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**CLIMATE AS ASSEMBLAGE: IMAGINING AN ECOLOGICAL METAPHYSIC**

**By**

**ANDREA RAE GAMMON**

**Bachelor of Arts, Philosophy, University of Maine, Orono, ME, 2010**

**Bachelor of Science, Biology, University of Maine, Orono, ME, 2010**

**THESIS**

**presented in partial fulfillment of the requirements for the degree of**

**Master of Arts in PHILOSOPHY**

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**May 2013**

**Approved by:**

**Sandy Ross, Dean of The Graduate School  
Graduate School**

**Christopher Preston, Chair**

**Philosophy**

**Albert Borgmann**

**Philosophy**

**Deborah Slicer**

**Philosophy**

**Dane Scott**

**College of Forestry and Conservation**

## ABSTRACT

*Gammon, Andrea, M.A., Spring, 2013*

*Philosophy*

### **Climate as Assemblage: Imagining an Ecological Metaphysic**

Committee Chair: Christopher Preston

Human interventions have resulted in striking changes to the global climate. I work from the understanding of anthropogenic climate change as the product of 250 years of emissions brought about through industrialization and continued by our fossil fuel economies and lifestyles. The instrumentalism of such activities can be traced back to our modern metaphysic, where inanimate matter becomes object and falls away from ‘man,’ the knowing, active subject. In this thesis, I specifically address how this division of passive object from active subject pervades our understanding of climate and conditions the ethics of our human responses to climate change. I argue that our current frame of thinking about climate that I term *climate-facing* mischaracterizes climate and our position in it: *climate-facing* is inaccurately dualistic, separating climate from human life when the two are mutually constitutive and when other, nonhuman forces are also involved. Instead of *climate-facing*, I propose that we reimagine *climate-as-assemblage*, that is, as an ongoing, interactive process of co-fabrication that incorporates both humans and nonhumans. I draw from vital materialist Jane Bennett to explore the concept of assemblage, and I offer an indication of what this reconceptualization would look like for climate. *Climate-as-assemblage* brings to light numerous and diverse nonhuman forces, or actants, and taking these seriously requires a reconceptualization of agency that can be broadly disseminated across these instead of restricted to human subjects only. This revision—distributive agency—fits particularly well with climate, and I indicate how it might guide us on questions of climate engineering. I suggest that we should consider scholarship and action that complement *climate as assemblage* and that align with an ethic of distributive agency as we proceed in our relations with climate.

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I would be remiss if I failed to notice how much of an assemblage this thesis is and how without many, many human and nonhuman actants, it would never have been written. Here is a mention of a few of its more significant players:

First and foremost, I am indebted to Christopher Preston for his guidance, patience, and support during the last two years and especially during these fevered past months of thesis writing and revising. I could not ask for a more responsive and generous advisor and chair, and I am so appreciative of the time and effort he dedicated to this project. I also thank Albert Borgmann, Deborah Slicer, and Dane Scott for their help and feedback and for their invaluable instruction during the duration of the Masters program.

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THE MOTH, THE MOUNTAINS, THE RIVERS

Who can guess the luna's sadness who lives so briefly? Who can guess the impatience of stone longing to be ground down, to be part again of something livelier? Who can imagine in what heaviness the rivers remember their original clarity?

Strange questions, yet I have spent worthwhile time with them. And I suggest them to you also, that your spirit grow in curiosity, that your life be richer than it is, that you bow to the earth as you feel how it actually is, that we- so clever, and ambitious, and selfish, and unrestrained- are only one design of the moving, the vivacious many.

MARY OLIVER



## PREFACE

For millennia, humans have behaved as rebels against a superpower we call “Nature.” In the 20th century, however, new technologies, fossil fuels, and a fast-growing population resulted in a “Great Acceleration” of our own powers. Albeit clumsily, we are taking control of Nature’s realm, from climate to DNA. We humans are becoming the dominant force for change on Earth. A long-held religious and philosophical idea — humans as the masters of planet Earth — has turned into a stark reality.

Crutzen and Schwägerl (2011)

I take as the topic of this thesis anthropogenic climate change, mentioned by Crutzen and Schwägerl, as one of the most pronounced and consequential effects of human life on earth. I work from the understanding of anthropogenic climate change as the product of 250 years of emissions brought about through industrialization and continued by our fossil fuel economies and lifestyles. The imperceptible changes of increased atmospheric concentrations of carbon dioxide<sup>1</sup> are already present in rising sea levels; shrinking glaciers; increased instances of extreme weather events; milder and shorter winters with reduced snowpack; hotter, drier summers with longer, harsher heat waves; increased drought; changes in the range of animals and plants as well as the spread of diseases they vector; biodiversity loss and extinction events, to name a few (NASA). These will increase and intensify as concentrations of carbon increase and manifest, profoundly changing landscapes and threatening human and nonhuman populations.

It is out of concern, then, that I take issue with statements like that of Crutzen and Schwägerl. The narrative that ‘we,’<sup>2</sup> through our dominance and mastery of landscapes,

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<sup>1</sup> Which, at the time of writing, was 397.34 ppm (CO2now.org, 2013, accessed 22 April 2013), up from the pre-industrial level of 280 ppm. Climate scientist James Hansen et al. urge that we should aim to keep the atmospheric carbon concentration below 350 ppm “If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted” (Hansen et al., 2008, p. 217).

<sup>2</sup> Crutzen and Schwägerl, even in 2011, seem to equate ‘we’ with ‘man’ in at least one case: “But teaching students that we are living in the Anthropocene, the Age of Men, could be of great help. Rather than representing yet another



life forms, and atmospheric processes, have wrested control of ‘Nature,’ inappropriately frames the human and the natural as oppositional, and the conclusions that issue from this inaccurate framing often seem dangerously overweening. Crutzen and Schwägerl proceed to argue that ‘our’ control (which is by their own admission, clumsy) legitimates the overtaking of ‘Nature;’ they write: “It’s no longer us against “Nature.” Instead, it’s we who decide what nature is and what it will be” (2011).

I spend my thesis problematizing this approach in the context of climate and climate change. Instead, of an inanimate, mechanistic system controllable by humans as Crutzen and Schwägerl might characterize it, I re-imagine climate as a lively, capricious congregation of human and nonhuman activities and effects. Appreciating climate as a powerful and unpredictable assemblage of forces provides a novel ethical approach to climate. I argue that instead of unilaterally “deciding what nature is and what it will be” as Crutzen and Schwägerl confidently propose, attention to the factors and others that contribute to climate and recognition of how climate shapes human life will encourage more intelligent, thoughtful, and humble decisions and interventions into climate and the other ecologies of which we are part.

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sign of human hubris, this name change would stress the enormity of humanity’s responsibility as stewards of the Earth” (2011).

## 1.0

Human interventions, primarily through greenhouse gas emissions since the industrial revolution, have resulted in striking changes to the global climate (IPCC, 2007, p. 39). The questions of how to proceed in mitigating and adapting to present and future climate changes receive wide and warranted attention. However, instead of beginning with these questions, I want to probe the metaphysics underlying our current position. Our metaphysical picture, that is, how we understand the world to hang together and what we take our place in it to be, undergirds and precedes our actions. For instance, many environmental ethicists (Taylor, 1986; Callicott, 1999; Plumwood, 1991) have criticized the instrumentalist worldview that takes the world as resource, or instrument, for human exploitation. Implicit within this worldview is a dualistic metaphysical picture where the human subject, characterized as active and agential, is separated out from the passive and inert objects and matter that comprise the rest of the world. It is out of this subject/object dualism that an instrumentalist worldview arises (Plumwood, 1991; Heidegger, 1977b), as once the active subject is differentiated from passive objects, a hierarchy forms, and the subject makes use of what she takes to be unfeeling and morally inconsequential objects, manipulating them to suit her purposes. Thus, by seeing the world in this metaphysically dualistic way, we are predisposed to take passive matter instrumentally for our active, agential ends. Our metaphysics strongly condition the way we see the world, what ethics can emerge, and on those ethics, what actions are permissible. In this way, the dualistic metaphysical picture made way for our extraction and burning of fossil fuels in the first place.

The latter half of the twentieth century saw widespread recognition of the scale and severity of ecological devastation and the exhaustibility of resources, which have

culminated in distress about environmental catastrophe. It is no coincidence that environmentalist and feminist criticisms of the instrumentalist worldview have risen in prominence around the same time, and these critics have argued persuasively that the instrumentalist worldview is unsustainable. In this thesis, I will argue that it is also metaphysically problematic. Subsequently I propose a more accurate metaphysical frame for climate and an ethic that follows. The thesis proceeds in this way: in the following section, I introduce our modern metaphysical picture in more depth through Heidegger's essay "The Age of the World Picture" and briefly remark on what the world picture has meant for ethics. Heidegger argues that our modern metaphysic, dominated by scientific knowing, has simultaneously cast humans in the position of the subject and made the world representable to humans as an object in its entirety, that is, as a world picture. I observe how instrumentalist tendencies emerge out of the totality of the world picture. Then I move into the specific case of climate to illustrate how our modern metaphysical thinking misrepresents climate and our position in it. I term our modern metaphysical thinking on climate *climate-facing*, which I argue ignores the messy and complex way in which human and nonhuman bodies and forces come together, assembling continuously to make climate. *Climate-facing* is inaccurately dualistic, separating climate from human life when the two are mutually constitutive. Further, *climate-facing*, by focusing on the position of the human reckoning with climate, obscures nonhuman actants also involved alongside humans in making climate.

In chapter two, I propose my own metaphysical framing of climate, *climate as assemblage*, which aims to show climate as an ongoing, interactive process of co-fabrication in which both humans and nonhumans are involved. We, from the

Heideggerian “position of man” (human position), consider ourselves outside of or differentiated from the nonhuman things and forces of climate (like weather, highways, or plankton). The assembled climate I will try to imagine attempts to bring human into nonhuman configurations and to bring the nonhuman configurations into or nearer the animate realm of humans. And in considering the involved roles of all of the actants, the assemblage leads to a reconfiguration of agency—a distributive agency—that extends creative power to the dynamic arrangement of natural processes and nonhuman actants. An ethic of a distributive agency, then, follows from *climate as assemblage*, and in the third chapter, I will begin sketching what I think this ethical framework might look like and how it might guide human thinking and actions on climate change.

