POSTHUMAN PERFORMANCES IN ENVIRONMENTAL ETHICS AND SOCIAL EPISTEMOLOGY

by

JUSTIN SIMPSON

(Under the Direction of Dr. Chris Cuomo)

ABSTRACT

Drawing from material feminists, posthumanists, and science and technology studies, I conceptualize humans as the products of contingent, ongoing practices with more than humans. Humans are not merely dependent on nonhumans, but entangled with them. From technology to animals, nonhumans are active participants in the world's becoming, co-constituting the very being of humans—including our body, identity, and agency. Based on this conceptualization, I first address ethical issues at the intersection of food, agriculture, and technology by comparing the worlds associated with the landrace Carolina Gold and the genetically modified Golden Rice. Each rice is evaluated based on the criterion of biocultural diversity and how well each promotes open-ended futures of multi-species flourishing. In the second part, I work to cross pollinate environmental ethics with social epistemology. In particular, I critique social epistemology's anthropocentric focus on propositional knowledge and argue for expanding social epistemology to include nonhuman animals. By recognizing that nonhuman animals are epistemic agents with tacit, embodied knowledge, I argue that it is possible for humans to commit epistemic injustices against nonhuman animals. These injustices wrong them as knowers and givers of knowledge, silencing their testimony and erasing their competencies in different knowledge practices. In the third part,

I turn to Robin Wall Kimmerer's account of gratitude, gift giving, and reciprocity to advance an affirmative and joyful environmental ethic. Each person has a specific responsibility to share their unique gifts with the world in return for the gifts they receive from nature. Since reciprocity requires knowing oneself and the nonhuman recipient, I argue that open-ended curiosity is a virtue that enables humans to better understand nonhumans through the co-creation of shared worlds and the attunement of bodies.

INDEX WORDS: biocultural diversity, environmental ethics, new materialism, nonhuman epistemic injustice, open-ended curiosity, social epistemology

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CHAPTER 1

Introduction

Existential environmental problems such as the climate crisis and the sixth mass extinction are not merely technical problems. Ecofeminists have argued that the domination of nature is historically linked to a dualistic conception of nature and culture as well as an atomistic conception of humans and nonhumans. According to such conceptions, humans and nonhumans are radically distinct, sharing no common properties. Humans are intelligent, active, and linguistic beings. Nonhumans are passive, unintelligent, and meaningless beings. Furthermore, this perspective conceives of humans and nonhumans as being essentially given, independent, discrete, and self-constituting entities. Such a framing conceals how humans are embedded in, dependent on, and co-constituted by nature. Due to a value hierarchy among the dualistic terms, humans are supposedly justified in using nonhumans as mere resources. Addressing the conceptual root of environmental problems therefore requires a fundamental rethinking of humans, nonhumans, and the relation between them.

My dissertation further unsettles this atomistic and dualistic mode of thought through posthumanists, material feminists, and science and technology studies scholars such as Karen Barad, Bruno Latour, Donna Haraway, and Rosi Braidotti. Despite their differences, this body of literature presents humans as intimately entangled with nonhumans. Rather than pre-existing, discrete, independent, and self-constituting bodies, which subsequently interact, Barad posits relations as fundamental. It is relationships—intra-actions—that produce individual bodies with particular boundaries, properties, and meaning. That is, human and nonhuman individuals are

entangled relations of differences. Moreover, from clay to COVID-19, amoebas to complex animals, from sunglasses to particle supercolliders, nonhumans are active participants in the world's becoming. In addition to having agential abilities that change over time, nonhumans have agency in the sense that they change the possibilities of change and re-constitute the material-discursive apparatuses (i.e., the bodies) of humans and nonhumans. Consequently, humans are not simply materially dependent on the natural environment. Nonhumans co-constitute the very being of humans—our bodies, experience, personal identity, and agential abilities. Rather than acting as individuals, or only with other humans, human agency therefore involves networks of more-than-human others that enfold power relations pertaining to gender, race, class, culture, ability, and age.

While offering compelling insights into humans and nonhumans, the ethical implications of posthumanisms, material feminisms, and science and technology studies are still largely undeveloped. Given that humans and nonhumans can be entangled in better or worse ways, my dissertation seeks to provide an ethical analysis of how one should and should not live in a relational, becoming world in which nonhumans are active and intelligent beings. Furthermore, this group of scholars often define themselves as moving beyond the philosophical obsession with language that marks 20th century philosophy. The opening lines of Barad's chapter in *Material Feminisms* has become somewhat of a rallying cry for this group of thinkers. Barad states that

> Language has been granted too much power. The linguistic turn, the semiotic turn, the interpretative turn, the cultural turn: it seems that at every turn lately every 'thing'—even materiality—is turned into a matter of language or some other form of cultural representation…Language matters. Discourse matters. Culture matters. There is an important sense in which the only thing that doesn't seem to matter anymore is matter (2008, 120).

Material feminisms, posthumanisms, and science and technology studies (among others) seek to counteract this bias by resuscitating the study of matter, bodies, and affectivity, understanding these in a non-reductive, non-essentialist, and non-deterministic way. While this body of scholars

never rejects language as unimportant, the implications of this work for such fields as epistemology remain neglected. My dissertation seeks to address this by cross-pollinating the ontology of posthumanisms, material feminisms and science and technology studies with environmental ethics and social epistemology. As Stacy Alaimo notes, "Barad's ontology, which renders distinctions between 'nature' and 'culture' nonsensical, is a major intervention in feminist and cultural theory. Even as I find her onto-epistemology extraordinary for feminist and environmentalist philosophy, I think that such radical reconceptualizations will not take root very quickly" (2008, 249). That is, Barad's agential realism which is grounded in their quantum physics background can be a little too radical and abstract. By applying Barad's ontology to environmental and social contexts, I hope to make it more concrete—or better yet, I hope to help crack the concrete of sedimented beliefs so that it can take root.

In the first part of my dissertation, I attend to the ethical issues at the intersection of food, agriculture, and technology. Agriculture and land use are responsible for 23% of human greenhouse gas emissions that are contributing to the climate crisis, which is expected to exacerbate food shortages. To provide a window into ongoing issues surrounding food and agriculture, I compare the landrace Carolina Gold with the genetically modified Golden Rice. These two rices offer competing visions of the future of food. Drawing on the relational and process ontology of Barad's posthuman performativity, I seek to problematize current debates around food, in which both sides of the argument often engage in an atomistic and dualistic analysis. Rather than analyzing each rice in isolation, I consider each rice's world—its particular network of humans, technology, crops, environment, and animals—and how each rice is involved in worlding practices that re-constitute the very nature of humans and nonhumans. To attend to each rice's world and worlding practices, I offer a posthuman performance in environmental ethics

to advance biocultural diversity and multi-species flourishing. This ethic is then used to ethically compare the two rice worlds.

In the second and third part of my dissertation, I seek to offer posthuman performances in social epistemology. The second part confronts the opposition between culture and nature that posits nonhumans as unintelligent, passive, and meaningless beings. I advance a more capacious epistemology that challenges social epistemology to be more inclusive. In particular, I critique the anthropocentric association between knowledge and propositional language, which excludes nonhuman organisms from being knowers. Based on the work of Barad, Michael Polanyi, and Aldo Leopold, I argue that nonhuman organisms are active epistemic agents that possess tacit, embodied knowledge and engage in corporeal knowledge practices. Given their epistemic standing, I then argue that it is possible to commit epistemic injustices against nonhumans. More specifically, due to negative identity prejudices such as speciesism, I contend that it is possible to commit testimonial injustice against nonhumans. Such an injustice wrongs them as knowers and givers of knowledge, silencing their testimony and erasing their competence in different modes of knowing. Furthermore, I argue that it is possible for humans to commit (transcendental) epistemic smothering against nonhumans. This injustice broadens social epistemology by revealing the onto-epistemological nature of social intra-actions. That is, it reveals how epistemic beliefs can have ontological consequences. While the argument for nonhuman testimonial injustice and epistemic smothering seeks to evince similarities between nonhumans, attending to the (non-dualistic) differences between humans and nonhumans, I argue that it is possible to commit fourth-order epistemic exclusions against nonhumans. Taking nonhumans seriously as social onto-epistemic agents holds the promise of a stronger objectivity and increases the significance of species extinction as the loss in an entire world of knowledge.

While the second part focuses on how (epistemic) interactions and intra-actions with nonhumans can go wrong, the third part offers an environmental ethic to better understand nonhumans as onto-epistemic agents. Such an ethic seeks to escape the binary star system of egoism and altruism, while avoiding the blackhole of fear, guilt, and despair evoked by environmental doom and gloom narratives. Drawing on Robin Wall Kimmerer's account of gratitude, gift giving, and reciprocity, this section presents an affirmative and joyful environmental ethic. According to Kimmerer, each person has a responsibility to share their unique gifts with the world in return for the gifts they receive from nature. Gift giving thereby affirms both the giver and receiver such that doing good for the environment can feel good. Such an environmental ethic is a sustainable ethic in the sense that it allows a person to stay with the trouble and continue to invest the time and energy needed to address the environmental problems facing the world.

I seek to make two contributions to Kimmerer's account. First, drawing on Barad and Latour, I argue that nature provides humans with more than external tangible gifts. Nature also provides ontological gifts by co-constituting the very being of humans. Second, to reciprocate nature a person must not only know themselves and their unique gifts, but they must also know the nonhuman recipient to understand what qualifies as a good gift. Accordingly, I turn to the ethological work of Vinciane Despret to argue that open-ended curiosity is an onto-epistemic virtue that allows humans to better understand nonhumans. Epistemically, a person must be open to adjusting their beliefs and questions in relation to nonhuman others. Ontologically, a person must be open to transforming their bodies and practices such that they can be affected by, and make sense, to nonhuman others. Open-ended curiosity ultimately seeks to help a Western audience live according to Kimmerer's affirmative and joyful environmental ethic by becoming better gift givers.

References

Alaimo, Stacy. 2008. Trans-corporeal feminisms and the ethical space of nature. In *Material feminisms*, eds. Stacy Alaimo and Susan Hekman, 237-264. Indiana University Press.

Barad, Karen. 2008. Posthumanist performativity: toward an understanding of how matter comes to matter. In *Material feminisms*, eds. Stacy Alaimo and Susan Hekman, 120-156. Indiana University Press.

CHAPTER 2

A Tale of Two Rices: An Ethical Comparison of Golden Rice and Carolina Gold Through a Performative New Materialist Lens

The 2019 Intergovernmental Panel on Climate Change's special report found that agriculture, forestry, and other types of land use are responsible for 23% of human greenhouse gas emissions (IPCC 2019). Climate change is expected to exacerbate environmental problems related to agriculture, such as pollution, the encroachment of farms into forests, desertification, and the exhaustion of freshwater sources. With so much at stake, it is worthwhile to reconsider the ethical discussion surrounding food and agriculture. Two crops—Golden Rice and Carolina Gold rice—provide a window into food and agricultural studies. Golden Rice has become a poster child for genetically modified crops, supposedly exemplifying the humanitarian promise of technological solutions to food insecurity and agricultural problems. Dating back to the 18th century, the landrace Carolina Gold has witnessed a renaissance on farms and plates in the American South. But Golden Rice and Carolina Gold offer competing visions for the future of food—one based on productivism and disembeddedness, the other on idiosyncrasy and embeddedness. Jettisoning a dualistic and atomistic framework, this paper draws upon performative new materialism to attend to the human-nonhuman networks of these crops. I advance biocultural diversity as an ethical criterion to evaluate how well each rice promotes open-ended futures of multi-species flourishing.

Golden Rice

Golden Rice has become a poster child for genetically modified crops because of its purported humanitarian benefits. Scientists created Golden Rice for developing countries suffering

from vitamin A deficiency caused by food insecurity. In acute cases, vitamin A deficiency can cause blindness and even death in children. The designers of Golden Rice engineered it to be a biofortified crop that produces more beta-carotene, a precursor to vitamin A, in its endosperm. Golden Rice thus represents the promise of technological solutions to nutritional deficiency that can mitigate the effects of food insecurity.

As ecological anthropologists Glenn Davis Stone and Dominic Glover (2016) document, Golden Rice is the outcome of European biology and American funding. It was originally created by inserting two daffodil genes and one bacterium gene into the rice genome. Although primarily intended for the Philippines, developers did not originally breed Golden Rice with local varieties. Following the cosmopolitan breading strategy of Green Revolution rices, Golden Rice is an amalgamation of rice DNA taken from various locations and inserted in Green Revolution rice (Harwood 2015; Richards 1997; cited in Stone and Glover 2016). Starting in 2001, Golden Rice arrived at the International Rice Research Institute (IRRI) as the javanica subspecies, a US commercial variety, then cross-bred with indica varieties commonly grown in the Philippines (Dubock 2014). In the early 2000s, researchers crossed the trait responsible for beta-carotene into Rc82 and the Green Revolution standby IR-64. Golden Rice thus exemplifies a cosmopolitan crop.

Golden Rice is an incisive window into the debate surrounding the future of food because it embodies the production-driven and disembeddedness of genetically modified agriculture. Stone and Glover define productivism as an approach in which the "output is to be prioritized at the expense of other agricultural virtues" (2016, 88). Although Stone and Glover note that Golden Rice has "yet to meet standards of productivity" due to its comparatively lower potential crop yield, it nevertheless adheres to productivism in the sense that it prioritizes output. In particular, the design of Golden Rice sought to maximize the plant's nutritional and medical value.

Moreover, Golden Rice represents a disembedded crop. Stone and Glover define embeddedness as "the extent to which local agro-ecological context is valorized or nullified in the crop's construction" (2016, 88). Genetic engineering attempts to hardwire desired properties into the genes. Consequently, a plant's complex biological processes as a living organism are reduced to genotypes, germplasm, gene constructs, and individual genes. Presenting the desirable properties as being built into the crop itself conceals the ways in which the plant and its desirable properties are dependent on environmental interactions and management techniques (Charles 2001; McAfee 2003). The decision not to initially breed Golden Rice with local varieties also represents an underappreciation of the agro-ecological context.

Proponents of genetic engineering present the disembeddedness of Golden Rice as a virtue. Assuming that nutritional properties (theoretically) can be intentionally incorporated into different rice varieties, and these properties are genetically encoded, Golden Rice's cultivation success is not contingent on place-specific environmental growing conditions. Even if Golden Rice's reported success and yields during its testing at IRRI depended on ideal rice plots with placeless chemical fertilizers and modern technology, any intended growing site could theoretically reproduce these conditions. Furthermore, proponents predict that its success is not dependent on cultural factors. Given that "technology is in the seed, no manufacturing, packaging, distribution, or change of cultural practices is required for populations to improve their nutritional status" (Dubock 2014, 214). Hence, Golden Rice could be a universal solution to vitamin A deficiency that can be grown in other locations and exported worldwide.

Carolina Gold Rice

While scientists were developing Golden Rice, there was a renaissance of the antebellum landrace Carolina Gold rice. As a landrace, Carolina Gold was bred using pre-industrial

domestication methods and has since been maintained agriculturally rather than by scientific breeding in conjunction with modern farms (Roberts 2011). Carolina Gold took root on plantations in the American South during the 18th century (Carney 2001; Tibbetts 2006). Commercial interest in Carolina Gold grew as a cash crop to export back to Europe. The early success of Carolina Gold, and the cultivation of rice in general as a Southern staple, depended not only on the labor of enslaved people but also on their expertise. They processed the unmilled seed on slave ships, planted it in their personal plots as a dietary staple, and made it a viable crop in the colonies using West African agricultural techniques and knowledge (Carney 2001).

Consequently, after the Civil War, the prominence of Carolina Gold declined and then disappeared after the devastating hurricane of 1911. Carolina Gold returned on the Southern scene in the 1980s with duck-hunting enthusiast Richard Schulze, who planted the rice after hearing about the exceptional taste of ducks fed on Carolina Gold (Schulze 2005). By 2000, Carolina Gold became viable for growing as an exotic crop in a global rice market saturated with inexpensive rice from overseas. Carolina Gold regained its public prestige with the help of southern farmers like Glenn Roberts and famous regional chefs like South Carolina's Sean Brock.

In contrast to Golden Rice's productivism and disembeddness stands the idiosyncrasies and embeddedness of landraces like Carolina Gold. Landraces display individual variation at the genetic level. This variation is "celebrated and encouraged" by Roberts for its survival advantages, such as the ability "to maintain crop vigor, success in low-resource, high-stress environments…drought resistance, disease and pest tolerance…and the innate ability to adapt to climate and other change" (2011). Proponents of Carolina Gold also appreciate it for culinary and nutritional reasons. According to Roberts, it is the individual variation of landraces that "contributes to the appealing and dramatic flavor profile and high-quality nutrition" (2011). The

deep roots of Carolina Gold enable it to "better uptake water and nutrients including important micronutrients for human and animal nutrition" (Roberts 2011). Landrace advocates also prize the idiosyncrasies for their agronomic traits. Carolina Gold's deep roots reflect its height. This height allows growers to use Carolina Gold for thatch, bedding, fodder, and silage. Additionally, some landraces have allelopathic properties such as suppressing weeds without tillage, which makes them more energy-efficient, while others can suppress pests and have medicinal properties.

