*De*moral*izing:*

Reading in sociological evolutionary theory and Peters' communication's chasm to Niklas Luhmann's (1989) Ecological Communication *to examine mainstream environmentalism's moral codes*

Jacob A. Miller[1] and Dr. Matthew R. Sanderson[2]

1. Jacob A. Miller, M.A. (Communication Studies), PhD Student,
Department of Sociology, Anthropology, and Social Work, Kansas State University
204 Waters Hall, 1603 Old Claflin Place, Manhattan, Kansas 66502 USA
Personal Website

2. Dr. Matthew R. Sanderson, Randall C. Hill Distinguished Professor of Sociology, Anthropology, and Social Work & Professor of Geography and Geospatial Sciences, Kansas State University
204 Waters Hall, 1603 Old Claflin Place, Manhattan, Kansas 66502 USA
Editor, *Agriculture and Human Values*
Chair, American Sociological Association Section on the Sociology of Development
matthewsanderson.wordpress.com

Luhmann Conference 2020: "Moral communication. Observed with social systems theory"
Dubrovnik, Croatia (hybrid, in-person and via Zoom), 15-18 September 2020

**Working, rough draft. Comments and suggestions welcome.*

Abstract

Niklas Luhmann's (1989) *Ecological Communication* is more relevant than ever because his theory of autopoietic social systems foretold widescale in-action on climate change mitigation. The theory posits that at a systems' core are binary codes which prevent inconsistencies and paradoxes. Codes reduce system complexity, preserve its consistency, deal with ecological resonances on their own terms, and ultimately, allow for inaction on ecological issues. Climate change is the totalizing issue, and mainstream environmentalism has not significantly catalyzed system's widespread solutions on par with climate change's scale and severity. As we descriptively argue, this is due to its historical trend of deferring to the moral binary code of "care-harm," which does not resonate as well with Luhmann's six primary social systems. By initially reading in amoral social evolutionary theory and John D. Peters' concept of "chasm" into Luhmann's theory, we can better understand the processes by which environmentalism genuflectes to its moral code to the detriment of itself and of climate change mitigation.

Introduction

Humans have one decade. By 2030, we must roughly half global emissions to keep warming below 1.5 degrees to avoid baked-in, catastrophic effects (Wallace-Wells 2020: 5; World Meteorological Organization 2018), yet emissions continue to climb. In fact, we are on track to go north of four degrees C, where climate change damages could reach $600 trillion, megadroughts, desertification, flooding, and direct heat would kill millions, and we could have "twice as much war" and "half as much food" (Wallace-Wells 2020: 8). Poor and marginalized individuals face climate injustices that already underway (Pezzullo 2003; Robinson 2019; Sandler and Pezzullo 2007; Schmitt, Castor, and Thomas 2020).

We could keep going; indeed, the models, projections, and current impacts of climate change (CC) are alarming and innumerable. However, a large enough percentage of U.S. society knows climate change to be the most serious problem we face (Leiserowitz, Maibach, and Roser-Renouf 2009; Reidmiller et al. 2019) and yet little to no significant action has occurred. "We" (Jensen 2020)—hereafter referred to as wealthy, consumptive, Western U.S.—have failed to significantly mitigate climate change in time, but we still must try given that beyond 4 degrees of warming, an organized global community "is likely to be beyond adaptation" (Anderson 2011).

Inaction on CC mitigation is foremost a social problem. Social science (and humanity) disciplines should be rapidly overhauling curriculum to address the dictates of CC (Bonnett 2018; Morton 2010; The Land Institute 2020; Zabel, Duggan-Haas, and Ross 2017), or at least make it their central focus. Urry (2011) calls for a new sociology of climate change adaptation, arguing that it take a decisive stance toward society as society has generated structures and processes that have contributed to climate change (Bhatasara 2015: 222). Environmental sociology is still a subfield that has much to offer but has not collectively tackled reorganization

of society around consumptive habits and other needed adaptations (Bhatasara 2015; Dietz, Shwom, and Whitley 2020; Dunlap and Brulle 2015). Klinenberg, Araos, and Koslov (2020: 649) ask "what would it mean for sociology to make climate change a core disciplinary concern?" The short answer is "a lot," but the longer answer is that the authors say may come closer to uniting CC as a moral code.

Mainstream U.S. sociology is slow to make CC central in part because it turned away from Talcott Parsons' "grand" (in C. Wright Mills' words) structural fundamentalist theory and predominantly toward empirical middle-range theories with no overarching theory. The closest thing to an overarching "theory" (more like emphasis) is structural stratification and critical theory in the vein of the "big three" (Marx, Durkheim, and Weber). Nevertheless, recent neo-sociocultural evolution theories and the rise of CC provide strong support for functionalism. theories.' By evolution here we mean "models of the *generation of variety, transmission of information and the action of selection and other processes* (drift, migration, etc.) on the distribution of information within a population over time," with information consisting of "social rules" (Dietz and Burns 1992: 187, emphasis in original).

Luhmann should not be pigeonholed as a solely a functionalist or complexity theorist (if anything, Luhmann is a Luhmannist), but his work certainly more closely associates with functionalism as compared to the dominant sociological theories; indeed, Luhmann briefly studied with Parsons, and even though their theories differed (most notably on closed versus open system), much like Parsons, Luhmann constructed a grand sociological theory "in terms of scale and ambition" (Valentinov 2012: 15). Counterfactually, had mainstream U.S. sociology stuck with such a theory and not drifted with cultural, linguistic, postmodern turns, CC may be better understood in terms of temporal dimensionality, timeframe, and beyond the tired

nature/culture dualism (Levinovitz 2020; Mclaughlin 2012; McLaughlin and Dietz 2008). Moreover, despite Luhmann's (1996) arguing that any moral constitution in sociology would have to be empirical, ignite irritation within the discipline, and not be based on self-exclusionary tendencies of the division of labor, communicators denouncing oppressive stratifications often mount their arguments on assumed moral superiority, self-designed righteousness, nonexistent unifying moral code (e.g. ideology or political position), and, based on these premises, exclusion from wrong/bad culpability. This isn't to mainstream sociology doesn't contain ethical aims doesn't help adapt to and mitigate CC—indeed, it has the tools and resources do so (Dunlap and Brulle 2015)—only that as severe an adjustment would not be needed had the discipline trended differently.

Environmental sociology has not compelled its discipline in the same way that mainstream environmentalism has not compelled other systems: each has added complexity and inflamed the binary codes that are the heartbeats of systems. Luhmann's (1989:38) *Ecological Communication* explains how binary codes, which are oppositional by nature, "highly successful and important evolutionary achievements that have only attained their contemporary degree of abstraction and technical proficiency after a long development," resolvers of system paradox and inconsistency, and drivers of replication. The six systems Luhmann (1989) discusses are Economy (51), Law (62), Science (76), Politics (84), Religion (94), and Education (100), which have their primary binary codes of pay-don't pay, legal-nonlegal, truth-falsity, either-or, immanence-transcendence, and "technical bivalence" (good-bad, right-wrong, pass-fail), respectively.

A dual code is core to a system's existence, so although "criteria" and "programs" may change, the code remains fixed (40-41). Functional systems only respond to ecological

problems—which are filtered through the physiological body, mind (consciousness), and communication's communicating through the "information"-"utterance"-"understanding" process (Wahyuni 2019:12)—in harmony with their own system-specific rationales, which would never sufficiently curtail the cumulative, deleterious effects on ecological environment. Thirty-one years later, it seems Luhmann was accurate in his assessment. Bergthaller (2018:9) explains:

> The legal system has evolved environmental legislation; the political system has seen the emergence political platforms for ecological reform; the economic system has found ways of translating ecological costs into the languages of prices – and of making consumers pay for "green" products. The education system has integrated ecological issues into its curricula, while science has produced ecologically oriented subdisciplines (among them, as a late-comer, ecocriticism). These changes have often had significant positive effects, but it is abundantly clear that they do not add up to anything even remotely like the ecological revolution which the environmental movement during its heyday was hoping to foment.