### 1.1 Heidegger and our modern metaphysic

I begin with Heidegger, who takes the metaphysic of the modern age as his subject in his essay “The Age of the World Picture.” The essay begins thus:

In metaphysics reflection is accomplished concerning the essence of what is and a decision takes place regarding the essence of truth. Metaphysics grounds an age, in that through a specific comprehension of truth it gives to that age the basis upon which it is essentially formed. (1977a, p. 115)

The most basic ideas and intuitions that define an age, then (like what we take to be true, how we know things, what things are, etc.), are *grounded* by our metaphysics. According to Heidegger, our modern metaphysic, and thus our modern age, find their essence in science [*Wissenschaft*], especially through what Heidegger terms Representation [*Vorstellen*]. Representation is the fundamental ontological relationship of science,<sup>3</sup> occurring when a knowing subject becomes differentiated from an object and Represents that object

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<sup>3</sup> Proceeding through a program of research, procedure, rigor, and specialization (Heidegger, 1977a).

as a knowable entity to himself. Through the act of Representation, then, the (human) knowing subject breaks away from the nonhuman objects he studies. That this seems obvious, I think, speaks to the pervasiveness of such a metaphysic in our modern understanding of what things make up the world and how we know and relate to them. However, the relationship of Representation is far more significant than it might at first appear: Heidegger claims that only through Representation can a subject or an object arise. He writes:

What is decisive is...that the very essence of man itself changes, in that man becomes subject...Man becomes that being upon which all that is, is grounded as regards the manner of its Being and its truth. Man becomes the relational center of that which is as such. (1977a, p. 128)

The human subject<sup>4</sup> thus ascends to the position of the fundamental authority that grounds—i.e., organizes, knows, interprets—all other things through Representation. His essence changes. Similarly, it is in the relationship of Representation that the object materializes as differentiated from the relational center of the subject: the object is *objectified*, or made object. Thus, objects are always in reference to the knowing subject. Objects are set before the subject to be known: “in such a way that man who calculates can be sure, and that means be certain, of that being” (Heidegger, 1977a, p. 127). That is, Representation (through the procedures of calculation, measurement, and correspondence to guidelines always in reference to the knowing subject) makes objects come into being for the subject. Representation, then, makes the knowing subject active over and above objects; simultaneously these objects, by Representation, are rendered passive and inanimate.

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<sup>4</sup> ‘Subject,’ here, is meant in a particular sense. Heidegger’s subject is not the individual, subjective I; it is instead an ontologically determinative status. We can see this in its derivation: ‘subject’ comes from the Latin, *subiectum*, which is a translation of the Greek *hypokeimenon*: “The word names that-which-lies-before, which, as ground, gathers everything onto itself” (Heidegger, 1977a, p. 128).

Ultimately, the dominance of science through Representation as a way of knowing leads to the world picture, which Heidegger argues is the decisive character of the modern age. Herein, the whole world is turned object and made graspable to the knowing subject as a single picture that can be Represented to us in its entirety. One particularly important manifestation of this is the way in which the world picture carves out a novel position for the knowing subject, from where he is studying and facing all else:

Now for the first time is there any such thing as a “position” of man. Man makes depend upon himself the way in which he must take his stand in relation to whatever is as the objective. There begins the way of being human which mans the realm of human capability as domain given over to measuring and executing, for the purpose of gaining mastery over that which is as whole. (Heidegger, 1977a, p. 132).

“The position of man,” or the human position, provides a unique and essential epistemological vantage for the knowing subject. The human subject is now able to oversee and comprehend ‘world’ as a single object. In this way, he is separated out from the rest of the objects that comprise ‘world.’ From here, ethics follow too. But this metaphysical starting place obviously conditions the ethics that ensue: man, first positioned as the knowing subject, thus becomes capable of acting on the object (whether the totality of the world picture or its component parts) by “measuring and executing,” and “gaining mastery.” Though Heidegger does not expressly address the ethics that follow from the modern metaphysical picture, we can discern in his writing two possible ethics that follow: first, safeguarding, and second, the attitude of *challenging-forth*. The first, safeguarding, appears in Appendix 9 to “The Age of the World Picture,” where Heidegger suggests that in Representation, the subject forms a conscientious<sup>5</sup> attitude

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<sup>5</sup> N.B. conscience from con-science, from the Latin *con-sciencia*, or *with knowing* (Heidegger, 1977a, p. 152).

towards the object, pulling it into “the sphere of representedness safeguarded by man” (Heidegger, 1977, p. 152). The subject, through his knowledge and mastery of the object, then becomes its steward. The second, the attitude of *challenging-forth*, [*Herausfordern*], pertains especially to technology. *Challenging-forth* is the specific mode of technology’s revealing power. That is, challenging-forth “puts to nature the unreasonable demand that it supply energy that can be extracted and stored as such” (Heidegger, 1977b, p. 12). Challenging-forth disposes us to see the world as resource [*Bestand*], further amplified by technological advancement that enables us to utilize these newfound resources. Moreover, technology further conditions our thought towards instrumentalism. Objects already conceived in opposition to the subject now become little more than instruments for our use. Though an ethic of safeguarding appears to have little in common with an ethic of instrumentalism, they share the core metaphysic of a subject executing mastery over that which she has taken as object. Further, both ethics reify this dualism and the hierarchal position of the subject, which leads to such problematics as paternalism and exploitation.

Surely, as modern humans, we cannot choose to opt out of the modern age, of science, technology, and of the metaphysical picture that sets the object of ‘world’ up against our position as knowing subjects. But this is not to say that we cannot challenge the presuppositions of our current metaphysical picture. In what follows, I will lay out what I take our position on climate to be as it is rendered by modern metaphysic: the position of *climate-facing*. This position echoes Heidegger’s “new position of man” (human position), where man is stationed apart from that which he takes as object. The

position of *climate-facing* instantiates the distinction of subject and object but, as we should see, misrepresents both of these components.

## **1.2 *Climate-facing***

Behind all of the political and social conversation and concern over climate change is of course its scientific foundation. The earth's atmosphere has a significantly higher concentration of carbon dioxide than any time in the past 800,000 years (Lüthi et al., 2008). This is altering the earth's energy balance and changing the global climate. The IPCC defines climate change as

a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity. (IPCC 2007, p. 30)

Without the ability to visualize to ourselves the world as picture (accomplished, recall, through science as Representation and the human position) it seems to me that we would not be able to conceptualize 'global climate change' in the way in that we currently do: that is, the 'global' in global climate change could only have been realized through the totality of the world picture. There is no such thing as a global mean temperature without first a sense of the 'global' that we can comprehend and Represent to ourselves. One of the most profound changes humans have made on the earth, the modification of its atmospheric chemistry, would have passed unnoticed by humans without the world picture cluing us into a sense of the global. So it seems that this subject/object dualism paradoxically is both the metaphysical source of the problem of global climate change and also the thing that lets us discern its existence. The object is given over for study and the subject, positioned outside to study and face the object, brings the object into being



for itself. Unfortunately, the way in which we see global climate change is also dictated by the terms of the metaphysical picture: that is, in the rigid subject/object dualism; the human position pervades. Scientifically, climate is the object of study, the known, and humans the scientific subject, the knower. Climate is the disturbed natural system, humans the (external) agents of disturbance. Politically, climate is the natural turned threatening, humans the threatened but also the empowered entities who can collectively act differently to undo the natural danger we've triggered, to *solve the problem*, by “measuring and executing, gaining mastery over that which is as whole” (Heidegger, 1977a, p. 132). Thus, the dualism introduced by modern science carries over into our attitude about climate and our discourse on climate change: climate is the object, humans the knowing subject. In light of anthropogenic climate change, we now recognize that the subject profoundly *affects* objects. However, the metaphysical division between the subject and object remains entrenched, perhaps even intensified by invocations like Crutzen and Schwägerl's mentioned in the preface.

I refer to this current framing of climate as *climate-facing*. With this term I mean to capture the ontologically separate categories of the object of climate *vis-à-vis* a collective human subject.<sup>6</sup> My use of ‘subject’ from here on diverges from Heidegger's: though I want to keep his knowing subject in mind, the subject I mean is the subject assumed by scientific and political discourse: that is, the active, knowing human, impacted by climate and implicit in its anthropogenic change. Moreover, *climate-facing* references the positioning of the knowing human subject as oppositional from climate:

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<sup>6</sup> Let me make clear that the collective human subject is the assumed ‘us’ of humanity. This is the common, undifferentiated picture of humanity advanced in the narrative of climate change as a single event impacting ‘us.’ I am not advancing this view. The idea of a unified ‘us’ is no less problematic than the rendering of climate as a passive, knowable, unified object. However, the political framing of climate change as an urgent problem ‘we’ must solve takes a unified ‘us’ as the subject.

this is not in the sense of being antagonistic (though this could perhaps be argued) but in the sense of being independently contained and constituted and fundamentally dissociated from the other. Heidegger's human position, then, is well instantiated in *climate-facing*. This term also contains some sense of the imperative that climate is something we have to face, that is, to reckon with, to solve. As Julie Cupples (2012) observes:

In the first world, in both everyday and scientific discourse, climate change is frequently posited as a transcendent and teleological megahazard, caused by the prime movers greenhouse gases, which have the potential to wreak havoc and undermine our way of life (p. 13).

The subject-object dualism of modern metaphysic percolates into our “everyday,” or what I have been referring to as ‘political,’ discourse also. In such discourse, both climate and climate change are understood as external to humans. The natural forces of climate provide the background conditions, or setting, for human life, and we have built up systems and defenses that protect and isolate us somewhat from weather-related threats.<sup>7</sup> Consequently, we conceptualize ourselves as separate from climate—as able to stand apart from it and face it—and the explanations we use for human activities and behavior are different from those we use to understand those pertaining to climate. The latter are natural forces we understand as mechanistically governed by physical laws that enable us to predict their workings reliably. We can reasonably forecast when there will be storms, where snow will fall, when volcanoes will erupt and how their eruptions will bear on

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<sup>7</sup> The frame of *climate-facing* is meant to capture the Western understanding of climate. Surely there are people in other parts of the world whose conception of climate differs markedly, perhaps in response to the inclemency of extreme weather events brought on by anthropogenic climate change. I mean to capture and address the Western framing of climate and climate change to problematize it, not to erase or ignore the very real people very significantly already facing climate dangers. As Cupples (2012, p. 13) notes, this is a danger in our current Western frames on climate change: “It is apparent that the biophysical realities which we socially construct as climate change—rising sea levels, drought and flooding, intensified hurricanes, disappearing ice—are of course affecting millions of humans and nonhumans right now, in Bangladesh, the Sunderbans Islands, Tuvalu, Papua New Guinea and Central America. The repeated positing of climate change as a future-oriented problem constitutes an insidious erasure of those killed and displaced by climate-related disasters at the present time. Dominant approaches to climate change are clearly a key part of the neocolonial global order, in which the deaths of third world inhabitants in disasters are more acceptable, more justifiable, than the future potential deaths of first world people who haven't been born yet.”

Sahelian precipitation.<sup>8</sup> We understand past climates through piecing together data that reveal histories and explain trends, and similarly, data-driven models help us extrapolate about future climatic conditions. By contrast, the explanations we apply to human systems and individuals involve greater complexity and consideration than the application of physical laws; namely, we take adult individuals to be independent, autonomous agents who act rationally according to principle. Humans are agential, but it makes no sense in our modern metaphysical frame to talk about anything other than humans, climate and its related forces included, as having agency. This rigid restriction of agency to the human subject is a clear ethical consequence of our modern dualistic metaphysics and the positioning of humans as ontologically above or outside of all nonhuman others.