The variety and embeddedness of Carolina Gold is also witnessed in the field. At Anson Mills' farms, Roberts practices polyculture farming. He plants cover crops such as runner peas to block sunlight, minimize weeds and tilling, and practices intercropping. Roberts has also adopted sun cycle rotation, a type of crop sequencing. By planting Carolina Gold after field peas, Roberts noticed an improvement in the rice flavor and soil tilth. Finally, variety is found in Roberts' harvesting process. Carolina Gold is not only a fragile crop that easily falls over under pressure; it also has a variable maturation rate. Accordingly, it resists uniform and large-scale harvesting methods using industrial machines. Roberts therefore often turns to hand-harvesting fields multiple times. Harvesting techniques can vary from manual artisan handwork to machine assistance.

Beyond the rich history of landraces, the preservation of local culinary traditions drives Robert's work. The idiosyncratic nature of landraces, such as Carolina Gold's perishability, makes them "the quintessential 'local' food and best meant for 'local' consumption" (Roberts 2011). Carolina Gold has gained notoriety through Southern restaurants like Sean Brock's Husk. Brock uses the crop to recreate flavorful traditional Southern recipes like the signature dish of South Carolina—hoppin' John—a stew consisting of rice, black-eyed peas, and pork. Regional restaurants like Husk pride themselves on using traditional recipes, ingredients, and cooking

methods such as the whole animal approach to cooking that utilizes the entire animal instead of only the prized cuts.

Like the rice itself, these Southern recipes and culinary methods are indebted to enslaved people. Segregation was a ubiquitous feature of the South, except when it came to food (Tibbetts 2006). Creole food is the product of the intermingling of European and African food cultures. While enslaved people prepared European dishes for plantation owners using what produce was available, they did so by drawing on African cooking techniques, seasoning, and flavor profiles. African enslaved people were also responsible for dishes like hoppin' John. Furthermore, enslaved people and their descendants developed Soul food and the whole animal approach to cooking to supplement their diet, and complement their dishes with wild fish, game, and animal parts that were discarded by whites, such as the feet, ears, heads, and entrails (Tibbetts 2006).

Although they are both rice, Golden Rice and Carolina Gold present different "visions of what rice should be, and how it should be produced" (Stone and Glover 2016, 88). Each has garnered controversial acclaim as the future of agriculture and food. On the backdrop of food crises, socioeconomic and cultural issues, and environmental problems, it is necessary to have an ethical criterion based on an ontological framework that can attend to the factors surrounding each rice. Accordingly, I turn to performative new materialism to address these entangled factors. To help articulate and motivate the turn to performative new materialism, I first introduce the dualism and atomism of modernity as a point of contrast, then I show how Golden Rice and biodiversity are an extension of modernity, and finally, I present the problems with modernity.

Modernity

According to Bruno Latour (1993), modernity assumes that everything in the world can be sorted into the pre-given and fixed categories of culture/subject/human and

nature/object/nonhuman.[1] These categories represent a dualistic dichotomy. These categories are mutually exclusive in that they do not share common properties. Accordingly, modernity regards nature-culture mixtures as primitive confusions and inappropriate projections. Works of purification seek to cut the world at these natural and cultural joints by severing inappropriate natural or social elements in order to sort entities into their proper original category. In the words of philosopher Alfred Whitehead, the result is a "bifurcation of nature into two systems of reality" that separates nature as it appears in human experience from the physical entities and processes that cause these experiences (Whitehead 1964, 30). Experiential secondary qualities such as the "greenness of the trees, the song of the birds, the warmth of the sun, the hardness of chairs, and the feel of velvet" are discredited because they supposedly do not reflect the objective state of nature (Whitehead 1964, 31). Consequently, modernity reduces nature to primary, quantifiable properties such as location, mass, and velocity.

In contrast to the human/culture category involving historical and free individuals, nature is a collection of passive, inert matter. Nonhumans are mere "intermediaries" that transport external forces and information without transformation (Latour 2006). For example, a domino can be considered an intermediary in a series of dominos. It presumably does not make a difference as an individual. That is, the individual domino does not add, modify, or translate, its input. The force of the previous domino is more or less identical with its output, the force it transfers to the next domino. Each domino is therefore interchangeable in that substituting one domino for another would not affect the functioning of the whole. A system of passive intermediaries is consequently predictable. Like with projectile motion, a person can predict the system's final state by knowing

[1] Although I employ Latour's concept of modernity, this dualistic and atomistic conception of the world has been described and criticized by many others such as Karen Warren (1990), Donna Haraway (1991), Val Plumwood (1993), and Maria Lugones (1993).

the initial state and applying the kinematic equations. Thus, "[t]he sphere of real facts," deep ecologist Arne Naess writes, "is narrowed down to that of mechanically interpreted mathematical physics" (2001, 66).

Furthermore, modernity conceives of matter in an atomistic way. Reality is an aggregate of pre-existing, discrete entities with inherent and immutable essences. Each entity occupies a definite location within a fixed spacetime container. This container model entails there is always already distance between entirely separate entities. As independent variables, humans and nonhumans, a thing and its environment, can be neatly disentangled from each other and analyzed in isolation without loss. While these entities can interact in different ways, causing changes in an entity's properties over time—such as their mass, location, momentum—these interactions cannot substantively change an entity's inherent being. Atomistic thinking thereby reduces the world to a fixed set of actual entities and corresponding possibilities.

The tenets of modernity are found in conceptions of biodiversity, ethical debates around food and agriculture, as well as the design of Golden Rice. Accounts of biodiversity, such as that offered by the Convention of Biological Diversity, reflect modernity's dualism. As Sarah Whatmore observes, this account "casts it in wholly biological terms" in that it is "the outcome of an evolutionary process divested of human presence," which "conjures a world until recently unmarked by the (invariably negative) 'impacts' of human society, only countenancing hybridity as a technological accomplishment associated with the advent of genetic resources" (2006, 92). Such an account presents biodiversity as a pure, natural metric that is independent of humans. Furthermore, while organisms and species are interdependent, insofar as they are viewed as having fixed, inherent, and independent essences in the form of DNA and biological life cycles,

conceptions of biodiversity remain atomistic. Biodiversity thus becomes a measure of the number of different species that are defined purely in objective and quantifiable terms.

Within ethical debates around genetically modified crops, both sides often articulate their position in modernist terms. These debates center around whether crops are unnatural, nutritionally inferior, pose risks to human health by introducing new toxins or allergens, or threaten biodiversity by outcompeting wild counterparts (Sandler 2005; Rauch 2018; Moghissi et al. 2015). Such discussions focus on the effects of crops on pre-existing people and the natural environment, assuming that these categories are substantially discrete, independent, and fixed. This framing neglects how crops and agriculture can transform the being of people, individual nonhumans, and the environment at large. More generally, the logic of modernity is witnessed in food ethics when food crises are reduced to production and distribution problems, which result from a lack of availability, accessibility, utilization, and stability of nutritious food conceived as a material resource (FAO 2006). This logic reduces the rich and diverse qualities of human and nonhuman life to quantitative terms. Consequently, food becomes a mere material resource.

The abstract, disembedded design model of Golden Rice is also premised on modernist tenets. Atomism justifies the cosmopolitan crop design strategy of combining attractive "atoms"—genetic combinations—from different locations. Atomism also engenders the view that rice can be neatly severed from biological processes, the environment, and agricultural practices. Insofar as the nutritional qualities of Golden Rice are supposedly genetically encoded, they become inherent properties. Golden Rice consequently becomes an encapsulated vitamin supplement. Furthermore, according to modernity's dualistic and atomistic assumption, it can be reintroduced into farms without significant disruptions to the farmers, agricultural animals, and local ecosystems.

While there are many problems with the atomism and dualism of modernity, given the focus of this paper, it is worthwhile to draw attention to two in particular. The first involves practical difficulties. Research compiled by Stone and Glover (2016) reveals the challenges a messy, complicated amodern world presents to the viability of Golden Rice. Tang et al. (2012) based their highly cited findings that Golden Rice is a good source of vitamin A on trials involving children with well-balanced diets. However, children suffering from malnutrition have diets low in fats, which are required to absorb vitamin A (Dawe et al., 2002; Haskell 2012; Nestle 2001). Furthermore, this demographic of children would also reduce Golden Rice's actual efficacy because they are at higher risk for intestinal infections and parasites. Such conditions hinder the absorption of beta-carotene and decrease its conversion rate into vitamin A (Nestle 2001). Additionally, Tang's studies neglect the effects of storage and cooking on the levels of beta-carotene. Such factors are essential as oxygen, light, and heat are known to breakdown carotenoids (Pénicaud et al. 2011; Hansen 2013). Finally, the pathway opened for beta-carotene might negatively affect the flow of other nutrients (Stone and Glover 2016). This relationship illustrates how Golden Rice's nutritional properties are not inherent but depend on various factors such as diet, the human body, storage, and cooking.

Lastly, modernity encourages an indifferent and violent relationship to nature (Warren 1990; Plumwood 1993). As passive and inert matter, nature lacks internal self-organizing principles and interests, which could pose ethical restrictions on human action. Passive, inert, and meaningless, nature beckons humans to inscribe it with meaning by manipulating, developing, and exploiting nature to serve (some) human purposes. Nature becomes merely a resource with instrumental value. Moreover, equating nature only with objective, quantifiable properties divorces humans from nature and delegitimates personal, qualitative relationships with nature.

This separation further undermines environmental ethics. In Arne Naess' words, "[e]very appeal to save parts of nature based on reference to sense-qualities of any kind become meaningless. Every passionate appeal that involves deep feelings, empathy, and even identification with natural phenomenon must then be ruled as irrelevant" (2001, 65-6). The cold, inert nature of primary, quantitative properties elicits a cold indifference. "The framework of reductive mechanism," ecofeminist philosopher Val Plumwood contends, "permits the emotional distance which enables power and control, killing and warfare, to seem acceptable, just as it did in the case of the animals Descartes' followers used for experimentation" (1993, 119). These practical and environmental concerns motivate moving beyond the modern framework.

Performative New Materialism

The ontology of performative new materialism offers one alternative to the problematic metaphysics of modernity.[2] Rather than starting with a closed set of discrete, self-contained humans and nonhumans that are given from the start and subsequently interact, Karen Barad's performative new materialism presents the world as an open-ended but non-arbitrary process of becoming. "Humans" and "nonhumans" emerge through intra-actions.[3] Intra-actions are "generative material articulations or reconfigurings of what is and what is possible" (Barad 2007, 389). Specific practices performatively materialize and co-constitute humans and nonhumans in particular ways. Each is a part of the world, being affected by the world and affecting it. Even

[2] The term "performative new materialism" is employed by Christopher Gamble, Joshua Hanan, and Thomas Nail (2019) to distinguish the new materialism of Barad and Vicki Kirby from non-performative new materialisms such as Jane Bennett's vital new materialism and the negative new materialisms of Graham Harman's object-oriented ontology and Quentin Meillassoux's speculative realism. While all these new materialisms shift the focus from epistemology to ontology, the non-performative versions take ontology and epistemology to be independent and the performative versions contend that they are co-constitutive. More specifically, Gamble, Hanen, Nail define performative new materialisms by three criteria: the activity of matter is indeterminate, matter is an ongoing iterative process, and matter is fully relational and immanently self-caused.

[3] Barad places "humans" and "nonhumans" in scare quotes to reflect that they are not given, nor fixed, but contingent and revisable products of iterative, open-ended intra-actions. For convenience, in the rest of the paper I will simply refer to humans and nonhumans, but these terms should be read as "humans" and "nonhumans".

scientific practices and theories do not merely *re*present and *re*produce nature as it is, independent of humans. In other words, "[n]ature is not a pure essence that exists 'out there'" waiting to be discovered (Barad 2007, 382). Rather, scientific experiments are performative in that "what is 'disclosed' is the effect of our intra-active participation with/in the world's differential becoming" (Barad 2007, 361). For instance, in quantum physics, light does not have a pre-existing, determinate state that is simply unknown before the experiment. It becomes locally determinate in relation to the particular material-discursive configuration of the scientific measuring apparatus. With one apparatus, light is a wave; with another apparatus, light is a particle. That is, a scientist is not a detached observer. Rather, the very method and material-discursive apparatuses that make possible the observation substantively affect what is observed.[4]

More specifically, Barad contends that intra-actions produce humans and nonhumans through agential cuts. These agential *cuts* enact boundaries between the resultant entities. An organism's body differentiates itself from the environment and differentiates its environment in particular ways that matter to it, while excluding others from mattering. A plant not only distinguishes between sun, air, water, soil, rocks and roots, but co-constitutes their being. That is, in addition to drawing boundaries and shaping the surface contours of human and nonhuman bodies, intra-actions constitute the very body, identity, and agency of humans and nonhumans. Based on the specific differential relationship, intra-actions materialize entities with particular sensibilities and agential abilities: how it can be affected by others and how it can affect others.

[4] To be clear, Barad is not advocating a new form of idealism or social constructivism. As Barad stresses, "phenomena do not require cognizing minds for their existence" (Barad 2006, 361). That is, intra-actions are not determined solely by humans. Moreover, given that epistemology and ontology are not separate, independent domains, ideas cannot serve as a foundation or primary cause, which explain away the materiality and changes of the world. Following Niels Bohr, concepts are always entangled with the material world. Barad consequently understands the world in terms of material-discursive apparatuses.

Hence, identity and agency are not fixed, inherent properties. They are in-between, relational properties that develop through and across specific connections and associations.

While agential cuts enact difference and separation, they do not result in the absolute exteriority of atomism. A particular intra-action does not eternally determine the resulting entities. Materiality is always substantially open to others. It can be re-constituted by subsequent intra-actions. Furthermore, intra-actions do not result in an absolute separation because they enfold entities, producing an "entangled relation of difference" such that the resultant entities remain connected even if they are not necessarily physically contiguous (Barad 2006, 236). In other words, the resultant entities are differentially constituted. Consequently, they are not reducible to a combination of pure human and nonhuman elements. According to Barad, "[n]ot only subjects but also objects are permeated through and through with their entangled kin; the other is not just in one's skin, but in one's bones, in one's belly, in one's heart, in one's nucleus, in one's past and future" (2007, 393). For instance, in quantum physics experiments, a material-discursive measuring apparatus differentially constitutes light. The being of light (as particle or wave) therefore is entangled with the scientific equipment and human scientists, which/who bring the "outside" world with them into the laboratory. Moreover, following quantum physicist Niels Bohr, Barad's emphasis on the materiality of meaning challenges the dualism between things and words. Concepts are always embodied—they are "*specific physical arrangements"* (2008, 132). Barad's account thus challenges the atomism and dualism of modernity.

From the perspective of performative new materialism, it is impossible to give an account of Golden Rice and Carolina Gold in isolation as individual seeds or staple crops in terms of given, pure essences. A particular association of actors, including scientists, farmers, plants, animals, and technology is connected with each rice in specific ways. Each is a "rice world" that "encompasses

biological characteristics of seeds, agro-ecologies of rice landscapes, processing, and marketing, key institutions, visions of what rice should be, and how it should be produced" (Stone and Glover 2016, 88). These more-than-human associations function together as a material-discursive apparatus that makes an agential cut, making each rice what it is. These associations are consequently enfolded into the being of each rice. As Haraway notes, "a seed contains inside its coat the history of practices," which can include collecting, breeding, planting, calendars, labor systems, pest-control procedures, landholding, marketing, taxonomizing, patenting, biochemically analyzing, advertising, eating, cultivating, harvesting, celebrating, and beliefs about hunger and wellbeing (1997, 129). Furthermore, the nutritional status of Golden Rice is not a fixed and inherent property. It is a network phenomenon. As the research compiled by Stone and Glover shows, whether Golden Rice is a good source of vitamin A depends on the recipient's diet, intestinal infections, parasites, storage, and cooking.

Likewise, nonhumans co-constitute the body, mind, and culture of humans. Barad contends that the more than human entanglements "we are a part of reconfigure our beings, our psyches, our imaginations, our institutions, our societies" (Barad 2007, 383). From the materiality of the seed to the plant, the way it grows, its favorable environmental conditions, when and how to harvest, how to store, and how to prepare, rice has its own material terms and dynamics. Through iterative intra-actions, these dynamics become differentially enfolded into the being of humans. They shape and translate human bodies, experiences, thinking, beliefs, values, intentions, and practices—both on and off the field. Each rice world opens particular human possibilities and futures while simultaneously foreclosing others.