That these efforts have failed to add up to substantial mitigation points to their collective failure of deferring to moral arguments despite the amoral nature of systems (Luhmann 1992a, 2013). For example, recall our initial framing of this paper ("we have ten years…"). It is a typical doom-and-gloom, fire and brimstone framing that leans on existentialism, alarmism, and crisis. Despite the scientific system producing this communication and sounding the resonances warning all other systems and subsystems of the untenable degradation of the "Environment" encompassing them, those resonances have failed to produce collective and meaningful change. The last fifty years have led up to this recent approach, and we are no farther along in taking (not

just talking about) political action on par with the CC's scale (Cox 2020; Klein 2015; N. Klein 2020).

Ill-defined and shifting moral precepts based on who the action is determined for (God, society, nature, non-human species, future generations, and so on) add complexity to systems. Economy, law, science, politics, religion and education and the recursive interpenetrations of their environments, reverberate with the resonances of alarmist tones, among other tones. Each has become more complex by taking on climate change, and while their codes have been addressed, to our knowledge they have not been made explicit within the context of Luhmann's *Ecological Communication*. Thus,

> RQ: How has mainstream environmentalism's morally coded communication increased the complexity of related systems?

The remainder of our diagnosis is descriptive because description is (1) in line with Luhmann's heuristically descriptive reality of modern society (Bergthaller 2018:10) and (2) non-teleological and compatible with socio-cultural evolutionary theories within sociology. Our paper features three main sections. First, Luhmann's theory reinforces the importance of recent **sociocultural evolution**'s tenets in relation to the environmentalist (sub)system. Second, inevitable **chasms** in the communication process allow for codes to reinforce in defense against the moral codes' resonance. Finally, with these tenets and processes in mind, we'll briefly explore how moral codes have shaped and evolved mainstream **environmentalist** communications over the last half century.

Sociocultural evolution theory in sociology

Environmental sociology is in the midst of a "second Darwinian revolution" characterized by a rejection of anthropocentrism and foundationalism (Mclaughlin 2012).

Darwin's theory undermined the Greek and Christian assumption that natural order determined moral order, and similarly, linear grand narratives are being replaced in sociology by "local multi-linear histories" (Mclaughlin 2012: 252). Both evade teleology. Teleological theories misapply evolutionary theories because adaptation, natural selection, contingency, and so on contain no end goal (Richerson 1977: 21). Without prescription, a systems' emergent processes can show themselves free of dictates or some end. Richerson adds that ecological perspectives must "be rather complex" due to the "differentiation" within modern societies (what), agreeing with Luhmann's theory even without citing him. Theory containing ecological and evoluitonary principles but with an aim toward prescriptive change (e.g. Marx's siezing means of production or Weber's rationalization) violate evolutionary concepts. Luhmann too acknowledges systems have not concious end goal, and that systems' striving for replication is as ingrained as in ecology.

The historical patterns of divergence, adaptation, and specialization are amoral insofar as no deity or transcendent force determines their direction. Over time, intra- and inter-species differentiation in *open* systems in ecology produce diversity (Greenwood 1984). Conversely, Luhmann (1989:12-14) theorizes systems as closed using the analog of cell autopoesis,[1] which use proteins for replications and in the transcriptions. Perhaps this is one reason that Dietz and Burns (1992:188) say "Luhmann (1982: 255-271) seems to understand the Darwinan position, but adopts a form of systems analysis that is inconsistent with an evolutionary analysis of the sort we intend." Indeed, Luhmann (1989) is not an essentialist or nominalist, but he is not concerned with populations thinking (McLaughlin 2001; Sober 1980). He does address agency-structure,

[1] Autopoesis is defined by structural determinism and organizational closure (e.g. nervous systems, social systems) in a non-process-relational metaphysic. Advancements in theoretical ecology on auto-catalysis (Ulanowicz et al. 2009) may update or challenge the autopoesis metaphor.

but in terms of political binaries and environmental (in)action (Bhatasara 2015). However, Luhmann (1989:11-14) does realize that systems are created out of the evolution's complexities and tensions and that the entirety of the system is dependent upon the outside Environment's resources and "flow of molecules and energy."

A system's structure determines their operations but cannot create its own supply of carbon, materials, exchanges, etc. Further, Luhmann (1989) says systems will use up their "degrees of freedom" separated from the environment in which they are contained until they've self-annihilated. A system's functioning may be closed, but it is certainly not determined.

Grappling with hierarchy is not limited to the structuralists, for Luhmann says observation of "how" the "what" of systems (first order) operates is second order. This presumes hierarchy (in observation) in horizontal, not vertical, fashion. To answer McLaughlin (2001) and Sober (1980), Luhmann (1989) would likely point to his operation in the second order and belief that the only way society knows about environmental damages is through their communication. In the same way, the only way Darwin was able to craft a theory of evolution was thanks to the scientific system, and the only way populations thinking spread was through the education system. Regardless of the degree of impact of discoveries in science, they are foremost discoveries that were made possible through exploration of the Truth-falsity binary. These systems exist *a priori* of our discoveries that our systems do not constitute all of evolution (and indeed, only a tiny fraction of it) and for that most of our history we have not organized in these systems. The communications will always first produce the discoveries of the communications, even if the discoveries reconfigure our understanding of our communications' place in the cosmos.

Hierarchy is also present in systems' spatial-temporal scale, a concern of social evolution theory. *If* the closed versus open discrepancy is another reason for the inconsistency between evolutionary theory, then it helps to read self-annihilation in at a larger scale over a longer time frame. Programs can change while their core codes maintain, but that process does not determine a system's long-term sustainability or demise. Similar to species, as vague as their boundaries are, Luhmann (1989) says that systems aim to survive and reproduce. Excess exposure to its outside "environment" is likely to result in its endangerment and elimination. He spends a majority of his time theorizing on the social systems themselves, *within* the spatial-temporal boundaries of the six "cell" systems that have maintained the longest in human history: economy, law, science, politics, religion, and education. His systems theory applies to them insofar that they are alive and maintain as such via binary codes latent with tautology providing unity rather than regression (as poststructuralists, such as Levi-Strauss, treat bifurcations). There exists a positive, but still amoral, valence within a system that reinforces it; conversely, more negative valences within the system increase complexity and threaten sustainability (Valentinov 2012). In sum, Luhmann (1989) begins by acknowledging evolution's influence and the "macroscope's" (Rosnay 1979) constant and irrevocable influence on all systems, borrows terms from evolution, but then quickly zooms into the social realm where he stays for most of his writing.

From social to evolution inevitably requires a discrepancy in scale. As Dietz (2005: 208) explains:

> Clearly genetic evolution provides the explanation for what differentiates contemporary humans from other species; that is the essence of what evolutionary theory is all about, enshrined in the title of Darwin's masterpiece. But the social sciences are not concerned

> primarily with cross species comparisons, but with comparisons of individuals and groups in the contemporary world and in the past and with social change within the last 10,000 years or so. In the case of historical change, our time scale is more likely to be on the order of years or decades, only occasionally centuries and rarely millennia.

Luhmann (1989) leaves spaces for readers to consider centuries and millenia when he initially talks about the "Environment" of systems. People are outside social systems and not parts of society, but "parts of society's environment" (Bradford 2011: slide 2). A brief but related digression on Luhmann's use of "Environment" can perhaps provide clarity here. Darwin eliminated the concept of "the environment" (Mclaughlin 2012), for populations do not own their own environments in terms of bound material and energy: "'environment' always consists of multiple biophysical and social dimensions" (McLaughlin and Dietz 2008). Luhmann might say that Environment (the sum of all other environments), with a capital E, is the source and provider of all resources—"the environment of a system always offers all there is" (Krippendorff 1991:137). The Environment has dominance and determination of the system. For instance, Pacific islands such as Nuatambu are disappearing due to sea level rise. Their Environment is gone, and as a result, so is their social system as tied to the environment (the island, their place). A system's environment is abstract and non-material insofar that codes and communications are abstract (Luhmann 1989: 37). Systems thought in Luhmann's terms are not grounded or concrete. Their selected communcations turn material as their effects shape, and are shaped by, the Environment's many manifestations, but the systems themselves are immaterial energy-wise. In this way we can read "Environment" as is an all-encompassing, material system. A better word for "Environment," so as not to dredge up its past connotations, would be "Ecosphere," comprising the bio-, atmo- litho-, and hydro-spheres (Jackson et al. 2018; Rowe 1961, 2003).