I will return to this ethical consideration later on. For now, the problems with the metaphysical position of *climate-facing* should concern us. It appears to me that this frame misses some important points. First, on this view ‘human activity’ (e.g., fire, agriculture, and industry), is mistakenly unilateral; there is no recognition of the involvement of nonhuman others—trees, fossilized plants and animals, oceans that absorb CO<sub>2</sub> and buffer its effects, etc.—in ‘human’ impacts on climate. The *climate-facing* framing, which attends only to climate and humans (those who can face up to climate, that is, face it, comprehend it), and frames them oppositionally, is not the appropriate framing in which to respond to the concern that other, nonhuman forces also impact and are impacted. Second, this view fails to account for how climate has also made us, humans, the way we are. Humans obviously bear on climate through

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<sup>8</sup> See Jim Haywood et al., 2013.

greenhouse gas emissions, but climate likewise acts on us through weather patterns and seasons, and more recently, through extreme weather events that threaten our bodies and the buildings we shelter in, disrupt supply chains, jeopardize food and water supplies, and perhaps even decide American elections.<sup>9</sup> Taking this reciprocity seriously will also be incompatible with the frame of *climate-facing*. Frames of this kind, that position ‘the natural’ oppositionally and dualistically from ‘the human,’ not only deliver negative consequences, as environmental ethicists and eco-feminists have argued. They are also simply inaccurate metaphysical renderings that mistake ontologies as dualistic instead of mutually affected and affecting and co-constitutive. And because they limit what we sense, how we act, and how we respond to situations like that of anthropogenic climate change, I suggest that *climate-facing* is not the framing we should be using to understand the world generally or to address climate change, specifically.

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<sup>9</sup> According to Karl Rove, Hurricane Sandy helped Obama to victory in 2012: “The president was also lucky. This time, the October surprise was not a dirty trick but an act of God. Hurricane Sandy interrupted Mr. Romney’s momentum and allowed Mr. Obama to look presidential and bipartisan” (Rove, 2012).

## 2.0

Now the sun, moving as it does, sets processes of change and becoming and decay, and by its agency the finest and sweetest water is every day carried up and is dissolved into vapour and rises to the upper region, where it is condensed again by the cold and so returns to the earth.

ARISTOTLE, *Meteorology, Book II*

...You vapors, I think I have risen with you, moved away to distant continents, and fallen down there, for reasons, I think I have blown with you, you winds...

WALT WHITMAN, "Salut au Monde!"

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In chapter two, I draw upon the work of vital materialist and political theorist Jane Bennett to build my metaphysical frame of *climate as assemblage* and the ethic of distributive agency. (I might have explored this by continuing with Heidegger, but I have found Bennett's vital materialism offers greater concreteness and increased attention to the ecological issues of the present day.) I begin by introducing Bennett through her related concepts of *thing-power* and *assemblage*. I then imagine *climate as assemblage*, explicating the roles of nonhuman others in and around human influence and then exploring how climate and humans are fundamentally inseparable because climate historically and currently constitutes human lives. The ethical corollary of an assemblage-type metaphysic—an ethic of distributive agency—broadens the construction of agency canonically employed in ethics to encompass nonhuman actants and the powerful assemblages they form. Finally, I go on to suggest reasons why an ethic of distributive agency is particularly well-suited for the assemblage of climate.

## 2.1 Jane Bennett's *Thing-Power*

Political theorist Jane Bennett begins her book *Vibrant Matter: A Political Ecology of Things* (2010) by telling of an ordinary morning in her hometown of Baltimore when she noticed a discarded plastic work glove, a bottle cap, a stick, a dead rat, and a mat of pollen lying together in the gutter. For other pedestrians on this morning and any other morning, these objects were merely pieces of trash, debris to be hurried over and ignored if noticed at all. But on this morning, Bennett noticed that these objects “shimmied back and forth between debris and thing” (p. 4). In other words, these objects, commonly seen (or overlooked) as useless waste seemed to resist this classification and instead hinted at another identity. Despite their human-given status of garbage or discards, they had a kind of vitality of their own that called Bennett over to them.<sup>10</sup> The inert garbage turned expressive, and she could momentarily see in these things and in their arrangement a glimmer of vitality.

What Bennett experienced for a few moments of what she calls hyperreality that morning—the call from previously lifeless things turned lively—she attributes to what she now terms *thing-power*, or, “the curious ability of inanimate things to animate, to act, to produce effects dramatic and subtle” (p. 6). Among many other effects, things command our attention, inspire, and alarm us. To use some of Bennett’s examples, electrons stray from patterned paths and cause blackouts; heavy metals leak from poorly-contained landfills and contaminate water supplies; fatty acids alter brain function and

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<sup>10</sup> Bennett describes her encounter with these things as “calling her over to them” and as “hyperreal” in her presentation at the Nonhuman Turn Conference, (Bennett, 2012).

change our moods. Importantly, though these instances might include human components (like the toxic waste our lifestyles generate) or exist—as do the human brain and electric transmission wires—within human or human built systems, *thing-power* exists independently of human use and associations. Bennett emphasizes that the lively capacity of things is “not entirely reducible to the contexts in which (human) subjects set them” (Bennett, 2010, p. 5); that their power exists in excess of the human meanings we associate and project onto them. We tend to think of things in exclusively human contexts: as tools or as waste, as evidence of human presence, as reminders of the pervasiveness of industry and commercialism. Objects can then seem potent, but we tend to see such liveliness as reflecting back our human histories, intentions, projects, and machinations. This tendency has done important work in identifying the interplay of human (i.e., cultural, political, and socio-economic) factors in things we produce and the systems that produce them. However, this recognizes *only* human influence. Bennett worries that on these types of constructionist views, where any power or liveliness found in things is unquestioningly attributed to human activity or influence, we overshadow the possibility of a *thing-power* existing in isolation from the thing’s connections to human society (Bennett, 2010, p. 17).

It is not Bennett’s intention to divide decisively or finally the human from the nonhuman: her project actually works in the opposite direction, aiming to identify the interplay and fluid overlap between the two. “One moral of this materialist tale,” Bennett writes, “is that we are also nonhuman and that things too are vital players in the world” (Bennett, 2004, p. 349). Bennett wants us to pay attention to the vitality of *all* materiality, which includes the materiality of human bodies and human-built systems. She attempts to

dispense with the rigid ontological dualism of living versus nonliving, where only living (and almost always human) things are active and the rest of the world is passive. This is somewhat of a difficult task: we easily see animation in living things, but we are not so practiced at seeing vitality in nonliving matter. As we have seen in Heidegger's explication of our modern metaphysics, the knowing subject characteristically objectifies the nonhuman, stripping it of its vitality. This objectification pervades our epistemologies and ethics, and as Bennett rightly notes, even our grammatical structures reflect the dualism of the active subject over or against the object. (Bennett, 2011). In response to these challenges, she works on building a vocabulary and focusing on the *thing-power* of nonliving things to counteract to our proclivity to see liveliness as only coming from or in relation to human agency.

Bennett is one of a growing number of thinkers involved in the resurgence of attention to nonhuman things. Her vital materialism is similar though not identical to the speculative realist movement in philosophy; there are important differences, but both trends attempt to stand back from constructionist thinking that has dominated late twentieth century, especially postmodernist, philosophy. Speculative realists Bryant, Harman, and Srnicek comment that what they term "the anti-realist trends" of continental philosophy where such foci as "discourse, text, culture, consciousness, power, or ideas" constitute reality may not provide an adequate philosophical response to problems that are decidedly material (Bryant, Harman & Srnicek, 2011, p. 3). They write:

Without deriding the significant contributions of these philosophies, something is clearly amiss in these trends. In the face of the looming ecological catastrophe, and the increasing infiltration of technology into the everyday world (including our own bodies), it is not clear that the anti-realist position is equipped to face up to these developments. The danger is that the dominant anti-realist strain of



continental philosophy has not only reached a point of decreasing returns, but that it now actively limits the capacities of philosophy in our time.

There are two features of Bennett's vital materialism that set her apart from other brands of speculative realism. First, Bennett pays considerable attention to the ways in which humans can be receptive towards the nonhuman and the implications such receptivity would have for ethics, politics, and ecology. Second, her version of vital materialism, though focusing on individual things, also considers the ways in which conglomerated objects aggregate, organize, and assemble in recognizable and significant ways, generating powerful emergent effects. This focus seems especially necessary when considering the novel configurations of the age of globalization<sup>11</sup> and in situations of environmental degradation:

Bodies enhance their power in or as a heterogeneous assemblage. What this suggests for the concept of agency is that the efficacy or effectivity to which that term has traditionally referred becomes distributed across an ontologically heterogeneous field, rather than being a capacity localized in a human body or in a collective produced (only) by human efforts (Bennett, 2010, p. 23).

I suggest that both of these features—the human reception of *thing-power* and the organization of things in assemblages—can helpfully inform and revise our understanding of climate and move us out of the *climate-facing* frame. I revisit *thing-power* when I consider our ethical response to *climate-as-assemblage*. For now, however, I am more interested in the latter: how the concept of assemblage, which I put to work as *climate as assemblage*, brings out salient features of climate change that our current frame of *climate-facing* obscures.

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<sup>11</sup> “Globalization names a state of affairs in which Earth, no longer simply an ecological or geological category, has become a salient unit of political analysis. More than locality or nation, Earth is the whole in which the parts (e.g., finance capital, CO<sub>2</sub> emissions, refugees, viruses, pirated DVDs, ozone, human rights, weapons of mass destruction) now circulate.” (Bennett, 2005, p. 445)

## 2.2 The Assemblage

For Bennett and other speculative realists, mechanical or organismic models cannot adequately describe or contain the systems and arrangements that surround us and make up our lives—systems that are multi-faceted, dynamic, and often volatile. To tackle these arrangements and their confounding problems, Bennett looks to Deleuze and Guattari's concept of the assemblage. Her definition—itsself lively—is worth quoting at length:

Assemblages are ad hoc groupings of diverse elements, of vibrant materials of all sorts. Assemblages are living, throbbing confederations that are able to function despite the persistent presence of energies that confound them from within. They have uneven topographies...and so power is not distributed evenly across its surface...The effects generated by an assemblage are...emergent properties, emergent in that their ability to make something happen (a newly inflected materialism, a blackout, a hurricane, a war on terror) is distinct from the sum of the vital force of each materiality considered alone. (2010, p. 23)

The lively, fluid, interaction of bodies, intensities, and lines of flight<sup>12</sup> of an assemblage is, by its nature, difficult to govern and even more difficult to predict. The assemblage concept responds to the reality that most systems and organizations are not composed simply of two or maybe three parts: the autonomous human agent, the passive nonhuman world, and perhaps the social or political arrangements conditioning human behavior. Assemblage, instead, recognizes the involvement and potency of a multitude of facets—which Bennett, following Bruno Latour, calls actants—and the heterogeneous grouping of the assemblage allows us to see each actant exerting a force on the whole. The interplay of these uneven and fluctuating forces characterizes the assemblage, a departure from the modernist picture where the autonomous, rational, (human) agent acts with hegemonic force on her surroundings. The assemblage, then, makes room for the forces

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<sup>12</sup> “Lodge yourself on a stratum, experiment with the opportunities it offers, find an advantageous place on it, find potential movements of deterritorialization, possible lines of flight, experience them, produce flow conjunctions here and there, try out continuums of intensities segment by segment, have a small plot of new land at all times” (Deleuze & Guattari, 1987 p. 161).

of nonhuman actants while still possibly preserving the space of moral agency that analytic ethics has carved out for the rational, autonomous human.