Barad's account also challenges the dualism that consigns nonhumans to being passive, inert matter. Nonhumans are active participates in the world's becoming. Like humans, nonhumans

have agency. Agency does not merely involve actualizing one possibility amongst a given set. Barad argues that intra-actions entangle entities creating new entities that engender a new set of possibilities. Disrupting the association between agency and intentionality, Barad maintains that "[a]gency is about changing possibilities of change entailed in reconfiguring material-discursive apparatuses of bodily production" (2007, 235). That is, with the intra-active production of new more-than-human entities comes new spacetimes and causal theories. These more-than-human entities are themselves material-discursive apparatuses that enact the world in particular ways, making other bodies matter in particular ways—having different bodily boundaries, agential abilities, and meaning, while excluding others. Due to these different corresponding spacetimes and other bodies, nonhumans can thus change how change occurs. In the words of Bruno Latour, nonhumans are "able to propose their own theories of action to explain how agencies' effects are carried over [having] their own meta-theory about how agency acts… They will not only enter into a controversy over which agency is taking over but also on the ways in which it is making its influence felt" (Latour 2007, 57). Ascribing agency to nonhumans, however, is not an "uncritical move for equality" that extends human agency to nonhumans (Plumwood 1993). Nonhumans have different kinds of agencies. As Bruno Latour notes, there is a difference between installing a speed bump and a '30 MPH' speed limit sign (2007, 77).

Even nonhumans of the same type or species can have different materialities and agential abilities. Like humans, each is a singular entity that has a specific history of intra-actions with others. This history is "written into their materialization, their bodily materiality holds the memories of the traces of its enfoldings" (Barad 2007, 383). Consequently, nonhumans are not

necessarily interchangeable intermediaries, but mediators.[5] As Latour defines it, a mediator is a "unique event, totally irreducible to any other" (2006, 153). Similar to humans, nonhumans are not necessarily determined by the environment or their biological nature. Nonhumans can also make a difference in unexpected ways by translating forces as well as transforming information and other entities. Given that each entity has its own particular differential materiality, spacetime, agential abilities, and causal theory that translate action, "[t]heir input is never a good predictor of their output" (Latour 2007, 39).

Biocultural diversity

With performative new materialism, it is necessary to reconceive and expand the modern concept of biodiversity with the notion of biocultural diversity (Baker 2013; Kimmerer 2013). This notion captures the particular entangled relations of difference between humans and nonhumans, which result from contingent, open-ended intra-actions. *Bio*cultural diversity captures the qualitative diversity of nonhumans. More than the number of distinct biological species, biocultural diversity attends to the different materialities, agential abilities, causal theories, spacetimes, and worlds of these species. Furthermore, biocultural diversity recognizes the qualitative diversity within a category. An individual organism is not necessarily identical with another organism of the same species because it can become a unique individual through its specific history of intra-actions. Thus, biocultural diversity registers the singularities of nonhumans and how they are non-substitutable mediators that affect the world's becoming in unique ways. Biocultural diversity also allows for nonhuman diversity to increase. Barad's account

[5] It is important to emphasize that they are not *necessarily* intermediaries because nonhumans can be controlled and stabilized through their network associations (Latour 2006). However, their standing as an intermediary—being primarily inert and passive—is not given, but an effect that requires ongoing work, which can fail.

of the world's open-ended becoming recognizes how new hybrids—new entangled relations of difference—can be produced through intra-actions.

On the other side of the entanglement, bio*cultural* diversity takes into account how humans are co-constituted through intra-actions with more than humans. Intra-actions fold nonhumans into the being of humans in particular ways. Intra-actions involving different nonhumans will produce humans with different bodies, minds, beliefs, cultural values, and practices. Although humans are one species, biocultural diversity recognizes the qualitative differences within humans' being, which in turn co-constitute nonhumans in different ways.

Additionally, biocultural diversity includes the sensorial, affective, and emotional dimensions of nonhumans. As Alfred Whitehead argued, if we acknowledge that humans are part of nature, we cannot discredit the apparent nature of human experience. In his words, "[w]e cannot pick and choose. For us the red glow of the sunset should be as much a part of nature as are the molecules and electric waves by which men of science would explain the phenomenon" (1964, 29). According to Naess, the relational nature of secondary properties is not sufficient grounds for excluding them from nature. Even primary properties are relational. The "objective" property of 'height' depends on another measuring device (such as a rigid ruler) to establish a specific unit of measurement. Rather than being purely subjective, these characteristics are "like smell, *bound in an interdependent relationship to our conception of the world*" (2001, 48). Naess also argues that feelings and emotions are a part of nature because they are integral parts of gestalts that frame experience. "[R]eality as spontaneously experienced," Naess explains, "binds the emotional and the rational into indivisible wholes, the gestalts" (2001, 63). Experience consists of wholes like a tall, dark, somber tree. The tree's height, darkness, and somberness are all a part of reality. In Barad's terms, different sensibilities, feelings, and emotions are aspects of the measuring apparatus

of an individual human body. Consequently, when humans intra-act with nonhumans, we enact cuts that co-constitute nonhumans with sensorial, affective, and emotional dimensions. Rice therefore is not just rice simpliciter. It is not necessarily simply a seed, staple crop, or raw material resource. Its being can also include taste, texture, the meaning of a filling meal, nostalgia, the feeling of home, and hope for the future due to its identity being an entangled relation of difference.

In comparison with biocultural diversity, the modern conception of biodiversity is not only impoverished but impoverishing. Insofar as biocultural diversity measures different forms of life—different ways that matter matters—biodiversity enacts a loss in biocultural diversity, even without the extinction of a species. Becoming worlds are reduced to one given world with a fixed set of possibilities. Historically, this account of nature corresponds to the agential cut of a white, western, capitalist culture, predominately practiced by heterosexual males with particular types of technology. Considering all matter—from micro-organisms to mammals—as inert, passive, and mechanical further reduces biocultural diversity because it neglects not only the possibility of nonhuman agency but different nonhuman agencies. The little diversity that remains is stripped away by divorcing observer and observed, disavowing nature's sensorial, affective, and emotive dimensions.

A Performative New Materialist Environmental Ethic

An environmental ethic based on performative new materialism seeks to interactively protect biocultural diversity. Human life and flourishing are dependent on biocultural diversity. In addition to being a source of material sustenance for humans, nonhumans are sources of joy. As Chris Cuomo argues, "[h]umans cannot flourish without other humans, ecosystems, and species, and nothing in a biotic community can flourish on its own" (1998, 74). Humans therefore depend on healthy ecosystems and "healthy ecosystems usually include a high number of different species

and forms of life" (Cuomo 1998, 134). Human flourishing also depends on the existence of other, different human beings. For instance, a stronger sense of objectivity and scientific progress depend on diverse humans working together to understand the world (Harding 1993; Alcoff 2008). Human flourishing is thus intimately bound up with biocultural diversity as "[l]iving-with [is] the only possible way to live-well" (Haraway 2016, 162).

Moreover, biocultural diversity can enrich human identity and agency. More than simply existing with, Haraway avers that "[w]e become-with each other or not at all" (2016, 11). Following Barad, humans are co-constituted and re-constituted by more than humans through studying objects, making and using technology, and engaging with inanimate nature, plants, and animals. That is, humans are entangled relations of difference and becoming in an open-ended, indeterminate world. The relation between humans and nonhumans, individual and environment, however, is no longer a zero-sum game such that "whatever [comes] from the outside [is] deducted from the total sum of action allotted to the agents 'inside'" (Latour 2006, 215). Latour disrupts this antagonistic understanding by describing nonhumans as "subjectifiers…because they literally lend you the shape of a psyche" (2006, 212). Nonhumans co-make humans into individuals through co-constituting their particular needs and personal desires, bodily experiences of pleasure and pain, wellbeing, what they care about, hope for, and imagine. In addition to helping articulate one's individual identity, nonhumans can increase human agency. In particular, a person's association with more-than-human others can make them more competent, increasing one's sensitivity and agential abilities. Biocultural diversity thereby enhances human flourishing by providing more qualitatively diverse entities for humans to form connections with, to become with, which can ultimately lead to richer and more robust individual lives and communities with different bodies,

sensitivities, agential abilities, and futures. Biocultural diversity thus reflects how human flourishing is an act of multi-species flourishing.

Yet, biocultural diversity is not intrinsically good. (Gunnarsson 2013; Cuomo 1998). Biocultural diversity is not a license to litter and pollute, nor does it justify introducing new technology and hybrid organisms that are harmful or oppressive to nonhumans and humans. Making a similar point, Karen Warren notes how despite ecofeminism embracing differences in general, "nothing can become part of a feminist ethic—can be part of the quilt—that promotes sexism, racism, classism, or any other 'isms' of social domination" (1990, 139). Biocultural diversity becomes an ethical value when it empowers, increasing the ability to affect and be affected. Put differently, biocultural diversity embraces differences that are life-affirming—such as the "the kinds of diversity [that] are likely to promote environmentalist and feminist agendas" (Cuomo 1998, 132). Accordingly, intra-actions, interactions, and biocultural diversity should not undermine the primary conditions necessary to continue becoming in different ways. Becoming should "sustainably" enact diversity—in a way that does not diminish qualitative diversity and future possibilities for multi-species becomings (Braidotti 2006).

Beyond the individual level, biocultural diversity describes a structural openness. Biocultural diversity will not promote mutual flourishing and becoming unless human and nonhuman differences are able to make a difference. There consequently cannot be hierarchical networks with gross inequities of power between humans and nonhumans, and more specifically between certain groups of humans and nonhumans. The problem with such networks is that while differences might technically be present, they do not have to be represented and considered. They can be disregarded, backgrounded, oppressed, subjugated, and dominated as mere intermediaries in a system constructed to satisfy (some) human interests. Thus, for biocultural diversity to enrich

and empower humans and nonhumans in different ways, it must be situated in an egalitarian network that has been "opened up, flattened down, and cut down to size" (Latour 2006, 252).

While a human-nonhuman network rich in biocultural diversity will help promote multi-species flourishing and open new, different ways of becoming, sustaining biocultural diversity depends on individual actors enacting biocultural diversity. Barad's performative new materialism thickens environmental ethics by revealing how there is more to ethically consider than simply preserving diversity through promoting, caring, or respecting the interests and needs of more than humans. Such an account assumes the world is more or less already given, rather than performatively enacted. In addition to interactive concerns about preservation, Barad contends "what is needed is…an ethics of worlding" (Barad 2006, 392). Such an ethic attends to underlying intra-actions that differentially constitute the being of more than humans, which in turn affects the meaning of wellbeing, respect, and care (Johns-Putra 2013). These intra-actions demand ethical consideration because there are many ways to engage in intra-actions and none of them are innocent. They are not innocent because they "make the world intelligible in specific ways but also foreclose other patterns of mattering" (Barad 2006, 394). As part of the world, intra-actions are laced with power relations that implode issues of gender, race, class, socioeconomics, politics, culture, international business, and geopolitics. These power relations make certain things materialize and visible in particular ways, foregrounding a specific set of interests, backgrounding others, and completely excluding others from mattering at all. Although intra-active practices are always exclusionary, not all practices are exclusionary to the same extent or in the same way.

Ethical intra-actions enact biocultural diversity by attending to the singularities and multiplicities of more than humans. That is, it is a matter of attending to others as mediators that can make unique differences in events. Accordingly, understanding others cannot simply rely on

abstract and detached analogical reasoning or transcendent metaphysics. When these methods dictate our mode of engagement and understanding, they stifle, domesticate, and erase the differences we are trying to attend to by forcing them into preconceived categories (Bergson 1998; Braidotti 2006). Our understanding must be immanently acquired through bodily interactions and intra-actions that "follow the actors themselves" through their world-making activities on the ground (Latour 2006, 61). This will require sensitive apparatuses and practices that are open to different nonhumans and their corresponding materialities, agential abilities, and causal theories. Such apparatuses and practices provide the conditions for the possibility of the observed entity to demonstrate its difference—how it mobilizes, affects, and transforms others and how it is affected, mobilized, and transformed by others, including the ways that it resists and refuses to be moved. In Rosi Braidotti's words, we must "experiment with resistance and intensity in order to find out what posthuman bodies can do" (2019, 99).

To perform biocultural diversity, humans must embody biocultural diversity. No longer vilified as the source of epistemic error, moral vice, or constraint, the human body becomes a productive site of understanding. Expressing a similar sentiment, Naess contends that a richer, more integral, and "joyful experiencing of nature is partially dependent upon conscious or unconscious development of a sensitivity for qualities" (2001, 51). However, the development of this sensitivity is not a humanist project of perfection that develops and disciplines the human body in the image of upper-class, Eurocentric, masculine, heterosexual ideals (Braidotti 2019). Given how different bodies materialize different worlds, homogenizing human bodies would enact a loss in biocultural diversity, universalizing one agential cut. Because nature is an open-ended iterative process of becoming and the human body lacks a given, fixed essence, developing this qualitative

sensitivity will require experimenting "with what we are actually capable of becoming" (Braidotti 2019, 92).

Such experiments are not solely individual nor intersubjective undertakings though. A person becomes a more bioculturally diverse body through heterogeneous practices with qualitatively diverse more than humans. These intra-actions re-materialize human bodies and subjectivities by translating them according to the sensitivities, agencies, and materialities of more than humans. These nonhumans provide supplementary souls that "literally lend you the shape of a psyche" (Latour 2007, 212). Such practices enfold biocultural diversity into humans. The resulting hybrid human body has more refined and different sensibilities and agential abilities—different ways of seeing, feeling, thinking, valuing and acting. These sensibilities and agential capabilities subsequently make us more sensitive and open measuring apparatuses, which can follow the actors themselves and attend to the singularities of nonhumans.

Such practices and bodies also perform biocultural diversity through enacting other, new nonhumans. By deferring to the other, following the actor itself, and mapping the circulation of entities around it with sensitive and open hybrid minds and bodies, we are better positioned to cross into their worlds. In doing so, "we can detect many other entities whose displacements were barely visible before" (Latour 2006, 205). Based on this different metaphysics, we can perceive and understand other, more diverse nonhumans that would not be registered by purely a human metaphysics or an isolated individual. Experimental practices thus perform biocultural diversity in that "lots of surprising *aliens* may pop up in between" the circulating entities (Latour 2006, 59).

This hybridization of the human body is simultaneously an ethical act of becoming. Instead of being an abstract, detached ethical value that humans must apply to a situation, embodying biocultural diversity makes humans more entangled with and committed to nonhumans.

Bioculturally diverse human bodies are sensorially, affectively, and emotionally connected with nonhumans. We are ontologically accountable to them. We feel the moral gravity of their singularity in our bones and our hearts. Following Thomas Birch, this entanglement produces a "deontic experience…in response to something or someone, that one *must* do something, that one is called upon to do something" (1993, 322). Being more response-able accompanies this felt responsibility. We are not only more sensitive to the other's more-than-human differences—the specificity of their needs, desires, and wellbeing—but have the agential abilities to more attentively respond to them in ways that care for nonhumans and humans in more robust and acute ways. Heterogeneous practices involving open and sensitive hybrid human bodies that treat nonhumans as mediators are thus more inclined and better able to interactively protect, and intra-actively perform, biocultural diversity. Such practices represent an ethic of worlding that helps ensure mutual flourishing in a non-ideal, non-innocent world. With this ethic in hand, we can now compare the two rice worlds.

The Moral Behind the Tale of Two Rice

As a combination of different genes and the product of an international collaboration, Golden Rice initially appears to be the epitome of biocultural diversity. Golden Rice entangles nature and culture, and as Barad asks, "isn't the undoing of the very idea of an inherent nature-culture boundary a useful tool, if not a prerequisite, for destabilizing sexism, racism, and homophobia and other social ills that are propped up by this dualism and its derivatives?" (2006, 368-369) However, the matter is not so simple. It is necessary to inquire into the nature of this biocultural diversity. Are humans and nonhumans treated as mediators? Is it a sustainable form of becoming? Which humans and nonhumans matter, in what ways, and which are excluded?

Although Golden Rice brings together genes from different sources, it assembles these genes with the sole intent of producing one desirable trait—increased beta-carotene. This human interest dominates the design behind Golden Rice, reducing a complex, biological organism to raw material—an intermediary for vitamin A. The growing, harvesting, and processing ensure Golden Rice remains a mere intermediary, reducing the life of the rice. Thus, Golden Rice is/becomes a reflection of human interests and only matters as a human resource. In this sense, Golden Rice lacks *bio*cultural diversity.