Although nominalist in nature, this concept forgoes localization in favor of totalization. It is consistent with Geologic, Earth, and Atmospheric research that draws planetary boundaries for climate change, change in land use, biodiversity loss, pollution, nitrogen and phosphorus cycles, and more (Bogardi et al. 2012: 38; Vörösmarty et al. 2010). Moreover, Ecosphere signifies the entirety of Earth systems over millennia and the anthropogenic effects humans have had on its scale in such a short time relative to the geologic calendar; e.g. since 1970, as much as 60 percent of animal populations on earth have died (Kolbert 2014; Wallace-Wells 2020:3), and since the time of Darwin we've wiped out 6,500 years of cooling (Ciaccia 2020). Local ecological destructions to which Luhmann (1989: 37) refers are parts of an emergent whole denoted by "climate change." Such a scale harkens social evolutionary theories, although one must read these in to Luhmann. For this paper's purposes, we stick to "Environment," even though we read it as "Ecosphere" to incorporate a more accurate scale.

Non-teleological theory and an evolutionary temporal scale are two connections to be drawn between Luhmann (1989) and sociological eovlutionary theories. These also influence the recent movements of New Materialism (Alaimo 2010; Bennett 2005, 2010), Speculative Realism and Object-Oriented Ontology (Bryant, Harman, and Srnicek 2011; Cates, Bruner, and Moss 2018; Gunn 2014; Harman 2011), Ambient Rhetoric (Rickert 2013, 2018), and Critical Realism (Real-Actual-Empirical). Morton's (2013:10) concept of "hyperobjects," things "massively distributed in time and space as to transcend spatiotemporal specificity," is broad, and critics have argued that several objects could fit within the definition and characteristics (viscous, molten, nonlocal, phased, and interobjective). Even if not a tight concept, it is a useful heuristic for understanding the scale and totality of hyperobject's effects, such as nuclear radiation or climate change. Spanning communication, philosophy, English, metaphysics, theory, and more,

these newer movements contain several differences. However, they are united in their attempt to constitute ontologies that (1) incorporate process-relational thinking into objects qua language/meaning—"systemic translations of difference are dependent on the temporal contingencies of the ordering relations of each object" (Miller 2020:382)—(2) turn away from poststructuralism toward matter itself, and (3) share moral tones of urgency, crisis, and care for ecology. The most basic common denominator is their attempt to prove that "materiality matters" (Bennett 2010: xvi).

These vocabularies and thoughts are a sharp departure from mainstream environmental thought (Bergthaller 2018; Cole 2013). According to Bergthaller (2018:3), the new materialists do not deal with the implications of their premise of flat ontology, wherein humans are a singularity just as a sponge or atom is a singularity. In emphasizing the process of objects over time as well as the fact that they are imperative to pay attention to, humans are written out of importance. Even having caused climate change, our standing is diminished to that of a pile of rocks. They recast new wine in old wine bottles, carry over many modern dualisms (Latour 1993), are therefore more a false consciousness than an actual ontology, and, ultimately, don't conceptualize society in ecological terms. Luhmann does not prescribe to ontologies but instead treats them as one more complexity in communication.

What these movements share with Luhmann is the insistence to push the boundaries of communication far beyond the standard sender-receiver transmission model interpreted, and even embodied, by individual humans. Communication for Luhmann can be power or money. Likewise, but much broader than Luhmann, new materialists might consider the translation of information between objects communication. So a collision between atoms or the sloshing of tides is considered communication. Communication recursively and processually affecting

systems and its parts occurring in the shared, communal, and societal ether is precisely the idea of communication adopted by ecological turn scholars in ecological/environmental communication (McGreavy et al. 2018; Wells et al. 2018). Although they share the broadening of the concept of communication, to place it before and beyond language's evolutionary emergence 50-150 thousand years ago is too far removed from the basis of Luhmann's theory. So we'll leave these approaches here as they are and move on.

To better answer the question of how environmentalism increased systemetic complexity through moral codes, it helps to first expound upon the temporal gaps within Luhmann's process of communication communicating. As we argue in the next section, it is precisely in those gaps where binary codes erupt and stand defense against Environmentalism's moral interpenetrations.

Communication's chasm

Drawing from earlier theories in communication (Bühler 2011; Shannon and Weaver 1949), Luhmann synthesized a three-pronged selection process consisting of selection of information, the selection of utterance, and selective understanding (Luhmann 1992b; Seidl 2004:7; Wahyuni 2019:12). Understanding is the necessary distinction between information and utterance. For example, if we say "climate change makes volatile weather patterns more likely" (information), the anyone wishing to select and respond must distinguish that information from all other information—including related information such as "weather created the hail that damaged my car" or "climate change is a liberal conspiracy." Moreover, they must select our motives for saying it, such as tone, emphasis, nonverbals, etc. (utterances). The distinction between the two produces the emergent property of understanding. Our thoughts/actions, through interpersonal or organizational, are understood by the system, and that's what makes a difference. The second order observation of this system is concerned with communication *about*,

not *with*. In this way, observation of communication is only made possible "from behind, contrary to the temporal course of the process" (Luhmann 1995:143).

Once again, code bivalence carries with it hints of poststructuralist contributions, especially Derrida's *différance* or Barthes' *Death of the author* (Allen 2018; Lodge and Wood 2008). However, the key difference is that the differences that produce understanding do not erase boundaries, core codes, or regress or devolve the substance of meaning; indeed, differences promote the opposite. By focusing on the selection, selections accept and allow for future communications within the system which reinforce it. Luhmann's (1989, 1992b) conceptualization of communication is admittedly a much different one than typically found in the field of communication. The field has historically relied primarily on the sender-receiver model with sign-referent-symbol. The focus has been on studying transmission within organizations, or interpersonally—in this way individuals are not written out of the process.

Even though communication broke off from sociology and psychology to establish itself as its own field (Anderson and Baym 2004; Craig 1999, 2009) its core theories and models heavily borrow and adapt from other disciplines, making the case that it's more sub-discipline than not. Sharing this sentiment was John D. Peters (1999), a lifelong communication scholar. His *magnum opus* was *Speaking into the Air: The History of the Idea of Communication.* In outfling the history of communication, through Christianity, spiritualism, and attempted communications with the dead, Peters emphasizes that despite our attempts to make communication a physical, communal, shared process, it never has been and never will. My thoughts are always my own, never yours. Although I can empathize, I cannot ever fully feel (select) *your* pain, or whatever emotion you utter. This sentiment extends to all communications.

Peters' three main distillments are that humans can be alone together, that we can all come closer to a mutual understanding of a dream, and that we are forever trapped in a communicative solitude. These dominant developments in the history of communication (as a medium) are premised on the supposition that humanity's communication can come together while aimed in a common direction. Therefore, Peters emphasizes, these three traditions of communication constitute merely the *idea* of communication but never fully its reality. Communication as an idea too exists in the ether.

Peters would likely agree with Luhmann that humans cannot communicate, only "communications can communicate." I read in Peters to Luhmann's notion of communication because this is coming from a full professor who taught communication for 40+ years. He arrived at the same conclusion without reading in Luhmann himself. Peters won the book award for the National Communication Association's book award the next year, and it was well-received. This is one piece of evidence suggesting that despite Luhmann's place being sociology (and law, education, politics, and so forth), his theory would hold in the communication discipline as well. Peters' conception supports Luhmann's concept as it allows for better translation, and as a result, interdisciplinary collaboration, between social systems theory and predominant studies of communication which have far too long focused on teleological transmission.

The crux of *Ecological Communication* is that codes that make up self-referential systems prevent inconsistencies and paradoxes, therein reproducing the system, preserving its consistency, and allowing for inaction on environmental issues. Similarly, Peters (1999: 263-271) concludes that all communication—including interpersonal, organizational, and as well as those across systems society, similar to Luhmann's distinguishing of the three social system

types, face-to-face, interaction, and organization (Seidl 2004:13)—produces and reproduces a "chasm." The chasm occurs when communications push in directions that threaten the sustainability of the system. Chasms are inevitable, continuous, and incapable of being fully bridged.

