequences and developing international agreements to safely deploy and monitor geoengineering technologies. If geoengineering were adopted, a combination of techniques would be used depending on cost, regional conditions, and the climate's response. Different methods may have local or global effects, so regulatory policies need to be agreed upon by the international community. Therefore, many scientists have called for the creation of regulatory agencies to advise the United Nations and lay out plans for how geoengineering methods should be prioritized. Geoengineering could help us reverse climate change in a more controlled manner, buying us time to make our society more sustainable. (Kulkarni 2022)

The Role of a Professional Society: American Geophysical Union Action

In 2022, the American Geophysical Union (AGU)¹ board of directors authorized an ethical framework initiative to advance research progress on these climate intervention-related topics. The context for AGU action to help address the growing climate crisis is summarized in below passage from a 2022 AGU white paper titled "AGU Climate Intervention Engagement: Leading the Development of an Ethical Framework." The white paper defines the needs and outline plans for AGU (2022) actions:

Current technologies for active removal of carbon dioxide and other greenhouse gases from the atmosphere are not nearly at the scale needed to reach net zero emissions. Significant questions, both practical and ethical, remain as to the long-term storage of removed CO₂. As a result, other potential climate intervention technologies to mitigate warming are being researched and discussed in both

the public and private sectors, including a variety of approaches known as “geoengineering.” These methods (including SRM and Other Climate Altering Technologies) are largely untested and pose significant risks if implemented at scale. They should not move forward for deployment without an international ethical governance structure to allow globally acceptable risk-controlled testing.

An AGU (2023a) position statement on climate geoengineering states:

Given the likelihood that the world will overshoot global average temperature targets, Climate Intervention (CI) measures such as carbon dioxide removal and solar radiation management may be part of a comprehensive risk-management strategy. CI measures cannot substitute for deep cuts in emissions or adaptation. That said, research aimed at understanding the benefits and impacts of CI measures is necessary and must consider global transparency, ethical, and inclusion practices and be subject to robust governance and oversight structures. CI research must be part of a broader climate solutions package that, given the urgency of addressing climate change, should be funded at a level matching the enormous scale of the space programs of an earlier era.

The governance of climate intervention is not straightforward. Many scientific reports call for dramatic intervention to avoid catastrophic climate tipping points, and research and small-scale tests are already in progress. However, the unintended consequences (or what engineers call ‘revenge effects’) of large-scale climate intervention are not fully understood. There is evidence that some large-scale climate interventions may have significant negative local and regional consequences. For instance, modeling studies of solar radiation modification suggest such an approach could alter the South Asian monsoon season and reduce precipitation in India—affecting food security for more than a billion people (Bala and Gupta 2019). As a result, some have called for a total ban on such research and approaches (Solar Geoengineering Non-Use Agreement 2022).

Ethical and Social Implications

Climate geoengineering raises complex ethical dilemmas regarding responsibility, justice, and intergenerational equity. Critics argue that deploying geoengineering technologies could undermine efforts to reduce greenhouse gas emissions and promote sustainable development. Furthermore, geoengineering interventions may disproportionately impact vulnerable communities and exacerbate existing social inequalities.

The challenges around the potential to engage in climate engineering are multifaceted and often controversial, inviting a need for broad conversations and deeper understanding. Many of the questions are ethical and do not have

quick or easy answers. For example, more than 1,500 people signed a 2022 international petition calling for a halt to climate geoengineering research (Solar Geoengineering Non-Use Agreement 2022). Similarly, in 2023, more than 100 scientists signed an open letter supporting the need for climate intervention research (An Open Letter Regarding Research on Reflecting Sunlight to Reduce the Risks of Climate Change 2023).

In this context, AGU has proposed that climate engineering research, policy, governance, and potential scaling discussions should first require directly addressing the ethical issues and ethical dilemmas involved. AGU proposed the development and use of broadly held ethical principles to help navigate this territory based on definitions of ethical issues and ethical dilemmas (AGU 2023b):

- “Ethical issues” are the difficult social questions that involve some level of controversy over the right thing to do. Environmental protection is an example of a commonly discussed ethical issue, because there can be trade-offs between environmental, societal, and economic risk factors.
- “Ethical dilemmas” are situations in which it is difficult for an individual to make decisions either because the right course of action is unclear or because it carries some potential negative consequences for the person or people involved.

AGU leadership’s views are that professional societies are critical for establishing ethical standards on important geoethics issues. AGU recognizes that while professional societies do not have the same enforcement strength as nation states, the larger professional societies with global membership have the potential to offer consistent ethical standards across national borders.

Following its white paper, AGU has proposed a set of preliminary Ethical Framework Principles for climate intervention research, experimentation, and outdoor scaling. These principles are the result of extensive, diverse insights collected through workshops, summits, surveys, and outreach discussions with participants around the world, including in regions most affected by the consequences of climate change.

American Geophysical Union Internal Process for Developing Climate Intervention Research Principles

To directly address the ethical issues and ethical dilemmas around climate intervention research and potential scaling, in 2022 the AGU undertook an initiative to facilitate voluntary ethical principles towards advancing needed discussion and governance policy. AGU does not advocate for climate intervention; however, it believes that the urgent priority of a healthy climate requires enhanced climate intervention research and community engagement, and that ethical guidance is needed. Internally, AGU adopted the following engagement principles to guide this work (AGU 2022):

We are committed to:

- ensuring that research about climate intervention strategies is done in ways that are inclusive, representative, and just;
- ensuring that research about climate intervention strategies is done in ways that do not make deployment inevitable;
- ensuring that research about climate intervention strategies does not undermined efforts to reduce carbon emissions; and
- assuring public participation and consultation in the development of ethical framework decision-making mechanisms and processes.

In their white paper, AGU details why it was positioned to lead efforts to develop an ethical framework:

- AGU science and scientists represent a deep resource of knowledge necessary for proper climate intervention assessments.
- For more than 100 years, AGU has been a trusted and respected voice in science policy, scientific ethics and scientific publications. AGU also has unique global scientific convening expertise that can be used to forge partnerships and calls to action to proactively address and coordinate scientific attention and ethical climate actions.
- The AGU Strategic Plan makes an imperative call for AGU to (1) catalyze discovery and solutions to scientific challenges, (2) promote and exemplify an inclusive scientific culture, and (3) partner broadly with other organizations and sectors to address scientific and societal challenges. One of the most pressing science-related societal challenges needing action is global climate change.
- Building on existing programs, AGU is uniquely positioned to lead in bringing inclusive scientific outreach to local communities globally and to assure attraction and development of early-career and next-generation scientists in this space to proactively address the climate change crisis around the world in both policy and ethical practice strategies over the next 30 years.
- Because of the urgency of this growing crisis, bold and sustained action by AGU to help lead and address research about climate intervention strategies and implementation is both an ethical and moral organizational obligation.
- AGU has used its convening power to assemble a global advisory body of more than 40 ethicists, scientists, policy makers and other experts to help guide this work. (AGU 2022)

Further, AGU's engagement principles were developed with the understanding that climate intervention research, if tested at large scale, could have impact not only within national jurisdictions (land and territorial seas) but also outside national jurisdictions (the atmosphere, space, the high seas, Antarctica).

Balancing Caution with Urgency: Integrating Climate Justice Issues

Based on the urgency of rapidly increasing negative impacts of climate change, AGU leadership invested the direct resources and organizational expertise necessary to partner and co-lead with other organizations and governing bodies to support the voluntary ethical principles and adopt an associated governance framework to help guide climate intervention research. Importantly, the 2023 Intergovernmental Panel on Climate Change synthesis report states that approximately 3.3 billion to 3.6 billion people—almost half of the world’s total population—are among the most vulnerable to the negative impacts of global climate change, with people in the developing world hit hardest (IPCC 2023). Also, between 2010 and 2020, human mortality from floods, droughts, and storms was fifteen times higher in highly vulnerable regions compared to regions with very low vulnerability (IPCC 2023). Thus, there is a need to balance caution with urgency and proactively address issues around climate justice. AGU has declared that an ethical governance framework for climate intervention research and potential scaling “must proactively address the following issues”:

- distributive justice (who benefits and who is harmed)
- procedural justice (who decides/how will geoengineering decisions be made)
- local right of refusal versus global impact of refusal
- capacity to conduct research not being equitably distributed
- measurements and reporting:
 - land use and ocean issues.
 - slippery slope and moral hazard hypotheses (and how to evaluate those hypotheses) (Tang 2023)
 - levels or maturity matrix for various phases of research and field experiments or deployment. (AGU 2022)

AGU is acting to assure that its proposed ethical framework principles proactively address climate justice as a priority (AGU 2023b).

Climate Intervention Attitudes Survey

AGU also sponsored a survey of attitudes on geoengineering. In closely interrelated work, Professor Joel Cutcher-Gershenfeld² of Brandeis University reports that:

[a] survey of 156 experienced geoscientists and a series of five expert-invited workshops provide in initial look at this complex landscape. While some respondents say we should just focus on reducing carbon emissions, 95% of geoscientists surveyed see ethical standards as important for geoengineering

research. There is near universal (97%) agreement on ethical standards for large-scale “outdoor” research and very high agreement (85%) for small-scale studies. Just 63% say ethical standards are important for lab and simulation studies, raising the challenge of connecting “upstream” lab/simulation research with “downstream” small- and large-scale research. Over 90% of geoscientists responding support voluntary compliance and monitoring, but over 80% say it will be hard to do. Ensuring shared governance of ethical standards, principles and guidelines for climate intervention research and deployment—across nations, public organizations, and the private sector—is seen as important by 92% of respondents, but is seen as hard to do by 88%. Additionally, 91% see it as important that ethical standards apply equally to commercial enterprises. 80% of respondents call for the approach to ethical standards to be inclusive and 86% call for special attention to vulnerable populations. Early career geoscientists and geoscientists from the Global South have stronger views on most issues, pointing to the importance of lifting up their voices. These data provide a window into the complex landscape that must be navigated to advance ethical standards for geoengineering. (Joel Cutcher-Gershenfeld, pers. comm.; manuscript in progress)

Building on Prior Work: Five Ethical Framework Principles for Guiding Climate Intervention Research

In developing the proposed ethical principles framework, AGU looked to other voluntary and compulsory national and international governance structures that have been developed over the past two decades to address new and emerging technologies that present huge potential human, global health, or environmental risk. Four recent examples are (1) human cloning, (2) the development of genetically modified crops, (3) the advancement and application of nanotechnology, and (4) the emergence of CRISPR gene-altering technology.³

Building on previous geoengineering ethical principles such as the Oxford Principles (Oxford Geoengineering Programme 2009), the Asilomar Principles (Asilomar Scientific Organizing Committee 2010), and the 2019 Tollgate Principles (Gardiner and Fragnière 2018), AGU has now published draft proposed ethical principles for guiding climate intervention research (AGU 2023b).

These five principles have been developed through an ongoing outreach process designed to invite broader views beyond those scientists and engineering organizations directly involved in the research. For this work, AGU has sponsored workshops, summits, surveys, open comment periods, and other mechanisms to help assure greater representation is considered by researchers and those sponsoring field experiments towards climate interventions technologies. The

proposed ethical principles for climate intervention research, experimentation, and potential scaling are now more fully developed, with extensive detail around each (AGU 2023b):

1. Societal interest/public participation: Ensuring open and transparent communication with the public and the creation of engagement guidelines for feedback.

- The public should be provided with timely information about climate intervention research, especially outdoor experiments, and communities in the vicinity of any planned outdoor experiments should be given notice in advance, with the opportunity to comment.
- Care should be taken to identify and invite public comment from regions where the experiments are being conducted, as well as those who may be impacted.
- Project plans for climate intervention experiments should include plans for post project monitoring (publicly communicated), including monitoring for potential adverse impacts.
- Any planned outdoor experiments should exhibit due diligence to prevent and mitigate potential environmental harm.
- Engagement with vulnerable and marginalized populations should be based on norms and procedures co-developed with the involved communities.

2. Environmental justice: Discourse with the relevant, diverse, indigenous communities impacted by climate change and to be impacted by climate interventions with particular consideration of their equity and inclusion in the process as a whole.

- Concepts and values advancing environmental justice are determined through discourse with relevant, diverse communities.
- The ways in which environmental justice are to be realized are designed with explicit attention to historical injustices.
- Consideration of transparency, inclusion, fairness, equity or social issues within or beyond direct impacts of climate intervention experiments should be addressed in advance with relevant impacted communities.
- Project sponsors should understand, anticipate and be prepared to address five forms of environment justice:
 - Distributive justice
 - Intergenerational justice
 - Procedural justice
 - Corrective justice
 - Ecological justice

3. **Data principles/transparency:** Ensuring climate intervention research creates data in compliance with FAIR (**F**indable, **A**ccessible, **I**nteroperable and **R**eusable) principles (FAIR Principles n.d.).
 - Climate intervention data should be properly preserved in discipline-specific or generalist trusted repositories to ensure compliance with FAIR principles, i.e., data are Findable, Accessible, Interoperable, and Reusable.
 - Climate intervention outdoor scaling experiments should publicly reveal funding sources.
 - Information about the context in which the climate intervention data was generated should be made explicit when sharing data, including from indoor experiments and simulation models, so that relevant values and perspectives represented in the scientific process for generating the data can be known and acknowledged.
 - Provide pre-registration for outdoor experiments and share negative results.
4. **Scaling:** Ensuring that field experiments abide by local, regional, and international laws and regulations, and facilitating the creation of increased oversight and reporting requirements depending on the scale of proposed work.
 - All outdoor scaling experiments would abide by local, regional, and international governance laws and requirements.
 - All anticipated climate intervention experiments should address risk assessment requirements and review standards to be applied at various stages of potential testing or deployment.
 - All outdoor experiments or scaling will be covered by an independent review board (to be determined) before deployment.
5. **Governance and monitoring:** Abiding by guidance for planning, coordination, and registering of field experiments; and ensuring validated monitoring, reporting and verification procedures are in place.
 - Researchers and project sponsors should apply an incremental, proportional, step- by-step approach to the design of outdoor experiments that employ leading scientific methods and that anticipate adverse impacts and to include plans for monitoring for potential adverse impacts in pre- and post-outdoor trials.
 - Researchers and project sponsors should identify the appropriate local or regional or international governing bodies for its work in advance of outdoor scaling.
 - Mechanisms should be established to register climate intervention experiments in advance of outdoor trials and to monitor outdoor experiments where there is not voluntary registration.

- Researchers, project sponsors, and their home institutions share the responsibility to ensure that outdoor experiments, pilot stage scaling or implementation trials meet the Ethical Framework requirements as outlined either in these modules, the Asilomar Principles, the Oxford Principles or the Tollgate principles, plus any established local regional, national or international requirements, including institutional review boards, prior to deployment.

These five general ethical framework principles for climate intervention research, as facilitated by AGU, are still receiving public comments as of this writing and are subject to additional modifications and clarifications. Global outreach and engagement on these principles remain in progress across various global stakeholder groups, including in United Nations climate conferences. This important work is in its infancy. Ongoing global engagement and education around climate intervention research and the related ethical issues are anticipated over the next decade.

Conclusion

Climate geoengineering research represents a complex and interdisciplinary field that offers potential solutions to mitigate the impacts of climate change. However, significant challenges and uncertainties remain, including technical feasibility, governance, and ethical considerations. Continued research and international collaboration are essential to better understand the risks and benefits of climate geoengineering and to develop responsible approaches to addressing the climate crisis.

The economic implications of climate geoengineering are multifaceted. While geoengineering interventions may offer cost-effective solutions to mitigate the impacts of climate change, they also entail significant financial risks and uncertainties. Moreover, the potential commodification of geoengineering technologies raises concerns about equity and access, particularly for developing countries that may lack the resources to participate in or benefit from these interventions.

Potential geoengineering interventions also raise fundamental questions about humanity's relationship with nature and the ethical boundaries of technological manipulation of the environment. Some critics argue that geoengineering represents a hubristic attempt to control and engineer the Earth's natural systems, which could have unforeseen consequences and undermine the intrinsic value of biodiversity and ecosystems. Cultural and ethical values play a crucial role in shaping societal attitudes towards geoengineering research and deployment.

The acceptance of climate geoengineering interventions among the general public and stakeholders is influenced by various factors, including perceived effectiveness, trust in governance institutions, and cultural attitudes towards technology and risk. Public perceptions of geoengineering may vary widely, ranging from skepticism and mistrust to cautious optimism. Understanding and addressing public concerns and values are essential for achieving social acceptance and legitimacy for geoengineering research and deployment efforts. The role and views of faith-based and religious communities are important in these ongoing discussions, and AGU has helped facilitate this ongoing engagement through participation in conferences organized by the Institute on Religion in an Age of Science (<https://www.iras.org/>), as well as others.

AGU has contributed proposed ethical principles through a facilitated process the authors believe will benefit researchers, policymakers, and the general public. The aforementioned factors coupled with the urgency of the climate crisis suggest more research and public engagement are needed. AGU envisions its facilitated ethical principles for climate intervention research, experimentation, and potential scaling as a living document to be updated as technology, policy, and societal needs evolve around climate change-related issues.

Acknowledgments

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Notes

- ¹ The American Geophysical Union is the world’s largest organization of Earth and space scientists. Headquartered in Washington, DC, AGU has a global membership of >60,000 from 147 countries. AGU publishes 25 peer reviewed scientific journals.
- ² Joel Cutcher-Gershenfeld is a professor and the Florence G. Heller Chair of the Heller School for Social Policy and Management at Brandeis University.
- ³ CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) is a gene editing technology that can modify the genomes of living organisms (National Human Genome Research Institute 2024).

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Wizards of Climate Science: Ancient Magicians in the Court of Big Science

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Myths inform real-world decision making. Scientific simulation models can do the same. Neither reflects their real-world targets perfectly. They are most useful in an apophatic sense: employing them as the best tools available without confusing their indications with Truth. The actions and choices of wizards often reflect those of scientists; drawing parallels is informative and several questions will be explored within this framework. How is a climate scientist to respond when offered a Faustian agreement promising limited insights? As scientists, how might we better communicate scientific limits regarding which aspects of the future we can see clearly and which we cannot? Should we risk casting doubt on the as-good-as-it-gets science underlying anthropogenic climate change? If an electorate requires certainty of a threat before it will vote for action, are lies of omission or misrepresentation justified? Is it ethical for scientists whose research is relevant to the policy process to pause their typical vigorous scientific criticism of overinterpretation by others (particularly in sciences downstream from physical science) when their science is thought not adequate for purpose? Should scientists merely advise, presenting the relevant science as neutrally as they can, or advocate by emphasizing evidence that supports their preferred course of action, or become activists overselling their science to achieve well-motivated policy ends by whatever means required?



Introduction and Aims

Both wizards and scientists have a fundamental curiosity about the world
and seek to understand the underlying principles that govern it.

It is not uncommon to find characters who embody both scientific and
magical qualities, blurring the lines between science and wizardry.

ChatGPT

Wizards cast spells, scientists run models. Each activity is an art. The 2023 Institute on Religion in an Age of Science conference on “The Wizards of Climate Change” provided an opportunity to discuss the challenges faced by modern scientists in the context of those illustrated by wizards of myth and fiction. Wizards and scientists share many social characteristics. They speak in unknown languages and write in mysterious symbols not understood by the public. They undergo apprenticeships and gather in private meetings. They often wear robes, and in general dress somewhat out of style. They are guided by their beliefs and evidence; consensus per se is of little value to them in terms of insight into advancing their art. Their methods are obscure; inaccessible, if not secret. And they are loath to present their insights plainly or reveal the tricks of their trades. I will argue that it is this last point, however well intentioned, that can come back to haunt all of us.¹

It is crucial to protect “as-good-as-it-gets” science, distinguishing it clearly both from propaganda and quantitatively questionable extrapolations of model-land. A great deal can be learned from the model-lands in which simulations dwell, yet there exists a clear and present danger in the belief that scientific models mirror reality perfectly. Parallels to the dilemmas faced by today’s scientists can be found in the stories of yesterday’s wizards.

Science requires faith. Decision making based on the insights of science requires some hope that science is predictive of the real world. The nature of such hopes themselves is not the stuff of science. Is the physical world governed by laws we once knew but have lost in the fall from Eden (Harrison 2007)? The argument that science allows us to regain lost understanding was advanced not only by theologians but also by scientists of the caliber of Johannes Kepler, Nicolaus Copernicus, and Admiral Robert Fitzroy. Today, many have forgotten these beliefs of scientists’ past and neglect apophatic aspects at the core of science. My aim is to stay true to the title of the aforementioned conference, illustrating important issues of climate science in the accessible context of wizards of myth.

The second section of this article discusses scientific simulation modelling and considers scientific prediction (a.k.a. “projection”²). Entering model-land often provides glimpses of something akin to the future, while observations of the past and present allow scientists to test the veracity of today’s models. A council of wizards is introduced in the third section. With wizards and

scientists together, the fourth section contrasts their strengths and challenges when forecasting the future. The fifth section continues this discussion in the context of imperfect models (Berger and Smith 2019; Petersen [2006] 2012; Judd and Smith 2004). The sixth section then explores the intentions of wizards and scientists and clarifies the discussion of opacity. The discussion of forecast information in public is considered in the seventh section. In the eighth section, the actions of wizards and scientists are contrasted, the central role played by doubt is noted. Empirical evidence for the anthropogenic impacts on the Earth's climate is strong; that said, doubt that today's best available models are adequate for the simulation, much less the prediction, of the nature of future weather³ is also well founded. This section also considers appropriate roles of skepticism in science and the risk of creating future generations of skeptics.

The ninth section investigates the question: Must the truth be out there? If all our evidence comes from model-land, can we act before we see the negative impacts forecast in full force? The tenth section provides an overarching discussion, while the conclusion in the final section notes a few suggestions for less wizardry in future decision support.

Scientific Simulation Modelling

Impossible to see the future is.
Yoda

Computer simulation realized dreams of past generations of scientists to be able to approximate the best mathematical theories of the day and watch the systems they represent evolve forward in time. Approximate trajectories appeared where true solutions were unobtainable analytically, creating the field of experimental mathematics. When modelling a particular system with a particular purpose, it is critical to clearly distinguish the best available model from those adequate for the particular purpose for which the experiment was designed (Parker 2020, 2024; Bokulich and Parker 2021). The better the computer graphics become, the more challenging this distinction.

Experimental design when given only imperfect models is a key, undersung step in the use of simulation for decision making. Designing numerical experiments that would inform decisions only if given perfect models wastes time and resources. There is a tendency to generate CO₂ by running a “best” model far beyond the point in the future at which it might be scientifically adequate for a policy maker's purpose. Ensembles of model runs show the sensitivity of that model, while ensembles over different models typically show the diversity of current models; neither need reflect a probability of quantitative interest in terms of prediction. Novel techniques like cross-pollination in time (Du and Smith 2017) provide ensembles that breach the weaknesses of the individual models in-hand, yet fail to address limitations those models share,

for instance, weaknesses imposed by technology. Even in the short term with no big surprises, the envelope of their forecasts cannot yield reliable probability predictions.

One approach is to reduce some costly aspects of the experimental design (say, the lead time from the desired political target) to restrict computation to those targets that the model is thought likely to prove adequate; the additional computer time could then be used to run larger ensembles or reduce the shortcomings of the model itself.

Another approach towards increasing the value of simulations is to employ expert insight to determine when (the lead time at which) a given model's inherent flaws become too large to sensibly motivate action, and then adjust the lead time as appropriate. Of course, if different groups did different things, one could not "combine" the results "statistically," but when beyond a model's adequacy range, it is difficult to see how including it in such statistics would prove useful for decision making. Experiments designed to advance science may exploit these runs, of course; they may provide insight into how to decrease the systematic flaws in each model. And by focusing precisely on how and when individual model trajectories go wrong, we might better wrestle with understanding the climate system and our possible futures in the world.

Simulation of Weather and Climate

Weather models are simplified climate models: looking further into the future requires turning on more and more physical processes in model-land. For a few hours, modelers might consider the oceans static with only minor ill effects on predictability; for a few months, we might do the same with ice sheets. Simulating these additional processes, and observing the new phenomena that emerge, gives no license to turn off the weather processes that define climate. This leads to a conundrum: the further out we wish to simulate, the simpler we must make our models, *if* the simulation is to run fast enough to be useful. How then might we know whether the known neglecteds technology forces us to omit have simplified the best available model so much as to make it misleading? How badly can we simulate a year and still expect to realistically simulate a decade? What big surprises might lurk in the future that simply cannot occur in long simulations of today's models? Does science require simply ignoring risks today's technology cannot simulate?

Regardless of the answers to these questions, if obtaining funding demands require models to be run out to 2100, then technological constraints will limit what can be included in those models. Running out twenty years rather than eighty would allow more realistic model structures that neglected less of the solid known science. The impact of these known neglecteds limits the lead time at which model trajectories are relevant to policy making.

When applied to models, a decision maker can safely treat the word “included” as a red flag, inasmuch as “included” must be distinguished from “simulated realistically.” Contrast, for example, Figures 1 and 2. HadCM3 remains a workhorse climate model; the details in Figure 2 are features of topography **not** included in the climate model. Specifically, it shows the height of the surface of the Earth as measured by a satellite minus the “height” at the same location as defined at a grid point of HadCM3. The outlines of squares reflect the boundaries of grid “points.” Detailed processes visible in Figure 1 cannot be simulated realistically at this resolution.

When a policy maker, industry chief scientist, or academic in a field downstream from climate science who has been thinking of models with a vision resembling Figure 1 then sees Figure 2, the relevance of climate modeling outputs to their targets of interest dissolves. Lifting opacity often makes it abundantly clear, suddenly, that model output is not adequate for the purpose they long held in mind. Oversell generates doubt in the whole of climate science, including the underlying as-good-as-it-gets science.

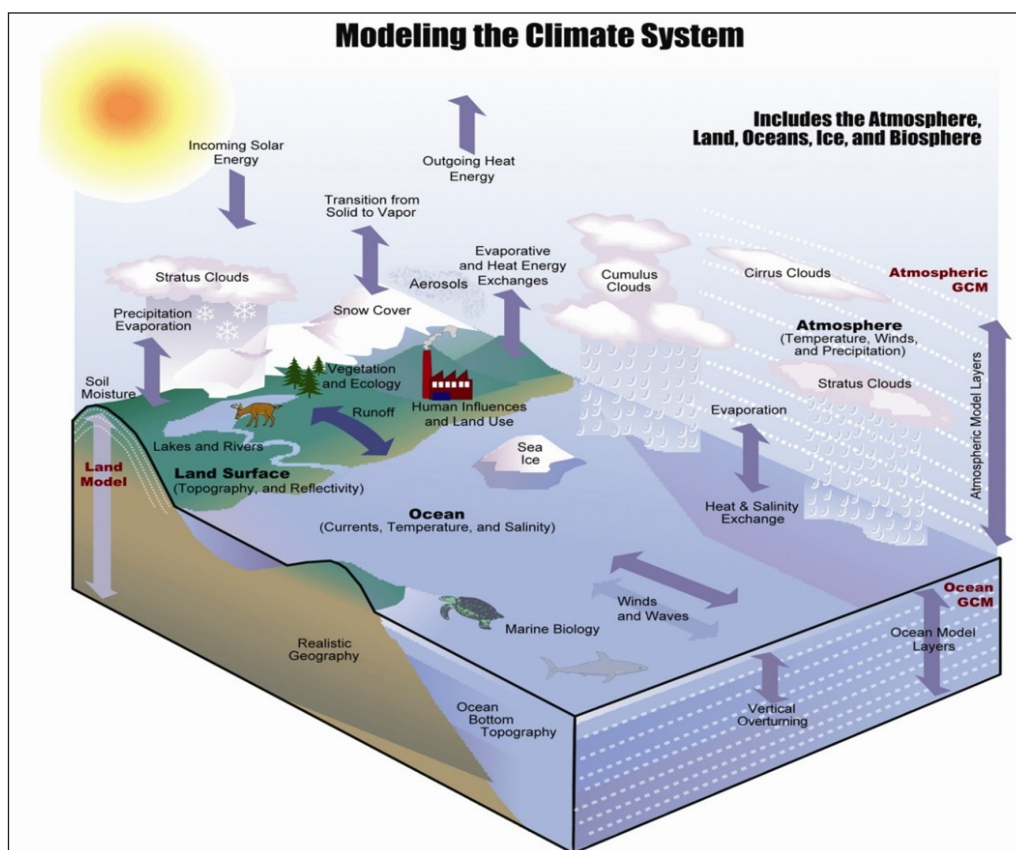


Figure 1: A widely viewed schematic by Thomas R. Karl and Kevin E. Trenberth (2003) shows what phenomena are “included” in models of the climate system. Whether or not an included phenomenon is modelled realistically depends on the resolution of the model and how well the phenomenon is understood.

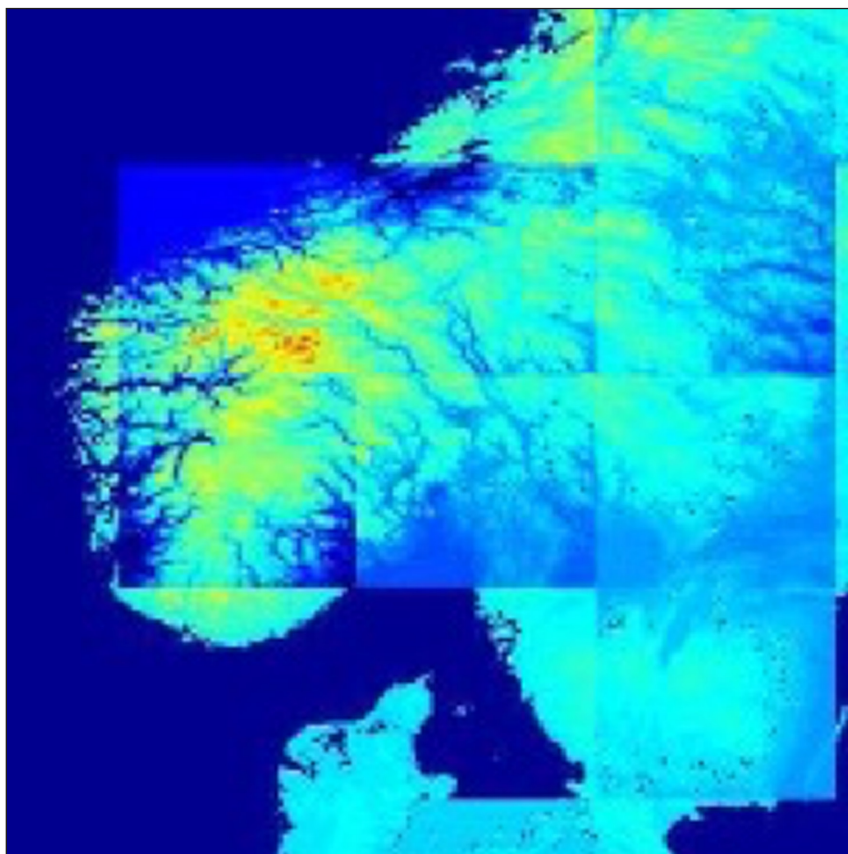


Figure 2: A graph of the actual height of the land surface minus the grid-box height in the HadCM3 at the corresponding location. The fine details seen reflect features that are **not** in the model. The resolution of the model is reflected in the large squares outlined. This graph was a collaboration between the author and Ana Lopez.

Tuning, Stability, and Model Sedation

Tuning a big model for extrapolation is a challenge; doing so with quantitative high-resolution observation over only a fraction of the demanded lead time even more so.⁴ The lifetime of an operational weather model is arguably five years or so before major revisions, that of climate models perhaps a bit less. In each case, the next generation is rarely developed from scratch, and sometimes not only ideas but computer code is incorporated from other models. A significant difference between weather forecasting and climate forecasting is that model failures of the former are seen every week, or less. **Weather models have a lifespan long compared to the lead times they target. Climate models have a lifespan much less than their forecast lead times;** even the careers of climate scientists are unlikely to exceed a century.

Models tend to be tuned to a set of agreed statistical targets. Various aspects of the model are adjusted to achieve a better fit, while physical relationships remain constrained by the relevant equations. This yields an internal consistency

missing in statistical models; physics-based equations also prevent modelers from fitting the target quantities precisely, even given the immense number of degrees of freedom in the model. As of 2024, the best climate models have nontrivial systematics errors even in their global mean temperature, as suggested in Figure 3.

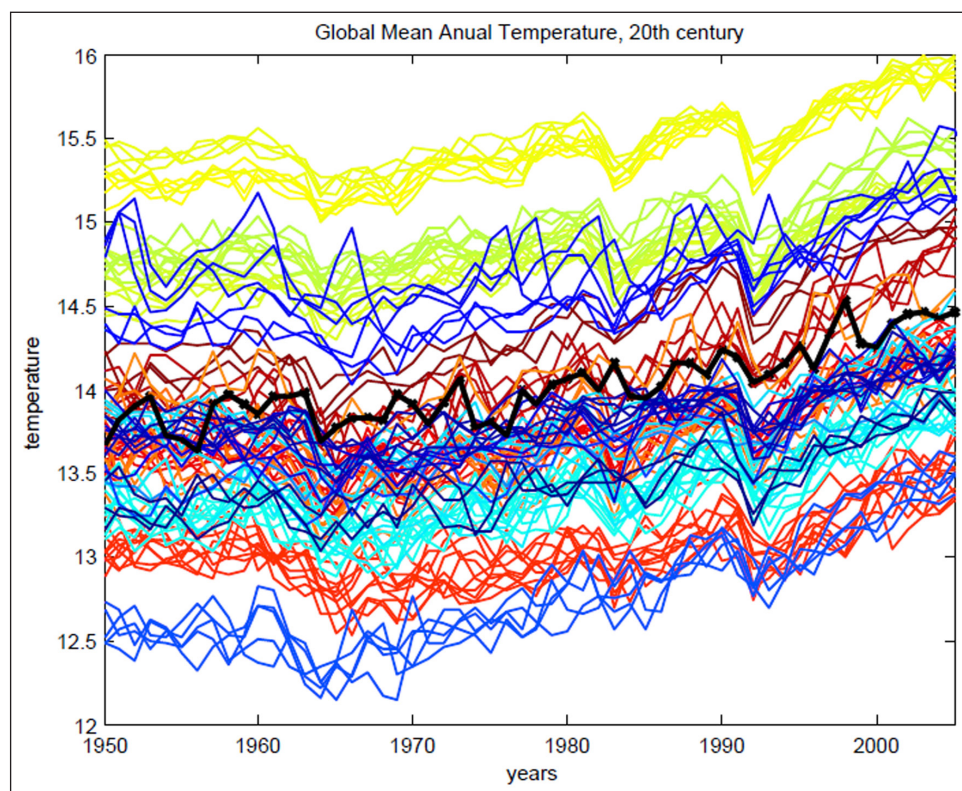


Figure 3: Global mean temperature time series from the CMIP5 ensemble before removing their systematic errors to form anomalies. See Frigg, Smith, and Stainforth (2015) for details. This graph was a collaboration between the author and Ana Lopez.

Consider the use of anomalies in the presentation and application of model-land simulations. While the use of anomalies in empirical research has a long and strong history of value added, **the use of anomalies of model output (which removes the systematic errors of the model, resetting them to zero) both hides the fact that large systematic errors have been obscured and destroys complex physical relationships between variables, relationships that are a major strength of physics-based simulation.** Both contribute to opacity.

Models are tuned to be stable, or at least to not appear unstable. It is unseemly for a model to run nicely for a few thousand years and then suddenly do something never observed either in model-land nor in the available data. Of course, this behavior may merely be due to a bug (see Stainforth et al. 2005), which, if possible, should be identified and perhaps squashed. Regardless, experimental

designs often assume such misbehaviors can be neglected, and doing so keeps the interpretation of model runs less complicated and less costly. Tuning can lead to reducing the sensitivity of potentially realistic, apparently overactive, models. Ideally, this reduction of model sensitivity affects only the unphysical dynamics it targets. **In practice, however, tuning can inadvertently (and unknowingly) sedate models.**

Intractability due to technological constraints can lead to ambiguity; not communicating well-understood challenges to simulation leads to opacity. As shown in Figure 4, HadCM3's model Andes are two kilometers shorter than their real-world namesakes. To be clear: it is not that scientists do not know how to simulate rock; rather, modelers are incentivized not to simulate the Andes realistically in order to achieve some other goal. The height of the Andes is a “**known neglected.**” These are not “unknown unknowns” but known phenomena that are intentionally simulated poorly, thereby limiting the fidelity of simulations of future from their first time-step. And we know what these known neglecteds are!

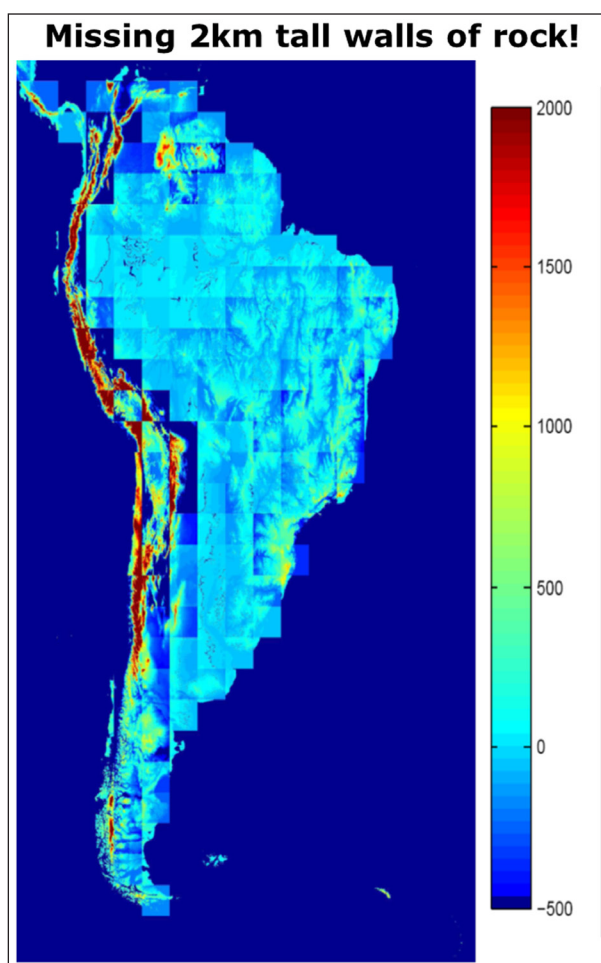


Figure 4: A comparison of the topology of South America in model-land and South America in reality; details as in Figure 2.

If a distinctive event has a small probability of occurring, it is unlikely to be seen in a short 100-year model run, or in the observations. Yet, if a model is run for a thousand years, it may well occur. Identifying and exploring the causes of individual events in each and every model run is time consuming. Using statistical measures to identify major (previously) unobserved events, and then interpreting them as unphysical without careful inspection leads to a quandary, as tuning the model to suppress such things may result in effectively sedating the model, while omitting such runs from analysis may ignore a shortcoming (or bug) in the model (see Stainforth et al. 2005 for an example of the latter). Model development in the long run would benefit if each such apparent glitch was understood and ideally publicized to allow similarities in structurally different models to be noted.

Professionally, I hold that in the case of our climate, arguments for the big picture (the thermodynamics) are solid, as-good-as-it-gets science: greenhouse gases in the atmosphere of the planet will continue to trap energy.⁵ **Issues of circulation, of what will happen where and when, and questions of attribution are not so well grounded. We might all take care to ensure that the advancement of science, exposing past misunderstanding, is interpreted as a good thing.** Oversell and continued opacity risk allowing the exposure of past oversell to shake the general faith in underlying as-good-as-it-gets science.

An open discussion of the decrease of model fidelity as a function of lead time would be valued by decision makers. Knowing the known neglected allows basic science to estimate the lead times at which it is likely to lead model simulations astray. If precipitation over the Amazon (or Okefenokee) is poorly simulated, then real-world feedbacks not triggered in the model altering the health of the Amazon might be expected to kick in for the real-world Andes within twenty years. In such cases, all model trajectories will eventually prove unrealistic and thus become misinformative. Initially, the shortcomings will be local in space and time. Then, due either to absent feedbacks or the introduction of fictional reactions, the scale of model irrelevance will grow to be global. A major change in the health of that ecosystem might suggest significant forcing of the climate system, which in another twenty years might be expected to have nontrivial, nonlocal effects. This takes us only to 2080; typically, simulations are required to run to 2100.

Key here is that the timescales on which models might become irrelevant can be estimated using sound back-of-the-envelope science. This information can then guide experimental design and increase the information extracted and publicized from the same investment in science. Policy makers can better estimate when model output is likely to become misleading when the analysis includes known unknowns, known neglecteds, and potentially an informed gut feeling for the impacts of unknown unknowns

given the known fidelity of today's scientific understanding. **No presentation of model-based probabilities is complete without a quantitative expression of the likelihood of model irrelevance.**

Wizards and Phantastic Objects in Myth, Science, and Society

Reality is that which continues to exist when you stop believing in it.

Philip K. Dick

I now introduce our Council of Wizards and start to draw parallels with modern science.

The three weird sisters of Macbeth give precise forecasts that prove accurate in detail yet lead to suboptimal decision making. Are they advising Macbeth, informing him about his future, or are they actively aiming to reshape it? Can one do the first without the second?

Professor Marvel from the *Wizard of Oz* movie exposes his use of empirical evidence to build Dorothy's confidence in his crystal ball predictions, while honestly advertising his skill at sleight of hand on his wagon. As the **Wizard of Oz**, he uses his ability to control complex machinery and technology to inspire fear and awe. Propaganda and oversell serve him well, as he is known to be a wonderful wiz "because of the wonderful things he does." Yet to hide his own ignorance and limitations, he deploys his technological wizardry with the intention of sending Dorothy and her friends to their deaths. Realizing the risks of exposure, he maintained his balloon in case the need for a rapid getaway arose. And even though he employs this proven technology, Dorothy is abandoned. Aspects of this backstory are mirrored in the footnotes and unsung statistical shenanigans of the modelers of model-land.

The **Wicked Witch of the East** reflects classic false skeptics, often ill-trained, mercenary merchants of doubt. Her sister, the **Wicked Witch of the West**, reflects the still-active coven of well-informed false skeptics motivated by greed and intent on maintaining a cohort of disposable false-skeptic minions to misguide policy both now and in the future. **Glinda** is a good witch, yet she suppresses vital information. Why does she not tell Dorothy how to use the ruby slippers to go home in her opening scene, long before Dorothy leaves Munchkinland for her hazardous adventures? Doing so would, no doubt, reduce the profits of the movie.

Odin of Norwegian folklore sacrificed his right eye in order to foresee the future; the cost of a good forecast can be high. He gains information and works to alter the future and delay climate change, all within the constraints woven by the **Norns**. Just as there is a place for free will and Odin's personal agency within a fixed big picture, so also what is accomplished today can change tomorrow, even if limited by the True laws of physics, if such things exist.

Christopher Marlowe's **Faust** is an academic in search of useful knowledge, the cost of which is even higher than that paid by Odin. Yet despite their deal, when Faust asks about the retrograde motion of the planets, **Mephistopheles** fails to reveal the Copernican model of the solar system (which, as it happens, was widely discussed in the university(s) Faust attended). Deep uncertainty is built into even the staging of this play, as each night the decision of which actor will play Faust and which Mephistopheles was not made until the actors were on stage. Faust touches not only on this actual uncertainty on the real-world stage, but also reflects care to maintain the economic and social survival of the play, and Marlowe's good name.

While Twain's **Merlin** is outmaneuvered primarily by **Hank's** understanding of science and chemistry, Hank also exploits his knowledge of the past. Even the most unlikely event that has already happened now has a probability of one. "What's done is done."

Anansi, of Ghana, is the owner of all stories, and so arguably **the** wizard of models. He tells these stories without falsehood, yet in a way that often, if not always, ends up benefiting him, reminiscent of Brer Rabbit and Loki. Would developing such skills benefit scientific advocates for action to achieve their goals, or should scientists focus on their weaknesses and expose them? To what extent should scientists in the policy process restrict themselves to telling their stories with neither obscurity nor falsehood? Would Anansi exploit the tactics of those modelers of model-land who misrepresent their constructs as reality, or would he expose them and thereby risk casting doubt upon the as-good-as-it-gets science by exposing the oversell of modelers of model-land? How should today's scientists proceed?

Wizards often possess what David Tuckett (2011) calls "**phantastic objects**." Phantastic objects include broomsticks, crystal balls, plants ("eye of newt and toe of dog"), helpful familiars (ravens or flying monkeys), matches, wands, scientific certainty, perfect models, ruby slippers, the true laws of physics, artificial intelligence, and an easy exit from model-land. Such an object would allow one to achieve whatever unachievable goal is currently desired.

There is immense pressure on science to provide phantastic objects. This pressure comes from the public, governments and other funders of science, and naïve scientists themselves. How can scientists best respond to justifications such as "if we do not do it, someone else will"? "How do we adapt without knowing what will happen?" "We must have a clear, quantitative vision of the future to prepare for it." "People are not acting; we must motivate them to act now." "We have the best available model, and the best available model is always worth using."

In short, how can an environment be created in which scientists can reply sustainably to requests for phantastic objects: "No one can answer that question precisely today"?

Apophatic science aims to shed belief in such objects. It is devoid of phantastic objects as possessions, targets for science, or the deliverables of research proposals. **Models cannot provide a crystal clear vision of reality, be it in the present, the future, or even the past. From an apophatic stance, models remain merely computational bookkeeping algorithms whose interpretation is always open.** As they are all we have, it is fine to use our models as long as we never mistake them for more than they are. In terms of insight, they are most useful when we can see through them, placing their strengths and shortcomings in plain sight (see Smith 2007, chapter ten).

Apophatic science encourages the use of models, if (and only if) they are constantly distinguished from the real world in sufficient detail. **Science depends on faith but also on scientific skepticism.** Doubt trumps faith. It can tolerate a good deal of political banter when those arguing seek to be correct, not merely to score more points on the day. Physical scientists regularly fall victim to Alfred North Whitehead's fallacy of misplaced concreteness, given that, as Whitehead (1925) noted: "Sometimes it happens that the service rendered by philosophy is entirely obscured by the astonishing success of a scheme of abstractions in expressing the dominant interests of an epoch." Whitehead's concern was the Newtonian formation of science; perhaps computer simulation plays that role today? Well-meaning computer simulation with extraordinarily realistic graphics may impede more than just the progress of science. How long will we have to wait before we obtain a wizard powerful enough to break that spell?

Forecasting, Prediction, and Projection

A deed without a name.
William Shakespeare, *Macbeth*

When Macbeth confronts the three weird sisters, he asks what it is they do. They reply, "A deed without a name." Each forecast they give Macbeth proves accurate; nevertheless, these insights do not accomplish his happy end. Clear communication and trust are critical for good support of policy. Opacity, intentional or otherwise, can prove costly. Climate science today appears more vulnerable to opacity than other physical sciences.

Clear communication of ways and means, and embracing achievable aims, requires distinguishing **weather-like forecasting systems**, used to predict the short-term future under similar conditions day after day, from **climate-like forecasting systems**, used to make isolated extrapolations into the far future on a lead time long compared with the model's lifetime. Mark Twain (1889) captured implications of this distinction when he wrote that "a genuine expert can always forecast a thing that is five hundred years away easier than a thing that is only five hundred seconds off."

If the basic science underlying climate science was flawed fundamentally, climate models would have alerted us to a failure in our understanding decades ago. Simulations might have shown alternative rosy futures of which we were unaware. They have not done so. **Rather, a wide variety of model Earths have each shown harsh warming in the big picture thermodynamics of every model planet roughly similar to the Earth.** Perhaps their largest contribution has been the lack of doubt cast on the basic scientific conclusions about significant negative impacts held at the turn of the century.

Big surprises arise when something happens that simulation models cannot mimic, something that turns out to have important implications. In weather forecasting, we can all see the lead times at which our models become silly, but in climate forecasting, we are in the dark. In terms of basic statistics, like global mean surface temperature, existing models disagree by several degrees; I see this as a strength, not a weakness. Models that have been sedated are, of course, more likely to experience a big surprise. If today's models agreed to within the statistical uncertainty of the observations, would we have more confidence in their simulations?

There are many phenomena today's models cannot simulate realistically; it seems likely there always will be. Whether due to known neglecteds or unknown unknowns, these phenomena will impact the future climate of the Earth. Often, much of the difference between simulations of the past and the past as observed are put down to natural variability. It is critical, of course, that this natural variability does not become a cloak for important processes that cannot (yet) be simulated realistically; this would create systematic overconfidence in the models of the day. **While scientists may never be able to say what phenomena will happen in a given year, one stated aim of probability forecasts is to capture the chance of such natural variability almost completely every year, say, via an ensemble of simulations.** One would not know which years would have an El Niño, a devastating drought, or a severe winter, but members of the ensemble would each reflect these phenomena, and their teleconnections, realistically; individual members of the ensemble would reflect changes in the relative frequency of each phenomenon.

Given the nonlinear feedbacks of the biological and environmental subsystems simulated in climate models, assuming one can linearly superimpose natural variability willy-nilly with no downsides is not justified. And again, if there is no option, then why not redesign the experiments run? Why keep repeating such calculations (running today's models to 2100 and beyond) until sufficient, agreed model improvement makes those calculations decision relevant? What stops us from employing more severe testing of our models to determine the questions for which they are likely adequate for purpose, and then reconsidering the basic design of the experiments run? Many, if not most of the climate scientists and climate modelers asked expect a big surprise before

2050 (N~50). Could the big surprise be pleasant? Yes, if, for example, it arose from some missing stabilizing feedback or resulted in a real-world future that proves less catastrophic than today's models project. While this is possible, the known neglecteds that we know of suggest this happy outcome is much less likely than a positive feedback.

We need not know the details in order to take action, any more than we need to know the detailed impacts of a pandemic or a war believed to be just. To "wait for more details" is a decision not to act (Oreskes, Stainforth, and Smith 2010; Smith and Stainforth 2012). To offer some phantastic object via further research is to play into the hands of those who favor no action.

Increasing Confidence in Less-than-Perfect Models

A scientific approach to the examination of phenomena
is a defense against the pure emotion of fear.

Guildenstern in *Rosencrantz and Guildenstern Are Dead* by Tom Stoppard

The Intergovernmental Panel on Climate Change's (IPCC's) physical science working group has long acknowledged limitations due to structural model error: "Such limitations imply that distribution of future climate responses from ensemble simulations are themselves subject to uncertainty (Smith 2002) and would be wider were uncertainty due to structural model errors accounted for." (Solomon et al. 2007, 797). The key point here is that the diversity of the model simulations in hand cannot be taken as sampling the diversity of likely future climates, either by climate scientists or in downstream sciences.

What if models were developed independently, say, in separate space stations that each received all the observations but shared no code or conclusions? As years passed, would their simulations be expected to converge in distribution? For weather forecasting, I expect they would give more and more skillful answers (Bröcker and Smith 2008), and in that sense, converge. Their diversity would contain useful information on remaining structural model errors. For climate models, I do not expect to live to see meaningful convergence between independently developed climate models regarding the distribution of the weather future generations will have to face in 2100 (Smith 2006).

Wizards and magicians each guard the flow of information to the public. Science should take caution not to proclaim the past successes of science as support of today's newest models in extrapolation; this can be exposed as bait and switch.

Given a system best modeled as nonlinear, there are foundational reasons actionable probability forecasts cannot be provided (Judd and Smith 2004;

Smith 2002). However, the sensitivity of models both to the internal variation of the model itself and to variations in the model-land forces it is subjected to can be examined (see also Hazeleger et al. 2015). This is often done with ensembles that sample plausible variations in model quantities of interest. The resulting distributions reflect sensitivity in model-land, not probability in our future (Stainforth et al. 2005). In other words, **the diversity of a group of imperfect models does not reflect the uncertainty in our future**. What are in hand are ensembles of exploration whose members are physically interesting (for insight into things for which the model is believed to be adequate for purpose, to be physically relevant).

It is unclear what predictive purpose might be served by statistics computed from ensembles of imperfect simulations in extrapolation. The value of such ensembles lies in insight, not numbers. Looking at the widest variety of plausible outcomes available yields food for scientific thought, while noting the way impossible outcomes become unphysical yields guidance for model improvement and the formation of potential big surprises. **Significant confusion has come from failure to broadcast the fact that ensembles reflect sensitivity in model-land, not probability in the world.**

So, what are ensembles if not samples of potential real-world future Earths? What can they tell us? Ensembles over and within various climate models represent actual model climates. The fact that every single model world remotely similar to our understanding of the Earth shares robust general features suggests that these features can reasonably be expected to be reflected in our world. All policy-relevant probabilities are conditioned on something. Clarifying what that something is ensures its credibility.

Opacity, Clarity, Confusion, Open Uncertainty

And be these juggling fiends no more believed
That palter with us in a double sense.
That keep the word of promise to our ear,
And break it to our hope.
Act 5 Scene 8, Shakespeare, *Macbeth*

While the three weird sisters speak the truth, they do so knowing that “security is mortals’ chiefest enemy” (Act 3, Scene 5). Macbeth calls them “imperfect speakers”; their predictions are delivered with an opacity that is all but certain to mislead Macbeth. In Marlowe’s *Doctor Faustus*, however, Mephistopheles fails to “keep the word of promise” to Faust’s ear; arguably, he lies when Faust questions him regarding the retrograde motion of the planets, or at best gives an empty reply.⁶

While mathematical models can be used for calculation and prediction, science need never claim that they describe the way the universe actually is. This distinction parallels the theological divide, allowing models to be taught as methods of calculation but not as a way to see how the world is. It reflects the divide between model-land and reality. And perhaps that between Galileo and the Church?

A lack of transparency on the degree of relevance numerical model-land output should play in downstream sciences (infrastructure, agriculture, economics and regulation, etc.) is particularly challenging. Currently, such sciences sometimes assume numerical output from a distribution of climate models is a reasonable reflection of likely futures to input into downstream models. Note that IPCC Working Group I rejects this assumption explicitly, even for global mean temperature (Solomon et al. 2007, Figure SPM.5).

Running models puts model-land numbers on the table, but is it ever advisable to put meaningless, misleading model-land numbers on the table? Why initiate anchoring? Why even appear to suggest sufficient targets for “climate-proofing” and sufficient engineering design in the face of deep uncertainty? Will our failure to lift the opacity on which detailed aspects of today’s simulations are decision relevant lead to a rejection of the underlying as-good-as-it-gets science when that opacity is lifted in the future?

In Act V, Scene 5, Macbeth speaks of his doubt concerning the predictions of “the fiend that lies like truth.” **Opacity places at risk the role of science in policy making, not only in climate policy but in a much bigger picture.**

Physics-based simulation models utilize the actual value of temperature⁷ to determine the behaviors of water (be it a fluid, solid, gas, or at a triple point). A major advantage of these models is that they provide coherent model states of the system: not just temperature but combinations of, say, temperature, humidity, and atmospheric pressure that make physical sense. The model variables in each model are known precisely. Taking anomalies means subtracting out each model’s systematic error, forcing them to agree (on average) over the anomaly period. This may be fine for motivating mitigation, as one can see if all the models warm, but it has the downside of making it appear that the models agree in terms of temperature when they do not: given two models with the same anomaly temperature, one may be well below freezing and the other well above. The physical coherence of model states is also lost when one moves to anomalies.

Honest mistakes and missteps will always occur in marathon research programs aiming to support policy. How might scientists convey them quickly and effectively, reducing the risks of sustained opacity?

Presenting Climate Science in Public

Most things I worry 'bout
Never happen anyway
Tom Petty, "Crawling Back to You"

While scientists feel they should inform the public of a clear and present danger, should they also nudge the electorate to act on a clear and future danger? Should they advocate, or more subtly nudge, the electorate to action using silence, opacity, selective criticism? Can even outright scientific fraud be justified when the stakes are high?

When I spoke to a Republican Congressman concerned about the future of coastal St Augustine, Florida, as-good-as-it-gets science yielded relevant information. Alternatively, when I spoke to a Republican Congressman interested in the impact of climate change on dairy cattle in far inland central north Florida, much less could be said with confidence. There are good reasons early IPCC reports repeatedly stressed confidence "at continental and larger scales" (for example, Solomon et al. 2007, 591, and elsewhere both in this report and others.) And this confidence *in those scales* grew as understanding of the thermodynamics of planets deepened. The fourth national assessment (USGCRP 2018) implies confidence in projections of daily high temperature (working hours) in the year 2099. **The assessment warns that such estimates depend on economic models, but even if the economic models were perfect, would the limited fidelity of today's models have made this fit for purpose?** I do not have confidence that the models can generate 2099 circulation patterns with sufficient realism in projection. Asking individual climate scientists is informative.

Scientists sometimes criticize the political process without having experienced it. It is advisable for any American scientist who wishes to engage in the policy process engage in person (and in private) with their representatives. Feeling the atmosphere of policy making is a great benefit in understanding and aiding it. Politicians routinely make decisions under deep uncertainty. The fact that they display deep confidence after announcing a decision does not suggest they ignored uncertainty in coming to it. What fraction of the scientists who post on the platform formerly known as Twitter have had a one-to-one discussion with an elected/appointed climate policy person? My own views were embarrassingly naïve in 2010. Even my views published after ten years of annual visits to Capitol Hill (Pierson and Smith 2018) now appear embarrassingly rosy given more recent events in Washington.

The Rabbit of Caerbannog

Forecasts, insight, and scientific evidence are not always taken as seriously as scientists (or wizards) might like. Tim the Enchanter is perhaps our least known

wizard. In the film *Monty Python and the Holy Grail*, Tim leads King Arthur and his knights to a deadly encounter, warning them of the dangers they face and giving them empirical evidence to back up his theoretical claims (“Look at the bones!”). Ignoring both the theory and the evidence, Arthur initially suffers a major defeat, and Tim says forlornly, “It’s always the same. I always tell them ...” (Gillian and Jones 1975).

In fact, and in fiction, decision makers do not always respond to insights as scientists and wizards might hope. The question is how to respond. Should scientists remain advisors, relating all relevant information in as clear a manner as we are able? Do we become advocates pushing for a particular policy response? Or do we take on the role of apologists, selectively presenting information via obscurity and omission while avoiding falsehood?

Contrasting Wizards of Climate with Those of Myth

One man’s magic is another man’s engineering.

Robert A. Heinlein

Are there any characteristics found amongst the wizards in our council that are also found in Big Science in general, and climate science and modeling in particular? The short answer is yes, both positive and negative characteristics. A more nuanced answer requires noting that wizards of science are as diverse as their mythological namesakes.

Doubt and scientific skepticism lie at the heart of progress in science. Sadly, science seems to have temporarily surrendered the word “skeptic” and the notion of the good skeptic. Today, we must each distinguish the critical, positive role played by scientific skeptics from that of false skeptics (often paid lobbyists who argue backwards from the desired conclusions to the evidence required to support them), naïve skeptics (who mean well but simply do not hold a deep understanding of the relevant science), and simple habitual naysayers.

There are, of course, many similarities between false skeptics and the witches of Oz. Even Glinda fails to reveal decision-relevant information to Dorothy when she first dons the ruby slippers: Glinda knew Dorothy could click her heels together and go home at the beginning of the film.

The classic “it is not happening” false skeptics, well reflected in the Wicked Witch of the East, have by and large gone where the goblins go; we need not worry about them at present. The Wicked Witch of the West reflects the modern false skeptics who now stand in their place. These are well-educated, well-financed, perhaps agnostic false skeptics; Naomi Oreskes’ “merchants of doubt” are still out there, often accompanied by scary accomplices and insightful propagandists waiting to exploit opacity and oversell (Oreskes, Stainforth, and Smith 2010).

But what of sincere, well-trained scientists and modelers? The easiest parallels here are with Anansi, reflecting the way they tell stories to achieve the ends they desire.

There are befuddled true believers on both sides. I have been told sincerely both “if I haven’t seen it in a model then it doesn’t exist” and “it is not actually happening.” There are also those who believe that the best available model-land output is always of value, even if it is not adequate for the purposes to which it will inevitably be put. **Good science happens in model-land of course; the best available simulations are always of interest in science, but the failure to impress others with the limits and shortcomings of complicated results, of basic limits to application, is a fault. Failure to criticize misapplication in downstream science leads to opacity, which, when lifted, threatens the general faith in climate science.** Worse still is the exploitation of “not-yet-ready-for-primetime science” for profit;⁸ footnotes and fine print are bad science and bad business. Disappointment in the downstream sciences, and in those applying science in the real world, may well result in some backlash when opacity is lifted.

Quantitative attribution of current events to anthropogenic causes requires one to assume that both climate models of reality as observed and those of a never-observed, no-anthropogenic-emissions world can produce small-scale weather phenomena realistically. Attribution stories bring me back to MacBeth, and questions of probability. It is widely believed that “what is done is done.” The probability of a past event that has already happened equals one. Attempts to attribute events already observed present a host of difficulties, both scientific and philosophical. An alternative approach proposed at the National Academy of Sciences meeting on attribution would have the advantage of making climate science more predictive. The idea is to use models to determine rare or unprecedented events vastly more likely to happen in a 2x CO₂ world than a 1x CO₂ world and then state them before they happen. One would consider extreme model-land events in a 2x CO₂ model world and then compute the frequency with which these events happen in the 2x CO₂ and 1x CO₂ model-worlds. Publishing a basket of novel events that would not be expected to be observed in 1x CO₂ model worlds, and yet have a nonvanishing chance in the 2x CO₂ worlds, would make climate science more predictive. In place of saying “this is precisely the kind of thing we would have expected” *after* an extreme event, we scientists could say: “This unprecedented event was one we predicted years ago was likely to happen.”

Many, perhaps most, climate scientists aspire to resemble Odin, to achieve the best outcome possible within fixed-boundary conditions. Some have paid a high price in the form of personal attacks while openly and honestly presenting

today's science. Many scientists are disappointed that society is slow to take effective action. All that said, achieving lasting, informed climate policy is a marathon task. Risking the credibility of science is a costly gamble.

Scientists must choose whether to advise policy makers, to advocate for a particular government action based on the scientific insights pressuring decision makers, or to go further as activists and aim to manipulate the electorate with oversell and inventive science. Arguably, becoming an activist is a misstep, even if done for the planet's own good.

Big Science creates industries, even industrial sectors. Embracing this fact casts no doubt on the as-good-as-it-gets science underlying the threats of climate change but fails to acknowledge that this truth leads to misunderstanding the products produced, experimental designs executed, and the framing of the scientific insights obtained. One danger is that as soon as Big Science becomes too big to fail, it fails to be science. Harsh, well-founded criticism is a common mechanism for advancing understanding scientifically, but it is sometimes a significant challenge in climate science. Some have entered into a Faustian pact, even as they play the role of Mephistopheles (or was it Marlowe?), refusing to answer honest questions of today's science clearly. There are reviewers who demand phantastic objects not available from today's science. Government agencies issue funding calls demanding unobtainable targets: funding to produce "best available" results that are known a priori not to be adequate for purpose; researchers who know this bid for them. Exposing the shortcomings of such projects leads to unfounded criticism (Frigg, Smith, and Stainforth 2015).