Although at first glance, the concept of assemblage seems abstract and difficult to grasp, there are plenty of illuminating examples of such arrangements. Bennett brings the concept to life with her example of the North American electric power grid and its failure in 2003. For Bennett (2010, p. 25) the electric grid is:

a volatile mixture of coal, sweat, electromagnetic fields, computer programs, electron streams, profit motives, heat, lifestyles, nuclear fuel, plastic, fantasies of mastery, static, legislation, water, economic theory, wire, and wood—just to name some of the actants.

The grid's functioning and its failure demonstrate how nonhuman things, like those Bennett has listed, command a force that rivals and often exceeds the force of human agency. Especially when they are assembled in potent constellations like that of the electric grid, especially when they commingle with and comprise human bodies,<sup>13</sup> these nonhuman actants work in ways that deserve our attention. By considering these things to be actants, Latour and Bennett make room for the very real and lively ways in which nonhuman things act, even if they lack the intentionality that constitutes human agency. What I attempted to show in the previous chapter is that in our modern metaphysical thinking, there is precious little room for actants. Humans are the positioned as the privileged agent; everything else is rendered passive.<sup>14</sup> Human agency, then, acts like a sponge, absorbing and accounting for all activity, mirroring the gathering metaphysical center of the knowing human subject. However, if we are to discern and appreciate the omnipresent and powerful roles that nonhuman actants play in and around us all the time

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<sup>13</sup> Human agency surely requires the electricity firing between neurons in the human brain, the caloric energy of food that fuels brain function, and the atmospheric oxygen carried through the breath and blood that sustains the brain, etc.

<sup>14</sup> Even animals that we commonly consider to be lively and active are at best moral subjects, never moral agents, and we frequently attribute their behavior to their organismic, 'animal nature.'

instead of continuing to subsume them under human agency, we require a metaphysics that entertains that these things have a liveliness *independent of* human activity and instrumentality. Bennett suggests that we revise our picture of agency so that it may be distributed over many causally-related people, technologies, and nonhuman things. But before an ethic of distributive agency in climate change can come into view, we need to recognize some of these nonhuman forces and bodies active in assembling climate that we tend to overlook.

### ***2.3 Climate as Assemblage***

In building the picture of *climate as assemblage*, I aim to bring to our attention the real and powerful ways in which human and nonhuman actants, physical facts, and societal histories and conditions interact and conglomerate. Even a cursory examination of some of the so-called human impacts on climate reveals the integral role of nonhuman others. I begin the following subsections by identifying many of these others, and then I concentrate on the particular actant of fossil fuel. I then turn back to the human and endeavor to show how climate and humans are materially interactive and interwoven. Far from being positioned outside of climate, humans, I argue, actually embody past climates and are profoundly climate-impacted.

#### ***2.3.1 Nonhuman actants***

Our current climate is the product of countless factors and actants: the earth's distance from the sun, its axial orientation; variations in solar radiation and the radiation balance of incoming sunlight and outgoing thermal energy; greenhouse gases that insulate the earth and prevent the re-radiation of all of its heat; plate tectonics and

volcanic eruptions; the thermal inertia of water; ocean currents and their oscillations; glacial formation and retreat; living and dead matter cycling carbon terrestrially and aquatically; bacteria and aerobic respiration; air masses, differentials in temperature and pressure, and prevailing wind patterns; methanogens, permafrost and feedback loops; fossil fuels; deforestation and afforestation; agriculture, crops, and cattle; algae; phytoplankton, again, to name a few. On an assemblage view, these are a few of the actants—the forceful players—that make and affect the current climate we experience. These are important to highlight, especially if Nigel Clark is correct in suggesting that we rarely appreciate the full potency of these actants. In his book *Inhuman Nature*, Clark explores the unstable and often violent forces and natural upheavals characteristic of earth’s processes and their impacts on human life and thought. He writes:

I set out from the position of our susceptibility to the earth’s eventfulness, for our all-too-human exposure to forces that exceed our capacity to control or even make full sense of them...As fleshy, sensuous creatures, we have always been exposed to the energy and the inertia, the flow and the congealing, the mobilization and the halting of the earth. It is constitutive of our humanness, I argue, that we are inherently liable to being thrown off course by the eventualities of our planet. (2011, p. xiv)

Situated as we are in the more vulnerable position of the asymmetry Clark draws, we as humans surely owe great recognition to the actants that overpower and could easily overwhelm us. But instead, we take little notice of them, interpreting them as given facts of the earth’s workings, perhaps even taking their outcome as ordained, as making way for the *telos* of human life. The metaphysical picture of *climate-facing* works in this direction, obscuring and diminishing the activity and liveliness of the nonhuman. Accounting for the potency of nonhuman actants is important if humans are indeed the weaker force but also because ignoring these other forces mischaracterizes our fundamental metaphysics: what we take the world to be and how we can relate in it.

Clark's point is an important one, but it misses the basic offering of Bennett's assemblage: the point of the assemblage is not only to bring out the nonhuman in contrast to the human (and perhaps prove human frailty by comparison) but to locate the nonhuman and the human together. The point is that they merge, entangle, and they often comprise each other. Upon closer examination, the division of the human from the nonhuman often turns out to be artificial: in my previous list of climatic factors, deforestation, afforestation, agriculture, cattle, and crops are profoundly human acts or results, but none of them is singularly human. For instance, consider how agricultural changes in land use often typically trade one set of nonhuman others, e.g., native varieties and diversities for another set, e.g., plantations of homogenous crops or livestock who requiring cleared landscapes for grazing. Similarly, we are certainly justified in identifying fossil fuels as the central player in the problem of climate change, but talking of fossil fuels make no sense outside of the context of our carbon economy and energy-intensive lifestyles or without considering the nonhuman lives from which they issue. In fact, this major player in the climate assemblage I think deserves some special attention.

### *2.3.2 Dead labor and fossil fuels*

Carbon-based energy, in the form of fossil fuels, permeates and powers our industries, agriculture, global trade and politics, democracies, cities and suburbs, and communications. The lifeblood of modernity is the quite literally the dead labor of plankton, plants, and other organisms-turned fossil fuel. Though not writing specifically about climate change, Scott Kirsch and Don Mitchell put the Marxist concept of 'dead labor' to work in an actor-network-theory context. They write (2005, p. 696):

No longer, Marx writes, do laborers see the end result of their own labor: “the detail labourer produces no commodities”. The final, ossified thing is a conglomeration, a stitching together of any number of discrete processes, often occurring over vast stretches of space and time.

We can see how something like Bennett’s assemblages might be used to illuminate the dead labor contained in fossil fuels. Of course, humans are responsible for the emissions of greenhouse gases by the combustion of fossil fuels. But the frame of *climate-facing* ends the story there, obscuring the forcefulness of the nonhuman, the paleo-organisms, and how their dead labor is expended. By revealing this, the assemblage helpfully counteracts our instrumentalist tendency by showing how objects we currently take as instruments possess an agency outside of the uses to which we put them. Here we can see this in one of its purest instances: we view these dead, now-compressed and conglomerationed organisms as *bestand*, resource: they are fossil *fuels*, their previous paleo-organism identities almost entirely obscured. In fact, the very processes and activities that these dead bodies power only further obscure them. For instance, driving a car across America’s highways evokes the feeling of the freedom of the open road, of independence and latitude. Though this requires the car, the highway, fueling stations, and especially for my example, the dead labor of organisms-turned-gasoline among many other things, these collaborative factors are rarely considered when we think of the unattached allure of driving. Or we might instead dig deeper into this example and, recognizing the context behind cheap gasoline, concern ourselves with the geopolitical realities of fossil fuels and the human consequences of their procurement. These are surely important concerns. But still, these concerns are voiced in terms of resource, exploitation, and energy markets. In these types of concerns, humans and our political and economic arrangements are the operating powers, eclipsing any possible attention to the activity and power of the

thing—oil, coal, gas—in itself and its organic progenitors. Consider instead what assemblage-type thinking brings out. On an assemblage reading, fossil fuel is itself an assemblage: the enterprising combination of plant death, heat, pressure and geological timescales, geopolitics, imperialism, internal combustion, oil rigs, Gulf Wars and energy-intensive lifestyles, just to name a few. And these relationships, as they are brought to light as assemblage invite further exploration. But as Bennett would council, equally significant is attention to the component things themselves as potent and lively and capable of behaving in unpredictable ways. Kirsch and Mitchell note towards the end of their article:

Finally, none of the above should be interpreted as implying that the relations among humans, objects, nature, technologies, and knowledges are always fully within human control. Any product, all dead labor, can take on a “life” of its own, and may come to dominate the living labor that makes it (consider, eg, the emission of carbon dioxide). The “nature of things” is indeed to become non-human actors. (2005, p. 701)

Single actants, dead plants, for instance, can yield unexpected results, like the warming of our planet. That we now understand the chemical relations connecting paleo-organisms to our present atmosphere—the carryover of hydrocarbon chains and their release through combustion—should not be taken to explain away the potent *thing-power* involved in the thing we take as fossil fuel. This, I think, is part of the reason why recognizing the dead labor involved in fossil fuels is important: not so much the scientific understanding that it can engender as much as the realization that things take on unexpected dimensions and that their liveliness can have profound implications, as in the case of burning fossil fuels for energy and the unforeseen effect of global climate change. Fossil fuels turn out to have quite an explosive agency. Similar attention could be focused on actants such as polar bears; the matrix of floods, droughts, and wildfires in the U.S. and elsewhere;



climate models, and many others as conglomerations of the human and the nonhuman in understanding climate and climate change: all of these are assemblages ripe with affinities and charged with the capacity to yield unintended consequences. I will return to the promise of unintended consequences and their bearings on ethics later in the chapter. Here, we should see that single actants, like fossil fuels, upon closer examination, can turn out themselves to be complex imbrications of human and nonhuman lives and factors, dynamic, active in character, and capable of surprising us. When we look for assemblages, we find them, and this frame can illuminate old concepts, like “fuel” or resource, in new ways.