Peter's concept of a chasm is a useful analog for understanding differences in understanding produced by a system. On occasions when an utterance and information is not distinguished—e.g. when "climate change increases weather volatility" is (mis)understood by a Congressional legislator as "weather patterns naturally change and therefore climate change is not a big issue"—gaps emerge, heightening complexity and creating system-internal distortions (Krippendorff 1991). These widen communication's chasm, because the to bridge the gap in understanding more information and utterances supplement (not replace) this (mis)understanding. It is in these spaces where binary codes live, resonate, and intensify. Drawing on the previous, extended, and face-to-face political example of the information "climate change produces weather volatility," selection that deviates from the initial information can be awkward, off-putting, and counterproductive. The legislator would likely draw back, defend their position based on status, power, or previous accomplishment, and then ultimately defer to their binary code, which in the case of politics is "either-or" (Luhmann 1989:84). Either continue listening to why climate change effects the area of representation, or don't (or pretend to). The goal-orientation of the legislator ultimately cares about support-non-support for a bill, or whether his selection of this new information will make him look good/bad to his constituency, or more likely, funders.

It is here, in this selection gap that widens the chasm, where codes reinforce the system. Peters concludes that the chasm can only be shrunk (not fully closed) through "love," enduring

"presence," and fulfillment of divine meaning. In this logic their opposites expand the chasm; love-hate and presence-absence suggest the binary still remains in this conception of abstracted communication as well. A code's greatest presence is in the absence of positive selection.

The temporality imbued in the deference to each code is dynamic depending on the system. In politics, the code of either-or, in favor or in opposition to, intensifies and reduces in the 'gaps' differently and at different rates than codes in say religion or education. That is to say, speculatively, that communications are still bound by spatial-temporal contingencies which determine their difference in relation to the communications in other systems. This is empirically hard to demonstrate, but it is important, as it is in a new materialist and social-evolution tradition, to specify *if* the material reality of the Environment is to have proper consideration.

The more selections that fail to produce understanding, the more the system complexifies. Too much complexity creates a tumultuous oscillation of "programs" the system, again, thereby threatening its sustainability (Valentinov 2012), but those complexities reinforce the codes because the accumulation of negative selection requires a code's stability. Programs based on moral codes chiefly resonate with heighten complexity. In the next section, we support this idea by non-exhaustively examining the moral codes of key environmental milestones.

Mainstream environmentalism's moral codes

Is environmentalism its own system, a subsystem of science, or something else entirely? We begin by answering this question. Luhmann (1989:49) says that each "function system has to be analyzed individually according to its own specific resonance capacity." Luhmann (1989: 77) denotes science having the code of "truth and falsity" towards acquisition of new knowledge on the differentiation of theory and method. Science "reflects itself and transforms" (82), not producing "moral responsibility" but rather "the consciousness of selection in reference to still-

indeterminate recombination possibilities and technology as already determinate and realizable" (83). It is paradoxical, then, that science would come to study the catastrophic side-effects of the very technologies it has produced.

Even more paradoxical is the continual insentience of technological fundamentalism. "Ecomodernism" has arisen out of the dying ashes of environmentalism (Nisbet 2018; Shellenberger and Nordhaus 2004, 2007), embracing human dominance, genuflecting to market forces, and going all in on technological modernization to solve CC. The ecomodernist example supports Luhmann's idea that reducing complexity—which technology is supposed to do by maximizing efficiency—*increases* complexity within a system. In this case, technology has been proven to increase the pernicious production treadmill (Curran 2017; Lynch 2014; Sanderson and Hughes 2019) and speed up entropy (Bellamy and Diamanti 2018; Floyd et al. 2020). Not to mention, there are significant hurdles including scalability, tenfold extraction of minerals like cobalt to create PVs, and simply not enough land on which to put renewable energies (Cox 2019; Gauthier 2018; Ostrom and Cox 2010). Moreover, Vaclav Smil has long denounced the lure of renewables as a panacea (White 2016), and Smil has convinced Bill Gates of their intellectual poverty and unreliability. The debate between increasing our dependence on technology or not is a key complexity in the environmentalist debate, and the former is winning out based on national political rhetoric.

Luhmann (1989:83) concludes his section on science by saying any possible "corrective measures" for the ecological risks, even those created as a byproduct of paradoxical technology are more likely to be practiced in economy with an aim toward economic profitability, toward law according to existing law's criteria, and in politics "for reasons of political opportunity." Renewable technologies, rather than more sweeping decarbonization and cap-and-adapt policies,

resonated with the leftist political system and found themselves at the heart of the Green New Deal resolution (Ocasio-Cortez and Markey 2019). Even though it would not do enough fast enough (Cox 2020), it was the one policy that got close. And it failed to get a single "yes" vote. This outcome dealt yet another blow to climate scientists, but the blow should not come as a surprise, for "a differentiated system can be made to resonate only on the basis of its own frequencies" (Luhmann 1989: 16). Politics has dealt with climate on its own terms, through a "zero-sum," "either-or" and "goal-means" codes (86-87). Polarization presents ideological divides on top of these codes (E. Klein 2020). It is clear here that ecological realities cannot directly enter into political systems; they filter through political bodies, collective consciousness, and their information is either selected or not. Here the temporal bandwidth is limited. Consider that during 2020, in each system, in politics and the media, climate change took a backseat to responses to the pandemic, BLM protests, school closings, the opioid epidemic, and other issues. There has been no time for significant dialogue surrounding climate change even though it is worsening, gives us hurricanes as evidence, and is connected to climate change in several ways (most notably, that we live in a material world) (McKibben 2020; Palken and Miller 2020). The Environment is all we have even if we are stuck in the immediacy of our own systems.

Evolution is amoral, teleology contains morality, and evolution evades teleology by being amoral. As is evident, environmentalism is made common by a teleology built around taking individual actions through agency or fixing or tearing down the governmental structures that allow for climate change (fossil fuel subsidies, fracking easements). As some entity resembling a system, environmentalism's system itself is amoral, yet within its guiding principles are historically defined as concerned with the altruism-self-interest spectrum, whose models do not blanket apply but only in certain contexts (Dietz 2005; Dietz et al. 2020). Thus, the moral binary

code for environmentalism writ large, as we argue, has been the "care-harm" (Haidt 2013),[2] which carries the burden of a moral-singe. Care as much as possible for natural/environmental/ecological/planetary 'things' and do as little harm to them as possible. Toward ends with this mean goes against population dynamics in evolutionary selection (populations do not actively "care" about other populations or environments; they merely strive to survive). Moreover, environmentalism risks extinction as its own "system" since the care-harm code does not fit within the amorality of the six systems. Therefore, by this characterization environmentalism may constitute a system in that it has a name and influence on systems, though, to the chagrin of most environmentalists, fails to constitute a system to the degree of the other six (more on this later).

As we argue, it helps not to think of environmentalism as a system, but rather a subsystem which adds complexities to the other systems. This is because its programs change must more quickly relative to the six out of a shared sense of urgency and necessity to act on behalf of ecology and are more attuned to the feedback generated by the Environment. They change in response to the dictates produced by the six's binary codes, which must be dealt with on their own terms.