Allowing opacity may be inadvertently arming the next generation of false skeptics, as well as future naïve skeptics who become flying monkeys spellbound by false skeptics. More worrying, allowing opacity today may be generating scientific skeptics among honorable scientists and captains of industry disgruntled by the oversell with which current scientific understanding is sometimes communicated; they may begin to doubt the as-good-as-it-gets science upon which our current understanding of climate is based. **By failing to make plain the limits of today's scientific understanding and modeling, by overselling climate services and skill at attribution, we risk filling the ranks of naïve skeptics with economists, agriculturalists, engineers, and other academics who sit downstream of climate modeling.** Joining them will be industrial chief scientists from energy, finance, and (re)insurance, and disaster risk managers who see the limitations of the product they were sold by long-established climate enterprises. False skeptics will no doubt exploit the clout of these naïve skeptics. The cost here is delay, and the cost of delay can be significant. Once scientists lose our credibility, once someone calls attention to the little man behind the curtain, it will be difficult to reestablish the relationship of trust and respect that currently exists.

Today's models still have huge systematic errors in their estimation of the current climate. While it is challenging for a salesperson to lead with uncertainty, avoiding it has introduced an opacity that, when lifted, is likely to generate a new kind of skeptic, indeed a new population of scientific skeptics—namely, downstream scientists and decision makers who feel they were misled, even lied too, regarding the clarity of vision of the future climate sciences offered. Similarly, scientific improvement of attribution methodologies will lead to perceptions of oversell regarding current attribution figures.

That is not to suggest that there is any serious scientific doubt in the foundations of anthropogenic warming. Following Brian Hoskins, I would argue the thermodynamics are understood rather well, and at the same time, there is little insight into changes in circulations. That is to say: we have a fuzzy big picture down well, but as scientists, we know we do not know the details. And following Julia Slingo, I would note the current bias (systematic errors) are huge in the context of expected changes: even if downstream submodels of economics and agriculture were perfect, their outputs would prove misleading. **How do we avoid forcing an honest broker to unearth evidence of oversell of climate model output, evidence that would lead people to question the as-good-as-it-gets science along with the oversell?**

Apophatic Science: Must the Truth Be out There?

To let understanding stop at what cannot be understood is a high attainment.

Those who cannot do it will be destroyed on the lathe of heaven.

Zhuang Zhao

Apophatic science maintains that humans hold neither the tools nor the mental ability to comprehend reality as it truly is. **Given the frequency with which policy advice suffers from Whitehead's fallacy of misplaced concreteness and what appears to be an inescapable overconfidence in and overreliance on our models and modes of thought, I suggest we elevate the belief that we cannot be certain to a guiding principle.** Many scientists, including Richard Feynman and John Wheeler, have stressed the importance of doubt.

It is difficult for some scientists to admit that we cannot hold even as-good-as-it-gets science with certainty. It weakens the perception that we are “merchants of truth.” However unpleasant that loss of wizard status is, we must give it up. Embracing this strengthens the positive contributions of science in the policy process, particularly in climate-like situations (Smith and Stern 2011). Professionally, I expect embracing how the laws of physics lie as a young scientist would boost one's insight, if not one's employment prospects, in Big Science.

But can it not be said with certainty⁹ that the Earth is not flat? The world is not flat, nor is it round, nor is it an oblate spheroid. These geometric categories

do not apply to an actual planet, so the claim that it is flat is content free. Often, the Earth has been best modeled as flat, but today, general relativity is commonly required to make a phone call.

Unlike religion, science can never offer certainty; this might be a key factor in distinguishing the two.¹⁰ The question of whether ultimate “true” laws of physics exist or science is “turtles all the way down,” as Feynman contemplated, will not be answered here. But in terms of advancing science in practice, it is useful to keep each alternative in mind (Cartwright 1983). Suggesting that today’s models and laws must be justified empirically in extrapolation is an empty debating tactic, as this is never possible. Climate-like tasks never allow a relevant out-of-sample track record. For weather-like forecasts, one can formulate tests of internal consistency and evaluate them both in the past and in the future. For climate-like forecasts, our knowledge of physical science and the known neglecteds allows informed estimates of the likely relevance of our simulations of our future, and their decay with lead time. **Science in the policy process would be empowered if scientists were abler (and willing) to say, “No one knows.”** Merely failing to claim that a graphic, a map, or an estimate has epistemic significance is a dereliction of duty for a scientist who is confident that it has none.

Given knowledge of the known neglecteds, and perhaps an informed gut feeling¹¹ for even the unknown unknowns, it can be discussed that the probability of some big surprise increases with lead time; the alternative of assuming it is zero seems inexcusable. Again, **no presentation of model-based probabilities is complete without a quantitative expression of the likelihood of model irrelevance.**

Even if reality exists independently of us, what we believe and what we doubt constrain our ability to act. What an individual believes can impact what each of us can achieve, as illustrated in some excess by the missionary Harold in Terry Jones’s *Erik the Viking*.¹² Set in the changed climate of the age of Ragnarök, which Odin foresaw but could not prevent, Harold’s disbelief in the Norse legends means he cannot see the dragons nor the Halls of Valhalla. They are merely the beliefs of Erik and the Viking band. As they do not exist for him, he is not bound by them, allowing him to save the day. Strong belief can without doubt increase one’s willingness to take on a given risk, as Erik’s martial prowess when wearing the cloak of invisibility. At the same time, strong belief can both blind one to rational argument and lead to the oversell of flimsy arguments that point in the right direction.

How can the public develop a deeper understanding of science, what science can and cannot do? Education of the electorate might prove effective and need not be scholastic. Yet, should that education aim to obtain a vote for action by any means required? Such an aim would misrepresent the traditional aim of science in the policy process and place the future role of science informing society at

risk. On the other hand, education targeting an understanding of the strengths and weaknesses of science and how to spot *all* the abuses of science would be of value tomorrow, and in twenty years. Where would climate policy be today if such understanding had been commonplace twenty years ago? Education is a long-range goal, but then the first IPCC report was over a quarter of a century ago. We can strive to improve the electorate's understanding of what science can do, and what it cannot, in 2050?

The efficacy of a person's belief in the science of weather-like events, where they face somewhat similar situations every day, is as difficult to deny as it is to oversell. For climate-like phenomena, which are arguably one-off extrapolations, waiting for irrefutable empirical evidence will carry extraordinarily high costs; there are significant benefits to maintaining an appropriate level of trust in the robustness and credibility of the science of our day. Oversell in any Big Science will eventually be exposed as such by science. This places both the public's belief and the decision maker's trust in science in jeopardy. Traditionally, science thrived in an environment where weaknesses, shortcomings, and internal inconsistency were highlighted and debated within each discipline; it is disheartening to imagine a future in which the public view of scientists then resembles the current view of wizards now.

Conclusion and Suggestions for Progress

Science advances by making mistakes, the key
is to make them as quickly as possible.

John Wheeler

Models provide hints. Rather than tossing their hard-won output into a statistical meat grinder to produce colorful graphics of dubious relevance, we might do well to learn their individual weaknesses and attempt to construct causal pathways that clarify what leads to the huge differences in their behavior. Invest time in understanding the evolution of each model planet, what looks reasonable, what looks unphysical. And accept that the weaknesses of and differences between these trajectories are our clues to learn from, that their faults are not enemies to be incarcerated in an oubliette. Scientists can both improve their models and demand more sensible limits on the questions we ask of them. We can aspire for a time when our climate models resemble observations of our planet without tomfoolery, a time when they can shadow the dynamics we have seen in the past (Smith 2006; Beven, Buytaert, and Smith 2012). Proximity aids understanding. We should keep our theories close and our models closer.

Political decision makers deal with deep uncertainty all the time; scientists might need to learn how to better deal with lobbyists. In short, we can be more open regarding our missteps, more honest about how much we do not know, and clearer that informed instincts say our future climate will (almost certainly)

be worse than today's model-land stories. There is often a cost in waiting for "proof." Anyone who has ever captained a nice ski boat in gator-infested waters knows what happens when you turn the wheel: nothing. If you see something ahead in the river, do you wait to be certain whether it is a log or a gator, or do you act? Given my risk appetite, along with the costs and the benefits of action, I tend to take precautionary action before I am absolutely certain of the downside. Given my personal risk tolerances, we have already waited longer than ideal in terms of taking significant action to reduce the impacts of anthropogenic climate change. **I believe that the overselling of today's model output and acceptance of opacity put the policy roles of science at risk, not only in climate but in all advanced sciences. While a great deal has been learned about climate science, I believe that in the last twenty years, we have learned very little regarding the decision-relevant details of the local phenomena we will see in 2050, much less 2100.**

Opacity would be reduced by frank discussion of the spatial and temporal scales at which today's models provide high fidelity insights into the future. Given the observed systematic biases and known neglecteds of today's best available climate models, it seems virtually certain that high-resolution (county-scale) maps of the United States showing the number of outdoor working hours lost in 2099 are not expected to reflect reality (see USGCRP 2009, Figure 19.21). Stating that the economic models used are not thought to be reliable could be interpreted as obfuscation if the climate models used could not be relied on for quantitative planning purposes even if the economic models were perfect.

We can embrace diversity in our models even when it cannot be quantified as uncertainty in our future, and never suppress it in presentation. Instead, we can clarify that diversity in this context increases the risks we face and may point the way toward scientific progress. We can avoid ambiguous works and misleading images; if not banning the word "uncertainty" then taking care to make clear which of its various meanings is intended each and every time it is employed (Smith and Stern 2011). And, at the same time, we can make climate science predictive again, providing baskets of expectation rather than either fractional attribution or forecast probability.

Other suggestions include:

- Keep numbers, the models, and the code clear and open, archived well beyond the lead time of the forecast. Publicize both strengths and weaknesses as lead times are reached so that those who inherited decisions based on earlier climate services projects can reevaluate. Project, monitor, and revise; never optimize, build, and ignore. Attach health warnings securely to the product.

- Models that include everything are unlikely to inform anything: even the most complicated models are best kept simple enough to be interpretable. Designing the UK's Global Calculator required explicit action to stay close(r) to reality and avoid "modelling everything."¹³
- Resist the demand to fund only science that appears immediately applicable while simultaneously avoiding pressure to oversell the science in hand. Deprecate the oversell of "not-yet-ready-for-primetime" science and modeling until it is ready. Discuss openly when the downsides of exposure and anchoring might exceed the immediate desire for inadequate model-land numbers known to be **not** fit for practice. **Fine print damns honest science.**
- Quantify oversell as soon as it is known, and evaluate claims relative to reality (not in terms of "improvement" relative to past models). Reduce expectations explicitly from past oversell (climate services, UKCP07, attribution, etc.).
- When attempting to sway the pendulum of public opinion, take care to be clear on what outcomes would prove the work invalid. Apply severe tests to today's models, and in the future, admit clearly when they are likely to go wrong. Minimize the risk of oversell regardless of how far in the future it might be exposed.
- More readily adopt established best practice from other fields. Suggesting that a model-based, expert-informed probability of 99 percent implies "virtual certainty" (Mastrandrea et al. 2010) ignores over half a century of hard-won insights in communicating confidence to policy makers and others from high-risk applications, including intelligence (CIA, see Steury 1994) and the commercial nuclear power, aviation, and insurance sectors.
- Require consistency tests when dynamically downscaling with one-way coupling to ensure that the climate of the driving model remains roughly consistent with that of the high-resolution model, reporting their divergence.
- Train the next generation of scientists to contribute toward solving big problems, to chance deep understanding over piecemeal progress of no lasting value. Do academics wish to incentivize our students to take on scientifically challenging problems, where progress would be of deep value in decision making, or for them to focus on publishing something that will get them a job next year, say, the penguin effect (Smith and Stern 2011)? And do we not have a duty of care: How do we mitigate the danger that we teach them to box and then send them out into a street fight? We can win a street fight without sacrificing our principles, but the tactics required differ somewhat from those employed in academic banter. Maintaining our principles and credibility is critical given the likely duration of the conflict.

- Clarifying assumptions made a priori while conveying confidence in the scientific conclusions obtained can aid decision makers (Kelvin's gambit) and thereby allow the science to support good policy and decision making on climate time scales, acknowledging the limitations of each generation of models and they come and go.
- Tune models toward the observed dynamics, not some target statistics; show the duration for which the models can shadow reality and learn why they fail when they do. Take sufficient data today to evaluate (and initialize) future models.

Governments often have difficulty addressing threats that are not obviously immediate. The challenges of addressing climate change can be reduced by the actions of scientists; it is clear that the negative impacts will be more devastating if no action is taken before the observational evidence is overwhelming. **This may require scientists to appear less wizard-like and protect the as-good-as-it-gets science by more clearly acknowledging the shortcomings of our current understanding.**

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Notes

- ¹ References to “we” and “us” refer generally to all readers of this article, to the electorate, and to all of humanity, including scientists.
- ² A projection is merely a prediction conditioned on this or that being the case. All predictions are conditioned on something. All non-tautological probabilities are conditioned on some information assumed to be true.
- ³ Climate is a distribution of weather states and their sequence.
- ⁴ We have only approximately fifty years of satellite observations from which 100- to 1000-year extrapolations are generated. There are no such observations at all in the case of a 1x CO₂ planet Earth.
- ⁵ Of course, there is always the possibility of a big surprise. It seems unlikely that such a surprise would prove that today’s laws of physics are incorrect in some novel manner (Cartwright 1983). Alternatively, a big surprise could easily make it clear that the conclusions drawn from them were, at best, irrelevant in the real world. This acceptance of doubt is a foundational aspect of all science; doubt is a strength of science, not a weakness.
- ⁶ Sugar (2009) considers Mephistopheles’s reply a “completely empty response,” and goes on to note that “this extended passage suggests that as the new ideas supported by astronomical evidence began to enter the public consciousness, a deliberate attempt was made to resist them and their accompanying ontological and theological uncertainties.” In the two texts, Faust is said to have studied at different universities, Wittenberg and Wertenberg, each considered radical astronomical thought (teaching the Copernican model; the first being more conservative than second). Indeed, the University of Tübingen did not allow Kepler to defend his thesis (1593), which supported Copernicus’s picture of the universe.
- ⁷ Care should be taken to distinguish temperature in the real world from model temperature in model-land. Governments have in fact asked formally for the IPCC to better clarify this.
- ⁸ See Met Office (2006). The online link appears no longer active.
- ⁹ I am grateful to Ed Hawkins for clarifying these points with me.
- ¹⁰ This suggestion has not gone undisputed. See Petersen (2023).
- ¹¹ When providing his estimate for the age of the sun, Lord Kelvin left the door open explicitly for then-unknown sources of energy, like nuclear fusion. Kelvin’s gambit is of great value in applied science.
- ¹² This movie is an ideal introduction toward clarifying what we believe we know robustly, from both oversell and false-hearted lying, and the impact of our beliefs on our abilities.
- ¹³ See <https://www.gov.uk/government/publications/the-global-calculator> and https://www.imperial.ac.uk/media/imperial-college/faculty-of-natural-sciences/centre-for-environmental-policy/public/Prosperous-living-for-the-world-in-2050---insights-Global-Calculator_2015.pdf.

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Holism in Dealing with Global Problems

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To the extent that we humans believe that we can solve our species-level problems with technology, we remain on the path to self-destruction. But there is an alternative; we can see other species like ours as empirical examples of how to be a species—how to participate in ultimate reality. This article exemplifies how holistic information provided systemically by other species can be used. Such information reveals the magnitude of humanity's challenges and what is needed to address the myriad interrelated global problems, including climate change. Such systemic thinking involves a shift from conceptually extracting things *from* their context to seeing everything *embedded in* its context.

Seeing other species as role models for how to participate in ecosystems requires a paradigm different from that prevailing in today's world. Words often attributed to Albert Einstein put it succinctly: "We can't solve problems by using the same kind of thinking we used when we created them." Following the leads of Gregory Bateson, Thomas Berry, Fritjof Capra, and Albert Einstein, this article implements systemic thinking by using other species as role models. Replacing conventional thinking with systemic thinking leads to holistic approaches to global problems. The solutions to many of these problems, however, may very well have to be accomplished by the forces of nature; such solutions would be both natural and normal.



“Enlightenment is a direct experience with reality.”

– Pema Chödrön

“A new type of thinking is essential if mankind is to survive . . .”

– Albert Einstein

Introduction

The Origin and Maintenance of Patterns That Reveal Normative Information

The universe consists of interacting parts that obey all laws of nature. The ecotheologian Thomas Berry repeatedly reminds the human world that every mode of being is “universe-referent” (in mathematical jargon, a function of everything) (Berry 1999, 2009a). Scientists have long recognized that living systems are self-preserving, self-organizing, and capable of healing through processes collectively referred to by the term homeostasis. We humans acknowledge the resulting patterns personally in our body temperature, blood pressure, heart rate, and breathing. The field of medicine works with such patterns as a matter of course. Measurements outside the normal range of natural variation (such as a fever) are cause for concern. They are recognized as unhealthy and unsustainable. Normative information is a useful guide for detecting and guiding the solution of pathological problems.

Nearly everyone recognizes that the human species is different from other species in obvious ways. Each species is unique, as is each individual within a species. A two-ton individual human, however, would be seen as more than simply special; the abnormality would be cause for deep concern. An individual with a blood pressure of 200/45 would be recognized as experiencing a pathological condition—an abnormality. Analogously, a comparable species-level abnormality should be cause for serious concern (Fowler 2009, 2021; Fowler and Hobbs 2002, 2003).

The laws of nature apply at all levels universally, including to ecological systems. Ecological patterns are the subject of extensive scientific research and documentation; the resulting normative information provides essential guidance for humans as a species. Ecological and evolutionary processes ensure homeostasis within and among such systems. Among species, there are normative patterns involving body size, density, consumption of O₂, geographic range, population size, production of CO₂, and resource consumption. As in medicine, observations of abnormalities among species are cause for concern regarding the health of the systems involved. In medical jargon, such abnormalities indicate a diseased system.

The Utility of Natural Patterns/Role Models

Adopting the view that particular species can serve as useful role models offers a compelling path forward for *Homo sapiens*. It involves a different way of

thinking to observe patterns among species and any associated abnormalities. If the abnormality involves the human species, then humanity has the option of doing everything possible to be normal—to restore health. The role models that inform us humans represent hundreds of thousands of years of universal trial-and-error processes to reveal what works, all within bounds established by natural laws. However, mimicry of an individual species is as ill-advised as the mimicry of an individual human; it is the pattern among role models that informs us—both as individuals and as a species.

Thus, natural patterns provide normative information that can either serve to guide humans as a species or predict the results of the homeostatic self-organizing forces of nature, or both (Fowler 2021). Rather than asking experts for their opinions, a generic question is asked: What is normal for mammalian species of human-body size? Reality—defined as “that from which nothing is excluded” (Fowler 2021)—provides the answer in the form of normative information (Fowler and Hobbs 2003; Fowler 2009, 2021). Such questions are prompted by any suspicion that the human species is being or doing something unsustainable or unhealthy. The following sections address questions related to being a normal species—specifically those involving climate change.

Normal Production of CO₂

Carbon dioxide is the primary contributing factor in climate change. What is the normal rate at which CO₂ is produced by individual animals? As shown in Figure 1A, per capita CO₂ production is related to body size—a pattern consistent across several taxa. The red circular points reveal that individual human bodies produce CO₂ consistent with the general pattern. It is a different story for the *total* per capita rate for humans (red squares in Figure 1). This includes CO₂ produced by our socioeconomic/industrial complex and is obviously quite abnormal.

Figure 1B illustrates why the logarithmic scale used in 1A is important. Several graphs in this article involve log transformations and require an understanding of the nature of log scales. In log-scale plots, points at the low end of the spectrum are farther apart and, at the high end, they are closer than they would be using linear scales. Points at the upper ends are the reverse of a car’s side-view mirror: in reality, they are farther apart than they appear in the graph. As seen in Figure 1B, in a simple linear plot, nearly all non-human species are lumped together near the origin. It is difficult to see any correlation or differentiate among the various taxonomic categories—an important element in choosing the correct species to serve as role models. Nevertheless, Figure 1B does give a distinct visceral impression of human abnormality for per capita CO₂ production.

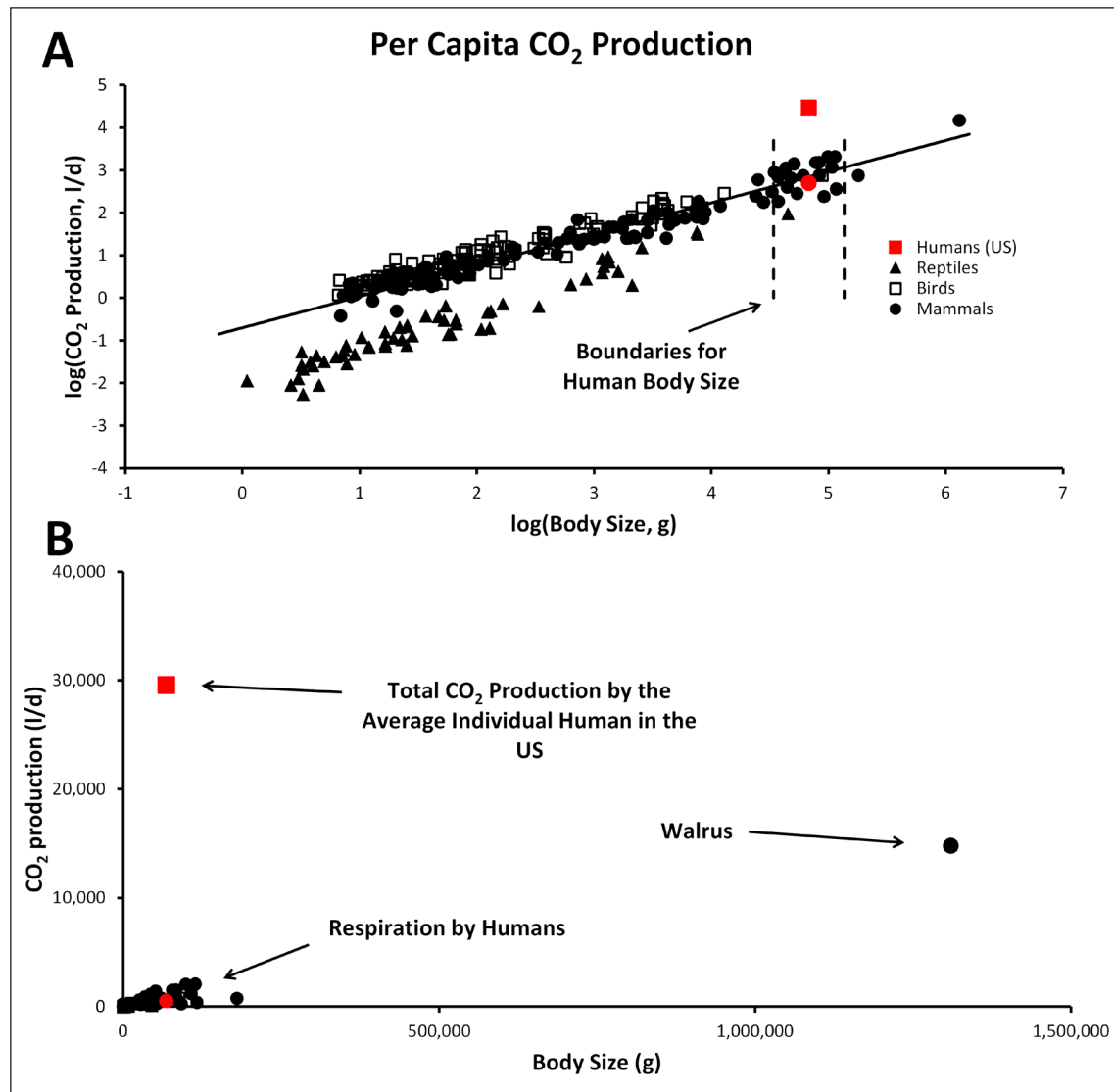


Figure 1: The relationship between total per capita CO₂ production and body size for reptiles, birds, and mammals (Nagy, Girard, and Brown 1999; Hudson, Isaac, and Reuman 2013). These serve as standards of reference for evaluating CO₂ production by humans in the United States (shown for 2018, with total CO₂ production by state from http://www3.epa.gov/statelocalclimate/resources/state_energyco2inv.html and total population from <https://www.census.gov/newsroom/press-kits/2018/pop-estimates-national-state.html>). The two dashed lines in panel A represent the upper and lower bounds assumed for mammals of human-body size (Rodden and Fowler 2018). The diagonal regression line is for all mammals in the sample.

One way to evaluate humans is to compare measures of *Homo sapiens* with the mean or average of the same measures among other mammalian species—this central tendency provides a norm. For CO₂ production, the regression equation of Figure 1A can be used to solve for mammals of human-body size (assumed to be sixty-eight kg). The per capita CO₂ production by individual human bodies

is normal. However, after adding in the CO₂ production by the socioeconomic/industrial complex for the United States, per capita CO₂ production is over forty times that for other species of mammals of human-body size. Globally, the mean per capita CO₂ production by humans is about ten times that of this central tendency. In all cases, insofar as changes in the Earth's climate involve CO₂ production by humans, such abnormalities are contributing factors.

What is the *total* rate at which CO₂ is produced by a normal species of human-body size? This requires looking not at per capita production but the global total for each species. Figure 2 shows data for global CO₂ production by 124 species of mammals, including humans. As in Figure 1A, the forty-seven species of approximately human-body size are bounded by vertical dashed lines. Clearly, the human species is an outlier, exhibiting an obvious abnormality.

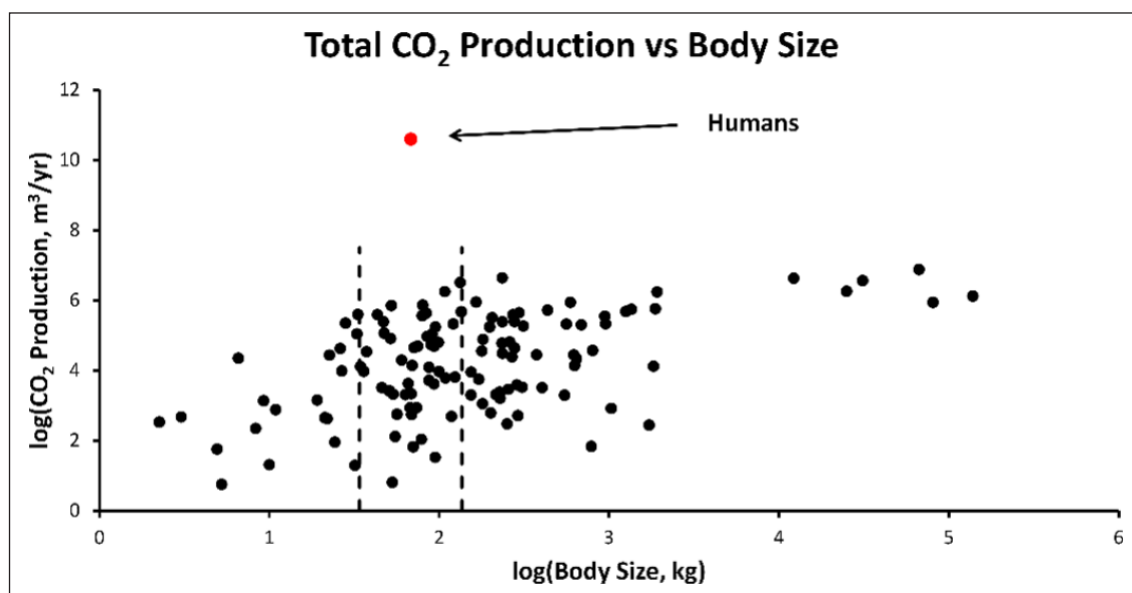


Figure 2: Global CO₂ production by 124 species of mammals, including humans. The abnormality for humans is seen by comparing humans to the set of other species between the vertical dashed lines. The data points are based on 2019 information for population size and body size (<https://www.iucnredlist.org/search>) combined with information for per capita production of CO₂ as related to body size (Figure 1). The original data for population size was expressed in terms of mature individuals; the comparison shown involves the assumption that 75 percent of the totals are mature and 25 percent are juveniles.

For the data illustrated in Figure 2, total CO₂ production by humans is over 197,000 times more than the average (arithmetic mean) among the forty-seven non-human species (an abnormality of over five orders of magnitude). The main difference between per capita (ten times the norm) and total CO₂ production (197,000 times the norm) is population. The total includes CO₂ produced in the making of concrete and burning fossil fuels along with respiration. The human species produces as much CO₂ in 160 seconds as the average otherwise-similar

species produces in an entire year. To the extent that CO₂ levels in the atmosphere are involved in changes in the Earth's climate, this abnormality is a contributing factor. Keep in mind that burning fossil fuels is abnormal on its own; it falls in the category of things no other species of mammal does (e.g., produce TNT, generate nuclear energy, practice medicine, or use technology to mitigate the consequences of faulty thinking) (Fowler 2021). As authors of this article, our mission is less to pass judgement on such endeavors and more to report what other species tell us.

The arithmetic mean is not the only point of reference for evaluating species. Another measure of central tendency is maximum diversity. As documented by Fowler (2008), diversity is directly influenced by the way the human species participates in living systems. There are various measures of biodiversity, one of which is known as the Shannon-Weiner information index. Unlike conventional understandings of the term “diversity” —limited to simple species richness—the Shannon-Weiner index includes a measure of balance or equity. Thus, if one species thoroughly dominates numerically, the “diversity” can be low, even approaching zero, even when all the same species are present and participating. For example, we humans produce 99.98 percent of the CO₂ produced by the full group of forty-eight similar species illustrated in Figure 2. *Homo sapiens* is extremely domineering in this ecological process. If illustrated in a pie chart of CO₂ production by species, the other forty-seven virtually disappear into an invisible sliver representing 0.02 percent of the total (Figure 3). This absence of diversity results in a Shannon-Weiner diversity index of nearly zero (Fowler 2008).

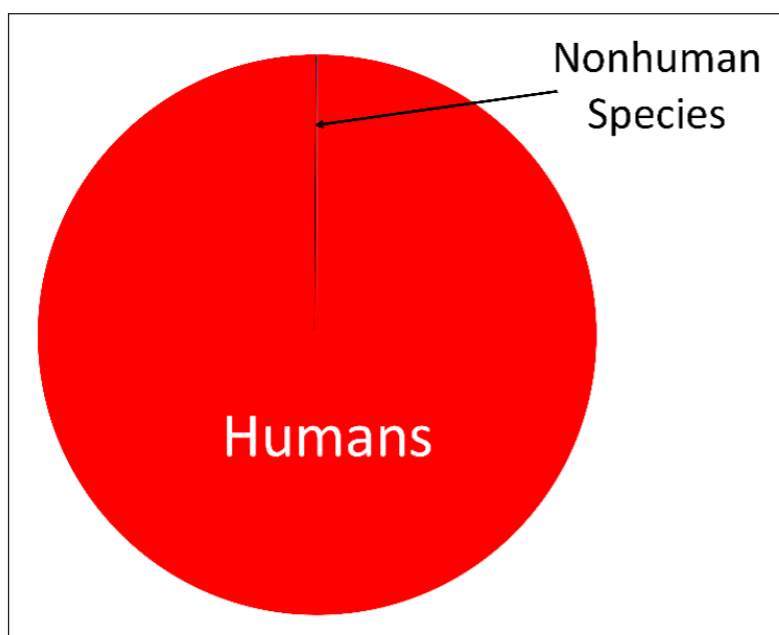


Figure 3: Global CO₂ production by forty-eight species of mammals with body sizes similar to humans, including humans. Data are from the sources listed in Figures 1 and 2.

In everyday language, the lower the Shannon-Weiner diversity index, the more the dominant species is the “bully on the block,” and abnormal or pathological in its existence. The higher the diversity index, the more of what Thomas Berry (1999) calls “mutually enhancing” relationships exist with the other species. In that light, the Shannon-Weiner index is a measure of the degree to which humans take advantage of information provided by other species. It is related to the degree to which humans “listen to the voices of other species” (Berry 1999) and adjust species-level behavior accordingly. The higher this index, the more the human species honors the existence of the other species and embraces their importance and meaning as parts of reality.

Diversity, as the term is used here, can be dramatically increased, even maximized, without any change in the number of species present (Fowler 2008). Current production of CO₂ by humans is over 42,000 times as much as what would maximize the diversity among all forty-eight species of human-body size in Figure 2—assuming no reaction by the nonhuman species. This is less of an adjustment than would be required to match the average; maximized diversity always occurs at levels above the average (Fowler 2008).

The impact of human abnormality is felt at all spatial scales from the location of individuals up through and including the biosphere. There is a related phenomenon known as “equivalence rules” (Damuth 2007; Habeck and Meehan 2008); that is, there is no correlation between certain measures of species and body size. When the production of CO₂ per unit area is examined, an example is revealed (Figure 4). After asking the question: “At what rate do

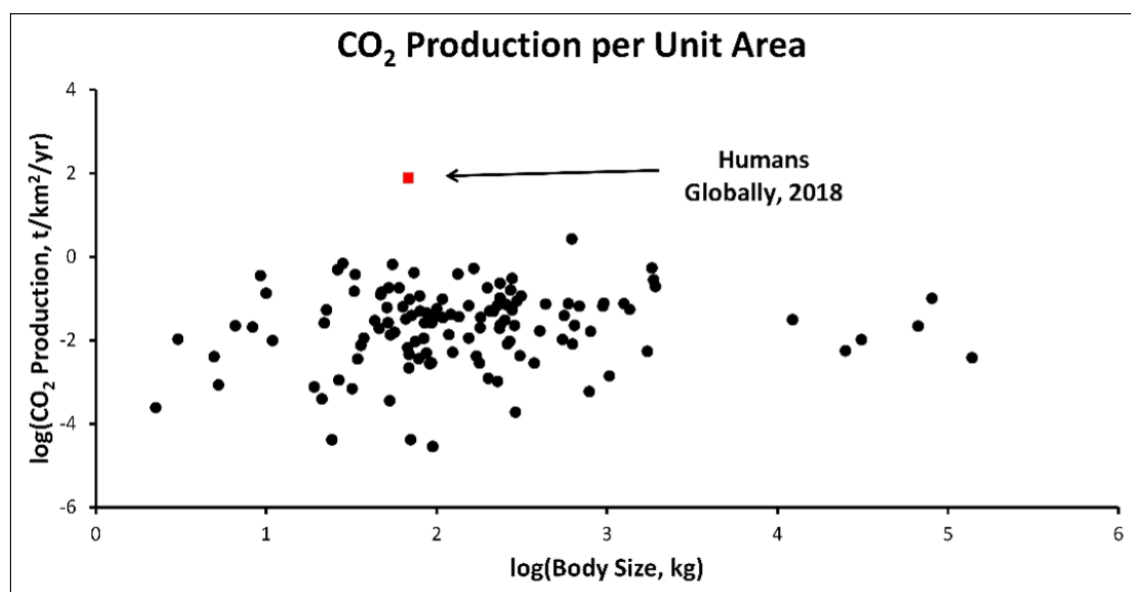


Figure 4: The production of CO₂ per unit area by humans in comparison to that by 123 other species of nondomestic mammals of human-body size (based on population sizes using the same sources as for Figure 2, per capita production from data used in Figure 1, geographic ranges from Jones et al. (2009), and CO₂ production by humans (from <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2254rank.html>)).

normal species produce CO₂ per unit area?”, all mammalian species can be used to detect and evaluate any human abnormality. Also important is the fact that this metric can be applied to any of the infinite parts, or combinations of parts, of the Earth.

The ripple effect of abnormality in any area has impact everywhere. The Earth experiences the consequences of abnormality anywhere. For example, there are many ways to sample the countries of the world. It can be done in pairs (e.g., Italy and the United States, or Norway and Thailand), in groups of fifteen, or in combinations of fifty-seven—groups of any size up to the total. We found 189 countries for which there are data for both CO₂ production and measures of area; CO₂ production per unit area by humans can be calculated for them all. The largest set of samples comes from using various combinations of half of the total of all countries; in this case, there are 4.536×10^{55} different ways to combine ninety-four countries ($189/2 = 94.5$). Measures of a random sample of such combinations show that CO₂ production per unit area by humans consistently involves an abnormality measured in several orders of magnitude; the average is over 4,000-fold greater than that for groups that only include nonhuman species. Alignment with the natural laws of one of these trillions of combinations would impact all others because they are all interconnected components of a single Earth system. Doing so everywhere would be a significant step toward holism.

The areas in which this approach can be applied are infinite. They include the geographic range of any other species along with every county, continent, ecosystem, watershed, country, municipality, and all of their combinations. Measures of the nonhuman wild species in any specified area serve best as standards of reference, as they would account directly for the circumstances of that particular environment (e.g., the combination of Kenya and India, or the geographic ranges of impala, black walnut, and Colorado tick fever). However, lacking such information, the general pattern of Figure 4 provides initial approximations of what would be normal.

Beyond the holism of infinite applicability on spatial scales is the fact that being normal would result in having a normal impact on everything (Belgrano and Fowler 2007). This “everything” includes the infinite sets of the parts of reality—that from which nothing is excluded. Furthermore, it includes all combinations of those parts. Producing CO₂ at normal levels would be a start, but there remain numerous other dimensions of being a species.

Normalcy in Other Dimensions of Being a Species

Imagine an individual human with both a fever of 108°F and a pulse of 200 beats per minute. Medical treatment of only one and ignoring the other would be malpractice—grossly negligent. Thus, as a species, treating the abnormality we humans exhibit for CO₂ production is insufficient if there are other dimensions of being a species for which *Homo sapiens* is obviously abnormal.

Owing to the interdependent nature of the parts of reality, other forms of abnormality are often obviously connected to that of CO₂ production. For example, a large part of the explanation for human's abnormal total CO₂ production involves our abnormal population size. If the human population were reduced to half its current level, without change in per capita production of CO₂, our global CO₂ production would be half of what it is today. The two are inextricably linked. As such, given that humans are mammals, given our body size, and given prevailing circumstances, what would our population size be if we were a normal species?

Population

The current global human population is about 14,000-fold greater than the arithmetic mean among species of mammals of similar body sizes (Figure A1, Appendix A). Human individuals are so numerous as to make up close to 99.7 percent of the total for the sample of forty-seven species shown between the lines of Figure 2. As with CO₂ production (Figure 3), humans dominate other species. The human population is about 3,600-fold greater than the population size that would maximize diversity. Were the human population size normal, the prevailing circumstances would be different owing to the dynamic, interconnected nature of natural systems (especially their cybernetic nature—the way they involve and provide information) (Bateson 1972, 1979). On average, the populations of the nonhuman species would increase after being relieved of abnormal human impact. This would result in higher, more accurate, and more reliable standards of reference for evaluating other species, like humans. Importantly, the reference points for CO₂ production would also be/become different from those under current conditions as the CO₂ production by these species would increase with their populations.

If the global human population were of a size that would maximize biodiversity, and assuming no response by the other species, it would be about 2.2 million, roughly equivalent to the population of Tijuana, Mexico. If the human population corresponded to the arithmetic mean, it would be about 500,000, or the size of Atlanta, Georgia. The nonhuman species with the largest population may be the white-tailed deer; even that is less than forty million. One can only imagine the repercussions of having the total human population reduced so dramatically. Aside from the moral issues about how this might be achieved, there would be both positive and negative impacts as experienced in today's systems of belief and values. Certainly, however, with a population of normal size, total human CO₂ production would be much closer to normal, even without a reduction in per capita production of this gas by humans. Given the pattern in changes that could be expected in the populations of nonhuman species (increasing totals, density, and geographic ranges—along with increased CO₂ production), total human CO₂ production

would very likely be quite normal, as would at least a few other dimensions such as population density, that is, the number of humans per unit area (Figure A2, Appendix A).

Livestock Populations

Population size and density are metrics that also apply to domestic species. The population sizes of most domestic species are abnormal by multiple orders of magnitude (Figure A3, Appendix A). The total population of cattle is over 12,000 times larger than the arithmetic mean for other mammalian species of their body size. The population of sheep is 2,500-fold larger than normal. Such abnormalities extend to cats, dogs, swine, camels, and other domestic species. Similar assessments of domestic fowl require making use of matching data for nondomestic birds as normative information. These show similar abnormalities, but their measure and illustration are beyond the scope of this article. Maintaining those abnormal populations requires energy and associated CO₂ production. The bodies of these species also produce CO₂ themselves. In addition to the global measures of abnormality for these species, there are many ways in which abnormality is observed locally. This is exemplified by their density in various ecosystems of the world and in the geographic ranges of other species. Their geographic ranges overlap those of other species, making the number of impacted species abnormal as well.

Energy Use

Another dimension of species that involves normative information is energy consumption. Global energy consumption by humans is 99.97% of the total energy consumption by all forty-eight species of human-body size; it is 3,521 times the *total* of the other forty-seven species (between the lines of Figure 2). Every three and a half seconds, the total energy consumption by the human species is the equivalent of that of the atomic bomb dropped on Hiroshima in 1945. The total energy consumed by humans is over 154,000-fold greater than the arithmetic mean for that consumed by the forty-seven nonhuman species. See Figures A4–A6 (Appendix A) for more detail.

Agricultural energy use is a significant contributor to human abnormality in CO₂ production. From the point of view of energy consumption, burning fossil fuels to extract energy from ecosystems as agricultural products is one form of abnormal energy consumption used to maintain another form of abnormal energy consumption. This abnormality is further exaggerated by the use of crops (such as corn) as sources of fuel. Otherwise, the energy harvested agriculturally is largely used to either feed humans directly or feed livestock, another source of food for humans—that is, energy used to maintain the abnormal human population along with the abnormal populations of domestic species (Figure A3, Appendix A).

Geographic Range

Within the biosphere, all species occupy a portion of the Earth known as their geographic range; the area outside that range is unoccupied. A major issue in the modern world involves the question of what portion of various ecosystems, states, countries, continents, and the Earth should be protected from direct human impact. There are two complementary issues to consider (Hobbs and Fowler 2008): the portion of a specific area that is occupied and the portion that is left unoccupied. The patterns for other species are correlated with the size of the area being considered (Fowler and Johnson 2015; Rodden and Fowler 2018); if the ecosystem is small, larger portions are occupied, and if the ecosystem is large, smaller portions are occupied. The biosphere is the largest ecosystem, and the portion left unoccupied is the largest.

What is the size of a normal geographic range? If the range of *Homo sapiens* corresponded to the arithmetic mean among the thirty-one terrestrial species of the forty-seven from Figure 2, it would cover a space about two-thirds the size of India. This is only about 1.5 percent of the Earth's land surface. If marine mammals are included as well as terrestrial mammals, the mean geographic range is nearer the full size of India. Current human occupancy of the Earth, as seen by lights at night as photographed by astronauts, is obviously many times the area of India. The number of other species whose geographic ranges are overlapped by that of humans is another extreme abnormality.

The list of ways the human species has already been shown to be abnormal is extensive. The authors' previous publications have revealed abnormality in the harvesting of fish over various temporal and spatial scales. Abnormalities also exist in human contributions to extinction rates, the consumption of marine resources, total mass, O₂ consumption, and survival rates (Fowler 2009, 2021). Human consumption of water exhibits an abnormality of over five orders of magnitude (Fowler 2008). In many cases, such abnormalities are observed in specific areas as well as globally. Other examples include population density, water consumption per unit area, mass per unit area, biomass consumption per unit area, and O₂ consumption per unit area. The rates at which humans produce pesticides, produce plastic, suppress the populations of nonhuman species, and exhibit selectivity in our harvests of resources are all abnormal (see the list in Fowler and Oppenheimer 2017). The widespread sense that humans are abnormal is confirmed by scientific measurements that reveal the magnitude of our abnormality and the extensive variety of ways we are abnormal.

The science that best serves the human species in managing ourselves ecologically (i.e., intransitive management) is that which reveals normative information, as exemplified in the preceding figures (and in Appendix A; Fowler and Hobbs 2009, 2011; Fowler 2021). Such research is essentially unlimited. It begins by identifying species that are similar to humans. Next, in the area of

concern, research reveals data for species-level measures of interest. The same data for humans is then compared. Considered in the context of seeking human alignment with evolved norms, the results can be used by consulting firms, intergovernmental panels, government agencies, and international organizations (with the common objective of normalcy) (Fowler 2021).

From Mitigation to Participation

There are numerous dimensions of being a species, and very often related measurements show humans to be extreme outliers. Important to the main point of this article is that, in all cases, mitigating the consequences of human abnormality does not change the systems of thinking that cause and perpetuate such abnormalities and their extensive impacts. Without changed thinking, mistakes of the past are repeated. Humans remain on a path that includes the risk of our own demise as a species.

Conventional thinking tries to set goals for the future without normative information. Recently, the twenty-eighth United Nations climate change conference noted the need for a 43 percent reduction in CO₂ production by humans by 2030. This may be a step in the right direction, but it would still result in production that would be over 150,000 times greater than the average for similar species. After a reduction to only 57 percent of today's levels of CO₂ production, human abnormality of over five orders of magnitude would persist. A 43 percent reduction would have to be repeated ten to twelve times to achieve normalcy.

Replacing conventional thinking with systemic thinking involves a conceptually simple conversion. Instead of thinking about mitigating humanity's impacts, we humans would think about becoming normal and participating normally in our world. Doing so, human impacts would be self-mitigating by natural systems. There would be no need to put any thought, time, effort, or energy into mitigating actions.

In today's world, mitigation predominates; examples abound. The topic of the 2023 Institute on Religion in an Age of Science conference was climate change and mitigating measures. Many such measures have been proposed, including various forms of geoengineering, such as extracting CO₂ from the atmosphere, reflecting light back into space, planting more trees, stimulating the uptake of CO₂ in the marine environment, and others.

Importantly, mitigation is not confined to the abnormal production of CO₂ by humans and its effects on climate. Mitigating measures include those aimed at the consequences of climate change and are exemplified by the control of infectious diseases, epidemics, pandemics, and disease vectors. Ecosystem restoration is mitigation for the consequences of an abnormal population. Fish ladders mitigate the consequences of abnormal use of water. Removing

plastics from the ocean and disentangling marine mammals are mitigation of the consequences of the abnormal production of plastics. The abnormal use of pesticides by humans is mitigation for the abnormal monocultures of agricultural crops. Radioactive waste disposal is mitigation for the abnormal use of atomic energy. Outward Bound, holy hikes, and forest bathing are essentially mitigating measures for the psychological, mental, and emotional consequences of various forms of abnormality.

Focusing on appropriate participation in the world, rather than mitigation, involves a change in thinking. As has been demonstrated, other species provide role models for how to be aligned with reality: being part of the Earth community, part of ecosystems, part of the biosphere, part of any combination of species.

As Bateson (2015) said: “The major problems in the world are the results of the difference between how nature works and the way people think.” People can change the way they think (Fowler 2021), but it is far from easy—just ask a recovering addict or an entrepreneur after numerous failures. Profound changes in thinking are often precipitated by rapid change, personal or historical. Paradigm shifts like this often provoke deep conflict, even bloodshed, as old and new worldviews clash. In all cases, the path forward involves improved alignment of mindset with reality. Humans, as individuals and as a species, must be open to the possibility that one of the consequences of conventional thinking is reinforced conventional thinking—a doubling-down brought on by the harsh consequences of an abnormal environment. If that tendency is not overcome with rational action, some major part of the way forward may have to be that of nature taking its course, forcing normalcy through natural homeostatic processes. In the geologic past and predictable near future, such processes have been merciless—never pretty! Achieving normalcy, by whatever means, may be the path to thinking that preserves and perpetuates normalcy for the benefit of all parts of reality.

Future Advances in Science

It is important that the study of species continues to identify more ecological dimensions. This must be followed by research to characterize patterns defined by those dimensions (Fowler and Hobbs 2011). With normative information in hand, the human species has the responsibility, to the extent possible, of being normal—participating in the real world normally. Like tissues and organs within a human body, normalcy among species is a measure of health for the entire biosphere. Repetition and updating of past work are called for to obtain more precise estimates of species-level human abnormality for the dimensions that have been explored so far. Further, research to explore abnormality in other dimensions is as important for humans as a species as it is for individuals in the field of medicine.

A few examples of such dimensions include:

- rates at which elements are extracted from the lithosphere and atmosphere (e.g., oxygen, gallium, nitrogen, sulfur, potassium, carbon, copper, lithium, iron, tantalum, helium, cobalt, gold, tungsten);
- rates at which things like plastics, biocides, fertilizers, explosives, and pharmaceuticals are produced;
- rates at which light is produced (see Jägerbrand and Spoelstra 2023);
- the mean distance between where food grows and where it is consumed;
- home range size;
- the mean distance traveled annually by means other than walking or running; and
- rates at which feces, urine, estrogen, and heat are produced (especially on a per unit-area basis).

This is undoubtedly a huge list, with every case providing material for innumerable term papers, advanced degrees, publications, and environmental impact statements (Rodden and Fowler 2018).

In addition to the study and characterization of individual forms of abnormality, there is the need to investigate the full set of synergistic interactions and cumulative effects of abnormality involving two or more dimensions simultaneously. Consider, for example, one single pair of ways species can be measured. How does synergism in the combination of abnormal CO₂ production and abnormal water consumption relate to the risk of extinction for any species (including *Homo sapiens*)? If there were only fifty species-level metrics, there would be 1,225 such questions involving pairs of dimensions. The total for all combinations would be 1.126×10^{15} . Such questions can be asked for any of the infinite set(s) of combinations among the ways humans are abnormal, and all lead to management questions of what humans would be and/or would do as a normal species (Fowler and Hobbs 2011) across all dimensions of being a species.

Discussion

The human species is abnormal in numerous ways, and those ways are all intersectional due to the inherent interconnectedness of natural systems. Any mitigating action, whether it involves technology or not, does not solve the underlying problem of abnormality. More importantly, human belief systems that perpetuate/accentuate abnormality are not changed when their consequences are simply mitigated.

Only a belief system that values alignment with natural processes will accomplish being normal. Symptomatic relief of the consequences of deficient thinking (mitigation) does not change the thinking, but thinking can be changed (Fowler 2021). Replacing conventional thinking with systemic thinking brings holism into the picture (Fowler, Belgrano, and Casini 2013; Fowler 2021). The

inadequacies of conventional thinking have been identified by many (e.g., Capra 1982; Fowler 2009; Scholz and Steiner 2015), and the negative ramifications of conventional thinking have been recognized for centuries. Dante Alighieri treated the issue at the personal level, as described by Meeker (1997):

Dante believed that he must present the world in all its complex multiplicity so that people could better understand where they were in relation to everything else, material and spiritual. Misery, according to Dante, is the result of mistaking or distorting one's vision so that only a fragment of reality can be seen, and then taking that fragment for the whole. Felicity becomes possible as the eye learns to see the millions of fragments that make up the universe interacting with one another to create a cosmos. Misery arises from simplified and narrow vision; felicity lies in participation in systemic complexity.

Participation in systemic complexity is at the heart of systemic thinking and at the core of being a normal species (Hobbs and Fowler 2008; Fowler 2009, 2021). Systemic thinking acknowledges that humans are embedded in systemic complexity and allows us to seek normalcy for the sake of restoring integrity to the whole.

How does systemic thinking lead to holism? Achieving holism requires seeing any fragment as the result of natural integration of the forces of the whole (Belgrano and Fowler 2007, 2011; Fowler and Hobbs 2011; Fowler, Belgrano, and Casini 2013) while at the same time not equating it to the whole; being normal in one dimension but not others is insufficient. Natural integral patterns of normative information account for everything (all emotions, galaxies, history, gravity, intelligence, symbiosis, evolution, politics, mass, light, extinction, magnetism, chemicals, and behaviors). How does this work?

As documented by Leopold Infeld (2006), Einstein understood natural integration; everything is an expression of everything that contributed to what it is and does (that is, immanence) (Fowler 2021). In Thomas Berry's words, everything is "universe-referent" (Berry 2009a). In Alfred North Whitehead's (1926) words: "[E]ach unit is a microcosm representing in itself the entire all-inclusive universe." In the Far East, Indra's net is a metaphor for the ways everything reflects everything else (Fowler 2021). In the field of physics, the information inherent to systems accounts for this complexity; the things accounted for are "implicate" in the patterns observed (Bohm 1980). This "holographic" nature of natural patterns can be seen as a form of "memory" (Bateson 1972; Fowler 2021). As Berry put it: "The human and the Earth are totally implicated, each in the other." (Berry 2009b).

Extremely important is the fact that this holism thoroughly accounts for human thinking, the structure and function of the brain, and all consequences. As such, systemic thinking is fully self-referent—not simply by thinking about

our thinking but by taking advantage of natural integration to account for all thinking (Fowler 2003, 2009). Heather Berlin says: “[M]y brain is an exquisite machine that perceives reality in the service of survival, not accuracy” (Bicks and Strachan 2023). All inaccuracies, limitations, built-in bias, and risks of human extinction posed by the evolution of the human brain are automatically taken into account by the holism of natural integration; natural integration takes into account the unknowable—completely and objectively (Fowler 2009, 2021).

Thus, natural integration accounts for infinitely more than can be accounted for by conventional thinking; the essential guidance of normative information for making humans a normal species is holistic. Through the interconnected nature of reality, being normal then guarantees that all consequences are normal—no consequence is ignored (Fowler 2021). If humans were to become normal in all the ways of being a species, no part of reality would be subjected to abnormal human influence—a holistic form of justice.

In this regard, it is important to realize that the holism of natural integration also accounts for both God and the numerous human perceptions of whatever God is. Humans hold an overwhelmingly huge variety of beliefs about God. Each belief is contained within the whole of reality simply by being in someone’s thoughts—all beliefs and thoughts are parts of reality (that from which nothing is excluded). As such, every belief is taken into account by natural integration, particularly in ways human beliefs contribute to, and maintain, observed abnormality. All of reality, and all parts of reality, are accounted for by the holism of natural integration. As such, humans have the option of defining God as reality, that is, equating God and reality (that from which nothing is excluded (Fowler 2021)). If humans were to become normal in all the ways of being a species, all of reality and all parts of reality would be free of abnormal human influence. God, by anybody’s definition, would be spared any abnormal human influence. In taking such a step, perfect alignment between belief and reality would be achieved.

At the species level, it now seems clear that we humans need to stop formulating guidance based on conventional thinking; it does not work. Humans need to start relying on guidance provided by role models (Fowler 2003, 2009; Fowler and Hobbs 2002, 2003, 2011; Fowler, Belgrano, and Casini 2013). This change would mean that intergovernmental panels, consulting firms, teams of experts, environmental organizations, political parties, government administrations, and all individuals involved would acknowledge their biases and limitations and, rather than offer advice, do their best at being experts in seeking normative information for guidance (Fowler 2021). The advice of experts would be replaced by the wisdom of role models. Obviously, this would be a huge change and run against the human tendency to maintain the status quo, to continue doing more of the same. Natural selection and genetic forces undoubtedly contribute to the ways humans think—and are also behind the

abnormality of today's world. Using normative information to be normal would deal with the risks such forces pose.

The Marine Stewardship Council is an example of an organization that perpetuates abnormality. This council currently certifies commercial fisheries as sustainable when, in fact, the harvests involved are abnormal. Most of today's fisheries harvest over twenty times more than would be normal and are, therefore, unsustainable (Fowler, Belgrano, and Casini 2013). Another example of conventional thinking involves population size. Over half of the several dozen "experts" quoted by Joel E. Cohen (1997) believed that a sustainable global population for humans is larger than the current population. Every such "expert" believed that a sustainable global population is far greater than what would be normal for mammalian species of our body size. Their guesses were larger by orders of magnitude (Fowler 2009). In nearly all cases, the factors taken into account by the systems of thinking brought to the task by these "experts" were confined to simple things like space, food, energy, or a superficial mathematical model. All such factors are simply fragments of the whole in the ways they are used—subject to the misleading "Humpty Dumpty syndrome" (Fowler 2003, 2009; Fowler and Hobbs 2011). There was nothing involving the holism of natural patterns. We humans cannot recombine selected fragments to achieve the whole represented by the holism of immanence (that from which nothing is excluded in the inherent integral nature of everything (Fowler 2021)).

Perhaps one of the best examples of the simple-minded and erroneous nature of conventional thinking involves the known connection between energy consumption and CO₂ production. Based on an acceptance of this clear connection, it is frequently suggested that humans should convert to using clean energy to help reduce CO₂ production. Atomic energy, solar energy, wind energy, energy from the tides, and hydroelectric power are forms of energy that produce less CO₂ than burning fossil fuels. The most obvious problem with this thinking is that it addresses only one of many intersectional factors and fails to deal with human abnormalities in total energy consumption (Figure A5). Such thinking accentuates abnormalities and all consequences of these abnormalities. There is little to no recognition of abnormal population size, extinction, epidemics, international conflict, habitat degradation, or loss of ecosystems. This is an example of what Gregory Bateson (1972) calls conscious purpose—setting goals based only on the limited set of things of which humans are aware. However, there is a subset of conscious purposes that actually works: the conscious purpose of being normal.

Thus, conventional thinking (the prominent prevailing paradigm) has resulted in extensive abnormality. Over the history of comparing humans with other species that serve as role models, there is a growing number of documented abnormalities and a variety of measures of their magnitude (Reimchen 1995; Cohen 1997; Fowler and Hobbs 2002; Fowler 2009; Darimont et al. 2009;

Darimont et al. 2015; Stephens et al. 2019; see also Fowler 2021 and references therein). The various categories of human abnormality at the species level include consumption of water, total biomass, the biomass consumed, the portion of primary production consumed, selectivity in harvesting wildlife, the estrogenic compounds produced, total survival rate, geographic range size, and population density—abnormalities exemplified by those graphically illustrated in this article. The extent of these abnormalities varies from less than one (up to ten times the norm) to over six orders of magnitude (millions of times the norm). The degree of abnormality depends, in part, on which measure of central tendency among the role models is used. An important fact to keep in mind is the CO₂ produced in maintaining these abnormalities and all subsequent consequences. The energy used to counteract the homeostatic self-organizing forces of nature results in CO₂ production that is a major component of the human attempt to control nature rather than control ourselves. Humans currently use energy, and produce CO₂, to prevent such forces from helping us be normal. Using energy in the application of technology to mitigate consequences of current thinking adds to our already abnormal use of energy, promoting a vicious spiral of increasing abnormality, unsustainability, and ecological pathology.

There is a long list of proposed means for mitigating climate change. Such measures must be recognized as inadequate, misleading, and inadvisable because:

- although possibly permissible in specific cases and in the short term, mitigation does not change the thinking that gave rise to the problem being mitigated. A change in thinking (Fowler 2021) is clearly preferable to taking mitigating action.
- mitigation exemplifies manipulation rather than participation. It assumes a level and kind of control that is antithetical to systemic thinking (Fowler 2003, 2009; Fowler and Hobbs 2009, 2011). Nature isn't apart from humanity; humanity is in it and of it.
- mitigation is abnormal and, therefore, to be avoided; no other species mitigates the consequences of its participation in reality.
- taking action to mitigate consequences of existing human abnormalities does nothing to reduce the abnormalities; for the most part, it perpetuates them.
- mitigation is not holistic. To the extent humans can be normal, we must think holistically.

This holism is extremely important. The respected eco-theologian Thomas Berry (1991) recognized how nature's role models account for everything, or achieve holism, in being "universe-referent." Berry went beyond this in noting the importance of recognizing the magnitude of the problems humans face. He was serious about "reinventing the human at the species level" (Berry 2009a) and

that the “empirical observation of the world is our most valuable resource in establishing a viable mode of being for the human species” (Berry 1999, 2009a).

As has been emphasized, other species do not mitigate the consequences of their existence; mitigation is abnormal and to be avoided. This is especially true for the use of technology, particularly technology that contributes to accentuated abnormality in things like resource consumption and its consequences. Humans face a deep quandary in that it would be abnormal for our species to intentionally, intransitively, be a normal species. A form of deep ecology is manifest in realizing that it is perfectly normal for pathological abnormalities to be corrected by homeostatic forces (Greer 2016)—the self-organizing nature of natural systems. Following the “let go, let God” advice of twelve-step programs for individuals, such correction is clearly a viable option for the human species (Fowler 2021). It would be what Thomas Berry calls enduring the severity of Earth’s discipline (The Gaia Foundation 2009). This is in stark contrast to thinking of the collapse of civilization as a horrible event to be avoided; “threats to individual as well as societal existence may be what humans require to change outdated thinking” (Lawler 2010). As William Rees (2006) said: “[W]e need a genuine paradigm shift.” Rees joins Fritjof Capra (1982), who emphasized the need for “a new ‘paradigm’—a new vision of reality; a fundamental change in our thoughts, perceptions, and values.” Later, Capra (1990) said that “systemic problems . . . require a systemic approach to be understood and solved.” Accepting nature’s role models as holistic guiding information would be a major part of the shift to a systemic paradigm. Being normal would result from its implementation (accomplishment, practice, or praxis) (Fowler 2009; Fowler and Hobbs 2011). It would be listening to the voices that Thomas Berry (1999) recognized for all things. As Bateson (1979) put it: “[I]n talking about living things or self-corrective circuits, we should follow the example of the entities about which we are talking.”

Interwoven with the mimicry of role models in achieving normalcy is the matter of reversing the burden of proof (Fowler 2003; Gerrodette et al. 2002). Given the veracity of reality (Fowler 2021), sceptics or opponents of being normal face the responsibility of proving that their position does not contribute to repercussions that are important to avoid. For example, given the role of extinction as part of the trial-and-error process of evolution and in the formation of macroecological patterns (Fowler and MacMahon 1982), people who are concerned about the economic impact of being normal have the responsibility of proving that the human construct of economic systems does not pose a risk of ultimate extinction for the human species. The same holds for any aspect of our being abnormal. Any opposition to being normal raises the responsibility of proving that such opposition is not a matter of anthropocentrism, arrogance (Stanley 1995), indifference, disrespect, disregard, and ignorance of reality (especially regarding other species). All of humanity

bears the responsibility of proving that our species is not predisposed to extinction by forces that cannot be resisted—particularly forces that drive the human mind, behavior, and decision making.

In this regard, the historical collapse of human civilizations cannot be ignored—experiments that did not work. For example, the work of Luke Kemp (2019) indicates that conditions such as those of the human abnormalities exposed in the work presented and cited in this article are likely contributors to the collapse of nearly ninety civilizations of the past. Kemp (2019) quotes Arnold Toynbee in saying that “[g]reat civilizations are not murdered. Instead, they take their own lives.” To what extent are human systems of thinking factors in these dynamics and behind the risk of human extinction?