### 2.3.3 *Climate making humans: Hominin Evolution*

By now I have illustrated how thinking of *climate as assemblage* brings out what *climate-facing* obscures by specifying some of the many ways in which nonhuman actants assemble to form climate. Further, our picture of agency should also look different; taking nonhuman actants seriously requires an expansion of agency from the canonical picture of individual (humans) rationally choosing to act on principles into a broader notion that can include the workings and creative forces of nonhuman actants. Climate should be looking less like an inert, established background feature as it is cast in our current metaphysical frame. Setting aside for the moment the ways in which we and nonhuman others have fashioned climate, I endeavor to dissolve further the metaphysical frame of *climate-facing* by attending to the most significant way in which climate has fashioned and constituted us. Though not forgetting the manifold ways in which nonhumans are involved in climate, I turn back to the human to argue that evolutionary, long-term, directional selection pressures physically tie us to climate. Because past and

present climates actually constitute our physical bodies and minds, we are always inseparable from them.

The dramatic fluctuations in climate over long expanses of time bear profoundly on the evolution of any living species. Our ancestral hominins experienced an array of climate changes: long-term cooling and drying and periods of glaciation as well as shorter-term seasonal changes in daylight, precipitation, and temperature. And as climates shifted, so too did critical factors like food availability and diversity, regional vegetation and landscape structure, water sources, and options for and requirements of shelter. In the face of these changes, some hominin branches adapted and survived, and others failed and died out. As the human descendants of the surviving hominins, we, in our very biology and physiology, embody the paleoclimates of our forebears.

Paleobiologist Anna Behrensmeyer writes: “The role of climate in the origin and adaptations of humans relates not only to our past but also, potentially, to our future” (2006, 476). She elaborates on some likely evolutionary impacts:

A number of hypotheses propose that climate-driven environmental changes during the past 7 million years were responsible for hominin speciation, the morphological shift to bipedality, enlarged cranial capacity, behavioral adaptability, cultural innovations, and intercontinental immigration events. (2006, p. 476)

Christopher Ruff adds hominid thermoregulation and a reduction in pelvic breadth to this list (Ruff, 1991). Lahr and Foley attribute expansions and contractions in hominid population distribution in present-day Europe and Africa to climate fluctuations (Lahr & Foley, 2003). Behrensmeyer cautions that first, the paleoclimate record<sup>15</sup> presents difficulties in interpretation; and second, climate needs to be considered alongside

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<sup>15</sup> The integral role of nonhuman others appears prominently in climate science too: stable oxygen isotopes found in foraminifera skeletons, pollen, mammalian fossils, and land and water deposits are used as proxies in reconstructing paleoclimates, and these proxy records “are subject to local tectonic and climatic processes that often obscure or completely overprint global-scale climate signals” (Behrensmeyer, 2006, p. 476).

biological processes influential in human evolution; and third, the specific relations linking climate change and hominin evolution require nuance:

Rather than a simple story of global climate drumbeat and evolutionary response, more informative and exciting revelations about the 7-million-year development of hominin morphology, behavior, and culture will likely come from detailing the prolonged tension between local ecosystems and global climate change. This is also a strikingly relevant theme for the future of our species. (2006, p. 478)

My treatment is admittedly “the simple story” Behrensmeyer discourages, and though this is clearly inadequate for paleobiology, it will suffice here. My intention is to argue broadly that climate has made humans what we are; the specific mechanisms of interest to paleobiologists and anthropologists may enrich this story and perhaps aid human adaptation in the coming climate shifts but are not necessary to my point. Recognizing the long-term directional selection pressure of climate on human evolution is uncontroversial, and, as Behrensmeyer notes, perhaps insightful in the midst of our present and future climate fluctuations. Geographer Nigel Clark brings a poetic gloss to my point:

Making it through one climate crisis would have been an awesome and unlikely achievement. But our forebears—small, straggling bands of humans or hominids—made it through hundreds of these episodes. We, all of us alive today, are the outcome of their ability to endure. We are the improbable heirs of the struggle, sacrifice, and sheer luck of distant ancestors caught up in recurrent catastrophe. Not only did their efforts allow us to exist, they literally made us what we are: the harsh mechanism of highly selective survival gifting us with the psychological, cerebral, and social capacities we now take to be our own. (2008, p. 42)

Clark draws out nicely that our present bodies and minds continuously reflect past climate states. And though modern humans are insulated from many of the risks, threats, and environmental pressures that characterized the lives of our hominin ancestors, we should not take this to mean that climate has been shut out of our modern lives and ceases to influence us. We can easily point to adjustments to climate we make in our daily lives,

from clothing, shelter, distribution of populations, food. Indeed, this paper, and many, many more on global climate change are motivated precisely because climate *threatens* us, and its threats bear heavily on large-scale, structural factors like ways and places of human life, on politics and economies but also on the smaller, day-to-day challenges of food and water availability or our experience of weather. The facts of climate's continuous involvement in our bodies, daily experiences, and ways of life reveal our human position as not outside of or above but *situated in* the assemblage of climate, profoundly acted on and constituted by nonhuman others and forces.

#### **2.4 Distributive Agency**

As I have shown, nonhuman and human factors intertwine and conglomerate, forming a climate that is never static or finished, but instead is eventful, complex, potent, and mercurial. I have thus muddied the picture of climate, as I have tried to bring to life the dynamic interplay between collections of forces. The dualism between climate and humans should be collapsing as we realize that climate has made us and other nonhuman forms the way we are and that we, alongside these other nonhuman bodies, assemble to make climate. No longer should climate appear as inert, as a background setting for human life. Instead, matter is lively, things have power, and when they come together in assemblages, they can form active, complex systems that easily overpower and outlast the control of human agents. Recall the surprising agency of paleo-organisms reawakened in our combustion of fossil fuels. Consider that the prevailing winds, while powering our farms of turbines, simultaneously contribute to warming by altering the albedo of parts of

the earth.<sup>16</sup> Re-imagining *climate as assemblage* reveals nonhuman actants as amassing greater influence than we currently presume and human subjects, especially as conceived by modern ethical frameworks, as less sovereign than we take ourselves to be. Upon such considerations, our current concept of agency, where the rational, autonomous (exclusively human) subject acts on principles, seems outmoded. This makes sense, as following Heidegger's insistence, ethics are grounded in the prevailing metaphysics. Consider the repositioning that *climate as assemblage* requires: instead of occupying the human position, facing climate from the outside, we are situated in, among climate and its forces. A subsequent sea change in ethics should issue, then, from this metaphysical rearranging, and as has been suggested, this will take the form of a revision of agency. Limiting agency to human agents occludes the activity Bennett and others encourage us to look for among nonhuman things. Taking assemblages seriously will require novel ethical responses that permit and respond to the liveliness of nonhumans and our ongoing involvement with them. Bennett describes the new ethic she envisions as a theory of distributive agency. On this construction, agency not as a property unique to human subjects but a broader affective capacity that conglomerations of converging actants can amass together. In what follows, I will offer an explanation of distributive agency drawn from Bennett and explore why an ethic of distributive agency is defensible and preferable for considerations of climate.

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<sup>16</sup> Zephyrean air flows conduct cryoconite (a mix of dust, dirt, and particulates from soot) towards the poles and up to snowy elevations and icecaps, changing the albedo and of these otherwise white and thus very reflective surfaces and introducing new microbial communities (Takeuchi, Kohshima, & Seko, 2001; Lydon, 2013).

### 2.4.1 Bennett's broader construction of agency

For Bennett, 'agency' has at least three important aspects: efficacy, trajectory, and causality. Each aspect appears not to attach uniquely to human actions. The first aspect, efficacy, is the creative capacity to cause something new (2010, p. 31). Usually we understand efficacy in a moral context of an agent who operates with an intention, but we certainly can conceive of efficacy without a moral subject and thus without intentionality. Consider, for example, Superstorm Sandy,<sup>17</sup> the hurricane that devastated parts of New York and New Jersey and affected all states on the eastern seaboard in October, 2012, killing more than 150 people and causing at least (US) \$50 billion in damages in the United States alone (Porter, 2013). Sandy may have lacked intentionality, but her efficacy is clear. She possessed terrific creative and destructive forces, and these were only amplified by human factors like the densely populated Atlantic seaboard, beachfront properties, power and class relations in New York,<sup>18</sup> etc. The second of Bennett's considerations, trajectory, similarly centers on intention, at least as conceived by moral philosophy, as she notes: "Moral philosophy has figured this trajectory as a purposiveness or a goal-directedness linked to a (human or divine) mind capable of choice or intention" (Bennett, 2010, p. 32). However, trajectory might also be taken to mean directionality or movement away from one point to another: again, intentionality is not necessary for trajectory (2010, p. 32). Consider Sandy's path from the Caribbean Sea, gathering intensity as she traveled up the eastern coast of the U.S., finally making landfall near

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<sup>17</sup> Journalist Alexandra Witze at least metaphorically assents to the agency of Sandy, as evidenced by her personification of the storm: "She was born, like all hurricanes, as a faintly inauspicious stirring of winds. But she didn't come from off the coast of Africa, as many tropical Atlantic storms do. She was a child of the Caribbean," and later: "To better predict any future Sandys, scientists are working to understand exactly how she was born, grew and died" (2012).

<sup>18</sup> See Zoltán Glück's (2013) blog post "Race, Class, and Disaster Gentrification" from the blog *Tidal*.

Atlantic City, New Jersey. Third and last of Bennett's aspects is causality, which, when agency is distributed, strays from our Aristotelian conception. Bennett writes that causality will be "more emergent than efficient, more fractal than linear" (2010, p. 33). Sandy herself was a meteorological assemblage, the hybrid weather event of low air pressure from the north and west, abundant atmospheric water vapor probably resulting from other, nearby tropical storms, heat rising from the warm Caribbean waters, and a high pressure system over the Atlantic (Witze, 2012). If we consider agency to be distributed across many bodies, we are more likely to see swarms of causal forces out of which an effect emerges than the simple chains of causation we are accustomed to identifying. The concept of an assemblage, then, for its sheer number of actants and forces (that, as Bennett's *thing-power* suggests, are often inscrutable) and for the effects that emerge from specific arrangements of these things, forces, and multiplying intensities, cannot be reduced to or explained only in terms of causality.

Bennett writes:

A theory of distributive agency...does not posit a subject as the root cause of an effect. There is instead always a swarm of vitalities at play. The task becomes to identify the contours of the swarm and the kind of relations that obtain between the bits. To figure the generative source effects as a swarm is to see human intention as always in competition and confederation with many other strivings... This understanding of agency does not deny the existence of that thrust called intentionality, but it does see it as less definitive of outcomes. (2011, p. 32).

Bennett challenges human agency not by disputing that humans, who have intentionality, act differently and have distinct responsibilities but by suggesting that on an assemblage view, our account of human intentionality overreaches. Assemblages, as we have seen, are not mechanical, predictable, or governable systems. Human intentionality comprises a powerful force, but it is by no means the exclusive or even dominant force in most arrangements. However, critics might respond that distributing agency across nonhuman

others misallocates force that should remain exclusive to the agential human subject. They might argue that intentionality forms the core to agency, and though assemblages might be efficacious, have trajectory, and cause outcomes, assemblages, without the necessary condition of intentionality, are not agential. Or that distributive agency diminishes agential capacity from the robustness of moral autonomy and intentionality to the accident of a tree falling on a transmission line or the whimsy of a genetic mutation.