For instance, the first author was involved in the Extinction Rebellion and Sunrise Movements' Washington, DC chapters for a brief time in 2019. One protest was on the steps of the DNC. We tried to get the attention of chairman Tom Perez, who would not hold a special climate change debate (The Washington Post 2020).[3] For many hours into our protest, seasoned DNC members and Congress members would walk past our strike with a knowing, supercilious,

[2] Conservatives are least likely to ascribe to this moral foundation, which is likely why they have historically been at odds with the movement, particularly in the past two decades.
[3] The first author is viewable at 6:43, if proof is needed.

and dismissive grin. It was clear that they thought us naïve, and soon enough the patty-wagon would arrive. At most protests it felt the same. We sang/yelled "which side are you on now!?" hoping to convey the climate crisis. Time and time again we were waited out, because politics will either deal with you or not based on their code. The economy binary says the system, and everyone in it, needs to profit. So new "green" technologies become implemented, companies sign onto minimal climate legislation to look good and have access to input data (why some think Exxon Mobil is on the 2020 Growing Climate Solutions Act) and produce rhetorical greenwashing and half-measures meant to appease (Brown 2019). Its resonances make politics attempt to change its programs, through market-driven cap-and-adapt, tax, and trade policies that make pricing carbon a rational-moral imperative. The systems resonate with other systems; e.g. some political approaches rely on changing a piece of IRS tax code, which is already so complex. Radical attempts to morally redefine natural law undergirding the legal-nonlegal code by granting human status to non-humans—following the precedent that Whanganui River in New Zealand is now a legal person (Warne 2019)—widen the gaps between positive system selection, complexifying it and allowing the code to reinforce. Analyzing these implicitly-moral attempts from a macro-perspective, they may push the boundaries in ways necessary to institutionally recognize the Environment, but they do so in ways that create complexity and feedback reinforcing the core of environmentalism as "care-harm." This further fractures environmentalism, making any attempts to unify around climate change much more difficult.

Consider the 2018 IPCC report (World Meteorological Organization 2018). It has arguably done the most for climate change as it catalyzed the global "Fridays for our Future" youth movement (featuring Greta Thunberg), the Extinction Rebellion and Sunrise movements, and thrust climate change back into national and international consciousness. However

galvanizing it has been, at least in the U.S. it has not resulted in significant climate legislation. It's not simply due to the fact that the Trump Administration would never take action, given their continued undermining of environmental regulations; the public quickly moved on to other issues in 2019 even before COVID-19 hit. Regardless of the totality and extent of the IPCC's findings, they lost steam in less than two years. If ecological reality, communicated by the IPCC's Truth, could penetrate the other systems, then economy as we know it would have to dissipate, politics would become singularly focused on climate change, and law would reconsider the basis of natural law. But ecological reality cannot enter systems as is, only as it is selected by codes. The IPCC has many facets, contributing scientists, overall objective. It communicates the results using strong language that contain a whiff of moral and ethical responsibility. The 2018 IPCC report, and resulting policy proposals, was interpreted by politically leaning media (e.g. Fox News) as, among other things, globalist, liberal, reliant on unreliable models, and unrelatable to domestic interest (Fisher, Murray, and Reighard 2019), reinforcing *carte blanche* carbon emissions and indefinite economic growth.

Even though the IPCC is comprised of numerous countries, scientists, governing bodies, and has created a loud resonance, over time its 2018 report has become reduced to a part of the environmental code. the chasm of difference it created within systems was so great that the core codes came to the forefront. Can we have capitalism, endless growth, profit, self-serving politics, or an education that continues to teach root memorization of nonrelevant pass-fail concepts? These discussions and their supported programs challenged the essence of the binary codes. They added immense complexity. However, no system has yet been overhauled or demolished. Global warming, as communicated by the IPCC, has been reduced to the accumulation of absence even though the Environment's deterioration remains present.

A system draws from its communications over time. Mainstream environmentalism has deep roots (though not as deep as the roots of the six systems). By mainstream, I mean predominantly white and male.[4] Mainstream has written over indigenous traditions, and there are many critical rewritings of this history that include indigenous perspectives and voices (Kimmerer 2013; McCay 1980). However, they are not mainstream (though that is starting to change). Since this paper favors description, we cover the history as it is commonly written in the U.S. from a non-critical angle, but recognize the need to diverge from the mainstream.

The history of mainstream U.S. environmentalism arguably began with Emerson and Thoreau, then Muir and Roosevelt. Idyllic and pastoral, nature and culture, preservation and conservation reined. Environmentalism took a backseat during the two world wars.[5] Modern environmentalism reemerged in the 1960s and 70s, characterized by small scale problems that could be fixed individually (reduce, reuse, recycle) or through singular acts—banning DDT (Carson 1962), CFCs, etc. The Clean Air and Clean Water Act were the first prescriptive policy of their kind and featured bipartisan support. President Nixon founded the EPA. Electric cars and efficient technologies were integrated into systems rather seamlessly, all things considered.

These examples, especially the 1986 CFC ban, are used now by environmentalists to say that we can come together on these issues. However, banning CFCs and agreeing that we should mitigate at scale on climate change are two radically different issues (Waxman 2019). Climate change is far more complex than any singular problem and is functionally differentiated to the highest degree. The establishment of the IPCC (1988), Kyoto Protocol (1992), and Paris Agreement (2015) have taken bold steps and made bold efforts to mitigate at scale, but again

[4] And sometimes "racist" (Kashwan 2020).
[5] War-time mobilization and rationing are called upon as examples of what our nation needs to do to "combat" climate change; war is a most useful metaphor (Benjamin, Por, and Budescu 2017; Flusberg, Matlock, and Thibodeau 2017)

have fallen short and emissions continue to rise. Gore's (2006) *An Inconvenient Truth* and *An Inconvenient Sequel: Truth to Power* are perhaps at the core of how environmentalism resonates with all of the systems. It sports facts, flair, apocalyptic messaging, and ultimately the moral imperative to care for the Earth we have done harm. Morality may be highly justified, but systems do not adapt based on sound reason or justification alone. 21st century environmentalism has been more focused on large-scale, structural problems that are integrated and messy. The nomenclature of ozone to global warming to climate change to climate crisis has increased denial and skepticism among certain key populations within systems. Some have succeeded, others have backfired. An illustration of the latter—using our shift to the Anthropocene[6] (Gildersleeve 2018; Shaw and Shaw 2016; Zylinska 2014) as justification for urgent action is paradoxical because epochs are based in Geologic time.

Environmentalism today carries remnants of these milestones. On one hand, they indicate superb achievement in care and scientific Truth. On the other hand, once climate change began to take center stage around the time of Luhmann (1989), the integration with different environmentalist approaches has provided greater information selection. Greater information selection allows for more chasms in the selection process, while beckons the strengthening of system codes. Environmentalists commonly use recent weather events as evidence of a changing climate, whether or not they are a directly attributable to increases in ppm CO2, volatility, or variation. This is so that more people can realize that the immediacy of weather is tied to the climate change. However, systems can easily dismiss these events or the catastrophe of climate change by pointing to problems or solutions of earlier environmental arguments long past their expiration date—e.g. "if we use more efficient light bulbs, then we can solve climate change

[6] The Anthropocene's existence and start date is still fiercely debated among Geologists.

together" and "What does climate change have to do with weather? It's in the future!" These chasms (and many more) produced by difference in selection become more frequent as mainstream environmentalism shifts its programs around a moral code.

A system is complex to the extent that we can discern many distinct subsystems of it (Rosen 1985). Environmentalism has its many distinct subsystems loosely tied together by perceived moral telegony of increased care and decreased harm. In a way this was inevitable since climate change transcends local fixtures of spacetime. It has splintered like the tree of evolution, but at a more rapid rate. In a daring attempt to become a totalizing system that interpenetrates other systems with the reality of ecology, it scattered into subsystems of the other systems.

The U.S. government, the economy, religious institutions, scientific products (DeGrasse Tyson and Nice 2020), education—all are culpable in some way, and some deny or accept culpability more than others and point at one another and themselves as the problem and solution. Described as a "wicked" problem, it evades single solutions. Its complexity has further distanced the autopoietic system from the outside "environment." Any way you look at climate change, it is complex and existential, and it is precisely for this reason that systems will be slow to adapt. Systems, like organisms, will do everything they can to adapt and survive *while holding tight what makes them who they are*. Systems will continue to bear down on their codes unless they're otherwise forced to bend.

We arrive full circle back to our RQ. We initially asked, how has mainstream environmentalism's morally coded communication increased the complexity of related systems? Our analysis demonstrates that it has scattered environmentalism programs that cater to the resonances of the six systems. Its many programs, which have occurred over a short time span,

have heightened the complexity of the systems. The temporal differences and negative valences of selection of information and selection of understanding widen the chasm, which allows for greater filling by the systems' codes. codes. Environmentalism retains as a system through the care-harm binary code, whose moral utterances that stand in good faith. However, they fallen short of necessary catalysis on climate change mitigation.