Summary

When the role models the universe has provided are observed, it can be seen that the CO₂ produced by humans is abnormal in innumerable ways. CO₂ production is not the sole abnormality; the list of human abnormalities is long and growing. The magnitude of human abnormality at the species level is measured in orders of magnitude, so it is of no surprise that there are observable consequences. It can also be seen that mitigation is abnormal. Mammalian role model species serve as reality’s mentors, to which the human species is an apprentice. Such models show that it is very normal (and natural) to achieve normalcy by letting the homeostatic forces of nature do what they do—by ceasing human resistance to the laws of nature, as carried out to the ultimate peril of humanity (e.g., human extinction) (Bateson 1979; Fowler 2021). In the role of apprentice, the human species can learn from the wisdom of those mentors. They would be given voice in a holistic democracy with votes based on the ways they exist and participate in reality—the essence of their being (Fowler 2009, 2021). The power of their votes is maximized at maximum diversity.

Belief in mitigation as a solution to the consequences of species-level human abnormality (including contributions to climate change) does nothing to change the belief systems that cause and perpetuate those problems. It does nothing to deal with any genetic predisposition to think in ways that promote species-level suicide (Fowler 2009). Belief in the wisdom of reality changes everything. This belief involves knowing that emergent from reality (as a result of cosmogenesis and the evolutionary processes involved (Swimme 2022)) are holistic role models for how to participate in the grand system of reality (Fowler 2009, 2021). Systemic thinking requires a paradigm shift from manipulation to participation. It also involves knowing that beliefs maintained by humans are parts of that reality and can evolve to be more consistent with it—to be in better alignment with reality (Bateson 1972, 1979; Fowler 2021). Such thinking would help make serious progress in solving the problem Bateson (2015) identified in regard to the misalignment of current belief systems and reality.

Adopting systemic thinking would result in convergence toward the truth of reality by all belief systems (Fowler 2021). It would create unity of mind and nature—seen as necessary by Gregory Bateson (1979). Implemented, it would lead to all things being relieved of the effects of human abnormality. It would allow all life to flourish. This includes long-term life for *Homo sapiens*. Implementation, however, appears to be largely confined to accepting the help of the system(s) of which humans are a part—the homeostatic forces of nature. Do humans have what it takes to allow such forces to come to our rescue? A mindset that welcomes such help is almost beyond comprehension in today's world. Nevertheless, a reduction of the human population to 0.1 percent of its current levels would result in global ecological health not seen for millennia. Fully normal, anthropogenic climate change would not be a problem.

Appendix A

Other Means of Comprehending Human Abnormality

This appendix complements the main text by treating two kinds of information. The first is the combinations of parts of reality that are included in the holism accounted for by systemic thinking. Secondly, there are graphs involving more detailed treatment of dimensions mentioned only briefly in the main text (in the section “Normalcy in Other Dimensions of Being a Species”).

Combinations

Consider random groupings of twenty-four species sampled from the forty-eight depicted between the lines of Figure 2. Combinatorial mathematicians would calculate that there are 3.225×10^{13} such groups, called combinations. This is 32.25 trillion combinations! Owing to the magnitude of human abnormality in things like global CO₂ production, a combination with humans as one of the species will be abnormal compared to combinations without humans. These would be depicted in over 16 trillion graphs like Figure 2 but confined to twenty-three points between the lines for species of human-body size.

With so many combinations to work with, a subsample of 1,000 can be used to compare those in which humans are included (half the total) with those in which humans are not included. Humans today are producing about 258,000 times more CO₂ than would be required for the groups with humans to have arithmetic means equivalent to those without humans. The sixteen trillion groups containing humans all have their ecological influence (their ripple effects), particularly that of contributing to climate change.

Furthermore, measures of diversity can be calculated for all such combinations to observe the limits to natural variation of this metric. Current production of CO₂ by humans is over 44,000-fold greater than what would maximize the mean diversity among these trillions of combinations.

Further Dimensions with Normative Information

Total global population is one of the ecological measures of species. Global CO₂ production by humans is closely tied to total population. Figure A1 shows information for the total human population in parallel to that of Figure 2 for total CO₂ production. The abnormality of population density (Figure A2, to be compared to Figure 4 for CO₂ production per unit area) is observed globally. This abnormality is observed in essentially all countries as well as all combinations of countries (of which there are well over 10^{60}). This huge number is magnified by similar orders of magnitude by the combinations of species providing normative information.

As can be seen in Figure A3, the total populations of domestic species are also abnormal, by orders of magnitude. The same holds true for their density in various areas (and combinations of areas) of the Earth.

What is the normal rate of energy consumption by individuals of species with body sizes similar to that of humans? Figure A4 illustrates data that provide the answer as well as provide guidance for changes humans would need to make to achieve normalcy.

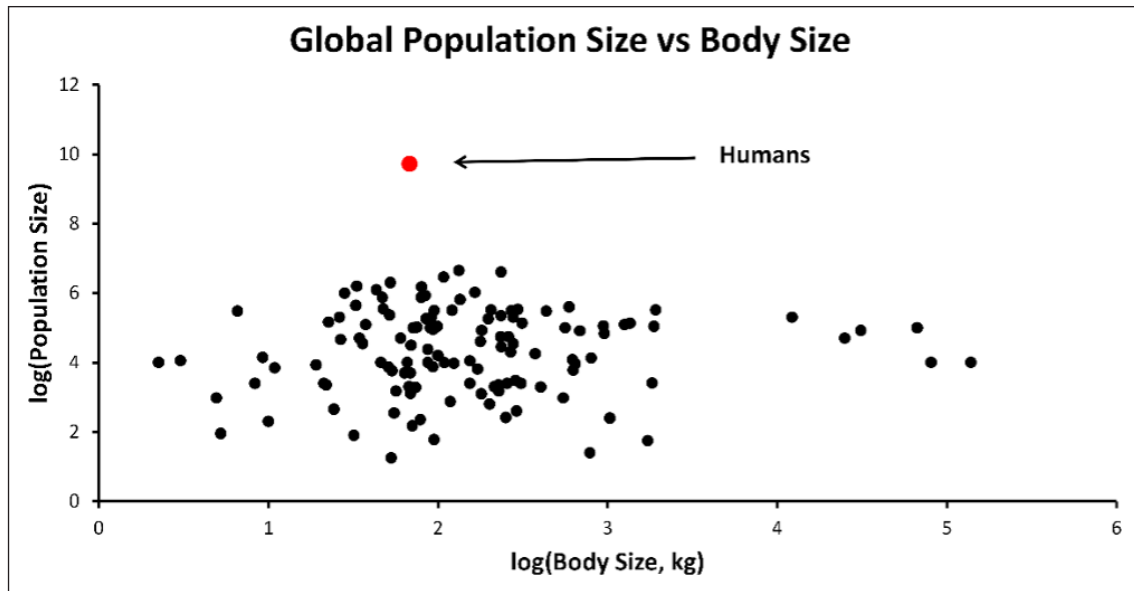


Figure A1: The total, or global, population of humans in comparison to the pattern for the global populations of 123 other species of nondomestic mammals (those represented in Figures 2–4 with the same data sources).

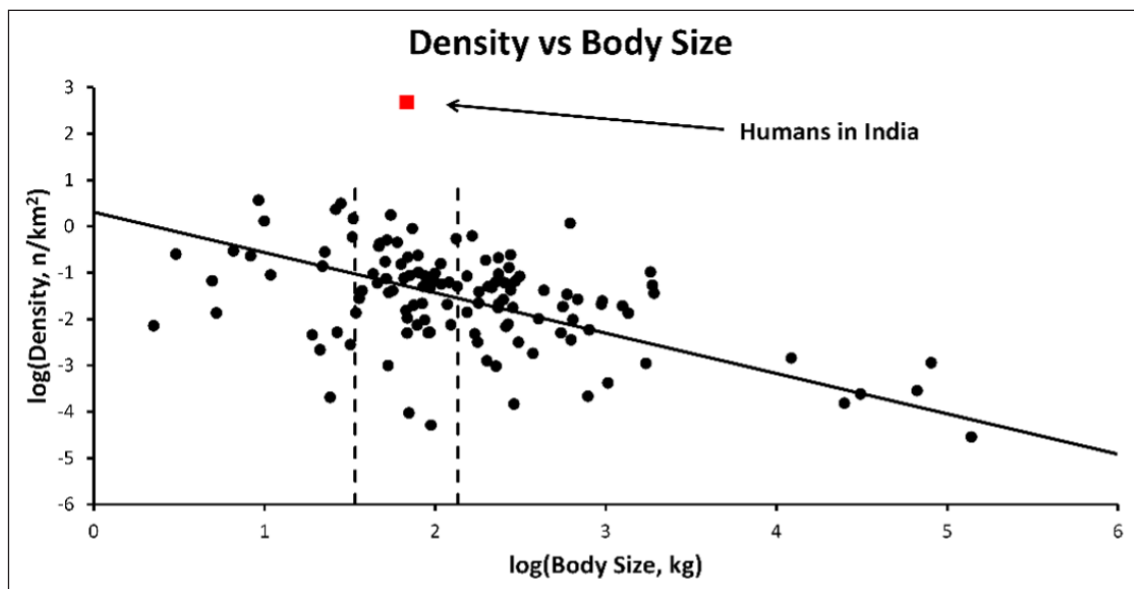


Figure A2: Normative information in the relationship between population density and body size for the same nonhuman species shown in Figures 2–4. Illustrated for comparison is the abnormality for the density of humans in the country of India.

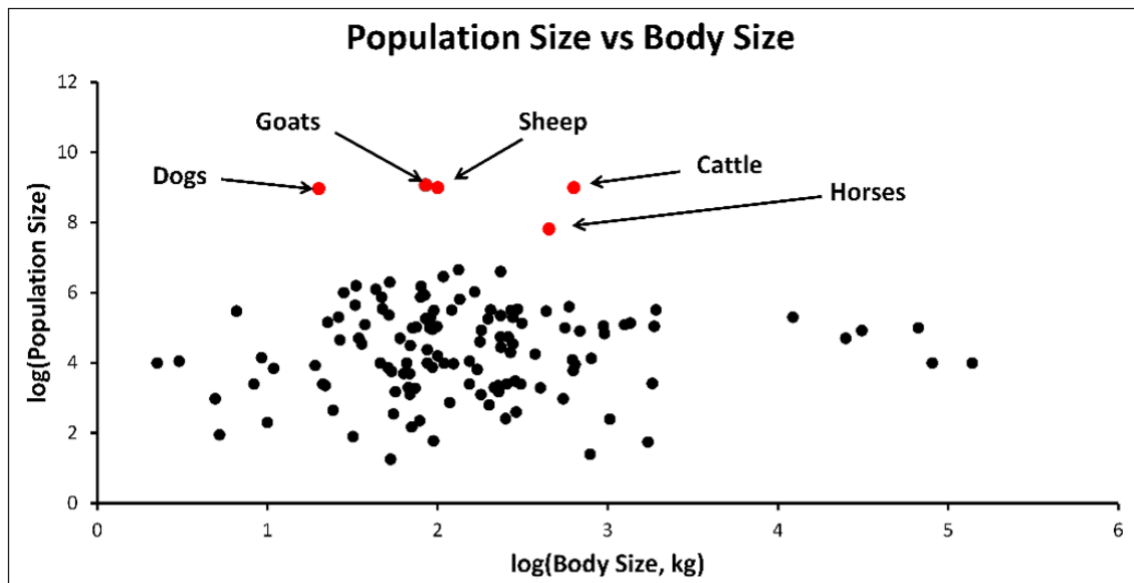


Figure A3: The abnormality in population size for five species of domestic mammals in comparison with what is normal for other species of mammals of similar size. The 123 species used as normative information are the same as in Figures 2–4 with the same sources of data.

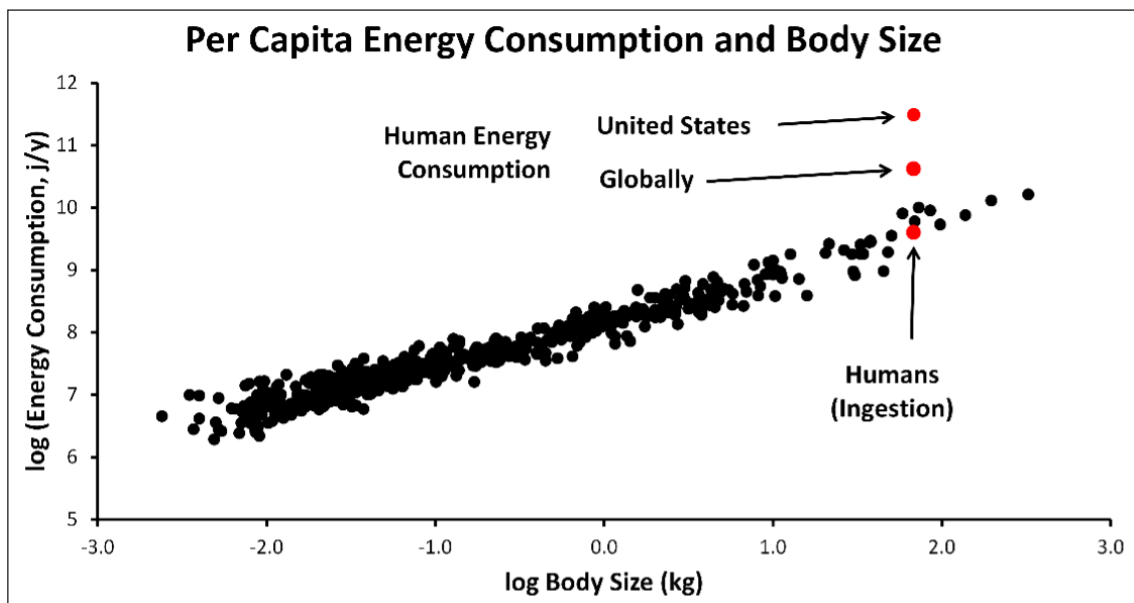


Figure A4: The relationship between per capita energy consumption and body size for 580 species of mammals (Capellini, Venditti, and Barton 2010) providing standards of reference for evaluating the abnormality of humans (illustrated by the averages for the United States and globally).

At what rate do mammalian species of human-body size normally consume energy on a global scale? Figure A5 illustrates data that provide the answer and reveal human abnormality. There are two global measures for humans. The first

involves the ingestion of food to meet metabolic needs. The second is the result of using energy from all sources (e.g., fossil fuels, nuclear reactors, hydroelectric generators, and solar power, as well as ingestion). As with any global measure, comparing measures of *Homo sapiens* with measures of combinations of other species involves essentially innumerable samples of normative information and indications of human abnormality.

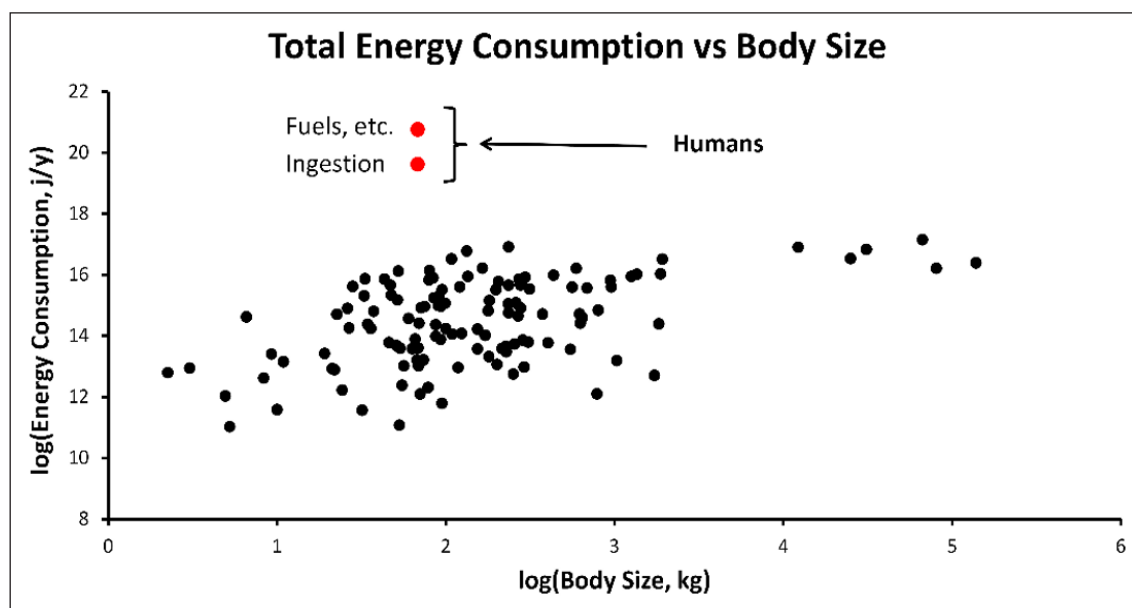


Figure A5: The total consumption of energy by humans in comparison to the pattern for this metric for 123 other species of nondomestic mammals (those represented in Figures 2–4).

As with CO_2 production per unit area in Figure 4, energy consumption per unit area can be measured for the harvest of crops raised agriculturally (Figure A6). This measure represents another example of an equivalence rule (Damuth 2007) in not being correlated with body size among species of the same taxa. The geometric mean for 119 crop harvests is over 3,700-fold greater than the geometric mean for the 123 nonhuman species (an abnormality of over 3.5 orders of magnitude). Beyond the energy extracted is the total energy consumed per unit area, including that used in planting, cultivation, harvesting, storage, processing, and transportation along with the production and maintenance of the equipment involved in agriculture. Confined to energy extraction per unit area, the metric matches that for nonhuman species that ingest what they extract without the expenditures of energy characteristic of human endeavors. Such uses of energy are abnormal on their own, including the burning of fossil fuels to supply such energy.

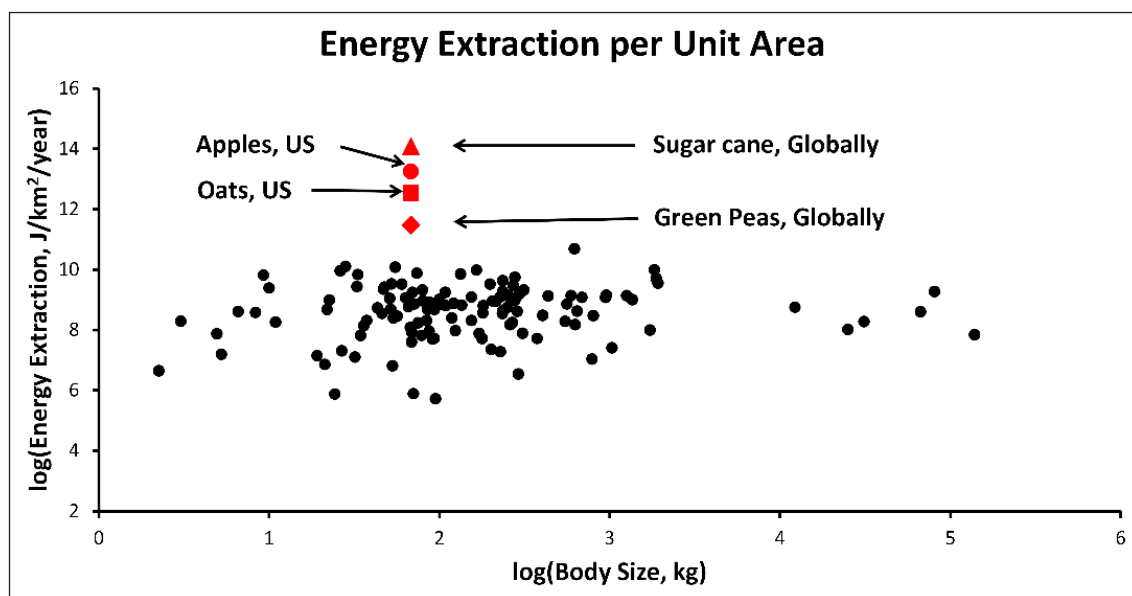


Figure A6: The abnormality of the harvest of four agricultural crops expressed as extraction of energy per unit area. Data for crop production per unit area are from the FAO (<http://www.fao.org/faostat/en/#data/QC>) and conversion to energy is based on data from Johansson and Liljequist (2009). The nonhuman species are the same as in Figures 2–4 with the same sources of data.

Again, as with any of the measures involving equivalence rules (lack of correlation with body size), the corresponding measures of the human species can be compared to those of all combinations of areas and all combinations of nonhuman species—mammals of any body size. The number of ways human abnormality can be observed and measured is essentially beyond comprehension. The number of such comparisons is larger than the number of elementary particles thought to make up the universe. Yet, if humans were normal in all ways, no element of the universe would suffer the consequences of human abnormality because there would be none.

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Imagining Global Climate Solutions: Reflections on *The Ministry for the Future* and *Eleutheria*

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Even though a scientific consensus has been building for many decades that the climate emergency is real, and despite many protests and conferences demanding action, global climate solutions remain elusive. What are the main sticking points to making climate progress, and how might they be overcome?

This article draws on two novels to imagine possible solutions: *The Ministry for the Future* by Kim Stanley Robinson and *Eleutheria* by Allegra Hyde. Both envision effective social change over the next few decades.

Themes and pathways discussed include influencing public opinion, new religious movements, politics at the global scale, tweaking the global economic system, geoengineering, and the various roles that people from all walks of life can play—especially young people—to deliver climate solutions. Not least, a common theme is how love can save the world.



Many scientists today warn that humanity faces a global “climate emergency” (see, e.g., Ripple et al. 2022), and yet progress in responding to the crisis has been relatively anemic (Smith 2022). The most recent annual climate conference sponsored by the United Nations in Dubai recognized an immediate need to phase out fossil fuels as an energy source, but it failed to adopt any binding commitments to move nation-states and other global actors, including large energy-producing businesses, toward this end (Ahmed 2023). Professor Michael Mann diagnosed the result as “weak tea.” “It’s like promising your doctor that you will ‘transition away from donuts,’ after being diagnosed with diabetes,” he said. “The lack of an agreement to phase out fossil fuels was devastating” (quoted in Ahmed 2023).

How does one find reason for pragmatic hope in the face of the possibility—perhaps now even the strong likelihood—of a dystopian future? This article begins with an assumption that the climate challenge qualifies as a moral imperative, perhaps “what now matters most” (Parfit 2011, 419; see also Larrabee 2018). It then draws on what might at first seem an unlikely source of inspiration: climate science fiction or “cli-fi.” I suggest that two recent books—*The Ministry for the Future* by Kim Stanley Robinson (2020) and *Eleutheria* by Allegra Hyde (2022)—can help us all imagine climate solutions in the spirit of pragmatic hope (Goldman 2023, 1, 19, 153).

Cli-fi novels and movies have proliferated as the climate crisis has intensified. One prominent progenitor is Octavia Butler, who wrote two searingly dystopian novels in this genre, *The Parable of the Sower* (1993) and *The Parable of the Talents* (1998). These books envision massive climate refugee migrations into North America and the consequence of a return of a white nationalist authoritarian government in the United States. In *The Parable of the Talents*, Butler even prophesied the rise of a presidential candidate who would promise to “make America great again” (Aguirre 2017). Many other cli-fi novels and movies fall into the dystopian category as well (see, e.g., Akkad 2021; Rubin 2015; *Mad Max* (Miller 1979); *Waterworld* (Reynolds 1995)).

There is a history of positive social influence from dystopian novels that send a warning to correct course. Classic examples are Margaret Atwood’s *A Handmaid’s Tale* (1985), Aldous Huxley’s *Brave New World* (1932), and George Orwell’s *Nineteen Eighty-Four* (1949). It is also true, however, that imagining dystopias can be disabling, especially when the imagined futures are not only very dark but increasingly likely. Dystopian visions can help people imagine the scale and terror of the climate threat, but obsessively thinking about a coming apocalypse does not contribute solutions that might prevent or mitigate it. Focusing on the dark side of the future, perhaps especially when it is an increasingly likely future, can have destabilizing psychological effects. Octavia Butler herself planned a series of four novels beyond *The Parable of the Sower* and *The Parable of the Talents* but then found them “too depressing”

to write (Canavan 2014).¹ Contemplating catastrophe can, for good reason, induce feelings of anxiety, depression, and listlessness (Clayton 2020; Pihkala 2018). These psychological effects may be particularly pronounced for children and younger people given that they are likely to experience adverse climate consequences more acutely than older generations (Clayton 2020; Wu, Snell, and Smaji 2020). One remedy may be to focus on the possibility—again, even if not the likelihood—of positive climate futures (Pikahla 2018, 554–55).

The Ministry for the Future and *Eleutheria* fit this bill. In *The Ministry for the Future*, Kim Stanley Robinson imagines a new United Nations ministry created in 2025 under the Paris Agreement. Mary Murphy, a lawyer and former Irish foreign minister, is appointed to head the ministry in Zurich. The press labels it the Ministry for the Future, and the name sticks. Murphy leads an international, interdisciplinary team, and by 2050, they succeed: “Because they were never going to give up, never never never. Lose, lose, lose, lose, lose, win” (Robinson 2020, 16, 18, 456). Along the way, this long and somewhat meandering book splices political, economic, and philosophical asides into the overall plot that provide a plausible set of climate solutions that, taken together, could save the world from at least the worst of imagined dystopian futures.

In *Eleutheria*, Allegra Hyde introduces the lead character of Willa Marks, an orphan of rural American survivalists who finds her footing as a young adult in Boston. She falls in love with a woman who is a sociology professor at Harvard, and Marks becomes enthralled with an outside-the-box climate plan that leads her to Eleutheria, an island in the Bahamas, to join a charismatic former military leader in a utopian community called Camp Hope. Not to spoil the surprise: suffice it to say that Marks ends up becoming responsible for a viral media event that decisively changes global opinion toward seriously addressing the climate challenge.

Neither novel shies away from the grimness of this challenge. Robinson opens *The Ministry for the Future* with the ominous words, “It was getting hotter.” This begins a jarringly physical description of a deadly heat wave in India that kills 20 million people (Robinson 2020, 1–12, 21–25). In fact, a disaster of this order is becoming increasingly plausible if present climate trends continue (Smith 2022, 42–43). The initial public response when this happens could well be, as Robinson imagines, “business as usual.” “For awhile,” Robinson writes, “it looked like the great heat wave would be like mass shootings in the United States—mourned by all, deplored by all, and then immediately forgotten or superseded by the next one, until they came in a daily drumbeat and became the new normal” (Robinson 2020, 25). In the novel, though, India soon radically shifts its position on climate—and the rest of the world eventually follows. The story unfolds at different levels, imagining the social vectors by which humanity at last gets a handle on the climate problem and begins to reverse the increasing greenhouse gases (mostly carbon dioxide and methane) spewed into

the atmosphere. It is not easy, and there are bumps on the road to net zero, but *The Ministry for the Future* imagines how a global victory can be achieved by 2050. Then, the fifty-eighth annual conference of the United Nations hosts a mid-century celebration when the famous Keeling Curve of ever-increasing carbon dioxide emissions peaks and begins to slope downward (Robinson 2020, 475–76). I will not spoil the details of the happy ending, but it includes an evocation of Jules Verne: a carbon-free airship cruising above a still beautiful, preserved planet (Robinson 2020, 519–35).

Similarly, Allegra Hyde is not sanguine about the climate challenge. In one scene in *Eleutheria*, she writes: “Sunshine seared the island, making every wisp of breeze a miracle. The heat reminded everyone of the species snuffed out by the minute, the coastlines swallowed by rising seas, the forests clear-cut, the methane belched into an atmosphere already thickened with fossil fuel fumes. Another march wouldn’t stop it all. Certainly not another petition. Legislation was a little too late. There were too many people with too much money tied up in the scrap-picking of Earth” (Hyde 2022, 87).

The main character, Willa Marks, has a toughness toward long odds borne of her upbringing: “Love for me has meant a bullet in a tree trunk: a slow-seeping sweetness. It has meant annihilation and paradise—two sides of the same coin. It has meant getting what you want, when what you want is the worst thing for you. It has meant my parents, who, for all the terrors they impressed upon me, also made me believe in impossible odds” (Hyde 2022, 35).

As in *The Ministry for the Future*, there is grit in the characters of *Eleutheria* who are committed to doing something serious about solving the climate emergency (cf. Duckworth 2016). Focusing on good, positive solutions was necessary too, as Willa Marks says: “Because without a vision of a better world, it was despair all the way down” (Hyde 2022, 249).

Both novels, then, provide themes for imagining futures that are positive even in dark times (cf. Beckert 2016; Jamieson 2014). They acknowledge the terrible climate reality humanity faces and forge hopeful stories. Sometimes, facts in real life can imitate fiction, and this article reviews several themes in these books in a spirit not of predicting success or projecting false optimism but rather of pragmatic hope—not a nice, easy, or unthinking feeling of hope but a realistic hope that comes from sustained commitment to “envision and call a better world into being” even against long odds (Goldman 2023, 19).

Perhaps in this kind of hope there is also a place for faith (cf. Tillich 1957). Neither *The Ministry for the Future* nor *Eleutheria* preaches a gospel, though religious movements are in the background of each story. Both books foresee a danger that new religious cults may arise that embrace either terrorism (a subplot *Ministry for the Future*) or charismatic militarism (a threat in *Eleutheria*). Danger also lies in reliance on an unguided or too-optimistic faith in technology, economics, politics as usual, individual lifestyle changes, or leaving our collective

fate in the hands of a supernatural divinity who most likely is not there to intervene. Instead, these two novels make room for a humanistic faith that finds a middle path between the eschatological extremes of apocalypse and utopia, and between irrational fear and unreasonable hope (Larrabee 2018, 516–17, 523–38, citing Moltmann 2012). Both novels tell helpful stories in this middle ground of how humanity can act progressively in the face of the current climate impasse to achieve a brighter, healthier, and happier future.

Changing Public Opinion

Both *The Ministry for the Future* and *Eleutheria* deal with one of the most difficult aspects of the current climate crisis: the intransigence of public opinion. Despite living in a post-Enlightenment age of science, the governance structures of human society are matched only very imperfectly to the progress of science. Scientists believe, based on a great deal of evidence from different scientific disciplines, that the main cause of global climate disruption is the cumulative, ongoing emissions of carbon dioxide and methane from the production and use of coal, oil, and so-called natural gas (which is mostly methane). The percentage of working scientists who hold this view today is between 90 and 100 percent, including virtually all climate scientists (Smith 2022, 297–98; see also Powell 2017).² Yet, most people around the world still believe that scientists themselves are divided on whether the actions of human beings are causing climate disruption. One reliable poll found a bell curve distribution: a vast majority of people in the United States, for example, believe there is no consensus among scientists and instead imagine great division among them (Smith 2022, 298–99, fig. 19.1). Given that the global climate problem is one that relies on science to identify and diagnose, this disconnect between science and public opinion is a major stumbling block to making progress.

A few primary reasons explain this disconnect between the climate consensus among scientists and the divided opinions among citizens. First and perhaps foremost, climate science is complex and ever-changing. The scientific consensus has been growing over time, and the reporting of current knowledge through international bodies, primarily the International Panel on Climate Change, is careful to observe scientific measurement standards of certainty and confidence—which are never 100 percent. Because too many people do not have enough education to grasp even a basic understanding of the science, however, they are left having to “trust the experts.” So, when these experts present dire warnings that call for big changes in government policies and individual lifestyles that would disrupt long-formed habits and entrenched economic interests, responses of recalcitrance and resentment are not surprising.³

A second major reason for the failure of public opinion to follow the scientific consensus is that very strong and organized collective groups—especially big petrostates and the fossil fuel industry—have enormous economic interests

in opposing the scientists. Effective global climate policies would, almost by definition, undermine the power of the petrostates and the profits of the fossil fuel industry. In response, these interests work to water down international agreements and oppose national and subnational climate-related regulations. Fake science has even been manufactured by “a climate denial industry” to make it appear that scientists disagree when they really don’t (Smith 2022, 302–5; see also Jamieson 2014, 4, 81–96). Anti-climate interests also use the mass media to promote climate denial and conspiracy theories (such as that scientists are conjuring the climate problem to get government grants). The fight between those who are calling attention to the scientific consensus and those who oppose any change that would disrupt their business models and profits has been aptly characterized as a “new climate war” for public opinion (Mann 2021).

In fact, the entrenched political and economic interests opposing effective climate policy finally appear to be losing the battle for public opinion in many places in the world, at least with respect to a belief in basic climate science. Overall, a recent global poll has shown that approximately 70 percent of the global population believes climate to be a “very serious” or “somewhat” serious threat; only 13 percent sees no threat and only 18 percent holds no opinion (Smith 2022, 297). However, there are large and significant geographical variations. At one end of the spectrum, around 90 percent of western and northern Europeans express strong concern, as do almost 95 percent of Chinese and around 85 percent of Latin Americans (Smith 2022, 297–98). Citizens in other nations are much less unified. The most polarized country is the United States, where 86 percent of left-leaning citizens (mostly Democrats) believe the climate is a serious problem, compared with only 22 percent of those who lean to the right (mostly Republicans) (Smith 2022, 299). Australia and Canada have divided opinions too, though not as extremely as in the United States. Many Asian countries such as Japan and South Korea report a high level of concern, but many other countries with low levels of education and economic have correspondingly low concern about the climate challenge (Smith 2022, 298–99).

The division of public opinion in the United States is especially concerning because of the country’s political and economic power in the world. There are signs public opinion is “grinding towards grudging agreement on the fundamental story,” though the favorite policy option seems to be the ineffective planting of trees (Smith 2022, 300–2). Because of “deep capture” of governments by lobbying and campaign finance, this emerging climate majority does not yet express itself very strongly or effectively in national elections (Hanson and Yosifon 2003). As of this writing, the most influential climate-denying politician, former president Donald Trump, seems poised to possibly return to power, which would, once again, seriously set back climate progress (Goldmacher 2023). Even if Trump should lose, there are tens of millions of American citizens who continue to simply deny the climate is a problem. Although a recent survey of

registered voters found that 56 percent would “prefer to vote for a candidate for public office who supports action on global warming,” only 13 percent of conservative Republicans would (Leiserowitz et al. 2023, 4).

The Ministry for the Future provides a positive story on the global front, imagining that the Paris Agreement allows for the founding of a “subsidiary body” that journalists quickly dub the Ministry for the Future (Robinson 2020, 15–16). The massive heatwave that kills 20 million people in India galvanizes at least some global citizens into action, and perhaps this kind of tragedy is what it will take. Human beings are not easily moved to significantly change their lives in response to predictions of the future—even by trusted scientists—because we are motivated by evolution to focus more primally on the immediate concerns of everyday life (e.g., finding food, drink, shelter, work, and sex; provisioning for oneself and one’s family; and seeking out entertainment that is programmed to satisfy our evolutionarily inherited sensory preferences) (see Marshall 2014). Climate disasters may therefore be required to spur an immediate recognition of danger—and then, just maybe, key leaders and citizens across various walks of life will be sufficiently motivated to take the serious steps needed toward climate solutions.

Without giving away the plot, *Eleutheria* concludes with a surprise ending that has great global impact on public opinion, in large measure because it succeeds in inspiring young people into concerted actions to demand change *now*. The book also imagines future disasters that catch public attention, including “Mass Mortality Events.” In one such event with an unknown cause, “birds dropped from the sky like feathery rain,” their “small bodies thumped onto windshields and sidewalks and park benches” (Hyde 2022, 105). At first, events like these were “treated like anomalies—odd as UFO sightings—rather than what they were: a pattern, a series, a sequence leading toward the unspeakable” (Hyde 2022, 105). Later in the book, “a series of calamities pundits called “The Ten Plagues”” occurs: a swine flu sending food prices up, toxic algae clogging major harbors, mass die-offs of mice and dolphins, a large spike in Lyme disease, and huge release of health-impairing pollen (Hyde 2022, 247). As in *The Ministry for the Future*, Hyde imagines that things must get a lot worse before public opinion shifts enough to start making things better.

Recently, real life events have often tracked these fictional accounts. Historic Canadian wildfires turned the air in New York City and other major cities on the United States’ East Coast a toxic orange (Roush 2023). These fires are said to be only one example of “angrier wildfires” in a “warming world,” especially in northern latitudes (Livingston 2023; see also Migliozzi et al. 2020). An epic flood inundated about one-third of the total land area of Pakistan (Jones 2022; UNICEF 2023). Disastrous heatwaves are also rising in frequency, with death tolls in the thousands and tens of thousands, if not yet the millions or tens of millions imagined in *The Ministry for the Future* (Goodell 2023, 10, 18, 114). As

one French politician observed following a spate of heatwaves: “Here in Paris, there are three options. We can roast, we can flee, or we can act.” (Goodell 2023, 286). The observation can be generalized. Despite the dystopian dreams of billionaires to escape to another planet (see, e.g., *Don’t Look Up* (McKay 2021)), we have only one planet right now—and the only serious option is to act accordingly.

Doing so will not be easy, but cli-fi contributions such as *The Ministry for the Future* and *Eleutheria* may help to overcome the natural human tendency to focus on short-term rather than long-term risks and opportunities. If one or both books were optioned for a movie or TV series, future influence on public opinion might be further enhanced (though the ending of *Eleutheria* might be too dark for Hollywood to produce).⁴

New Religious Movements

Religion is a theme in both *The Ministry for the Future* and *Eleutheria*, but not in the manner of an intervention by Pope Francis or other religious leaders (*Laudato Si’* 2015; see also Fox 2018). Instead, the impending global climate catastrophe spurs grassroots religious or cult-like organizations, though not to the same depth and spiritual richness created in Octavia Butler’s *Earthseed Parables* (Butler 1993; Butler 1998; see also Stillman 2003). One might hope for a translation of Butler’s dystopic religious order into the more hopeful tones of the *Ministry* and *Eleutheria*, but they do not provide this sort of theological contribution, except perhaps for a few small touches or suggestions (Robinson 2020, 537–40, 545–46).

Instead, in *The Ministry for the Future*, a religious fervor seizes what is at first an organized group responding to the terrible heatwave and vowing to “declare an economic war” against those who continue to contribute greenhouse gases to the atmosphere. The time had come, they said, “for India to step onto the world stage, as it had at the start of history, and demand a better world. And then help to make it real” (Robinson 2020, 26). This group, called the Children of Kali, then organizes attacks on fossil-fueled ships and planes as well as power plants in a “War for the Earth,” rationalizing its violence by taking measures to save the “innocent ones” from “collateral damage” (Robinson 2020, 135–37, 229–30). The “guilty” ones, in their view, were the rich and those who participated most significantly in the fossil-fueled destruction of the climate. Soon, Kali was not just in India but “everywhere” and spun off other terrorist groups (Robinson 2020, 135–37, 130, 368–69). At a minimum, this imagined scenario raises serious concern that continued ineffective global inaction to address escalating climate damage could lead to widespread organized terrorism and war.

Eleutheria imagines a different kind of violence: a cult-like response organized by a charismatic former United States military leader. *Eleutheria* is an imagined island where this cult-like group assembles and plans for an authoritarian

right-wing takeover of the United States government. Again, not to spoil the ending by disclosing details: the protagonist foils the scheme. The author's depiction of the attractiveness of the pro-climate features of the militaristic utopia called Camp Hope is chilling in its believability (Hyde 2022, 203–5, 219).

Both novels raise the specter of a general fear that democratic governments may not be able to rise to the challenge of the climate crisis. But though there are tragedies along the way, both books offer happy endings in this respect. No new religious or secular authoritarianism arises, and dystopic outcomes such as imagined in Butler's *Parables* are averted. *Eleutheria* paints a scenario that, though tragic and disturbing, gives an example of heroic selflessness that in the novel provides a spiritual beacon to the world. In *The Ministry for the Future*, the power of global citizens and mechanisms of governance also succeed, more or less democratically, and establish within a space of several decades a new pro-climate world order.

Financial Leverage from Central Banks

One organizational method by which *The Ministry for the Future* imagines a peaceful climate transition of the global economy is through intervention by the world's central banks. The main idea is to use financial leverage to encourage more pro-climate investments, as well as discourage the further development and sale of fossil fuels. This strategy complements well-known (though difficult to accomplish) proposals for a global climate tax (e.g., Kotchen 2023). Climate-focused taxes can also have regressive effects, that is, hurt the poor more than the rich (because consumption taxes tend to represent a larger share of the personal budgets of people with lower incomes), but these regressive effects can be reversed if a "carbon tax" is coupled with a "carbon dividend" (see Metcalf and Goulder 2021). The proposed new innovation is to supercharge these measures—which today require national legislation, though countries could coordinate in a "climate club" (Nordhaus 2015)—by establishing a "carbon coin" issued by central banks, which have the power and authority to create money (Robinson 2020, 172–76). The idea is to adapt the "quantitative easing" central banks use to combat threats of economic depression by increasing money supply to instead finance certifiable greenhouse gas reduction projects (Robinson 2020; see also Chrobak 2021). A leading real-world proponent of the idea, whom Robinson name-checks, is Delton Chen (Patterson 2022; see also Global Climate Reward 2023).

There are some complex details I will omit here, but the basic idea of a carbon coin or carbon reward is to add a carrot of positive financial incentive for climate protection to the stick of financial penalties for climate damage. Or, to use another metaphor: a kiss rather than a kick (Robinson 2020, 173). Rather than the traditional method of asking national governments to invest in targeted subsidies, such as in the climate-oriented subsidies of the Inflation

Reduction Act adopted in the United States in 2022 (White House 2023), the idea of a carbon coin is to use the central banks' power to create money for the purpose. The hitch is that the reform requires a significant shift in the public's conception of the role of central banks to address the climate emergency as a serious threat to global economic stability.

Realistically, the first reaction to the idea from the central bankers is depicted as quite negative (Robinson 2020, 187–89, 211–14). “Not our purview,” says the chair of the United States Federal Reserve when Mary Murphy makes the pitch, reflecting the traditional role of central banks to focus on stabilizing currency rather than picking and choosing substantive policy priorities for investments. “Maybe it should be,” responds Mary, and eventually she and her team convince the central banks, led by China, to swing into action, forming a Climate Coalition of Central Banks (Robinson 2020, 188–89, 287–95, 341–45). A critically convincing but controversial step in the book is to make the carbon coin payments available to petrostates such as Saudi Arabia as well as big oil companies that promise to participate. They are paid to keep discovered but not yet exploited fossil fuel reserves in the ground. A centralized reporting and certification system run by the Ministry for the Future assures compliance (Robinson 2020, 342; Robinson 2023).⁵

Central banks in the world today have already put the climate crisis on their agenda. Proposals have been made and are gaining steam (so to speak) for vigorous financial disclosure of climate risks. The Financial Stability Board (2023), a global coalition of finance ministers and central banks, formed a Task Force on Climate-Related Financial Disclosures, which set disclosure standards now passed along to the International Sustainability Standards Board (IFRS Foundation n.d.). California and the European Union have been leading in the establishment of laws for greenhouse gas and internal climate policy reporting by large companies (Delmas, Gerrard, and Orts 2023). Some scholars argue that central banks such as the Federal Reserve should stick to their knitting and focus only on the traditional economic goals of financial stabilization—including inflation and employment rates (e.g., Skinner 2021). Given the long-term economic as well as environmental consequences of climate disruption, however, this position is untenable, at least from a point of view that appreciates the real existential stakes. As Mary Murphy argues to the central bankers in *The Ministry for the Future*, “stabilizing inflation rates and unemployment rates” will become impossible as “the climate [heats] up” and “could no longer be fulfilled if the climate emergency got out of hand” (Robinson 2020, 293). Other academics and policymakers are also examining different options for how to shape central bank interventions toward climate solutions in the real world today (Network for Greening the Financial System 2021).

In the end, the global banking system plays a major role in a successful “Great Turn” depicted in *The Ministry for the Future*. Mary Murphy smiles to herself at

the end of the book: “Saved by the fucking bankers” (Robinson 2020, 511). And why not? Those with the greatest power in the world today are those who also hold the greatest technological means—in this case, financial leverage—to make the essential global turn toward climate sustainability (Robinson 2020, 189).

Geoengineering

Some climate experts counsel humanity to put our faith in methods of geoengineering as a climate solution. Some recommendations are better than others, however, and it should be recalled that the human species has in fact been “geoengineering” our planet for at least several centuries (Frankopan 2023). Also, as Dale Jamieson points out, geoengineering seems to be more of “an attitudinal marker” rather than “a distinct category of responses” to the climate policy debate (Jamieson 2014, 207).

One candidate for a quick technological fix is solar radiation management (Smith 2022, 199–247; see also Kolbert 2022, 165–86). Some relatively low-tech solutions, such as painting roofs white, may make sense, but others, such as putting arrays of mirrors on satellites or firing aerosols into the stratosphere, are at best problematic. Because blocking solar radiation does not address the main underlying cause of climate warming (i.e., fossil fuel production and use), these technologies, once deployed, must be continued indefinitely to avoid a “termination shock” (see Stephenson (2021) for a dystopian account). It does not go too far to refer to some ideas, such as putting a massive solar umbrella in the middle of space between the Earth and the sun, as risking an Icarus effect for all of humanity (Orts 2024). In addition, these technologies would do nothing to address other problems caused by increasing greenhouse gas concentrations, such as ocean acidification (Williamson and Turley 2012). In short, most recommendations for solar radiation management are much too risky. Humanity has already been playing dice too often with our planet, so there is no good reason to roll them again with this kind of technological intervention.

Another candidate is the direct removal of carbon dioxide from the atmosphere (Smith 2022, 149–97; Kolbert 2022, 143–64). Again, some low-tech solutions, such as planting trees wisely, may make sense, though planting trees indiscriminately can have detrimental consequences, such as increasing the severity of wildfires (Cameron 2023; Leverkus et al. 2022). High-tech direct removal of carbon dioxide from the air has attracted large investments too, such as from billionaire Bill Gates (Rathi 2022), but its technological future remains uncertain—perhaps as uncertain as the carbon capture and sequestration technologies promoted mostly by the fossil fuel industry (Smith 2022, 171–97). Although touted as “the single best near-term” solution in “the entire geoengineering toolbox,” with modestly successful pilots in the United States and Norway (Smith 2022, 183–86), one must treat these carbon capture ideas with some degree of skepticism. Given that promoters of some large-scale

geoengineering proposals often hail from the aerospace and energy industries, one should at least pause before buying a pitch that “the same people who brought you climate change will be here to save you from it” (Jamieson 2014, 224). They may be more likely looking to save themselves and their climate-damaging business models.

The Ministry for the Future foresees that geoengineering experiments will be made by nation-states, beginning in the book with hard-hit India (Robinson 2020, 8–20, 37–39). Robinson is sanguine about the motivations of the business interests likely to support these geoengineering techno-fixes, which if successful would provide an unhelpful rationalization for the business-as-usual burning of fossil fuels (Cohen 2021). There is also no international legal authorization for global climate geoengineering under the Paris Agreement or elsewhere (Eliason 2022, 443–44), but nation-states may go forward anyway in the absence of law. *The Ministry for the Future* imagines a qualified success from India’s intervention (Robinson 2020, 355–56; see also Eliason 2022, 459).

More speculatively, *The Ministry for the Future* imagines a reengineering of Antarctica that repurposes oil rigging and drilling technology to lift fast-warming water from beneath the melting ice sheets to the surface—and then turns it into surface ice to reconstitute the glaciers and tack them back down to bedrock (Robinson 2020, 79–83, 179–81, 259–69, 355, 471–74). This kind of glacial geoengineering is not provably impossible, but there are substantial legal impediments under the governing Antarctic Treaty, and the science is still quite rudimentary (Corbett 2019; Meyer 2018; U.S. National Science Foundation 1959). This solution would also constitute only a temporary stop gap—slowing down the melting of the Antarctic icepack rather than arresting it.

In an earlier nonfiction contribution, Robinson correctly observed that “geoengineering the atmosphere looks iffy at best; geoengineering the oceans even worse” (Robinson 2012). The truth is that humanity has the technologies needed to make the transition to a net zero global energy and materials world, and these extant technologies are improving with respect to both efficacy and efficiency (Jacobson 2023). The main impediment remains the path dependence of a fossil-fuels based world and the businesses and petrostates that profit from the status quo (e.g., Aghion et al. 2019). In addition to the need to make a transition from fossil fuels toward renewable energy—including solar, wind, and geothermal, as well as the battery and storage systems needed to support them (Usher 2019)—new transportation technologies are also essential.

Innovation in Transportation

Technological solutions are already available in the transportation sector. Essentially, the message is to “electrify everything” and make a total transition away from the use of fossil fuels in powering the world’s electric grids (Smith 2022, 86–88; see also Doerr 2021, 1–61). All coal-fired electricity plants should be

eliminated as soon as possible (Jamieson 2014, 6, 236). China remains the largest national miscreant in this respect, approving the construction of an average of two new coal plants every week. China accounts for around one-third of the total annual carbon emissions today, though it is also the biggest producer of renewable energy (Davidson 2023). In the United States, landmark legislation passed by the Biden administration will lead to a supercharging (so to speak) of infrastructure for electric vehicles in the United States (White House 2023), though there is reason to worry about its progress (Plumer and Popovich 2024). The trend in Europe is generally in the same positive direction, exemplified by a sharp spike in the last few years in the number of electric vehicle registrations (European Environment Agency 2023). It is possible to imagine a relatively near-term future without coal and absent the choking massive pollution of internal combustion engines, but it will take sustained political commitment and economic investment. As *The Ministry for the Future* foretells, “the crux of the challenge” of a transition to “clean energy” can be met in the next several decades (Robinson 2020, 476).

Other technologies imagined in *The Ministry for the Future* include modernized, more efficient airships, perhaps powered by hydrogen (with the Hindenburg problem solved) as well as solar panels (Robinson 2020: 519–27; Thompson 2023). New twenty-first century wind- and solar-powered clipper ships are envisioned too—large passenger- and cargo-sized versions of the zero-emission sailboat Greta Thunberg used to cross the Atlantic for a climate conference in New York City in 2019 (Robinson 2020, 419–19, 528; Milman 2019). Electric-powered high-speed rail transportation networks that traveled everywhere would give renewed meaning to intercontinental railroad (Robinson 2020, 419; see also Shen, Pan, and Feng 2023).

Direct and Covert Political Action

Technological climate solutions of all sorts will require political interventions. Both *The Ministry for the Future* and *Eleutheria* are “political” books in that they understand that climate progress depends on political action to change course. Both books also recognize that traditional political pathways—such as organizing and voting in elections—have so far been insufficient.

The Ministry for the Future is named for a small subsidiary body imagined to be set up within the framework of the Paris Agreement, but its real influence takes place when reaching out to powerful central banks—and there is even a gesture toward covert action that may even involve violence. In an interview, Robinson said that he “obscured” what “the Ministry’s black wing was doing” (Laidman 2022). He skates close to the moral edge when one of his characters calls purveyors of violence most would call “eco-terrorists” “resistance warriors” (Robinson 2020, 368–69), and Robinson later admitted that he “should have done better [to] make a strong distinction between sabotage and murder.”

Violence, he says, “always blows back in your face,” and “the most vicious thugs take power” (Laidman 2022). An expansion of eco-terrorist violence would likely beget violent authoritarian responses and the reinforcement of what has been called “climate leviathan” governments (Wainwright and Mann 2018). One can even imagine authoritarian petrostates and large fossil fuel companies covertly financing eco-terrorists to rally public opinion in favor of the climate-destroying status quo.

One valid criticism of *The Ministry for the Future* is that it fails to grapple sufficiently with the worrying rise of populist authoritarianism in the world, including in India (Cohen 2021). At the same time, and in a more ecumenical spirit, Robinson emphasizes the need for “political coalitions” of progressives of all stripes given the scale and immediacy of the climate problem (Cohen 2021). Divisions among those who agree that humans need to work together to make climate progress only aid those who are working hard to maintain the status quo, which usually means power and profits for themselves.

Eleutheria is more politically realistic in this sense than *The Ministry for the Future*. *Eleutheria* sees the need for some cathartic event that would fire up public opinion in the world in our “age of spectatorship” (Green 2009; cf. Edelman 1988). It focuses on how major change most likely will come from the younger generation. The utopia of its depiction of Camp Hope—following a charismatic leader with a big plan—is not the message in the end. It is in fact a false and duplicitous hope that would lead to authoritarianism (Hyde 2022, 267–69). Instead, and again without giving away the ending, the story is one of how the world’s youngest citizens, those following in the footsteps of Greta Thunberg and others, could rise up in righteous anger and demand that older adults must act seriously. *Eleutheria* imagines the potential power of the youngest generation to galvanize climate action through their mastery of social media and the creation of viral events (Hyde 2022, 299–302, 320–21). Youth groups such as Sunrise in the United States and youthful leaders such as Thunberg and Luisa Neubauer in Germany provide good reasons to think that a political movement of this kind is yet possible and could achieve climate policy victories like those in previous generations that fought for civil rights as well as the first generation of environmental protection laws (Neubauer and Repenning 2023; Sunrise Movement 2020).

How Love Can Save the World

There are love stories too in both *The Ministry for the Future* and *Eleutheria*, and the details of these are probably better read in the original. Suffice it to say here that love—and friendships and mutual caring—is necessary for the imagined successes that occur through the social and political struggles imagined in both books. Both novels tell stories of how, drawing from the Hebrew tradition, there often emerges in critical moments in world history a small group of

Tzadikim Nistari or “hidden good people who keep the world from falling apart” (Robinson 2020, 117).

In *The Ministry for the Future*, the main protagonist, Mary Murphy, the lawyer and former Irish foreign minister named to head the United Nations subsidiary body, assembles a crack team of others from different vocations and geographic origins, including a hardcore chief of staff from Nepal, a lawyer from Russia, a climate scientist from France, an agriculturist from Argentina, an oceans expert from Chile, a geoengineering specialist from Indonesia, a citizen-of-the-world guru of artificial intelligence and social media, an indigenous peoples’ representative from Canada, a Jordanian expert on refugees, an Australian economist, a Swiss insurance and re-insurance expert, and ecologists from Hong Kong and the United States (the latter nicely named Bob Wharton) (Robinson 2020, 18, 53–54).

The adventure is how they work toward success, and at the end of the book, at annual the United Nations climate conference held in 2053, the world celebrates a “Great Turn” when the famous Keeling Curve of ever-increasing greenhouse gases spewed into the atmosphere (Rafferty 2023) levels off and begins a downward slope (Robinson 2020, 475). The Paris Agreement in this vision comes to be seen as “the greatest turning point in human history” (Robinson 2020, 475). Although it started off “weak,” it evolved to create an “unstoppable” momentum for a global clean energy transition, moving forward with the Half Earth project of reclamation and preservation of land and ocean, reforming economics to include new measuring systems of sustainable success, securing zero population growth, and reducing overall economic inequality (Robinson 2020, 475–79). In other words, as one reviewer described it, the novel is a feasible utopian story of “the world healing” (Frug 2021).

Eleutheria derives from the ancient Greek word for freedom (Domini 2022), and it is the story of how unlikely heroes can emerge from often-difficult upbringings that have steeled them to undertake feats of great bravery. The courage needed for political action “is not necessarily or even primarily related to a willingness to suffer the consequences,” Hannah Arendt has written, because “courage and even boldness are already present in leaving one’s private hiding place and exposing oneself” (Arendt [1958] 1998, 186). A lesson for all is that it is not too late to learn to love both each other and the Earth (Jamieson and Nadzam 2015; White 2018)—and to find the strength to act in our everyday lives to contribute to climate solutions.

Eleutheria’s Willa Marks provides good advice that comprehends many of the climate solutions mentioned here—and more!

Turn off your lights. Turn off your computers, your printers, your phones, your security systems, your air conditioning, your robot vacuums, your entertainment consoles, your microwaves, your heat-sensing pillows, your electric toothbrushes.

Pull all other plugs. Drive less, bike more, find alternatives to flying. Plant trees. Plant native trees. Plant flowers and vegetables and then eat the vegetables and some of the flowers. Clean your plate. Compost your scraps. Divert gray water for irrigation. Take shorter showers. Use biodegradable soap and make your own cleaning products. Air-dry laundry. Repair the clothes you have. Repair the shoes you have. Repair furniture. Repair houses. Repair friendships and have your friends over for dinner. Speak to strangers. Skill share. Ride share. Babysit. House sit. House share. Reuse, reduce. Work less. Buy nothing. No straws. Pick up litter. Keep bees.

Create bike lanes and pedestrian pathways. Limit tailpipe emissions and institute congestion pricing. Enforce energy efficient building codes. Promote zero-carbon construction. Generate electricity from renewable sources. Consider cogeneration, carbon capture, citizen-owned utilities. Promote public transport—better public transport—and make it free to all. Create community gardens. Stormwater gardens. Wastewater gardens. Create community forests and fields and rivers and lakes and marshlands. ... Fund environmental education. Make nature easy to love. Add green roofs, green walls, green sidewalks. Make spaces multifunctional. Give artists license to add beauty... .

Set binding international climate treaties. Set ambitious targets—the ones required to avert climate catastrophe—and do what it takes to meet those goals. Tax toxins, or better yet ban them. Prosecute offenders for crimes against the Earth. Decouple money from regulation. Decouple money from governance. Close loopholes. Close drill sites and fracking operations and ruinous mines. Decentralize the Internet and energy systems and power structures in every sense of the word... . Tell the truth. Represent the people. Take responsibility for the past, and for the future. Try.

I'm trying—

For all the cases that can be made against me, know that I'm trying, that I have been trying, and will continue to try, along with many others. In fact, more people are trying than ever before. (Hyde 2022, 291–93)

In novels like these can be found wisdom for everyday life that sometimes eludes humans when we rely only on scientists, academics, politicians, or religious figures. Perhaps literature qualifies as a kind of modern religion that can integrate science as well as the potential for the secular change and personal commitment necessary to address the planetary emergency we now face. In novels like *Eleutheria* and *The Ministry for the Future*, we can find some hope and inspiration.

Conclusion

It is too late for comprehensive solutions to the climate crisis because it is already here (Orts 2011). The truth is that humanity has, as a partially integrated global civilization, failed to adopt the necessary modifications that would have averted a significant amount of the climate damage that is now occurring and will inevitably continue to occur going into the near-term future (Jameison 2014). No silver bullet will solve the inherited climate problem, which is still accelerating. Even though the climate problem is wickedly complex (Peters 2018), it can be solved, or at least the impact lessened, through a portfolio of policies that require or encourage climate-friendly technologies—both the “hard” technologies of engineering and other physical sciences as well as the “soft” technologies of law and finance (Robinson 2020, 250–52; Nelson 2005, 153–65, 195–209; see also Hawken 2021; Doerr 2021). In short, humanity can act ethically and work hard to slow and—eventually, though perhaps not in all our lifetimes—halt the ongoing climate damage. There are no guarantees, but we must at least, as Hyde says, “try.”

The Ministry for the Future and *Eleutheria* are two books that chart directions forward for humanity collectively to take. Neither fails to appreciate the darkness and difficulty of the climate crisis, and both imagine opportunities for effective, practical action. I anticipate that similarly positive and hopeful imagining will follow in both nonfiction and fiction—with new available translations also into action. For, as Virginia Woolf has written, “we are not passive spectators doomed to unresisting obedience but by our thoughts and actions can ourselves change. . . . A common interest unites us; it is one world, one life” (Woolf 1938, 270).

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Notes

- ¹ This loss is much to our collective detriment. As Gerry Canavan (2014) observes, Butler tried multiple times to make progress on *The Parable of the Trickster*, the third in a planned series that would have embraced Christian symbolism. The three others in the series, to be titled *The Parable of the Teacher*, *The Parable of Chaos*, and *The Parable of Clay*, would have been set on other worlds and followed the symbolism of the “Earthseed” religion invented in her first two completed books.
 - ² Even scientific skeptics (who, it should be noted, have often worked for fossil fuel companies) agree that the consensus among climate scientists about the anthropogenic causes of climate disruption is around 97 percent (Skuce 2016; see also Cook et al. 2016). For an important discussion of kinds of uncertainty, especially regarding climate science, and the need to effectively communicate and engage with policymakers and citizens with respect to these different kinds, see Smith and Stern (2011).
 - ³ As an anonymous reviewer pointed out, the long-standing scientific consensus regarding the basic thermodynamics of climate change does not extend to the many significant uncertainties remaining about the circulation effects and consequences following from them. Periodic reports updating scientific progress in understanding and attributing climate consequences may provide an additional reason public opinion is confused. Casual followers of the news may interpret new climate discoveries as evidence of uncertainty and debate rather than the creation of new knowledge based on a firm foundation of scientific understanding.
 - ⁴ Some good news is that a movie version of Octavia Butler’s *The Parable of the Sower* is in the works (Kroll 2021).
 - ⁵ It is not clear why the additional complication of a “digital currency” needs to be added to this plan. Coordinating the major existing currencies, with distributions made through the established banking structures, seems to be a better bet given their already-established trading markets and regulatory oversight capacity. Robinson (2023) seems open to this suggestion. Digital currencies also have negative environmental effects, including on the climate, given their large demand for energy (Chamanara and Mada 2023).
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Storytelling in the Anthropocene

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This article examines the 2015 book *Love in the Anthropocene* and storytelling in relation to ecological collapse. Climate fiction may engage elements of craft, in particular Enlightenment iterations of selfhood, that may contribute, regardless of a story's content, to destructive dynamics of the Anthropocene. This article proposes that writing fiction is both an act of bearing witness and of creating reality. It explores how the "post-development" (Kothari et al. 2019) framework of the Pluriverse might inform the way fiction is told and consumed in the twenty-first century, and to what ends. Stories that offer humans hope and justice, and help us navigate ecological collapse, may have less to do with realistic and cautionary apocalyptic and dystopian fictional worlds than with a view of the world the Pluriverse helps describe: one that emphasizes relationality (as is fundamental among many Indigenous and Zen Buddhist worldviews, for example) and understands reality as constituted by many worlds, kinds of worlds, and ways of being.



The nature of climate change—its relative invisibility, abstractness, and enormity—makes it hard for humans to grasp (Jamieson 2014). Generally, most “cli-fi”—climate fiction, or stories about a climate change world—aim to give humans a scaled sense of what graphs and charts might actually look like in our neighborhoods, on our shorelines, and in our backyards. Presumably, the hope behind much but not all cli-fi is that glimpses of a world altered by climate change will be sufficiently frightening or awful that humans may be able to appreciate what the species is up against and take action now to avoid rushing headlong into the worlds that climate fiction describes. When Dale Jamieson and I started talking about writing *Love in the Anthropocene* (2015), our aim was a little different.