Golden Rice also lacks bio*cultural* diversity. Although Golden Rice centers human interest, there is an asymmetry in this centralization of agency. The cultural work behind agriculture is divorced from the human and nonhuman actors in the field: the local soil, crops, animals, environment, farmers, community, and culture. By reducing the nutritional properties to genetics, this neglects the agency associated with environmental interactions and management techniques (Charles 2001; McAfee 2003). Agency is relocated and distributed amongst scientists in the laboratories of land-grant, knowledge-based institutions, IRRI's controlled fields, modern technology, synthetic inputs, and agricultural companies, all laced with particular political, academic, cultural, and economic interests.

By not attending to the historical entanglement of the biological and cultural variables at the nexus of food issues, Golden Rice also does not protect biocultural diversity by offering a real solution to these issues. This specialized technological magic bullet only addresses the problem's symptoms rather than the causes of the food insecurity that precipitated the vitamin A deficiency. For instance, if international socioeconomic interventions and the productionist paradigm of monoculture agriculture eroded biocultural diversity via deforestation and the depletion of soil fertility, and if the increasing growth of cash crops for export created a nutritional deficiency, then

this is what needs to be addressed. Not only does Golden Rice not address these underlying causes, but it could also perpetuate the problem by concealing and maintaining the responsible practices by providing a temporary, topical solution. Golden Rice would thereby contribute to a loss in *bio*cultural diversity by not addressing the practices responsible for deforestation, soil infertility, and the homogenization of crops.

Furthermore, the technical challenges encountered embedding the 'golden' transgenic trait in local varieties jeopardize its potential humanitarian value as well as the work and resources invested in it. Although in development since 2001, Golden Rice has yet to be commercially released to farmers. Meanwhile, the Philippines implemented food supplements, nutritional education, and a law requiring the fortification of common ingredients with vitamin A (Stone and Glover 2017). Vitamin A deficiency has since decreased from 40.1% to 15.2% of the population between 2003 and 2008 (Food and Nutrition Research nd). Thus, "[Golden Rice] shrinks from a sure solution to a pervasive public health crisis of the developing world, to a possible dietary supplement in certain, unnamed, difficult-to-reach spots in the Philippines" (Stone and Glover 2017, 95).

Additionally, Golden Rice might decrease bio*cultural* diversity. The history of Green Revolution rice raises concerns about how agricultural colonialism can seed cultural and economic hegemony. According to Nick Cullather (2010), getting high yield varieties into the hands of farmers in developing countries was not the sole concern. Green revolution rice varieties were a means to inculcate the methods, technology, and synthetic inputs used and sold by the West into Filipino's thinking and agricultural practices. As Stone and Glover explain, the point "was not only to displace locally adapted seeds, but to transform locally embedded, cultivation and breeding practices and even local food, cultures, and rural ways of life" (2016, 93). Making a similar remark

on the gendered implications of India's recent history with biotechnology, monoculture, and the development paradigm, Vandana Shiva (2012) notes how they fail to acknowledge, and ultimately erode, women's agricultural skills and knowledge.

While there are important differences between Green Revolution rices and Golden Rice, the concern is the extent of the homogenization that would result from Golden Rice. Proponents claim that no "change of cultural practices is required" (Dubock 2014). But this begs the question: no change with respect to what? If the standard of comparison is Green Revolution rices, and Golden Rice yields depend on modern technology, agricultural practices, chemical inputs, and technology, this still imperils certain human subjectivities, values, knowledges, and cultures that are sustained through different (non-masculine, non-industrial, non-productionist) relationships with seeds, crops, technology, and the land. The reliance on imports would also further wed populations to the global market. Historically, an asymmetry of power marks this global interdependency such that the agency, subjectivities, and interests of some do not have to be seriously regarded. According to John Cobb Jr.

> The intended and actual consequence of present economic policy is that no community or nation feeds, or houses, or clothes itself. All of this is to depend on trade…They cannot live without importing the necessities of their livelihood, however unfavorable the terms of the trade may be (2012, 686).

These connections would thereby make Golden Rice farmers less able to respond, and therefore more vulnerable, to environmental, economic, and sociopolitical changes.

On the other hand, the world of Carolina Gold and Glenn Roberts welcomes and celebrates biocultural diversity. *Bio*cultural diversity is witnessed in the genetic lineage behind landraces and the genetic variations of individual plants. The different uses of Carolina Gold beyond eating the grain, such as thatch, bedding, fodder, and silage, reflect Carolina Gold's diverse agency.

*Bio*cultural diversity is also found in the practice of polyculture farming. Additionally, there is the entanglement of flavor between Carolina Gold and runner peas as well as Carolina Gold and ducks.

The world of Carolina Gold also displays bio*cultural* diversity in the fields where it is grown. Roberts uses a variety of technology to grow, harvest, and mill Carolina Gold. Furthermore, more than a human resource, Carolina Gold affects humans from farm to table on multiple sensuous levels. Farmers and locals aesthetically appreciate the fields of Carolina Gold for their stunning golden hue. In the kitchen, the nutty, earthy aroma released while cooking had Keith Pandolfi craving the rice (2016). Carolina Gold also lends itself to a variety of dishes due to its diverse genetics, uncommon starch character, versatile flavor, and ability to emulate medium and short grain rice (Slow Food Foundation for Biodiversity 2019). At the table, Carolina Gold is not solely a means of nutrition, but something to be savored as an end in itself. The subtle green tea, nutty, and floral flavor led Sean Brock to claim that it was "the most flavorful rice I have ever tasted" (Heritage 2014). Its unique starch character also gives Carolina Gold a notably pleasing, rich, and chewy texture. This rich, multi-sensuous affective experience contributes to the entanglements with this rice, creating not only a profound appreciation for it but also an identification with it.

Moreover, this is not a world where humans unilaterally impose their interests. This world treats seeds, plants, the environment, technology, and humans as mediators. Differences are not only recognized but encouraged to make a difference. The agricultural technology, methods, and practices that Roberts use to grow, harvest, and mill are adapted to Carolina Gold's idiosyncrasies. Additionally, the cooking techniques of chefs also seek to serve as supporting actors for the rice to shine and speak for itself.

In general, there is an openness and sensitivity exhibited in a democratic negotiation process that seeks to balance the interests of the crops, the ecology of the local environment, soil, the land, animals, farmers, nutrition, taste, economic needs of the community, as well as the chefs. The result is a sustainable world of multi-species flourishing. Carolina Gold's resiliency to harsh environmental conditions and changes is good for farmers. Its greater nutrition and flavor are good for consumers. The local supply chains and distribution are good for local economies. Carolina Gold also performs bio*cultural* diversity by nourishing cultural identities, providing traditional ingredients to recreate regional dishes such as hoppin' John using traditional culinary techniques. Local supply chains, as well as whole-animal approaches to cooking, are also more environmentally sustainable. In addition to the rice-crop rotation system, Anson Mills' farms grow 30 sustainable acres of Carolina Gold at Prospect Hill field on the Edisto River, one of the oldest tidal trunks and dyke rice fields in the country. This rice farm improves water quality and ultimately helps protect these environmentally threatened wetlands, which serve as a habitat for wildlife (Slowfood Foundation 2019).

Due to this openness, the world of Carolina Gold is not only "full of significant otherness, but it is also "full of kinds-in-the-making" (Haraway 2016, 12). Human actors like Roberts and Brock treat Carolina Gold as a mediator by embodying biocultural diversity. Carolina Gold has created corresponding human sensibilities and agential capabilities. It literally makes these farmers and chefs, growing on and into their beings. They have become "non-natal kin" (Haraway 2016). They think and act in relation to it, immediately seeing through the lens of the more than human world of Carolina Gold. It is in their bones, bodily dispositions, and hearts. They are sensitive and responsive to its unique characteristics, growing tendencies, and flavor profiles. This sensitivity opens the space of agency for both humans and nonhumans. The same goes for the world of rice

off the farm. While an homage to the region's culinary and agricultural heritage, these dishes are sites of open becoming insofar as chefs offer creative re-interpretations of these dishes. Thus, Carolina Gold both interactively protects and intra-actively performs biocultural diversity.

The world of Carolina Gold is not without problems, though. In addition to a past marred by slavery, the celebration of Carolina Gold risks decreasing biocultural diversity. Due to their notoriety, Roberts and Brock, both elite white males, disproportionally determine what tastes good and what is authentic, traditional Southern ingredients, food, and cooking in the public imaginary (Jones 2017). Rather than being purely objective, biological, or historical, "taste and heritage are embedded in contemporary meaning-making and value-adding processes that serve particular economic and cultural ends" (Jones 2017, 219). For instance, the culinary judgements of Roberts and Brock are influenced by their personal histories, which subsequently produces selective views of the Antebellum South and tasty Southern cuisine. Thus, while there is a more symmetrical relationship between humans and nonhumans, this is only between some humans, which perform a particular world. Moreover, the heritage and extraordinary flavor increase Carolina Gold's price. Consequently, "consuming delicious Lowcountry heritage increasingly becomes a niche opportunity for the affluent and ostensibly enlightened" (Jones 2017, 232). Underscoring the injustice, Michael Twitty writes, "[o]ur story has been used to raise the price point of many menus so much so that the descendants of the enslaved cannot afford to enjoy and appreciate the very edible heritage that was nourished by their Ancestor's skills, knowledge, and blood" (cited in Cadigan 2019).

If the world of Carolina Gold is going to provide an egalitarian, bioculturally diverse vision of the future of rice, it is necessary to reckon with this crop's history and current inequities. To learn to "live and die well with each other in a thick present," Haraway writes that we must "make

trouble, to stir up potent response to devastating events, as well as to settle troubled waters and rebuild quiet places (2016, 1). Carolina Gold cannot dismiss the history of slavery because this would be another way of "placing slaves and Africa in the background of rice history," and more generally, erasing the pivotal impact of enslaved people had on America's economy, culture, and agriculture. (Carney 2001, 149). Staying with the trouble of this non-innocent crop entails recognizing and centering the historical agency of enslaved people in Carolina Gold's world. Celebrating Carolina Gold Rice must be framed as an affirmation of the expertise and creativity of former and current black lives, which contributed and continue to contribute to the rice's biocultural diversity, agro-ecology, and Southern culinary culture.

Insofar as critiques begin and end with white, heterosexual, males at the center, they risk repeating the mistakes of past. Accordingly, staying with the trouble involves appreciating the thickness of the present in terms of Carolina Gold's current bio*cultural* diversity. Black chefs like Food Network star Kardea Brown, Benjamin "BJ" Dennis IV, and Mashama Bailey of The Grey restaurant in Savannah, Georgia, are also part of the worlding of Carolina Gold and Southern cuisine. Attending to these actors opens the space of agency, revealing a different Southern world of rice with different more than human actors, ways of life, and relations to food. For instance, Dennis is a chef who "could not only acknowledge the Gullah Geechee origins of his dishes but also make those origins—and their present-day implications—his focus" (Cadigan 2019). Dennis' worlding goes from urban hubs like Charleston to the Sea Islands of South Carolina and Georgia and then back to Savannah and Brunswick, Georgia. The Sea Islands are home to Gullah Geechee communities, which were originally formed by descendants of West African enslaved people who labored on antebellum rice plantations. Dennis' world of Carolina Gold includes roadside restaurants, home kitchens, family farms like Jackie Frazier's Barefoot Farms, African American

cultural institutions like Penn Center, the Taste of Gullah festival held at the historically black Harrington School Cultural Center, and Bill Green's restaurant Gullah Grub, which doubles as a training center that teaches local middle schoolers how to cook rice, fish, and grow vegetables (Cadigan 2019). Through his networking and seed sharing, "Dennis is able not only to anchor a people to their past, but bring back the kind of self-sufficiency that's always existed in this community. It's a small and simple act, but it's also a revolution" (Cadigan 2019). By centering and empowering these human actors, the world of Carolina Gold becomes more bioculturally diverse.

In summary, this chapter developed a performative account of biocultural diversity as an ethical metric to compare the worlds of Carolina Gold and Golden Rice. Such a metric is not interested in a logic of purity that presents a gold standard to determine which rice is the fool's gold (Deleuze 1990; Lugones 1994). Instead, biocultural diversity reflects the human-nonhuman entanglements that result from specific, contingent intra-active practices of engagement. As an ethical metric, biocultural diversity attends to which agential cuts and entanglements produce open hybrid humans with the sensibilities and response-abilities that sustain open-ended becoming and multi-species flourishing. Although this comparison was not exhaustive of the on-the-ground realities of each rice world, biocultural diversity ultimately provides an ethical metric to assess which visions and tales of rice are better and more wholesome. Beyond these rice worlds, this ethical account intimates a way forward. One which moves away from worlds that exclude or privilege either nature or culture, creating networks of exploitation, dominations, and oppression, and towards becoming worlds of multi-species flourishing, in which matter matters and differences matter.

References

Alcoff, Linda. 2008. How is epistemology political? In *The feminist philosophy reader*, eds. Allision Bailey and Chris Cuomo. McGraw-Hill, 705-717.

Baker, Lauren. 2013. *Corn meets maize: Food movements and markets in Mexico*. Rowman and Littlefield.

Barad, Karen. 2007. *Meeting the universe halfway: Quantum physics and the entanglement of matter and meanin*g. Durham: Duke University Press Books.

Bergson, Henri. 1998. *Creative evolution*. Dover.

Birch, Thomas. 1993. Moral considerability and universal consideration. *Environmental Ethics*. 15(4), 313-332.

Braidotti, Rosi. 2006. *Transpositions: On nomadic ethics*. Polity

Braidotti, Rosi. 2019. *The posthuman*. Cambridge: Polity Press.

Brock, Sean. 2014. *Heritage.* Artisan Books.

Brooks, Sally. 2013. "Biofortification: lessons from the Golden Rice project." *Food Chain* 3(1-2), 77-88.

Cadigan, Hilary. 2019. People say Gullah Geechee culture is disappearing. BJ Dennis says they're wrong. *Bon Appétit*. www.bonappetit.com/story/bj-dennis-gullah-geechee.

Carney, Judith. 2001. *Black rice: The African origins of rice cultivation in the Americas*. Cambridge: Harvard University Press.

Charles, Dan. 2001. *Lords of the harvest: biotech, big money, and the future of food*. Cambridge: Perseus.

Cobb Jr., John. 2016. Toward a just and sustainable economic order. In *Environmental ethics: readings in theory and application*, eds. Louis P. Pojman and Paul Pojman, 6th ed. Boston: Cengage Learning.

Cullather, Nick. 2010. *The hungry world: America's cold war battle against poverty in Asia*. Cambridge: Harvard University Press.

Cuomo, Chris. 1998. *Feminism and ecological communities: An ethic of flourishing*. Routledge.

Dawe, David, R. Robertson, and Laurian Unnevehr. 2002. Golden rice: what role could it play in alleviation of vitamin A deficiency? *Food Policy* 27(5-6), 541-560.

Deleuze, Gilles. 1990. The simulacrum and ancient philosophy. In *The Logic of Sense*, ed. Constantin Boundas, trans. by Mark Lester and Charles Stivale, 253-265. Columbia University Press.

Dubock, Adrian. 2014. The politics of Golden Rice. *GM Crops & Food* 5(3), 210-222.

Food and Agricultural Organization (FAO) of the United Nations policy brief issue 2 June 2006.

Food and Nutritional Research Institute. nd. Seventh national nutrition survey 2008-2009. Department of Science and Technology (Philippines).

Gamble, Christopher, Joshua Hanan and Thomas Nail. 2019. What is new materialism? *Angelaki*, 24(6), 111-134.

Gunnarsson, Lena. 2013. The naturalistic turn in feminist theory: A Marxist-realist contribution. *Feminist Theory* 14(1), 3-19.

Hansen, Michael. Golden Rice Myths. *GMWatch Home*. http://gmwatch.org/index.php/news/archive/2013/15023-golden-ricemyths.

Haraway, Donna. 1991. *Simians, cyborgs, and women: The reinvention of nature*. Free Association Books.

Haraway, Donna.1997. *Modest−Witness@Second−Millennium.FemaleMan−Meets−OncoMouse:Modest−Witness@Second−Millennium.FemaleMan−Meets−OncoMouse: Feminism and Technoscience*. New York: Routledge.

Haraway, Donna. 2016. *Staying with the Trouble: Making Kin in the Chthulucen*e. Durham and London: Duke University Press.

Harding, Sandra. 1993. Rethinking standpoint epistemology: What is Strong Objectivity. In *Feminist epistemologies*, eds. Linda Alcoff and Elizabeth Potter, 49-82. Routledge.

Harwood, Jonathon. 2015. Global visions vs. local complexity: Experts wrestle with the problem of development. In *Rice: Global networks and new histories*, eds. Francesca Bray, Peter Coclanis, Edda Fields-Black, and Dagmar, Schafer. Cambridge University Press.