From a sociological, evolutionary lens, it is important to ruminate on whether the how matters. Why has environmentalism complexified and failed to mitigate? Is it because the evolution of humans has trended, nearly linearly, toward cooperation and complexity (Harari 2015)? Climate change is composed by the accumulated material effects of populations achieving complexity through extraction and exploitation (of people and of natural resources). If cooperation and complexity is somehow compatible with future system's communications, then climate change will continue as models predict. The Environment will reach a tipping point and rip out their binary, however core. Moreover, our answer questions whether increasing systems complexity will continue as systems rapidly "evolve" by "progressing" culturally. Just as the rise of the internet, machine learning, ubiquitous technology, incredible access to information, and artificial intelligence have increased the complexity of all systems, so too will future complexities threaten the sustainability of systems. Complexity's goal, as we see it, is to achieve a post-human, interconnected singularity (Harari 2018; Kurzweil 2005). We wonder if systems can adapt programs to reckon with a singularity across systems in an unlivable world. These are a couple future directions we offer for consideration.

Limitations

Luhmann was prolific, purposefully enigmatic and non-linear. Any attempt to adequately encompass the nuance and complexity of his work is simply not possible in this paper. We have

but scratched the surface of his 70+ books and 400+ articles. Surely there are many an assumption or critique contained within this essay that succumb to theoretical slippage, fallacy, or contestation by another essay we have never heard of. Some degree of straw man fallacies are inevitable when incorporating and addressing large swaths of literature, movements, and era. Further distinction and clarity is needed on this front.

Moreover, the essay relies on secondary translations and only four primary Luhmann texts. This, combined with the short nature of this essay, inevitably relies upon, and produces, oversimplifications. This paper was also written in the span of three caffeine-fueled days, as some conference papers can be, and thus it requires substantial editing. In this vein we welcome answers from Luhmann on any point for rewrites. However egregious or numerous, these limitations should not invalidate the overall the attempt of this essay, or at the very least nuggets worthy of continuation.

Conclusion

Bill McKibben (2020:65) concludes his essay on how we got to the Green New Deal thusly:

> Loosely quoting from the Massachusetts abolitionist Theodore Parker…'The arc of the moral universe is long, but it bends toward justice.' That is, this may take a while but we're going to win. The arc of the physical universe is short and bends toward heat—if we don't win soon, then we don't win at all.

As optimistic and comforting as this humanistic sentiment is, Luhmann's (1989) theory of how social systems will continue to perpetuate inaction is just as pessimistic. That systems are amoral, and just as in social evolution, the arc doesn't bend toward anything; the arc just wants to keep being the arc.

We now step back from descriptive stance and offer concluding, prescriptive remarks. Systems may be amoral and self-reinforcing, according to Luhmann, and that may describe the past 50 years. Insofar as this grand theory holds, we could agree that criticism and prescribed solutions to a crisis are useless, and think of climate change as "signs of a permanent, irreversible change in the conditions of life" (Bergthaller 2018:11). However unifying, the theory is still within the higher education system and will be interpreted by other systems as a "monologic voice…that can step on more practical environmentalist strategies" (Cuginotti 2012). One can read Luhmann's use of "degrees of freedom" until self-annihilation as deterministic. If a system is an autopoetic cell, then we need only take warning from cancer cells, which spread to a point where they kill the host but also themselves. Indeed, the metaphor of humans as the Earth's "cancerous cells" has been used, disused, and reused by some within the environmental movement. However, Luhmann says systems *can* develop their own complexity in a sustainable way so long as the environmental complexity to which they are sensitive includes the factors on which they critically depend (Luhmann 1997:133; Valentinov 2012:19). "It is for this reason of the possibility of readjustment that the pessimistic Luhmannian outlook does not boil down to an outright prediction of an unavoidable ecological catastrophe" (Valentinov 2012: 19).

How systems can develop their own complexity is another paper, but the catalysts must come from somewhere. The structuralists in us believe agency of change is still very much possible even within evolutionary theory (Dietz and Burns 1992; McLaughlin and Dietz 2008) and an "ecology of social action" (McLaughlin 2001). Whether by values, beliefs, morals, ethics, guiding principles, or some combination thereof, good change draws from morality and will keep working with system's binary codes. Beyond ignorance, code-pull, or indigitation, how can one disagree with the rationale that our place on this Earth—the one thing uniting thing all humans

and their thoughts and actions across time, from Lucy to Joseph to Ghandi to MLK Jr. to Mother Theresa to Hitler to Luhmann to Trump—is better livable than unlivable? Livable-unlivable is the Truth, and it is currently the uniting code of our species. That is not a moral appeal. That is a physical, spiritual, ecological, and humanistic appeal. And every other appeal humanity has ever conjured. And so we state again: The Earth is all we have. And we have ten years to do something about it.

References

Alaimo, Stacy. 2010. *Bodily Natures: Science, Environment, and the Material Self*. Indianapolis, IN: Indiana University Press.

Allen, Amy. 2018. *The End of Progress: Decolonizing the Normative Foundations of Critical Theory*. New York: Columbia University Press.

Anderson, James A., and Geoffrey Baym. 2004. "Philosophies and Philosophic Issues in Communication, 1995–2004." *Journal of Communication* 54(4):589–615.

Anderson, Kevin. 2011."Climate Change: Going Beyond Dangerous," July 5, Manchester, UK.

Bellamy, B. R., and J. Diamanti. 2018. "Materialism and the Critique of Energy." *Mediations* 32(1):1–16.

Benjamin, Daniel, Han-Hui Por, and David Budescu. 2017. "Climate Change Versus Global Warming: Who Is Susceptible to the Framing of Climate Change?" *Environment and Behavior* 49(7):745–70.

Bennett, Jane. 2005. "The Agency of Assemblages and the North American Blackout." *Public Culture* 17(3):445–66.

Bennett, Jane. 2010. *Vibrant Matter: A Political Ecology of Things*. Durham, North Carolina: Duke University Press.

Bergthaller, Hannes. 2018. "Beyond Ecological Crisis: Niklas Luhmann's Theory of Social Systems." *Electronic Book Review*.

Bhatasara, Sandra. 2015. "Debating Sociology and Climate Change." *Journal of Integrative Environmental Sciences* 12(3):217–33.

Bogardi, Janos J., David Dudgeon, Richard Lawford, Eva Flinkerbusch, Andrea Meyn, Claudia Pahl-Wostl, Konrad Vielhauer, and Charles Vörösmarty. 2012. "Water Security for a Planet under Pressure: Interconnected Challenges of a Changing World Call for Sustainable Solutions." *Current Opinion in Environmental Sustainability* 4(1):35–43.

Bonnett, Michael. 2018. "Ecology and Environmental Education." *International Handbook of Philosophy of Education*, edited by P. Smeyers. Cambridge, UK: Springer.

Bradford, John. 2011."Niklas Luhmann and Communication," November 7, Slideshare.

Brown, Alleen. 2019. "From Climate Denial to 'Green' Petroleum: Massachusetts Accuses Exxon Mobil of Deceptive Messaging." *The Intercept*, October 31.

Bryant, Levi, Graham Harman, and Nick Srnicek. 2011. *The Speculative Turn: Continental Materialism and Realism*. Melbourne, Australia: re.press.

Bühler, Karl. 2011. *Theory of Language: The Represenational Function of Language*. Amsterdam, Netherlands: John Benjamins Publishing Co.

Carson, Rachel. 1962. *Silent Spring*. Cambridge, MA: Riverside Press.

Cates, Bruner, and Moss. 2018. "Recuperating the Real: New Materialism, Object-Oriented Ontology, and Neo-Lacanian Ontical Cartography." *Philosophy & Rhetoric* 51(2):151.

Ciaccia, Chris. 2020. "Global Warming over Past 150 Years Has Wiped out 6,500 Years of Cooling, Study Says." *Fox News*. Retrieved July 6, 2020 (https://www.foxnews.com/science/global-warming-over-past-150-years-has-wiped-out-6500-years-of-cooling-study-says).

Cole, A. 2013. "The Call of Things: A Critique of Object-Oriented Ontologies." *The Minnesota Review* 2013(80):106–18.