Here is the essence of one of our early conversations: imagine how a nineteenth-century person might feel if they knew that in the future, they would have to visit a special place—a sort of special park—in order to be among trees and animals. What would they think if they were told that in 150 years, most Americans would have to go to these special parks for a night under the stars or to experience the fragrance of a coniferous forest? With the exception of perhaps some relief regarding predators such as wolves and grizzly bears, we imagined this nineteenth-century person would be fairly horrified to learn of these special parks. What, they might wonder, happened to all of the *other* trees and animals and visible stars that used to be *everywhere*? *What happened to the trees and stars?*

But, in fact, here in the twenty-first century, Dale and I think these special parks—we call them state parks and national parks—are pretty great. We are among many American and international travelers who love these parks. Many people plan all year for annual visits to them, have special gear for these visits, put stickers of these special parks’ names on water bottles, and wear t-shirts with the parks’ names on them. Visits to these parks, and the kinds of recreation done in them, can even be indicators of wealth and social status.

So, what happened inside the hearts and minds of twenty-first century Dale and Bonnie that we are in fact so *un*-perturbed by the idea of visiting a special park—and paying money—to be among trees and animals for one or two weeks of the year?

Perhaps in a hundred years more, conservationists in state and national forests that have all but burned down in forest fires will somehow manage to restore a few trees. And though it might freak out some people to imagine it, our great grandchildren may well be pretty stoked about going to see, say, the Three Trees of Northwest Wyoming or the Last Tree Standing in Arizona.

They will pay a lot of money and plan vacations around going to see those trees; they will wait in line for days and take pictures.

This is what had my attention, and Dale’s. We felt that the climate fiction we had seen and read neglected this aspect of our future selves’ interiority. A lot of

apocalyptic cli-fi goes something like this: the main character is someone a lot like many “developed world” contemporaries, both inside and out (living in an industrialized country, usually the United States, relatively wealthy, healthy, and educated), except that they are somehow navigating life in an unrecognizable dystopia punctuated by crisis. In much of this cli-fi, it is as though a nineteenth-century person is dropped into a disorienting, heartbreaking “special park,” and all of the readers or moviegoers, and the characters themselves, are horrified by it. But in fact, generally, most travelers, to mine and Dale’s knowledge, do not experience these national and state parks as horrifying and depressing or panic inducing. Generally, we might tell nineteenth-century folks, if we could, that we are only too happy to visit special tree parks on our vacations—and our stories about such visits would read not like apocalyptic literature at all but like any other human drama.

Furthermore, a lot of cli-fi—both in books and on screen—seems to feature protagonists who are also, in some measure, superheroes, or, at the very least, the sort of unique, essentialized individuals for whom redemption and victory are both possible and necessary.

We are not superheros—neither me and Dale nor our typical readers—and we do not particularly believe in American stories of redemption, seductive though they may be. In terms of climate victories, we are skeptical and uncertain, and generally pessimistic. So, the aim of our stories was not to stir people to action, exactly.

In *Love in the Anthropocene*, Dale and I wrote: “We may once may have thought of nature as the backdrop against which we lived our lives—pretty scenery to be sometimes plundered for its resources, or to write songs about—but the Anthropocene throws into stark relief that nature is not a ‘background’ and never has been. It has always been a part of our lives—a part of us as we are part of it” (Jamieson and Nadzam 2015).

This is something that has been underscored by the pandemic and the grim realities of climate change. In our coda on love, we articulate that it is perceiving the self as separate, as “in here” and everything else as “out there,” that has led to the ecological collapse we are experiencing. This fundamental delusion of separation is at the very core of feeling entitled to and untroubled by the plunder, commodification, and exploitation what so many humans in mainstream Western cultures perceive as “other”—be they other humans, animals, rivers, forests, or ecosystems (Jamieson and Nadzam 2015).

Dale and I also noted, and while writing kept a hard, imaginative eye on, the so-called banality of evil and how it is that obviously morally reprehensible realities—such as misogyny or racism—can be so normalized that they do not register as wrong, or even as existing, for whole swaths of the population.

It is as if so many of us are agreeing, without quite being conscious of it, to a “normal” that really does look to Dale and me like evil: “So we can only visit

the woods in a special park? Because no other woods remain? Cool. Let's buy a tent." "We can only see wild animals in cages? Because there's nowhere else left for them to live? Cool. Let's get an annual zoo pass."

We set to writing stories about worlds of last-remaining-tree parks. We began, for example, with "Fly-Fishing," a story in which a father who remembers wilder fishing experiences takes his daughter to a national park where the riverbed is made of no-slip turf, the flora has been painstakingly restored to resemble that native to the eighteenth-century century, all invasive weeds have been eradicated, and everyone is guaranteed a certain number of fish depending on how much they have paid. (Sort of like farmed-game hunting in Texas).

We wanted to write not about a world so transformed that everyone in it is horrified and afraid but a world in which everyone is themselves so transformed that the transformations of the world hardly bother them at all. Think, for example, of the millions of young children who did not know it was odd or unusual to wear N95 masks to school (and indeed everywhere outside the home) during a pandemic, and who think nothing of putting them back on or staying inside on a summer's day when the wildfire smoke is bad (however much we might feel grief or loss on their behalf). Once, as the "economy was reopening" post-Covid, I had my masked children in a wagon inside our local co-op, and an older woman shook her head and with tears in her eyes told me she was so sorry and that she just could not bear it, seeing such little ones in masks. My children, then five years old, were curious about the woman's behavior. Did she think they should not "get to have" masks?

As writing fiction goes, it was tricky to thread this needle. We needed the father in the fly-fishing story to remember fishing as a child in the 1990s, say, and his daughter, who had never seen a wild river or a live fish, to find nothing amiss with the gorgeously, painstakingly restored and human-engineered landscape. If anything was amiss in this new park, if her father was distraught, she was not aware of it and could never understand why. She was just a teenager on an excursion with her dad.

Every story we wrote needed a little bit of this double vision: world and interiority as humans once knew it, world and interiority as it might become. It was like narrative calculus, trying to take a picture of the rate of change of the human heart to gauge not only what such change might mean years from now, but also what it *already* means about us. In some places in the book, we pulled this off; in others, not so much.

We gave a reading at the New York Institute for the Humanities, for example, and an unimpressed critic said of the stories: "But these aren't about the future. All of this is happening now." To which a more enthusiastic reader responded: "Right! Because it is a horror movie, and *the caller is inside the house*."

Furthermore, we had to be careful in assessing these generational differences (such as between the father and daughter in "Fly-Fishing") not to immediately

assume that the past or present generations will always be better and that every tomorrow and increasingly futurized generation will be progressively worse.

In the first place, for many of us, and for many reasons, even amid accelerating, existential climate change, life in the 2020s is much preferable to life in 1950.

In the second place, maybe it is better for our children and grandchildren if they think nothing of wearing masks more and more often, or all the time. If you live in a world where the only trees are in a park, maybe it is better to think that is pretty cool and to be happy about your tree-park visits than to always be deeply troubled and disturbed by them. For better or worse, humans can adapt to unimaginable conditions.

So ultimately, Dale and I were not exactly trying to write stories that would inspire fear or action. The questions we wanted to hold in mind were: What matters to us, and why? And does it matter to us if sometime in the near future, it no longer matters to us? More precisely, what might our loving relationships look like in a world that is almost entirely human designed? Are we altering not only landscapes, ecosystems, the animal kingdom, and the tilt of the earth but also, thereby, what human love is? If we are really not separate from so-called nature, such a level of wholesale change, inside and out, seems inevitable.

In our stories, for example, there are real and perhaps very sad limits to the way a father can connect with his daughter outside on a river. In another story, a romantic relationship is simultaneously long-term, intimate, and entirely non-committal; it is not clear—in such a world, it need not be stated—whether the relationship occurs entirely or mostly via virtual reality or IRL (in real life). There are highly personalized, robotic prostitutes that can be designed and used in a mall, then throw away. Is there anything wrong with such scenarios? The characters in the book do not really think so, even though some of our contemporary readers might, and do.

Is it disturbing to imagine our grandchildren or great grandchildren would find not only nothing wrong with the Last Tree Standing Park but that they might also feel nothing particularly had been lost?

And if these things are indeed troubling, ought humanity do something now—what could it possibly be?—to avert such a reality? Finally, what does it really mean for a respected scholar in philosophy and a Zen priest/novelist to suggest love is the answer? That is not a practicable solution. That is not mitigation.

And besides, despite the aphorism that love wins, it is generally appreciated that love is not trying to win, that love is not only or ever for superheroes and victory fables but for ordinary people who suffer and who are stricken by some measure of disbelief regarding the impermanence of absolutely everything. Sometimes, it seems the point of being here is to be as grief-stricken and heartbroken as possible—what other, better measure that one has loved hard and well?

Loss is sacred, however much it hurts, and those of us with a spiritual practice or in recovery of any kind—we know this. We know that our practices are ways of shedding, of dropping away. And that, at best, such practices entail loss: loss of habits of thought and action, the loss of a sense of self so brittle and fixed that your face meets every moment of the day like a clenched fist. To know the self, said thirteenth-century Eihei Dogen Zenji, is to forget the self.

One of my Zen teachers and I joked in a conversation recently that if the practice were really advertised for what it is, Zen centers would put up signs that read something like: “Come here to lose everything you have, all you think you know, everything you are.” Our ancestor Mazu Daoyi, or Ma, an initiator of the koan tradition in eighth century China when the empire was falling apart in a spectacular ruin of starvation, disease, and war once said of his monastery: “Oh, it’s just the place where you let go of your body and your life” (Sutherland 2018). And this was at a time when people were already losing everything, living precariously, barely surviving.

In the New Testament, Jesus told his disciples, “If any man will come after me, let him deny himself and take up his cross and follow me” (Matthew 16:24 KJV), and “He that findeth his life shall lose it: and he that loseth his life for my sake shall find it” (Matthew 10:39 KJV).

Tibetan siddha Milarepa famously said: All worldly pursuits have but one unavoidable and inevitable end, which is sorrow. Acquisitions end in dispersion. Buildings end in destruction. Meetings in separation. Births in death.

The Quran reads: “If God wants to do good to somebody, He afflicts him with trials” (al-Almany 2009), and “Every self will be tasting of death” (Surah 29:57–66).

Not only can our notion of “love wins” be informed by this kind of sacred loss *and* love—apparently a package deal for us humans—it is also central to another and important way that storytelling is both giving rise to and could also help us navigate accelerating and existential climate change. Storytelling—depending on the kind of story—may be both the poison and the antidote to our situation.

Since Dale and I published our book, I have continued to write fiction—not cli-fi, per se, but fiction—and some of my thinking and strategies on the page, amid ongoing personal conversation and reflections on our lives, have led Dale and I to conclude that we need to write one more story. One that pushes a little harder on the interiority of a character, and the illusion of separation, in a very particular way. To explain how and why this is so, I am going to borrow some language from what scholars call the Pluriverse. Pluriversalists are from many fields and work across disciplines including anthropology, international relations, environmental law, particularly Rights of Nature, and history.

First—and this is the foremost tenet of the Pluriverse—different worlds and ways of being coexist (Kothari et al. 2019; Querejazu 2016; Hutchings 2019).

Not just different ways and worlds for, say, a muskrat versus a person or a fish as opposed to a gull, but different worlds and ways of being among humans. Not just different ways of knowing, not just different cultures or points of view, but different ways of being (Querejazu 2016). This is an ontological, not epistemological, claim. For this reason, it can be unsettling to entertain, and downright baffling or even infuriating to some.

In one conference during which I shared some of the basic tenets of the Pluriverse, an accomplished attendee remarked that those who “believe in other ontologies” are “mentally ill.” In another context, in response to my curiosity about and wanting to engage in a serious discussion about the literature of the Pluriverse, a colleague and successful philosopher made a face and said that there is only one ontology, and observations about it are made empirically.

As remarkably, upon being introduced to the Pluriverse, the majority of attendees from across disciplines at the aforementioned conference, as well as during a public lecture at the University of Cambridge in 2023—expressed something like relief (“I knew it!”) and openhanded, if sometimes skeptical, dialogue. Their questions—and some of mine—went something like this: Different ways of being and worlds exist? How can this possibly be true? Are we not all here on the same planet? What other world? What other way? Are we really allowed to talk about this?

Let us imagine two women standing on a city street.

One of these women experiences herself as an individual looking out on the city, observing other people, buildings, a river, animals, trees. She is independent and autonomous; from her vantage point, much of the world can be explained, measured, and described via rational resources and means. She can subtract herself from the street and the city she is observing in order to comprehend it. She is here, in her body, perceiving, assessing, and judging reality with increasing accuracy per the tools of her culture, and reality is “out there.”

While some may already see the flaws in this kind of view, and may already believe this way of being has its dark side, it is important to acknowledge that it took centuries of revolution—political, cultural, socioeconomic, scientific—for this woman to get here. Her apparent autonomy and the tools she uses to describe her world rationally have proven powerfully liberatory for many humans. Hers is also likely the conventional way of being for most people, most of the time—and this is remarkable. Much of humanity has come a long way. And, really, questioning the universality of her way of being—standing here, assessing reality out there—is very difficult for most, even if the spiritually woke among us say the words “interdependence” and “oneness.” To question the universality of this woman’s sense of the world around her might be to unravel one’s entire understanding of self, the cosmos, the real, and the possible.

For the other woman on the street, there is no Archimedean point from which she can view the city, its buildings, people, river, or animals as “out

there.” She cannot subtract herself from anything she is seeing. Nothing exists extrinsically or independently; everything is mutually constituted, so much so that there is no subject or object, no independent “self” looking out a “city.” This woman does not experience herself as the center of anything, neither the street nor the scene around her. If asked, she might state that the river, animals, other people, trees, and community garden all have the same fundamental ontological value, like so many parts of a single body. In fact, increasingly in environmental law, Rights of Nature arise from just this understanding, whereby communities resist the idea of human separation from nature and mobilize “on behalf of mountains, rivers, and ecosystems,” arguing that each is a being with “rights” and are not mere objects or resources to be used (Kothari et al. 2019).

The way of being in the world of the first woman, who experiences herself as separate and for whom reality is “out there,” can be called the euromodern ontology (Querejazu 2016). Critically, this ontology is unique in its insistence on being universal, or the only true one. Here are some other characteristics of the euromodern ontology (Hutchings 2019):

- It is the dominant worldview that has been emerging in Europe since the Renaissance transition from the Middle Ages to the early modern period and took its position as universal towards the end of the eighteenth century (Kothari et al. 2019).
- It considers humans the center of the world (Blaser 2012).
- It presupposes a fundamental separation between humans and nature and, indeed, between and among all humans as well (Hutchings 2019; Shiva 2019).
- It is defined by linear time that moves only forward and backward (Kothari et al. 2019; Blaser 2012).
- Efficiency is its most fundamental measure of success, and “success” is highly valued (Malghan 2019).
- All other ways of being in the world are dismissed, discredited and/or delegitimized (Querejazu 2016).
- Other realities or ways of being exist only as myths or untraditional beliefs within the euromodern ontology (Blaser 2012).

Readers may find they take issue with some, but not all, of these tenets of the euromodern ontology. It is important to note that people who describe the euromodern ontology this way are not saying that modernity is bad and tradition is good. It may be easy to slip into that kind of dualistic thinking, but it should be avoided as it is simply not true, and a list of compelling counterexamples could be generated very quickly.

The underlying ethic of this euromodern ontology—grounded in dualistic thinking, including a fundamental separation between humans and nature—is the heart of a way of being that has allowed for the commodification and exploitation of nature, animals, children, and other humans, and for the kind and degree of extractivism that has led to climate change and massive species extinction (Querejazu 2016; Law 2015; Jamieson and Nadzam 2015).

This second woman's way of being in the city is not of the euromodern ontology but is instead relational and more in line with certain Indigenous cosmovisions, for example, and with Buddhism, Taoism, and certain feminist and ecological movements (Querejazu 2016). It is also in line with quantum physics's and complexity theory's presentation of the observed existing in dependence of the observer and of the physical world as emerging, open ended, and evolving—as ever and unpredictably arising (Theise 2023; Querejazu 2016).

One need not disavow modernity, nor be an Andean mountain dweller, quantum physicist, or practitioner of an Eastern spiritual tradition to feel and experience resonances with a more relational way of being. In fact, many even across mainstream Western culture seems to be feeling it. Kothari et al. (2019) suggest that many humans, especially in industrialized countries, may feel, even if they do not ask outright:

- What has gone so terribly wrong with this way of living (Kothari et al. 2019)?
- Who is responsible for it (Kothari et al. 2019)?
- How am I responsible for it (Kothari et al. 2019)?
- What would a better life look like, and how do we get there (Kothari et al. 2019)?
- How can I minimize the harm I am doing (Kothari et al. 2019)?
- What is a life worth living (Kothari et al. 2019)?
- How can conditions that allow such a life to happen even begin to be met (Kothari et al. 2019)?
- How is it that so much legitimate human progress seems to be “betraying its promise” (McMichael 2019)?
- Why do I feel so “ill at ease” (McMichael 2019)?
- What is an alternative? What kind of world do we want to create, and how do we do it (Querejazu 2016)?

The first broad response I will give to these questions comes from one of my Zen teachers, John Daishin Buksbazen. He used to say to me, “We're not *in* this all together, we *are* this all together.” Everything we do—every word, thought, action, motive, fear, sneeze, fart, howl, slice of toast, pile of dog shit, forest fire, mendacious lie, horrible politician, and desperate prayer—is part of a single fabric called *this*.

There is a lot of hope and agency in this, as well as enormous responsibility. If you do not like the fabric of “this,” change the threads you are using. Most appreciate that there are endless opportunities in a single hour alone to choose which threads we are going to weave with: good intentions? A pack of lies? Irritation? Follow through? Attention? Distraction? Despair? Joy? A hard, hard, hard-won moment of patience?

Relational ways of being are creative practices and always in revision. There is no final resting point of ultimate comprehension. Relational ways of being cannot be known or assessed as if from aside in any satisfactory way; they can only be practiced and experienced (Kothari et al. 2019).

So, what does it look like to practice and experience more relational ways of being?

The stakes are fairly high because people create reality by the stories they tell (Blaser 2012). For some, this might seem obvious, and for others, like a wild and abstract claim: we create reality by the stories we tell? Sounds a little woo. To appreciate this idea, it helps to broaden the understanding of what a story is.

Here is a rough definition: a story explains phenomena and experience using language and symbols. Today, while writing, I am using English. For example, “Noah was 600 years old when the floodwaters came on the earth” is a story. So is: “Little Red tucked her basket under her arm and headed into the dark wood.” So is: “It is a truth universally acknowledged that a single man in possession of a good fortune must be in want of a wife . . .”; and so is: “Last week an atmospheric river dumped several feet of snow on the Sierras in California.” But so are these:

“I am a human being on planet earth.”

“I am revising this paper in my car.”

“I am up here, and you are over there.”

Whether myth, fiction, or news media, people do act on these narratives when they believe in their respective truths, sometimes without recognizing them as narratives, sometimes without even recognizing them. If I tell myself the story—consciously, unconsciously, or subconsciously— and from all directions hear and see it confirmed that I am separate from each and all others, separate from the floor on which I stand, separate from the boulders on the shore and the cries of seagulls, this will inform the kinds of actions I take, the virtues I either cultivate or dispense with, and the extent to which I prioritize and even define something like “self-interest.” In this way, collectively, profoundly rooted in the stories we tell ourselves, our many, many actions strung together over time do indeed create a world. There is nothing new age or “woo” about it; it is simply a matter of cause and effect.

Most of the stories I consume—nonfiction, fiction, news media, film—generally arise from and assume the aforementioned universalism of the euromodern ontology. There are some wonderful and weird exceptions. But generally, without ever explicitly announcing itself, but with absolute authority, this ontology describes the world and my place in it in relation to everything else, including all of you, readers. The extent to which it shapes and prescribes one's actions is enormous, and most of the time, it does so invisibly.

On the page, a work of character-driven formal realism—the dominant novelistic aesthetic that “resolved” so many ontological and epistemic questions of the Enlightenment—usually adheres to a particular formula, no matter how radical or weird or sci-fi the subject matter or point of view. I have an acronym for the formula: EPiC MAP. Exposition (or backstory) informs a person's Psychological state, from which their Character arises (including their various virtues, flaws, and so forth). And this character, which does sometimes shift in a story or novel, drives their Motives, either consciously or unconsciously. Based upon these motives, the character takes various Actions. All these actions strung together create a Plot. A rough and ready (and bad) example is the serial killer movie: the killer is abused as a child, which gives rise to a profoundly unstable if not characterologically “flawed” personality, which gives rise to hateful, violent, destructive motives, which culminate in serial killing. An only slightly more complex plot would braid this same string with those of a few other characters—the detective and their love interest, say. This is fairly reliably the convention no matter how wild or strange the sci-fi world or historical setting.

But what if this entire conception of selfhood—that the so-called Euromodern ontology is continually reinforcing—is wrong? The students I have had who want to “be writers” intuit this aforementioned formula or have it directly described to them and more or less diligently set to work writing stories and novel drafts. The artists in the class—the spirits with the mortal wound, as it were—look at me skeptically. Can we break those rules? Can we not do it differently? Or even: that does not really jibe with my experience or with what is calling me to create art.

I, too, find so many of the “answers” to so many ontological and epistemic questions—as they are presented in many stories, novels, and films—to be hollow and unsatisfying, if captivating and seductive. While this formulation of selfhood may significantly if not completely free me from many sociopolitical prisons, it does not really describe my experience of being in a body or in a world. I almost never feel like a clear, focused, wholly rational being but more like a flux of call and response, and a pretty inattentive, confused flux on most days and in most moments. If I am really paying attention, I rarely find the world a measurable, describable background distinct from this body, whatever it is.

Let us go back to the two women on the city street. There is one more critical difference between these two women's experiences.

A fundamental question of Western philosophy asks: Am I one? Or am I many? The first woman would answer that question with: "I am one. I am myself. Just as you are one. You are yourself." The second woman would not answer with: "I am many." She would answer with: "Yes. Both. I am one *and* many."

While a person can experience being one and many—and I trust many of you, readers, have done so—it is practically impossible to grasp this nonduality with a rational mind. A rational mind is precisely the wrong tool for to understand this. A rational mind sorts and categorizes dualistically. There is nothing wrong with this. It is the rational mind's job, and it is an exquisite tool to have. It is just not the right tool for every job, including this one. Nonduality can be experienced but never grasped intellectually.

So, the body is a better tool for the job. The whole body. With its goosebumps and shaking sobs, with its laughter and ravenous hunger and need to pee. And with its apparently distant trees and leaves and rats and roaches and stars. Am I one, or am I many? It is a question that I can only contemplate with my whole body. And that whole body is perhaps bigger than can be understood.

How, aside from dancing, chopping onions, painting, or washing dishes with one's body, can a person engage their body, or this whole body, to experience nonduality? Experiencing or appreciating art is a wonderful tool for the job. Contemplating quantum and complexity theory may be a good tool for the job. Reading poetry is a great tool for the job.

Stories? A little trickier. Mainstream Western culture does not have a lot of stories that shift a conception of selfhood, in part because aesthetically, and for many good and important reasons, Western culture has so valued character-driven fiction. How can a person or group of people now begin to tell and share stories that shift or rattle an Enlightenment sense of selfhood in such a way that actually prompts behaving differently in the world and towards so-called others?

A question like this is a bit upside down. Because if a person should, and must, and can only write what they know, then they must first experience a bit of the flux of self, then share these experiences. If I want to write these stories, I must taste the self momentarily dropping away. Most of us do indeed taste this from time to time—before a sunset, in the split second of comprehending a poem, in ecstasy, in shock before the deceased body of a loved one, perhaps even while raking leaves, or—as the transformative magic of so many fairytales suggests—while engaged in seemingly endless, repetitive, unsurmountable tasks like sorting heaps of lentils from ashes.

But suddenly, almost accidentally, happening upon these experiences is not enough; if I want this way of being to be part of the stories I tell and the worlds I create, I have to cultivate it. I have to be willing to stay in these liminal spaces,

however uncomfortable or disorienting they may be, for however many hours of sorting lentils from ashes it might take. I have to practice being present when I experience hiccups or glitches in the Euromodern “tape” that I may be otherwise conditioned to ignore, dismiss, or pathologize and unapologetically share my experiences from and of them. I—and Dale and I—need to tell stories that originate in experiences—however fighting—that may be discounted by the dominant, Euromodern ontology but that, as artists creating the world, we are willing to play with to test out both in our lives then on the page.

It does not take that much of a shift or rattling away from entrenched thinking to see that there are other ways of presenting character or self that may be more aligned with a relational ontology. Not in a radical, jarring way but slightly, lightly, and in a way that really resonates. Here is one experiment in its entirety by Lydia Davis (1991).

It is called, perhaps a bit tongue in cheek:

Trying to Learn

I am trying to learn that this playful man who teases me is the same as that serious man talking money to me so seriously he does not even see me anymore and that patient man offering me advice in times of trouble and that angry man slamming the door as he leaves the house. I have often wanted the playful man to be more serious, and the serious man to be less serious, and the patient man to be more playful. As for the angry man, he is a stranger to me and I do not feel it is wrong to hate him. Now I am learning that if I say bitter words to the angry man as he leaves the house, I am at the same time wounding the others, the ones I do not want to wound, the playful man teasing, the serious man talking money, and the patient man offering advice. Yet I look at the patient man, for instance, whom I would want above all to protect from such bitter words as mine, and though I tell myself he is the same man as the others, I can only believe I said those words, not to him, but to another, my enemy, who deserved all my anger.

Both on and off the page, as any in relationships can attest, the stakes are fairly high if we do not allow that there may be something authentic and important about the way Lydia Davis’s “protagonist” begins to break down her understanding of personhood or self as essentialized.

Lydia Davis is of course a wonder, a MacArthur Genius, a brilliant light—what about the rest of us? How can anyone begin to tell the story of a self that is a flux in continual relationship with everyone and everything around it?

You can try it on, right now (you can always try it on right now). Let us say, as Dale and I suggest in our introduction to *Love in the Anthropocene*, that there is no “backdrop” to our human lives. Imagine that from above, if it were possible, a huge set of fingers were to descend, pinch me by the back of the neck wherever I might be while you are reading this (washing dishes or chopping

onions), then pull me upward toward the sky. If I am not separate from you, or from the houses, trees, cities, landfills, factory farms, or wars being waged between us, then all of it—houses, trees, cities, landfills, the battlefields, and all of their living and dead would be pulled up together, like a single fabric, a single cloth. And part of the fabric would be you—all humans, actually, including our many eyeballs and everything they are seeing. It would be the germs under our fingernails, the lunch digesting in our guts, the thoughts in our minds, and indeed even our intentions and motivations, our memories and suspicions and fears, however conscious or unconscious we may be of them. Everything. No separation.

And now, if you can, hold this presumed reality for a moment, drop the large set of fingers (which we had to use as our beginning Archimedean point). No external set of fingers but all still the same fabric. You can wiggle it—the whole fabric—the whole universe—by wiggling your toes inside your shoes. This is not a metaphor.

The implications for telling stories from such ground are myriad and, in my opinion, as reasonable as they are fascinating. Say for a moment that I am the protagonist of a story in which the author presumes no separation. Since, according to such a premise, we—author, character (whether fictional or not), reader—are all part of the same fabric, since there is not a hairsbreadth separation among any of us—it is reasonable to suppose that some of “your” thoughts might somehow be accessible to “me,” perhaps not verbally but in some other manner. And not in a supernatural or shocking way, not in a way that pathologizes or imbues me with magical powers, but as a matter of course.

It might even be possible for two or more of us to communicate without speaking. Even across long distances. Even in dreams. And if one of you readers were to suddenly feel a sharp pain in “your” back, or unbearable heartache, I too might register that pain. Synchronicities or powerfully intuitive and even somatic empathy would be not Dickensian coincidences to be avoided when writing a story or magical realism attributed only to certain charming demographics but totally reasonable and important experiences for beginning to describe the mysteries of being.

Let us extend the neck-pinching experiment further, pulling higher and higher on the “cloth.” Eventually, everything would be drawn up. Everything. In a deeply relational ontology according to which everything is mutually constituted and profoundly interdependent, where everything is “one,” that means *everything*, including what is called “yesterday” or “January 24, 1532.” Pull on the cloth and you pull on the day you were born. You pull on last Christmas. And so, without any exaggeration or metaphor, the protagonist of a story might sit in a fast-food restaurant in Chicago, sensible of the so-called past—of everyone who had ever entered the restaurant, say, and the thoughts

in their heads and the aches and pains in their bodies. Of all the nonhuman animals that fly over or scamper through the restaurant, or who once lived on the same patch of land long, long before it was a restaurant, or a city, or even had a name.

I will add too, because it bears so impressively on one's willingness to tolerate, explore, and share the experiences we have before we write them into stories, that records of such experiences could also reasonably be categorized as nonfiction. Certainly, such a suggestion revives ongoing Enlightenment questions about the differences among truth, lies, fiction, myth, fantasy, and fact, and returning to these questions again and again would, in my view, not only be welcome but may be urgent.

In the next and likely last story Dale and I are writing, these are some of the ways of being we are experimenting with. It requires us to live between worlds a bit, then take a note on it, then live between worlds a bit, then take another note on it.

As the literature of the Pluriverse posits, there are millions of people who live in-between worlds in their daily lives—caregivers, people who speak multiple languages, spiritual practitioners, people who live in borderlands of all kinds, geographical and otherwise (Bernstein 2005).

I would suggest that almost everyone lives and shift between worlds and ways of being, for moments, for split seconds of the day, from time to time—out of the Euromodern ontology and into another way of being just for a second. A moment of so-called transcendence—as soon as you recognize it, reify it, try to pin it down as anything other than unpredictable emergence, it is gone.

In practice, in politics and across the world stage, there are many difficulties conceiving of political solutions and pragmatic agreements among groups with different ways of being (Hutchings 2019). It may even be practically impossible—as many sense and dread—to come to any meaningful solutions in time to preserve what we recognize or care about as human, as life on Earth. It may be indeed that we will hurt and hurt those we love, that we will suffer, that we will lose everything. Clearly, we have a long way to go toward replacing competition with cooperation, toward appreciating our moral obligations to all sentient beings, which includes ecosystems and rivers, and toward replacing “winning arguments” with deeply unflinching ethical investigation (Hutchings 2019).

But I think at the very least we can all agree that at this point, 2024, human beings are affecting virtually every living thing on the planet, and this means we have broad, deep moral obligations—more so perhaps than we are prepared to accept and more than we thought the word “love” covered. It is easy and understandable that we might be defensive about a way of being that has given us our identity and many things we cherish about ourselves and being human. But one can learn little if anything from a defensive posture. And if, in an experiment, a person drops such defensiveness for a few minutes, I can tell you

it is very easy to just pick it back up again. It is a worthy experiment, and there are many, many opportunities each day to try it out.

Of course, we cannot function responsibly in a political world or in a family or in a relationship without identity—without a particular form, an apparently distinct body—that is accountable for particular thoughts, speech, and action. But love in the Anthropocene, it seems to me, entails that we do so while regularly checking each human identity against the breathtaking mystery of existence. Dropping what we think we know of ourselves as separate or distinctive and unique beings does not mean anyone is aiming to resolve everyone and all species and forms into a homogenous “we” or “one.” What it does entail is a willingness to sit in the place of not knowing what it really means to be human, or alive; this is a place from which empathy and compassion—caring about the experiences and fates of others—arise quite naturally. It is a place from which we can navigate our lives, not in accordance with a list of “Ten Ways to Fight Climate Change” or “How to Survive the Apocalypse,” but with awareness of the many unforeseeable consequences of even an unarticulated intention. Awareness that the effects of a sloppy task, or a selfish act, or an intuition ignored, become part of the fabric of whatever this mystery is and what we consequently become and must live in. One need not wake up tomorrow enlightened to understand how to face and exist in the world in 2024 or 2025 or to suddenly conceive of some solution to climate change or its effects. One need only wake up acknowledging how incomplete our knowledge is, how little each of us can really perceive—especially of our interconnectedness but even of our own bodies and orientation in space and time—to proceed more gently, erring, when we invariably do, toward causing the least possible amount of harm.

And this next story Dale and I are co-writing? It is arising, as all stories do, in our shared experience—in this case, grounded in a deliberate, oft-articulated intention to practice and cultivate love and friendship across many seasons, miles, projects, personal discoveries, and even conflict and hurt as we age and as our hearts are broken by the world.

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Why We Must Stop Saying “Climate Apocalypse”: Symbols, Religious Social Memory, and Effective Climate Action

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The apocalyptic framework has become a handy metaphor for climate change because this story, better than most others, is able to express the scope and severity of the transformation most scientists believe is coming to humanity’s planetary and social systems. Since the first Earth Day in 1970 (Bailey 2000) and increasingly in journalistic media, nongovernmental organization circles, scientific literature, academia, eco-activism, and youth culture, climate change is referred to in world-ending terms that are explicitly apocalyptic. Those who use the phrase “climate apocalypse” mean to spur serious confrontation with the facts of climate change, resulting in climate activism, whether in the form of climate change mitigation or shoring up societal resiliency. However, stories not only describe reality, they help shape reality, and “climate apocalypse” has the unintended effect of creating passivity, fear, paralysis, and naïve hope in its audience.



Drawing on insights from Sherry B. Ortner on key symbols; Charles Peirce on icons, indexes, and symbols; and social memory theorists such as Barry Schwartz, this study suggests that the symbolic story of climate apocalypse brings with it a well-entrenched referential system of symbolic associations from the long history of Jewish and Christian apocalypticism that shapes and influences human actions, creating a passive response in its audience, exactly the opposite of what the phrase “climate apocalypse” is meant to inspire. There is a rapidly closing window in which to act to avoid the worst impacts of climate change. Choosing the right rhetorical framing of the climate crisis is critical if the goal is to mobilize action and avoid unintentionally creating climate anxiety or false expectations, such as the idea that savior figures of any kind will provide easy climate solutions. Instead, it is time for thoughtful communication about the difficult realities that climate change will bring and the global public education necessary for a vast and rapid civilizational shift if the climate crisis is to be confronted resiliently and equitably.¹

State of Climate Change

With the rise of the industrial age, the Earth entered a new geologic era that scientists call the Anthropocene, meaning that human activity has become the primary driver shaping planetary conditions. Reliance on fossil fuels led to the development of certain industrial societies, but it also raised global atmospheric carbon dioxide levels from 280 parts per million, where it had remained for 6,000 years, to over 420 parts per million, levels last seen on Earth four million years ago in the Pliocene Era, when global average temperatures were 3°C (5.4°F) warmer and sea levels were 30–40 meters higher than they are today. In the Pliocene, atmospheric CO₂ had accumulated from geologic processes unfolding over thousands of years, whereas in the Anthropocene, human activity has created this concentration of atmospheric CO₂ in just 150 years or so, ten times faster than has occurred after any ice age in geologic history—and emissions are accumulating at an increasing rate (IPCC 2023).

As a result, global average surface temperature rise has already increased 2.0°C since 1880 (Lindsey and Dahlmann 2024), with an overall global average temperature rise of about 1.2°C (about 2.2°F) over the pre-industrial period (1.5°C in August 2023). The last nine years from 2014 to 2023 were the hottest in recorded history,² with July 2023 being the hottest month ever recorded in human history, registering a 1.5°C (2.7°F) global average temperature rise above pre-industrial temperatures (Van Campenhout 2023). Temperature records will continue to be smashed as humans continue to emit greenhouse gases at an increasing rate,³ causing further temperature rise. Even if humans were to cease all emissions now, a lag between concentrations of CO₂ and temperature increase means that the global average temperature would still rise for decades or longer. Thus, while there is still some imprecision in our climate modeling,

at humanity's current rates of emissions, we may be on track for Pliocene-like conditions of a global average temperature rise of 2.7–4.0°C (4.9–7.2°F) by the end of the century (IPCC 2022; Spratt 2019).

As a species, humans have not only demonstrated a remarkable ability to change our environment and habitats, we have also created technology that has allowed us to enter extreme environments as varied as the ocean floor, the summit of Mount Everest, Antarctica, and the lunar surface—at least for a few people, for short durations of time and at great expense. Thus, it is sometimes easy to forget that humans are animals who depend on specific environmental conditions in our habitats to thrive and survive. Beyond certain heat-stress limits, the so-called “wet-bulb temperature” of heat combined with humidity, human bodies cannot function well or even at all, since beyond this limit we cannot sweat enough to regulate our core temperatures (Vecellio et al. 2022). The heat limit for human survivability is thus dependent on humidity, and in some regions, this threshold may be far lower than previously thought, with one recent study putting it as low as 31.5°C (88.7°F) under certain air conditions, even for young, healthy adults (Vecellio et al. 2022). Given that temperature rise is greatest at the sparsely populated polar regions and the densely populated equator, the regions of human civilization most vulnerable to climate impacts include many nations of the global south, the economic designation for less-developed nations where the majority of the world's children reside. In its latest report, the Intergovernmental Panel on Climate Change (IPCC) concludes that half of the world, 3.3 to 3.6 billion people, currently live in contexts that will be “highly vulnerable” to negative impacts of climate change by mid-century (IPCC 2023), with some regions becoming uninhabitable by humans due to heat and humidity exceeding survivable wet-bulb temperature thresholds. In addition, one million other species are at risk of total extinction due to climate threats (IPCC 2023).

Avoiding these alarming scenarios requires vast and rapid civilizational-level transformations to curb greenhouse gas emissions and also produce carbon capture techniques. The IPCC's sixth climate assessment from 2023 (IPCC 2023), an international consortium of nearly 300 scientists in sixty-seven countries collating the results of 34,000 scientific reports, recently explained that in order to avoid a disastrous global average rise in temperature of 2.0°C⁴ and stay at a less threatening rise of 1.5°C (2.7°F), carbon emissions need to peak in 2023 and global fossil fuel emissions must be cut by almost half by 2030 to reach net-zero global greenhouse gas emissions by 2050 (IPCC 2022). Some scientists caution against overstressing these precise thresholds, arguing that since the existing climate models are still unable to predict with absolute certainty the acceptable threshold of global average temperature rise, any alternate scenarios that unfold might inadvertently spur climate change denialism.⁵ Yet, while scientists may disagree on the exact amount of time humans have left to avert climate catastrophe, it is clear that the last nine years from 2014 to 2023 were the

hottest in recorded history and that even if all emissions were to cease now, the accumulation of greenhouse gases will take time to dissipate and global average temperatures will continue to rise for many decades. Even worse, greenhouse gas emissions are still rising, as has the average global rise in temperature since the beginning of the industrial age, which passed the 2.0°C mark for the first time in recorded history on Friday, November 17, 2022 (Dance 2023). Given that the world's national carbon pledges in 2022 would actually result in a 10.6 percent increase in global greenhouse gas emissions by 2030, it is clear that the current processes of international climate negotiations and policy changes are unlikely to result in dramatic decreases in global greenhouse gas emissions anytime soon (*UN News* 2022).

Curbing carbon emissions now is particularly crucial given that at least six climate tipping points are at risk of being activated, which by definition are changes to large biophysical systems that will negatively impact Earth's entire climate system in unstoppable, unpredictable ways that are sometimes abrupt and often irreversible. Already, four climate tipping points are possible, but some scientists believe that at the 1.5°C threshold, four or five tipping points become likely, including the melting of the Greenland and West Antarctic ice sheets, which together would result in an eventual ten meters of sea-level rise, the abrupt melting of the Arctic permafrost, the death of almost all coral reefs (the basis of much of the ocean food chain), and the collapse of the Atlantic Meridional Overturning Current (AMOC) (Rockström 2023; McKay et al. 2022).⁶ One new study suggests that the collapse of the AMOC could occur as early as 2025 and most likely in 2057 (Ditlevsen and Ditlevsen 2023), causing the extinction or displacement of vast numbers of ocean species, creating ocean dead zones, and changing air temperature and weather patterns in unpredictable ways, including altering the monsoon systems (IPCC 2022, 1216; McKay et al. 2022). Moreover, around the 2.0°C global warming threshold, which Earth is slated to cross between 2050 and 2070, sixteen additional climate tipping points are more likely to be activated (McKay et al. 2022), which could see the global average temperature rise to 4.0°C or more (7.2°F or more) by century's end (Spratt 2019; Lynas 2020; McKay et al. 2022), rendering the world unrecognizable.

Since the Earth ultimately functions as a unified, whole ecosystem of interdependent parts, of which humans are just one, the climate crisis is also a civilizational crisis, triggering social tipping points or conditions in which societies become unstable. These impacts are readily evident when regions are viewed from a systems perspective that includes human activity (Meadows 2008). As global temperatures increase, so will the strength and frequency of storms, ocean temperatures, stress on food crops, periods of drought, glacial ice melt, sea ice melt, and habitat suitability for certain species, such as mosquitoes. Reasonable predictions of tertiary impacts include increases in crop failure, the severity and frequency of floods, wildfires, and incidence of heat-induced illnesses, and rise

in sea level, as well as decreases in the availability of potable water and food supplies. A higher incidence of diseases is inevitable, such as ebola and malaria from mosquitoes and cholera and other infectious diseases contracted from unsanitary flood waters. Each of these conditions also unleashes a challenging series of events in the social sphere, such as civil unrest, internal displacement, and mass migration. With up to 1.2 billion climate migrants projected by mid-century, climate change will cause cascading disruptions in many societies around the world, even if they are not directly impacted by rising temperatures (IEP 2020). Since many migrants will come from the economically depressed global south with little resources to offer and in the direst need, no society is currently prepared to handle this scale of mass migration, either along the journey points or in the destination countries. Activating just one tipping point, the cessation of the AMOC, would not only have a disastrous impacts on the whole ocean and climate system, it would also eliminate major food sources for two billion people, destroy industries, and result in food shortages, driving starvation, civil unrest, and displacement. Consider the effects from Europe's "Little Ice Age" (from the fourteenth to nineteenth century), which occurred as a result of the weakening of the AMOC.⁷ Since water temperatures influence air temperatures, which dropped on average 2°C, the seasons changed, killing crops and causing millions in Europe to starve, with 1816 being declared "the Year without a Summer" (Arellano-Nava et al. 2022; Lapointe and Bradley 2021).

Discounting tipping points, Earth still appears to be on track for a 2.7°C (almost 5°F) global average temperature rise by the century's end, a disastrous scenario for many, especially the world's poorest people (UNEP 2021, 2022; *UN News* 2022). Factoring in tipping points, the world may be on the road to a 4°C (7.2°F) rise or more by century's end, which would threaten civilization in almost all parts of the globe (IEP 2020). One Australian thinktank concluded that human civilization could end as early as 2050 (Spratt 2019; Spratt and Dunlop 2019). This grim scenario prompted the United Nations Secretary-General António Guterres to state that "it's now or never": unless governments everywhere make a dramatic change across all sectors, "we will be doomed," and "the world will be uninhabitable" (*UN News* 2022). It is likely that only one billion people would be able to survive a 4°C world, and the majority of those survivors would be forced into the remaining habitable areas of the planet, roughly above the forty-ninth parallel north (above the United States and Canadian border, or northern France, or above Xinjiang in China) or, in the Southern Hemisphere, in the tip of Patagonia and in Antarctica (Vince 2019; Spratt 2019).

Responding with "Climate Apocalypse"

With a future this foreboding and unprecedented in human history, it is no wonder that many commentators find themselves drawing on apocalyptic theology to imagine the scale and depth of destruction now facing humanity.

Referring to a “climate apocalypse” has become an increasingly popular way of framing the unfolding climate crisis. Specific data on the actual frequency and valence of this usage in media should be available within the next few years (Vander Stichele 2023),⁸ but in the meantime, even a cursory search of recent headlines finds that the phrase has entered widespread usage. In 2019, the *The New Yorker* featured author Jonathan Franzen’s article “What If We Stopped Pretending?” The arresting pull quote pronounced in white italics on a black background: “The Climate Apocalypse Is Coming. To Prepare for It, We Need to Admit That We Can’t Prevent It” (Franzen 2019). The graphics feature a stunning illustration by Leonardo Santamaria that shows the silhouette of a woman, presumably a mother, pushing a child on a tire swing, surrounded with a blackened forest ablaze with red, orange, and yellow flames. Similarly, on July 4, 2022, the title of the *New York Times* opinion editorial by Paul Krugman warned of “Another Step toward Climate Apocalypse,” next to which was a photo by Emilio Fraile of Europa Press of a silhouetted firefighter walking toward a terrifying wall of forest fire flames in hues of orange, yellow, and black (Krugman 2022). Or consider a *Boston Globe* article by Sabrina Shankman from July 24, 2021, which features a triptych of photos: a melting glacier on the left, a building on fire in the middle panel, and flood evacuees on a raft in the right-hand panel. Above this, the headline reads in large lettering, “Welcome to the Climate Apocalypse. (It Will Get worse.)” (Shankman 2021).

Each journalist used the phrase “climate apocalypse” to stress the severity of the state of climate change, not only to help their readers become cognizant of the grim reality of climate change but also presumably so that they would take action. There is even a new Wikipedia entry on “climate apocalypse” that highlights that climate action is crucial:

A **climate apocalypse** (also called a **climate dystopia** and a **climate-induced collapse**, among other names) generally denotes a predicted scenario involving the global collapse of human civilization and potential human extinction as either a direct or indirect result of anthropogenic climate change. Many academics and researchers posit that in actuality, *unless a major course correction is imminently implemented*, some or all of the Earth will be rendered uninhabitable as a result of extreme temperatures, severe weather events, an inability to grow crops, and an altered composition of the Earth’s atmosphere. (Wikipedia 2020, emphasis added)

The phrase “climate apocalypse” also informs other semantic domains, including “eco-apocalypse” and “environmental apocalypse,” as well as other climate-related phenomena, in a “X + apocalypse” linguistic formula. For instance, during the record-breaking heatwaves of the 2022 summer, a French meteorologist named Francois Gourand used the phrase “heat apocalypse” to

describe the unprecedented and devastating weather in southern Europe (*Agence France-Presse* 2022), and the phrase was so potent that it went around international news media like the fire it was describing, appearing, for instance, as the headline in the *Guardian*, *Agence France-Presse*, *Al Jazeera*, *CNBC*, *The Washington Post*, and *9Now* in Australia. *The Atlantic* also featured a story in the fall of 2022 on the Turkish “honey apocalypse” caused by climate change, with the headline “Turkey’s Honey Apocalypse Is a Warning to the World” (Nadworny 2022).

Such usages are not limited to the media. The use of “climate apocalypse” and similar terms is also prevalent in scholarship on climate change, as even a cursory review of the many recent titles makes clear, e.g., *The Environmental Apocalypse* (Kowalski 2023), *An Inconvenient Apocalypse: Environmental Collapse, Climate Crisis, and the Fall of Humanity* (Jackson and Jensen 2022) and *Political Spirituality in an Age of Eco-Apocalypse* (Perkinson 2015). Many of these texts have the goal of explicitly or implicitly motivating effective climate action—that is, they still have hope. Others have less or no hope. The *Dark Mountain Manifesto*, the Dark Mountain Project, and twenty-four Dark Mountain books build a social, creative, and literary space that is “a love song for a collapsing world” (Kingsnorth and Hine 2009; Dark Mountain Project 2023). Created by the environmentalists Paul Kingsnorth and Dougald Hine, the first decade or so of the project took a decidedly dark turn, although Kingsnorth has recently converted to Romanian Orthodox Christianity in a way that now holds out a sliver of hope (Kingsnorth 2021).

“Climate Apocalypse” as a Generator of Passivity: Ortner on Key Symbols

Although the goal of using the phrase “climate apocalypse” may be to motivate climate action, what is the actual impact of this rhetoric and apocalyptic framing of climate change? Does referring to this situation as a “climate apocalypse” help or hinder in motivating the critical collective action we must all take within just a few years? Answering this accurately and making the best decisions regarding how to frame climate crisis in public discourse requires critically analyzing audience reception of the phrase “climate apocalypse.” The work of anthropologist Sherry B. Ortner on key symbols, symbols that play a key cultural role and hold a particular place of importance, is quite useful for such an analysis.

Given the widespread usage of “climate apocalypse” in academia, journalism, and other media, it seems intuitive that this symbolic phrase expresses an idea that is important to the audience. Ortner’s work offers the means to determine whether the phrase “climate apocalypse” and other symbols serve as “key symbols” that perform vital functions in a particular society. She lists five indicators, any of which could signal that a given symbol is a “key symbol” (Ortner 1973, 1338). Since her work uses 1970s anthropological terminology, she refers to how “natives” view a particular symbol, “X” (Ortner 1973, 1338). In this case, “members of the general public” may be substituted for “natives” and “climate

apocalypse” for the “X” symbol to see whether “climate apocalypse” functions as a key symbol for many audiences according to Ortner’s five indicators (at least in the United States and Western Europe, and perhaps elsewhere).

Ortner’s first and second indicators state: “The [members of the general public] tell us that [climate apocalypse] is culturally important,” and “The [members of the general public] seem positively or negatively aroused by [climate change], rather than indifferent” (Ortner 1973, 1338). The potency of the phrase “climate apocalypse” is clear in the many activist protests that took place across Europe in 2022 and 2023, as well as in the apocalyptic framing of climate change by United Nations Secretary-General António Guterres, who addressed the World Economic Forum of global leaders in Davos, Switzerland, in 2020 by describing climate change as the worst of the Four Horsemen of the Apocalypse, which he said included: “Climate change, mistrust of leaders, increased geopolitical tension, and the dark side of the technological revolution” (World Economic Forum 2020).

Ortner’s third indicator of a key symbol is that: “[Climate apocalypse] comes up in many different contexts . . . or symbolic domains (myth, ritual, art, formal rhetoric, etc.)” (Ortner 1973, 1338). As I have noted, “climate apocalypse” comes up in street protests, French weather reports, the most respected journalistic venues, scholarly accounts, art, film, and music. “Climate apocalypse” also crosses semantic domains to produce the related phrases “heat apocalypse,” “eco-apocalypse,” “honey apocalypse,” and so forth.

Ortner’s fourth indicator states: “There is greater cultural elaboration surrounding [climate apocalypse] . . . compared with similar phenomena” (Ortner 1973, 1338). While I know of no hard data regarding such a comparison, the idea of “climate apocalypse” anecdotally appears to receive greater “cultural elaboration” than some other scenarios of existential risk, such as the danger from supervolcanoes or asteroidal impacts (Torres 2024). Ortner’s fifth indicator does not seem to be applicable: “There are greater cultural restrictions regarding [climate apocalypse] (Ortner 1973, 1338). Still, “climate apocalypse” fulfills four of Ortner’s five indicators of key symbols; thus, I suggest the concept does function as a key symbol for many societies today.

The real value of Ortner’s work is not simply to confirm a hunch that “climate apocalypse” conveys a critical social idea. She also distinguishes between two kinds of key symbols that function in different ways. The first is the summarizing key symbol, namely: “those symbols which are seen as summing up, expressing, representing for the participants in an emotionally powerful and relatively undifferentiated way, what the system means to them. This category is essentially the category of sacred symbols . . . and includes . . . catalysts of emotion” (Ortner 1973, 1340). “Climate apocalypse” appears to function as a “summarizing symbol”—a way for those learning climate facts to express their total impression of the dire ecological and civilizational future, to

express their deep emotion over this, and to do so using the sacred language of “apocalypse.” This applies to both the popular meaning of “apocalypse” as “endtime” and the religiously valenced “apocalypse,” as Guterres’s extended metaphor of the Four Horsemen of the Apocalypse made clear (World Economic Forum 2020).

Regarding the function of a summarizing key symbol, Ortner explains, “The important mode of operation of summarizing symbols [including most sacred symbols] . . . is [their] focusing power, [their] . . . intensifying” (Ortner 1973, 1342). They “speak primarily to attitudes, to a crystallization of commitment” (Ortner 1973, 1342). The summarizing key symbol, however, is not a vehicle for prompting careful reflection on the crucial details needed to navigate the climate crisis or reach agreements at COP28 (the United Nations climate change conference) and beyond. To grasp the visceral yet irrational responses that a summarizing key symbol might evoke, consider the actions groups such as Just Stop Oil, Extinction Rebellion, and Occupy in 2022 and 2023, when young people threw food at precious art treasures in Europe and glued themselves to the walls and frames in famous museums, to a dinosaur exhibit, to various roads, and to the floor at the University of Lisbon. Although the goal of the activists was to draw attention to the climate crisis, the form of their protest performance remained disconnected from their explanations and deterred the audience they intended to persuade.

For instance, after throwing soup on Vincent Van Gogh’s *Sunflowers* (which was protected by glass) in London’s National Gallery, Phoebe Plummer shouted to the crowd, “What is worth more: art or life?” (Quiroz 2022). Similarly, after covering John Constable’s *Hay Wain* with a dystopian painting of Earth’s climate future and gluing herself to the frame, activist Hannah Hunt yelled: “So yes, there is glue on the frame, but there is blood on the hands of our government” (ITV News 2022). While the meaning was clear to the activists, onlookers tended to express horror and puzzlement rather than a deeper understanding of the climate crisis, even long after the event. This is because, according to Ortner, summarizing symbols such as “Throwing Food at Art” or “Gluing Ourselves to Objects” succeed in “operat[ing] to compound and synthesize a complex system of ideas, to ‘summarize’ them under a unitary form” (i.e., climate change = destruction; commitment to climate action = gluing ourselves here because we will not be deterred) (Ortner 1973, 1340). However, a detailed understanding of the signified quickly gets lost. While disruptive summarizing symbols are emotionally powerful and may act as catalysts of commitment for those who already belong to the cause, as Ortner states, “[they do] not encourage reflection on the logical relations of ideas” (Ortner 1973, 1340). When national treasures are damaged or the functioning of an institution such as a university is impeded, such disruptive symbolic tactics, even though nonviolent, widen the gulf between “us” and “them,” and those who might have come around to

the cause initially can find themselves confused, frustrated, or angry about the symbolic acts. Michael E. Mann, Professor of Earth and Environmental Science and Director of the Penn Center for Science, Sustainability, and the Media at the University of Pennsylvania, lamented over the Van Gogh *Sunflower*-tomato soup incident, stating: “The public outrage was palpable. The reliably progressive Dan Rather, a consistent advocate for urgent climate action, opined: ‘It’s destructive to protest the destruction of our planet by trying to destroy beautiful art,’” and Mann tweeted, “If you’ve lost Dan, maybe rethink your strategy folks” (Mann 2022). An Anneberg Policy Center poll of 1,031 respondents from October 2022 asked, “Do nonviolent disruptive actions decrease/increase your support for efforts to address climate change?” (Mann 2022). Only 13 percent said such actions increased their support, while 46 percent said the tactics decreased their support, and “a whopping 27 [percent], in fact, said [nonviolent disruptive tactics] *greatly* decrease their support [for addressing climate change],” a result that tracked across all age groups, from 18–29 to 65+ (Patterson and Mann 2022). Despite the activists’ bravery, dedication, creativity, and willingness to suffer for their ideals, if their real goal is to gain attention for the climate crisis in order to spur change and action, a summarizing symbol such as “Food Thrown at Art = climate crisis” has the reverse effect.

Interestingly, the media coverage mapped these disruptive climate actions onto another summarizing symbol in which “climate apocalypse = climate crisis.” *ITV News* described Hannah Hunt’s attack on Constable’s *Hay Wain* as painting “an apocalyptic vision” over the painting (*ITV News* 2022), and *New York Times* reporter Ross Douthat reported the actions of the Just Stop Oil activists who threw tomato soup on Van Gogh’s *Sunflowers* by stating: “The activists are protesting . . . the expansion of the energy support, on the grounds that fossil fuels are pushing the world toward *climate apocalypse*” (Douthat 2022, emphasis added). This journalistic phrasing indicates that, at least in this context, the rhetorical function of “climate apocalypse” is as a summarizing symbol. The phrase is an emotionally charged condensation, but it does not promote further understanding of the complex, wicked problem of the climate crisis, nor does it spur effective collective action. While it catalyzes commitment by those already committed to combatting climate change, it does little to motivate new action.

In fact, characterizing disruptive protests as apocalyptic may deter those who are not climate activists by cementing historical associations with environmental radicalism. As early as 1997, Lois Ann Lorentzen (1997, 144, in Crockford 2021) called Earth First! “an ecological apocalyptic movement.” Martha Lee also wrote of Earth First!ers as a millenarian group who spoke of “environmental apocalypse,” believing that industrial society would bring about “total economic collapse, the cessation of the infrastructure of our current civilization is only a heartbeat away” (Lee 1997, 120–28). Lee classified the early Earth First! movement as a millenarian group due to several characteristics:

- Believers awaited an imminent apocalypse.
- This apocalypse would end the current social order, industrial capitalism.
- Believers formed a group of “elect” whose right-thinking in understanding the crucial importance of wilderness enabled them to prepare the Earth for the impending apocalypse by preserving what little wilderness remained.
- The end of industrial capitalism would usher in the ultimate, or final, stage of human history. (Lee 1997, as summarized in Crockford 2021)

EarthFirst! was committed to “monkeywrenching”—or property damage to stop harm to the environment, the implicit threat of the Food Thrown at Art actions—which ranged from pouring karo syrup in the gas tanks of construction equipment to attempting to sabotage power lines at a nuclear energy facility (Flannery 2016, 197).⁹ The activists were motivated by biocentrism—the idea that every species of life is as valuable as every other (Foreman 1991, 26). Since at its root biocentrism arises from compassion, most EarthFirst!ers and other radical environmentalists have rejected violence against persons, yet the philosophy has the potential to devalue human life. Some eco-activists have become eco-terrorists, fighting against what co-founder Dave Foreman called the “Humanpox,” or those ravaging the environment (Foreman 1991). Foreman even believed that the Humanpox had a different genetic strain of human ancestors than environmentalists (Foreman 1991, 57; Flannery 2016, 192). Such us versus them dualism is inscribed further by a “climate apocalypse” framing of climate change, which plays on tropes of good and evil persons and can in some cases catalyze violence (see Flannery 2016, 67–78, 192).

In contrast to *summarizing key symbols*, “*elaborating [key] symbols . . . work in the opposite direction, providing vehicles for sorting out complex and undifferentiated feelings and ideas, making them comprehensible to oneself, communicable to others, and translatable into orderly action*” (Ortner 1973, 1340, emphasis added). A conceptual elaborating symbol on the climate crisis would be “good to think with,” as Lévi-Strauss might say, by guiding the audience in “conceptualiz[ing] the interrelationships among phenomena by analogy to the interrelations among the parts of the root metaphor” (Ortner 1973, 1340). It may primarily possess conceptual elaborating power, what Stephen Pepper (1942) called “root metaphors,” or it may primarily possess action elaborating power, actually spurring climate actions (Ortner 1973, 1340).

An example of an effective elaborating symbol that is also a disruptive action would be the 1960 Greensboro sit-in in which African American college students sat at a segregated Woolworth’s counter and refused to leave after being denied service. The more one thinks about the symbol, the more details of the actual referent emerge. An excellent example of an elaborating key symbol on climate change that takes the form of a literary image is Greta Thunberg’s statement

to the World Economic Forum at Davos: “I want you to act as if our house is on fire, because it is” (World Economic Forum 2019). The various parts of the elaborating symbol make sense in relation to various aspects of the climate crisis, and the more one thinks about it, the more one comes to understand anthropogenic climate change. Fire is hot and global warming is hot—plus, climate change literally increases the risk of fires. When there is a fire, people know what they have to do: get out of the house. But once we think through that part of the metaphor, we realize that the house is our planet, and we have nowhere to go. Thus, we have to act quickly to put out the fire, which certainly means not feeding it more fuel or using more fossil fuel. As an organizing symbol that helps formulate further understanding and as a cultural strategy, “our house is on fire” works to spur action in a way that “climate apocalypse” and “Throwing Food at Art” cannot.

“Climate Apocalypse” as a Generator of Passivity: Peirce on Symbols and Collective Memory Theory

Semiotic theories on metaphor and social memory theory explain even further why the framing “climate apocalypse” will backfire as a strategy for spurring activism. The semiotician Charles Peirce proposed that there are three ways signs communicate meaning. For Peirce, an icon is a sign that has an obvious physical connection with the signified; it represents that thing (an acorn, a clock). At the other end of the spectrum, a symbol, as Peirce defines it, is a sign with no innate connection to the signified (male, female, 4) (a very different framework than Ortner’s). The index is a sign that has some kind of relationship with the signified that needs to be teased out (Peirce 1907, 1992, 1998) (see Figure 1).

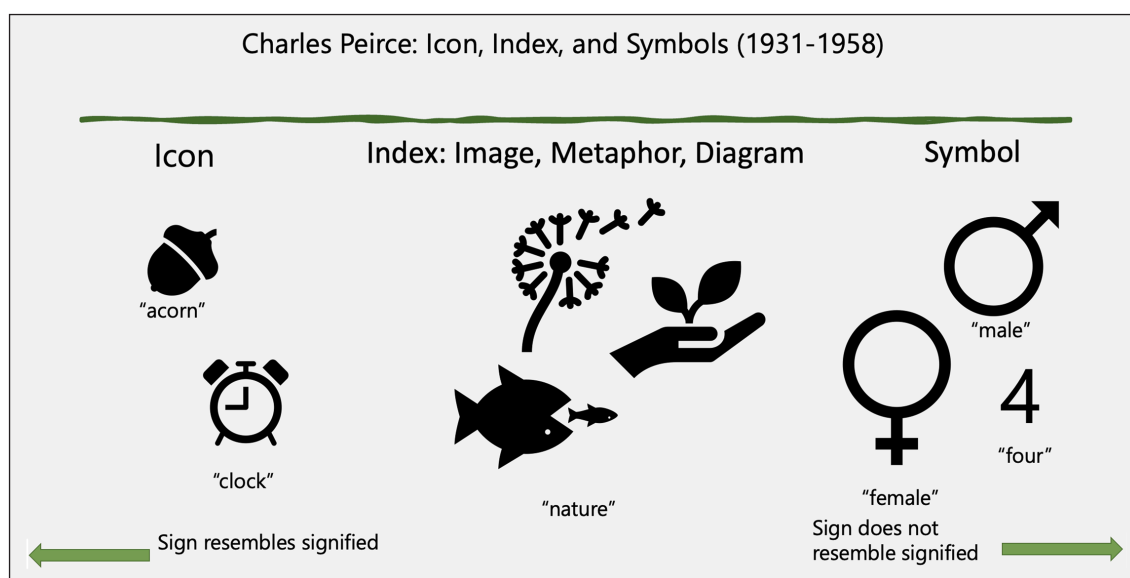


Figure 1: Charles Peirce on icon, index, and symbol (Peirce 1931–58).