Haskell, Marjorie. 2012. The challenge to reach nutritional adequacy for vitamin A: β-carotene bioavailability and conversion—evidence in humans. *The American Journal of Clinical Nutrition* 96(5), 1193S-1203S.

IPCC. 2019: Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems [P.R. Shukla, J. Skea, E. Calvo Buendia,

V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press.

IPCC. 2020. Summary for Policymakers — Special Report on Climate Change and Land. IPCC — Intergovernmental Panel on Climate Change. Accessed July 13, 2020. https://www.ipcc.ch/srccl/chapter/summary-for-policymakers/.

Johns-Putra, Adeline. 2013. "Environmental Care Ethics." *symplokē*, 21(1-2).

Jones, Bradley. 2013. Producing heritage: Politics, patrimony, and palatability in the reinvention of Lowcountry cuisine. *Food, Culture & Society* 20(2), 217-236.

Kimmerer, Robin Wall. 2013. *Braiding Sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants*. Milkweed Editions.

Latour, Bruno. 1993. *We have never been modern*. Harvard University Press.

Latour, Bruno. 2007. *Reassembling the social: An introduction to actor-network theory*. New York: Oxford University Press.

Lugones, Maria. 1994. Purity, Impurity, and Separation. *Signs: Journal of Women in Culture and Society*, 19(2), 458-479.

McAfee, Kathleen. 2003. Neoliberalism on the molecular scale. Economic and genetic reductionism in biotechnology battles. *Geoforum*, 34(2), 203-219.

Moghissi, A Alan., Shiqian Pei, and Yinzuo Liu. 2016. Golden rice: scientific, regulatory and public information processes of a genetically modified organism. *Critical Reviews in Biotechnology*. 36(3),1-7.

Naess, Arne. 2001. *Ecology, community and lifestyle: Outline of an ecosophy*. Cambridge: Cambridge University Press.

Nestle, Marion. 2001. Genetically engineered "Golden" Rice unlikely to overcome vitamin A deficiency. *Journal of the American Dietetic Association* 101(3), 289-290.

Pandolfi, Keith. 2016.The story of Carolina Gold, the best rice you've never tasted. *Serious Eats: The Destination for Delicious* | Serious Eats, 26. www.seriouseats.com/2016/05/carolina-gold-heirloom-rice-anson-mills.html.

Pénicaud, Caroline, Nawel Achir, Claudie Dhuique-Mayer, Manuel Dornier, and Philippe Bohuon. 2011. Degradation of β-carotene during fruit and vegetable processing or storage: reaction mechanisms and kinetic aspects: a review. *Fruits* 66(6), 417-440.

Plumwood, Val. 1993. *Feminism and the Mastery of Nature*. London: Routledge.

Rauch, Jonathan. 2018. Will Frankenfood Save the Planet? *The Atlantic*. Last modified April 29. https://www.theatlantic.com/magazine/archive/2003/10/will-frankenfood-save-the-planet/302806/.

Richards, Paul. 1997. Toward an African Green Revolution? An anthropology of rice research in Sierra Leone. In *The ecology of practice: studies of food crop production in sub-Saharan West Africa*, ed. A.E. Nyerges, 201–252. Amsterdam: Gordon and Breach.

Sandler, Ronald. 2005. A virtue ethics perspective on genetically modified crops. In *Environmental virtue ethics*, eds. Philip Cafaro and Ronald Sandler, 215-232. Rowman & Littlefield Publishers.

Schulze, Richard. 2005. *Carolina gold rice: The ebb and flow of history of a Lowcountry cash crop*. Charleston, SC: The History Press.

Shiva, Vandana. 2012. Women's Indigenous knowledge and biodiversity. In *Environmental Ethics: Readings in Theory and Application*, eds. Louis Pojman and Paul Pojman, 6th ed. Boston: Cengage Learning.

Slow Food Foundation for Biodiversity. 2019. Carolina Gold Rice: Ark of Taste. www.fondazioneslowfood.com/en/ark-of-taste-slow-food/carolina-gold-rice/#:~:text=Brown%20Carolina%20Gold%20Rice%20is,has%20a%20beautiful%20chewy%20texture).

Stone, Glenn, and Dominic Glover. 2016. Disembedding grain: Golden Rice, the Green Revolution, and heirloom seeds in the Philippines. *Agriculture and Human Values* 34(1), 87-102.

Tang, Guangwen, Yuming Hu, Shi-an Yin, Yin Wang, Gerard E. Dallal, Michael A. Grusak, and Robert M. Russell. 2012. β-Carotene in Golden Rice is as good as β-carotene in oil at providing vitamin A to children. *The American Journal of Clinical Nutrition*. 96(3), 658-664.

Tibbetts, John. 2006, African roots, Carolina gold. *Coastal Heritage* 21(1).

Twitty, Michael.1990. Afroculinaria. afroculinaria.com/.

Warren, Karen. 1990. The power and the promise of ecological feminism. *Environmental Ethics*, 12(2), 125-146.

Whatmore, Sarah. 2002. *Hybrid geographies: Natures cultures spaces*. London: Sage.

Whitehead, Alfred. 1964. *The concept of nature*. Cambridge University Press.

CHAPTER 3

Against Anthropocentric Epistemologies and the Possibility of Nonhuman Epistemic Injustices

The epistemic side of colonialism is the devastating effect of the "disappearing" of knowing, where local or provincial knowledge is dismissed due to privileging alternative, often Western, epistemic practices.

---Kristie Dotson

I want to engage in a carrier-bag practice of storytelling…putting unexpected partners and irreducible details into a frayed, porous carrier bag. Encouraging halting conversations, the encounter transmutes and reconstitutes all the partners and all the details. The stories do not have beginnings or ends; they have continuations, interruptions, and reformulations—just the kind of survivable stories we could use these days.

---Donna Haraway

Experimenting with thinking is what we all need to learn.

---Rosi Braidotti

Climate change and the sixth mass extinction are not merely technical problems, but are symptoms of a more fundamental, existential problem. This problem is historically entangled with a dualistic relationship between humans and nonhumans that posits the former as intelligent, active, historical, and meaningful and the latter as unintelligent, passive, immutable, and meaningless (Plumwood 2003; Warren 1990). This paper addresses one root of this problem through the development of a more "capacious epistemology" that brings together social epistemology, Karen Barad's agential realism, and environmental philosophy (Alaimo 2008). Feminist social epistemologists first enlarged epistemology by replacing an abstract, self-sufficient epistemic agent with situated, interdependent epistemic agents (Grasswick 2004). However, social epistemology remains "not social *enough*" insofar as it largely neglects nonhumans (Pohlhaus 2012, 716). This paper helps correct this anthropocentricism by arguing that it is possible to commit epistemic injustices against nonhumans. The concept of "nonhuman epistemic injustices"

seeks to expand the vocabulary of accountability and track the on-the-ground ways that members of marginalized and oppressed groups of nonhumans are silenced. Developing upon Barad's ontology of knowing, this paper presents a more capacious epistemology that challenges anthropocentric epistemologies that make propositional language a necessary condition for knowledge. This critique seeks to reveal the tacit, embodied knowledge of nonhumans as well as their active engagement in epistemic practices. Such a recognition of nonhumans raises ethical and epistemic concerns about the disappearance of knowing that transpires with the dismissal of individual nonhuman animal knowledge, the differences in knowledge and epistemic practices between different species, and the loss of nonhuman knowledges caused by anthropogenic species extinction.

This paper expands social epistemology in three ways. First, I argue that Miranda Fricker's concept of testimonial injustice can be committed against nonhuman animals. This argument lays the theoretical ground for reconceptualizing animals, matter, and embodiment. Weaving together Barad's agential realism, Michael Polanyi's tacit knowledge, and Aldo Leopold's environmental reflections, I argue that nonhuman animals are not only active knowers, but also givers of knowledge, albeit not in the conventional sense. I contend that nonhumans can be victims of testimonial injustice because nonhumans are subject to negative identity prejudices that deflate their epistemic competence. Second, bringing together the work of Vinciane Despret and Kristie Dotson, I argue that it is possible to commit a transcendental form of testimonial smothering in which oppressive human-nonhuman intra-actions truncate nonhuman agential abilities such as language use. Finally, drawing on the work of Barad and Jacob von Uexküll, I argue that it is possible to commit a fourth-order epistemic exclusion based on *inter*species differences between humans and nonhuman animals.

The Animal Becomes a Question: The Self-Imposed Lacuna within Social Epistemology

Whether testimonial injustice, testimonial smothering, and epistemic exclusion can be committed against nonhumans is not obvious due to the historical conception of nonhumans/objects and how these epistemic injustices are articulated. Attempting to make good on Loraine Code's critique of traditional epistemology's model of knowing (1993), Vrinda Dalmiya describes how

> Code speaks to the political bias underlying this traditional choice and argues that if instances of knowing selves rather than knowing objects had been exemplars of knowing, then the contours of epistemological theory would have been very different from what they are now" (2001, 221).

While starting with subject-subject interactions may have changed the contours of epistemology, for analogous reasons, starting with subject-object interactions can also change the contours of epistemology once objects are divorced from the homogenous category of inert, asocial, passive, unintelligent beings. For instance, Donna Haraway argues for an alternative epistemology that begins with subject-object interactions, but one in which "the object of knowledge [is] pictured as an actor and agent, not a screen or ground or a resource, never finally as a slave to the master that closes off the dialectic in his unique agency and authorship of 'objective knowledge'" (1991, 199).

Furthermore, the current philosophical articulation of epistemic injustices obscures and seemingly forecloses the consideration of nonhumans. For example, Dotson states that epistemic violence involves the refusal of an "audience to communicatively reciprocate a *linguistic* exchange, owing to pernicious ignorance. Pernicious ignorance should be understood to refer to any reliable ignorance that, in a given context, harms another *person* (or set of persons)" (2011 238; italics added). Insofar as nonhumans do not participate in (propositional) linguistic exchanges and nonhumans are not considered persons, they apparently cannot be subject to epistemic violence. Dotson also states

> Epistemic oppression refers to persistent epistemic exclusion that hinders one's *contribution to knowledge production*. Epistemic exclusion, here, will be understood as an unwarranted infringement on the *epistemic agency of knowers*. Epistemic agency, in this analysis, refers to the ability to utilize persuasively shared epistemic resources within a given community of knowers in order to participate in knowledge production (2014, 115 italics added).

From the assumption that they are not knowers nor epistemic agents, and cannot contribute to knowledge production, it follows that nonhuman animals cannot be epistemically oppressed—by definition. Gaile Pohlhaus' language also obstructs making the connection between social epistemology and environmental ethics. In addition to claiming that "[k]nowing requires resources of the mind, such as language," Pohlhaus specifically presents language, concepts, and criteria as instances of epistemic resources (2012, 718). Without language, nonhuman animals thus cannot be knowers. Finally, Fricker initially describes testimonial injustice as resulting in a "deflated level of credibility [given] to a speaker's *word*" (2007, 1; italics added). Testimonial injustice would therefore not apply to nonhumans because they are not speakers of words.

In contrast, Paul-Mikhail Podosky's concept of other-oriented hermeneutic injustice expands the scope of social epistemology to include nonhuman animals. According to Fricker, hermeneutic injustice occurs because of "structural identity prejudices in the collective hermeneutic resource" (Fricker 2007, 155). Due to these structural identity prejudices, a speaker lacks the concepts to understand and communicate their experiences with others. Their social experiences are consequently "obscured from collective understanding" (Fricker 2007, 155). As Dotson explains it, a history of unwarranted credibility deficits against a marginalized portion of the population produces a dominant shared language that only reflects their experiences (2014, 127). For instance, in Fricker's example of Carmita Wood, who endured sexually inappropriate and aggressive behavior from her male coworkers, Wood described her reasons for leaving as

"personal" because the dominant shared language at the time lacked the concept of sexual harassment.

Rather than focusing on the speaker, Podosky's other-oriented version focuses on the listener. Other-oriented hermeneutic injustice articulates how structural identity prejudices in the conceptual framework can prevent the listener from understanding the speaker's experience and oppression. Regarding nonhuman animals, Podosky contends that they "have their experiences obscured from collective understanding because the schemas responsible for our understanding of nonhuman animals objectify them in a way that makes it difficult, if not impossible, for us to comprehend the basic oppression they are subject to" (2018, 224). Thus, other-oriented hermeneutical injustice can be committed against nonhuman animals.

While Podosky's argument is an important step forward, it is beset by dualistic and anthropocentric premises. The dualism between active human and passive nonhuman seems to be implicit in his claim that "[n]onhuman animals do not have social power; they cannot impose functions, they cannot change norms, and they cannot converse to sway the minds of those who wish to eat them" (2018, 225). Additionally, Podosky's account of nonhuman hermeneutic *justice* is arguably anthropocentric because of its exclusive linguistic basis. Podosky claims that the moral properties of nonhumans are obscured by the oppression of language itself. The oppression of language refers to the unnecessary lack of linguistic expressive capacity—the lack of concepts—that would allow one to accurately track and render intelligible the many forms of oppression. Consequently, he contends that recognizing the moral dignity of nonhumans "can *only* be appropriately realized through language" (2018, 227; italics added). Liberating animals by overcoming hermeneutic oppression therefore requires the liberation of words so that they can

fully reach their "expressive capacity, and…track truthfully the oppression of everyone" (2018, 226).

Due to this language-centrism, Podosky's account of nonhuman hermeneutical justice could itself perpetuate epistemic injustice against humans and nonhumans. While *particular* conceptual schemas can be oppressive, assuming that language is the *only* way to know, and therefore the only solution, is itself oppressive and hegemonic. More specifically, Podosky's language-centric solution represses other modes of *human* knowing through affective, bodily and emotional engagements with nonhuman animals. In Alexis Shotwell's words, "focusing on propositional knowledge as though it is the only form of knowing worth considering is itself a form of epistemic injustice" because it neglects embodied epistemic resources (2017, 79). Podosky also neglects how embodied, tacit knowledge is the basis of explicit knowledge for humans (Polanyi 1962). Like a totalizing, foundational discourse, Podosky's solution could serve as a "mechanism of *de facto* repression of at least some of the experiential dimensions of the situation" (Cheney 1989, 120). By discounting the affective experiential dimensions of embodied relations with nonhumans, Podosky neglects human epistemic resources for crafting a more just world, which we both desire.

Overlooking the more-than-linguistic aspects of human knowledge can also lead to overlooking the tacit, embodied knowledge of nonhumans. As Mihaly Héder and Daniel Paksi note, "[s]cience education forces us to ignore our tacit and personal knowledge and commitments in an effort to be more objective, more exact...This leads to questioning the existential knowledge of animals and its continuity with our own tacit and explicit knowledge" (2018, 63). Similar to science education, language-centric epistemologies fail to acknowledge nonhumans as knowers because they do not recognize embodied, tacit forms of knowledge. That is, human epistemic

injustice can beget nonhuman epistemic injustice. The shortcomings with Podosky's account reveal how merely applying concepts from social epistemology is insufficient. The dualistic and anthropocentric assumptions within social epistemology must also be jettisoned. Accordingly, I ground my account of nonhuman testimonial injustice in the onto-epistemology of Barad's agential realism.

Nonhuman Testimonial Injustice

Despite being aware of Miranda Fricker's account of testimonial injustice, Podosky does not consider the possibility that testimonial injustice can be committed against nonhuman animals. Testimonial injustice stems from the negative identity prejudice of a listener. The prejudice distorts their perception of the speaker, ultimately deflating the speaker's credibility and epistemic competencies. Due to this deflation, the listener fails to believe the speaker's testimony. While the primary harm of epistemic injustice is that the "subject is wronged in her capacity as a knower," the specific harm associated with testimonial injustice is that the "subject is wronged in her capacity as a giver of knowledge" (Fricker 2007, 44). Accordingly, the case for nonhuman testimonial injustice depends on demonstrating the following: 1) nonhuman animals are knowers; 2) they can convey this knowledge to humans; and 3) humans hold negative identity prejudices about nonhumans animals.

My case for nonhuman testimonial injustice follows from Barad's agential realism. Agential realism makes room for nonhumans as onto-epistemic agents by challenging representationalism. According to Barad (2008), representationalism posits a world in which things exist prior to their representation and are independent of the practices of representation. Representationalism advances an epistemic project concerned with whether ideas accurately represent reality. Such a project positions humans as outside observers of the world.

Words/epistemology and things/ontology are therefore independent. Moreover, things are considered to exist independently from other things. Each thing has inherently determinate boundaries and properties. Representationalism thereby presents an atomistic and dualistic conception of the world.