Cox, Stan. 2019. "That Green Growth at the Heart of the Green New Deal? Its Malignant." *Counterpunch*, January 17.

Cox, Stan. 2020. *The Green New Deal and Beyond: Ending the Climate Emergency While We Still Can*. San Francisco, CA: City Lights Publishers.

Craig, Robert T. 1999. "Communication Theory as a Field." *Communication Theory* 9(2):119–61.

Craig, Robert T. 2009. "Reflection on 'Communication Theory as a Field.'" *Communiquer. Revue de Communication Sociale et Publique* (2):7–12.

Cuginotti, Augusto. 2012. "Ecological Communication | Niklas Luhmann." *Augusto Cuginotti*. Retrieved September 3, 2020 (https://augustocuginotti.com/ecological-communication-niklas-luhmann/).

Curran, Dean. 2017. "The Treadmill of Production and the Positional Economy of Consumption." *Canadian Review of Sociology/Revue Canadienne de Sociologie* 54(1):28–47.

DeGrasse Tyson, Neil, and Chuck Nice. n.d. "Coronavirus and Climate Change, with Neil DeGrasse Tyson."

Dietz, Thomas. 2005. "The Darwinian Trope in the Drama of the Commons: Variations on Some Themes by the Ostroms." *Journal of Economic Behavior & Organization* 57(2):205–25.

Dietz, Thomas, and Tom R. Burns. 1992. "Human Agency and the Evolutionary Dynamics of Culture." *Acta Sociologica* 35(3):187–200.

Dietz, Thomas, Rachael L. Shwom, and Cameron T. Whitley. 2020. "Climate Change and Society." *Annual Review of Sociology* 146:135–58.

Dunlap, Riley E., and Robert J. Brulle, eds. 2015. *Climate Change and Society: Sociological Perspectives*. 1 edition. New York, NY: Oxford University Press.

Fisher, Allison, Caitlin Murray, and Jasmine Reighard. 2019. *Foxic: Fox News Network's Dangerous Climate Denial 2019*. Washington, D.C: Public Citizen.

Floyd, Joshua, Samuel Alexander, Manfred Lenzen, Patrick Moriarty, Graham Palmer, Sangeetha Chandra-Shekeran, Barney Foran, and Lorenz Keyßer. 2020. "Energy Descent as a Post-Carbon Transition Scenario: How 'Knowledge Humility' Reshapes Energy Futures for Post-Normal Times." *Futures* 122:102565.

Flusberg, Stephen J., Teenie Matlock, and Paul H. Thibodeau. 2017. "Metaphors for the War (or Race) against Climate Change." *Environmental Communication* 11(6):769–83.

Gauthier, Philippe. 2018. "The Limits of Renewable Energy and the Case for Degrowth." *Resilience*. Retrieved September 8, 2020 (https://www.resilience.org/stories/2018-11-21/the-limits-of-renewable-energy-and-the-case-for-degrowth/).

Gildersleeve, Ryan Evely. 2018. "Becoming-Policy in the Anthropocene." *Education Policy Analysis Archives* 26:152.

Greenwood, Davydd J. 1984. *The Taming of Evolution : The Persistence of Nonevolutionary Views in the Study of Humans*. Ithaca, NY: Cornell University Press.

Gunn, Joshua. 2014. "Canned Laughter." *Penn State University Press* 47(4):434–54.

Haidt, Jonathan. 2013. *The Righteous Mind: Why Good People Are Divided by Science and Religion*. New York City, NY: Penguin Random House.

Harari, Yuval. 2015. *Sapiens: A Brief History of Humankind*. New York City, NY: HarperCollins.

Harari, Yuval Noah. 2018. *Homo Deus: A Brief History of Tomorrow*. Illustrated Edition. New York City, NY: Harper Perennial.

Harman, Graham. 2011. *The Quadruple Object*. Reprint. Zero Books.

Jackson, Jane. 2014. *Introducing Language and Intercultural Communication*. Florence: Routledge Ltd - M.U.A.

Jackson, Wes, Aubrey Streit Krug, Robert Jensen, and Bill Vitek. 2018. *Transforming Human Life on Our Home Planet, Perennially*. Vol. 2.

Jensen, Robert. 2020. "Who Is We?" *The Ecological Citizen* 4(1):Y-Z.

Kashwan, Prakash. 2020. "American Environmentalism's Racist Roots Have Shaped Global Thinking about Conservation." *The Conversation*, September 2, 7.

Kimmerer, Robin W. 2013. *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants*. Milkweed Editions.

Klein, Ezra. 2020. *Why We're Polarized*. New York City, NY: Avid Reader Press, Simon & Schuster.

Klein, Naomi. 2015. *This Changes Everything: Capitalism vs. The Climate*. Reprint. New York City, NY: Simon & Schuster.

Klein, Naomi. 2020. "Market Fundamentalism at the Worst Time." Pp. 27–37 in *Winning the Green New Deal: Why We Must, How We Can*. New York City, NY: Simon & Schuster Paperback.

Klinenberg, Eric, Malcolm Araos, and Liz Koslov. 2020. "Sociology and the Climate Crisis." *Annual Review of Sociology* 46(1):649–69.

Kolbert, Elizabeth. 2014. *The Sixth Extinction: An Unnatural History*. London, England: Picador.

Krippendorff, Klaus. 1991. "Review of Niklas Luhmann, Ecological Communiaction." *Journal of Communication* 41:36–40.

Kurzweil, Ray. 2005. *The Singularity Is Near: When Humans Transcend Biology*. 1st Edition. Penguin Books.

Latour, Bruno. 1993. *We Have Never Been Modern*. Cambridge, MA: Harvard University Press.

Leiserowitz, Anthony J., Edward Maibach, and Connie Roser-Renouf. 2009. *Global Warming's Six Americas 2009: An Audience Segmentation Analysis*. Fairfax, VA: George Mason University.

Levinovitz, Alan. 2020. *Natural: How Faith in Nature's Goodness Leads to Harmful Fads, Unjust Laws, and Flawed Science*. New York City, NY: Penguin Random House.

Lodge, David, and Nigel Wood. 2008. *Modern Criticism and Theory: A Reader*. 3rd ed. London, England: Pearson Education Limited.

Luhmann, Niklas. 1989. *Ecological Communication*. Vol. 41. Chicago, IL: University Of Chicago Press.

Luhmann, Niklas. 1992a. "The Code of the Moral." *Cardozo Law Review* 14:995–1009.

Luhmann, Niklas. 1992b. "What Is Communication." *Communication Theory* 2(3):251–59.

Luhmann, Niklas. 1995. *Social Systems*. Stanford, CA: Stanford University Press.

Luhmann, Niklas. 1996. "The Sociology of the Moral and Ethics." *International Sociology* 11(1):27–36.

Luhmann, Niklas. 1997. *Die Gesellschaft der Gesellschaft*. Suhrkamp: Frankfurt am Main.

Luhmann, Niklas. 2013. *A Systems Theory of Religion*. edited by A. Kieserling. Stanford, CA: Stanford University Press.

Lynch, Michael J. 2014. "Treadmill of Production Theory." *Green Criminology*. Retrieved September 7, 2020 (http://greencriminology.org/glossary/treadmill-of-production-theory/).

McCay, Bonnie J. 1980. "A Fishermen's Cooperative, Limited: Indigenous Resource Management in a Complex Society." *Anthropological Quarterly* 53(1):29–38.

McGreavy, Birdie, Samantha Senda-Cook, Justine Wells, and Jr George F. McHendry. 2018. *Tracing Rhetoric and Material Life: Ecological Approaches*. Cham, Switzerland: Palgrave Macmillan.

McKibben, Bill. 2020. "How We Got to the Green New Deal." Pp. 55–66 in *Winning the Green New Deal: Why We Must, How We Can*. New York City, NY: Simon & Schuster Paperback.

McKibben, Bill. 2020. "The Coronavirus and the Climate Movement." *The New Yorker*, April 6.

McLaughlin, Paul. 2001. "Toward an Ecology of Social Action: Merging the Ecological and Constructivist Traditions." *Human Ecology Review* 8(2):12–28.