I suggest that those who employ the sign of “apocalypse” in reference to the climate crisis do so because they are thinking of it as having a literal correspondence with the climate future of disaster—that is, they construe “climate apocalypse” as an icon in which “apocalypse” is a total devastation wreaked by the climate future. In other words, it is world ending. Repeatedly, across domains of usage of “climate apocalypse,” it is this world-ending aspect that is in view, particularly in the popular consciousness and the media. While an Australian thinktank’s serious report on “existential climate-related security risk” from 2019 nowhere uses the term “apocalyptic,” the media readily translated the data into apocalyptic terms, with the headline “End of Civilization: Climate Change Apocalypse Could Start by 2050 If We Don’t Act, Report Warns” (Weise 2019; see Spratt and Dunlop 2019).

Yet, as historians and religion scholars know, “apocalypse” entails so much more than the end of the world; otherwise, “The End of the World,” plain and simple, would function as the main key symbol. The several thousand-year history of apocalyptic thinking plays with a trove of religious and literary narratives possessing certain typical themes and structures, mapping vast terrains of conceptual regions belonging to the cognitive container of apocalypse (Collins 1998). Apocalypse is no icon. Rather, in the public imagination, the sign “apocalypse” is a very complex index. The signifier “climate apocalypse” indicates some sort of relationship with what is signified—climate crisis—but this is a relationship that needs to be teased out carefully. Moreover, the index type is a metaphor, the most fluid category of all the signifiers identified by Peirce.

Alexander Feodorov (2018) extends Peirce’s basic treatment of metaphor in his article “Peirce’s Garden of Forking Metaphors.” Feodorov notes that “metaphor . . . transfers meaning between different logical universes . . .” but as opposed to analogy, metaphor has much more play, it is a “hypoiconic sign, i.e., an embodiment of pure potentiality” (Feodorov 2018, 189, 199). Between the sign “climate apocalypse” and the signified, the climate future, there is always a third thing in this “forking metaphor” (i.e., the middle tine of a fork) (Feodorov 2018). That is, there is always something that the mind of the hearer has to fill in to bridge the sign and the signified. Since “climate apocalypse” is a summarizing key symbol, meaning that it is weak on helping its audience think through the complexities of that scenario, the “Thirdness” of the forking metaphor “climate apocalypse” must be filled in by the audience’s own mental play because it is not inherent to the symbol (Feodorov 2018).¹⁰

Collective, or social, memory theory can be helpful in understanding the process by which this mental filling-in between “climate apocalypse” and climate change occurs and how this generates passivity, deterring the audience from taking effective climate actions. Social memory theory analyzes the ways in which groups dynamically construct the past in relation to the present. The theory posits that the remembered past is socially constructed in terms of the

pressing needs of the present with “coherence-bestowing activities” (Kirk and Thatcher 2005, 7–15). “Climate apocalypse” has currency because so many people are concerned with the world-ending quality of climate change.

Social memory theory also maintains that since the remembered past reflects an ongoing attempt to make sense of the present, the way societies construct the past continues to evolve as present needs shift and various motifs from the repository of past images recede or become accentuated (Kirk and Thatcher 2005, 7–15). This social memory-making process is similar in some ways to how an individual’s neuro-biological memory functions. Individuals’ memories are not stored biologically as a discrete, static files of former events. Instead, several neural pathways must reconstitute each time a memory is “recalled,” crafted anew out of an array of available building blocks of memory (Budson and Kensinger 2023). In a similar fashion, the ancient literary genre “apocalypse,” which arose in ancient Persia and coalesced in early Judaism and Christianity (Collins 1979, 1998), supplied numerous cultures over time and space with a repository of recurring themes and motifs. As a story, an apocalypse is a revelation that explains how a righteous group who is presently suffering under cosmically evil forces will someday be delivered through the dramatic intervention of divinely sent agents of deliverance. These agents will rescue the righteous and punish the wicked, inaugurating changes so vast that an end and new beginning to history can be spoken of, a “new heaven and a new earth” (Collins 1979, 14; Flannery 2016, 2). Social memory theory therefore suggests that certain persistent features from this apocalyptic history are always bubbling beneath “climate apocalypse,” ready to surface when they relate to our pressing present needs. These associations may not be consciously acknowledged—indeed, if Freud was right about the unconscious, then it would be the apocalyptic themes repressed at a deeper, unexcavated level that exert the most power over us (Freud 1913, 485–93).

In this way, social memory has framing capacities for the future, with political, affective, and value-laden goals that program future actions (Schwartz 1996, 909). As Schwartz (1996, 909) puts it, collective memory is both a model *of* society and a model *for* society; memory is a social frame that is orienting and influences future activities. Collective/social memory exerts power as a “cultural program that orients our intentions, sets our moods, and enables us to act” (Schwartz 1996, 921, 909–10). When climate change is expressed through the apocalyptic story, millennia of apocalyptic tropes orient the audience’s intentions, set their moods, and influence their action—or their collective inaction.

I suggest that when the public hears the metaphor (in Peirce’s terminology, the index) of “climate apocalypse,” the pre-cognitive container of “apocalypse” brings along a well-entrenched referential system of symbolic associations from the long history of Jewish and Christian apocalypticism that moves audiences to collective passivity in at least five different ways.

First, when contemporary sources speak of “climate apocalypse,” it evokes the world-ending aspect of apocalyptic theology and ignores the world-creating aspects that have always been the ultimate *telos* of apocalypse in Judaism, Christianity, and Islam. Climate disaster is not a threshold into a better, more just world, it is the opposite. The phrase “climate apocalypse” is purposefully overwhelming. It should not be dismissed as merely alarmist rhetoric, because the real climate facts are so dire. Yet when the framing of “climate apocalypse” manipulates sacred stories to inflict trauma with no emphasis on the world-redeeming parts of historical apocalyptic theology, it may create passivity rather than spur quick and cooperative climate action.

The extent to which young people equate climate change with the world-ending aspects of apocalypse was captured in a 2021 poll in *The Lancet*, in which fifty-six percent of people ages 16–26 agreed that “humanity is doomed” (Hickman et al. 2021). Fully seventy-five percent of this age group called the future “frightening” (Behnke 2022). Generation Z’s climate anxiety has even produced a musical genre called “apocalypse pop,” with songs such as “Colony Collapse” by Snag, which laments: “The more that I learn, the more I believe the Earth is a corpse laid at our feet” (Behnke 2022). The world-ending aspects of “climate apocalypse” are also stressed by eco-activists such as Extinction Rebellion, which protested in sixty European cities from October 7–11, 2019, announcing: “To governments of the world: We declared a climate and ecological emergency. You did not do enough. To everybody else: rebel . . . This isn’t a distant *apocalypse*. People all over the world are suffering and dying right now” (*Agence France-Presse* 2019). Accordingly, *France 24* ran the headline “Climate ‘Apocalypse’: Extinction Rebellion Begins Fortnight of Protests” (*France 24* 2019).

Second, the framing of “climate apocalypse” reinforces the assumptions of apocalyptic religions that expect the end time to come soon, a theological development that has dangerous consequences at this moment of climate crisis. Apocalyptic evangelical Christianity in particular is still associated with greater climate denial or the belief that the effects of climate change are signs of the end time. The fourth angel in Revelation 16:8–9, who pours his bowl of wrath on the sun and is given the power to scorch people with fire, may be interpreted as rising temperatures or heatwaves. The angel who destroys one-third of the sea in Revelation 16:3–4 may be interpreted as the death of ocean life and coral. Yet since most Christian believers in an imminent apocalypse *welcome* the end time, environmental disasters interpreted in this way create passivity and hinder climate action.

The apocalyptic religious framing of climate change becomes particularly problematic in societies with strong apocalyptic leanings, such as the United States. In 2010, fully forty-one percent of Americans surveyed by the Pew Research Center (2010) said Jesus will “probably” return by 2050. Conflating

the climate crisis and a belief in an imminent end time impacts the willingness of the general American public to make the degree and scale of sacrifices necessary for climate change mitigation and societal resiliency. Perversely, the United States is more responsible than any other nation for climate change in terms of both historical and current per capita emissions (Ritchie 2019; Ritchie, Rosado, and Roser 2023),¹¹ yet continues to play an outsized role in international climate negotiations.

Evangelical Christian apocalyptic ideology can also affect climate action in nations with key ecosystems, such the overwhelmingly Christian Democratic Republic of Congo, which has the second-largest rainforest in the world and the largest wetland—critical carbon sinks for the planetary climate system. The message in this heavily churchd country (which is thirty-five to forty-five percent evangelical) that climate change is a sign of the apocalyptic end time reduces buy in for protecting natural resources, despite the extraordinary financial incentives to do so, considering the average per capita annual income of less than US\$600 per person (World Bank 2023). To be clear, it is not evangelical Christianity per se that generates climate passivity, it is the apocalyptic framing of climate change. If, for instance, the dominant symbol associated with the climate crisis were to address Jesus's clarion call to care for the poor (e.g., Matthew 25:31–46), a scriptural emphasis that is far more pervasive in the Bible than apocalypticism, then recognizing the inordinate impact of American lifestyles on the global poor on account of climate change could very well motivate worldwide climate action.

Third, the very logic of apocalyptic theology is that human effort will be ineffective in righting a broken world. This too is detrimental, even in a secular setting. Consciously or unconsciously, the framing of "climate apocalypse" contributes to the widespread tendency of people to place hope for salvation from disaster in savior figures such as inventors, scientists, or governments who might rescue humanity in the nick of time. This takes the burden of difficult problem solving and civilizational-scale transformation off our shoulders. Instead, it consciously or unconsciously places hope in a magical inventor, an all too risky proposition given that many billionaire technocrats do not have equity and humanitarian concerns motivating their core missions. This is especially dangerous considering the popularity of the "longtermism" philosophy among technological innovators, a belief that ignores equity or social justice in favor of perpetuating the human species, which only requires preserving a remnant of humans (Torres 2021).

Fourth, each time the narrative of "climate apocalypse" is reinscribed, it reinforces the expectation that somehow the innocent will be saved and the wicked will be punished. When apocalypse is applied to the climate crisis, this theology becomes truly perverse, cruel, and damaging. The poorest nations

and Indigenous peoples did not create the climate crisis, but they will suffer the most from it. Half of all historical CO₂ emissions were created by just twenty-three countries, twenty-two of which are Western European Christian nations or colonies. The other half were generated by 150 countries, many of which are located in the poorer Global South, which includes the equatorial and coastal regions that will be hit hardest by the impacts of climate change (Popovich and Plumer 2021). The twenty countries out of the 195 at COP27 that are responsible for eighty percent of carbon emissions will protect their self-interests before ever acting to protect the majority of the world, despite the fact that other nations are not historically responsible for creating climate change and will feel its worst impacts.

Ethically speaking, it is particularly problematic when someone in a highly polluting society such as the United States uses the term “climate apocalypse,” because they are unconsciously identifying themselves as the one suffering. In the logic of apocalypticism, this means that Americans are conceptually framing themselves as the righteous who will be saved, yet considering responsibility for both historical and current per capita emissions, those in the United States are most certainly the wicked (Popovich and Plumer 2021). With relatively greater resources with which to adapt to the impacts of climate change, many Americans may be able to escape the worst harms. Indeed, the most affluent in the world’s high-emissions societies—those who created climate change—will fare the best in the climate crisis. By contrast, vulnerable peoples in those same developed nations, including black and brown peoples, will tend to fare less well, and the poor of the Global South will absolutely languish. The richest of us might even escape to Mars or a survival bunker built by the rich (Torres 2021). If predictions of a 4°C global average temperature rise by the century’s end hold, however, only a billion humans will survive—and they will mostly be those who caused climate change (Spratt 2019).

The fifth and perhaps the most destructive implication of framing the climate crisis as a “climate apocalypse” is that in the logic of apocalypticism, the brokenness of the world is not humans’ fault. Apocalypticism absolves us because a cosmic evil that is bigger than human history has the world in its grips. The term “climate apocalypse” imparts the feeling that humans aren’t *really* responsible (even though we are, since climate change is perpetuated by economies and lifestyles fueled by fossil fuel consumption) and creates an aura of helplessness in which we are not the ones who can fix it. Surely some inventor will save us in the nick of time, or some consortium of governments will suddenly work out their difficulties to cooperate and repair the damage done to the climate. On the other hand, if the ninety-seven plus percent of climate scientists are correct and humans caused climate change, then we humans *have* to fix it. The house is on fire.

Conclusion

United Nations Secretary-General Antonio Guterres stated on November 4, 2022, that unless COP27 produced historic agreements, “we will be doomed,” adding, “this is not fiction or exaggeration” (Harvey 2022b). Already known for having spoken of climate change as the most dangerous of the Four Horsemen of the Apocalypse, Guterres often uses religious imagery to impart urgency to climate action (World Economic Forum 2020). Recently, he stated, “We are on a highway to climate *hell* with our foot on the accelerator” in which there is “wave upon wave of suffering for billions of people” (Guterres 2022). This may be a mixed metaphor, but it is still a better type of key symbol than “climate apocalypse,” because humans need to act *now* to stop emitting more carbon so that we can slow our path towards a disastrous future, and maybe even change course. We need to reclaim the choice before us, as Guterres dramatically stated: “We have a choice. Collective action or collective suicide. It is in our hands” (Harvey 2022a).

Through its non- or pre-cognitive container of associations, the narrative of “climate apocalypse” creates trauma and elicits a passive response in audiences in multiple ways, even when employed in secular contexts. Human effort is deemed ineffective in righting a broken world, leading to inaction. The world-ending, violent, and traumatic aspects of apocalypticism rather than its world-creating character become the focus of climate discussions, leading to passivity and despair. Consciously or unconsciously, the framing places hope for salvation in savior figures (inventors, scientists, governments) who might rescue humanity in the nick of time, obscuring the need for sweeping civilizational transformations to end fossil fuel consumption. Moreover, in the realm of religious responses, the impact of using the apocalyptic story to describe climate change becomes even more detrimental. By identifying climate change with signs from the Book of Revelation and fitting scientific and experiential data into the narrative of imminent catastrophe and the divine salvation of the righteous, vast swaths of the American public and communities in nations with keystone ecosystems, such as the Democratic Republic of Congo, have become complacent. Finally, perpetuating the narrative of “climate apocalypse” obscures crucial differences between the traditional apocalyptic story, in which the righteous are rescued and the wicked are punished in the end time, and actual social injustices of climate change, in which the most vulnerable and the populations that have produced the fewest greenhouse gases will likely suffer the most. Hence, the framing of “climate apocalypse” both draws on narrative violence and perpetuates violence.

I strongly suggest that anyone urging climate action stop saying “climate apocalypse.” While it is a difficult task to find a suitable alternative, the most compelling visions will be *elaborating key symbols* that not only convey the world-ending potential of the climate crisis but also the world-beginning possibilities that societal transformations could bring about. For instance, in

his environmental encyclical *Laudato Si': On Care for Our Common Home*, Pope Francis I urges humanity to abandon the consumptive, technocratic civilization that created climate change, stating: "Nobody is suggesting a return to the Stone Age, but we do need to slow down and look at reality in a different way" (*Laudato Si'*, 114). Even when Pope Francis expresses his vision in apocalyptic terms, he stresses the world-creating side of apocalypticism: "This leads us to direct our gaze *to the end of time* . . . so that God may be everything to every one (1 Corinthians 15:28) . . . the risen One is mysteriously holding [the creatures of this world] to himself and directing them towards fullness as their end" (*LS*, 100). He also uses the elaborating symbol of the Earth as "God's art" (*LS*, 80), painting an intensely inclusive and positive cosmic vision: "The universe unfolds in God, who fills it completely" (*LS*, 233). In a similar way, the Orthodox Christian leader Ecumenical Bartholomew uses an elaborating symbol for the Earth when he states that environmental sin is a sin against God because "[t]he Lord suffuses all of creation with His divine presence in one continuous legato from the substance of atoms to the Mind of God" (Ecumenical Bartholomew 2011, 136). Biblical models can also offer the *Urzeit-Endzeit* paradigm of texts such as Isaiah 2:2–5 and 11:1–16, in which the end time sees the restoration of the original harmony of the Garden of Eden.

Others have argued that since much of the problem of climate change has emanated from a particular Christian worldview of humankind's divinely dispensed domination of "nature" (White 1967; Taylor 2009), it may be fruitful to look to Indigenous/native/First Nations/aboriginal cultures for symbols of worlds ending and yet beginning, e.g., the Diné and Hopi's "fifth world," or to religions such as Hinduism or Buddhism, which view the universe itself as cycling over and again through destruction and creation. Inspiration can also be found in frameworks that transcend any particular religion and envision the kind of future humankind might wish to create, such as the One Billion for Peace Pledge (BioEarth 2023) or the Earth Charter (Earth Charter Institute 2023).¹² Although crafting the appropriate language to convey the urgency of the climate crisis while also motivating climate action is no simple task, many sources can provide inspiration for thoughtful and creative elaborating symbols. Thus, it is time for climate activists to stop saying "climate apocalypse," if we want to avoid one.

Notes

- ¹ This article is based on my paper presented at the Society of Biblical Literature Annual Meeting, Denver, Colorado, November 20, 2022. I wish to thank the Apocalypse Now program unit for this invitation, especially the co-chairs, Ana T. Valdez and Bert Jan Lietaert Peerbolte.
- ² As reported by the European Union's Copernicus Climate Change Service (Van Campenhout 2023).
- ³ Despite twenty-seven Conference of Parties (COP) leadership gatherings on climate change, the Mauna Loa observatory continues to show rising CO₂ levels, see <https://gml.noaa.gov/ccgg/trends/monthly.html>.
- ⁴ Temperature rise is calculated in the IPCC reports as the concentration over pre-industrial levels, which they measure from 1850–1900 (defined in the IPCC *AR6 Special 1.5°C Report 2018*).
- ⁵ This is a prudent concern. Understandably, the IPCC has made these temperature thresholds the focus of their recommendations, likely as an attempt to influence decision makers, who operate by negotiating around benchmarks. Yet, a problem arises in that the COP dynamics lack the flexibility needed to respond to new climate data quickly, especially considering the lag time between emerging climate data and changes in recommendations by the IPCC, which can only occur after the relevant teams have conducted a thorough review of new scientific studies.
- ⁶ One new study suggests that the mass bleaching of almost all coral reefs, which would also lead to vast ocean dead zones across the planet, will occur at 1.5°C (Heron et al. 2022).
- ⁷ A 2023 study concluded that the collapse of the AMOC is ninety five percent certain to occur between 2025 and 2095, most likely in 2057 (Ditlevsen and Ditlevsen 2023). The AMOC is a large system of ocean currents in the Atlantic Ocean that mixes nutrients and waters from the tropics to the Arctic—like mixing cake batter from the bottom of the bowl to the top. It has operated for 12,000 years since the end of the Ice Age, although it weakened from 1315–1851. Climatologists were unsure what caused this anomaly (the coldest period in 10,000 years), but a recent paper in 2021 may have solved the riddle. The AMOC normally conveys warm tropical water to the Arctic along the north European coast, where it meets cold Arctic waters, loses heat, and then sinks and flows south along the North American coast. In the fourteenth century, a series of erupting volcanoes and extra solar activity warmed the tropical current that flowed up to the Arctic, releasing an overabundance of formerly frozen sea ice into the North Atlantic, lowering salinity, and changing the usual layering of the water strata normally differentiated by salinity and temperature, which resulted in the collapse of the AMOC and colder air temperatures (on average 2°C).
- ⁸ At least one scientific research project emanating out of Tilburg University in the Netherlands is already underway under the guidance of Dr Caroline Vander Stichele. The team is tracking social media posts by some sixty environmental groups to track instances of phrases such as “climate apocalypse” as well as related climate terms with religious valences, such as “climate sinner,” “climate ritual,” and “climate sangha” (Vander Stichele 2023).
- ⁹ Lee argues that by the mid-1980s EarthFirst! underwent a significant change, drawing in more “social justice”-oriented “career activists” from the Pacific Northwest who tempered the early tendency toward violence such that the end time “would be a golden age in which species’ life in the biosphere would be balanced, wilderness would reemerge, and humans would live in harmony with their environment” (Crockford 2021, summarizing Lee 1997).
- ¹⁰ The pathway of the creative force of metaphor lies beyond the scope of this paper but is nevertheless intriguing. Merrell adds: “In this vein, I would ask that you consider the creative process as emerging from metaphoricality, at the heart of which lies hypoiconicity. This involves a creative process beginning with feeling, sentiment, and emotion (Peirce’s Firstness), which, after passing through sensation and the experience of imagined or physical world particulars (Secondness), might eventually find their way to explicitness through ideas, thoughts, and concepts incorporated in words (Thirdness)” (Merrell 2006, 120).
- ¹¹ The United States alone is responsible for over twenty percent of all historic greenhouse gas emissions (Ritchie 2019). Even though China is the greatest emitter of CO₂ today—and even though the emissions per person in the United States have steadily dropped since 2000 while China’s are

rising—in 2023, the emissions per person in the United States were still 14.9 tons per person compared to 9 tons per person in China (Ritchie, Rosado and Roser 2023).

- ¹² However, the iconography of the Earth Charter's Ark of Hope project, which houses a copy of the charter, reveals an extremely strong influence from Biblical religions, especially Christianity. See www.arkofhope.org.

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Pathways to Equity in Addressing Climate Change: A Bahá'í Perspective

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According to current scientific consensus, anthropogenic climate change has become one of the most serious existential threats to human civilization. In the latter half of the nineteenth century, Bahá'u'lláh warned of the dangers inherent in the unbridled advancement of material civilization if a parallel advance in the moral and spiritual dimensions of civilization were neglected.

This article outlines a framework with three components for dealing with the crisis of anthropogenic climate change. The first component is to embrace justice and equity, rooted in an awareness of the essential oneness and wholeness of the human race. The second is the full embrace of sound science. The third is consultation at all levels of society regarding the technological and social measures to be taken, in which all have a voice and participate in forging solutions.

It then outlines Bahá'í approaches to climate change in light of this framework. It first profiles the worldwide Bahá'í community, then discusses the concept of the three protagonists in the civilization-building process, and finally outlines the framework for action, which characterizes Bahá'í work at the neighborhood and community level.



Introduction

With the possible exception of the prospect of nuclear war, climate change is arguably the greatest existential threat to the human race in historical times (IPCC 2023; United Nations 2021, 2022; Vergun 2021). The root cause of climate change is not difficult to discern: it is, in the words of the founder of the Bahá'í Faith, Bahá'u'lláh ([1952] 1976, 342), a civilization that has been “allowed to overleap the bounds of moderation.” In the latter half of the nineteenth century, Bahá'u'lláh warned of the dangers inherent in the unbridled advancement of material civilization if a parallel advance in the moral and spiritual dimensions of civilization were neglected:

Whoso cleaveth to justice, can, under no circumstances, transgress the limits of moderation ... The civilization, so often vaunted by the learned exponents of arts and sciences, will, if allowed to overleap the bounds of moderation, bring great evil upon men ... If carried to excess, civilization will prove as prolific a source of evil as it had been of goodness when kept within the restraints of moderation. (Bahá'u'lláh [1952] 1976, 342–43)

Identifying the root of the problem enables a clearer vision of the solution: to identify those elements that would bring civilization back into moderation and then to assiduously strive to translate those elements “from the realm of thought into that of reality” (Abdu'l-Bahá 1920).

Writing to the Hague in 1920, 'Abdu'l-Bahá, the successor of Bahá'u'lláh, designated by Him as the Centre of His Covenant, talked about what was needed to secure enduring peace following the Great War: “For it is clear and evident that the execution of this mighty endeavour is impossible through **ordinary human feelings** but requireth **the powerful sentiments of the heart** to transform its potential into reality” (Abdu'l-Bahá 1920, emphasis added).

It is the “powerful sentiments of the heart” that religion is uniquely equipped to inspire in whole populations, provided religion can free itself from superstitious beliefs that run counter to scientific knowledge, and of the prejudices of sectarianism that, regrettably, still pollute the religious landscape. When so freed, religion becomes a powerful force for good. The Universal House of Justice (2002), the governing body of the worldwide Bahá'í Faith, writes:

When [religion] has been faithful to the spirit and example of the transcendent Figures who gave the world its great belief systems, it has awakened in whole populations capacities to love, to forgive, to create, to dare greatly, to overcome prejudice, to sacrifice for the common good, and to discipline the impulses of animal instinct.

The solution to the existential crisis of climate change, in the view of the authors, requires both the application of scientific knowledge on the one hand and the realization, expressed in the arena of action, of the eternal and unifying principles that lie at the foundations of all the world's great religions on the other hand. Science and religion, the Bahá'í writings state, are "**the two most potent forces in human life**" (Shoghi Effendi [1938] 1974, 204, emphasis added). True civilization is characterized by both material and spiritual progress. Without this balance, it cannot serve the long-term interests of humanity.

The power of science resides in the power of its method, of course—but it also resides in its unity. The late nineteenth and twentieth centuries saw remarkable developments in science and in the new range of previously unimagined technologies that came from those new developments. Equally remarkably, from a cultural and social perspective, there has emerged in the modern world one universal science, infinitely diverse in its many disciplines but united in a single, all-embracing, progressive worldview, universally accepted and taught in all the schools of the world. Never, before the modern period, has there been such a universal knowledge system taught in all the schools of the world. And the reason is clear: in the words of 'Abdu'l-Bahá (1978, 110), "the sciences of today are bridges to reality."

Especially relevant to the issue of climate change is the support given to the Intergovernmental Panel on Climate Change (IPCC) by the scientific community since the formation of the panel in 1988. During the past forty-five years, thousands of researchers from a host of disciplines have spent countless hours contributing to and reviewing the accuracy of the reports of that panel. In that succession of reports is the consolidated view of a worldwide scientific community on both the causes and impacts of climate change and the increasing levels of confidence in those causes and impacts. This is truly a remarkable development. The value of having such a consolidated view cannot be overemphasized. It can truthfully be said that the scientific community has risen to the challenge of the age.

Religion, however, despite its inherent power to unite humanity in great endeavors, has remained disunited. The Universal House of Justice (2002) notes: "In contrast to the processes of unification that are transforming the rest of humanity's social relationships, the suggestion that all of the world's great religions are equally valid in nature and origin is stubbornly resisted by entrenched patterns of sectarian thought."

The authors suggest that this refusal of the world's religious leadership to acknowledge the uniting power of religion writ large is the primary reason organized religion has become increasingly irrelevant to modern life and failed to exert a salubrious influence on human progress commensurate with the influence exerted by scientific progress. "The vitality of men's belief in God is dying out in every land", Bahá'u'lláh ([1952] 1976, 200) noted, surveying the

religious landscape of the nineteenth century. Today, indeed, “the greater part of organized religion stands paralyzed at the threshold of the future” (Universal House of Justice 2002).

As the twentieth century progressed, one of the consequences of this failure to recognize the spiritual validity of all of the world’s great religions was the marginalization of religion in the international sphere. The following was part of a 2002 statement by the Baha’i International Community to the World Summit on Sustainable Development held in Johannesburg, South Africa, in that year:

[I]t cannot be denied that the power of religion has also been perverted to turn neighbor against neighbor ... So long as religious animosities are allowed to destabilize the world, it will be impossible to foster a global pattern of sustainable development.

Given the record of religious fanaticism, it is understandable that the United Nations has been hesitant to invite religion into its negotiations. However, the United Nations can no longer afford to ignore the immeasurable good that religions have done and continue to do in the world, or the salubrious, far-reaching contributions that they can make to the establishment of a peaceful, prosperous, and sustainable global order. Indeed, the United Nations will only succeed in establishing such a global order to the extent that it taps into the power and vision of religion. To do so will require accepting religion not merely as a vehicle for the delivery and execution of development initiatives, but as an active partner in the conceptualization, design, implementation, and evaluation of global policies and programs. The historically justified wall separating the United Nations and religions must fall to the imperatives of a world struggling toward unity and justice. (Baha’i International Community 2002)

What have been some of the consequences of the religious abandonment of the international field? An article written under the auspices of the International Monetary Fund (Guivarch, Taconet, and Méjan 2021) notes:

Our own research shows that if the most dire projections of future economic damages in the current scientific literature hold true, climate change would reverse the gains of the past few decades and cause inequality between countries to rise again. Within countries, the impacts of climate change also risk worsening inequality.

While the effects of climate change are global, and their projected impacts concern every area in the world, a wide scientific literature suggests that climate risks disproportionately affect the poorest countries and people, who are more exposed and more vulnerable to their impacts.

This article outlines a three-part solution to the problem of climate change: the recognition of justice and equity as the necessary foundation that will seal and ensure a lasting solution; the embrace of sound science; and the embrace of consultation—at all levels of society, from the community level all the way up to the international level—regarding technological and social measures to be taken. It then discusses the efforts of the Bahá'í community along the lines of this three-part solution. It gives a summary of the global profile of the Bahá'í Faith; introduces the concept of the three protagonists in the civilization-building process as a useful construct to understand the levels at which change must be made and to provide a focus for holistic solutions to the issue of climate change; and finally outlines the framework for action that characterizes Bahá'í efforts being made at the neighborhood level.

A Framework for Addressing Climate Change

Justice and Equity

Equity is variously defined as “the quality of being fair and impartial” (Oxford Learners Dictionaries), “the situation in which everyone is treated fairly according to their needs and no group of people is given special treatment” (Cambridge Dictionary), and “justice according to natural law or right; specifically: freedom from bias or favoritism” (Merriam-Webster Dictionary). In the Bahá'í view, equity is rooted in the essential oneness and wholeness of the human race. Bahá'u'lláh ([1941] 1973, 13) writes that “[j]ustice and equity are twin Guardians that watch over men” and that “[t]he purpose of justice is the appearance of unity among men” (Bahá'u'lláh [1978] 1988, 67).

Thus, justice and equity are seen to form a bedrock upon which viable and enduring solutions to the manifold problems afflicting humanity can be based. Their establishment is the means by which the unity of the human race can be accomplished. It is, in fact, a lack of justice and equity in the governing of human affairs that has led to the current climate crisis. The crisis itself cannot be averted, in any lasting fashion, without advances in the appreciation and application of these two vital principles.

In a letter to Queen Victoria, Bahá'u'lláh praised her for having “entrusted the reins of counsel into the hands of the representatives of the people,” adding, “It behooveth them ... to regard themselves as the representatives of all that dwell on earth” (Bahá'u'lláh [2002] 2003, 90). In this same vein of thinking, Bahá'u'lláh ([1992] 2016, 31) enjoins those elected to govern the affairs of the Bahá'í community to “regard themselves as the guardians ... for all that dwell on Earth” and “to choose that which is meet and seemly.”

Personal morality, one of the foundational and eternal principles contained in all the world's religious scriptures, is no longer sufficient, as it is limited in its power to bring about change in today's very complex world. A new collective level of morality and ethics is needed: a level of ethics in which leaders of

thought and formers of policy transcend what may be best for them personally or for their particular constituents—those who elected them or funded their election—and think instead of what is best for the human race.

Never before in history has humanity been drawn together as tightly as in the modern period (United Nations 2009). The emergence of a universal science curriculum is one example; others include the development of a globe-spanning system of commercial air travel and a worldwide communication system “embracing the whole planet ... and functioning with marvelous swiftness and perfect regularity,” a development foreseen by the Guardian of the Bahá’í Faith, Shoghi Effendi, in the 1930s and now utilized by nearly two-thirds of the global population (Shoghi Effendi [1938] 1974, 203; Petrosyan 2023). Adoption of this new level of ethics is vital if civilization is to continue to advance and to thrive.

One of the great changes destined to take place in the world, the Bahá’í writings state, is an end to the “struggle for existence” in human life. ‘Abdu’l-Bahá (1978, 302) characterizes the struggle for existence in these terms:

[F]or as long as man is captive to nature he is a ferocious animal, as the struggle for existence is one of the exigencies of the world of nature. This matter of the struggle for existence is the fountain-head of all calamities and is the supreme affliction.

That the conduct of human affairs is still locked into this animal struggle for existence is evidenced by continued poverty in a world in which science has generated untold wealth, and in the growing disparity between the rich and the poor, with the ultra-rich commanding an ever-larger fraction of the world’s wealth (Oxfam America 2023). For there to be any lasting solution to the problem of climate change, this economic inequity must be remedied. ‘Abdu’l-Bahá (1978, 281) proceeds to predict that this change will happen. He foresees that affairs will so be changed as to put an end to this “exigency of the world of nature”; that “the world of humanity” will “be transformed into the Kingdom of God.” The question, then, is not so much whether this will happen but rather how soon, and how much damage will be done before sweeping changes are brought about.

Embrace of Sound Science

Although the root of the problem of climate change is what might be called a lack of spiritual or moral values, any solution must include a wider appreciation of science and, beyond the application of technical solutions, a utilization of sound scientific methodology. “Great indeed is the claim of scientists ... on the peoples of the world,” Bahá’u’lláh ([1978] 1988, 52) wrote in the nineteenth century. A letter written on behalf of the Universal House of Justice (2017) to three individuals who had expressed some skepticism about

the severity of climate change, whether climate change was anthropogenic, and the accuracy of some of the projections made by climate scientists, emphasized the science:

Scientific inquiry into the question of human contributions to global warming has gradually unfolded over a century of investigation and, more recently, with intense scrutiny. While there will naturally be differences of view among individual scientists, there does exist at present a striking degree of agreement among experts in relevant fields about the cause and impact of climate change. Sound scientific results, obtained through the employment of sound scientific methods, produce knowledge that can be acted upon; ultimately, the outcomes of action must stand the test of further scientific inquiry and the objective facts of the physical world.

The Universal House of Justice not only affirms the current conclusions of science regarding the “cause and impact of climate change,” it also outlines a course of action utilizing sound scientific methodology. Critically, science has produced “knowledge that can be acted upon.” The scientific process does not end there; in a sense, it has only begun. As individuals or communities act, they must continually assess the “outcomes of action,” and these outcomes must “stand the test of further scientific inquiry”: Which process will produce more knowledge, or corrections to existing knowledge? Which can guide further action?

As is discussed later in this article, this cyclical process of rational assessment followed by action, followed by further rational assessment leading to further action, is one in which Bahá’í communities are enjoined to engage in their work at the grassroots of society and in pursuit of social and economic progress.

Consultation

The Bahá’í writings enjoin consultation as “the means by which agreement is to be reached and a collective course of action defined” (Universal House of Justice 2017). Bahá’u’lláh writes ([1978] 1988, 168) that “the heaven of divine wisdom is illumined with the two luminaries of consultation and compassion. Take ye counsel together in all matters, inasmuch as consultation is the lamp of guidance” and that “[c]onsultation bestoweth greater awareness and transmuteth conjecture into certitude” (Research Department of the Universal House of Justice 1980, 3).

Consultation, as it is conceived in the Bahá’í writings and practiced within the Bahá’í community, must be linked with compassion as a necessary concomitant. The primary objective of consultation is the realization of justice and equity. The attribute that links justice and equity to consultation is compassion. Consultation done properly has a strong rational component.

It is compassion, however, that awakens a higher nature than the rational; it awakens that quality religions have called “the divine.” In solving major social problems, at all levels, both the rational faculty and the remarkable human capacity for the “divine,” or what some might term the “transcendent,” must be brought to bear.

Critical to finding solutions to the problem of climate change is the participation of all concerned, governments and governed alike, from the highest levels of government down to the most fundamental level of society: the local community or neighborhood. Consultation must take place between national governments; within governments at the national, regional, and local levels; between governments and their citizenries; and among the members of the population themselves. Without a full exchange of views at all levels, any measures decided upon—suggested courses of action—will be resisted at some level; a resistance that will undermine actions that need to be taken. Equitable solutions require consultation among all concerned in the outcomes—that is, consultation must proceed in such a manner that all concerned in the outcome have a voice, with the diversity of views that naturally exists within the population freely expressed.

Bahá’í consultation eschews the adversarial approach and the kind of compromise of competing interests that, all too often, has proved to be a corrupting factor affecting parliamentary political debate. Rather, it is to be carried out in a spirit of unity in which the motive of all parties is to seek out the truth and outline a unified course of action. Integral to the consultative process is freedom of expression together with full and frank discussion. This may lead to a clash of differing opinions during the process, but this does not mean a clash of egos or a clash of wills. Consultation depends, for its efficacy, on adherence to the first two principles outlined: justice and equity, and the spirit of scientific objectivity.

There are several additional key elements to consultation. When a group engages in consultation, “every ... member should recognize that he has a duty to ensure that his voice is heard and that appropriate consideration is given to his views” (Universal House of Justice 1989). ‘Abdu’l-Bahá (1978, 87) writes that when “every member expresseth with absolute freedom his own opinion and setteth forth his argument,” consultation will succeed in avoiding “ill-feeling or discord.” Since all have contributed fully to the consultation, when agreement is reached, all the participants should whole-heartedly support the agreed-upon course of action. There are no “minority opinions” at the conclusion of consultation. Shoghi Effendi reiterated this salient principle: “The Assembly members must have the courage of their convictions, but must also express whole-hearted and unqualified obedience to the well-considered judgment and directions of the majority of their fellow members” (Research Department of the Universal House of Justice 1980, 16).

Richard Feynman ([1985] 2018) gives the following fascinating account of a consultation that took place regarding a particular scientific problem:

One of the first interesting experiences I had in this project at Princeton was meeting great men. I had never met very many great men before. But there was an evaluation committee that had to try to help us along, and help us ultimately decide which way we were going to separate the uranium. This committee had men like Compton and Tolman and Smyth and Urey and Rabi and Oppenheimer on it. I would sit in because I understood the theory of how our process of separating isotopes worked, and so they'd ask me questions and talk about it. In these discussions one man would make a point. Then Compton, for example, would explain a different point of view. He would say it should be this way, and he was perfectly right. Another guy would say, well, maybe, but there's this other possibility we have to consider against it.

So everybody is disagreeing, all around the table. I am surprised and disturbed that Compton doesn't repeat and emphasize his point. Finally at the end, Tolman, who's the chairman, would say, "Well, having heard all these arguments, I guess it's true that Compton's argument is the best of all, and now we have to go ahead."

It was such a shock to me to see that a committee of men could present a whole lot of ideas, each one thinking of a new facet, while remembering what the other fella said, so that, at the end, the decision is made as to which idea was the best—summing it all up—without having to say it three times. These were very great men indeed.

This account illustrates several important features of consultation: focus on the problem at hand, complete freedom of expression among the participants, dispassionate examination of the points presented, and final universal agreement on a course of action. Although Feynman seems to conclude that this was achieved because it was "great men" who were participating, the view of the authors is that it is not "intelligence," "the capacity for abstract (mathematical) thought," or "scientific expertise" but rather disinterested focus on the problem at hand in an atmosphere encouraging complete freedom of expression. The Bahá'í experience across diverse settings has been that virtually any consultative group whose members have the right set of attitudes can adhere to these principles.

Bahá'ís are enjoined to always blend consultation with scientific methodology. The aforementioned letter by the Universal House of Justice (2017) further notes: "A phenomenon as complex as climate change cannot be reduced to simple propositions or simplistic policy prescriptions. Even when there is agreement on some underlying facts, there may be a diversity of views about what to do in response to those facts."

It continues:

Consultation provides a means by which common understanding can be reached and a collective course of action defined. It involves a free, respectful, dignified, and fair-minded effort on the part of a group of people to exchange views, seek truth, and attempt to reach consensus. An initial difference of opinion is the starting point for examining an issue in order to reach greater understanding and consensus; it should not become a cause of rancor, aversion, or estrangement. By acting in unity, a conclusion about a particular course of action may be tested and revised as necessary through a process of learning. (Universal House of Justice 2017)

This provides an outline for how consultation can be pursued in a way that leads to “common understanding” and an effective “collective course of action.”

It should be noted that the Universal House of Justice (2017) found it remarkable, and an auspicious portent, that “at a time when nations have difficulty reaching agreement on many important issues, the governments of nearly every country on Earth have reached political consensus on a joint framework ... in the Paris accord, to respond to climate change in a manner that is anticipated to evolve over time as experience accumulates.”

In summary, the three elements of justice and equity; embrace of science, implying as it does utilization of scientific methodology; and consultation come together to help recognize a problem and forge enduring solutions. The framework presented here calls for an integration of spiritual principles with science and the more widespread adoption of scientific methodology in the application and monitoring of measures based on spiritual principles, to the degree that the integration of science and religion becomes normative, in principle and in practice.

The Bahá'í Community

The Bahá'í community is worldwide, drawing its membership from, and embedded in, societies and cultures in every corner of the world. Although still small in size, representing around one-tenth of one percent of the world's population, by the late 1980s, the Baha'i Faith had become the second-most widespread religion in the world by country (Encyclopaedia Britannica 1988). Despite its size, it represents a cross section of human society.

Foundational to the Bahá'í understanding of reality is not only the oneness of the human family, but also that all religions stem from the one same God. As children in one family have differing requirements at differing times, so it has been with the peoples of the world. Unique to the Bahá'í understanding is that humanity has now reached the much-anticipated stage of development where it is possible to understand that there is no need for conflict or contention, but rather mutual cooperation and responsible, sustainable development.

Shaping this perspective are the writings of the twin Manifestations of the Bahá'í Faith, the Báb and Bahá'u'lláh, which are considered divine revelation, together with the writings of 'Abdu'l-Bahá, the son of Bahá'u'lláh, who was not a Manifestation of God but nevertheless is considered to have been divinely inspired. These comprise the Sacred Writings of the Bahá'í Faith. Added to these as authoritative are the writings of the Guardian of the Bahá'í Faith, Shoghi Effendi, appointed to that position by 'Abdu'l-Bahá, and the writings of the Universal House of Justice, whose members are elected through a three-tiered system. The former, as a body of writings, is considered authentic interpretation of the Sacred Writings and the latter elucidations of both the Sacred Writings and the interpretations of 'Abdu'l-Bahá and Shoghi Effendi. Within the Bahá'í Sacred Writings is prohibition against authoritative interpretation by anyone outside the authorized interpreters, as each believer should read and understand the texts for themselves. It is this diverse understanding based on the Sacred Writings that forms a bedrock for engaging in Bahá'í consultation.

Bahá'ís do not see themselves as separate in any essential way from the communities in which they live. As indicated, some of the most essential measures that must be taken to address climate change must be done on the international level, involving international cooperation among governments on the one hand and large-scale efforts by societies on the other. Bahá'ís, therefore, see their work at the neighborhood level as complementary with efforts being made on the world stage writ large.

In the following section, we provide an international profile of the Bahá'í Faith, discuss the Bahá'í understanding of the “three protagonists” in the civilization-building process and the necessity for a new set of relationships binding them, and finally talk about the nature of the efforts being made in Bahá'í-sponsored initiatives at the neighborhood level.

Bahá'í Programs and Organizations

Worldwide, some 1,300 Bahá'í communities are engaged in intensive programs of development. The neighborhoods in which Bahá'ís are working span the globe, from rural settings in Central and South America, across Central Africa, Southeast Asia, Papua New Guinea, and some of the islands of the Pacific to urban neighborhoods in large metropolitan areas in all parts of the world. There are several thousand Bahá'í efforts in social and economic development: over 900 sustained large-scale projects, over 600 schools, and over 70 Bahá'í development agencies. Although these initiatives are Bahá'í-inspired, in none of them is there a separation between members of the Bahá'í Faith and the general public. The neighborhood activities, for instance, are for people of all faiths and no faith. The programs of development are carried out in consultation, and in the consultative process, all voices are equal.

Bahá'u'lláh ([1978] 1988, 35) instructs His followers to “consort with the followers of all religions in a spirit of friendliness and fellowship.” This is something Bahá'í communities take to heart.

The Bahá'í International Community (<https://www.bic.org/>) has been registered with the United Nations as a nongovernmental organization since 1948 and has consultative status with the United Nations Economic and Social Council and the United Nations Children's Fund. It is also accredited with the United Nations Environment Programme and the United Nations Department of Public Information. In addition to collaborating with the United Nations and its specialized agencies, the Bahá'í International Community collaborates with United Nations member states, nongovernmental organizations, and academia.

The International Environmental Forum (IEF; <https://iefworld.org/>) is a Bahá'í-inspired professional organization for environment and sustainability. The IEF was started in 1997 and has grown to over 700 members in more than 70 countries. It sponsors an annual online conference on environmental issues, engages in educational activities, and has produced a number of papers. Most recently, it was an active supporter and participant in the Interfaith Partnership on Religion and Sustainable Development's interfaith conference in Abu Dhabi and the COP28 Faith Pavilion.

The Wilmette Institute (<https://wilmetteinstitute.org/>), an educational institution organized under the auspices of the National Spiritual Assembly of the Bahá'ís of the United States, sponsors, in conjunction with the IEF, an annual online course on climate change, in addition to its many other courses on science and religion, philosophy, theology, history, art, and key social issues, such as racism.

The Association for Bahá'í Studies North America (n.d.), an organization formed under the auspices of the National Spiritual Assembly of the Bahá'ís of Canada, “promotes inquiry within the sciences and humanities to advance thought and practice that address the needs of contemporary society.”

Operating since 1999, the Institute for Studies in Global Prosperity (n.d.) “provides a forum for the exploration of concepts and the analysis of processes that give shape to humanity's search for global peace and prosperity.” Among its activities, the institute sponsors annual courses for university students and graduates.

The Three Protagonists in the Civilization-Building Process

Bahá'í writings identify three protagonists in the civilization-building process: the individual, the institutions, and the community.

Throughout human history, interactions among these three have been fraught with difficulties at every turn, with the individual clamoring for freedom, the institution demanding submission, and the community claiming precedence.

Every society has defined ... the relationships that bind the three, giving rise to periods of stability, interwoven with turmoil. (Universal House of Justice 2010)

As humanity today is undergoing unprecedented changes in the intellectual, psychological, and social aspects of life, the relationships among these three protagonists in the civilization-building process are not developing apace, nor in any systematic or conscious fashion. Humankind's political life is locked into old patterns that are no longer relevant. Western-style democracy, for instance, remains an adversarial system, with political parties locked into concepts developed during the Enlightenment that see society as composed of competing elements that could be made to work together through a political process of debate and compromise.

Despite this stubbornly persistent legacy from the past, relationships among the three protagonists are evolving, although in a haphazard fashion, which has led to both uncertainty about the future and the very serious problems of excess. Humanity is engaged in a race between the destructive effects arising from our current course and our ability to adapt to the new realities emerging in the modern world. The Universal House of Justice emphasizes the learning that must take place to bring about new, harmonious relationships among these three "actors on the stage of history." It notes:

At the heart of the learning process is inquiry into the nature of the relationships that bind the individual, the community, and the institutions of society—actors on the stage of history who have been locked in a struggle for power throughout time. In this context, the assumption that relations among them will inevitably conform to the dictates of competition, a notion that ignores the extraordinary potential of the human spirit, has been set aside in favor of the more likely premise that their harmonious interactions can foster a civilization befitting a mature humanity. (Universal House of Justice 2013)

That same letter goes on to add:

[A] new conception of each appropriate for a humanity that has come of age is emerging ... The relationships that bind them ... are undergoing a profound transformation, bringing into the realm of existence civilization-building powers ... At a fundamental level these relationships are characterized by cooperation and reciprocity, manifestations of the interconnectedness that governs the universe. (Universal House of Justice 2013)

The past two centuries, having seen a vast intellectual advancement of the human race, have created the need for a new paradigm. The struggle for power among

these protagonists must give way to a dynamic and harmonious cooperation. Drawing on Bahá'u'lláh's analogy comparing the world of humanity to the human body, the Universal House of Justice (2013) writes:

Just as the appearance of the rational soul in this realm of existence is made possible through the complex association of countless cells, whose organization in tissues and organs allows for the realization of distinctive capacities, so can civilization be seen as the outcome of a set of interactions among closely integrated, diverse components which have transcended the narrow purpose of tending to their own existence. And just as the viability of every cell and every organ is contingent upon the health of the body as a whole, so should the prosperity of every individual, every family, every people be sought in the wellbeing of the entire human race.

There is no question that the worst effects of anthropogenic climate change can only be addressed, or mitigated, through large-scale interventions at the international and national levels, and most fruitfully by governments working in concert.

At the same time, however, one cannot escape what should be an obvious fact of humanity: the power to effect change, ultimately, rests with the individual. What is needed are fundamental changes in the patterns of thinking and operating that led to the problem in the first place—patterns that have prevented the efflorescence of the human spirit, an efflorescence that, in concert with principled international action, is necessary to ensure lasting change.

The document *Century of Light*, produced under the auspices of the Universal House of Justice, notes, with regard to the indigenous populations of Africa, Asia, Latin America, and the islands of the Pacific:

One of the great strengths of the masses of humankind ... lies in an openness of heart that has the potentiality to generate lasting social transformation. The greatest handicap of these same populations has so far been a passivity learned through generations of exposure to outside influences which, no matter how great their material advantages, have pursued agendas that were often related only tangentially—if at all—to the realities of the needs and daily lives of indigenous peoples. (Bahá'í World Centre 2001, 108–9)

Without an efflorescence of the human spirit—without a general awakening of the individual in society—one problem may be solved in the short term, but the solution will bring only symptomatic relief. As in the case of a body afflicted with an underlying disease, symptoms will reappear in other limbs and take other forms.

An example is presented by the crisis of nuclear war. The potential catastrophe of nuclear war hung over the world for decades during the Cold War. At the end of the Cold War, the threat receded but never disappeared, and it is still with us. The only lasting and stable solution to this potential crisis was never applied: the creation of an international order that recognizes the essential oneness and wholeness of the human race, curtailing the sovereign power of nations to initiate warfare and working to bring about equity within the human family. Consequently, the underlying disease of excessive materialism has produced in the global body politic a new symptom: anthropogenic climate change, which again threatens the existence of the human species.

That the root problem is materialism and not simply individualism is asserted in *Century of Light* (Bahá'í International Community 2021, 89, 90):

Whether as worldview or simple appetite, materialism's effect is to leach out of human motivation—and even interest—the spiritual impulses that distinguish the rational soul ... In the absence of conviction about the spiritual nature of reality and the fulfilment it alone offers, it is not surprising to find at the very heart of the current crisis of civilization a cult of individualism that increasingly admits of no restraint and that elevates acquisition and personal advancement to the status of major cultural values.

What, then, is the proper role of the individual in a society in which the interactions of the three protagonists have been harmonized? In all societies, power has come from the individual. The prime awakener of this power, the Writings of Bahá'u'lláh suggest, is the system of morality and ethics arising from Revelation. The individual is seen as having a twofold moral purpose:

- to develop his or her own inherent potentialities
- to contribute to the transformation of society.

“All men,” Bahá'u'lláh ([1952] 1976, 215) writes, “have been created to carry forward an ever-advancing civilization.” Justice can be achieved in the world only as the individual citizen gains the ability, in the words of Bahá'u'lláh ([1932] 1970, 4), to “see with thine own eyes and not through the eyes of others” and learn to “know of thine own knowledge and not through the knowledge of thy neighbor.” The ability to contribute to the transformation of society begins with self-knowledge. “Man should know his own self and recognize that which leadeth unto loftiness or lowliness, glory or abasement, wealth or poverty” (Bahá'u'lláh [1978] 1988, 35).

Regarding the institutions, the Bahá'í Faith recognizes that while they provide guidance, the power of accomplishment comes from the individual. Institutions

must govern in such a way as to stimulate and encourage, along salutary lines, the development and expression of this power that lies latent in the individual members of society. In an open letter written anonymously to the people of Persia circa 1880, ‘Abdu’l-Bahá ([1957] 1990, 111–12) wrote about the necessity to “establish schools throughout Persia, even in the smallest country towns and villages, and to encourage the people in every possible way to have their children learn to read and write,” noting that “[u]ntil the nerves and arteries of the nation stir into life, every measure that is attempted will prove vain; for the people are as the human body, and determination and the will to struggle are as the soul, and a soulless body does not move.”

The institutions of society—the governmental institutions—therefore must develop along new lines: “not to control but to nurture and guide” (Universal House of Justice 2013).

In the Bahá’í Faith, decisions are made by Spiritual Assemblies—democratically elected institutions—and not by individuals. The members of the institutions have a primary duty:

[t]o win by every means in their power the confidence and affection of those whom it is their privilege to serve; to investigate and acquaint themselves with the considered views, the prevailing sentiments and the personal convictions of those whose welfare it is their solemn obligation to promote; to purge their deliberations and the general conduct of their affairs of self-contained aloofness, the suspicion of secrecy, the stifling atmosphere of dictatorial assertiveness and of every word and deed that may savor of partiality, self-centeredness and prejudice; and while retaining the sacred right of final decision in their hands, to invite discussion, ventilate grievances, welcome advice and foster the sense of interdependence and co-partnership, of understanding and mutual confidence between themselves and all other Bahá’ís. (Universal House of Justice 1972, 10–11)

The assembly members themselves are as subject to the guidance of the institutions as all other members of the community. Outside of the duly constituted meetings of the assembly, they have no special authority, unless assigned specific duties. Shoghi Effendi ([1928] 1974, 63) writes that “the keynote of the Cause ... is not dictatorial authority but humble fellowship, not arbitrary power, but the spirit of frank and loving consultation.” Populations need what liberal democracy has called “the rule of law” to be operated on all levels. They need institutions whose members are held to obedience to the law to the same degree as the general population.

What, then, of the third protagonist in the civilization-building process, the community? Humans are social beings, communal beings. The community is the center around which unity is manifested, the collective in which the individual is

nourished and supported, the setting in which the efforts of the individual gain meaning. The mental health and social wellbeing of the individual is nourished when the community “takes on the challenge of sustaining an environment where the powers of individuals, who wish to exercise self-expression responsibly in accordance with the common weal and the plans of institutions, multiply in unified action” (The Universal House of Justice 2013).

One of the crises of the modern period is a crisis of community. In an opinion piece published in *The Washington Post*, the journalist E. J. Dionne (2023) writes about the “essential role” played by “[h]ouses of worship and other religious institutions” in “promoting social connectedness, mutual aid, and community building”:

What has brought this realization to life is widespread concern over the rise of loneliness and decline of forces that pull communities together. With religious disaffiliation soaring, especially among younger Americans, there is reason to worry that secular alternatives to religious civil society are not growing fast enough to fill the void. Even if secular social spaces proliferate, a society suffering from disconnection can ill afford to lose any of its community-building capacity.

In 2023, the Surgeon General of the United States, Vivek Murthy, produced a report, *Our Epidemic of Loneliness and Isolation*, subtitled *The U.S. Surgeon General's Advisory on the Healing Effects of Social Connection and Community*. In the opening letter to the report, he writes:

In recent years, about one-in-two adults in America reported experiencing loneliness ... Loneliness is far more than just a bad feeling—it harms both individual and societal health. It is associated with a greater risk of cardiovascular disease, dementia, stroke, depression, anxiety, and premature death. The mortality impact of being socially disconnected is similar to that caused by smoking up to 15 cigarettes a day, and even greater than that associated with obesity and physical inactivity. And the harmful consequences of a society that lacks social connection can be felt in our schools, workplaces, and civic organizations, where performance, productivity, and engagement are diminished. (Murthy 2023, 4)

To address this crisis, Americans need to reestablish community, “to make the same investments in addressing social connection that we have made in addressing tobacco use, obesity, and the addiction crisis” (Murthy 2023, 4):

We are called to build a movement to mend the social fabric of our nation. It will take all of us—individuals and families, schools and workplaces, health

care and public health systems, technology companies, governments, faith organizations, and communities—working together to destigmatize loneliness and change our cultural and policy response to it. It will require reimagining the structures, policies, and programs that shape a community to best support the development of healthy relationships. (Murthy 2023, 5)

There is another critical role of community: ultimately, community—not the individual nor the governing institutions—is the adjudicator of values and what is accepted as truth. Truth is discovered by the individual. But it is the community that puts the seal on truth, which informally decides what is true and good, and what is not. When community disintegrates, as is happening in many societies around the world under the onslaught of growing materialism and as a result of the failure of religion to adapt to the exigencies of the times, values go into free fall.

The philosopher of science Naomi Oreskes has pointed out the vital role of the scientific community in adjudicating scientific truth. Although it is the individual scientist (or research team) who makes scientific discoveries, it is the scientific community that, in aggregate and operating informally, determines scientific truth (Oreskes 2019).

In *Science as Social Knowledge*, Helen Longino (1990) gives a number of examples illustrating her thesis, showing how different background assumptions, even in the physical sciences, can lead and have led to different evidentiary conclusions from the same set of data. Naomi Oreskes (2019), in support of Longino, notes that it is the scientific community that determines scientific truth. Specifically, scientific truth is determined in any particular discipline by the community of experts in that discipline—that community that has the knowledge and training to generate data, formulate background assumptions that link data with evidence, and assess hypotheses in light of that evidence. The objectivity of science rests on the ability of the community of experts to identify the background assumptions and to evaluate them, as well as on its ability to assess the links between evidence and theory. (Sarracino 2023)

Key to the salutary influence of the community, however, is the kind of individual within it. The Bahá'í community is not a congregation. “One of the distinctive features of the Bahá'í Administrative Order ... is the responsibility it places upon the individual believer to participate in its activities” (Universal House of Justice 1989). This letter continues:

[T]he followers of Bahá'u'lláh are called upon, in their relationships within the community, to engage in consultation ... to offer their views and recommendations on all matters which pertain to the interests of the Faith

and its community ... This active involvement by every Bahá'í in the life of the community provides it with access to each individual's insight and wisdom and is a source of great strength to the organic unit. (Universal House of Justice 1989)

Work at the Neighborhood Level

As stated, the Bahá'í community is not a congregation. Likewise, community-building activities at the neighborhood level and Bahá'í-initiated socioeconomic projects do not treat their participants as passive receivers. When working at the neighborhood level, Bahá'ís work to a framework of action. There is a triple focus: community building, social action, and involvement in the discourses of society. The Universal House of Justice (2021) has emphasized three key areas of learning that will be vital in the years immediately ahead:

- how to raise up vibrant, outward-looking communities
- those communities learning how to bring about spiritual and material progress
- how to contribute to the discourses that influence the direction of that progress.

Work at the neighborhood level is carried out in a cycle of action, reflection, consultation, and study. This cycle ensures that, while engaged in continuous action, the action is reflected upon to generate learning, and that this learning leads to greater understanding, which in turn leads to new phases of corrected action. It is a scientific approach to learning in action, engaged in by a community working at the grassroots of society in attempts to generate meaningful change. The Universal House of Justice (2023) writes:

In place after place, the initiatives being pursued reveal a population learning how to take increasing responsibility for navigating the path of its own development ... What is required for all these complementary aspects of a community's wellbeing to advance is ... the capacity to engage in systematic learning in all these areas—a capacity that draws on insights arising from the Teachings and the accumulated store of human knowledge generated through scientific enquiry.

Although material advancement and wellbeing are of course important, Bahá'í projects are inherently holistic in their aims. Consideration of the environment is a vital feature of Bahá'í neighborhood activities throughout the world. Otherwise, one is simply perpetuating the kinds of activities and foci that led to the problems being addressed by the projects in the first place. All activities at the community or neighborhood level, whether

pursuing social, intellectual, or economic objectives, or a combination of these, arise out of consultation and are carried out both with the intent of strengthening the bonds that tie the community more closely together and with the environment in mind.

The Bahá'í Community and Civil Society

A question that might arise from what has been presented so far is, “Is this not utopian—an ideal that can never be realized in practice?” Despite the persistence and growth of religious fanaticism in the twenty-first century, there has also been significant progress in multifaith efforts and in civil society. The IPCC’s *Sixth Assessment Report* (2021, 2022) makes a number of references to the importance of involving religious groups in civil society:

Climate governance will be most effective when it has meaningful and ongoing involvement of all societal actors from local to global levels (very high confidence). Actors, including individuals and households, communities, governments at all levels, private-sector businesses, non-governmental organisations, Indigenous Peoples, religious groups, and social movements, at many scales and in many sectors, are adapting already and can take stronger adaptation and mitigation actions.

In advance of the recent COP28 conference, the Interfaith Partnership on Religion and Sustainable Development held an interfaith conference in Abu Dhabi, producing the “Abu Dhabi Interfaith Statement on Climate Change,” which was presented at COP28. Notably, COP28 included a Faith Pavilion, the first at such a conference. “[T]he Global Faith Leaders Summit brought together over 150 representatives from science, religion, including Bahá'í, Buddhism, Christianity, Hinduism, Islam, Judaism, Sikhi, Indigenous traditions, and politics to enhance climate ambitions ahead of COP28 ... During the gathering, the Interfaith Statement was signed by 28 religious representatives” (Interfaith Partnership on Religion and Sustainable Development 2023).

As mentioned, the Bahá'í community itself represents a cross section of humanity, and Bahá'í socioeconomic projects are all-inclusive and growing in number. In addition, one may consider the active support of, participation in, and contribution towards the development of civil society: “Civil society seems to be conceptualized as the arena within which a host of positive values are spontaneously manifested in the popular realm. These values include solidarity, participation, volunteerism, altruism, generosity, and justice. Civil society thus becomes a realm of freedom, where people take voluntary initiatives, self-organize at the grassroots to address social issues, participate in public affairs, and sacrifice their narrow interests for the common good” (Palmer 2018).

David A. Palmer (2018) goes on to note that “[t]he Bahá’í teachings and the community’s pattern of social engagement generally predispose Bahá’ís to support and identify with those elements of civil society that promote the enhancement of human dignity and reinforce unity and solidarity within and among communities.”

At the United Nations Millennial Summit in 2000, the Bahá’í International Community was chosen to represent global civil society. The participation of the Bahá’í International Community in civil society and its encouragement of the participation of religion and religious organizations in civil society have continued in the ensuing years.

Summary and Conclusion

The crisis of climate change has brought to the fore and made urgent the looming crisis of modern civilization, which, in the Bahá’í view, “result[s] from an excessive and enervating materialism” (Shoghi Effendi [1939] 1963, 24). It is a crisis that requires, to achieve a lasting solution, the development of a new normative relationship between science and religion, and organic changes in the way we humans do things at all levels: local, regional, national, and international.

The first change is to embrace the concept of the oneness of mankind—with all that entails—as an overarching vision: the health of the part must contribute, and does contribute, to the wellbeing of the whole, and the wellbeing of the whole is the only means to secure the enduring health of the part.

The second change is to adopt a framework consisting of three elements: justice and equity as an overarching concern; the embrace of sound science; and the process of free and full consultation that engages all concerned. Implicit in this is the adoption, as humanity works to address climate change and the many issues that arise from it, of a scientific-type methodology, including a cyclical process of consultation, action, and reflection followed by further consultation and (possibly) new lines of action. At every step, continual study is necessary so that actors, whether on the local, national, or international level, keep abreast of the latest scientific discoveries and developments.

The framework requires action on local, regional, national, and international levels and the development of a new pattern of relationships among the three protagonists in the civilization-building process: the individual, the community, and the institutions. Each must be respected, each must be given scope, and all must work together in harmony.