"The point of challenging traditional epistemologies," according to Barad, "is not merely to welcome females, slaves, children, animals, and other dispossessed Others (exiled from the land of knowers by Aristotle more than two millennia ago) into the fold of knowers but to better account for the ontology of knowing" (2008, 378). Barad's ontology of knowing is an onto-epistemology that studies the practices of knowing in being. This onto-epistemology reveals how matter matters, and therefore how the body matters for knowledge practices. Rather than knowledge being premised on the distance between subjects and objects that exist *in* the world, Barad's onto-epistemology contends that "we know because 'we' are *of* the world" (2008, 147). Being of the world rejects the atomism (and dualism) between humans and nonhumans with inherent properties because it entails that humans are iteratively co-constituted by the world through their involvement with more than humans. This co-constitution includes everything from ideas to the atoms that make up the human body. As Barad puts it, nonhumans are "not just in one's skin, but in one's bones, in one's belly, in one's heart, in one's nucleus, in one's past and future" (2007, 393). Insofar as the human body is the condition for the possibility of thought, and the body is differentially constituted by more than human bodies, human knowledge practices depend on materiality (Grosz 1993).

The significance of materiality for epistemology goes beyond how it physically shapes the human body. Developing on the work of quantum physicist Niels Bohr, Barad challenges the assumption that words and things are absolutely separate domains. For Bohr, there is always an

entanglement of matter and meaning. Concepts are always embodied—they are "*specific physical arrangements"* (Barad 2008, 132). For instance, the meaning of the concept of "position" derives from a specific material apparatus, namely a rigid ruler fixed to a table. This is not merely an epistemic point. Unlike Heisenberg who believed that prior to a measurement a particle had a pre-existing determinate position and momentum, which we simply do not know, Bohr maintains that prior to the measurement, the particle is in a state of ontological indeterminacy. The measurement with the ruler is an *intra-action* that enacts a local resolution—an agential cut—that effects a separation between observer and observed. The intra-action constitutes the particle's boundaries, properties, and meaning—thereby making its position determinate.[6]

This agential cut, however, does not result in the observer and the observed being absolutely exterior and independent. The measurement ontologically entangles the two. The measured object enfolds the measuring apparatus as the latter marks the measured object. Consequently, in addition to the meaning of 'position', the atom itself also "includes the apparatus that helps constitute it (Barad 2007, 472). Finally, beyond their positive, constitutive role, material bodies matter because they enact material exclusions. The rigid apparatus with fixed parts that is required to measure position simultaneously excludes the measurement of momentum, which would require an apparatus with movable parts. Barad's ontology of knowing thus reveals how "practices/doing/actions" of material apparatuses are not only constitutive of reality, but also are the basis of knowledge production (Barad 2008, 122).

More than equipment in a scientific laboratory, apparatuses include the practices of human and nonhuman bodies. By studying knowing in relation to the specific materiality of measuring apparatuses, Barad's agential realism provides a non-anthropocentric, corporeal epistemology. As

[6] Hence, Barad's interest in the ontology of knowing.

they explain, "practices of knowing cannot be fully claimed as human practices, not simply because we use nonhuman elements in our practices, but because knowing is a matter of part of the world making itself intelligible to another part" (2008, 147). That is, human epistemic practices represent only one form of knowing—one instance of the world making itself intelligible to another part. For Barad, there is more-than-human knowledge because knowing does not require cognizing minds. Barad's onto-epistemology thus makes room for nonhumans to be knowers qua onto-epistemic agents.

It is possible for nonhumans to acquire knowledge because the world is an ongoing process of open-ended becoming. In their words, "possibilities do not sit still...new possibilities open up as others that might have been possible are now excluded" (Barad 2007, 234). More specifically, materiality is not determined by pregiven, fixed, and self-contained essences. The boundaries, properties, and meaning of individual bodies are not inherent. Nonhumans are always open to the world because they are part *of* the world, which means that nonhumans change the world and are changed by it. Through their iterative, open-ended intra-actions with others, nonhumans become entangled with—being differentially (re)constituted in relation to—these particular others. Like subjects, Barad maintains that nonhumans "are permeated through and through with their entangled kin" (Barad 2007, 393). An organism's specific engagement with the world stays with it by re-materializing it in a particular way. This differential re-materialization re-constitutes the very being of an organism, including its agential abilities, thereby opening some possibilities while excluding others in terms of how the organism can be affected and how it can respond.

Barad's example of the brittlestar helps show how nonhumans are knowers qua onto-epistemic agents. Brittlestars are brainless and eyeless echinoderms, which are relatives of starfishes. A brittlestar has ten thousand spherical calcite crystals on its five limbs and central

body. These crystals function as tiny lenses that focus light onto nerve bundles. Together these create a complex optical system like the compound eye of an insect. Despite not having eyes, "they *are* eyes…its very being *is* a visualizing apparatus. The brittlestar is a living, breathing, metamorphosing optical system" (Barad 2007, 374). The brittlestar's bodily practices are boundary drawing practices that enact an agential cut that performatively differentiates the brittlestar (subject) from its environment (object), and further differentiates its environment into parts (objects), with respect to the brittlestar. These bodily practices thereby make the world intelligible to the brittlestar. They allow the brittlestar to make sense of, discern, and recognize (without a brain and ideas) the parts of its environment, which in turn enable it to detect shadows, flee predators, track food, find hiding places, and navigate around obstacles in its environment. Given that these are matters of life and death, brittlestars are concerned epistemic agents with an interest in knowing and acting in the right way. Accordingly, the brittlestar's diffractive visual system and bodily practices must maintain a level of visual acuity to successfully perform these tasks.

Thus, for Barad, knowing is a direct material engagement with the world. This engagement involves a differential responsiveness. However, the contention that knowing is a matter of differential responsiveness does not mean that the brittlestar simply responds differently to external parts of its environment. It is also does not simply refer to the brittlestar revealing and singling out *preexisting* parts of its environment. Differential responsiveness makes a difference both to it and the world. The brittlestar is an active participant in the world's becoming. The brittlestar enacts the world. Similar to the ontological resolution enacted by the rigid and fixed ruler, the brittlestar's body is an apparatus that materializes the world, allowing certain things to matter, while excluding others from mattering. Consequently, the environment is performatively constituted in relation to the brittlestar. These practices are performative in that they contribute to

the world's differential becoming. What is disclosed is not given and simply revealed, but an effect of the brittlestar's practices.

For these reasons, Barad argues that brittlestars, like inanimate measuring devices, are discursive entities. Following Foucault's use of 'discursive', Barad is not asserting that nonhumans can make linguistic statements, but that they co-define what can count as meaningful. They do not merely describe the world. They ontologically co-generate meaningful worlds through their bodily practices. Nonhumans are thus knowers in that they actively engage in material-discursive practices that co-constitute the world in the process of making sense of it. The brittlestar are thus an example of how "being and knowing, materiality and intelligibility, substance and form, entail one another" (Barad 2007, 375).

Likewise, the brittlestar is differentially constituted by its environment. As Barad puts it, the brittlestar is "constantly changing its geometry and its topology—autonomizing and regenerating its optics in an ongoing reworking of its bodily boundaries" (2007, 375). In addition to changing its position by moving around, the brittlestar actively reworks its body. It can change coloration based on whether its day or night, break off an endangered arm to distract a predator, and regrow that limb. The brittlestar's knowledge of the world is thus embodied. Similar to how brittlestars do not have eyes but are eyes, brittlestars do not have knowledge, their body is a crystallization of knowledge. Their knowledge is dynamically entangled with the configuration of their body's materiality, which is itself entangled with the changing materiality of the bodies that populate their world.

This ongoing process of re-materialization is a type of learning. The organism's engagement with the environment inscribes it with a material meaning—with knowledge. Despite lacking a brain, even a brittlestar can learn because "[b]rain cells are not the only ones that hold

memories, respond to stimuli, or think thoughts" (Barad 2007, 239). Other systems of cells and the body itself can hold memories as well. The historiality of specific intra-active engagements with the environment is "written into their materialization, their bodily materiality holds the memories of the traces of its enfoldings" (Barad 2007, 383). This re-materialization engenders particular internal metrics that serve as conditions that co-produce a specific meaningful world. As Rosi Braidotti explains, living matter is intelligent because "it is driven by its informational codes, which both deploy their own bars of information" (2013, 60). The organism's body, in other words, is a measuring apparatus. It is a metric that provides a contingent structure for its sense-making practices, and ultimately, its knowledge of the world.

Polanyi's work on tacit and embodied knowledge (1962) helps elucidate how nonhuman animals are active, individual knowers. Eschewing the view that beliefs necessarily must take the form of propositions that are explicitly represented through language, Polanyi maintains that nonhuman animals have beliefs in the world in the form of existential commitments. Nonhumans believe that there is a world, and this world is a particular way. In order to survive animals must successfully navigate the world, which depends on an accurate understanding of the world, knowing the difference between what is nourishing and what is dangerous, and tracking the truth amidst different and changing situations. That is, they need to form true beliefs. Commenting on Polanyi's work on nonhuman tacit knowledge, Héder and Paksi note how "[t]rue knowledge is an achievement of a living being's heuristic action to adapt, to stay alive, to be successful. By true knowledge a living being can create a contact with reality for its benefit. A fish has true knowledge when it can successfully differentiate between a prey and a bait" (2018, 60). The material openness and intelligence of nonhumans is thus expressed in how nonhumans can adapt in original ways, engaging in meaningful heuristic efforts to not only solve problems, discerning between prey and

a bait, but also recognize problems (Polanyi 1962, 120). If this knowledge is not completely given, but an individual achievement, then nonhumans should be considered as active epistemic inquirers.

Making a case for the antecedent of this conditional, the tacit knowledge of nonhumans is written into the different modes of their materiality. This materialized knowledge can be inherited or acquired. DNA and instincts represent inherited forms of tacit knowledge. Such knowledge does not reduce nonhumans to machines determined by genetics though. As Héder and Paksi explain, "during its ontogenesis, the animal has to make heuristic efforts to develop its genetic heritage into real skills" (2018, 61). Nonhuman tacit knowledge can also be acquired through the individual development of particular bodily and behavioral dispositions. This knowledge is specific to the individual organism insofar as it is the result of its particular history of engagements with its world. Consequently, for Polanyi, an organism is a "technical achievement, and is therefore—like the practice of technology—an applied knowledge of nature" (1962, 403- 404). That is, this knowledge of a nonhuman animal is not completely given in advance, but an individual achievement.

Despret's analysis of the mirror test with magpies provides further evidence that nonhuman knowledge and capabilities can be individual achievements. The mirror test is a test of self-consciousness—that is, whether (human or nonhuman) animals have a concept of self. In the test, a sticker is placed on the animal's forehead. If the animal searches their own foreheads for it, for instance in the attempt to remove it, scientist infer that the animal recognizes that the reflection in the mirror corresponds to their image. Among the magpies tested, only some of them passed the test and tried to take the sticker off. For Despret, the interesting aspect of the experiment is that some magpies failed the test. These failures show that "[t]he dispositive does not *determine* the behavior that is acquired; rather, it creates the occasion for it…the dispositive is a necessary but

not sufficient condition" (Despret 2016, 101-103). In other words, the failure of some magpies showed that the self-consciousness of the successful magpies was a genuine individual achievement, and not an artificial product caused by the researchers, nor a direct consequence of the genetic/biological nature of magpies in general. Some magpies acquired—learned—a sense of self. Given that the knowledge of nonhuman animals is an individual achievement, it is thus appropriate to consider nonhuman animals as active epistemic agents.

Ultimately, inherited and acquired tacit knowledge show how nonhumans are subjects of knowledge, despite this knowledge not being linguistically articulable. Although there is not a correspondence between a proposition and reality with tacit knowledge, the adequacy of the achieved contact between nonhumans and the world is itself a corporeal correspondence. This achieved contact is a product of nonhumans adapting to the environment, transforming and attuning their bodies and practices in order to successfully navigate the environment. This bodily knowledge resembles accounts of explicit knowledge in that it "open[s] up a meaningful realm of experience" (Noë 2005, 8). It also satisfies the description of a good epistemic resource because it helps nonhumans "understand, investigate, and know about specific parts and particular aspects of the world" by foregrounding certain details (Pohlhaus 2010, 717). Indeed, the continued existence of an organism, and a species as a whole, attests to their competency as knowers and the accuracy and reliability of their sense-making activities.

The American environmentalist Aldo Leopold provides additional evidence of nonhuman intelligence. Despite lacking the formal, propositional systems that allow for rational deduction, nonhuman animals can nevertheless intelligently draw inferences from the world. Reflecting on his outdoor experiences with his dog, Leopold describes how "[h]e persists in tutoring me...in the art of drawing deductions from an educated nose. I delight in seeing him deduce a conclusion in

the form of a point, from data that are obvious to him, but speculative to my unaided eye" (1970, 67). As Leopold's testimony shows, while formal linguistic systems provide particular advantages for humans, nonhuman modes of knowing are superior in different respects and provide access to different aspects of the world (Taylor 1986). The claim that nonhumans are unintelligent is therefore based on an anthropocentric epistemic standard. By unjustifiably universalizing this standard as *the* standard, the different, nonhuman modes of knowing are delegitimized.

Given that nonhumans can be considered knowers, the case for nonhuman testimonial injustice now depends on showing that nonhumans can convey their knowledge. This argument requires expanding the definition of testimony beyond explicit articulation of beliefs. Miranda Fricker herself espouses a broader definition in a footnote, stating how testimony can be used "in an extended sense to include not only cases of telling but also cases of expression to an interlocutor of judgements, views, and opinions" (2007, 50). In other words, testimony can also include bodily expression of information. Given this definition, it is possible for nonhumans to provide testimony. As Leopold writes, "[l]ike people, my animals frequently disclose by their actions what they decline to divulge in words" (1970, 83). This expression can include sounds such as when a dog whimpers because they are in pain, or barks at someone at the door. Additionally, testimony can also be offered through bodily movements and behavior. According to Leopold, "[t]he dog knows what is grouseward better than you do. You will do well to follow him closely, reading from the cock of his ears the story the breeze is telling" (1970, 59). Thus, while the dog lacks the words to articulate his knowledge about the presence of a goose, the movement of his ears nevertheless effectively conveys this information.

One potential difference between human and nonhuman testimony involves intentionality. A human speaker provides testimony with the intention that the listener will uptake it. On the one

hand, human testimony is not always intentional. In the footnote on how testimony can involve expressing, and not explicitly telling, Fricker provides the example of Simone de Beauvoir expressing testimony through her bodily language. While the information conveyed via bodily language can be intentional, like feigning a yawn to express boredom, other acts such as shivering because it is cold can be unintentional. On the other hand, there seems to be cases in which the bodily expression of nonhuman testimony is intentional. For instance, nonhuman imitation (e.g. a raven pretending to be injured) appears to be intentional in that the nonhuman wants others to uptake these bodily expressions in particular ways (Despret 2016, 127). That is, insofar as imitation is type of deception, imitative bodily expressions are premised on the other having mental states that they are trying to mislead. Plumwood provides another example in which "[a] young wombat I used to play vigorous chasing games with would sulk if he did not win; he was an expert at feinting and manipulating a playmate's expectations, often feigning deceptive disinterest prior to mounting a surprise attack" (2002, 182). As Plumwood points out, "[a]ll these behaviours require sophisticated higher-order intentionality" (2002, 182).

The claim that testimonial injustice can be committed against nonhuman animals finally depends on the existence of negative identity prejudices that distort the perception of the other, deflating their epistemic competence. While Fricker's analysis of testimonial injustice focuses on encounters between humans involving identity prejudices in the form of sexism and racism, negative identity prejudices also pervade human-nonhuman interactions in unjust ways. Speciesism is a negative identity prejudice that decreases the moral standing of animals because they are not members of the human species (Singer 2011). Speciesism also has an epistemic counterpart. One instance of this counterpart is historically rooted in the interlocking dualisms between human/mind/masculinity/subject/meaning and nonhuman/body/femininity/object/reality.

Rather than just a distinction noting difference, dualisms imply a radical exclusion in which the binaries do not share any qualities (Plumwood 1993; Warren 1990). For example, in *Discourse on Method,* Descartes presented humans as thinking things, while nonhuman animals are mere extended things. According to his view, humans have an interior life comprised of self-conscious experiences and thoughts. Because humans possess language, humans are free and subjects of knowledge. Articulating an anthropocentric propositional epistemology, Descartes ultimately maintains that knowledge involves explicit, linguistic articulations—clear and distinct ideas. On the other hand, animals are reduced to machines determined by the laws of nature. Not only do they not possess knowledge of the world (because this requires propositional language), but they are devoid of experience. Animals are simply passive, unintelligent matter.