Bennett responds to these kinds of objections by demonstrating the shortcomings of moral agency as it is currently conceived. The autonomous individual is hardly autonomous, let alone individual. Bennett argues that even speech, usually put forward as an unequivocally and singularly human feature, is constituted and depends on—in her case—the graphite of her pencil, millions of people who have influenced and spoken English and other languages in the Indo-European language group before her, the electricity in her brain, etc. She (with, as we should note, the help of her graphitic pencil, her electric brain, her language heritage, her laptop) writes (2010):

On close enough inspection...human actants...will themselves turn out to be confederations of tools, microbes, minerals, sounds, and other “foreign” materialities. Human intentionality can emerge as agentic only by way of such a distribution. (p. 36)

Here, Bennett is only adding nonhuman others to the societal structures, constraints, and inducements that we already recognize condition human agency. Her suggestion that human agency, the mainstay of Western ethics, is itself assembled of heterogeneous, non-agential parts, should underscore the necessity of a revised concept of agency distributed across living and nonliving bodies and forces.

It is important to emphasize that distributive agency does not take each force or player as an agent in the same way humans are agents. Actants differ importantly from



agents in that actants do not operate with intentionality. Agency emerges from a level of activity or force, as in Bennett's examples of the tools, microbes, minerals, etc. that comprise the human. These are not themselves taken to be agents, especially in the moral sense. However, the confederation of bodies in assemblages act in curious ways. Reconceiving agency as the capacity, disseminated over many persons, microbes, minerals, to act and affect other things and bodies better suits the reality of an assembled climate whose forces can easily overwhelm human agency and outmatch human intentions. Further, not only does material agency seem to be the right metaphysic, its ethical ramifications offer a number of distinct advantages pertinent to climate. I conclude chapter two by exploring four of these.

#### *2.4.2 Distributive agency and climate change*

Distributive agency responds to an idea that Bennett's vital materialism shares with speculative realism: that things are not necessarily knowable, that they are inscrutable and surprise us. *Thing-power*, as we know, maintains that human meanings do not exhaust things, even when the thing is a human artifact. Further, interactions and assemblages amplify the uncertainty of the unaccompanied object. Bennett grants that objects that form the assemblage are ontologically prior to its attendant relations. But the novel relations that emerge from the assemblage, like that of distributive agency, bear on the (human and nonhuman members) of the assemblage and on what can be known about them. We should never rule out the possibility of surprise by things or complex assemblages like climate because we cannot assume that we can ever completely know them. Marilyn Frye observes the assumption of intelligibility:

Western philosophy and science have for the most part been built on the presumption of the Intelligibility of the Universe. This is the doctrine that everything in the universe and that universe itself can, at least in principle, be understood and comprehended by human intelligence, reason, and understanding. (Frye, 1983, p. 71)

Frye's point about epistemological limits should not disparage attempts at knowledge but may encourage a bit more humility in our dogged pursuit of exhaustive and definitive scientific knowledge in the West.

This relates to my second point: climate science demonstrates the limitations of scientific knowledge. Though the limitations of models are widely recognized and understood, there persists a greater, irredeemable uncertainty in our ability to know and predict in climatic systems:

Climate science offers a powerful example of a case where, despite huge advances in observation and modeling, the ability to modify does not necessarily imply the ability to precisely predict and control. While scientists can predict general trends with great confidence, the ability to model the exact nature of local impacts remains constrained. (Buck, Gammon, & Preston, in press)

Our techno-scientific inclination is to assume that with better science, more data, and more precise models, we can ultimately eradicate uncertainty about climate, even in such erratic, nonlinear systems. Our impetus for this knowledge ties back into Heidegger's point in "The Age of the World Picture" about *Wissenschaft*, our procedure of science as research. Assumed in *Wissenschaft* is that we are in a position to know and that the represented object can be known. Heidegger himself doubts this: "Much of what is cannot be brought under the rule of humanity. Only a little becomes known. What is known remains approximate; what is mastered remains unstable" (Heidegger, 1971, p. 53). An ethic of distributive agency better responds to the irredeemable uncertainty of science, first by entertaining the activity of more than human forces, and second by questioning the human position and the role of the knowing human subject.

Sheila Jasanoff's article "Technologies of humility" links the limitations of scientific knowledge with the third reason distributive agency is preferable for climate change: the social aspects of climate change. She writes:

Real problems in the real world are infinitely complex, and for any given problem, science offers only part of the picture. Climate scientists can tell us with high certainty that human activities are raising Earth's mean surface temperature, that extreme weather events will occur, and that melting ice caps will cause abrupt changes in the global climate...[but] science cannot tell us where and when disaster will strike, how to allocate resources between prevention and mitigation, which activities to target first in reducing greenhouse gases, or whom to hold responsible for protecting the poor. (2007, p. 33)

An ethic of distributive agency fits climate change because it underscores the social, political, economic, and cultural aspects of climate change. Climate change is frequently framed as a technical problem of excess carbon in our atmosphere, which misses or ignores these facts, and as I have already argued, misses the role of nonhuman actants in climate. Concealing the social and political histories of climate change glosses over the inequalities and vulnerabilities that led to or resulted from climate change, the capitalist, militaristic, and technological self-propelling power of the so-called first world and the responsibility we bear in the West for privileged and energy-intensive lifestyles. Considering agency as distributed across and built up from varying ontological actants—nation states; neoliberal policies; Western standards of living; carbon credits—alongside and constructed by nonhuman actants—the dead labor required for fossil fuels; seismic activity and nuclear facilities and waste; wind farms and their necessary airflows and topographies—more accurately represents climate change and should reconceptualize and reorganize our responses to it. For instance, an ethic of distributive agency will recognize the need for Westerners to make 'carbon-conscious' lifestyle choices of consuming less and caring more for the things that surround us and build our world, but it won't sponsor

the consumerist message that climate change can be ‘fixed’ by buying this kind of yogurt<sup>19</sup> or bringing reusable grocery bags to the store. Instead, an ethic of distributive agency takes humans as one of many impactful players among others (e.g., greenwashing, western guilt, petroleum-turned-plastic-bottles-turned reusable bag, markets, food supplies).

Finally, an ethics of distributive agency never takes any facet, even human agency, as having only one dimension. Though humans act with intentionality, our actions frequently elicit consequences unforeseen by even the most rational and deliberate agent. On our current ethic of principle-guided action, we risk missing the unintended effects of human actions, which in the context of climate change, are supremely significant: climate change itself is borne of the unintended effects of humans acting, as far as we could tell, rationally. Consider the more particular example of the regulation of sulfur concentrations in fuels.<sup>20</sup> Many countries, in efforts to reduce acid rain and prevent air pollution, regulated sulfur concentrations for land-based vehicles decades ago. However, the International Maritime Organization only recently acted to regulate the sulfur concentration of shipping vessels that burn sulfur-rich bunker fuel on the high seas, reducing sulfur concentrations by nearly an order of magnitude by 2020.<sup>21</sup> Though this regulation was intended to reduce air pollution and prevent thousands of related premature deaths annually, it has had what Blackstock considers to be “one of the greatest impacts of the climate system” for any single policy decision (Blackstock, 2012). This is because sulfur as emitted by the burning of fuels slightly changes the earth’s

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<sup>19</sup> See Heise & Strong, 2012.

<sup>20</sup> This example was offered by Jason Blackstock in his presentation “Geoengineering our climate: Tools for Rebalancing or reinforcing global inequity” (Blackstock, 2012).

<sup>21</sup> From its current concentration of 4.5% to ocean emissions of .5% and port emissions of .1% (Blackstock, 2012).

albedo, or reflectivity. Sulfur enters the atmosphere and reflects sunlight directly and indirectly by brightening and enlarging clouds (which also reflect sunlight), and its continuous presence in the atmosphere, through shipping activity across the oceans, has been effectively masking some of the warming caused by our elevated levels of carbon dioxide. Reducing sulfuric content in fuels seems like good policy in that it reduces air pollution and prevents premature death. However, it will have the unintended consequence of exposing us to warming to which we have already committed through previous carbon dioxide emissions but from which we've so far been shielded. And the (effective) warming of these sulfates is significant: it approximately equals the warming of one decade of emissions. What I want to show here is how a single action, in this case, a policy decision intended to reduce air pollution, has multifarious effects: it affects cloud formations; the earth's albedo; deaths in port cities; people and places vulnerable to the effects of climate change; and human experience of weather in unforeseen ways; it highlights the ways in which our policies and our actions are tangled up, and for Blackstock's purposes, demonstrates climate engineering to be less radical and distant of a concept than at first it seems. This is only one example, and its narration has been framed in terms of a human-directed policy. But an ethic of distributive agency—where ships and their sulfates are rendered as actants that bring to bear effects human agents failed to consider, where human policies and goals exist among other strivings and forces—provides, I think, a more apt ethical framework to approach climate, a system whose dynamism and force consistently overshadows and edges out human intentionality.



### 3.0

I have now proposed a novel metaphysical framing of climate—*climate as assemblage*—that conceptualizes climate as the lively interaction of human and nonhuman actants: a complex process issuing from material facts and forces; political and cultural structures and practices; ways of scientific knowing; human agency and oversight; and life, death, and evolutionary pressures (again, to name a few!) that is never finished and where all actants and agents affect and are affected, catalyze, and intensify in unforeseen ways. I offer this framework as one possible alternative to our modern metaphysical worldview. As I discussed in chapter two, issuing from assemblage-type framing is an ethic of distributive agency, and I have just suggested why this ethic is particularly apt for approaching the assemblage of climate, in particular. In this chapter, I aim to offer some indication of what an ethic of distributive agency would look like applied to climate and our collective grappling with climate change, with particular attention to climate engineering as one specific response. For this, I draw from the work of Bronislaw Szerszynski to illuminate why highly technological strategies of climate engineering may not be advisable on an ethic of distributive agency. Alternatively, we should consider scholarship and action that complement *climate as assemblage* and that align with an ethic of distributive agency as we proceed in our relations with climate.