What is the role and future of humans in the cosmos? Physicist Marvin Chester, in a speculative 2012 article, “A Fundamental Principle Governing Populations,” develops a new general population equation based on what he sees as “an overriding principle of nature” governing “all population

behavior”—that “the effect on the environment of a population’s success is to alter that environment in a way that opposes the success.” This, to the authors, can be seen as a natural consequence of the “struggle for existence.” The flourishing of a species results in changes that oppose the continued flourishing of that species. One *could* look at anthropogenic climate change from that perspective: humans are animals—nothing more than animals—and consequently, destroying the environment that has allowed us to flourish is nothing more than what would be expected of any animal species.

The fundamental religious view, however, is that humans are more than animal. We have a transcendent nature; it is this nature that enables us to escape the struggle for existence. We can flourish, in the way that we ourselves have come to define “flourishing”—the creation of an ever-advancing civilization, advancing both materially and spiritually. We must rise to that station that can be attained only through realization of our true nature.

The physicist and cosmologist Paul Davies (1992, 232), in *The Mind of God*, writes,

We, who are children of the universe—animated stardust—can nevertheless reflect on the nature of that same universe ... What does it mean? What is Man that we might be party to such a privilege? I cannot believe that our existence in this universe is a mere quirk of fate, an accident of history ... Our involvement is too intimate ... Through conscious beings the universe has generated self-awareness. This can be no trivial detail, no minor byproduct of mindless, purposeless forces. We are truly meant to be here.

The changes required to solve the climate crisis are so far-reaching, they are and must be “the work of not only this generation, but of many generations to come” (Universal House of Justice 2021).

As dire as the crisis appears to be, there is great confidence in the eventual outcome. The long-term future of the human species is envisioned as incomparably glorious. Indeed, ‘Abdu’l-Bahá asserts that humankind is transitioning to a cycle “destined to propel itself across the unborn reaches of time for a period of no less than five thousand centuries” (Shoghi Effendi [1938] 1974, 102), for the universe acquires meaning through the human spirit. The efflorescence of civilization through the triumph of the human spirit is intimately tied to the material and spiritual advancement of civilization. With the maturation of the human race, the far future is infinitely glorious.

Humanity, the Bahá’í writings assert, will not be refused “that culminating and blissful stage ... which is at once their inalienable right and their true destiny” (Shoghi Effendi [1941] 1980, 5).

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A Case for Hope in a Warming World

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It is difficult to feel hopeful in a rapidly warming world. But hope is not just a feeling. It is an active verb, one that calls for courage, solidarity, a clear vision, and hard work. First, knowing that each fraction of a degree counts, humanity is called not to despair but to use every technology and means, technologies we already have. Second, we can be encouraged by a vision of a new world and society that works for everyone. Third, we can be heartened by nature's resilience and an evolutionary theology that looks toward the future.



On a recent visit to the north shore of Lake Superior, a friend told of finding her eighty-five-year-old neighbor out on the big lake's rocky, uneven shoreline one spring day planting trees. When she expressed concern that he might fall or have a heart attack—and be three hours from the nearest hospital—he merely smiled and said, “So what better place to die?” and went on with his planting. It reminded me of a saying of the Prophet Muhammad (peace be upon him (pbh)): “If you are planting a tree and the end of the world comes, continue planting your tree.”

Sometimes thinking about climate change feels like thinking about the end of the world. But, as James Crews notes, “hope, no matter how slight it might seem, is as pressing a human need right now as food, water, shelter, or rest. We may survive without it, but we cannot thrive” (Crews 2021, 2). As I write, the air here in Minnesota is dirtier than that in Beijing or New Delhi due to Canadian wildfires. Temperatures in Phoenix have topped 110 degrees Fahrenheit for a record thirty-one straight days, and people there are ending up in emergency rooms with second-degree burns merely from falling onto the pavement. Antarctic sea ice in the Southern Hemisphere's winter has diminished by an area the size of Argentina. Finding hope in these days where climate change is no longer a prediction but a lived reality has seemed a daunting task. However, my religious tradition of Quakerism recalls the words of its founder, George Fox, who wrote of a vision he had: “I saw . . . an ocean of darkness and death, but an infinite ocean of light and love, which flowed over the ocean of darkness.” In this article, I hope to provide at least a glimpse of that “infinite ocean of light and love” as it pertains to the climate of the beautiful but fragile planet on which we live.

I am no Pollyanna. I am well aware of the many ways in which we humans are ruining our world and jeopardizing our future. If hope were merely a feeling of optimism or a certainty that everything will turn out okay, I do not have it. But hope is not just a feeling. Nor is it wishful thinking. It is an active verb. Just as the Arabic term “jihad” means to struggle and strive, not merely in “a holy war” but also in daily life, hope is now a call to struggle, to work toward a different and better future, and if we fail, to at least go down fighting. It calls for courage, vision, love, and hard work. Fighting climate change with every tool we have, including hope, is our jihad as we find ourselves not anticipating but already in the Anthropocene. Hope represents a holy calling to re-envision the present as well as the future and persevere, even when things look very dark. Such a hope requires three things to propel us forward and help us keep our eyes on the ocean of light and love: perseverance, vision, and resilience.

The French Resistance: Hope Perseveres in Dark Times

1940 has been described as “midnight for the French nation” (Dawsey 2022). Hitler's forces had overrun the country in a mere six weeks. Despite this

tremendous loss, then military officer Charles de Gaulle, in exile in Britain, gave a radio address urging the French to continue the struggle. His speech was recorded and broadcast by the BBC on the very day the French government signed an armistice with Germany that officially made 1.5 million French servicemembers German prisoners of war. It might have seemed that all was lost. However, de Gaulle held up a vision of a country that would prevail with British and American technology and help.

Technology, in the form of Panzer tanks and Heinkel bombers, had seemed totally on the side of the Germans in their lightning-fast conquest. But that did not make technology the enemy. De Gaulle called on anyone with experience in engineering or armaments to join the resistance and fight on with common sense, honor, and love for their nation (Wikipedia 2023). And fight they did. The number of citizens actively involved in the resistance is estimated to have been between one and three percent. While that may not seem like many, these citizens played a significant role in the Allied advance that ended the war. Resistance cells jury-rigged bombs to blow up bridges, rail lines, and ammunition depots. They published underground newspapers on small hand presses. They spirited Jews one by one to safe havens. While each action may have seemed small, they added up. These members of the resistance had no assurance they would prevail against the might of the Wehrmacht and the Gestapo. But they kept going. And they worked together. Resistance fighter Lucie Aubrac writes that the resistance “was the result of a war already lost,” yet, citing the French motto, “[t]hey robbed us of liberty and equality, but they could not prohibit fraternity!” (Aubrac 2000, 1).

There is no assurance of victory in the fight to mitigate global warming. As with the French in 1940, it may at times feel like we have already lost the fight. But just as those who joined the resistance used hope to work together to make whatever gains they could, we can do the same. And, though it may seem, as it did to the French, that technology is the problem, it is also on our side. We already have the technologies to provide clean fuel, better materials, and improved agriculture. The over 200 geologists, engineers, agronomists, politicians, writers, climatologists, biologists, botanists, economists, financial analysts, and architects in Project Drawdown (<https://drawdown.org/solutions/table-of-solutions>) have compiled a list of the more than ninety technological and political solutions to climate change already available and roughly twenty more that are on the way. Here are the top 15:

1. Reduced food waste
2. Plant-rich diets
3. Family planning and education of girls
4. Refrigerant management
5. Tropical forest restoration

6. Onshore wind turbines
7. Alternative refrigerants
8. Utility-scale solar photovoltaics
9. Clean cooking
10. Distributed solar photovoltaics
11. Silvopasture
12. Methane leak management
13. Peatland protection and rewetting
14. Tree plantations (on degraded land)
15. Temperate forest restoration (www.drawdown.org)

The good news is that the implementation of new technologies and techniques in many of these areas is not only the right thing to do but also the cost-effective thing to do. Wind and solar power are now more cost effective than fossil fuels and with the passage of Biden's Inflation Reduction Act, they are approaching those fuels in subsidization. Since 2010, the cost of solar energy has decreased by eighty-five percent, wind energy by fifty-nine percent onshore and seventy-one percent offshore, and lithium-ion batteries by eighty-nine percent. California now produces enough green energy to supply ninety-five percent of its in-state needs (Roth 2021). Former United States Environmental Protection Agency administrator Gina McCarthy believes it is quite possible to cut greenhouse gas emissions in half by 2030, and zero them out by 2050, partly because businesses are rapidly coming to see the shift to new energy technologies as job producers rather than job killers. She points to the automakers' realization that electric vehicles are the future and to the \$2.2 billion in private investment funding for offshore wind supply chains (McCarthy 2022). Private investors are not in it to lose money. Even Texas, despite the chokehold of the fossil fuel industries on its politics, has increased solar capacity six-fold since 2019, primarily because renewable energy brings a better financial return than fossil fuel (Rampell 2023).

Worldwide, reductions in the price of renewable sources of energy and a rise in political awareness have cut predictions of temperature rise in this century from four or even five degrees Celsius to somewhere between two or three degrees. The pace of transition to new technologies is quickening perceptibly in the United States with the adoption of the Biden administration's Inflation Reduction Act. It is also accelerating in China, where in 2023 alone, more solar power was added than is currently on the ground in the United States. In 2022, China's added renewable power would have met the demands of a single country such as South Africa, Australia, or Spain. At this pace, China is likely to reach its 2030 target ahead of time (Ritchie 2023).

But change is not happening fast enough. The Intergovernmental Panel on Climate Change emphasizes that humans must cut worldwide emissions in half by 2030. While China is on track for that target, most other countries are

not. Meanwhile, 2022 and 2023 have shown that the climate is changing far more rapidly than most models predicted. Despite reluctance on the part of most scientists, geoengineering technologies—such as orbiting “space mirrors,” hydrogen-filled balloons, or ejecting large clouds of sulfur dioxide into the stratosphere to increase the reflection of sunlight—may become necessary. These could have a rapid cooling effect (as some places experienced under the high-level smoke clouds from Canadian fires this summer) and would be relatively inexpensive to implement. Environmentalist Bill McKibben (2022) notes that “a recent article in the *Harvard Environmental Law Review* estimates that the ‘direct costs of deployment—collecting the precursor materials for aerosols, putting them into the sky, monitoring, and so on—would be . . . as low as several billion dollars a year.’” This puts solar reduction technologies in the wherewithal of not only countries but wealthy individuals such as Bill Gates or Elon Musk.

It is not known what the side effects of such technologies would be, but they would likely include further acidification of the ocean. Another strategy is ocean farming, which involves injecting nitrogen into the oceans to support seaweed and algal blooms. The fundamental issue of ocean farming is that the energy is at the surface but the nutrients there are depleted. They remain available in the depths, where the sun doesn’t reach. One company, Seaforestation (www.seaforestation.com), has developed a platform on which to grow kelp that spends the day at the surface of the ocean capturing sun and at night sinks below the surface to where there are nutrients. This kelp can be used as fertilizer, feed for fish, or a resource for producing other things like plastics or pharmaceuticals. It seems like a win-win proposition. Then again, kelp and algae can also get out of hand, as seen in 2018 when large piles of sargassum took over beaches from Florida to Mexico (Schubel and Thompson 2019). Technology is almost always a two-edged sword. As climate change worsens, it is likely that disputes will arise among both states and non-state actors as to the feasibility and advisability of these strategies and the jurisdiction of the air and seas.

Big investments or government programs, as necessary as they will be, can leave individuals feeling powerless, just as the armies fighting in World War II must have seemed to be the determining bodies beyond the small efforts of the resistance fighters. But here I come to the second piece of good news. Many of the things on the Drawdown list are small, things that can be begun person by person. An individual can install a heat pump, an induction stove, better insulation. Humans can all reduce our food waste and move toward a more plant-based diet.

Or consider number fifteen on the Drawdown list: the protection of temperate forests. While farming the ocean could lead to food sources that would obviate the need to clear forests for farmland, any big change here is still years down the road. But there are small things that can make a difference.

Consider that the average American uses about twenty-four rolls of toilet paper per year. If a sizable number of people would install a bidet, millions of the pines, birches and aspens that provide the virgin pulp to make toilet paper—particularly older, mature trees with the longer fibers that produce the ultrasoft texture we Americans demand—would remain standing (Coren 2023). Imagine if Americans could be convinced that washing our backsides was as crucial to personal hygiene as brushing our teeth?

Small potatoes, one might think. But every change, no matter how small, has a cumulative effect, and every tenth of a degree of warming prevented will save lives. As Czech playwright and politician Vaclav Havel writes:

Neither I nor anyone else will ever win this war once and for all. At the very most, we can win a battle or two—and not even that is certain. Yet I still think it makes sense to wage this war persistently . . . I have few illusions. But I feel a responsibility to work towards the things I consider good and right. I don't know whether I'll be able to change certain things for the better, or not at all. Both outcomes are possible. There is only one thing I will not concede: that it might be meaningless to strive in a good cause. (Havel 1991, 16–17)

French resistance fighter and actor Marcel Marceau concurs: “As the Book of Ecclesiastes said, two hundred years before Jesus Christ, ‘There is a time to live, to die, to build, to destroy, to love, to hate.’ Vanity, vanity. Everything is vanity, but you need to know that you have to go toward the light even if you know that one day we shall be dust” (Marceau 2002).

Pope Francis: Hope Rests on a Vision

Pope Francis, in the encyclical *Laudato Si*, asks people to consider what kind of world they would like to leave for their children. He decries the rampant consumerism of a “throwaway culture,” one that discards people, promises, the bonds of community, and the gifts of nature when they seem to lack immediately obvious or quantifiable value (*Laudato Si*, 16). He presents the current ecological crisis as inextricably intertwined with a social crisis and notes that humanity cannot solve one without tackling the other. This brings me to the second necessity for hope. While fear can lead to despair or apathy, hope rests on a vision of a better world, not just one with fewer smoke-filled days or monster storms but one with closer communities, more fulfilling jobs, more leisure time, better health, and, yes, even cleaner backsides. We already have the technologies we need. What we lack is the political will to implement them. That will can come in part through a clearer vision of what a better world might look like.

Many people who have lived in Europe have found that life lived on a smaller scale can indeed be more pleasant. Public transportation, readily

available, obviates the hassles of keeping a personal car or three; rental agencies make cars easily available when needed. Smaller dwellings are easier to clean and maintain, and food bought every few days is fresher, healthier, and more enjoyable. Most importantly, without long commutes and with more relaxed workdays, there is time for friends and family, for enjoying nature, and for other pursuits. Greener, quieter cities with cafes and shops in a walkable distance can be imagined. Humanity knows of more sustainable and healthier modes of agriculture, ones that do not rely on the constant application of chemical pesticides, herbicides, and fertilizers. It is possible to imagine buildings that no longer account for thirty-two percent of current energy use but rely on natural light and smart glass, heat pumps, and green roofs.

Vienna has shown that sustainability and equitable development need not be in conflict. The Wohnpark Neue Donau housing project, built over an underground expressway, includes 850 housing units, including subsidized rentals, owner-occupied homes, apartments for refugees, and student housing. The housing blocks are arranged diagonally so that most have a river view. Nearby shops, a school, a church, and a kindergarten mix with office high-rises and other residential neighborhoods (US Department of Housing and Urban Development 2023). With several other planned green developments, Vienna has been judged the most livable city by journals such as *The Economist* and other surveys (*The Economist* Data Team 2018).

Such a change in physical infrastructure requires creativity, a creativity humans possess as part of our creation in the image of our creator. Pope Francis notes that exercising the creativity needed to instantiate our vision of a better life “would be a worthy expression of our most noble human qualities, for we would be striving intelligently, boldly and responsibly to promote a sustainable and equitable development within the context of a broader concept of quality of life” (LS, 192). But material creativity and regeneration alone are not enough. Also needed is a fundamental change in our attitude toward life. We need to recognize that more or bigger is not always better. That a society might be better judged by its GNH (gross national happiness) than its GDP. That nature is not something to be tamed or used. It is not, as Pope Francis notes, “a mere setting in which we live” (LS, 139). We have evolved to be a part of our natural habitat, and while we have been uniquely resourceful in finding ways to control or modify that habitat, we remain dependent on it for our lives.

Despite the insistence of some, this vision of a world in harmony with nature does not call for deprivation. As Pope Francis notes:

It is not a lesser life or one lived with less intensity. On the contrary, it is a way of living life to the full. In reality, those who enjoy more and live better each moment are those who have given up dipping here and there, always on the lookout for what they do not have. They experience what it means to

appreciate each person and each thing, . . . Happiness means knowing how to limit some needs which only diminish us, and being open to the many different possibilities which life can offer. (LS, 223)

Such a vision can give our actions both direction and meaning. But will this vision be realized? Psychologist Viktor Frankl, writing after experiencing the darkness of a concentration camp, thought this was the wrong question: “We had to learn ourselves and, furthermore, we had to teach the despairing men, that it did not really matter what we expected from life, but rather what life expected from us. We needed to stop asking about the meaning of life, and instead think of ourselves as those who were being questioned by life—daily and hourly. Our answer must consist, not in talk and meditation, but in right action and in right conduct” (Frankl [1946] 2006, 77).

“We’re not fighting for a merely ‘livable’ planet,” says climate scientist Peter Kalmus. “We’re fighting for a riotous, wild, gorgeous, generous, miraculous, life-cradling planet that’s home to a society that works for everyone” (Hayhoe 2021, 243). And humanity is not alone in this fight.

Nature Herself: Hope Is Resilient

Catholic theologian John Haught writes: “Humans, to be sure, will always need unattainable ideals that call us to nobility of life, but these ideals can only be enlivening if they steer us toward an unprecedented future rather than a hypothesized initial or timeless perfection. . . . The notion of an unfinished universe happily opens up the horizon of a healing future . . .” (Haught 2015, 93). Belief in God’s total controlling power, combined with the Christian hope of eternal life in the “next world,” has led many Evangelicals to embrace an otherworldliness that diminishes this world. I recall hearing in my youth the words of Ronald Regan’s secretary of the interior, James Watt, that there was no need to preserve our natural resources for future generations since he did not “know how many future generations we can count on before the Lord returns” (Prochnau 1981). But for Haught, the future is not about the next world but the ongoing transformation of this world. Faith in the resurrection does not obviate moral choices in the here and now. Rather, it makes them imperative.

Climatologist Katherine Hayhoe labels the Evangelical dismissal of human responsibility expressed in the belief that “it’s all in God’s hands” as “false hope.” She writes that “false hopes might ease our mind short-term, [but] they do nothing to erase the fears that still roil in the back of our brains” (Hayhoe 2021, 243). True hope requires recognition of what’s at stake coupled with an acceptance that “we reap what we sow” (Hayhoe 2021, 244). Christianity has never preached helplessness. Indeed, the apostle Paul, writes in his epistle to the Romans (5:4 NRSV): “We know that troubles help us learn not to give up. When we have learned not to give up, it shows we have stood the test. When we

have stood the test, it gives us hope” (Hayhoe 2021, 244). In the same spirit, the prophet Muhammad (pbh), when asked whether humans’ actions mattered in light of God’s omnipotence, replied, “Trust God. But also tie up your camel.”

A faith informed by evolutionary science “rejoices that the same divine promise that brought Israel and the Church into being has for billions of years been drawing a whole universe toward an unimaginable future. Informed by cosmic hope, an ecological spirituality trusts that the divine field of attraction we refer to as the Holy Spirit is still at work in the entire cosmos . . . and applies not only to the ‘people of God’ but also, as St Paul came to see, to the ‘whole of creation’ (Rom. 8:22)” (Haught 2015, 155).

The hand of this Holy Spirit can be seen in the resilience of nature. She will heal if humanity lets her. Consider Moyenne Island. Brendon Grimshaw bought this despoiled and somewhat barren island in the Seychelles for £9,000, quit his job as a newspaper editor back in England and started a new life there. Moyenne had been uninhabited for 50 years. Grimshaw, together with a Seychellese companion, proceeded to plant 16,000 trees on the island. These, in time, attracted 2,000 new bird species. The birds were followed by other species, including hundreds of giant tortoises. The once-deserted island now contains two-thirds of the Seychelles’s fauna. In forty years, a desolate island became a paradise and was declared a national park in 2008 (Ham 2022).

Or consider the exclusion zone surrounding the now-defunct nuclear reactor in Chernobyl, where 30 years ago the explosion and subsequent fire at the No. 4 reactor of the Chernobyl nuclear power plant released large quantities of radioactive material. One hundred sixteen thousand people were evacuated from an area encompassing more than a thousand square miles. One might expect nothing but devastation. However, the more than 150 cameras placed in this zone have shown a remarkable flourishing of nature. Wolves, wild boars, beavers, moose, eagles, deer, lynx, and bears inhabit the zone’s thick woodlands. Packs of dogs, feral descendants of abandoned pets, and herds of an endangered species of horse originally from Mongolia roam. Though lifespans are shorter than elsewhere, life goes on despite high levels of radiation (Wood and Beresford 2023). In fact, in the absence of human activity, nature flourishes.

There is resiliency in humanity as well. Human history is a story of resourcefulness and adaptation, though sometimes it looks like one step forward and two steps back. As Czech playwright and politician Vaclav Havel writes: “A heaven on Earth in which people will love each other and everyone is hard working, well mannered, and virtuous, in which the land flourishes and everything is sweetness and light, working harmoniously to the satisfaction of God: this will never be” (Havel 1991, 16). However, Havel notes that the future depends on the young, who possess the idealism and morality to imagine a better future without looking too closely at the obstacles and costs that might lay in the path.

The activism and empathy of this younger generation are inspiring. The young citizens of Montana sued, and won, against the state, arguing that the extensive support for the fossil fuel industry championed by the Republican majority violated the state constitution, which guarantees residents “the right to a clean and healthful environment,” and holds the state responsible for maintaining and improving the environment “for present and future generations” (Gelles 2023a). These students are a hopeful vanguard. According to Michael Gerrard, director of the Sabin Center for Climate Change Law at Columbia Law School, there have been few trials regarding the climate: “This is the first that [gets] into the merits of climate change and what needs to be done, and how the state may have to change its policies” (Gelles 2023a). As generations that have been taught the human impact on the climate—generations unafraid to do things differently—age into the voting booth, there may be a change in direction.

The Montana lawsuit is not the only one of its kind. Class action attorney Missy Sims is representing sixteen Puerto Rican municipalities that are seeking to hold some of the biggest players in the fossil fuel industry responsible for the damage caused by Hurricane Maria through their deliberate obfuscation of the known effects of burning fossil fuels. This is the first case to use the Racketeer Influenced and Corrupt Organizations Act (RICO), originally designed to crack down on organized crime, in a climate suit (Gelles 2023c). RICO charges frequently carry massive financial penalties, a prospect that might eventually induce the fossil fuel industry to faster change. The Oregon county that includes Portland has also filed a lawsuit against several fossil fuel companies regarding the deadly heat wave of 2021 (Gelles 2023b). As climate costs mount, other lawsuits will follow.

The young are changing the nature of the American electorate. As older voters die and young people turn eighteen, climate change is gaining importance as an electoral issue. By the 2024 election, thirty-two million new Generation Z voters (those born between 1998 and 2014) will have come on board and 20 million older voters will have died since the last election; this changes the complexion of the electorate by about twenty percent. Gen Z has shown itself more inclined to get out and vote than previous generations were when they were young, and they vote on the issues (Lake and Heller 2023). A 2021 study conducted by the Pew Research Center found that for members of both Generation Z and millennials (those born between 1981 and 1996), thirty-five percent list climate change as their top political concern, and sixty-nine percent agree that addressing climate change should be the top priority of politicians (Funk 2021).

This does not let those in prior generations off the hook. In “A Letter to Adults,” Alexandra Villaseñor (2020) notes that while her generation “are stepping forward as the ‘conscience and moral voice’ on the climate crisis . . . the reality is it is too much work for one generation.” She calls on “[t]hose of

you who are retired and have more time on your hands, or with children you are no longer caring for, or those of you with additional resources” (Villaseñor 2020) to become climate activists as well. “Can you imagine how beautiful a movement led by children and grandparents would be?” (Villaseñor 2020). No one will solve climate change alone. The task is big, but each action, however small, may keep the Earth from warming some fraction of a degree. Thus, as one Irish Benedictine monk told me (pers. comm.): “There are three questions you can ask. But you should only ask one of them: ‘Did I try?’ The other two are ‘did I try hard enough?’ and ‘did I succeed?’ Well, there is a trap door over your head, and if you ask one of these, as sure as I’m standing here, that trap door is going to open and a whole load of excrement is going to come down.”

Life on Earth will continue. It is up to humanity whether the model will be Moyenne Island, where human agency fosters and encourages an abundant renewal and coexistence with nature or Chernobyl, where, despite humanity and its mistakes, nature flourishes in its absence. Perhaps humanity’s loss will be the gain of other plants and animals. This, then, is my final hope. In the words of nature poet Mary Oliver, no matter how much we love this world “when the time comes to let it go, . . . let it go” (Oliver 1983, 83).

Should that time come, if you are planting a tree, faith and hope call you to continue planting that tree.

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Networks, Cryptography, and the Next World to Come

An Everlasting American Techno-millennarianism?

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To understand the nexus between networked cryptography and American religiosity, it is essential to embed this inquiry within the broader context of religious imaginaries associated with communication networks in nineteenth-century North America and their evolution into the spiritual landscape of the twentieth century. Throughout United States history, network imaginaries have exerted a substantial influence, engaging in a continuous dialogue with the evolution of religious thought, attributing eschatological expectations to networks, and ascribing them with a profound sense of ultimate purpose and significance. This investigation finds its ultimate context within the early techno-libertarian communities of 1990s California, pivotal in shaping the design, development, and objectives of networked cryptography online, ultimately giving birth to cryptocurrencies and the blockchain protocol.



In 2020, the famous techno-ideological press organ of the Bay Area *Wired* published an article titled “Bitcoin Was Always a Religion” referring to the religiosity surrounding “crypto communities” (Kelly 2018). Indeed, cryptography and cryptocurrency have given rise to communities fueled by manifest religiosity and eschatological rhetoric. By potentially bypassing all intermediaries in economic or social interactions, the cryptographic protocol embedded in the blockchain promises to provide humanity with a (human) trustless, transparent and immutable architecture of communication in cyberspace, freeing individuals from the bondage of any external authority: what Nick Szabo (1997) already envisioned in the late 1990s as the “God protocol.”

California, particularly the San Francisco Bay Area, is unquestionably the location of a kind of post-Christian secular religiosity devoted to technological progress driven by science fiction, millenarianism (Davis 1998), and New Age spirituality (Aupers, Houtman, and Pels 2008; Zandbergen 2010, 2012). However, this syncretic mix of religious schemes, prophetic futurism, and science fiction narratives makes it difficult to characterize this symbolic system as a religious one *stricto sensu*. I prefer to use the notion of “religiosity,” which refers to a specific and more diluted form of experience as Georg Simmel pointed out (1998, 18). Religiosity can still be informed by historical religions but can also emerge spontaneously from local causes, to paraphrase Durkheim ([1912] 1994, 49). A category such as “religiosity” is moreover particularly relevant to characterize the fluidity of the religious phenomena in the United States.

The cryptocurrency creation context and its core idea were fundamentally that of a new digital world imagined and designed in 1990s California (Brunton 2020). Irreducibly associated with the revolution of personal computer networks promoted by the pioneers of the internet, cryptography and cryptocurrencies were among the main tools to realize the disruptive potentialities of the internet. But the prospect of spreading cryptography to the masses in order to make cyberspace “the new home of Mind” (Barlow [1996] 2003, 27), freeing individuals’ interactions from any external coercion, had to wait almost twenty years to be reanimated with the international deployment of blockchains and Bitcoin in 2008. Indeed, since the turn of the millennium, the emergence of platform capitalism driven from Silicon Valley has transformed the internet into a vast market for service provision that relies heavily on the exploitation of users’ freedom to interact and generate data online.¹ In a way, blockchains, cryptocurrencies, and the so-called Web 3 reactivate in a radical new socio-technical context the expectations of early crypto activists to make cyberspace a totally free place of exchange, interaction, and communication.

In order to understand the relationship between networked cryptography and a hypothetical specific American religiosity, this question must first be integrated in the larger framework of the religious imaginaries surrounding communication

networks in nineteenth-century America and their extension into the new spiritual landscape of the twentieth century. Indeed, network imaginaries have wielded considerable influence throughout the course of United States history, persistently engaging in an ongoing dialogue with the evolution of religious thought. This engagement contributes to the attribution of eschatological expectations to networks, bestowing upon them a sense of ultimate purpose and significance. This question is finally contextualized within the early technolibertarian communities of 1990s California, who played a significant role in shaping the design, development, and objectives of the networked online cryptography that gave birth to cryptocurrencies and blockchain protocol.

To understand this kind of technological religiosity within the specific cultural context of the United States, it is necessary to make some preliminary remarks. First, more than any other Western industrialized country, the United States has offered religious discourse a unique territory of emancipation. The Bill of Rights has contributed to providing fertile ground for the proliferation of religious rhetoric across the country. The constitutional protection of religious speech enshrined in the First Amendment shares of course elective affinities with the religious roots of American Protestantism. This is not only due to Protestants' sympathy for religious tolerance but also because liberal and orthodox Calvinist theologies have always been oriented towards the secular world (Troeltsch [1911] 1991, 61).

More importantly for the purpose of this article, the First Amendment has structured the American public sphere as a free market of ideas. It has created a symbolic sphere where religious, political, and scientific discourses can compete or merge in various configurations without seeming inappropriate.² The "public theology" of the American "civil religion" analyzed by Robert Bellah (1973) and the merging of millenarian Protestantism and the American technological sublime surrounding the Second Great Awakening (Miller 1965, 269–313; Nye 1996, 43) are typical examples amongst others of this interlacing of religious and secular discourses.

Religious discourse can infiltrate any type of secular discourse, whether for ideological purposes or as an expression of sincere faith. The tension between ideological and sincere uses of religious discourse is a major difficulty in appreciating its substantive religious nature. Many European observers fail to discriminate this tension due to their own frameworks, assimilating all uses of religious rhetoric in the American public sphere as manifestations of true and sincere faith. In the case of blockchains, the massive stream of religious discourse surrounding them (with expressions such as "God protocol," "crypto evangelism," "crypto guru," "Bitcoin Jesus") makes it difficult to distinguish their ideological features from their substantive ones. Practical evangelism and individual conversion, like the "orange pill" scenario (Figure 1),³ are two further recurring features in the effort of crypto gurus to foster the adoption

of complex and often unintelligible cryptographic protocols by the common man in everyday interactions.



Figure 1: “Take the Orange Pill,” courtesy of Bitcoin artist Lucho Poletti.

The *Wired* article cited at the beginning of this article is a good illustration of the tension between ideological and sincere uses of religious discourse. Even if it deals with the true non-confessional congregation of Bitcoin founded by crypto entrepreneur Matt Liston, this “church” called 0xΩ was in fact a pseudo church, a kind of religious trolling, even if, from a utilitarian point of view, a pseudo church can incidentally accept donations free from federal taxation. Despite this explicit ideological use of religion,⁴ albeit exotic from a European point of view, there are certainly religious patterns from the American spiritual ground associated within crypto communities. Indeed, not only has the First Amendment allow for the proliferation of religious discourse across the country, but it has also left open the dialectic between secular history and spiritual thought and, more precisely for the purpose of this article, between religious and technological imaginaries.

Networks, Cosmogony, and the New World

Even if blockchains are a relatively recent technology, their purpose was at the heart of the early personal computer revolution promoted by the

underground cyberculture of the San Francisco Bay Area. This revolution was to be accomplished by exploiting all the decentralizing potentiality of networked personal computers, giving birth to a radically new economic and social order. This expectation is in fact deeply rooted in American history, where artificial networks have always been associated with the prospect of a new order of times.

Indeed, economic and social transactions ensured by technological networks have played a major role in the symbolic and material design of the New World.⁵ In spite of railroad and telecommunication networks having allowed the American elite to establish their hegemony across the country and far beyond (the everlasting frontier), their deployment momentum was always celebrated as the prospect of a recovered unity that would bind individuals in an unmediated fashion (Carey 1989, 113–41). This vision was still largely informed in nineteenth-century America by liberal protestant theologies and liberal political philosophies walking hand in hand.

Unlike continental European countries, where artificial networks were the embodiment of an anticlerical materialistic movement promoted by pioneers of civil engineering like Claude Henri de Saint-Simon and his disciples (Desroche 1968; Musso 2007), networks in the American nineteenth century still heralded the coming Christian millennium (Miller 1965, 275; Marx 1968, 214). For Saint-Simon, these networks were the bases of a new human-centric religion (Saint-Simon [1825] 1969), but in America, they were still the concrete means to achieve Christian unity (Pucheu 2009). For Johnathan Edwards, the prominent protagonist of the first great religious revival, the reticulation of the world by ship and civil roads suggested the practical actualization of the mystical Body of Christ, which had hitherto been allegedly embodied in the Roman Catholic Church. Thanks to this reticulation, writes Edwards, “all the world shall then be as one church, one orderly, regular, beautiful society. And as the body shall be one, so the members shall be in beautiful proportion to each other. Then shall that be verified in the Psalm 122:3: ‘Jerusalem is built as a city, that is compact together’” (Edwards 1857, 333).

According to Edwards, the *corpus christi* was to be achieved by the voluntary communion of religiously enlightened individuals. As illustrated by the theological concept of willinghood (Miall 1848), Edwards promoted a unification exclusively based on the willingness of individuals driven by their own reason. Communication networks were considered the providential means to achieve this voluntary unification, binding people independently from any central power. Since the beginning, the American religious landscape was dominated by congregations fleeing European persecutions and rejecting centralization by giving an imperious role to individualistic rationality. For most puritans, the foundation of a religious or political community lies in the contract made by individuals enlightened by their own reason rather than by an overarching

authority like the Roman Catholic Church or a central government.⁶ In a way, the decentralized and libertarian scheme of Congregationalist ecclesiastical government promoted by Protestants sowed the seed of an individualist anarchism that infused and still infuses the American mind.

From a political point of view, communication networks were also seen as the alternative to centralized government by providing a harmonious distribution of power in all their ramifications. Associated with the organicist metaphor imported from European philosophy, the vision of the nation as an “organic machine” to be built by design was at the heart of American demiurgic enterprise in the Jacksonian era. Because networks are boundary objects situated between biological and artificial realms, their design was closely linked to that of an organism exhibiting self-organization, autoregulation, and life-like behavior. The deployment of this project across the American wilderness provided its definitively eschatological flavor, as this wilderness was the symbol of a world at degree zero of Creation, as illustrated by the famous Lockian aphorism “in the beginning, all the world was America.” Americans were manifestly mandated by God to begin the world again thanks to the providential application of steam and electricity (Miller 1965, 293). The networks made of artificial canals, roads, railroads, and telegraphs were both agents of wilderness domestication and of the design of an organic machine-like “nation system” (Marx 1968).

In the narrative of the new beginning (or Second Creation) that characterized nineteenth-century America (Nye 2003), networks appeared as a natural extension of the country-wide union already suggested by the providential natural pattern of the American landscape. Technological networks were not envisioned as an artifact but more as the result of a partnership between civilized man and God in the creative process of nature. As the great Unitarian orator of the Jacksonian era Edward Everett (1870, 147) asserted: “We shall be met by the general vague objection, that it is impossible, by artificial works, to divert commerce from its great natural channels. There are two kinds of natural channels—one sort made directly by the hand which made the world; the other, constructed by man, in the intelligent exercise of the powers which his Creator has given him. It is as natural for a civilized man to make a railway or canal as for a savage to descend a river in a bark canoe.”

For Everett, artificial networks were manifestations of the progress of Creation, which was central to the liberal and natural theologies and notably to the Unitarians, who dominated the highly elitist divinity school of Harvard in the nineteenth century. This dynamical progress of Creation, irresistibly oriented toward salvation, could be observed for most Unitarians in the cosmological evolutionary process recently discovered by naturalists (Savage 1876; Benz 1963). As illustrated in Everett’s quotation, Unitarians—like John Fiske (1895), who popularized Charles Darwin and Herbert Spencer

evolutionism in America—located technology-enhanced civilization at the highest level of the natural order. In a contribution to the *Atlantic Monthly*, the transcendentalist minister David Atwood Wasson offered a bright illustration of that phenomenon of naturalization:

Half a dozen rivulets leap down the western declivity of the Rocky Mountains and unite; four thousand miles away the mighty Missouri debouches into the Mexican Gulf as the result of that junction. Did the rivulets propose or plan the river? Not at all; but they knew, each, its private need to find a lower level; the universal law they obeyed accomplished the rest. So is it with the great human streams. Mighty beginnings do not lie in the minds of the beginners. History is a perpetual surprise, ever developing results of which men were the agents without being the expectants. (Atwood Wasson 1858, 512)

Civilized man embodied by Americans, concluded Atwood Wasson, “give[s] the world joy of a new and mighty artist to plan, a new strong artisan to quarry and to build in the great architecture of humanity” (Atwood Wasson 1858, 512).

If communication and transportation were irreducibly linked before the nineteenth century to the point of being interchangeable notions (as significantly the notion of commerce), the telegraph broke this identity by making the interactions—“intercourses” in the nineteenth century’s vocabulary—independent from “the physical movement of people and things” (Carey 1989, 143). If transportation networks were literally blood vessels, organic society was now be endowed with a nervous system that would animate humanity as a unique and whole body. “Is it a fact—or have I dreamt it,” wrote Nathaniel Hawthorne in 1851, “that, by means of electricity, the world of matter has become a great nerve, vibrating thousands of miles in a breathless point of time? Rather, the round globe is a vast head, a brain, instinct with intelligence!” (Hawthorne 1851, 283). In the same line, the Unitarian reverend Henry Whitney Bellows asserted at the celebration of the recent Atlantic telegraph deployment:

We have hitherto lived in a hemisphere, and now live on a globe—live not by *halves*, but as a whole—not as scattered members, but as the connected limbs of one organic body, the great common humanity—and thus we are able to compass for the first time, as a popular thought, the conception of one life, one history, one all-embracing, all inter-linking Providence—the establishment of a common, a right, and happy understanding among all nations, tribes, climes and interested, until the world humanity shall move as the globe itself moves, all together; and the race be, as individual is, vitalized by a spinal cord animating all its limbs, harmonizing all its movements, and giving coherency, energy and unity to its whole being. (McClenachan 1863, 245)

Expressions such as “highway of thought,” “iron nerves,” and “almost sentient nervous system”⁷ made it possible to resolve the negative dialectic between artificial and biological realities and deepen the process of naturalization. Moreover, telecommunication networks opened a totally new way of thinking about communication processes. Information and communication technologies’ imaginaries are not just fancy images related to material artifacts: they offer models that shape the way humans can think about relationships and communication processes in their broader sense (Kittler 1999). Still imbued with eschatological rhetoric, telecommunication networks inspired new conceptions of immaterial and spiritual communication. Modern Spiritualism and the possibility of communication with the beyond, for instance, was a direct consequence of the materialization of the dualistic body/mind model offered by the telegraph (Sconce 2000, 13). The same is true of the rise of mesmerism, telepathy, and telekinesis, which were linked to the discovery of electromagnetic properties, of which the telegraph was the first application (Brittan 1854). Telecommunication has enabled humans to envisage and give credit to new concepts related to the relationship *modus operandi* between body and mind, mind and mind, and mind and matter (Thurschwell 2001, 12).

All that enthusiasm filled with eschatological rhetoric and spiritual feelings never ceased to animate networks’ imaginaries in the United States. From telegraphs to the television network, from satellites to computer networking, what we now call information technologies were thought of as the heralds of a new step in the progress of Creation, now more and more assimilated with a teleological evolutionary process. “Techno millenarianism” therefore is deeply rooted in the American mind, even if it increasingly took on a secular expression detached from the Christian referents in the beginning of the twentieth century.

The Prospect of a New Edge

In the United States’ short history, techno millenarianism associated with network imaginaries has shown its constitutive ambivalence: artificial networks can draw an organic unity as well as be deleterious instruments of social control (or social engineering) in the hands of conservative government and greedy corporations. The libertarian counterculture that emerged in California in the late 1960s was in a way a reaction to that contradiction. Mario Savio’s famous seminal speech describing the oppression exerted upon individuals by governmental institutions and the big industry of his time explicitly refers to the machine metaphor (in Rosenfeld [1964] 2012, 216–17). Somehow, the dream of an organic machine unifying humanity had lost its vitalistic features to give birth to a dehumanizing technocratic enterprise crushing individuals in its gears.

Consubstantial to this counterculture posture, a new spiritual awakening took place in the heart of California: the New Age movement and what

scholars designate more globally as new religious movements (NRMs). Mainly supported by younger generations, NRMs emerged as a reaction to the Vietnam War, the domination by religious and political conservative thought, technocratic rationality, and Fordist industry. If it is problematic to assert, like William G. McLoughlin (1978), that the rise of NRMs alongside the libertarian counterculture initiated by the Beat generation could be identified as a fourth Great Awakening in American religious history, it must be admitted that they were symptoms of a shift in the traditional American belief system. The NRM phenomenon grew tremendously between the 1960s and the 1980s before finally vanishing in the late 1990s. They nonetheless deeply informed postmodernist culture. Above all, they contributed to enshrining individual sovereignty as the touchstone of Western culture.

This new religious spirit was not totally original. For instance, it shared the transcendentalists' quest for an unmediated relation to God embodied in nature or, more globally, in the cosmos. It also owes credit to the emergence of therapeutic and healing techniques of salvation of the late nineteenth century. Swedenborgianism, mesmerism, spiritualism, theosophy, Gnosticism, and other esoteric knowledges and practices were revisited in the flourishing Californian "cultic milieu" and "spiritual market" (Campbell 1972) of the NRMs. Asian and Eastern philosophies—already imported by Ralph Waldo Emerson, Helena Blavatsky, and, later, the Beat generation (Campbell 2007)—merged with the libertarian spirit that roamed California to give rise to what can be called a syncretic post-Christian eschatology. Deepening the idea of an inner divinity located within the self (already suggested by transcendentalism), individual consciousness was now thought of as the seat of the coming millennium. In a way, the redemptive figure of Christ was itself contained within the self, while His glorious return (the millennium) was to be seen as the metaphor for the awakening of individual consciousness inscribed in a teleological cosmic process. Healing practices, para- and trans-psychology, and the techniques of personal development like those professed by the Human Potential Movement⁸ together promoted an internal revolution giving "access to our inner divinity" (Hanegraaff 1996, 46) and presaging the first step toward the fulfillment of a broader cosmological plan: the expansion of individuals' consciousnesses into a holistic unification. As the French sociologist Françoise Champion asserted, the New Age movement and NRMs can be envisaged as a "religion of mystical and relationship quest," the recovery of an all-encompassed cosmological interconnectedness (Champion 1989, 167).

In this view, artificial networks were associated with vitalistic images of an organic and holistic unity of mind and matter as illustrated by the so-called Gaia hypothesis (Lovelock 1979). A unity hitherto hampered by political, religious, and scientific obscurantism. Driven by conspiracy theories, New Agers envisioned reality as a falsification deliberately maintained by the

establishment. This anxious feeling of falsification grew with the specter of the control of society linked to the Watergate affair, the War on Drugs, and the growing means of surveillance of the FBI, the CIA, and the NSA in post-war America. Through the utilization of occult practices, ranging from channeling and meditation to shamanic journeys and the exploration of altered states of consciousness through psychedelic experiences, adherents of the New Age movement sought to emancipate their individual consciousnesses. In doing so, they aimed to gain access to a holistic understanding of the “big picture” and unleash their unrestricted capacities for personal growth and self-expression.

Already depicted in 1963 by computer pioneer Joseph Licklider (1963) and his “intergalactic computer network”, the internet emerged in this specific cultural momentum. Favored by successive massive government funds, California had been at the forefront of the electronic and digital revolution since the middle of the twentieth century. This historical coincidence has favored the interlacing of libertarian counterculture and New Age spirit with the early development of personal computers and the internet (Turner 2006; Zandenbergh 2010). Envisioned as the concrete tools to operate the emancipatory quest of individual consciousness, the prospect of a planetary interconnection of personal computers met the early fascination of New Agers and young anarcho-libertarians with self-organization, autoregulation, spontaneous orders, and autopoiesis (Turner 2006, 11–41). These theories, synthesized through emerging scientific disciplines such as cybernetics, system and complexity theories, Prigogine’s dissipative structures, Francisco Varela’s autopoiesis, and others, conferred on the internet its teleological purpose. The old organicist metaphor equating society with an “organic machine” was now supported by scientific theories that further blurred the lines between living and non-living things (Wiener [1966] 1996), biology and society (Kelly 1994), and science and cosmology (Brand 1974, 9).

Terence McKenna and Timothy Leary, central figures of the 1960s psychedelic scene and soon-to-be prophets of the new computer age, illustrated this phenomenon of convergence specific to the nascent ethos of Silicon Valley. They were part of a more precise movement that emerged in the Californian underground cyberculture of the 1980s known as the New Edge, a contraction of New Age and cutting edge. An ancestor of *Wired*, the cyberculture magazine of the New Edge, *Mondo 2000* (previously entitled *High Frontiers* and, briefly, *Reality Hackers*), edited by Leary’s admirer Ken Goffman (a.k.a. R. U. Sirius), was one of the main press organs of this movement. Combining cyberspace, LSD, smart drugs, human-machine fusion, and space colonization with cosmological expectations, *Mondo 2000* offered a curious and often confusing technophile version of the New Age. In *High Frontiers* columns, Terence McKenna identified, for instance, computer networking as the agent of a radical cosmological shift: “Right now, nine million computers a month

are being hooked into communication systems. This is the new global organism which is taking shape. It is this organism which will survive. It's my conviction that the historical process creating these networks is mirroring intuitively larger cosmic processes. It is an actual intentionalization, or creation, of the *Overmind*" (McKenna 1987, 61).

This "Overmind"—a concept borrowed from the evolutionist Brahmanism of Sri Aurobindo (2010, 277–89)—shares obvious affinities with the natural philosophy of transcendentalists (such as Emerson's "Over-Soul") and furthermore with the "noosphere" of the French priest and evolutionary anthropologist Pierre Teilhard de Chardin (1955). The latter was also a recurring reference for the New Agers as well as for John Perry Barlow, the co-founder of the Electronic Frontier Foundation, assimilating the internet as the coming of Teilhard de Chardin's Omega Point. "The Point of all evolution to this point is the creation of a collective body of Spirit," wrote Barlow about the rise of the Internet (cited by Kreisberg 1995).

Mondo 2000 was also one of the main popularizers of the science fiction cyberpunk genre that quickly became a label for New Edgers to refer to themselves as (Jude, Sirius, and Nagel 1995). Alongside Leary, McKenna, and other heirs of the beat generation, *Mondo 2000* offered a central place to cyberpunk writers such as William Gibson, Rudy Rucker, Bruce Sterling, John Shirley, and so on. The cyberpunk genre, pioneered by Gibson, projected the countercultural and New Edge ethos into near-futuristic scenarios of the techno-world to come. In landscapes saturated with computing technologies, smart drugs and biotechnologies, novels such as Bruce Sterling's *Islands in the Net* (1989) or Neil Stephenson's *Snow Crash* (1992) presented a techno-utopian version of communalism evolving and struggling in an anarchic society dominated by a multinational oligopoly.

Cyberpunk offers a raw image of this "collective body of the mind" evoked by Barlow, featuring individuals directly interconnected within the material network of cyberspace via their biological nervous system (Vinge [1983] 2001; Gibson 1984). But one major contribution of cyberpunk and the hard science fiction of 1990s California was the conception of the internet as a territory. Vernor Vinge's *True Names* ([1983] 2001) was one of the first novels to feature humans, detached from both their bodies and their civil identities, evolving through avatars in the demiurgic topography of virtual reality ("the other plan"). The words "cyberspace" and "matrix" (coined by Gibson (1984)), and later "metaverse" coined by Stephenson (1992)) had definitively consecrated the internet as a "new space awaiting to be appropriated by mankind" (Nye 2003, 21). Like the wilderness for nineteenth-century Americans, cyberspace constituted for the New Edgers a liminal space, a new frontier toward the next stage of humankind's evolution. Like the Americans' redemptive movement through the wilderness, the "cyberpunk cowboys" were, once again, the agents

of a redemptive evolutionary dynamic, the redeemers of an old world—centralized, coercive, and hierarchical—presaging a new one—decentralized, self-organized and horizontal.

For Leary, Gibson “has produced nothing less than the underlying myth, the core legend, of the next stage of human evolution” (1996, 54). Echoing Leary, Ken Goffman (Sirius 1988, 4) asserts: “I am the new species. Through my information and communications technology, I am about the process of building a Species Nervous System and a Species Mind.”

Crypto-Utopia

Deeply involved in those countercultural movements mixing technological potentialities with eschatological expectations, a bunch of hackers from the most innovative companies of the new digital world (Xanadu, Amix, Sun Microsystems, Microsoft, Apple, Intel, Netscape, Xerox PARC, and so on) gave birth to one of the early virtual communities of the internet: the Cypherpunk mailing list. Founded in 1990 by John Gilmore, a famous libertarian activist and co-founder of the Electronic Frontier Foundation, and Timothy May, a physicist and retired Intel engineer (at the age of 34), as well as cryptographer Eric Hugues, the Cypherpunk virtual community was involved in the design and dissemination of online civil cryptography. It was a mission imbued with eschatological sentiments in the face of the threat of a cashless society (Real 1991, 16) and the specter of global surveillance raised by the prospect of widespread network computing. The Cypherpunks sought to somehow operationalize the criticisms and hopes of the Californian counterculture by advocating the advent of a techno-utopian New Edge.

Coined by hacker and co-editor of *Mondo 2000* Judith Milhon, then in a relationship with Eric Hugues, “Cypherpunk” refers to both cryptography (“cypher” meaning “secret code”) and the do-it-yourself Cyberpunk ethos in keeping with the hackers’ leitmotif: “mistrust authority, promote decentralization” (Rucker, Queen, and Sirius 1992). Most of Cypherpunk’s prolific contributors were also members of another virtual community: the Extropians, who were about to institutionalize the now famous transhumanist movement. Also peopled by engineers, geeks, and technophiles immersed in science fiction (mostly male), the Extropian list was more speculative than the Cypherpunk’s and dedicated its exchanges to “exploratory engineering” (Drexler 1988) such as space colonization, cryonics, mind upload, artificial intelligence, biotechnology, and nanotechnology. Both communities shared the same libertarian references and gave a very clear teleology to networked cryptography: making the internet an absolute free space of economic and social interactions.

“We, the Cypherpunk,” wrote Eric Hugues ([1990] 2003, 83) in the “Cypherpunk Manifesto,” “are dedicated to building anonymous systems. We

are defending our privacy with cryptography, with anonymous mail forwarding systems, with digital signatures, and with electronic money.” According to the Cypherpunks, anonymous remailers and digital authentication will protect private interactions, while “digital cash”, as they called it, will bring the advantages of cash (anonymous, untraceable) along with those of electronic money (secure, portable, easy to stock and exchange), enabling transactions to be made without any overhanging authority worldwide, whether it be for tax collection or legal purposes (Finney 1993). Through the design and production of cryptographic protocols, including several unsuccessful attempts to create cryptocurrencies, the Cypherpunk list laid the technical and symbolic foundations for contemporary crypto-interactions enabled by the blockchains.

For the Cypherpunks—and particularly their central figure, Timothy May—digital cash, anonymous communications, and decentralized marketplaces enabled by personal computer networks will inexorably give rise to a new planetary order: that of online crypto-anarchy (May [1988] 2003). “The Net is an anarchy,” wrote Timothy May (2001, 33): “This truism is the core of crypto-anarchy. No central control, no ruler, no leader (except by example, reputation), no ‘laws.’ No single nation controls the internet, no administrative body sets policy.” By using anonymous authentication (a pseudonym endowed with a cryptographic public key) in place of civil identities, individuals will be free to interact, transact, and contract online, bypassing the legalist and regulatory power of states and large corporations worldwide. The state will no longer be able to exercise its legal monopoly of violence and coercion in matters of taxation, inflation, expropriation, prosecution, imprisonment, and so on. Reduced essentially to its coercive functions, Cypherpunks as well as the Extropians envisioned the state as an artificial machinery (including the large bureaucratic corporations) exclusively driven by predation on individuals’ private property (Hayek 1944). Fed with naturalist theories of anarcho-capitalism and individualist anarchism (Rothbard [1974] (2000); Friedman [1973] 2007), private property must be understood here as far beyond material ownership to extend to individuals’ bodies, consciousnesses, and living choices, only limited by the strict respect for other individuals’ properties. According to Cypherpunks, networked cryptography will liberate individuals from their bodily and civil identities (or “True Names,” as Cypherpunk called them in reference to Vinge’s eponymous novel), making the internet an unbridled, free, worldwide marketplace of ideas, goods, and services where notions such as “nation-state” will soon become irrelevant (May 1994). In a crypto-anarchy, wrote cryptographer Wei Dai (1998), “the government is not temporarily destroyed but permanently forbidden and permanently unnecessary. It’s a community where the threat of violence is impotent because violence is impossible, and violence is impossible because its participants cannot be linked to their true names or physical locations.”

People will choose what they want to produce and exchange, and with which crypto-identity, with complete freedom and transparency. At the same time, anonymous public reputation systems will force digital entities (pseudonyms) to honor their commitments in order to maximize their reputational capital (Friedman 2011, 31). Individuals will also autonomously determine the value of the goods and services they exchange. This will encourage the spontaneous emergence of markets, independent of any central planning (whether by the state or large corporations), based exclusively on the supply and demand of individual agents, faithful in this sense to the ideas of “catallaxy” and spontaneous orders distilled by the Austrian economic school. Like the cypherpunks, Extropians saw the free market in its pure form (catallaxy) as a natural process (Figure 2) that can characterize not only economic transactions but also social communication and biological interactions (Lavoie 2004), all animated by individual adaptive behavior driven by self-interest (Mises 1949). By setting competition as the norm for social relations, the Cypherpunks imagined an anarchic society where competing communities with different values and interests shared by their individual members would re-engage the evolutionary dynamics driven by natural selection hitherto hampered by collectivism and illusory social justice (Pucheu 2023).

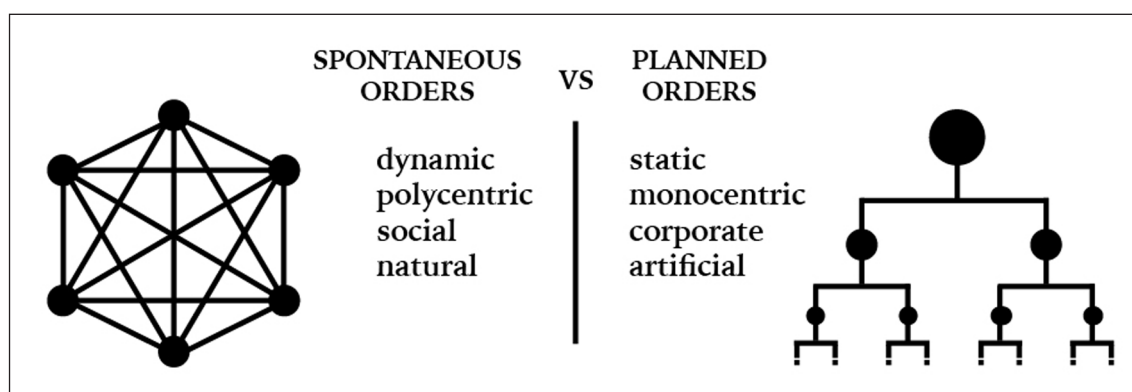


Figure 2: Spontaneous orders versus planned orders. Reproduction extracted from More (1990).

Smart contracts, which make possible the determination, validation, and automated execution of sealed contracts between individuals with no legal authority other than themselves, were part of the same design. At the heart of electronic private contracts, championed by early Cypherpunk and Extropian Nick Szabo (1996), is the idea of “privately produced law,” or “polycentric law”, defended by co-founder of the Extropian magazines Tom Bell (1991): the emergence of multiple competing legal systems that would provide the legal framework for the self-organizing principle of the crypto-anarchist project. As explained by Tom Bell, “as we race into an increasingly complex future,

the problem of allowing maximum flexibility and evolutionary potential for our species will press harder. Non-monopolistic legal systems, embodying the spontaneous order principle, appear to be an ideal way to ensure our limitless expansion” (Bell 1991).

From an Extropian point of view, central planning, bureaucratic organization, and scientific conservatism have dramatically impeded the free flow of an evolutionary process also manifest in technological progress (including that of the internet). Anarcho-capitalism is more than just a political program: it is the condition of possibility of the human’s “boundless expansion” across the universe thanks to technological progress, the ultimate evolutionary step toward posthumanism or “Ark-anarchy” (Figure 3; A 1990). The coming age of technological singularity (Vinge 1993) prophesied by the Moore law (the imminent emergence of a supra-human intelligence) and the no-less-prophetic Meadows report about the finitude of terrestrial resources (Meadows et al. 1972) were also central motives to accelerate this teleology.

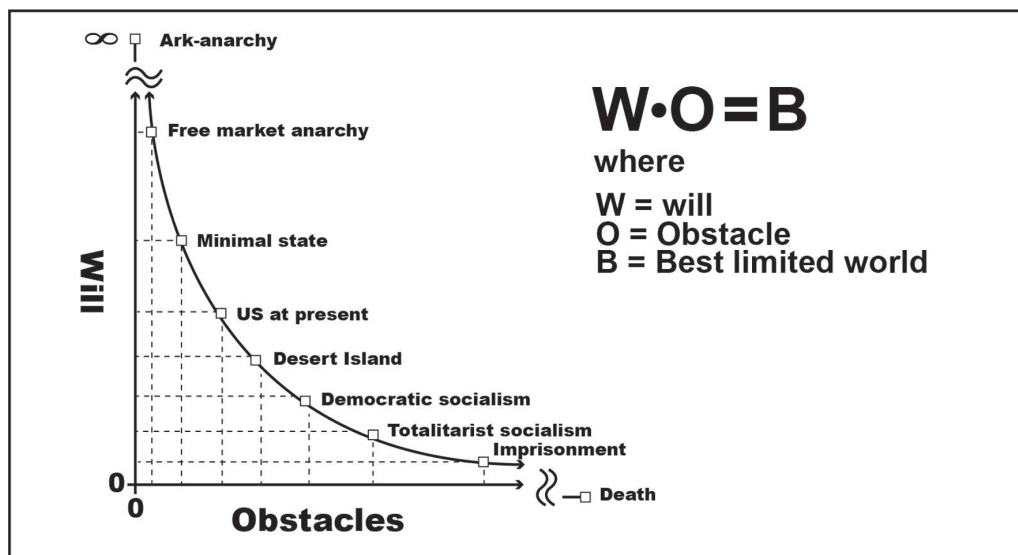


Figure 3: The Ark-anarchy graph of reality. Reproduction extracted from A (1990).¹⁰

According to the Extropians, digital cash and denationalized electronic currencies (More 1995) will allow new decentralized channels of capital circulation, independent from the state and big corporations, that will accelerate exploratory engineering such as space colonization, human enhancement, and radical life extension. A “pure” free market will ultimately promote “intentional speciation” (Reilly 1995, 38) by unleashing technoscientific innovation without any legal and regulatory authority.

Taking control of evolutionary mechanisms was not an audacious and selfish enterprise for the Extropians but a desirable and necessary one with respect to the “internal teleology” of cosmos (Reilly 1995, 38). Urging this “intentional

speciation”, a notorious Extropian explained: “Teleology refers to the existence of purpose. I am not referring to an external teleology in a theistic sense or as the Final Cause of all, rather to internal teleology. Purpose never enters into the universe, it imbues it” (Reilly 1995, 38).

Conclusion

Techno-millennialism associated with network imaginaries seems irreducibly linked, in United States history, with the everlasting desire to give birth to a New World. First associated with the prospect of re-establishing the Christian covenant, artificial networks were perceived as the concrete means to achieve the voluntary communion of dispersed individuals around the globe. In a way, the metaphorical unity associated with the mystical body of Christ incarnate by the Roman Catholic Church has been transfigured into the deployment of artificial networks, giving rise to an “organic machine” linking humanity as a single and whole body.

In what might be called a natural theology of technological progress, the antitrinitarian and liberal Unitarian elite of the Jacksonian era contributed to naturalized artificial communication networks, perceived—in the untouched landscape of the wilderness—as the pursuit of the creative process of nature. Transcendentalists, born of the Unitarian matrix, accentuated the pantheistic trend of their natural theology. But they also incarnated a romantic and seminal countercultural movement in the face of Unitarian rationalism. Without rejecting technological progress, they integrated communication networks into their quest for a global spiritual unity while opposing the interests of greedy capitalism and imperialist ideology.

Similarly, the rise of countercultural and neo-religious movements radiating out from California into post-war America was an expression of the rejection of technocratic rationality and scientific and political conservatism. Informed by new science such as cybernetics and system theories, the architecture of networks, whether artificial or natural, was interpreted as a broader cosmological process related to self-organization. The seekers of a mystical quest for a global, holistic unity of mind and matter have found in these theories the epistemology of their belief.

The rise of the electronic industry in post-war California encouraged the interweaving of these teleologies and spiritual beliefs with the early development of network computing. Blending technological potential with eschatological expectations, New Edgers, as they called themselves, were on the cusp of a revolution as dangerous as it was promising: the networked computerization of social and economic interactions. Amongst these New Edgers, the Cypherpunk virtual community imagined the communication protocols that would liberate individuals (and individual properties) from the bondage of statism, urged by the specter of a surveillance society. In what might be called a theology of individual

freedom, echoing to the NMR “self-religion” (Lambert 1999), Cypherpunks envisioned a society devoid of government control, wherein an unrestrained free market of ideas and things, enabled by decentralized computer networks, would promote an intensely individualistic and merit-based societal structure.

Deeply linked with the early transhumanists of the Extropian community, the prospect of crypto-anarchy was also the herald of another eschatology: posthumanism. According to Extropians, pure free-market, denationalized money and privately produced law will foster spontaneous orders that will promote and accelerate individual creativity as well as technological progress. It will ultimately give free rein to human ingenuity to take control of the evolutionary mechanisms.

Despite the efforts of the Cypherpunks to bring cryptography to the masses, computer networking has followed Chaum’s prophecy (1985), making the exploitation and surveillance of users’ data the cornerstone of digital capitalism. Decentralized networks and marketplaces have tremendously allowed the centralization of power in the hands of the digital oligopoly and data server owners. State governments, whether democratic or authoritarian, have also fully exploited the internet’s panoptic potential for surveillance and control. But 2008 brought cryptography and cryptocurrencies back into the spotlight with the deployment of Bitcoin. Invented by a mysterious cryptographic entity known as Satoshi Nakamoto, the Bitcoin protocol was closely linked to the Cypherpunk and Extropian communities from the outset. The Bitcoin white paper was published on a forum belonging to Perry Metzger, an early Cypherpunk and Extropian. Nakamoto developed Bitcoin until 2010 (before disappearing) alongside another famous techno-futurist libertarian, Hal Finney. The latter was also the first beneficiary of Bitcoin transactions. Having passed away in 2014, Hal Finney is now in cryonic suspension in the Alcor facility (run by the Extropians), taking a considerable quantity of Bitcoins (free from taxation and inflation and protected from the hypothetical disappearing of one or another fiduciary money) with him on his journey to the future.