Mclaughlin, Paul. 2012. "The Second Darwinian Revolution: Steps Toward a New Evolutionary Environmental Sociology." *Nature and Culture* 7(3):231–58.

McLaughlin, Paul, and Thomas Dietz. 2008. "Structure, Agency and Environment: Toward an Integrated Perspective on Vulnerability." *Global Environmental Change* 18(1):99–111.

Miller, Jacob. 2020. "Preventing Another Great Pacific Garbage Patch." Pp. 369–89 in *Water, rhetoric, and social justice: A critical confluence*, *Environmental Communication and Nature: Conflict and Ecoculture in the Anthropocene*, edited by C. R. Schmitt, C. S. Thomas, and T. R. Castor. Lanham, Maryland: Lexington Books.

Morton, Timothy. 2010. *The Ecological Thought*. Cambridge, MA: Harvard University Press.

Morton, Timothy. 2013. *Hyperobjects: Philosophy and Ecology after the End of the World*. Minneapolis, MN: The University of Minnesota Press.

Nisbet, Matthew. 2018. "The Ecomodernists: A New Way of Thinking about Climate Change and Human Progress." *Skeptical Inquirer* 42(6):20–24.

Ocasio-Cortez, Alexandria, and Edward Markey. 2019. *Recognizing the Duty of the Federal Government to Create a Green New Deal*.

Ostrom, Elinor, and Michael Cox. 2010. "Moving beyond Panaceas: A Multi-Tiered Diagnostic Approach for Social-Ecological Analysis." *Environmental Conservation* 37(4):451–63.

Palken, Daniel, and Jacob A. Miller. 2020. "An Incubation Period of Decades: Contemplating Climate Change in the Age of Coronavirus." *ISEE USA InSight*. Retrieved May 6, 2020 (https://insight.ieeeusa.org/articles/an-incubation-period-of-decades-contemplating-climate-change-in-the-age-of-coronavirus/).

Peters, John D. 1999. *Speaking into the Air: The History of the Idea of Communication*. New Edition. Chicago, IL: The University of Chicago Press.

Pezzullo, Phaedra C. 2003. "Touring 'Cancer Alley,' Louisiana: Performances of Community and Memory for Environmental Justice." *Text and Performance Quarterly* 23(3):226.

Reidmiller, D. R., C. W. Avery, D. R. Easterling, K. E. Kunkel, K. L. M. Lewis, T. K. Maycock, and B. C. Stewart. 2019. *USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II: Report-In-Brief*. *Domestic*. 4. Washington, D.C: National Climate Assessment.

Richerson, Peter J. 1977. "Ecology and Human Ecology: A Comparison of Theories in the Biological and Social Sciences." *American Ethnologist* 4(1):1–26.

Rickert, Thomas. 2013. *Ambient Rhetoric: The Attunements of Rhetoric*. Pittsburgh, PA: Univeristy of Pittsburgh Press.

Rickert, Thomas. 2018. "Towards Ecosophy in a Participating World: Rhetoric and Cosmology in Heidegger's Fourfold and Empedocles' Four Roots." Pp. 59–83 in *Tracing rhetoric and material life: Ecological approaches*. London, England: Palgrave Studis in Media and Environmental Communication.

Robinson, Mary. 2019. *Climate Justice: Hope, Resilience, and the Fight for a Sustainable Future*. Reprint. Bloomsbury Publishing.

Rosnay, Joël de. 1979. *The Macroscope: A New World Scientific System*. 1st ed. New York City, NY: Harper & Row.

Rowe, Stan. 1961. "The Level-of-Integration Concept and Ecology." *Ecology* 42(2):420–27.

Rowe, Stan. 2003. "The Living Earth and Its Ethical Priority." *The Trumpeter* 19.

Sanderson, Matthew R., and Vivian Hughes. 2019. "Race to the Bottom (of the Well): Groundwater in an Agricultural Production Treadmill." *Social Problems* 66(3):392–410.

Sandler, Ronald L., and Phaedra C. Pezzullo, eds. 2007. *Environmental Justice and Environmentalism: The Social Justice Challenge to the Environmental Movement*. Cambridge, Mass: MIT Press.

Schmitt, Casey R., Theresa R. Castor, and Christopher S. Thomas, eds. 2020. *Water, Rhetoric, and Social Justice: A Critical Confluence*. Lanham: Lexington Books.

Seidl, David. 2004. "Luhmann's Theory of Autopoietic Social Systems."

Shannon, Claude, and Warren Weaver. 1949. *The Mathematical Theory of Communication*. Urbana, IL: The University of Chicago Press.

Shaw, Julia J. A., and Hillary J. Shaw. 2016. *Mapping the Technologies of Spatial (in)Justice in the Anthropocene*. Vol. 25.

Shellenberger, Michael, and Ted Nordhaus. 2004. "The Death of Environmentalism." *Geopolitics, History and International Relations* 1(1):121.

Shellenberger, Michael, and Ted Nordhaus. 2007. *Break Through: From the Death of Environmentalism to the Politics of Possibility*. First Edition. Boston: Houghton Mifflin Harcourt.

Sober, Elliott. 1980. "Evolution, Population Thinking, and Essentialism." *Philosophy of Science* 47(3):350–383.

The Land Institute. 2020. "Transforming Education, Perennially." *Ecosphere Studies*. Retrieved July 13, 2019 (https://landinstitute.org/our-work/ecosphere-studies/).

The Washington Post. 2020. *Beyond Greta Thunberg: The Uprising of Youth Climate Activists*. YouTube.

Ulanowicz, Robert E., Sally J. Goerner, Bernard Lietaer, and Rocio Gomez. 2009. "Quantifying Sustainability: Resilience, Efficiency and the Return of Information Theory." *Ecological Complexity* 6(1):27–36.

Urry, John. 2011. *Climate Change and Society*. Cambridge, UK: Polity Press.

Valentinov, Vladislav. 2012. "The Complexity–Sustainability Trade-Off in Niklas Luhmann's Social Systems Theory." *Systems Research and Behavioral Science* 31(1):14–22.

Vörösmarty, C. J., P. B. McIntyre, M. O. Gessner, D. Dudgeon, A. Prusevich, P. Green, S. Glidden, S. E. Bunn, C. A. Sullivan, C. Reidy Liermann, and P. M. Davies. 2010. "Global Threats to Human Water Security and River Biodiversity." *Nature* 467(7315):555–61.

Wahyuni, Hermin I. 2019. "Ecological Communication in Information Society: Reflections on Niklas Luhmann's Thought in Understanding Ecological & Disaster Issues in Indonesia." *Jurnal Komunikasi: Ikatan Sarjana Komunikasi Indonesia* 4(1):9–17.

Wallace-Wells, David. 2020. "The Crisis Here and Now." Pp. 3–12 in *Winning the Green New Deal: Why We Must, How We Can*. New York City, NY: Simon & Schuster Paperback.

Warne, Kennedy. 2019. “New Zealand’s Whanganui River Is a Legal Person. How Will It Use Its Voice?” *National Geographic*.

Waxman, Olivia B. 2019. “The World Acted for the Ozone Layer. Why Not Climate Change?” *Time*, September 24.

Wells, Justine, Birdie McGreavy, Samantha Senda-Cook, and Jr George F. McHendry. 2018. “Introduction: Rhetoric’s Ecologies.” Pp. 1–36 in *Tracing Rhetoric and Material Life: Ecological Approaches*. Cham, Switzerland: Palgrave Studis in Media and Environmental Communication.

White, Kathleen Hartnett. 2016. “Renewables Are Incapable of Replacing Hydrocarbons at Scale.” *The Hill*. Retrieved September 11, 2020 (https://thehill.com/blogs/pundits-blog/energy-environment/274645-renewables-are-incapable-of-replacing-hydrocarbons-at).

World Meteorological Organization. 2018. *IPCC, 2018: Summary for Policymakers*. *International*. SR15. Geneva, Switzerland.

Zabel, Ingrid H. H., Don Duggan-Haas, and Robert M. Ross, eds. 2017. *The Teacher-Friendly Guide to Climate Change*. Ithaca, NY: Paleontological Research Institution.

Zylinska, Joanna. 2014. *Minimal Ethics for the Anthropocene*. Open Humanities Press.