Given that nonhuman animals are knowers, givers of knowledge, and subject to negative-identity prejudices, it follows that humans can commit testimonial injustice against nonhuman animals. To conclude this section, it is worth noting that such injustices would be culpable even when humans are raised in an anthropocentric and speciesist culture. The argument for this claim will be modelled after Pohlhaus's argument (2012) that willful hermeneutic ignorance is culpable. According to Pohlhaus, due to power imbalances, dominantly situated knowers can refuse to acknowledge the experiences or develop epistemic resources of marginally situated knowers. This is a culpable act because a person chooses, and continually chooses, to retain these faulty epistemic resources through such refusal. Put differently, a person is responsible for not learning the epistemic resources of marginally situated knowers that would reveal what is not apparent from their dominant situatedness—for example, the experiences of the marginally situated. Similar to human-human instances of willful hermeneutic injustice, nonhuman testimonial injustice involves dominantly situated knowers (humans) preemptively dismissing the epistemic resources of

marginally situated knowers (nonhumans) because they are "attuned to what is not immediately present within the experienced world of the dominantly situated knower, such resources can appear to the dominantly situated knower to attend to nothing at all, or make something out of nothing" (Pohlhaus 2012, 722). Furthermore, the denial that nonhuman animals are knowers and givers of knowledge is a way for humans to "maintain their ignorance by refusing to recognize and by actively undermining any new generated epistemic resource that attends to those parts of the world that they are invested in ignoring" (Pohlhaus 2012, 728). This is a culpable act because while a person did not choose to be born and grow up in social situations steeped in Cartesian dualism, speciesism, and anthropocentric epistemic prejudices, they do get to choose how to take up their epistemic interdependence and relate, or fail to relate, to nonhumans. Put differently, a person's speciesist, negative-identity prejudices are not immutable. A person can critically interrogate them and can ultimately stop believing in them.

Nonhuman Testimonial Smothering

In order to further uproot the entrenched ethico-onto-epistemological standing of nonhuman animals, it is worth considering whether humans can commit testimonial smothering against animals. According to Kristie Dotson (2011), testimonial smothering occurs when a speaker truncates the content of their testimony due to a perceived inability or unwillingness of the listener to uptake the testimony. The speaker's testimony consequently only contains the content that is accurately intelligible based on the listener's perceived competence. To use Dotson's example, Cassandra Byers Harvin (1996) recounts an experience at a public library where a white woman asked her what she was working on. After stating "raising black sons in this society," the white woman replied, "How is that any different from raising white sons?" As Dotson explains, "The insult, which is carried not only by the question, but also by the tone of question,

indicates a testimonial incompetence with respect to potential testimony on the difficulties of raising black sons in a U.S. context" (2011, 247). The white woman's testimonial incompetence functioned as "coerced silencing" that lead to Harvin truncating her testimony and promptly leaving the situation.

Vinciane Despret's analysis of the work of psychologist Irene Pepperberg indicates how the testimony and speech of nonhuman animals can also be truncated by humans. Pepperberg's experiments involved Alex, a grey parrot from Gabon. Rather than investigating what Alex is or what parrots are in general, seeking to reveal their hidden, given essence, Pepperberg's experiment was an active and open investigation into what Alex might be rendered capable of. In particular, Pepperberg eventually taught Alex to speak and to be understood. Alex learned to not only "speak, describe, count, classify objects in abstract categories, and use concepts like 'same' and 'different', but he was also able to use speech so as to influence the behavior of others: 'come here', 'I want to go to that place', 'no', 'I want this'" (Despret 2008, 125-6). Alex thus demonstrated capacities that exceed those typically attributed to nonhuman animals. This linguistic capacity is not limited to Alex. In 1990, two other grey parrots—Kyaro, a three and half year-old male, and Alo, a seven-month-old female—demonstrated the same competences as Alex. Thus, Alex, Kyaro, and Alo demonstrate that animals can speak with intention.

The success of Pepperberg and Alex was due to the nature of experiment. As it turns out, parrots have a pragmatic conception of language, which is premised on the ability to influence their environment. When Alex first inadvertently uttered a new sound, Pepperberg responded to Alex as if he had intentionally made this sound to make a comment or make a claim on her. The sound became a word that "signifies something for the parrot because it has signified something for the researcher" (Despret 2008, 125). Alex picked up on how making a sound impacted the

scientists, influencing their actions. To keep Alex interested in learning to speak, the researchers would give Alex control over its rewards by offering the correctly named or appropriately described object. If Alex did not want that object, but preferred to go for a walk, the researchers complied. As such, "[t]he reward, then, translates for Alex as the right to 'want' and to take a position in relation to what is offered to him" (Despret 2008, 125). The researchers thus signaled that they were receptive to, affected by, Alex as a meaningful other. That is, Alex became a subject with a unique point of view that made claims on them.

The subjective standing of Alex ultimately required Pepperberg to enter the experiment and become a part of it. As Despret puts it, Pepperberg agreed to "situate herself in a regime of transformations and accomplishments that mingle with and give form to desires" (Despret 2008, 128). To understand, however partially, Alex's interest and respond to the claims made on her, Pepperberg had to be receptive to Alex. She had to "subordinate her desire to what makes sense for Alex in the matter of speaking" in order to ask questions that mattered for Alex (Despret 2008, 127). Pepperberg's questions and experimental practices consequently remained attentively other-oriented, seeking to understand Alex's point of view as an individual parrot while making room for the inevitability of misunderstanding. By allowing and being sensitive to misunderstandings, Pepperberg was able to adjust the questions and experimental practices to keep Alex interested in learning. Alex's increased agency and subjective standing did not entail that Pepperberg became an intermediary and a passive object. She was a "mediator" that made surprising, unexpected differences in the experiment (Latour 2005). In continually adjusting and negotiating what is understood, she "suggest meanings perceived momentarily by [herself] alone" (Despret 2008, 126). Pepperberg was therefore not only an active participant, but also someone who was open to becoming constituted through the experimental practices in relation to Alex.

Why did science not make this discovery before, though? According to Despret, the problem is with the traditional mode of scientific experimentation. Scientist (and philosophers) tend to control the conversation (Despret 2008, 124). In addition to the traditional roles of human and nonhuman animal as well as researcher and test subject, control is witnessed in the ways in which scientists pose questions that they are interested in. Experiments often take the form of making the test subject "submit to the theories that guide research, submit to the problem that is imposed on them to the manner in which the researcher constructs and defines it" (Despret 2008, 131). For example, experiments about animal intelligence or linguistic competence regularly involve hypotheses, questions, and experimental designs based on human beliefs about language and intelligence.

Moreover, scientific (con)quest for objectivity requires scientists to be impartial. Impartiality involves bracketing anything subjective, personal, or particular about the scientist so that these factors do not interfere with the results. The good scientist is like an automaton. According to the etymology provided by Despret, an automaton is "one who is moved by itself, and only by itself, that is the one who will not be moved, put into motion by others. In sum, it is the one who will not be affected, and therefore who will not affect" (2004, 117). As an automaton, the scientist is a mere "intermediary" who transports without transforming/distorting the nature/truth of the thing (Latour 2005). They do not affect things or make a difference in the experiment. If affects reflect a person's biology, culture, race, gender, class, or personality, the impartial scientist that brackets these particularities is replaceable by anyone. As such, the results of a good scientist are objective—they are valid for anyone in general.

While intentionally trying to not affect the outcome of the experiment, in the case of parrots, impartiality nevertheless can have important effects. As Anthony Weston puts the point in

another context, "*[w]hatever* we do, including withdrawal, has consequences, ripple effects: it reshapes the space, both social and physical, in which the world goes on" (2011, 115). In Barad's terms, impartiality is an aspect of the material-discursive apparatus. It makes an agential cut that articulates the parrot with particular agential capabilities, and not others. In order to not affect the experiment, the good scientist qua automaton must not affect the parrot, nor let the parrot affect them. The impartial and impersonal scientist remains unaffected. They do not enter the experiment. The impartiality of the scientist thus makes it seem like the parrot is addressing no one—someone who is never affected. For a parrot with a pragmatic conception of language, there is therefore no reason to speak to the detached, objective scientist to try to affect their behavior. As Despret puts it, parrots "cannot speak if they don't feel they are speaking to someone" (2008, 125).

The parrot does not simply truncate a portion of its testimony in response to the automaton-like scientist. It does not try to speak at all because it would not have a practical effect on the impersonal, indifferent scientist. The parrot recognizes that they are not being recognized as something that matters as a subject. A parrot's recognition of the scientists' indifference is a recognition of the perceived unwillingness and incompetence of the impartial scientist and the corresponding experimental practice. Their impartiality and assumption that nonhuman animals are not subjects that can make claims on humans renders the scientist unwilling to engage in communicative exchanges. Consequently, the scientists fail to recognize how they are refusing to engage in a communicative exchange. In their recognition of how humans fail to recognize them, parrots completely truncate their speech because of the scientist's incompetence in accurately

tracking the truth of the parrot's epistemic status. The impartial scientist, or philosopher, would thus commit testimonial smothering against the parrot.[7]

Pepperberg's experiment with Alex reveals more than the possibility of nonhuman testimonial smothering though. Given that the experiment involves teaching Alex to speak, Pepperberg's experiment suggests a transcendental form of testimonial smothering. It is transcendental in the sense that it is the condition for the possibility of testimonial smothering. In human-human exchanges, a person carries their past with them into the conversation such that they have a set of beliefs and values. Their *interaction* with the interlocutor is partially responsible for the selection process of what to say. What they say and how they say it is based on their relationship with their interlocutor and the nature of the conversation such as what has been said and how it has been said. However, an *intra-action* with the interlocutor enacts an agential cut that not only affects the selection process but can also transform one's very beliefs and values as well as their expression (Piñeiro and Simpson 2020). The agential cut entangles the two, creating a connection between the two as well as interesting, original connections between the speaker's own ideas. The interlocuter causes the person to translate their beliefs and values (even if they are speaking the same language) to ensure it makes sense to the other. Consequently, there is the potential that the speaker's set of beliefs and values is no longer the same as it was before the encounter. They might say things that were not in their head prior to the conversation, nor their interlocutor's, nor are they a mere combination of the prior ideas held by them and interlocutor. This testimony can be a product of the relationship between the two. Accordingly, what can be truncated is not completely given. A transcendental form of testimonial smothering could therefore occur in the very

[7] It is important to extend this conclusion outside of the laboratory and scientific research. For instance, domestic animal abuse can cause nonhuman testimonial smothering insofar as the abuse leads the animal to truncate their testimony due to the perceived unwillingness of the human to engage in communicative exchange.

manifestation of the speaker in relation to the interlocuter. Such an injustice would precede the sort of testimonial smothering described by Dotson (2011).

Similarly, Pepperberg's research did not reveal a given fact about the world, neither in terms of what parrots intrinsically are nor whether Alex had an intrinsic ability to speak. The experimental practices and apparatuses are performative in that they co-constituted both Alex and Pepperberg, enacting an agential cut that differentially constitutes each in relation to one another. Both become entangled as their very being refers to the other. Each one transforms, translates, and mediates the other's very being. As Despret puts this point, the experiment was an "adventure in the course of which subjectivities overlap, are transformed, actualized and extended to the subjectivity of the other" (2008, 129). Pepperberg is no longer the same, but becomes "Pepperberg-with-parrot," and more specifically "Pepperberg-with-Alex". Based on what Alex suggested to her, Pepperberg was rendered capable of in a particular way. Through her sensitivity to Alex's interest and point of view, and ultimately negotiating with him, Pepperberg became a competent parrot experimenter. Alex simultaneously became "rendered capable of" what Pepperberg suggested to him through the experimental apparatuses and practices. Alex is no longer the same parrot that he was before his encounter with Pepperberg. Alex becomes "Alex-with-scientist," and more specifically, an "Alex-with-Pepperberg" that is capable of speaking. In the process of learning to talk, Alex "accepts and actively transforms" the color boxes, numbers, words, a grammar, forms, humans, and abstractions into part of his world (Despret 2008, 128).

Despret's analysis of Pepperberg's experiments reveals a transcendental form of epistemic smothering. It is transcendental in that if the experimental practice had been otherwise, it might have smothered what Alex *could* say. It is not simply truncating the content of one's speech, what Alex can say, but smothering the very ability to speak. The impartial experimental apparatus and

practices would have prevented Alex from actualizing potential potentialities. The potential for speaking and particular testimony are not already given, actualized, but performed in relation to the experimental apparatus. It is only when this potential for speaking is actualized—when transcendental testimonial smothering does not occur—that the possibility for testimonial smothering can occur.

Similar to the concerns that motivate Dotson's work, the concept of transcendental epistemic smothering seeks to hold humans accountable for the harms they inflict on others. Without acknowledging transcendental smothering, there could be cases in which a wrongdoer could claim that they did not commit testimonial smothering against another because the other did not truncate their testimony. However, the other did not truncate their testimony because their very ability to give testimony as well as the testimony itself was already transcendentally smothered. Such an occurrence is not an instance of hermeneutic injustice because the person could have the collective epistemic resources to express their experiences. Beyond the hypothetical example of a world in which Alex did not learn how to speak, the inability to provide testimony can also be due to intra-actions eliminating testimony itself. More specifically, given that material engagements can produce certain bodies that can experience certain things (Barad 2007; Jackson 2020), (material)-discursive apparatuses can perform the other such that they do not have these experiences in the first place, or at least cannot access these experiences, and so could not provide testimony about them. The concept of transcendental epistemic smothering, in other words, seeks to capture the ontological harm associated with epistemic injustices.

Nonhuman Fourth-Order Epistemic Exclusion

Both nonhuman testimonial injustice and nonhuman (transcendental) smothering have challenged the dualism between human and nonhuman animals. Like humans, nonhumans are

knowers that humans can commit epistemic injustices against. With this common grounding, it is now possible to make a more radical expansion of the category of epistemic injustice based on the (non-dualistic) differences between humans and nonhumans.[8] Attention to these differences further disrupts and decenters anthropocentric epistemologies by opening a space to move beyond an extensionalist approach of epistemology. The problem with an extensionalist approach, as Despret puts it, is that they are not "the type of story that honors [nonhumans]. It consists again, and always, of our own story" (2016, 158). This final section seeks to not only make social epistemology more inclusive of nonhuman knowers and non-propositional knowledge, but also initiate a transformation of epistemology by emphasizing the important differences between human and nonhuman epistemologies and ontologies. Due to these differences, it is possible to commit a fourth-order epistemic exclusion against nonhuman animals.

In "Conceptualizing Epistemic Oppression," Dotson explains the different types of epistemic exclusion through an adaptation of Plato's Allegory of the Cave. In Dotson's retelling, the fettered people in the cave were fed and watered from the right by mobile people. Unable to move their heads from right to left, the fettered persons would only experience the mobile people in terms of the voice sounds they make. In such a scenario the leftmost fettered person would be the only person that has not experienced a voice sound on their left. The leftmost fettered person, Dotson explains, "has the ability to detect something about the larger social world [i.e. a cave that is larger than immediately apparent] none of the other members can detect in quite the same way" (2014, 130). Given that the leftmost person can articulate their position, this would not be a case

[8] Although this section emphasizes the differences between humans and nonhumans, these differences should not be interpreted as dualistic in nature. Following Lena Gunnarsson, dualisms should be rejected, but distinctions should be maintained. As Gunnarsson explains, dualisms involve an "absolute separation which ignores any interconnection and mutual constitution between the terms in question, while distinction simply means that two things are not the same, which does not imply that they can be neatly separated from one another" (2013, 14).

of a second-order epistemic exclusion (i.e. hermeneutic injustice). That is, the problem is not that there are gaps in the dominant, shared epistemic resources, which prevent the leftmost person from communicating their unique experience. The problem is much more fundamental.

The problem involves the larger epistemological systems that are the grounding of epistemic resources. These epistemological systems are "what orients one's instituted social imaginaries" (Dotson 2014, 131). Dotson draws the concept of instituted social imaginaries from Loraine Code (2008), who explains how "an *instituted* imaginary carries normative social meanings, customs, expectations, assumptions, values, prohibitions, and permissions—the habitus and ethos—into which people are nurtured from childhood" (2008, 34). Due to the important differences between the leftmost fettered person's insight and the epistemological system, the insight is dismissed as either nonsensical, impossible, or dangerous. This dismissal is due to how the leftmost person's experiences reveal the inadequacy of the dominate, shared epistemic resources. The epistemic resources cannot "shed light on why they are incapable of accounting for the farthest left-fettered person's insight" (Dotson 2014, 131). In other words, the epistemic resources are inadequate because they not only do not capture aspects of the world, but they cannot currently capture these aspects without fundamental changes to the epistemological system. The very epistemic resources that would detect and change this third-order exclusion are part of the resilient epistemological system, which makes the exclusions. As it stands, the epistemological system is unable to acknowledge the existence of the leftmost fettered person's experience. Indeed, any attempt to do so, assimilates this experience "by only revealing what the system is prone to reveal, thereby reinforcing the idea that one's system is adequate to the task, when one is actually stuck in a vicious loop" (Dotson 2014, 132). Rather than a far-fetched, hypothetical example,

Dotson contends this third-order epistemic exclusion is much more common—it is "the stuff 'culture clashes' are made of" (2014, 131).