WikiLeaks, founded by Julian Assange (a member of the Cypherpunks as far back as 1995), and the Amazon-style drug-selling platform Silk Road, which first popularized the use of Bitcoin, were in complete adequacy with the crypto-anarchist project. While WikiLeaks sought to show the hidden reality behind state and financial conspiracies (by “watching the watcher”), Silk Road was the archetypal decentralized, transnational black market built around anonymous reputational systems imagined by May ([1988] 2003) in his crypto-anarchist program.

The subsequent developments of these crypto-utopias have diverged significantly from their initial objectives. Anonymity and pseudonymity were only secondary motives (except for hackers and marginal users of the dark web) in the widespread use of Bitcoin. The integration of Bitcoin and blockchain technology

into the financialized capitalism prevalent in our current era contributed to reducing their popular use to that of crypto-assets. While anti-state and libertarian ideologies persist within the realm of crypto-communities (Golumbia 2016), the pursuit of capital accumulation appears to be the predominant driving force. Consequently, cryptocurrencies and blockchains have become extensively integrated into the fintech (financial technology) ecosystem, where large corporations and venture capitalists aim to enhance capital circulation.

Despite being built on peer-to-peer networks, blockchains have not been able to prevent the imbalanced concentration of power within specific nodes (De Filippi and Loveluck 2016). Originally based on the distributed power of networked personal computers, mining, for example, is now concentrated in industrial-scale mining farms. As Joe Baldwin (2018) highlights, the “fetishism of decentralized networks” has also contributed to eluding power relationships related to network materiality, as to offer an illusory (and partial) mapping of reality where individual developers can seem equal to multinational corporations: “decentralized network fetishism conceals relations and systems of domination, exploitation, and alienation. There is an illusion of circumventing economic power with decentralized nodes but what has emerged upon closer scrutiny is the corporate occupation of cyberspace in powerful and deep nodes.”

Despite these drifts, Cypherpunks’ and Extropians’ credos remain central to the crypto world. Celebrated as their founding fathers, Cypherpunk ethos still imbues many emblematic figures of these communities. Some notable “old” Cypherpunks and Extropians like Nick Szabo, Perry Metzger, Dean Tribble, and Mark Miller are still deeply involved in crypto projects like smart contracts or decentralized finance (DeFi). The contemporary crypto-gurus also seem to be following the path of the Extropians, investing massively with other digital capitalist leaders in radical life extension, reverse aging therapy, cryonics, and experimental pharmacology (Nabben 2021; Huberman 2022).¹¹ The rise of decentralized autonomous organizations (DAOs) in the DeFi ecosystem, and the “network states” recently proposed by crypto entrepreneur Balaji Srinivasan (2022), echo the Cypherpunk techno-communalism and the Extropian desire to open new channels of capital circulation independent from the state and big corporations. Several crypto-communities are effectively dedicated to finance projects in exploratory engineering promoted by transhumanists that states or “traditional” corporations do not want to finance, whether for legal or strategic purpose.

The contemporary emergence of the so-called Web 3 following the disappointments of the Web 2.0 seeks to redeem the internet from the pitfalls of platform capitalism. By reviving the hopes that inspired early crypto-activists, the “web of trust” promises to provide humanity a new realm of social and economic interaction with privacy as its cornerstone. Once again, techno-millennarianism seems to be on the rise.

Acknowledgments

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Notes

- ¹ A scenario that was already envisioned by the early crypto activists of the 1980s and notably in the seminal David Chaum (1985) article “Security without Identification: Transaction Systems to Make Big Brother Obsolete.”
- ² This is contrary to the French context, where religious speech has been totally excluded from the public sphere and cannot compete or merge with any secular discourse. This does not mean that religiosity cannot still be a pattern of action, but it cannot be used as an explicit rhetoric, whether for political, economic, or scientific purposes.
- ³ The “orange pill” is inspired by the famous *Matrix* movie scene where the protagonist has to choose between two pills. By choosing the blue pill, he will continue to live in an artificial, fantasy reality, while the red pill (orange in the crypto world in reference to the main color of Bitcoin) will allow him to enter the “real,” unconstructed reality of the world. In Bitcoin communities, the orange pill is linked to the belief that once someone has fully understood Bitcoin’s value proposition, they become a maximalist and envision Bitcoin as the only store of value worth holding.
- ⁴ In the same line can be cited the (now inactive) non-confessional church Way of the Future founded by ex-Google engineer Anthony Levandowski, dedicated to the worship of a general artificial intelligence to come.
- ⁵ A period that can be circumscribed between 1776 (the declaration of independence) and 1890 (the official closure of the frontier) in which communication network deployment was at the heart of the early internal improvement policy and later the frontier’s expansionist phase.
- ⁶ If subsist in the Calvinist theologies a heteronomic God, depraved humans are alone in the secular world to accomplish their destiny in the idea—right or wrong—that they themselves made about God’s will.
- ⁷ Respectively extracted from *Harper’s New Monthly Magazine* 1873; Field (1866); Lossing (1873).
- ⁸ See, for instance, the synthesis from the Esalen Institute’s cofounder Michael Murphy (1992).
- ⁹ “A catallaxy is a special kind of spontaneous order produced by the market through people acting within the rules of the law of property, tort, and contract” (Hayek 1976, 109).
- ¹⁰ This graph presents a concise overview of the two cosmological polarities that America oscillated between in the 1990s: on one hand, entropy or death resulting from the absolute institutionalization of socialism, which would suppress individual wills, and on the other hand, the “Ark-anarchy” or post-human condition that would emerge from a gradual emancipation from statism in favor of boundless individual freedom.
- ¹¹ The ephemeral city of Zuzalu, initiated in 2023 by Ethereum founder Vitalik Buterin to bring together “leading innovators in crypto, AI, governance, decentralized science, and culture” (<https://www.zuzalu.city>), offers another luminous illustration of these teleological confluences between the crypto world and transhumanism.

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The First Blockchain: Bitcoin, Entropy, Religion

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Bitcoin did not suddenly appear in November 2008, at the heart of the subprime crisis. It has matured over a decade, notably through the exchanges of Nick Szabo, Hal Finney, and others, with key moments such as the publication of "The God Protocols" by Szabo in 1997. The theological analogy developed in the introduction to that text, which theorizes smart contracts, raises the question: simple facetiousness, geek irony, or a clue to religious references? By analysing not only the founding texts but also the discussions in the Extropian or cryptography mailing lists in which Szabo and Finney took part, this article seeks to answer whether religious references (vocabulary, imagination, symbolism, structure) may have played a role in the genesis of Bitcoin.



Machines are much more than the children of reason, they are above all the daughters of imagination, dreams and myths; they are much more than technical instruments: they are metaphysical devices. From them, man expects more than liberating socioeconomic rescues, he hopes that they will bring him Salvation and deliverance, tearing him away from himself and his existential limits. But he also expects his consecration as an all-powerful Creator. And that's why he worships them. The essence of the machine is to be considered as a dispenser of ecstasy, even in its works of death, because we see them as necessary apocalypses for the emergence of new dawns.

Jean Brun, "Biographie de la machine"

Introduction

Often, humans enchant technology without even being aware of it. Most of the processes of re-enchantment are involuntary and largely unacknowledged. Digital technologies are not immune to this mobilization of the sacred. This was noted by many observers as early as the 1990s and continues to be demonstrated by the excitement surrounding every piece of news related to artificial intelligence. Indeed, W. A. Stahl has shown that the discourse on computers and the internet is magical and mystical (Stahl 1995, 1999). Lee Worth Bailey, in *The Enchantments of Technology*, writes that there is a background of enchantment in human engagement with technologies. He gives the example of android robots, which are arguably among the most enchanting machines (Bailey 2010, 155). As this article shows, blockchains are no exception to this phenomenon.

The blockchain is often presented as a "general-purpose technology," a neutral infrastructure that allows the renewal of communication procedures between individuals and increases their efficiency. It is a distributed transaction register, a decentralized database based on a peer-to-peer network. It is encrypted and thus avoids going through a trusted third party. It is also collectively administered by all nodes in the network. This is the paradoxical promise of a blockchain: disintermediate trust through a "trustless" technology. The blockchain thus marks the transition from a system based on trust to a system based on proof: if we trust the underlying technology, we do not need to trust anyone. As a tool for decentralization, it holds the promise of emancipation from centralizing powers, either economic or political. Yet, looking back on its genesis provides evidence of the tensions that have appeared since its birth, both within user communities and in its relations with existing institutions, whether they be justice, law enforcement, or financial structures.

My hypothesis is that there is a link between these tensions and the theological infrastructure at work in the blockchain. The formulation is abrupt, and has been considered as a supposition that this article attempts to verify by revisiting the

origins of Bitcoin, the first blockchain. What is the role of religious imaginaries and theologemes¹ mobilized around this technical device? At what level of this device do they operate? My starting point remains that their presence is not fortuitous or decorative, but that they play an active role in the configuration of the technical device. Is this a simple analogy by substitution, where the techno-scientific imaginary would recover the functions of the old religious imaginary? Or is it a more complex reconfiguration, variable according to the regimes of secularization, the actors, and the moments?

The notion of religious imaginaries must be clarified. It is used here as a component of the socio-technical imaginations developed by certain sociologists. The concept of the imaginary can be used to analyze society's relationship with technology. Indeed, technological development is always caught up in a web of social meanings. The choice of a technology or the failure of an innovation does not depend on purely technical issues, but also on a technology's ability to "make sense" and fit into a specific socioeconomic context. Infatuation with an innovation can contribute to its development in a certain direction. In this sense, American sociologist Sheila Jasanoff defines "socio-technical imaginaries" as "visions of desirable futures that emerge from a shared understanding of the forms of life attainable through scientific and technological development" (Jasanoff and Kim 2015, 4). According to this definition, the material measures employed to develop a technological innovation are always accompanied and supported by an equally important production of meanings. Of course, this work is partly in line with the sociological analyses conducted on the religious dimensions of transhumanism, notably by Robert Geraci (2010), Hava Tirosh-Samuelson (2012), or Liogier and Servais (2016), but with one particularity: the ability to analyze a technical device, not just discourses or narratives. One could even go further: the ability to analyze a technical device in its discursive and narrative dimension. Philosophers of technology Wessel Reijers and Mark Coeckelberg (2018) recently introduced the notion of "narrative technologies," which seems to fit well with blockchains.

A certain teleological conception of modernity believes that religion would disappear with time. In reality, religion has gone through waves of high and low intensity. Secularization is to be understood as an ongoing cultural reconfiguration in which questions of the theological-political, but also the theological-technological, intersect (Dupuy 2004). The basic argument of this article is that these elements are not a priori unknown technology. On the contrary, the processes of secularization mobilize them according to different modalities that are specific to each historical context.

The interest in studying the origins of blockchains is twofold. First, the main players are not motivated by religious convictions or affiliation, and some even consider themselves beyond such perspectives. That is why this study cannot resemble that conducted by David Noble in *The Religion of Technology*, where

the scientists and engineers he studied, whether in the field of biology or the conquest of space, often claimed themselves to be religiously affiliated. The second interest lies in grasping the core of the origins of a technology at a stage in its genesis (in Gilbert Simondon's sense) that enables the identification of tensions and structural features. The technical object is a socio-cultural construct in which social relationships and crystallized imaginaries can be read like sedimentations in a glacial core. Gilbert Simondon emphasizes that the genesis of a technical object is part of its identity (Simondon 1958).

After setting the appearance of Bitcoin in its Californian context and recalling the way it was cultured by the Extropian network cultured until it reached maturity, this article studies how religion and theology appear at all stages of the history of the first blockchain.

Cryptocurrency as a California Dream

Before the 1970s, cryptography was mainly practiced in secret by military or espionage agencies and was classified as category XIII on the United States Munitions List. But that changed with the United States government's publication of the Data Encryption Standard and the development of basic encryption techniques during the 1970s (Levy 2002). For the first time, someone with modest computer resources could encrypt a message in a hidden way for the authorities. The "crypto" became a tool everyone could use. In 1985, computer scientist David Chaum (founder of the International Association for Cryptologic Research) described the possibilities of developing systems that would guarantee user anonymity (Chaum 1985). In 1989, he launched the DigiCash project, which was inserted into the traditional banking system: it allowed the withdrawal of electronic bills with private key cryptography. Those electronic payments became untraceable by the issuing bank, the government, or a third party.

The trajectory of cryptography towards these cryptocurrency projects independent of any state structure is in line with what Benjamin Loveluck writes about computing in general: "Initially denounced as one of the most advanced embodiments of the alienation of the individual by technology, and as an impersonal machine serving the interests of the bureaucracy or the government, [computing] became one of the main tools for individual emancipation while at the same time providing a collective solution for dealing with the resulting severance of social ties" (Loveluck 2015a, 242).

As the appropriation of the internet began to spread, electronic money sparked the interest of multiple Californian actors. Indeed, David Chaum's project was widely discussed in the early 1990s in circles motivated by the defense of cyberspace, as evidenced by Stephen Levy's article in *Wired* (Levy 1994), but also in magazines like *Mondo 2000* or the multiple mailing lists around the San Francisco Bay Area. On the Cypherpunk list, commenting on Chaum's

work, Hal Finney (1992) clearly states the problem in a message often shared in the archives and on crypto mailing lists: “Here we are faced with the problems of loss of privacy, of deceptive computing, of massive databases, of increasing centralization—and Chaum proposes a completely different direction to take, one that puts power in the hands of individuals rather than in those of states and large corporations. The computer can be used as a tool to liberate and protect people, rather than to control them.” In this Californian melting pot, the cryptocurrency project acquired a structured ideological framework at a time when liberalism was more broadly being reconfigured by this new socio-technical dimension.

Indeed, the program of the “new economy”, which saw the internet as a new field for the extension of liberal capitalism, was quickly challenged by the hacker movement and that of free software. Both contested a second “movement of the enclosure” through the multiplication of patents and other limitations. The 1990s saw the emergence of cyberlibertarianism, notably embodied in the magazine *Wired*. For such radical liberals, who seek to extend the logic of the market to all aspects of social life, the economic and social sphere is a self-organizing organism in which the circulation of information is crucial: the full automation promised by the internet is obviously received as good news. They often mobilize Richard Dawkins’ thesis on memes as cultural entities. In their view, the internet is both the opportunity and the device of a major cultural revolution, supporting neoliberals, as evidenced by John Perry Barlow’s “A Declaration of the Independence of Cyberspace” in 1996: individual autonomy must be protected from any state interference; cyberspace must remain autonomous. Within this movement, other sensibilities are developing, such as the Cypherpunk movement, which mobilizes hackers to defend the free use of cryptography, imagining the advent of a “cryptoanarchy.” Tim May compares “the crypto” to the invention of the printing press, or a wire cutter that will “dismantle the barbed wire around intellectual property” (May 1992). It is in this context that many projects such as Wikipedia, WikiLeaks, peer-to-peer sharing systems, and cryptocurrencies have emerged (Loveluck 2015b).

In this nebula, the group that has most continuously worked towards and carried forward the project of a cryptocurrency, that truly “cultured” it until it could be implemented, is not the largest or most visible one. It also stands out for its global approach: the question of the flow of information is just one element of the complete overhaul of human existence advocated by the Extropian movement.

A Techno-Utopia Cultured by the Extropians

In 1988, Max More and Tom Bell founded Extropy, the first structured transhumanist movement. The Extropians seek to reverse the entropic dynamic. This formulation is not metaphorical to them. For human beings, Extropy

entails overcoming the limits of their biological condition through the increase of their physical and cognitive capacities, the eradication of aging mechanisms, spatial colonization through new technologies (cryonics, genetic manipulations, transmutation of the body into a cyborg, etc.), and a new worldview that must be embodied in a radically new lifestyle. Concretely, Extropy is a movement animated by a dozen active members who spread their ideas through a mailing list, a publication, and conferences, and probably had a few hundred sympathizers at the end of the 1990s.

Extropy constitutes in many ways a vanguard of transhumanism (Damour 2018b). Its modes of activism have greatly influenced the transhumanist movement, for example, through the formalization of positions in the form of a common charter (the Extropian Principles anticipating the Transhumanist Declaration, etc. with its FAQ); an inclination for speculation on technological developments rather than practices; and a concern to position itself as a think tank to influence the public debate. Its positions, even today, serve as a standard within transhumanism, either to conform to or distance from.

To better understand the Extropian system of thought, it is necessary to know a little bit about who the Extropians are. An analysis of the email addresses on the Extropian list allows for identification of half the members of the Extropy network in the winter of 1991–92, a year before it made cryptocurrency central to its program. It is a male network, most of whom have a professional connection to computers. It is possible to identify three subsets among the active contributors to this mailing list.

The most numerous subset is centered around physicist Eric Drexler, who was then in the limelight for “inventing” nanotechnology, partly through his bestseller *Engines of Creation* (Drexler 1986). The Extropian list includes members of groups interested in nanotechnology and space colonization, notably linked to the L5 association, of which Drexler was one of the main leaders in the years 1986–89 (Damour 2018a). It also includes members of the Xanadu project, founded and directed by Ted Nelson, on which Drexler worked in 1988 (Drexler and Miller 1988). The second set comprises computer scientists, often specializing in cryptography. Some of these individuals were also involved in cryptography-related mailing lists, including some who were part of the emerging Cypherpunk movement. These mailing lists are partly professional: technical questions and utopias such as cryptocurrencies are discussed. One can note the number of important actors linked to the nascent web industry: executive members of the Xanadu project; Jean-François Groff, a close collaborator of Tim Berners-Lee and Robert Cailliau at CERN (the European Organization for Nuclear Research); Mike Linksvayer, the creator of Creative Commons; Lee Daniel Cook, one of the architects of Wikipedia; not to mention Julian Assange, who was involved in the mailing list at one point. Of course, these different people do not take part in the mailing list

equally. There is a significant porosity between these more ideological lists, such as the Cyberpunks list, and the more professional discussion lists, where similar themes are discussed, and technical standards and processes developed. The third set is polarized by Max More: cryonics enthusiasts from the 1980s; members of the University of Southern California, where FM-2030 worked; members of the robotics and artificial intelligence laboratory of Hans Moravec; and other (Figure 1).

Extropy is thus a mix of personalities and institutions recognized academically or economically and marginal movements such as cryonics. This heterogeneous assembly is polarized around three horizons of expectation, three techno-utopias also in search of official recognition: cryptocurrencies; Drexlerian nanotechnology; and cryonics. As Finn Brunton has shown, it is essential to link them to understand them (Brunton 2019). It is probably significant for the purpose of this article to note the central role played by Ralph Merkle, the only member of all three sets. Merkle is a computer scientist and mathematician, and one of the inventors of public-key cryptography. The fact that one of the main architects of blockchains and cryptocurrencies is at the intersection of the three techno-utopias promoted by Extropy—cryptocurrencies, Drexlerian nanotechnology, and cryonics—suggests that these three are intrinsically linked. It is impossible to understand cryptocurrency according to Extropy without considering it alongside two other speculative technologies.

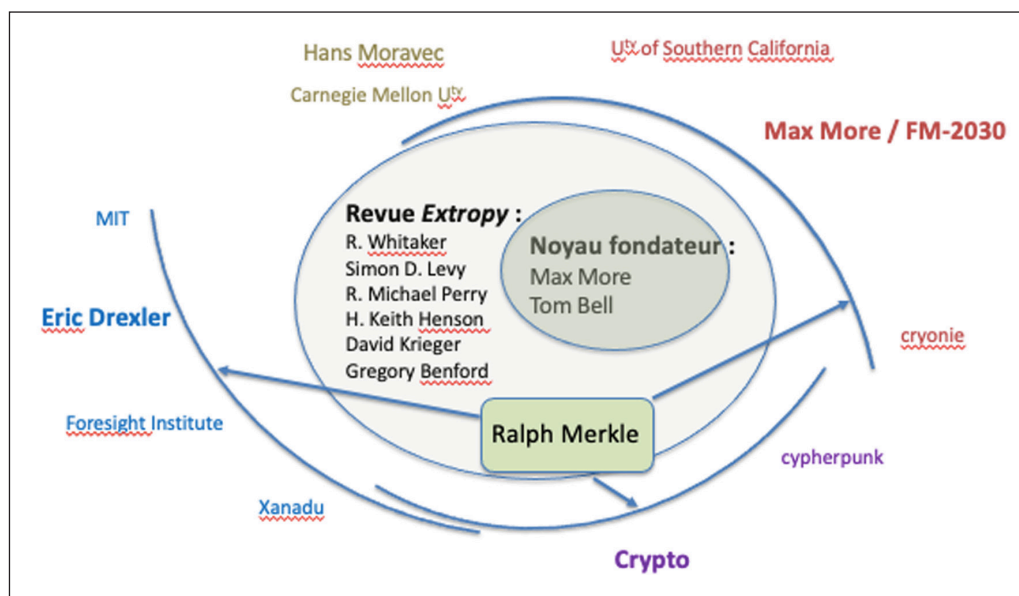


Figure 1: The three circles of Extropy in its early days. Source: Author, personal archives. This diagram visualizes an analysis of the users of the Extropian mailing list from December 1990 to December 1991. An analysis of the list's email addresses made it possible to identify half of the members of the Extropy network and characterize two-thirds of them.

Extropy made cryptography a major issue during the winter of 1992–93. It took its place among other techno-utopias such as nanotechnology, cryonics, and artificial life. The idea of a crypto was discussed on the Extropy mailing list from November 1992 onwards, giving rise to multiple exchanges between Tim May, Nick Szabo, Hal Finney, Charlie Stross, and Sasha Chislenko, all of whom are also found on other cryptography, or the nascent Cypherpunk, movement lists. Extropy, the movement's magazine, published a series of articles on the subject, including an article by Hal Finney ("Protecting Privacy with Electronic Cash" in the spring of 1993), an interview with Mark Miller, and the article where Nick Szabo theorized the idea of "smart contract," a key concept in blockchain, for the first time (Szabo 1996b). Extropians continue to speculate on cryptography, with as much assiduity as with cryonics, as evidenced by the gatherings called Extros. Thus, in June 2001, Extro 5 offered a series of speeches around privacy with Mark Miller, Nick Szabo, and Lee Daniel Crocker in San José, California.

But the network did more than just theorize about cryptography. Some of its members developed the technical device on which Bitcoin would rely in the future. The constituent elements of the technical device of Bitcoin are (De Filippi 2018, 15–30):

1. a decentralized database
2. dual-key encryption
3. the "hash" function
4. mining functions
5. a distributed consensus process.

Elements 3 and 4 were developed by major actors of the Extropian network.

The "hash" function is based on "Merkle trees." Invented in 1979 by Ralph Merkle, this technique uses a hash function to create a tree-like data structure. In this structure, each node has its hash, which is generated by the hash of all the nodes that stem from it. This mechanism allows for more efficient verification of the integrity of large databases. Bitcoin uses Merkle trees to organize transactions within each block of the chain, where each transaction can be uniquely identified by its fingerprint. As has been shown, Ralph Merkle is a prominent figure in the Extropian movement, at the crossroads of all the networks that comprise it.

Mining functions were gradually developed in various projects, including Adam Back's HashCash and the electronic payment systems BitGold and B-money, respectively designed by Nick Szabo and Wei Dai in 1998. B-money was theorized in an article by Wei Dai, cited by Nakamoto in the Bitcoin white paper: it uses the "proof-of-work" principle developed by Adam Back to secure email for issuing currency, with Wei Dai proposing to reward this work by issuing

virtual currency. The same year, Nick Szabo described BitGold, whose issuance is determined by the computing power spent to solve a mathematical equation.

However, BitGold introduces an element that allows the network to work asynchronously: the solution of each equation becomes an integral part of the next equation to be solved, thereby producing a series of transactions that are linked together chronologically. BitGold already presents most of the technical building blocks with which Bitcoin was built. Nick Szabo and Wei Dai are very active members of the Extropian network.

A functional prototype of a virtual currency was developed in 2004 by Hal Finney. He is a figure of the crypto: he worked with Phil Zimmermann on Pretty Good Privacy, or PGP, the first freely available, strong encryption tool, and designed the software's "network of trust" model for verifying the identity of PGP users. Finney is linked to the Cypherpunks and Extropians, actively publishing on their mailing lists and in the Extropian journal. Finney spotted Satoshi Nakamoto's Bitcoin white paper on a crypto mailing list in 2008 and immediately began exchanging emails with him, helping him debug his code and run his first transaction tests.

The hypothesis that Hal Finney or Nick Szabo is the enigmatic Nakamoto has often been advanced and discussed. Beyond the validity of these hypotheses, they are an acknowledgment of the role of Finney and Szabo—and thus of Extropy—in the creation of Bitcoin. This role is not exclusive: the idea of crypto belongs to the Californian zeitgeist, and Bitcoin cannot be exclusively linked to Extropy. Nevertheless, the cultivation of Bitcoin by Extropians is to be questioned and evaluated. This article does so while being attentive to the mobilization of religious or theological elements.

A Religious Imaginary

The analysis of this religious imaginary can be conducted on three levels: prospective texts; the vocabulary used and the choices made in the technical system; and the discourse within the blockchain communities. The prospective texts constitute a heterogeneous corpus in its form (articles, emails, manifestos) and describe the purposes and principles of a cryptocurrency. The technical device must also be analyzed for the technical choices made, with an emphasis on the white papers and the nomenclature used. Finally, the imaginary worlds mobilized in the form of images, vocabulary, and even narratives by the users organized in "community" should be considered.

Two metaphorical universes are mobilized around Bitcoin. Of course, there is the gold rush and the world of the pioneers, with the use of a vocabulary (miners, coins, gold, etc.) and images depicting them, contrasting strongly with the material reality of mining. In the American context, this can be placed in the register of the imaginary of the frontier and can be linked to the libertarian and Randian affinities of Bitcoin actors, even if transhumanists', Friedrich Hayek's,

reading of objectivism are very singular (Caré 2019; Brunton 2019). However, the second imaginary—religion—is more unexpected. It is the only referential mobilized across the three levels.

It is a diffuse, yet cobbled together and hybrid imaginary, often mobilized ironically. Its use undoubtedly stems from a very “geek” turn of mind, but that should not prevent it from being taken seriously. After all, the mobilization of revolutionary references in Tim May’s 1992 crypto-anarchist manifesto or Barlow’s 1996 “A Declaration of the Independence of Cyberspace” is also part of this mobilization that is both ironic and serious: these references are nevertheless interpreted as indicators of the ideology mobilizing hackers. In the same way, the uses of religion in the cyberculture of the 1990s, often interpreted as cybergnosis, or in an event like Burning Man, are both distanced and invested. It seems legitimate to interpret the religious references mobilized by blockchain communities as significant.

A quick analysis allows for the identification of the main elements that mobilize Christian references, as David Golumbia (2016) has shown. Some have claimed the title “Bitcoin Jesus” in order to identify their expertise or their claim position; a satirical Bitcoin church has been launched, with its own Ten Commandments; contributors to cryptocurrency have been called “true believers” from the beginning, and following another cryptocurrency is a form of apostasy, as with the creation of Bitcoin Cash; there are also fasting and feast days. This effervescence finds its foundation in the tutelary figure of Satoshi Nakamoto: this hidden prophet multiplied the proofs of his veracity in regularly issued messages before disappearing, giving free rein to speculation about his true identity. As Golumbia specifies, “Since its inception, speculation about Nakamoto’s true identity has been one of the galvanizing forces within the Bitcoin community. And few circumstances could have reinforced the cryptocurrency’s ‘distributed’ and ‘decentralized’ mythology better than a leader who seemed to waver in and out of existence, whose identity is likely fictional (Golumbia 2016).

How to interpret this appeal to the religious? First, it must be considered that this technical device is a currency. What gives Bitcoin its Golumbia is not its technical efficiency but rather the collective belief in its value. From this perspective, it is a currency like any other. However, it is a currency without apparent institutional legitimacy; therefore, it must draw on ideological legitimacy (Orléan 2019). In Europe, it finds justification in the political field, but a very particular political field (anarchism, left, or right), which in many ways take on forms of secular religiosity. The secularized system of the United States is of a different modality, allowing for the explicit mobilization of elements of religious ideology.

This mobilization also fulfills a function of “ideology masking,” to use Patrice Flichy’s terminology (Flichy 2001): the actual development of Bitcoin

sometimes gives rise to disillusionment, which the use of these religious references makes it possible to mask, no doubt explaining the ironic distance. It also serves to perpetuate narratives that hide the fact that the absence of instituting third parties has a very material cost: the development of an electrical network. Indeed, the solution found is the “proof of work” to guarantee the inviolability of the register. This proof of work is not real “work” but an energy cost. Any modification of the registry is very costly, and this cost is the price to be paid for the absence of trusted third parties.

There is also a governance issue. Indeed, Bitcoin operates thanks to an infrastructure that requires governance: contrary to the discourse surrounding it, there is nothing automatic about it. Nigel Dodd has described the hierarchy that allows to function, composed of a team of developers and discussions between groups of experts (“Bitcoin Classic” versus “Bitcoin Core”) (Dodd 2017, 2018). Technical choices must be made regularly, and these choices are negotiated between a small set of experts and the user community, with the former seeking the assent of the latter. It is within the framework of these technical choices, sometimes leading to “forks,” divergences within the blockchain communities, that, depending on the cultural contexts, this or that ideological aspect is mobilized (see De Filippi and Loveluck 2016; Rolland and Assen 2017). It is as if during moments of tension in governance, there is a reactivation of initial patterns, a need to carry out reform by returning to an original matrix. To understand this, one must go back to the prospective layers of the technical device.

A Theological Infrastructure

Among the prospective texts, those of Nick Szabo play an important role in the theoretical development of cryptocurrency. Little is known about Szabo’s biography, as he is very discreet and does not talk much about his background. He has, however, been a regular and central contributor to the Extropian and Cypherpunk mailing lists, just as his articles have generated a lot of commentaries.

In 1997, he published a major programmatic text, “The God Protocol”:

Imagine the ideal protocol. It would have the most trustworthy third party imaginable—a deity who is on everybody’s side. All the parties would send their inputs to God. God would reliably determine the results and return the outputs. God being the ultimate in confessional discretion, no party would learn anything more about the other parties’ inputs than they could learn from their inputs and the output. Alas, in our temporal world we deal with humans rather than deities. Yet, too often we are forced to treat people in a nearly theological manner, because our infrastructure lacks the security needed to protect ourselves. (Szabo 1997)

This text establishes an equivalence between theology and technology, with the latter replacing the former until it is sufficiently developed. This idea is frequent on the Extropian forum. Technology should allow access to an efficient and true social structure, a palliative device for humanity's mortal insufficiencies. This shows that, for the Extropians, the question of individual freedom is metaphysical rather than political.

What is Nick Szabo's God? One can already note that the figure of this "ordering" God is a familiar one, if not frequent, as the linguist Jacques Perret invoked it in 1955 when IBM asked him to find a word to designate these new economic calculators: referring to the "Deus Ordinator," he proposed "computer." This God who administers everything optimally and enables perfect communication—the realization of a horizontal communion that preserves the singularity of each—also calls to mind Leibniz's God: a perfect communicating God, as shown by Michel Serres (2007). Furthermore, according to John Elster, Leibniz's conception of providence is consistent with market logic—a thought that makes "forces" the fundamental unit of the universe, recognizes a pre-established harmony, and posits perfect rationality as the effect of a God maximizing his undertakings—which is not displeasing to an avid reader of Hayek (Elster 1975).

Indeed, Szabo seems to find in Friedrich Hayek the main keys to his worldview. In his criticism of nineteenth-century economic theories, Hayek continually denounces a "scientism" based on a hidden theological model—this God who could administer everything, who would have perfect knowledge—which is what classical economists seek, particularly Léon Walras, inventor of the theory of general equilibrium. Hayek criticized this claim, referring to an argument from seventeenth-century scholasticism: only God can know the totality of prices, but calculating and revealing it to humans makes no sense to him, so he leaves this question to the free action of the latter (Hayek 2007). This challenge had already been taken up by Pierre de Jean Olivi in the thirteenth century and relayed by the modern scholastics (Piron 2018). The influence of this theologian's *Treatise on Contracts*, which forged a number of key concepts in modern economics, starting with that of capital, is clear to see. Olivi, along with other Franciscan theologians, contrasted the diabolical figure that prevents money from circulating with the virtuous merchant who allows wealth to circulate: religious faith and the merchant's credit are two sides of the same *fides*, that trust that is so difficult to establish.

It is also possible to put Szabo's reflection into perspective within the framework of the American religious heritage, specifically the millenarian tradition of a techno-utopia where technical progress would allow for the realization of perfect communication, a kingdom already there. A lineage of American historians, from David Nye to David Noble or Harold Bloom, has well documented the investment of religious expectations in technical progress.

America is conceived as a second creation constructed, a new Eden. In his analyses of the religious currents born in the United States, Harold Bloom emphasizes the gnostic dimension of American religiosity, particularly since the Second Great Awakening, offering a synthesis between evangelicalism and the Masonic heritage (Bloom 1992; Noble 1997). Indeed, the Second Great Awakening (1795–1810), notably embodied by the evangelicals or the Church of Jesus Christ of Latter-day Saints (Mormons), proposes a resolutely optimistic vision of humanity and its actions and cultivates a progressive and nationalistic millenarianism. The great preachers of this revival, such as Francis Asbury or Charles Finney, proposed a voluntarist puritanism in which the transformation of the body tended to perfection, valuing a long life as a sign of the Election. Influence of the movement of “muscular Christianity,” born in England and diffused in the United States from the 1850s onwards, took over, especially through powerful associations like the Young Men Christian Association (YMCA). This analysis is still valid for the technological utopias of California at the end of the nineteenth century. It is significant that these Californian technological utopias developed in the 1970s and 1980s, a period marked by a major religious awakening in the United States, whose esoteric component nourished a strong sensitivity to the technological and scientific dimension. While charismatic revivals (the Charismatic Movement, Neo-Pentecostalism, and the Catholic Charismatic Renewal) seem less sensitive to the cosmic question, currents of Californian origin claim it, aspiring to a new alliance between science and religion, cultivating the idea that the use of technologies makes it possible to overcome levels of consciousness and metamorphose human intelligence, psyche, and even its body (Champion 1993). Thus, Marilyn Ferguson thinks she has succeeded in her groundbreaking book *The Aquarian Conspiracy*: she announces a new alliance between science and religion. It opposes classical science with another conception of science, one more sensitive to the global and spiritual dimensions of the universe.

This fusion of the scientific and the religious took other paths during the 1980s and the 1990s: the cult of the internet, which could take the form of “technopaganism” for Mark Dery or a “technognostic awakening” for Erik Davis (Dery 2007; Davis 1998). As early as the 1970s, engineers working on the development of the internet used religious metaphors, speaking of an immortal body in cyberspace. When Stewart Brand, Howard Rheingold, and John Perry Barlow created the WELL in 1985, the forerunner of discussion forums, it was to make it a tool for social and spiritual renewal. Oliver Krueger has studied these discourses that make the internet a moment in the evolution of the global history of humanity and the universe (Krueger 2007). To complete this picture, it would be necessary to describe how the apocalyptic breath that accompanied the conquest of space from the 1950s onwards has reappeared in the development of artificial intelligence in the following decades (Geraci 2010).

The Extropian movement, although defining itself as materialist, participates in this religious sensibility by describing technology as a religious experience: as has been discussed, technology replaces theology and assumes the same functions. Technology transforms (bodies and minds), transcends (increases human capabilities, overcomes its limitations), and unites (connects people), three expectations often linked to religion in the Western context. Some transhumanists perceive technological progress as a revelation, an experience of a religious nature that can simply replace religions, rendering them obsolete by fulfilling practices often conveyed in secret. Thus, when Gilbert Hottois decrypts the origins of the transhumanist idea, he emphasizes on the one hand, the opposition between transhumanism and religion, and on the other, an esoteric and gnostic subtext to Western history in which transhumanism would be inscribed: “We could, however, dig deeper and especially earlier toward alchemy, gnostic thought and mythology the idea of a technological material self-transcendence of the human species” (Hottois 2015, 41–42). The role played by esotericism in the origins of the movement has been described by Remi Sussan, particularly the work of Robert Wilson or the influence of Timothy Leary (Sussan 2016).

These contextual elements make it possible to reread Szabo’s texts differently. Thus, in a 1996 Extropy article, he describes smart contracts as follows:

I call these new contracts “smart,” because they are far more functional than their inanimate paper-based ancestors. No use of artificial intelligence is implied. A smart contract is a set of promises, specified in digital form, including protocols within which the parties perform on these promises . . . The legal force of the claim can be based on the text itself, rather than overstated, obscure, and often implicit interpretations about what “certifying” is supposed to mean. (Szabo 1996b)

According to Szabo, a smart contract removes the intermediation of human language. It bypasses human institutions and the difficult social and psychological work that accompanies their establishment and operation. It testifies about an aspiration to immediacy, to an automaticity that would do away with human transactions. This is not new; it is the characteristic of all writing. In the region of Susa in the fourth millennium B.C., the invention of envelope-bubbles proceeded in the same way. These envelope-bubbles were like clay purses containing calculi, small clay objects describing the contents of the merchandise the envelope-bubbles accompanied. Sealed, they allowed the recipient of the goods to know that the cargo delivered corresponded to that which had been sent—the word of the messenger, considered unreliable, was replaced by the fixity of the material trace. However, it is revealing that Nick Szabo (1996b) contrasts this animated contract with the “inanimate paper”: it mobilizes an

effective word, carrying the spirit/intelligence. Its legal force comes from the text itself: no need for hermeneutics, no need for interpretation. Szabo has examined the hermeneutic question where, criticizing a Heideggerian tradition, he imagines with Hans-Georg Gadamer (as he rereads him) and Hayek the possibility of a totally transparent transmission thanks to its automation:

I suggest that the “hermeneutic circle” of part and whole can be formalized along the following lines—the more bits of patterns, the more information we have; it is infeasible to learn from the whole. So we need algorithms that scan larger parts for the easy regularities, and smaller parts for the difficult regularities, then we need to compare, abstract and synthesize what we have learned about the parts, and so on. This is a whole field full of algorithms to discover, algorithms that approximate in polynomial time the uncomputable solution to the problem of learning from the whole. Put most generally, the problem of learning the whole is formalized as a matter of finding all regularities in the whole, which is equivalent to universal compression, which is equivalent to finding the Kolmogorov complexity of the whole. This formal method of analyzing messages is, not surprisingly, derived from the general mathematics of messages, namely algorithmic information theory (AIT). This formal model will apply most directly where the situation is formalizable: for example to induction from messages from the environment, scientific data. Formal models from AIT such as distance, logical depth, etc. can also be usefully applied informally. Indeed, “distance” has long been used in hermeneutics, again showing the strong similarities between these disciplines heretofore seen as about as distant as one could imagine—AIT at the forefront of modern computer science, and hermeneutics a seeming throwback to the Reformation theology. (Szabo 1996a)

The reference to reform is not anecdotal, but an indication of a structure of thought, which is seen even more clearly in the technical configuration of Bitcoin.

A Temporal Infrastructure

It is impossible to judge the technical choices that were made: what other technical devices could have worked? To answer such a question requires considering the technical possibilities, the purposes, the material, and the human context (resources, production, diffusion, etc.), which goes far beyond the limits of this article and its author. All that remains is to interpret and analyze the elements of language mobilized as close as possible to the technical device, i.e., the nomenclature of the technical elements and what Satoshi Nakamoto’s white paper puts forward. The interpretation of certain choices of vocabulary with religious connotations (the first block in the blockchain is called the “genesis

block”; the trusted entities that are part of a blockchain network, transporting information from the physical world to an intelligent contract, are called “oracles”, etc.) is difficult to conduct without a precise survey of those who chose them; otherwise, the door is left open to overinterpretations. Nakamoto’s founding text is a more solid basis.

Released on October 31, 2008, the white paper “Bitcoin: A Peer-to-Peer Electronic Cash System” describes a decentralized payment system with a virtual currency that can be exchanged between peers, without the need to go through any bank or financial intermediary. This preamble introduces the key elements of the system:

Commerce on the Internet has come to rely almost exclusively on financial institutions serving as trusted third parties to process electronic payments. While the system works well enough for most transactions, it still suffers from the inherent weaknesses of the trust-based model. Non-reversible transactions are completely impossible, since financial institutions cannot avoid mediating disputes. . . . What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party. Transactions that are computationally impractical to reverse would protect sellers from fraud, and routine escrow mechanisms could easily be implemented to protect buyers. In this paper, we propose a solution to the double-spending problem using a peer-to-peer distributed timestamp server to generate computational proof of the chronological order of transactions. (Nakamoto 2008)

For Nakamoto, timestamping is the pivot of technology, as it ensures the immutability that solves the problem of trust. The disappearance of a third-party organizer of human relations marks the end of traditional politics. In Nakamoto’s eyes, timestamping is, among all the technical elements constituting Bitcoin, the solution to eliminate the “cost of mediation” and automate hermeneutic work (Nakamoto 2008). In doing so, Nakamoto indirectly pays tribute to the work of Nick Szabo, because the main theoretical innovation of Bitgold, Szabo’s proposal to create a cryptocurrency ten years earlier, was to use strict timestamping as a guarantee of the system’s efficiency as a fiduciary foundation. This element allows the network to operate asynchronously: the solution to each equation becomes part of the next equation to be solved, producing a series of transactions that follow one another in chronological order. This mechanism allows the issuance of new money to be timestamped. Thus, the nodes of the network can verify at any time the validity of a transaction in connection with its execution in time. This solves the “double spending” problem that affects most decentralized electronic payment systems. But this temporal dimension is not simply a technical element in Szabo’s eyes.

Indeed, Szabo's interest in the question of time and clocks is part of a much broader deep thinking, both political and metaphysical. He expresses this in one of his articles, "A Measure of Sacrifice," peripheral to his computer activities but central to his thinking. In the article, Szabo looks back at the appearance of mechanical clocks in Europe in the thirteenth and fourteenth centuries, when the question of time had led to a series of historical publications, which Szabo cites. For him, the possibility of a quantified and reliable measurement of time allows an essential operation to the structuring of human societies:

First with the bell towers, then with their new clocks, Europeans measured with increasing accuracy and integrity the quantity of a most basic human quality—the sacrifices we make for each other. . . . The most important institutional breakthrough that accompanied the clock, the time-rate wage, was based on a largely implicit idea that grew with the invention of the clock—the idea of time as a measure of the sacrifice. Mechanical clocks, bell towers, and sandglasses provided the world's first fair and fungible measure of sacrifice. So many of the things we sacrifice are not fungible, but we can arrange our affairs around the measurement of the sacrifice rather than its results. Merchants and workers alike used the new precision of clock time to prove, brag, and complain about their sacrifices. (Szabo 2002)

Mechanized time measures sacrifice. What is this sacrifice? The sacrifice of time "we make for each other." At the start of his article, Szabo quotes a passage from Plautus in which an idler complains about solar clocks, which exert a moral constraint because they count time objectively, using the movement of the stars. Szabo's problem is to optimize the sacrifice each person makes of his or her time. By quantifying time and freezing it in irreversibility, the clock provides a solution. Timestamping is only the ultimate result of this process, by implementing the clock in money, i.e., to merge the measurement of sacrifice and its translation into monetary value. The measurement of time makes it possible to define an optimal price and create an efficient market, which is Szabo's immediate concern. But it is striking that he formulates this not with the concern to coordinate supply and demand, but with that of optimizing sacrifice, of distributing sacrifice among all in such a way that everyone receives a just reward. The aim is to ensure that there is no time theft between economic players, to establish a technical system whose efficiency will have made trust unnecessary. For medieval theologians, the issue of "time theft" was the same as that of interest-bearing loans. Olivi was one of those who lifted this theological assumption and, in turn, justified capitalist activity (Le Goff 1986).

The blockchain's timestamping feature goes a step further by preventing reversibility. It guarantees transmission and communication and makes them

robust by economizing on mediation and hermeneutics: there is nothing to interpret because the text itself self-certifies through timestamping. The technical device is self-founding. The blockchain is thought of as the socio-technical translation of a new relationship with time and a new social contract. Indeed, the blockchain carries with it the ideal of an indelible, unfalsifiable memory constituted in a decentralized manner. Each transaction recorded on the network is grouped in a block that fits into the previous block through a cryptographic validation process. Each new block forces the whole chain to undergo a new cryptographic treatment. There is therefore both intangibility and a rewriting that is always starts over. So, there is no need to interpret the blockchain to ensure the validity of what it records. The blockchain achieves this transmission without intermediaries, without interpretation, because it is automated: it is a hermeneutic freed from any hermeneutist, an immediate revelation, which underpins the idea of a “smart contract.”

The automated temporality implemented in the blockchain addresses two distinctly theological questions that concern Nick Szabo: the issue of immediate transmission, devoid of hermeneutics, and just retribution for the temporal sacrifice made. These questions are closely intertwined with the concept of an optimized monetary system. The amalgamation of these inquiries might appear incongruous, given human’s collective memory loss regarding the theological underpinnings of economic theory (Piron 2018; Hayek 2007; Perrot 1992).

These two questions should also be understood within the context of the Extropian program, which aims to equip humanity with technologies (cryonics, cryptocurrency, nanotechnology) that facilitate a detachment from our temporal reality (Brunton 2019; Damour 2018a, 2023).

The analysis presented here aligns with those establishing a connection between the transhumanist perception of time and millenarianism, as explored by François Hartog in his essay on the articulation of temporal modalities, namely “chronos” and “kairos,” in Western culture. Examining contemporary representations of the future, Hartog posits transhumanism as an ultimate avatar of Joachimism, aligning itself with the legacy of Joachim de Flore and his millenarianism (Hartog 2020; De Lubac 1979–81; Geraci 2010). It is also worth noting that Pierre de Jean Olivi developed an eschatology in the tradition of Joachim de Flore.

But explicitly linking Szabo’s or Nakamoto’s positions to American millenarianism or Joachimism is, of course, impossible. These connections are intended solely to underscore the presence of theological structures, or theologemes, working alongside others—an ordering god, the self-founding text, optimized sacrifice—that ultimately coalesce into a system, forming a theological matrix of the blockchain. This matrix is reactivated when its development encounters a governance crisis, drawing upon religious references.

Conclusion

Religion contributes to the aura of the Bitcoin technological device: it allows for mobilization, creates a sense of belonging, confers legitimacy, obscures real governance, and brings compensatory satisfaction. It bridges the gap highlighted by Antoine Garapon and Jean Lassègue between the logic of the blockchain and that of institutions. This disconnects the graphical order and the spatiotemporal order that “only a surfeit of belief attempts to synthesize” (Garapon and Lassègue 2018). However, this mobilization of religion, mostly Christianity, is not merely a “supplement of the soul” (Bergson 1932). It is implemented in the blockchain from its inception and is part of the “soul” of the blockchain, so to speak. The theologemes constitute a subtext of the technological proposal and allow it to be inscribed in a collective narrative, to give it meaning and orientation.

They undoubtedly contribute to the narrativity of this technical device, which has been considered revolutionary (in the 2000s) or disruptive (since the 2010s) by its promoters: by proposing to reform the temporal structure and short-circuit any hermeneutics, the blockchain is invested with the theological charge of the Reformation. Without doubt, this also contributes to its reception as a spiritual and emancipating experience.

Gilbert Simondon can help an understanding of this. The technological does not go without the religious in Simondon’s philosophy. The religion and the technology are the result of a “dephasing” of the same “primitive magic unity” (Simondon 1958). This is not in the sense of a historical origin but of a logical or “genetic” origin: the technicity and the religiosity are thus essences as modes of being in the world, connected by laws of transformation. Religion is, in Simondon’s view, a phase of culture in which the “fundamental qualities” have developed and detached from the “figures” of the primitive magical unity (Simondon 1958). Symmetrically, in this same cultural phase, technology has developed the “figures” in the form of detachable elements from the foundation. Religion and technology thus respectively generate the first “subjects” (the divine, the priest) and the first “objects” (artifacts) in this world. Spirituality, for Simondon, is then the higher form of the trans-individual, the intuitive consciousness that the “pre-individual charge” the subject possesses always allows to rise and progress. It is not surprising that the blockchain can be invested with this expectation. Yet to dwell on this observation would be to miss the essential: not all spirituality and theology are equal when it comes to building a common world and technological systems that protect and cultivate rather than enslave and destroy.

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Note

- ¹ A unit of theological meaning is called a “theologeme,” and theologemes combined according to their own syntax constitute a particular theology, a theological system. Here, “theologeme” designates the use of theological concepts outside a religious context for their symbolic charge, their semantic richness, or their historical depth (Pagé 1982).

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Perverse Attraction: Idolatry, Pornography, and the Making of Infrastructure

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The making of novel infrastructure often involves some kind of faith. This article considers a pair of experiments in the context of blockchain infrastructure led by entrepreneur Ameen Soleimani: MolochDAO and SpankChain, a grant fund and a sex-worker payments network, respectively. These enact a strategy we describe as “perverse attraction,” or the inversion of dominant moral hierarchies as a means of cultivating faithful practice around a still-incomplete infrastructural project. Although the technology at play is new, the strategy for advancing it reiterates the development of past infrastructures, from print cultures to the early internet. These precursors and the present case suggest that the strategy of perverse attraction, while occurring under the guise of empowerment, risks reinforcing the marginalization of its human participants.



Introduction

In a reflection on discourses surrounding economic development, media scholar Lilly Irani (2019, 223) asks, “How do you popularize an infrastructure?”—and, more particularly, “What if infrastructure exists but people have not taken it up?” To these questions this article proposes one possible answer: a strategy we refer to as “perverse attraction.” Through this concept, we mean to highlight practices that employ the inversion of dominant moral hierarchies as a means of cultivating faithful practice around a still-incomplete infrastructural project.

This article presents perverse attraction through the examination of public texts related to the work of Ameen Soleimani, a contemporary entrepreneur influential in the subculture surrounding the Ethereum blockchain. Ethereum is a distributed-ledger protocol, first released in 2015, capable of processing arbitrary “smart contract” programs across a decentralized network. Supporters believe Ethereum is capable of far larger influence and importance than it has thus far achieved, to the point of restructuring economic and organizational life (Swartz 2017; Buterin 2022). A deep-seated commitment to the idea of decentralization has drawn a loyal base of advocates. However, their visions of its potential can be realized only through mass adoption. Since Ethereum is not a governmental public works program imposed from above, adoption is contingent on its ability to spread through voluntary use: early adopters, on multiple sides of markets, inviting in those around them until the boundaries of its periphery dissolve into ubiquity. Soleimani is among those who have adopted this goal as a way of life and a livelihood. He is best known as the founder of MolochDAO and SpankChain, an idolatry-themed grant fund and a sex-worker payments network, respectively.

This article draws on Soleimani’s career, along with its broader context, to inductively theorize perverse attraction for the analysis of mediating technologies and religious cultures. To be clear, it is not our intent to claim that perverse attraction is a necessary, or effective, strategy for building infrastructure. We restrict our ambition simply to identifying, describing, and considering its ethical implications. Further, when we speak of the “perverse,” we do not mean to make a claim about the ultimate moral status of any particular phenomena; rather, we refer to their perversity in relationship to dominant moral and religious norms—as an analytic concept rather than a normative one. This article details how perversion can operate as a technique for establishing novel, voluntary infrastructures.

While this analysis focuses on Soleimani’s career, we suspect perverse attraction has been used across diverse contexts, long before the advent of blockchains. Slavoj Žižek’s *The Puppet and the Dwarf* (2003) claims to identify, as its subtitle puts it, a “perverse core of Christianity”—particularly in the

thought of the religion's most prolific early church-planter, the apostle Paul. Paul celebrated the off-putting quality of his gospel, writing to his followers, "We proclaim Christ crucified, a stumbling block to Jews and foolishness to gentiles" (1 Corinthians 1:18 NRSV). If Žižek is right, Paul built the network infrastructure of early Christianity on the attractions of the perverse; the use of perverse attraction seems to appear not only among subversive startups but also in new religious movements that eventually establish dominant moral orders. Although Paul and Soleimani represent very different kinds of infrastructural aspirations, both find in perversity a strategy for constructing still-aspirational networks, attracting the early adopters who will form the basis of eventual mass adoption—whether it is the conversion of the Roman Empire or the rise of a new digital infrastructure for decentralized coordination. As Silvia Federici (2004) shows in her analysis of witch hunts and the rise of capitalism, performances of perversion can also repel people away from legacy infrastructures and draw them toward new ones.

This article builds on and contributes to past scholarship exploring the interrelations of religious phenomena and mediating technologies (Hoover 2006; Stolorow 2005; Campbell 2012). Since our case study involves the intentional use of idolatry and pornography, its symbolic universe implicitly relies on dominant religious norms that categorize certain activities as perverse. In particular, we engage with research on religious entanglements with media infrastructures (Supp-Montgomerie 2021a; Ellis 2020). Infrastructure scholars have stressed the theme of visibility and invisibility (Parks 2007, 2015; Supp-Montgomerie 2021b), which is also a central theme for us—in this case, the visibility that can occur through the practice of pornography. We thus bridge infrastructure studies with literature exploring pornography as a pioneering practice for new technologies (Coopersmith 1998, 2000; Barss 2010; P. Johnson 1996). The stakes of blockchain infrastructure are particularly high given the degrees of control possible through protocols (Galloway 2006)—a type of infrastructure that sets the basic rules of communication across a network.

The article begins with an overview of the case study, introducing the two major projects of Soleimani's career. It then explores historical precedents and, through an analysis of the case, presents the concept of perverse attraction. The subsequent section considers the claims of empowerment through blockchain-based pornography in light of past experience and scholarship. By the end, it will have introduced a strategy for infrastructure development and called into question some of this strategy's basic claims.

From MolochDAO to SpankChain

On Valentine's Day 2019, Ameen Soleimani announced the deployment of the smart contract representing MolochDAO on the Ethereum blockchain

(MolochDAO, n.d.-b). As the name suggests, the code was intended to be the basis of a DAO, or decentralized autonomous organization—an organization governed by rules described in software on a blockchain and carried out through virtual tokens rather than conventional processes of legal incorporation. MolochDAO proved a landmark moment in the development of the growing subculture surrounding blockchains, cryptocurrencies, and DAOs that this article refers to collectively as “crypto.”

The arrival of MolochDAO occurred in the depths of the “crypto winter,” a downturn following the speculative frenzy of early 2018. The first prominent DAO, called simply “The DAO,” had been decimated by a hacker soon after its launch in 2016, nearly taking Ethereum as a whole down with it (Reijers et al. 2018). MolochDAO would involve many of the same leading figures in the Ethereum community. It was a collectively governed grant fund, an attempt to lift the spirits of Ethereum true believers by channeling valuable digital tokens to projects deemed worthwhile (Soleimani et al. 2019). Soon, it was distributing hundreds of thousands of dollars in donated cryptocurrency each year (MolochDAO 2022).

The “Moloch” part of MolochDAO’s name was suggestive as well. Moloch is an ancient Canaanite god in the Hebrew Bible whose followers appear to practice child sacrifice. In this story, Moloch stands as a canonical example of the Jewish and eventually Christian concepts of idolatry (C. L. Johnson 2006). Soleimani explains that he took the name for the project from an essay by the blogger Scott Alexander. The essay, “Meditations on Moloch,” dwells on the portions of Allen Ginsberg’s mid-1950s poem “Howl” that invoke Moloch (Alexander 2014). This passage from “Howl,” for instance, became the background of MolochDAO’s Twitter account: “Moloch whose mind is pure machinery! Moloch whose blood is running money! Moloch whose fingers are ten armies! Moloch whose breast is a cannibal dynamo! Moloch whose ear is a smoking tomb!” (Ginsberg 1956).

The conventional reading of Ginsberg’s poem is as a denunciation of 1950s America—“ensconced in suburban comfort, conformity, and the official ideology of containment” (Gray 2010). Against the buttoned-down Cold War empire of IBM suits and “one nation under God,” Ginsberg presaged the 1960s rebellions that were only beginning to brew. Half a century after it was written, however, Alexander read “Howl” differently. Ginsberg’s Moloch, for Alexander (2014), represents a more technocratic sort of complaint: “insufficient coordination,” “a perverse failure to optimize.” Moloch is the condition in which “every single citizen hates the system, but for lack of a good coordination mechanism it endures” (Alexander 2014). No longer is “machinery” really the problem, because for Alexander, “technology has the potential to seriously improve coordination efforts” (Alexander 2014). With

this reading in mind, the homepage for MolochDAO situates the DAO's participants in a cosmic, technology-aided showdown: "This demon god of coordination failure, who consumes our future potential for perverse immediate gain, will be slain. Pledge your oath to his demise, or go down with him" (MolochDAO, n.d.-a).

MolochDAO iconography, on its website and elsewhere, warns against too much seriousness about any of this. There are scary drawings of a horned god crowned with an Ethereum logo and a color scheme of black covered in dripping red blood. This depiction reflects the negative associations that tend to accompany the idol Moloch in societies heavily influenced by Christian traditions. Then comes a bright stock photo of people in office wear collaborating happily around a computer, with a bloody logo hastily added to the papers on their desk. The purpose appears to be not some literalistic belief in or against Moloch but a unifying mythology for a community in the crisis of an economic downturn, both a dead serious and inside joke. It served to organize the Ethereum community around a shared purpose, one not reducible to a token price or immediate use-value in the world as it is. As Soleimani puts it, "If you can't name your enemy, you can't fight them" (Soleimani, Twitter direct message to authors, January 12, 2023).

By the end of 2020, coronavirus-induced lockdowns began to fuel a speculative boom in crypto. Sales of non-fungible tokens (NFTs) tied to digital artworks led to an unprecedented rise in Ethereum's value. That year, the Moloch mythology took hold in another Ethereum-based DAO, Gitcoin. Like MolochDAO, Gitcoin's mission is to direct funds toward "public goods"—typically understood in these contexts as open-source software in the Ethereum ecosystem. To bring donations into its grant-making pool, Gitcoin produced a trio of comic books depicting the horned beast, determined to dis-coordinate the Earth, and doing battle against ETHbot, a neon-green, Transformers-style mechanical protagonist (Owocki 2021a, 2021b). The aesthetic was markedly different from MolochDAO's spooky black-and-red color scheme; Gitcoin paraphernalia emphasized the green robot, inviting people into the noble work of slaying Moloch rather than into the world of Moloch himself (Figure 1).

On the website greatestlarp.com, during the fall of 2021, Gitcoin orchestrated the sale of Moloch-themed NFTs, the proceeds of which would fund the matching pool for grants (Owocki 2021a). The reference to LARPing—live-action role playing—once again signaled that this cult of Moloch was not to be taken as a genuine religious movement. And yet, the performance raised genuine quantities of virtual money: 275.05 Ethereum tokens, or the equivalent of US\$494,034.13 when the sale ended on October 8.

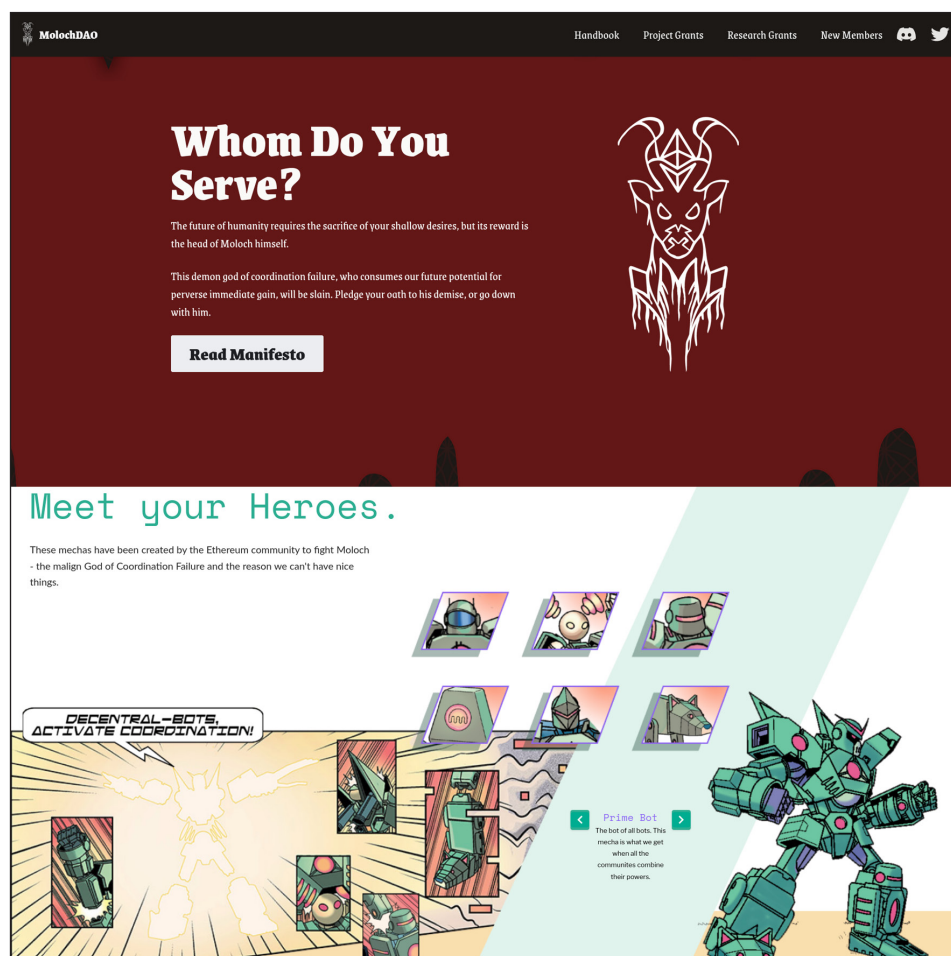


Figure 1: Excerpts from the websites of MolochDAO (top) and the Greatest LARP (bottom) circa September 2022.

All the while, Soleimani had another project in the works. In 2017, he attempted to pitch the New York crypto venture fund where he worked, ConsenSys, on creating an “evil” branch in San Francisco. His slide deck included a drawing of Moloch accepting a child as sacrifice (Munster 2019). In a later deck introducing his new company, SpankChain, he explained that the most likely path to widespread consumer adoption of crypto would be through the kinds of activities that lend themselves to illicit subcultures. The drugs phase happened with the early Bitcoin marketplace Silk Road (Van Hout and Bingham 2014), and pornography was next. ConsenSys founder Joe Lubin told a reporter, “He wanted to do all the dark things” (Munster 2019). When Lubin did not support the proposal, Soleimani went West anyway. SpankChain initially launched as a webcam platform that enabled performers to host shows. The brand eventually grew to include a SpankChain-specific token, Booty. SpankChain raised the equivalent of US\$7.5 million in the 2017 “initial coin offering” craze—selling tokens to investors on the promise of a future product—and released a demo on the first day of 2018 (Figure 2).