### 3.1 Distributive Agency and Human Responsibility

Before I proceed, I should note explicitly that distributive agency is never intended to exculpate human agents from our responsibilities and liabilities, which are particularly onerous regarding climate change. Though it does broaden the scope of agency so as to encompass forces outside of human intentionality, distributive agency never *erases* human intentionality but instead engages it with other nonhuman forces, flows, and intensities we have habitually and categorically ignored. These novel engagements should have profound political<sup>22</sup> and ecological effects. For instance, Bennett is particularly motivated by these possibilities, and she presents a hopeful case:

I pursue this project in the hope of fostering greater recognition of the agential powers of natural and artifactual things, greater awareness of the dense web of their connections with each other and with human bodies, and, finally, a more cautious, intelligent approach to our interventions in that ecology. (Bennett, 2004, p. 349)

Note that human intentionality and responsibility remain central in Bennett's imagining of what follows from assemblage-type thinking. "Greater recognition and awareness; a more, cautious, intelligent approach," she says. So far, dominated by instrumentalist-type thinking, we have failed to attend to the pulsing activity of nonhuman things and the assemblages or ecologies we form together. By Bennett's measure, humans have not approached the world intelligently. Instead we view and have arranged the world instrumentally; by assuming exclusive claim to agency, we have acted with force incommensurate to our actual capacity for intentional action. Further, Bennett reminds us: "Humans are always in composition with nonhumanity, never outside of a sticky web of connections or an ecology" (Bennett, 2005, p. 365); assemblages and ecologies call

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<sup>22</sup> For instance, might a newfound concern for nonhuman others required us to revise our concept of 'public'? How can risk be assessed when its networks and not only agents are vulnerable?



into question the external human position. Though she doesn't speak of it directly, anthropogenic climate change that endangers present and future humans and nonhumans is one formidable consequence of our unintelligent interventions. Alternatively, distributive agency urges us to recognize the potency of other actants we have disenfranchised ontologically: not to shift the blame for climate change, not to expunge our guilt, but to remedy the problems our modern, instrumentalist worldview has created. We will never completely abdicate the human position as capable of comprehending a world picture and acting with intentionality. However, by recognizing liveliness in things outside of humans, by countenancing actants, considering assemblages as agential, and by accepting the bounds of our own agency, an ethic of distributive agency could still replace (or at least destabilize) our ethic of instrumentalism. Distributive agency seems, then, to require that human agents shoulder an increased—not diminished—ecological responsibility, not in the form of “deciding what nature is and what it will be” (Crutzen & Schwägerl, 2011), but in recognizing our agency as mixed up in and often inseparable from the agencies of others.

As we proceed, we should be cautious even in how we formulate and approach climate change so as not to continue our habit of unintelligent intervention. For instance, we very commonly refer to climate change as a problem that is incumbent on humans to solve. But even the formulation of *solving the problem* should now appear to us problematic. Consider what such a formulation entails: the empowered human subject returns to the fore as the unilateral planner and operator, positioned against unruly but fixable nature. To solve the problem of a thing like climate change requires the knowledge, command, and organization of the human subject, who stands in the human

position, and as we recall “brings into play his unlimited power for the calculating, planning, and molding of all things” (Heidegger, 1977a, p. 135). Nature, and thus climate change, is again exogenous to the subject, and the subject faces them; the *solving the problem* formulation brings us squarely back to the frame of *climate-facing*. The human subject is thus uniquely positioned to perceive and comprehend something as a problem that she can work on and solve. A problem always already calls out for a solution, which, for the human subject, necessarily takes the form of enhanced calculation, manipulation, or modification in the way we act on the world because this is how we are set up to know the world.

Formulating climate change as a problem to be solved invites certain kinds of solutions or fixes. In what follows, I will use the ethic of distributive agency to evaluate climate engineering, one set of solutions that has been proposed in response to the problem of anthropogenic climate change. Because the ethic of distributive agency emerges from the more accountable metaphysical picture of *climate as assemblage*, it should steer us towards more intelligent interventions in the assemblages in which we’re involved. Without making any hard and fast prescriptions, I aim to show why some versions of climate engineering, though befitting of an instrumentalist ethic, become unappealing or untenable on an ethic of distributive agency. I suggest that climate engineering, as it is currently imagined, continues our instrumentalist trend of unintelligent interventions. But before I begin this assessment, the various strategies of climate engineering require some explication.

### 3.2 Climate Engineering

To begin, climate engineering (or geoengineering, as it's also known) is most commonly understood as “the intentional manipulation of the earth's climate to counteract anthropogenic climate change or its warming effects” (Corner and Pidgeon, 2010, p. 26). Because climate engineering is defined as *intentional* manipulation, it remains currently in the realm of the hypothetical: the warming or cooling caused by our unintended carbon and sulfur emissions do not count. Its proponents advocate for climate engineering research in the hopes that it will never be have to be implemented but with the insistence that in the event of an impending climate emergency or as a means of buying time while mitigation and adaptation are actualized, we might need something as drastic as planetary chemotherapy<sup>23</sup> to avert catastrophe on that same planetary scale.

Climate engineering proposals run an impressive gamut but are roughly divided into two categories<sup>24</sup> based on their mechanism: solar radiation management (SRM) technologies<sup>25</sup> would modify the albedo, or reflectivity, of the earth. That is, by reflecting away slightly more sunlight than the earth's surface currently reflects, we would reduce the amount of solar radiation we receive, and thus we might cool our atmosphere despite elevated concentrations of carbon dioxide. The other category of technologies, carbon dioxide removal (CDR) technologies,<sup>26</sup> remove and sequester carbon dioxide, designed to return atmospheric carbon concentrations to previous, safer levels. Simplistically, SRM

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<sup>23</sup> Ken Caldeira, one of climate engineer's leading researchers, frequently uses this metaphor to defend research in climate engineering. (Caldeira, 2013).

<sup>24</sup> See Royal Society (2009) for greater detail and explanation about the two families of technologies and their member strategies.

<sup>25</sup> These include strategies like injecting sulfate aerosol particles into the stratosphere, which, like the effect of a volcanic eruption, reflect sunlight away from the earth, and brightening clouds (as lighter surfaces reflect more sunlight) and increasing their coverage over the (dark) ocean surfaces, etc.

<sup>26</sup> These include strategies like afforestation, direct carbon capture and storage, ocean fertilization to increase blooms of phytoplankton that sequester carbon, etc.

might be thought of as masking warming while CDR attempts to tackle the cause of the warming.

These proposals generally receive more criticism and skepticism than acceptance or approval. Even preliminary research and discussion about climate engineering remain contentious: worries about governance and control; environmental ethics; social justice and marginalized others; vested corporate and political interests; values in scientific research and technological imaginaries represent some of the more prominent concerns but are by no means exhaustive. As I see it, an ethic of distributive agency provides a point from which to ground and articulate some of the reasons for these types of concerns. First, the prospect of climate engineering, where we (human subjects) are trying to figure out the best and most expedient way of dealing with climate (that big atmospheric thing outside us) works from the position of *climate-facing*, the frame I have argued is both metaphysically and ethically problematic. The dualism I have tried to dispense with is reinstated: climate is an exogenous system with an equilibrium state humans have disturbed through our emissions of carbon. This is both the cause of and an instantiation of the formulation of *solving the problem* I have already discussed. Observe how quickly nonhuman actants drop out of view. The climate and all other things we have already recognized as involved in its construction are forced back into the mistaken identity of passive, inert systems or matter on which we can work. Instead of envisioning *climate as assemblage*—as a process of conglomerated and ongoing actants and their forces and intensities—critically woven into human evolution and our very embodiment, climate is a system humans need to manipulate to restabilize. Agency is gathered up by

the human subject exclusively.<sup>27</sup> That the necessary players in an ethic of distributive agency—the nonhuman actants and assemblages we form together—are altogether absent in these considerations of climate engineering signals to me a worrisome lack of circumspection.

Secondly, the prospect of climate engineering urges the technological as the mode through which humans should face climate. However, the points I raised at the end of chapter two clearly problematize this directive. Recall how the technological emphasis renders the problem of climate change as merely a carbon problem solvable by engineering or technological means. Climate engineering proposes solutions like cloud brightening and aerosol injection for SRM and scrubbing towers and enhanced weathering for CDR (to name a few). However, these kinds of solutions myopically disregard the political, social, and cultural aspects of climate change and its human causes (Buck, 2012a; Borgmann 2012; Buck, Gammon, & Preston, 2014). An ethic of distributive agency recognizes these facets, and the actions that issue from this ethic should respond accordingly. Technological strategies are then incomplete, and on this point, climate engineering falls short.

Further, and again recalling chapter two, an ethic of distributive agency responds to the uncertainty of things as assemblages, making room for ambiguity and unpredictability. We encounter climate as a fickle mix of actants, a jumble of energetic swings and extreme fluctuations that eludes our current scientific knowledge and is likely irredeemably uncertain. Naturally such uncertainty persists and is amplified by climate manipulation scenarios. This is one of the main avenues of research, though studies

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<sup>27</sup> Later in the chapter I will discuss whether climate engineering requires this problematic frame.

modeling the effects of SRM produce speculative and somewhat conflicting results. For instance, the effects of SRM on precipitation patterns are among the best studied effects but are still not well understood, in part because they are likely to vary dramatically across the globe. Jim Haywood et al. have recently modeled that sulfate injection in the northern hemisphere precipitates drought in Sahelian Africa whereas sulfate injection in the southern hemisphere could reduce it (Haywood et al., 2013). Alan Robock et al. have demonstrated that SRM in the Arctic and in the Tropics would likely disrupt the African and Asian summer monsoons, “reducing precipitation to the food supply for billions of people” (Robock et al., 2008, p. 1). Alternatively, the work of Julia Pongratz et al. predicts that subsistence crops like wheat, rice, and maize could thrive under SRM-created conditions of high CO<sub>2</sub> and temperatures lower than those expected in an unengineered climate (Pongratz et al., 2012). Such effects are not limited to SRM either: Abigail Swann et al. show how afforestation—a CDR strategy—on a large-scale would alter global circulation patterns by acting on the Hadley cell and would affect precipitation worldwide (Swann et al., 2012). These studies provide helpful glimpses at some of the possible outcomes of climate engineering, and in this way, they complement an ethic of distributive agency by bringing to light potential unintended effects. However, we should not take these projections to be conclusive or anywhere near comprehensive at predicting what might follow from SRM or CDR. Distributive agency illuminates the multiplicity of effects issuing from our own actions, and many of these will be unforeseen even in the circumstance of perfect knowledge.

### 3.3 Technological Intervention and Control

I have already noted that the technological thrust of climate engineering problematically overlooks the social and cultural factors embedded in climate change. Further, these strategies of technological interventions rest on the assumption that technologies, once designed and built, remain within human control. However, if we take agency to be distributed across humans and nonhumans, we should realize that technologies amass and command agency on their own, independent of, and sometimes in opposition to human control. Sociologist Bronislaw Szerszynski names technologies of this type *dynamesis*, or *powers-type* technologies, and they set off cascades of consequences unbounded by their initial conditions or systems of origin. By Szerszynski's definition, *powers-type* technologies are "experienced not as a deterministic system but as a capricious agency" (p. 64). Nuclear power with its residual radioactive waste and its effectively interminable threat to animal health provides an example of the *powers-type* technology, as once unleashed, it "no longer stays put...but instead extends its powers across the social and natural landscape in unpredictable ways" (p. 64). We become responsible for the impossible task of keeping radioactive waste isolated for millions of years. Contaminated sites become uninhabitable to humans. The effects of *powers-type* technologies radically reshape the systems and landscapes from which they arise.