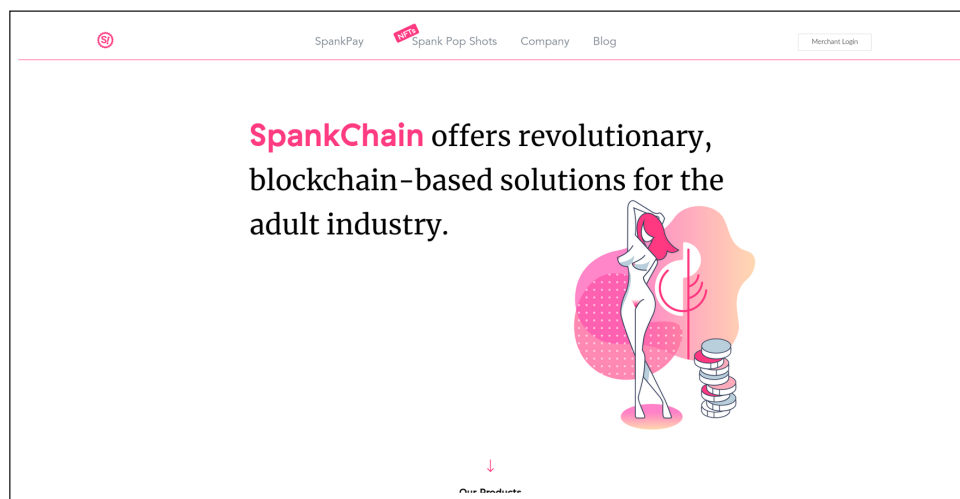


Figure 2: The top of the SpankChain website, circa September 2022.

Despite the existence of over a dozen pornography-related crypto projects at the time (Klein 2018), SpankChain gained traction as the first to generate a meaningful user base (Cuen 2018). With help from advisors in the adult entertainment industry and a strong technical team, SpankChain drew over 700 performers and 4,000 users within a year of its initial release (Munster 2019). Soleimani's branding prowess became apparent as news of SpankChain appeared in outlets ranging from the industry website *Decrypt* (Munster 2019) to *Rolling Stone* (Barrett-Ibarria 2019). Adult entertainers and SpankChain advisors espoused the potential of blockchains to liberate sex workers from the discrimination of financial institutions. Major credit card companies and online payment processors have been known to reverse charges made for sex work or ban alleged sex workers from using their platforms (Barss 2010; Motherboard 2022; Barrett-Ibarria 2019). Gabi, a SpankChain ambassador and cam model, told one reporter, "I think SpankChain is on the cutting edge. It's trying to solve a lot of these problems that are rampant in the industry" (Barrett-Ibarria 2019). Multiple performers echoed this sentiment. In a SpankChain blog post, pornography performer Janice Griffith wrote, "[SpankChain] is going to change everything we know about how to run our businesses" (Griffith 2017).

Meanwhile, on crypto-centered podcasts and in publications, Soleimani repeatedly explained how the adult entertainment industry could demonstrate the potential of crypto across society. SpankChain garnered acceptance, notoriety, and faith from subsets of both the crypto and adult entertainment communities. In 2019, the company introduced SpankPay, a tool that enabled performers to accept crypto payments. SpankPay allowed performers to retain 99.5 percent of their earnings, in contrast to third-party payment processors that frequently charge a 10 percent fee from adult performers.

This part of the project, however, was short-lived. In March 2023, SpankPay shut down after Wyre Payments terminated its contract. The upstream payment

processor claimed SpankChain had violated the network's terms of service (Nelson 2023). SpankChain's cam site is no longer active, and as of early 2023, the combined value of SPANK, the utility token that can be used to generate Booty, had fallen from its all-time high of US\$178 million to US\$0. As of January 2024, SpankChain continues to operate SpankMatch, a professional networking platform for the adult entertainment industry, and SpankUniversity, an educational platform focused on sex-worker health, as well as political advocacy initiatives for the industry.

Meanwhile, MolochDAO's design and nomenclature became the basis of DAOHaus, a popular platform for creating—or “summoning”—new DAOs. In that way and more, the singular intervention became infrastructure. SpankChain was also an early adopter of “state channels” for payments, which allow many transactions to be packaged within just two transactions on the blockchain—an efficient technique that has since become an important part of the broader Ethereum ecosystem.

Belief, Infrastructure, and Perverse Attraction

In an October 2020 podcast, Bitcoin founder Kevin Owicki and Soleimani riffed together on the Moloch mythology, during which Owicki spoke of “belief”:

If everyone went home and believed really hard in Bitcoin as a store of value, then it would win, immediately. And that is interesting, because it points out how much of these things are just based on belief. With Ethereum it's a little harder. It's not so much enough to believe in Ethereum. You also have to build useful stuff on it to get people to use it and then believe in it. (Soleimani and Owicki 2020, 00:33:22–00:34:07)

That is, as just a currency, Bitcoin could succeed on assent alone; but as an infrastructure for far more expansive applications, such as programmable contracts and entire organizations, Ethereum requires works as well as faith. Both MolochDAO and Bitcoin took that theory to heart as projects designed to funnel funds toward people who would build “public goods” with Ethereum (Soleimani and Owicki 2020). Both got their start at a time when faith seemed most necessary, during a severe downturn in the cryptocurrency market. They used the specter of Moloch, as the god of coordination failure, to motivate the “public goods” that could undergird faith in the nascent crypto infrastructure.

The idea that building infrastructure might have something to do with faith is not original to crypto. Scholar of religion and media Jenna Supp-Montgomery's book *When the Medium Was the Mission* (2021a), for instance, documents in detail how Evangelical Christian theology informed and motivated

the “infrastructuralist meaning” of telegraph lines, as well as other electronic communications networks. Writes Supp-Montgomerie (2021a, 23; emphasis added):

Cabled network media came into being tethered to a series of promises about the possibilities for technology, social life, the future, and communication. They were understood—*even before they worked*—as a brand-new technology that would create social unity in a flawless future through instantaneous, ubiquitous, frictionless communication. They were understood as connective and divine.

New infrastructures propose to make possible what was not possible before them. But infrastructures do not manifest their possibilities immediately or all at once. They are frequently subject to network effects (Katz and Shapiro 1994), whereby their value becomes evident only as they connect a large number of nodes. If there is only one road to drive on, most people will not see fit to buy a car; when roads cover the most desirable routes of travel, cars seem essential. From start to finish, the making of infrastructure is a matter of promulgating certain imaginaries. Kelsie Kabben characterizes crypto as “a collective exploration in ‘self-infrastructuring,’” an ongoing and prefigurative process (Nabben 2023, 1). For those outside crypto’s devoted subcultures, even its most basic infrastructures seem to remain in that stage of “even before they worked.” Using them requires patience and technical workarounds, motivated by a kind of faith that the new infrastructures will continue growing in power and someday overtake the old ones. Lana Swartz (2022) has gone so far as to suggest that the development of crypto infrastructure has amounted to a “network scam,” ultimately designed not to work but to extract from people who believe it will.

Bitcoin’s strategy surrounding Moloch was much like that of the telegraph missionaries Supp-Montgomerie has studied—an evangelical optimism based on the expectation of imminent triumph. While Bitcoin presented a hopeful story about people coming together, coordinating, and slaying Moloch, MolochDAO’s iconography bet on a kind of dark kinship. Both the idolatry of Moloch and the pornography of SpankChain reflect a theory that the best way to achieve the network effects necessary for functional infrastructure is to start in spaces that the dominant culture regards as illicit. This theory builds on the concept of “disruptive innovation,” canonical among technology startups, which holds that the most transformative businesses arise from once-marginal markets (Christensen, Raynor, and McDonald 2015). Perverse attraction adds the supposition that, in order to find those marginal subcultures of true-believing early adopters, the entrepreneur should identify dominant moral norms and subvert them.

Perverse Precedents

The strategy of perverse attraction, like that of evangelical optimism, has precedents. Well before SpankChain, observers noticed how pornography feeds the development and adoption of new technologies, from ancient sculpture and the printing press to VCRs and the internet (Barss 2010; P. Johnson 1996; Coopersmith 1998, 2000). In these accounts, pornography becomes a path for the adoption of new technologies precisely because of its existence outside the moral infrastructure. While the cost in time and resources of adopting a new technology may be prohibitive for most uses, advances in privacy and content delivery are worth the trouble for pornography. The more that dominant norms push pornography to the margins, the more pornography adopts this pioneering role.

For instance, pornography provided the basis for a flourishing magazine trade, attracting buyers and advertisers to converge around such titles (in the United States) as *Hustler*, *Penthouse*, and *Playboy*. These became among the most popular magazines during their peak in the mid-1970s, and they later were among the early success stories of the world wide web (Coopersmith 1998, 100). Meanwhile, by skirting (and pushing) the edge of what society considered pornography, the retail chain Victoria's Secret became a defining attractor for the late twentieth-century shopping mall (Juffer 1996; Stokrocki 2001).

"In the twenty-first century," journalist Patchen Barss (2010) finds, "the influence of the porn industry on new communications devices may still be dirty, but it is no longer a secret. It is part of the standard business model." Soleimani adopted this "standard business model" when he presented pornography as the next logical step for blockchain technology.

Soleimani's logic is also rooted in the affordances by which crypto could enable sex workers to gain greater agency and evade the repression that so often targets them. Blockchains introduce opportunities for enhancing privacy protections through the cryptography that is part of the underlying basis of the technology. And because cryptocurrencies themselves are rarely used and sometimes prohibited in mainstream economies, the speculative gains among early adopters mean that blockchains hold stores of financial value that cannot be easily spent above ground (De Filippi and Wright 2018; Corbet et al. 2018). This, paired with the relative insulation of the pornography trade, presents an opportunity to generate a multisided marketplace infrastructure without having to compete head-on with mainstream competitors. The appearance of perverse attraction in crypto thus attempts to leverage a well-established practice for a new kind of infrastructure.

Perverse Attraction as a Strategy for Blockchains

Soleimani has identified his infrastructure-building strategy with the management discourse of polarization-based marketing. He told one podcaster, for instance,

“The closer you get to fifty-fifty polarizing, the more viral you’re likely to go” (Draper 2018). Polarization marketing, generally, is based on the recognition that inserting a brand into an area of contention in society can draw intensity from the conflict, in turn intensifying the attention on the brand and some consumers’ attachment to it (Luo, Wiles, and Raithel 2013).

At risk of turning Soleimani against himself, however, we suggest that this is not what MolochDAO and SpankChain are doing. The god Moloch is not really a matter of widespread controversy in the twenty-first century; pornography sometimes stirs controversy but usually remains both widespread and out of public view. Rather, as Soleimani has also put it, his brands act as “memetic filters,” drawing together the specific audiences needed for each particular project: coordination-obsessed software developers, for instance, and people willing to use a new technology to access and produce pornography (Munster 2019). And yet, memetic filtering is only part of the strategy at hand.

Guided by the practice of Soleimani and his precursors, the strategy of perverse attraction involves several stages. First, it attracts participation into an infrastructure through the allure of the perverse, particularly among people most willing to depart from dominant infrastructures. Second, it bounds (or filters) that participation to the subcultures that dominant norms classify as perverse; this enables the infrastructure to develop around achieving self-sufficiency for a finite use-case, whose participants are willing to tolerate a work in progress. Third, the infrastructure deepens participant loyalty through the promise of empowerment, offering to render the perverse attractor no longer perverse nor marginal. Finally, success in serving a limited use-case attracts more widespread adoption, presumably to the point of superseding previously dominant infrastructures.

If building infrastructure is the overriding goal of perverse attraction, however, the strategy presents a quandary: As an infrastructure approaches mainstream adoption, what becomes of the people whom it enlists as perverse attractors? This question is particularly pressing to the extent that marginalized people become means toward an end other than their own survival and agency.

“I’m happy to be a porn tycoon,” Soleimani once told a reporter. “But the reason that I started Spank[C]hain was because I thought it was a good use-case for the technology” (Munster 2019).

Economies of Questionable Empowerment

In their white paper introducing SpankChain, Soleimani and co-founder William Bentley de Vogelaere describe the project as an “alternative to discrimination” (Soleimani and de Vogelaere 2017, 3). Similarly, a 2017 blog post published by SpankChain promised in its headline to explain “How SpankChain Brings Power to Performers.” Soleimani frequently posts to his social media accounts about news and advocacy for sex-worker rights. Multiple pornography

performers have expressed hopes for what SpankChain might enable. Courtnei Demilune, for example, recounts her previous experiences of discrimination as a transgender woman in pornography, concluding, “Spank[C]hain provides a solution to all of this . . . They are empowering us with the infrastructure we need” (Demilune 2017).

Histories of economic innovation, however, show a pattern of entrepreneurs bestowing financial empowerment and increased visibility on marginalized communities only to rescind access when the image of perversion no longer serves the ambitions of the infrastructure. Future infrastructure builders, in turn, benefit from the continued marginalization of those in the pornography industry, as it generates opportunities for further innovation.

This is not to say that blockchains are devoid of potential to empower workers in the adult entertainment industry. Crypto platforms codesigned with and by sex workers—including SpankChain, WetSpace, and MintStars—have provoked meaningful conversations about establishing a more just technological ecosystem for people engaged in sex work (Barrett-Ibarria 2019; Sigalos 2022; Salmond and Deyoung 2022; Garcia et al. 2021). But when platform-building is motivated primarily by the potential for sex workers to engender infrastructure adoption—as opposed to the ability of infrastructures to mitigate the marginalization of sex workers—the benefits to sex workers tend to be short-lived.

The British company UKash, for instance, achieved early success as a payment processing system for online adult entertainment (Barss 2010). The company was initially founded as a digital payment method for gamblers in 2005. It struggled before turning to pornography. The continued marginalization of pornography enabled UKash to find a motivated user base—until it was acquired by the US-based company Skrill, which has since banned sex workers from the platform. This kind of transition has been common. As the online adult entertainment industry gained popularity, many financial institutions became wary of working with adult entertainers. By 2002, most major credit card companies had placed significant restrictions on processing payments for pornography or had stopped working with the industry altogether. This kind of systematic exclusion produces a gap in the market. It enables alternative infrastructures to emerge and innovate in response to the pornography industry’s demands. But that infrastructure is not ultimately controlled by, nor designed for, sex workers themselves. As legal scholar Zahra Stardust summarizes, “Sex workers [are] treated on the one hand as a source of profit and data, and on the other as collateral damage in an online gentrification project” (Blunt and Stardust 2021).

In March 2023, the SpankPay service was forced to suspend payments because its banking partner, Wyre, began using a third-party payment processor that regarded pornographic content as a violation of its rules. On Twitter,

pornography performer Ally Sparkles (2023) responded in a way that expressed both disappointment and persistent confidence in the liberating prospects of blockchain infrastructures: “What a shame. Hopefully you can build back in a more decentralized fashion.” SpankPay advisor and pornography performer Allie Eve Knox emphasized the power of blockchain technology when coupled with legislative reform. Knox (2023) wrote, “I joined Spank in 2017 [because sex workers] needed these tech tools. SpankPay can no longer exist under discrimination, but SpankChain will continue to support the community and build the tools we need. We are committed to making legislative change to secure our financial futures.”

Visibility and Perversity

Perverse attraction promises visibility for new infrastructures, the entrepreneurs who market them, and the perverse attractors whose marginality produces appeal. However, visibility does not benefit all participants equally.

For instance, pornography magazine moguls such as Hugh Hefner and Larry Flynt gained celebrity status through their proximity to and perpetuation of perversion, as well as their ability to commercialize it. Through *Playboy* and *Hustler*, Hefner and Flynt developed reputations as iconoclasts and disrupters. They were able to leverage their social status and growing visibility to establish themselves as legitimate and successful businessmen operating in an unsavory industry (Voss 2015). In the infrastructure of American shopping malls, Les Wexner achieved similar status with Victoria’s Secret, at least until his downfall due to a longtime association with sex trafficker Jeffrey Epstein. Within the Ethereum subculture, Ameen Soleimani performs a role comparable to Hefner, Flynt, and Wexner, as both a purveyor of the perverse and a respected businessman.

This type of legitimization through perverse attraction, however, is often reserved for those with the ability to distance themselves from directly participating in deviance. Other participants do not have the option of distance. As Sarah Banet-Weiser (2018, 26) explains: “When the borders and boundaries of visibility are economized, ‘inclusion’ is about widening an already established set of norms. Thus, those who do not fit those norms because of difference become particularly vulnerable targets.” Visibility thus benefits those who can maintain a privileged distance from the work itself while amplifying the stigma of those who cannot.

Claims of empowerment through performer visibility have repeatedly been a political lobbying tactic for adult industry moguls in recent decades. In response to the impeachment of Bill Clinton, *Hustler* founder Larry Flynt offered US\$1 million to anyone willing to admit to having an illicit sexual encounter with a congressman or high-ranking United States official (Carlson 1998). Similarly, in 2018, SpankChain offered US\$25,000 to sex workers who were willing to

out congressional clients who had voted in favor of FOSTA-SESTA, a bill that further constrained sex workers' ability to advertise and work online (Cole 2018). Through economic and social capital, entrepreneurs leverage their role in a perverse industry for influence over legislators and powerful elites. It is unclear what lasting benefit accrues to those being asked to make themselves visible. As Melissa Gira Grant (2014, 25) writes, "[s]ex workers are called to give testimony on the nature of their work and lives in ever more venues: in secret diaries; on cable specials, opposite the 'disgraced' politicians who hire them . . . Very rarely does sharing anything in these venues serve them, or the public. Sex workers are there for the sake of some unseen owners' profits."

Perverse attraction thereby mirrors the tactics of popular feminism, in which visibility is asserted as synonymous with social change. While visibility can engender more widespread solidarity with stigmatized communities, it also threatens to reinforce their marginalization. As Banet-Weiser (2018, 26) explains, "Marginalized subjects . . . are punished and disciplined precisely when the spotlight falls on them." At least as much as it promises empowerment, visibility risks exposure to further surveillance and control. If visibility is not a means of direct ideological and structural change, it threatens to make the realities of marginality increasingly dangerous.

Restigmatizing the Perverse

When new infrastructures achieve mainstream adoption and perversion shifts from an attractor to a liability, companies frequently deny their affiliation with sex workers. The executives and corporations who are able to dictate visibility render those in front of the camera invisible by banning them from the very technologies that promised empowerment. As Patchen Barss (2010, 215) observes, "Following the pattern of dozens of pre-internet technologies, a widespread scrubbing of pornographic roots has begun, with many mainstream companies lapsing into silence or denial of their erotic ancestry."

CyberCash was established in 1994 as a means of simplifying and optimizing e-commerce. The company was a third-party payment processor that offered greater usability for credit card companies and e-commerce sites. CEO William Melton was forthright about the role of pornography in CyberCash's potential. He cited online gambling and adult entertainment as keys to CyberCash's success. CyberCash became a leading credit card verification service for the pornography industry before being hacked in 2000. The breach resulted in the downfall of CyberCash as an independent business, and it was consequently bought by VeriSign (Barss 2010, 254). In 2005, VeriSign was in turn acquired by PayPal, from which sex workers are now frequently barred. The SpankChain white paper, for instance, denounces PayPal as "notorious for closing the accounts of performers and seizing their funds" (Soleimani and de Vogelaere 2017, 3). Despite the role sex workers played in the mainstream adoption of PayPal's

constellation of services, dominant moral norms engender the exclusion of those industries from the company's current practices—re-stigmatizing them as perverse and illegitimate.

This is not an anomaly. Stardust (2020) explains, “To Big Tech, the sex worker is as indispensable as they are disposable.” Once new infrastructures achieve mass adoption, entrepreneurs and corporations tend to discard the people they claimed to be helping in favor of public approval. Because of this, the use of pornography as a perverse attractor risks enacting a form of misogyny that identifies the bodies of those in front of the camera as objects to be instrumentalized for the aspirations of entrepreneurs. Just as Moloch ultimately proves to be more mascot than god in the Ethereum community, tech entrepreneurs' empowerment of sex workers may be only a passing phase of an infrastructural strategy.

The Ethereum blockchain has yet to achieve mainstream adoption. It is possible that the decentralized, hard-to-regulate nature of Ethereum could enable a departure from past corporate behavior in relation to marginalized communities. If workers and customers control access to their own cryptocurrency wallets, and use smart contracts on a blockchain for transactions, state or corporate actors have no direct means to interfere. However, the Ethereum network remains vulnerable to censorship through the participants who validate transactions. Just as many validators have chosen not to accept transactions that violate United States sanctions, they also might face pressure to restrict transactions tied to sex work (Kessler and Young 2022). Soleimani has been an outspoken critic of such censorship.

Soleimani has insisted that SpankChain, at least, was designed to be permanently yoked to its mission: “We called the company [S]pank[C]hain precisely so we can never ‘pivot’ [or] dump adult performers should we grow bigger” (Soleimani, Twitter direct message to authors, January 12, 2023). Endorsements from numerous sex workers represent evidence for SpankChain's commitment to their interests. One model, River Sunshine, told a reporter, “I was making[,] on three sites combined, 6 percent of what I made in the same 30-day period on Spank[C]hain. I feel more in control of my money than I did using the banks and payment processors on other sites” (Cuen 2018). Despite multiple positive endorsements, sex workers do not express universal, uncritical praise for SpankChain. Technology reporter and sex worker Sam Cole explains:

[Blockchain technology] has so much potential. It could be this really beautiful, decentralized technology that could give people access to things that's almost irrevocable. It holds that promise, but at the same time that was the promise the internet held . . . so a lot of sex workers I know . . . are really cautious about putting too much trust or having too much hope about any new technology. (Motherboard 2022, 00:17:25)

SpankChain has successfully garnered the trust of many in the industry, yet there is still widespread hesitancy about the potential of crypto for sex work. Histories of infrastructure and pornography indicate a tendency in which practitioners of perverse attraction have ultimately harmed the people whose perversion was appropriated as cultural capital. Consideration and acknowledgement of these histories should guide participants in initiatives like SpankChain, serving as a reminder that infrastructural adoption and the power of precarious workers can turn from alignment to contradiction.

Conclusion

This article has outlined the strategy of perverse attraction—a method of developing technological infrastructure through targeted subcultures based on inverting dominant moral norms. To illustrate this, it has considered the career of crypto entrepreneur Ameen Soleimani, who has employed the strategy in two projects, MolochDAO and SpankChain. It has further raised concerns about the consequences of this strategy for the people who become the perverse attractors, such as the people engaged in the production of pornography. Historical experience suggests that claims of empowerment may be short-lived, and that the goal of producing a kind of mainstream infrastructure typically involves further stigmatizing the people who were supposed to be empowered. The critical question at hand is whether the highest priority for entrepreneurs and organizations is the infrastructure or the people whose safety and livelihoods depend on it.

The concept of perverse attraction contributes to a growing set of conceptual resources in the study of infrastructure—particularly, in this case, in understanding strategies for developing infrastructures through entrepreneurship. We follow scholars such as Isaiah Ellis (2020) and Supp-Montgomerie (2021a) in recognizing that religious imaginaries (or, in this case, sacrilegious ones) can help produce a faith that animates still-incomplete infrastructure projects and draws people to them.

Finally, we hope this analysis surfaces useful insights—and causes for concern—among those tempted to employ perverse attraction for the making of infrastructure. We do not claim to have arrived at solutions that can save the strategy from itself. So long as the cause of infrastructure retains priority over the people involved, that cause carries the risk of turning against them.

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The Financial Millennium

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As a financial technology with a millenarian attitude, cryptocurrencies were bound to produce their own heretics and schismatics. Communicating over Telegram channels, conference calls, symbol-laden images, and multi-hour YouTube videos, believers assert that Bitcoin and Ethereum are the exoteric forms of the hidden “chosen one”: XRP, a prominent but not industry-leading cryptocurrency. For those who believe, XRP is one component of a total economic and social transformation under a set of secret laws about to be revealed. Elites will be brought low, believers will become rich, global financial infrastructure will be rebased in a jubilee, and miraculous technologies and beings will be disclosed. For many theorists, this monetary apocalypse is part of an explicitly Christian apocalyptic event. In this article, I draw on archives across a variety of formats to explain the evolution of an apocalyptic crypto sect and use these archives to reflect on the context and future of religious imaginaries in the blockchain space.



The Video

Pick one video among the thousands of commentaries, decodings, and exegeses: “Ripple XRP/Bearableguy123 Christmas Finally Explained!!” It was created by an account called “프로 리플러: Pro Rippler” (the hangul text before the colon is just a translation of “pro rippler”) (2021) and posted on December 12, 2021; as I write this in March 2023, it has 17,575 views and 102 comments, mostly expressing gratitude and offering additional reflection and analysis. The video is almost seven minutes long, and its subject is a single image.

The image is a rendering from what appears to be MS Paint. It was posted to Twitter on December 19, 2018 by a user named *bearableguy123*. It is as cryptic and densely coded as an illustration from an alchemical manuscript. The documents of alchemy were populated with glass vessels, furnaces, pregnancies, birds, toads, and flowering trees and saturated with meanings from pagan myth and Christian gospel: wing-footed Mercury, the pelican feeding its brood with its own blood, Saturn consuming his children. *Bearableguy123*’s images are all set in the medieval milieu of castles, kings, monks in hooded robes, three-masted sailing ships, knights in armor—and, always, a toothily grinning brown bear wearing a domino mask and a hat. Hands hold cards, wands, swords; colors (green, purple, gold) appear on sails, flags, and Christmas stockings; ghostly strings of characters (“PUn4gQznCCnLoK2”) are written on stones. Everything means something, as it does in prophetic speech, Tarot cards, and dream interpretation books.

The image studied in this video by 프로 리플러: Pro Rippler is an interior with a Christmas theme. The bear, seated, points to a whiteboard set up in front of a Christmas tree. The image on the board is a version of a previous *bearableguy123* painting. There are gifts under the tree, objects on the mantel, a metal gauntlet on the floor, a knight with a shield by the fireplace, an arm in a business suit reaching in from out of frame to turn the crank of a machine that spits out coins carrying the logos of various cryptocurrency projects, and so on, into minute and inexplicable detail. The work of the video is to walk through this detail. There is no narration, only a soundtrack of dramatic, ominous music. The video zooms in on each component in turn, interspersing details of the painting with screenshots of other images and webpages, with highlights, boxes, and circles for emphasis: news reports, official documents, Wikipedia. Over these is superimposed text that adds up the numerology, fleshes out the explanations, and expresses surprise and excitement (“!?”).

Contained within these symbolic objects is the secret history of the financial present, and a prophecy. Through various codes and allusions, things in the room pertain to subjects including the international interbank settlement system SWIFT, the coat of arms of the House of Rothschild, the International Monetary Fund, Amazon Web Services, the United States Federal Reserve and the European Central Bank, Bitcoin, and the United States dollar. The image

also refers to specific individuals, particularly Brad Garlinghouse, the CEO of a financial technology and payments company called Ripple, and to Ripple's cryptocurrency, XRP. What all these objects portend—the marionette with open eyes, the gavel, the double ouroboros—is an imminent apocalypse: next week, next month, before March, by 2025. “Apocalypse” here is meant in its classical Christian sense of revelation rather than destruction. What bearableguy123 communicates, however indirectly, is the disclosure of secret and future things. He offers to open the books, in every sense of that phrase.

This apocalyptic language may seem rather grand for news about a financial sector conspiracy, but consider the nature of the news.¹ Some who analyze the paintings are merely investors. They hold onto the XRP token, which has lost most of its value during ongoing litigation involving Ripple, in the hope that it will be adopted for interbank settlement or as a reserve currency alternative to the dollar and thereby become immensely valuable. In the absence of any real evidence, these investors try to decode the cryptic symbols that promise the revaluation, or “reval,” of these assets and circulate their cryptic reflections in turn (see, for instance, FoJÄÄk 2023). This is a common pattern for near-worthless currencies, including various cryptos, the Iraqi dinar, and Zimbabwe bonds (Dinar Guru 2023; Giles 2021): scrutinizing the media for a “reval event,” when the actions of states, markets, or philanthropists will suddenly make a currency prized and profitable. (Often, these narratives are kept alive by scammers who sell the currency far above its market value and then sell seminars, educational materials, and other follow-on services to their victims.) For many others, however, developments with XRP are the prelude to the transformation of the world and the human condition itself, the birth of a new age.

According to analysis from believers, the new age begins with infrastructure. The blockchain-based, transnational, fraud-proof quantum financial system (QFS)—already in place to secretly secure United States elections from foreign interference—will mediate transactions and settlements. Ripple's crypto token, XRP, will act as the global interbank settlement currency in place of the worthless dollar. These will be the components of the National Economic Stabilization and Recovery Act (NESARA) and the Global Economic Stabilization and Reformation Act (GESARA). NESARA-GESARA include the elimination of all debt—a jubilee that will cancel mortgages, credit cards, and loans—and the abolition of income tax and the Federal Reserve. (The United States will switch to a sales tax on non-essentials for the government's revenue and a “rainbow currency” backed by precious metals and issued by the United States Department of the Treasury, not the Federal Reserve, in place of dollars.) NESARA-GESARA will dissolve the existing financial sector, seizing its assets and returning them to the citizenry. It sets intranational and international trade on a “level playing field,” based on an idle remark from an interview with Donald Trump prior to his presidency taken by conspiracy

theorists as a signal of a rebalancing of global currencies akin to Bretton Woods (Bonfire Guy 2020). Jobs will return from overseas and industries relocate domestically.

The Act halts United States military presence abroad, ending the wars and occupations at a stroke in a mass withdrawal. It unseals thousands of patents, revealing the technologies suppressed by the current dispensation because they threatened profits: healing machines (“medbeds”), cancer cures, free energy, and anti-gravity devices. These will heal our sicknesses, solve climate change, and provide unlimited power. NESARA-GESARA mandate immediate and comprehensive nuclear disarmament. They mark the beginning of a “golden age of global peace and prosperity” (Herscu n.d.). In some narratives, NESARA-GESARA also has an antithesis for which it is the only alternative: the Great Reset, a project of deliberate impoverishment, famine, plague, and war to produce mass death and total social control in the service of a communist-Satanic aristocracy who will rule the world. All of this starts with a blockchain and a cryptocurrency. It is the promise of the financial millennium.

The Financial Millennium

Norman Cohn’s five criteria for a millenarian movement are simple and clear: the movement’s salvation is collective, terrestrial, imminent, total, and miraculous (1970, 15). Thus, it is here, with one seeming exception.

It is **collective**, as it will be enjoyed by all in the movement upon its arrival. It will be experienced by virtually everyone on the planet at once, the banked and unbanked alike. Indeed, the QFS has specific blockchain-based functionality for those without existing bank accounts, so they will not be left behind by the new prosperous global order.

It is certainly **terrestrial**, as it will take place in this world and in this life rather than in another plane of existence or heavenly realm. NESARA-GESARA’s promise is at once transcendental and strikingly mundane and earthly: humanity will live in a planetary paradise of peace and abundance, freed of illness and suffering, but the path there lies through ordinary human bureaucracy. It is a story of documents, legal codes, executive orders, job re-skilling, factory ribbon cuttings, and installing telecommunications infrastructure.

It is **imminent**: every image, video, and post on relevant Telegram channels is a promise that it will happen soon, with an endlessly receding string of dates often connected with holidays or significant anniversaries. The most advanced form of financial millenarianism holds that it has already happened, with laws passed in secrecy, and is now being enacted. This approach involves close readings of business news for indirect traces of this process, where an oblique remark at an inflation hearing with a European Union central banker tells those in the know that SWIFT is about to be decommissioned and replaced with XRP and the QFS.

It is, of course, **total** in both its execution and its outcome. No aspect of any one's life will be untouched. Contemporary history will be understood as before and after this event. As Cohn (1970) puts it, this total transformation is one that promises "no mere improvement on the present but perfection itself." Depending on which flavor of NESARA-GESARA one follows, this perfection may encompass the redress of all economic and political injustice, the end of human suffering with the aid of occult super-science, or the admission of alien contact and the entry of humanity into galactic society.

The missing piece here would seem to be Cohn's fifth criterion, the **miraculous**: "it is to be accomplished by, or with the help of, supernatural agencies" (1970). It is on the question of the fifth criterion that the rest of this study turns. What I have presented so far about this belief system, however unrealistic, has been thoroughly secular: the mechanisms of the millennium are infrastructural technologies and financial policies, and its agents are bureaucrats, legislators, and tech CEOs. The tools of the perfected world—the free energy machines and medical breakthroughs—are based on images from science fiction and the fantasies of suppressed science that run back through the perpetual motion machines and quack cures of the nineteenth century. Where is the supernatural agency in this?

I would like to convince readers of two related points. The first is that belief systems like NESARA-GESARA—and, as we will discuss later, QAnon and the UFO "full disclosure" movement—have a logic to their development that necessarily tends over time toward the supernatural and, ultimately, the millenarian: they begin technologically and end supernaturally. The increasing role played by supernatural forces in the NESARA-GESARA story will be seen over time. My working term for this ratcheting effect is *millennial creep*, with reference to the "scope creep" of a project whose remit and goals keep growing larger and less realistic. A prediction, as I demonstrate, becomes a prophecy; an adversary becomes the literal Antichrist.

However, even as the framework, agency, and goals of the belief system become supernatural, the role of technologies persists: blockchains and cryptocurrencies, satellites, the internet and VPNs, and quantum computing, among others. I suggest that these technologies themselves function as miraculous agents. In fact, one can read backwards from the supernatural culmination to see that the technologies were always effectively supernatural in their role—in part through being only poorly understood, if at all, by their believers. What I hope to convince of, then, is that an idiosyncratic and syncretic creation of a kind of spiritual infrastructure can be seen in the NESARA-GESARA belief system.

To present this, I start with the history of NESARA-GESARA as a belief system, its adoption into different conspiratorial communities, the role of its increasingly prophetic interlocutors, and the emergence of its antagonist

and antithesis in the Great Reset. 'Then, once I have laid out the whole of the belief system, I clarify the role of the ratcheting millennial creep and the technological miraculous and close with a reflection on the present and future of the movement.

NESARA-GESARA

The promise of NESARA-GESARA began in the late 1980s as a set of policy proposals for the United States developed by an engineer named Harvey Francis Barnard (Gulyas 2021, 35). Barnard self-published his ideas as a draft bill in pamphlet form in 1996 and mailed them to every sitting congressperson. The proposals at this stage were straightforward: a set of fiscal and monetary reforms to change federal revenue collection from income to consumption and restructure both public and private loans by eliminating compound interest, lowering the annual percentage rate, and applying payments to principal first. The goals and means of this project were entirely terrestrial, but there is still a hint of the millennial in Barnard's provision of the retroactive application of his loan structure once the bill passed. Homeowners, for instance, who had been paying off a mortgage for decades would have all their payments to date retroactively applied to the principal, rather than the interest. One day, all at once, they would own their homes free and clear—in fact, they might receive money back for overpayment—but the language of this proposal remains diligently mundane about the event: "Immediately their discretionary spending increases" (Barnard 2005).

When nothing was done with his proposals, Barnard made them available online. They were picked up, adapted, and elaborated upon by a remarkable crew of scammers and confidence artists, conspiracy theorists, sovereign citizens, militia groups, and alien contactees, and their transformation into millennial texts began. Barnard had no patience for any of this, fighting an increasingly futile rearguard action against these new interpretations until he himself came to be accused of being subdued by or complicit with the conspiracy against NESARA.

The central problem faced by the adopters of NESARA cut across their various beliefs and agendas, from the scammers selling seminars and fraudulent tax advice to the UFO communicators and healers. The following points lay out the logical steps of its adopters:

1. NESARA is an obviously, objectively, and self-evidently positive program. It will provide good things: prosperity, stability, and wealth. Why, then, has it not happened? Why is it not happening now?
2. There must therefore be opposition to NESARA. There must be adversaries standing in the way. They must be powerful because they can resist this program and prevent its realization. They must also have

interests in the present order remaining in place; it must benefit them in some way. What is their agenda? Do they have an alternative program—perhaps an antithesis to the NESARA project?

3. If the opponents of NESARA are so powerful, why has the program not been wholly defeated? How have we come to learn about it? There must be advocates in positions of power who are fighting for it on our behalf. They need our support, and their struggle is taking place right now.
4. Given that this struggle is underway between advocates and adversaries, why do we not see more evidence of it in the press and the public sphere? The information is being suppressed, but we who know can discern the signs of the battle for NESARA.

I want to draw readers' attention to the appearance of the adversary in this story. At the earliest stages of the NESARA proposal, the opposition was merely inertia, institutional sluggishness, and the direct interests of those businesses who exploit the current, broken system for their profit—usurious banks, payday lenders, repossession agencies, and so on. As the program's promised goods got bigger, though, the adversaries necessarily grew in capacity and strength to prevent their realization, and these adversaries diversified in direct proportion to the diversity of belief systems adopting NESARA as a component. A few examples will suffice.

Shaini Goodwin

The idea of NESARA was adopted by a prosperity scammer named Shaini Goodwin in the late 1990s. She used NESARA to explain how her investors would be made wealthy and debt-free: she embroidered the original proposal with the promise that its passage into law would unlock all the secret high-yield investments she had been promising her subscriber-victims (Gulyas 2021, 36 *passim*; Robinson 2004). She was obligated to explain NESARA's interminably forestalled progress, both to placate those who had already sent her money and to drum up new business. She began to write about the "dark agenda" (Gulyas 2021, 29), a powerful cabal committed to keeping these prosperity tools as the preserve of the ultra-rich. The dark agenda corrupts judges, coerces politicians, and uses gag orders and threats of treason to keep NESARA out of the news. Their biggest coup was nothing less than the 9/11 attacks, which they organized to prevent a specific step in NESARA's launch involving financial computers in the World Trade Center towers. Against the dark agenda, Goodwin writes, are the "White Knights" who fight for the realization of people's prosperity and wealth.

Sovereign Citizens

For the sovereign citizen movement, NESARA grew to include their esoteric and complex belief system about the law and the Constitution of the United States.

Too convoluted to easily summarize here, the core of their version of NESARA takes its promised tax and banking reforms as one part of the dismantling of an illegitimate substitute for the real federal government, a corporation that has been in place since 1871 (or, in some versions, 1789) (Sarteschi 2020). Their explanation of what was contained in the bill includes things like “[f]orbids the sale of American birth certificate records as chattel property bonds by the US Department of Transportation” (see, among countless other examples, Asefeh 2020). For them, NESARA promised the restoration of sovereignty, not only to the country but to every citizen. They would be free from punishment for infractions like unpaid alimony, back taxes, or liens on their property, no longer prevented from seeing their children by corrupt family courts without true jurisdiction, and able to travel freely and access the hidden funds stolen from them by the United States corporation. (Many sovereign citizen cases revolve around acrimonious divorce and custody disputes, unpaid taxes, and foreclosed farm and rangeland property in the American West.) Their NESARA adversaries changed proportionally to match this new promise. Now, the management of the whole United States corporation and their overseas allies—an early version of what came to be called the Deep State: unelected and often unknown permanent administrators—are fighting NESARA.

UFO Disclosure

For the UFO contactees and channelers, NESARA involves not just the revision of the tax code but also the full disclosure of the hidden history of human–alien involvement: a vast tapestry of the Secret Space Program, Nazi slave labor camps on Mars, tens of thousands of abductions and disappearances every year, and a taxonomy of Grays, Avians, Nordics, Blues, and other aliens (Farrell 2012). With this disclosure would come the bounty of alien technology—the toolkit of free energy, anti-gravity devices, cures for all diseases and ailments, an abundance of all goods, and so on (Kasten 2010). Again, proportionally, the adversaries had to scale with the promise: they became the Reptilians. Literal serpent people, some in human guise, the Reptilians feed off both human flesh and the psychic distress caused by war, sickness, anxiety, occupational misery, and debt. They control the planet’s most powerful institutions in every society and are absolutely ruthless—indeed, literally inhuman.

The Prophets

I could continue, but the point has been made. NESARA has become a kind of flexible document adopted by various movements and incorporated into their belief systems and eschatologies. These adoptions have all involved the same characteristics. There is a promise to be fulfilled, one relevant to their community: freedom, the disclosure of secrets, the release of suppressed science or stolen wealth. This promise would necessarily involve the transformation of

society or, in some cases, the world—nothing would be the same afterwards. There is an adversary in the way of the promise who grew proportionally to it: from shortsighted politicians to rapacious alien serpent-men. There is a force for good on whom the realization of the promise depended. Finally, there is a messenger—or, in some cases, a prophet—who is able to provide news about this secret war and act as an interpreter of events for their public. The messengers have had various claims to authority, again depending on the nature of the community they are addressing on behalf of NESARA.

Some messengers have drawn on the authority of first-hand experience, such as recovered memory: many leaders of the UFO “full disclosure” community claim to have been abducted to live on other planets or in deep space for years or decades and then de-aged, their memories expunged, and returned to their ordinary lives on Earth. In therapy or under hypnosis, they recover their off-planet lives and speak on that basis (see, for example, Rodrigues 2021). Other NESARA messengers draw on a kind of parallel-universe version of worldly expertise, like the sovereign citizen “lawyers” who promote an analogue to legal training and recognition as the basis for the plausibility of their explanations of the NESARA future (Moore 2022). Still others have authorities speak through them, “channeling” the spirits of various superhuman beings, angels, aliens, ancient god-kings, and ascended masters, who can address the NESARA program with an authority that supersedes anything terrestrial.

Finally, a small but extremely influential group—perhaps the most important—speak as insiders, addressing their audience as public-spirited agents directly involved in this secret war. This last group includes Shaini Goodwin, under her working moniker of “the Dove of Oneness,” who claimed to be personally connected to “very important people whose responsibilities require their presence in the most secret and most important activities of this country and all the major countries in the world” (Gulyas 2021, 38). This group also counts as a member bearableguy123, the painter described at the beginning of this article. The brief text documents bearableguy123 has written to accompany their paintings are presented in a casual, first-name, in-joke register to imply that they are a high-level colleague of the cryptocurrency developers instrumental to the financial millennium.

This last category of messengers, the purported insiders, also includes the “Q Clearance Patriot” of QAnon. The original Q’s very choice of moniker expresses this insider authority—Q is a United States Department of Energy security clearance related to nuclear weapons—and the premise of their materials is that they are an agent within the small team at the highest level of military intelligence and the executive branch who were about to reveal the crimes and criminals of the Deep State cabal and destroy them. Over the years of its development, QAnon has come to share with NESARA-GESARA the quality of being additive rather than exclusive (Tian 2021). It could host coexisting and

sometimes contradictory claims and concepts, and it was inevitable that these two frameworks would start to overlap and blur together, picking up supporters in common—particularly once Q themselves began going quiet for longer and longer periods, leaving empty time to fill with other theories.

Two of these prominent insider-messengers, Goodwin and bearableguy123, neatly bookend the evolution of the purported bill from national to global, NESARA to GESARA. In the absence of any visible action, the prophesied transformation continued to grow in scope. NESARA had not taken place because it could not be done in one country alone, even one as powerful as the United States; it had to involve a transnational attack on the existing order. In the early 2010s, theorists from various currents of the movement began to narrate a new set of documents that promised a more comprehensive event and entailed yet more comprehensive adversaries.

As a theory, NESARA-GESARA has had a ratcheting logic of escalation—something else it shares with QAnon—which could only expand and never contract. This logic has enabled it to keep folding in new groups of believers and events: cryptocurrencies, blockchains, the popularization of universal basic income models and quantum computers, COVID-19. However, as the promised events have become more and more extravagant, more millennial, the adversaries keeping it from fulfillment and realization have become likewise more potent and diabolical. Once the program had grown to its current scale, incorporating hopes and desires ranging from currency and land reform to the restoration of the Chinese monarchy, disclosure of the hidden discoveries of Nikola Tesla, and the cancellation of all debts, its believers looked for an appropriately logical antagonist—an antithesis—which they found in the Great Reset.

The Great Reset

In the Great Reset was an ideal mirror image that could, in its way, substantiate the logic of NESARA-GESARA's claims by providing a similarly scaled alternative—one with actual evidence of its existence. As the story of NESARA-GESARA evolved, the explanation for the lack of activity became a claim that the world's great powers had their own version that they were attempting to advance in its place. As in medieval millennialism, signs of the Second Coming can be found in the actions of both parties: unity and peace among Christians, for instance, point to the imminent golden age, but so do the marshaled forces of evil led by the Antichrist.

In June 2020, in the midst of the COVID-19 lockdowns, then Prince Charles and Klaus Schwab, the head of the World Economic Forum and its gathering at Davos, co-founded an initiative to use the momentum of the pandemic and its disruptions as an opportunity to reform the global economy. It was the perfect example of a Davos initiative: top-down, well meaning

in a liberal *noblesse oblige* way, hortatory but toothless, revolutionary without proposing anything disruptive or discomfiting for its audience, and sweeping in its implications (labor, energy, security, technology, you name it) but thin on any concrete details or specific actions. It was also remarkably tone-deaf, one of the iconic twenty-first century failures to read the room. The real impact and consequence came not among its primary recipients, the boardroom and ministry types eating canapés at Davos, but from its secondary reception among the population at large alongside global pandemic shock and restrictions, lost jobs, panic buying and hoarding, and the fear of death by plague (and later, hesitancy, distrust, anxiety, and anger about mandated vaccines) (Christensen and Au 2023).

Where the NESARA-GESARA movement promises global prosperity and wealth (everyone will wake up with a fortune in their bank accounts, freed of their debts), they explain the Great Reset as an act of global impoverishment: asset seizures, deliberate hyperinflation and collapse of currency, the weaponization of debt, and, ultimately, the abolition or seizure of private property. NESARA-GESARA removes laws that give the state control over identities, movements, property, and bodies; the Great Reset is a lockdown that never ends, with mandated mask wearing and vaccine passports as the prelude to total control of people's movements and activities. Where NESARA-GESARA promises economic growth and the limitless, clean potential of breakthrough technologies, the Great Reset is a "degrowth" project (Masterson 2022) in which poverty, malnutrition and starvation, engineered disease, and the hoarding of scientific and technological innovation by the elite will lead to mass death and the reset of the world to a sparse population of cowed, technologically subdued peasants laboring on the behalf of a small, global, Satanic aristocracy. Eschatological change is not only possible, but inevitable, as the onset of the Great Reset (here understood to include lockdowns and vaccine mandates) makes clear; the only way to prevent it is not to fight for the status quo—which will be destroyed by the very people in charge of it—but to serve the right side in the final battle between the Great Reset and the Global Currency Reset, its alternative. "There are two Resets squaring off against each other" (Benzow 2022), as one supporter put it; "The Great Currency Reset (GCR) of NESARA-GESARA, not the black hat's Great Reset of the World Economic Forum, looks to be inching closer and closer to activation" (NallyBud 2022), another promised.

I use the word "Satanic" advisedly because it is here that the antithesis meets the Antichrist. In the next section, I answer a question the reader may now be asking: if the alternative to the Global Currency Reset is the Great Reset, and the Great Reset is being advanced by the world's richest, most powerful, and most evil people, who, or what, is on the side of the financial millennium? How could they possibly win?

The Technological Miraculous

A consequence of the ratcheting logic of certain conspiracies—including QAnon and NESARA-GESARA—is that they eventually escalate out of the human sphere entirely. As new actions and events get added, the burden of proof, or the pressure of its absence, becomes too great to be sustained by human actors. Even if a relatively reasonable and realistic version of NESARA-GESARA were considered, a commonsense objection is that it is difficult to imagine pushing this giant reform program through all at once—especially one that would immediately alter the whole financial sector beyond all recognition. This commonsense feeling of dubiousness worsens as the program grows: the project is being kept secret, by tens of thousands of people, and will have transformative effects on every industry and every aspect of life, all at once. Even the most favorable imaginings of administrators and executives, civil and military, strain at this idea. The longer the situation continues without evidence, the larger the problem of its absence grows.

The initial framework of the QAnon movement, with its explanation of an incorruptible team of specialists with military precision, gradually had recourse to secret supercomputers and time travel to explain how they would prevail. As the movement fragmented, many of its factions arrived at an explicitly Christian eschatology: the “Deep State” was no longer just corrupt pedophiles but Satanists practicing human sacrifice, and the QAnon project was aided by God’s intercession. Its imagined leaders became Christian super-soldiers in the service of the “Great Awakening,” a project as much about religious revival as the revelation of secrets (Springs 2021).

Likewise, NESARA-GESARA—which has absorbed many “anons” from the QAnon movement—has turned from the promise of human economists and central bankers to extraterrestrials and superhuman spiritual entities like the Comte de Saint-Germain. This last figure is a telling example. Saint-Germain was an eighteenth-century aristocrat of dubious origins—“king of quacks and impostors,” as Casanova dubbed him, or “the Wonder-Man,” in Voltaire’s sarcastic phrase—who parlayed his gift of gab and skill navigating the culture of secret societies and lodges into positions at court (Patai 1994, 463–79). In various accounts, he claimed to be centuries old, to have discovered the alchemical philosopher’s stone, and to perform miraculous material transformations. After his death (itself disputed by occultists), he became a figure in theosophical literature and was either spiritually contacted or met in person by various esotericists into the twentieth century. He reappears in the communications of Shaini Goodwin in the early 2000s, as she popularized NESARA; she would at times communicate on his behalf to explain the cosmic battle underway in the American financial system amidst calls for prayer on behalf of the White Knights. As NESARA became GESARA, Saint-Germain’s presence evolved into an institution, the Saint Germain World Trust, a secret bank holding an effectively supernatural,

inconceivable fortune (a quattuordecillion United States dollars—that is, a one followed by forty-five zeroes in the US, or eighty-four zeroes in the UK) that will be used to cancel all debt, public and private, and “buy out” entire industries like banking and pharmaceuticals: the financial motor for the world transformation (Gulyas 2021, 161). (That number itself is a nice example of the ratchet effect, since the secret funds to be unlocked by NESARA-GESARA had to grow by orders of magnitude in every retelling to account for the expanding role of the program—billions, trillions, quadrillions, and now a number so massive that it far exceeds all the money ever circulated in human history.)

Two significant dynamics can be discerned in this syncretic blend of occultism, conspiracy, and Christianity, which circle back to bearableguy123 and the role of blockchains in this emergent theology. One of these dynamics is more general and the other specific.

Millennial Creep

The first dynamic is an extension of the ratcheting effect of conspiracy theory, which I will call *millennial creep*—“creep” adopted from terms of art like “scope creep” and “mission creep” to describe a gradual shift in goals, requirements, and objectives from limited, realistic, and short term to general, long term, and encompassing. Millennial creep starts with a concrete material premise, event, or prediction and eventually arrives at the theological aspects of the ultimate destiny of the world: the eschatological domain of transcendence, paradise, judgment, and oblivion.

In 2017, Q made a prediction about the imminent arrest of Hillary Clinton; several years and almost five thousand posts later, the anons have arrived at a secret cosmic war between the representatives of God on Earth and the thrones and dominions of Satanic forces. Puzzling lights in the sky and disturbing personal experiences—lost time, recovered memories—resolve decades later with a UFO contactee narrative of humanity’s place in a billion-year history and the prospect of immortality and transcendence in a galactic community of pure energy beings. NESARA likewise began humbly, an unlikely proposal for financial and budgetary reform in the United States; after 30 years, it has become the threshold of a global golden age of healing, abundance, prosperity, and peace—and, depending on the proponent, contact with superhuman forces of good. At the end of their millennial creep, all of these movements meet the Cohn criteria of millennialism, with a modification for the last criterion about the role of the miraculous, which NESARA-GESARA shows most clearly.

The Technological Miraculous

The second dynamic is the *technological miraculous*. I think it is plausible that the millennial creep of a belief system like NESARA-GESARA includes the

straightforwardly miraculous. It features calls to prayer, references to spiritual entities, God, and so on. Its presentation by various proponents often presumes at least the assistance of supernatural agency. But to make that argument overlooks a factor more directly at work in the belief system: technologies that function *as* supernatural powers and operate as miraculous agencies themselves. Specific technologies and infrastructure components perform effectively spiritual roles in the financial millennium, foremost among them the blockchain.

The agency that will make possible the distribution of funds from the Saint Germain World Trust, enforce the “level playing field,” enable every human to join with or without a bank account, and maintain the transparent and eternal security of the new currencies used in GESARA will be the QFS, the quantum financial system. As with NESARA-GESARA, there are various accounts of what components make up the QFS, but the common elements include a quantum computer on a satellite (or twenty-four separate satellites in some accounts) using a new network protocol and a blockchain. These components are all very vaguely understood by believers, and the vagueness provides room for the miraculous to operate. The quantum computer (exceeding “other photonic technologies” with “3.5 trillion frames per second”) is superior to “conventional computing” by using “qbits” (Pandora’s Gifts 2020). It seems to be on a satellite solely as a way of securing it from the evil cabal on Earth. In space, it can either be under the protection of Space Force—considered the only reliable branch of the United States military since it was founded during the Trump administration—or the Secret Space Programs, for UFO disclosure advocates (Greere 2023). The new network protocol with which the QFS will communicate is variously understood. It is either a kind of VPN, a secure private network for “purchasing any product or service”; an application of the Starlink satellite internet for global reach; or a replacement for the internet’s current addressing system that will be based on GPS—or all of the above, at once (Monroe 2022). Finally, the QFS will host a blockchain system, a distributed ledger for tracking all tokens of value and all the assets that back those tokens (“gold, oil, platinum, or others”) and managing the settlement of all transactions at every scale, from the personal to the institutional (McCoy 2022).

From a technological perspective, none of this makes any sense to the extent that it would waste the reader’s time to explain the many ways these ideas do not work. That is, in fact, precisely what is useful about the QFS for this understanding: it is a *mélange* of magic words. Rather than a spiritual or supernatural vocabulary, it makes use of technologies, which function as spiritual mechanisms. VPN, GPS, qbits, cryptography, Starlink and so on are supernaturally applied. The blockchain here is not rendered meaningless but rather emptied of meaning so it can host something new. The QFS blockchain is repeatedly identified in GESARA literature as a “distributed ledger” or “decentralized ledger system” (gesara.news 2022), but it also only seems to

exist on a single computer or small set of trusted computers (the quantum machine in the satellite). This is a contradiction in terms—a distributed system that only works on a single machine—but what matters is what “distributed ledger” means in this context: it means safety, incorruptibility, and freedom from manipulation by evil forces. It is a record, and a system, that cannot be altered or controlled against people’s will. It means absolute trust.

In 1086, agents of William the Conqueror completed a survey of most of England and some of Wales for royal tax, ownership, and property assessment purposes. This database, stored in the treasury, was called the *Book of Winchester* after its location but within a century came to be referred to as the *Domesday Book*. This clever title was an allusion to the Last Judgment, in which, as described in Revelation, books are opened with records of the works of all the dead, and they are judged accordingly (Harvey 2014). The *Domesday Book* was similarly irrefutable: in property or tax disputes, its word was final. Where the doom of the *Domesday Book* was understood metaphorically—even, perhaps, with a touch of humor—by comparison with the Last Judgment, the QFS functions literally. It promises the control of time, which is the value proposition of blockchains generally: to irrefutably timestamp something so that it can never be edited or altered in the future (indeed, any blockchain entry will become part of protecting future entries in the ledger from ever being altered in turn, a link in a lineage of incorruptible accuracy). What is written in the blockchain book can never be erased; transactions and activities will stay as they are put down, bit for bit. The actual work of blockchains relies on the mathematical properties of cryptographic hashes and signatures; the actual work of distributed blockchains uses those tools in a system of managed consensus between networked computers. The root of the technological miraculous in a system like the QFS lies precisely in its misunderstanding, its glossing over, of these details. It squints past the operational facts of an append-only digital ledger to focus on the most abstract and transcendent form—an eternal book, of which no word can be changed. This misunderstanding makes room for an eschatological object, the miraculous means to the end: the record of the good, the disclosure of the evil, nothing hidden, everything trustworthy, in a way that begins in secular time but points beyond it.

The golden age arrives, heralded by blockchains and cryptocurrencies. Unable to gain access to the QFS or manipulate it, the cabal’s central banking system will collapse during the Great Currency Reset, and the QFS will act as a kind of recording angel—in the sky, off this fallen planet but immediately accessible anywhere—and keep the truth for humanity without the possibility of concealment or corruption due to the properties of “the blockchain” as believers understand it. The value people accumulate there can never be taken from them. Financially virtuous actions are rewarded and recorded for ever. The truth will be assembled and exposed there, uncensorably: the secret healing technologies, the free energy, the limitless future. With the QFS in place—that

is, with evil infrastructure like SWIFT replaced with good infrastructure—the NESARA-GESARA millennium can at last be fulfilled.

Conclusion: Signs and Portents

As I was working on this article, more schisms in NESARA-GESARA began. “Juan O’Savin,” the pseudonym of QAnon influencer Wayne Willott, announced that NESARA-GESARA would not happen—or that perhaps it would but in a different, more America-first form (Veniamin 2021). (The conceit of his interview style is that he never shows his face, using the front-facing camera on his phone for video calls, yielding hours of monologues during which one watches a hand gesturing in front of a restaurant table or the dashboard of a car driving aimlessly from parking lot to parking lot.) Other QAnon activists identified GESARA as the necessary step in the war with Satanic powers, aided by God and angelic intercessors through Donald Trump—indeed, as the fulfillment of the jubilee in Leviticus 25:9 (May 2021). The prophets and messengers continue to promise the arrival, imminent as ever, of the financial millennium—and to sell equipment, guides, seminars, and merchandise. In the absence of any concrete developments, the believers scrutinize the media landscape for signs and secret messages. They read the tweets of Elon Musk—in this case, in his role as the CEO of Starlink—for allusions to the coming transition; they analyze the stock photographs used in banal financial press releases, perform crude numerology on timestamps and prices, and study public remarks by Trump and a galaxy of obscure banking officials for portents and proof. And, of course, they look at the paintings and posts of bearableguy123.

The clues he embeds in dense allegories and cryptic letters continue to point to the end of the SWIFT system and the adoption of the XRP cryptocurrency in its place: the first step towards the financial millennium, the fall of evil powers, and the advent of the new age. Alongside interpretations of these images, his followers post anti-vaccine claims, various flavors of political conspiracy, materials related to the blood-drinking fantasy of “adrenochrome”—a staple of QAnon belief—and long YouTube videos explaining the QFS and NESARA-GESARA to newcomers. They await the technological miracle that will satisfy goals profane and sacred and remake this corrupt world: “XRP Ripple is without question unequivocally and irrevocably the global reset on financial system,” one influencer writes, opening a description of QFS, NESARA-GESARA, and the rest of the package (qfs1776 nd).

Meanwhile, the years go by. “A couple of Christmases ago,” bearableguy123 (2019) posts, “I told you that some great things were coming. Can you hear me now when I say that there are plans, within plans, within plans?” That was four years ago. Four days ago, as I write this, a Reddit user (MissionContext6434 2023) posted a question. The post is in a thread specific to XRP’s current situation, but I think it nicely expresses a sentiment underlying all the analysis,

fantasy, and promise of the financial millennium. It is the question behind them all. The phrasing is as I found it: “until when we will suffer?”

On that note of waiting for the promised event—whether financial, political, spiritual, or all three—I conclude this study. I hope it has demonstrated three things: the development of a contemporary, apocalyptic, economic-financial belief system that matches all of Cohn’s criteria for a millenarian movement; the logic particular to such a system, which necessarily ratchets in a millennial creep from the terrestrial to the supernatural; and the role played by technology in such a system, where it becomes a surrogate, and sometimes a vehicle, for the miraculous. If one accepts these three conclusions, then they may share my confidence in making a prediction: the NESARA-GESARA movement is not going away, and there will more like it, movements that take technology as the miraculous agency by which millenarian promise and prophecy will be fulfilled on Earth.

Note

- ¹ What follows here, and throughout the article, is a synthesis of a variety of sources, many of which include variations on the same claims and terms. It is a world singularly resistant to formal citation: screenshots of Telegram posts narrated in lengthy videos on conspiratorial, ultra-right hosting sites like BitChute and Rumble, linked from tweets with copied-and-pasted text from an inaccessible original, discussing PDFs hosted on Google Drive with neither author nor date. For the reader who would like to see these claims gathered together in their habitat, two good starting points are Monroe (2022) and qfs1776 (n.d.).

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IN THIS ISSUE

ARTICLES

- ADAM J. CHIN On the Method of Conceptual Analysis in Religion-and-Science
- PIETER SLOOTWEG An Inconvenient Truth: What the Bible Tells about God's Way to the Animals

THE WIZARDS OF CLIMATE CHANGE: HOW CAN TECHNOLOGY SERVE HOPE AND JUSTICE?

- WILLEM B. DREES The Ambitions of Wizards and the Warnings of Prophets: Religious Guidance on Climate Change?
- LEONISA ARDIZZONE Three-Legged Stool: A Peace Education Framework for Weaving Together Spirituality, Science, and Technology
- CONSTANCE M. BERTKA Climate Change and Climate Technologies: Public Perceptions and Communication Challenges
- BILLY M. WILLIAMS An Ethical Framework for Climate Intervention Research: What It Is and Why You Should Care
- MARK SHIMAMOTO
- LISA J. GRAUMLICH
- LEONARD A. SMITH Wizards of Climate Science: Ancient Magicians in the Court of Big Science
- CHARLES W. FOWLER Holism in Dealing with Global Problems
- LARRY HOBBS
- MEGAN RODDEN
- ERIC W. ORTS Imagining Global Climate Solutions: Reflections on *The Ministry for the Future* and *Eleutheria*
- BONNIE NADZAM Storytelling in the Anthropocene
- FRANCES FLANNERY Why We Must Stop Saying "Climate Apocalypse": Symbols, Religious Social Memory, and Effective Climate Action
- ROBERT SINCLAIR Pathways to Equity in Addressing Climate Change: A Bahá'í Perspective
- SARRACINO
- MARGERY DIXON
- NOREEN HERZFELD A Case for Hope in a Warming World

BLOCKCHAIN, RELIGIOUS IMAGINARIES, AND THEOLOGY

- DAVID PUCHEU Network, Cryptography, and the Next World to Come: An Everlasting American Techno-Millennarianism?
- FRANCK DAMOUR The First Blockchain: Bitcoin, Entropy, Religion
- CASSANDRA DANA Perverse Attraction: Idolatry, Pornography, and the Making of Infrastructure
- NATHAN SCHNEIDER
- FINN BRUNTON The Financial Millennium