Szerszynski's account provides a helpful rendering of distributive agency: he shows how technologies become agential and that this nonhuman agency emanates from the unintended consequences of human actions. We can see from his account—where technologies risk becoming precarious and unpredictable—why a framework of distributive agency would discourage technological interventions in climate as advanced

by climate engineering proposals. We might, with this perspective, return briefly to the bunker fuel example I introduced at the end of the previous chapter. In response to the knowledge about sulfur emissions masking carbon in the atmosphere, Jason Blackstock makes two hypothetical suggestions. First, he suggests that ships reduce sulfur emissions in ports to reduce air pollution-related human deaths but that they continue emitting sulfur at previous concentrations on the high seas to avoid the abrupt and dramatic warning that the policy of indiscriminate emission reduction would unmask. Second, and in the same sentence, Blackstock casually asks: What if we increased the sulfur content of bunker fuels on the high seas to mask more of the warming we're experiencing? His point is to show how unsuspectingly close to climate engineering we are: all that separates our current policy from climate engineering is the choice to do it *intentionally*. Blackstock's suggestion assumes that once we come to realize an unintended consequence (i.e., carbon masking by sulfur emissions), we can subsume it under human agency by making it deliberate. What an ethic of distributive agency should remind us, however, is that human actions are always operating alongside other forceful actions, and together, these yield unforeseen effects, no matter how strategic or well-meant. In this case, ships intended to move cargo from port to port, following the oceanic avenues of global trade, combust fossil fuels that turn out inadvertently to be masking warming from carbon dioxide. While the recognition of the effect is surely significant and should be taken to bear on policy decisions, we cannot assume that we now understand the full ramifications of bunker fuel sulfur emissions on future policies: that by holding this fact in regard, we would avoid the possibility of other, future unintended consequences. For instance, if the sulfur emissions from current bunker fuels aren't already impacting



precipitation, they very well may if we scaled up sulfur emissions to increase masking. Blackstock's suggestion inappropriately elides intentional action with unintended effects, assuming that we can just expand our human agency to encompass unintended effects as they crop up.

This kind of post hoc attitude to climate engineering, I suggest, makes two kinds of mistakes. First, as we saw with Szerszynski's accounts of technology-turned-agent, it fails to recognize that technologies often overtake human control and crowd out human intentions. Secondly, Maia Galarraga and Bronislaw Szerszynski (2012) show that it mistakes climate as a system human agents might unilaterally stabilize. But as I have endeavored to show, climate factors, are energetic, unsettled. The climate system as an assembled, oscillating, unfinished system, is decidedly not stable. Observing the same, Galarraga and Szerszynski write: "The shape of the atmosphere's complex dynamic structure of atmospheric cells, wind belts, cyclones, anti-cyclones, and so on is a dynamic product of the dissipation of energy from the equator to the poles" (p. 224). The climate system is not mechanical, stable system with definitive and finite inputs and outputs; that is bounded; and that endures relatively statically. Because the climate is always being made by human and nonhuman forces, "with constant adjustments of flows of energy and matter, temperature inversions, and boundaries between pressure systems" (p. 229), any consideration of human intervention in the climate must also be understood as an ongoing process of climate-making. Attempting to shape climate into some predetermined form or envisioning human interventions into climate as minor tweaking or periodic corrections from which we can step back—our work completed, fails to account for climate's

dynamism and uncertainty and how any of our interventions will create novel, human-made climatic states.

Ultimately, Galarraga and Szerszynski warn that any intentional human intervention into climate presents “deeply disquieting prospects” (2012, p. 234). They attend to the normative considerations embedded in any type of climate-making, pondering the weighty questions of what kind of responsibility such acts would entail and what kind of metaphysics such interactions would introduce. Though they focus exclusively on human actions, their account leaves room for consideration of influential nonhuman forces, and their recognition of climate as processural and ongoing makes their account largely compatible with my picture of *climate as assemblage*. I have argued that large-scale technological interventions in climate as they are currently envisioned in climate engineering are untenable within a frame of distributive agency. However, following Galarraga and Szerszynski’s insights, we should not conclude that all climate engineering is categorically unacceptable. It is possible to imagine intentional human interventions in climate that embrace *climate as assemblage*, countenance the agency of assembled nonhuman others combined with humans, and act from a position of greater humility and responsibility. These are not the kinds of visions climate engineering currently entertains. Further, as Galarraga and Szerszynski assert, any prospect of climate engineering should be disquieting. But it seems that, especially as climate engineering research and discussion gather pace, to the extent that any form of climate engineering can be compatible with a non-instrumentalist ethic, working from the metaphysical picture I’ve offered—*climate as assemblage*—is more likely than the current position of

*climate-facing* to reverse our instrumentalist trends and to sponsor actions sensitive to our ecologies.

### 3.4 Concluding Remarks

I will end with a brief indication what I imagine such actions could look like. Instead of working from the problematic formulation of climate change as a scientific or technical problem requiring an expedient, administrating solution, it is, I think, preferable to conceptualize climate change as a *situation*. The term *situation* brings out at least three important features that the formulation of *problem* obscures: first, it captures our physical location within (instead of external to) climate. That is, instead of facing and solving from the human position, we are stationed within and among the other co-constitutive factors assembling climate. Second, the term *situation*, in the sense that it represents a quandary, at least gestures at the gravity of climate-based threats that some already face and that will intensify for all of us in the coming decades.<sup>28</sup> And finally, *situation* accounts for our embeddedness in the political, historical, techno-scientific, and cultural structures and relations from which climate change has arisen. Holly Jean Buck's work on climate engineering pays specific attention to this third facet, and she argues that climate engineering should only proceed if it also addresses and remediates social and political inequalities (some of which have contributed to or are exacerbated by climate change). Her conclusions align with my skepticism of highly technological forms of climate engineering: sulfate aerosol injection and other centralized, top-down kinds of

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<sup>28</sup> That is to say, climate change is a present and future danger, which should be clear. However, some framings, like climate change as an 'opportunity,' inappropriately ignore the real present and future threats experienced by humans and nonhumans and tend to be voiced by those in advantaged and not disadvantaged positions. See Kelberer, 2012; Neubacher, 2012.

interventions are more likely to reinforce structural inequalities than are smaller-scale, localizable, participatory climate engineering strategies. She suggests that afforestation, brightening crops and urban albedo modification by brightening roads and roofs, all can be done at the community-scale and may empower instead of disenfranchise (Buck, 2012a; Buck 2012b).

These types of climate engineering strategies and Buck's focus on co-benefits in climate engineering may in fact be compatible with an ethic of distributive agency. They respond to our situatedness within climate, the threats climate change poses, and the social and cultural facts of human lives. Depending on how they are advanced and envisioned, they may also entertain the interplay of nonhuman forces with human forces. However, all climate engineering strategies arise from the instrumentalist formulation of *solving the problem* of climate change and so we might approach them cautiously. We might also entertain other ways of thinking that avoid trapping us in this formulation. Jennifer Gabrys and Kathryn Yusoff are helpful here. They pick up on the idea of thresholds, not as catastrophic tipping points as they are typically understood within climate science, but as material and political places of exchange and possibility that climate change opens up and that we might fruitfully explore.<sup>29</sup> They offer the specific and climatically significant threshold of 'zero degrees,' where ice melts, to bring the material and the political into contact:

The seemingly simple figure of melting ice...resonates with a far more complex set of global events that are simultaneously bound up with local ecologies. While the melting ice captivates and portends, it also calls our attention to the situated and local effects of climate change, and to the material and political practices that may emerge to address these changing environments. (Gabrys & Yusoff, 2012, p. 3).

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<sup>29</sup> Importantly, they remain in the frame of climate change as a threatening situation, not as an exploitable opportunity. It is within this frame that they explore creative responses and ideas for intersection and encounter.

Such thresholds open up novel combinations of disciplines (e.g., Gabrys and Yusoff encourage the merging of the scientific with the aesthetic), introduce new forms of practical engagement, and allow for “new publics...democratic actors...expanded collectives, ecologies, and material conditions” (Gabrys & Yusoff, 2012, p. 18) to emerge or gain recognition. Far from human interventions in climate systems in order to achieve a pre-determined climatic state or average temperature, thresholds are open-ended junctions created by climate change and responsive its effects. They can be physical places, like the newly traversable Northwest Passage,<sup>30</sup> or situations, like impending sea-level rise that will affect coastal communities. Thresholds merge scientific and political with the aesthetic to engage people and communities in their present locations, inviting thought about predicted climate futures and how to dwell in them.<sup>31</sup> Gabrys and Yusoff urge us to recognize and to organize our reactions, scientifically, aesthetically, and politically, around these.

These ideas are admittedly abstract; it is difficult to extract our thinking from the formulation of *solving the problem*, at least in part because this feels like one of the most concrete, grounded ways of thinking. Climate and climate change, too, are abstract. But many of the parts that assemble them are, in fact, material. As Bennett’s story about trash in the gutter brings out, the ecologies we intervene in surround us presently, but they are not lifeless and passive as we often mistake them to be. Nigel Clark (2011) recognizes our common mistakes and their far-reaching effects:

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<sup>30</sup> Gabrys and Yusoff offer a wonderfully hopefully quotation from Michael Serres and Bruno Latour, who consider the Northwest Passage “not “a juncture under control,” but rather, “an adventure to be had” Serres, M. & Latour, B. (1995 [1990], p. 70), in Gabrys & Yusoff, 2012, p. 13).

<sup>31</sup> Helen Mayer Harrison and Newton Harrison’s exhibition, “Greenhouse Britain,” merges science with art in the way Gabrys and Yusoff suggest thresholds make possible and in a way that also aligns with assemblage-type thought. “...rather than attempt to ‘dominate’ the seas, settlements might retreat to higher ground. *The oceans...become a principal actor* informing cultural, economic and design strategies for alternative habitats” (Gabrys & Yusoff, 2012, p. 14, my emphasis).

Because these multitudes of things do not simply do our bidding, but have agency or forcefulness of their own, we need to be judicious in the way we incorporate and rearrange them. Problems like ozone holes, global warming, and pathogen outbreaks, by this logic, ought to be viewed as the unsurprising outcome of not taking enough care in the way we assemble our worlds. (p. xv)

I take Clark to mean that the problem that needs solving is not the problem of the ozone hole or global warming or pathogen outbreaks, but the problem of our thinking and acting that have given rise to such situations. His last phrase: “care in the way we assemble our worlds,” I think deserves special attention. I take Clark’s suggestion here to underscore the very real ways in which our thinking—our metaphysics and our ethics—impacts the other active, nonhuman bodies, things, and multitudes we encounter. Situated as we are within climate change and other physical environmental problems, how we draw these relations and how we act on them, realizing that they too comprise and act on us, will have to be a central consideration for our interventions to become intelligent.

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