While human-nonhuman situations satisfy many conditions outlined in Dotson's explanation of third-order epistemic exclusion, I propose the category of fourth-order epistemic exclusions in order to attend to the important differences between humans and nonhumans. Following Dotson's interpretation of Plato's Allegory of the Cave, animals would occupy a position even further left than the leftmost *human* person because they would have a unique experience of the world that humans might not be able to easily access or cannot currently access at all. Despite lacking language, animals nevertheless articulate their situatedness and knowledge in their very bodily materiality and practices. Due to speciesism and proposition-centric epistemologies, however, their account "fails to gain appropriate uptake given the ways [their] testimony challenges shared epistemic resources" (Dotson 2014, 130). The dominant situated knowers have systematically denied nonhuman testimony because it is not articulatable in terms of the dominant shared epistemic resources. For instance, while the dominant epistemological system is explicit, proposition-based, nonhuman animal knowledge is implicit and tacit. Animals consequently cannot be knowers nor creators of meaning because they do not use propositional language. Any suggestion otherwise appears nonsensical from within a language-centric epistemological system.[9] Even if a human is initially open to nonhumans as intelligent epistemic agents or has experiences that seem to attest to their intelligence, the epistemological system disproves this possibility and debunks this experience. Indeed, despite new insight about animals (Despret 2016), the fact that the social epistemology still revolves around humans and propositional knowledge attests to the "resilience of a maladjusted system" (Dotson 2014, 130).

[9] Similarly, the claim that experimental norms such as impartiality and detachment, which are assumed to make science competent in representing the world, can make them incompetent is dismissed.

Despite these analogies, there are problems with simply placing nonhuman animals left of the leftmost fettered human. The danger is that this line creates a continuity that is defined by humans. Although disrupting dualistic views of humans and nonhumans, such a linear metaphor risks assimilating nonhumans into the worlds of humans, thereby erasing important differences. Making a similar point, Yogi Hale Hendlin writes

> While certainly other creatures behave similarly to humans in many ways, their processes and orientations are fundamentally different. Not worse, just different. The pernicious inertia of homogenizing consciousness and intelligence onto a single spectrum, usually hierarchized, prevents acknowledging a pluralistic understanding of these faculties that creates a multidimensional approach (2019, 353).

Thus, merely contending that humans can commit Dotson's concept of third-order epistemic exclusion against nonhuman animals would itself risk committing a third-order epistemic exclusion. In particular, given that Dotson's concept was created to capture problematic human-human interactions, the worry is that when applied to nonhuman animals it would only reveal what the system is prone to reveal. It is therefore prudential to reserve third-order epistemic exclusions for oppressive human-human situations and use the concept of fourth-order epistemic exclusions to capture oppressive human-nonhuman situations.

Unlike a third-order epistemic exclusion that involves an *intra*species clash between human cultures, a fourth-order exclusion refers to *inter*species clashes that result from the differences between humans and nonhumans. While it is important to attend to the cultural differences between humans as particular, historical material-semiotic apparatuses, it is also important to attend to the material-semiotic differences between humans and nonhumans, which are not reducible to analogs of human culture clashes.[10] More specifically, there are significant (statistical) biological,

[10] One might argue that this fourth-order exclusion is reducible to Dotson's third-order exclusion. The culture clash would be between Eurocentric, language-centric philosophies that fail to recognize nonhumans as active subjects and epistemic agents versus other cultures which recognize nonhuman animals as such. For instance, the Anishinaabe people recognize animals, plants, and rocks as teachers and agents (Kimmerer 2015). Similarly, Gloria Anzaldua

anatomical, physiological, environmental, and social differences between humans and nonhumans as well between different nonhumans. This is not merely an acknowledgement that nonhuman organisms are subjects with different bodies and perspectives of the same given world. Nonhuman animals are also different ontological agents that co-constitute worlds and different epistemic agents with different epistemic practices.

For instance, in *Forays into Animal Worlds*, Jacob von Uexküll describes how the materiality of an animal's body gives rise to particular signs, meaning, and if-then action chains in order to accomplish the animal's subjective aim. In Uexküll's famous example, a tick produces a world based on its embodied spatio-temporality and its particular interests such as surviving by feeding on the blood of mammals. Like the brittlestar, the tick is a material-semiotic and spatio-temporal apparatus. It enacts agential cuts that not only demarcate specific boundaries—populating the world with certain entities while foreclosing others from mattering—but also performs a particular spacetime and causality. More specifically, the tick's world consists of signs including butyric acid, body warmth, and follicle size. The tick's ontology—its world—involves a set of entities that is not necessarily identical with the set of entities associated with the world of other animals. For instance, humans do not exist (as individuals or a species) in the tick's world because the tick does not differentiate beyond warm-blooded beings. Furthermore, due to its different spacetime coordinates and causal theory, the tick has a different epistemology—a different practice of knowing how things subsequently interact. There are thus significant bodily differences between humans, ticks, and brittlestars, which entail different significations, different agential cuts, different worlds, and different ways of knowing (some of which do not require language, or even a brain). By not acknowledging the different forms of life and knowing between

(2015) describes nonhumans as teachers. While this is indeed a cultural clash, this critique reduces the comparison to different *human* understandings of animals.

humans and nonhumans, fourth-order epistemic exclusions reduce embodiment to human embodiment, worlds to the human world, and knowledge practices to human knowledge practices. That is, one risks returning to the arrogance and violence of anthropocentricism, in which 'Man is the measure of all things.'[11]

Conclusions

This paper has sought to "stay with the trouble" of nonhuman animals (Haraway 2016). On the one hand, staying with the trouble involves disrupting the human-nonhuman dualism, which presents nonhumans as passive, unintelligent, and meaningless, by challenging anthropocentric epistemologies that delegitimate tacit, embodied knowledge and neglect the meaning generating practices of materiality. Through Barad's agential realism, Leopold's environmental reflections, and the ethological work of Despret and Uexküll, I have argued that nonhuman animals are epistemic agents that are knowers and givers of knowledge. Accordingly, it is necessary to expand social epistemology to hold people accountable for acts of testimonial injustice and (transcendental) epistemic smothering against nonhuman animals. Taking seriously nonhuman animals as knowers challenges the dualism between human and nonhuman animals, which has historically operated to ground the superiority of humans, which in turn justified the oppression, exploitation, and killing of nonhuman animals (Warren 1990).

[11] While the reference to Uexküll is intended to show the important differences between human and nonhuman animals, it is not intended to reinstate dualism. As Despret emphasizes, an animal has a "mobile and variable world, with permeable and shifting boundaries" (2016, 165). Even if a human world was indeed currently, largely independent to a nonhuman, such as an organism living in the Mariana Trench, this does not entail a dualistic vision of the world, in which humans and nonhumans are absolutely and forever separate. Worlds can, and do, change and intersect. Indeed, all life forms share the fact that they are *of* the earth. Fourth-order epistemic exclusions of nonhumans by humans are therefore not a necessity, which would nullify their ethical standing. That is, it is theoretically possible to partially understand nonhuman forms of life. Furthermore, even if one's understanding of radically different creatures such as those living in the Mariana Trench are severely limited, this does not entail fourth-order epistemic exclusions cannot be committed against other animals.

On the other hand, staying with the trouble of animals entails recognizing the differences between humans and nonhumans. Rather than merely extending social epistemology to include nonhuman animals, and noting the limitations of propositional knowledge, these differences require disrupting social epistemology and acknowledging (nonhuman) embodied epistemic practices, tacit knowledge, and the material-discursive worlding of ontological practices. By challenging the separation of epistemology and ontology, Barad's account of intra-actions and the materiality of epistemic practices reveals the ontological stakes of epistemic practices, which transcendental epistemic smothering tries to capture. Furthermore, the (non-dualistic) differences between humans and nonhumans shows that it is possible to commit fourth-order epistemic exclusions against nonhuman animal epistemologies and worlds.

To conclude, it is worth drawing out three additional insights that follow from taking seriously nonhuman animals as onto-epistemic agents. First, beyond considering how epistemic injustices can be committed against nonhumans, social epistemology needs to expand the 'social' to include nonhumans for other reasons. Nonhumans affect both senses of human sociality—epistemic situatedness and interdependence. According to Pohlhaus (2012), one's situatedness in social settings informs what a person attends to and comes to know; while interdependence refers to the socially constructed and normatively enforced epistemic resources with which one knows the world, determining whether one knows and how they know. Intra-actions enfold the beings of nonhumans and humans into one another, exchanging desires and agential abilities. Given that nonhumans are active participants in intra-actions, and humans are produced through intra-actions with nonhumans, human bodies and minds are co-constituted by nonhumans. On the one hand, this entails nonhumans are social in the sense of epistemic situatedness because they make humans sensitive in particular ways. Nonhumans affect how humans perceive the world, directing human

attention towards specific aspects of the world. On the other hand, nonhumans are social in the sense of interdependency insofar as they co-constitute how humans think about and know the world. From laboratory equipment to concepts, nonhuman metaphors, and nonhuman companion species, nonhumans inform the epistemic resources by which humans know the world.

In general, like in the case of Pepperberg and Alex, human-nonhuman intra-actions can result in the co-creation of a shared world—an intersubjective we. As Despret contends, intersubjectivity entails "becoming what the other suggests to you, accepting the proposal of subjectivity, acting in the manner in which the other addresses you, actualizing and verifying this proposal in the sense of rendering it true" (2008, 135). Each regards the other as a meaningful subject with a unique point of view that makes claims on them, which they must negotiate with. Furthermore, intra-actions can differentially exchange agential abilities, desires, and meanings between humans and nonhumans. It is therefore reasonable to include nonhumans in the social sphere.

Second, ethically speaking, recognizing nonhumans as onto-epistemic agents elucidates nonhuman extinction and captivity in new ways. It is not as if a piece of a game goes missing, but the same game goes on. Developing upon Thom van Dooren and Eduardo Kohn, Despret contends that this characterization of extinction is

> not the form that makes a species, in the sense of quantifiable biodiversity, disappear but those that make worlds die, worlds that were hitherto shaped and characterized by practices, by modes of inhabiting, by landscapes that are no more…Extinction begins when the ways an animal composes the world and composes with the world are ended, when the ways he or she makes a world exist, according to the ways his or her ancestors had created it, have disappeared (Despret and Meuret 2016, 28-29).

Despret's point can be understood through Haraway's notion of sympoiesis (2016)—a multi-species string-finger game of cat's cradle. Like the image of a cat in the string figure, the world is not given but is produced and held together by the more-than-human intra-actions and interactions.

That is, a world is held together by more than humans. When an animal goes extinct or is severed from their natural environment the harm consequently extends beyond them. With their loss, others—including humans—become unbound, losing constitutive parts of their existence (Butler 2006). Speaking about the shift to raising sheep in confined pens on industrial factory farms, Despret contends how their previous grazing lands

> lost some of their ways of being, some of their modes of existence. The memory of the flock, in some ways, gives to the land a part of its existence. By the concrete memory of the mouths, the eyes, the guts, the bodies, the legs, and the feet, the flock multiplies the ways lands, paths, bushes, springs, and rocks exist (Despret and Meuret 2016, 33).

The loss of an animal is thus a loss in world.

Third, the acknowledgement of a fourth-order epistemic exclusion has important implications for social epistemology with regards to standpoint theory and strong objectivity. Although humans are situated knowers with partial perspectives and translations, humans are not consigned to relativism nor must we forfeit claims knowledge. Not only is objectivity not lost, but as Sandra Harding argues, a stronger sense of objectivity is achievable through the inclusion of the different perspectives of humans with different genders, sexes, classes, races, and abilities. Starting from the perspective and experiences of marginalized people generates "illuminating critical questions that do not arise in thought that begins from dominant group lives" (Harding 1993, 56). That is, marginalized situated knowers have important different experiences, insights, and epistemic resources not immediately accessible to dominantly situated knowers. These epistemic differences strengthen objectivity by providing different critical perspectives. Consequently, "[s]tarting research from women's lives will generate less partial and distorted accounts not only

of women's lives but also of men's lives and of the whole social order" (Harding 1993, 56).[12] This argument can also be extended to nonhuman animals.

Due to their different biological, anatomical, physiological, environmental, and social differences, nonhuman animals not only have different perspectives, but also different epistemic and worlding practices. By appreciating these differences, humans can come to have a broader, more accurate, and more critical understanding of the world. As Uexküll notes, "the woods is hardly grasped in its true meaning if we relate it only to ourselves…the meaning of the forest is multiplied a thousandfold if one does not limit oneself to its relations to human subjects but also includes animals" (2010, 143). Hence, while it is important to appreciate differences between groups of humans, and differences within those groups, it is also important to take into account the differences between humans and nonhumans as well as nonhumans and nonhumans. Taking these differences into account promises a stronger inter-species objectivity.[13]

For example, taking nonhuman animals seriously reveals an epistemology of ignorance. One form of this ignorance is how Western society privileges a visual epistemology, which is associated with an atomistic ontology in which there is always distance between discrete objects as well as between object and observer (Barad 2007; Behnke 2003). In addition to atomism, sight reinforces the dualism between humans and nonhumans. Summarizing the work of Walter Ong (1969), Jim Cheney and Anthony Weston note how "[t]he written word conspires with the visual metaphor to turn the world into a passive object for human knowledge" (1999, 121). Given that

[12] Linda Alcoff (2008) also argues that scientific progress is aided by different people working together. Due to their different background experiences, different people turn to different models and metaphors which elucidate problems in particular ways and offer different ways of solving these problems.

[13] This is not intended to compete against calls for human diversity. While it is important to appreciate the differences between humans and nonhumans, and differences between nonhumans, it is also important that this understanding of nonhumans is based on diverse human perspectives: different cultures, genders, races, sexual orientations, abilities, and socio-economic standings. As Yogi Hale Hendlin (2019) notes, even if nonhuman animals are taken into consideration—the appreciation for diversity will remain artificially homogeneous insofar as it is the same set of human material-discursive apparatuses (white, heterosexual, Western men) that are performing the experiments.

multiple sensuous engagements are open to humans, this is a question of ethico-onto-epistemic responsibility. As Nancy Tuana puts it while summarizing the work of Lorraine Code,

> To know well, we must be responsive to the differences articulating themselves in our experiences and practices, along with being attentive to how the distinctions we embrace, in part, construct our experiences, as well as how these distinctions are enacted in social practices, how they enable as well as limit possibilities and for whom, what they conceal as well as what they reveal (2008, 192).

The predominance of a sight-based onto-epistemology conceals other ways of understanding the world. For instance, a world of sound challenges the discrete, atomism of sight. Being able to superimpose through constructive and destructive interference with other sound waves as well as the acoustic space of one's physical environment, a sound wave is a differential articulation. Sounds also better reflect the processual nature of the world "since sound must be in active production to exist at all" (Ong 1969, 637). Moreover, the primacy of sight conceals other sensuous engagements with the world. As Braidotti notes, and the acute sense of smell of Leopold's dog attests, humans are relatively smell blind compared to other animals (2006, 104). By engaging with animals, it is therefore possible to develop a stronger, multi-sensuous objectivity.

Ultimately, crafting more just human-nonhuman worlds requires more capacious epistemologies. Anthropocentric epistemologies metaphorically cut off human ears, silencing the voices of nonhuman animals and concealing their knowledge and epistemic practices. Given that human minds and bodies are not self-contained and static, prolonged open-ended and other-oriented corporeal practices with nonhumans can help re-calibrate human bodies and sensibilities. Such practices help humans regrow ears in the form of attuned and entangled bodies and practices. These experiences and resultant bodily dispositions could be one way to generate more adequate and liberating concepts, which would help prevent other-oriented hermeneutic injustice against nonhumans. Even if they do not, this bodily attunement itself represents a tacit knowledge of

nonhumans. Making space for “trans-corporeal” “convers(at)ions” would thus not only be a more epistemically responsible way to understand nonhuman animals, but could also foster affective relationships that encourage ethical human-nonhuman practices (Alaimo 2008; Kirby 2008). Taking seriously nonhuman animals as intelligent onto-epistemic agents will not be easy though. Even when it comes to human-human relations Dotson notes that the “[f]ettered persons to the right of the farthest left prisoner will need to extend extraordinary amounts of credibility to the farthest left prisoner” (Dotson 2014, 132). This paper has sought to water the seeds of nonhuman credibility by making the nonsensical a little more sensible and the impossible a little more possible.

References

Alaimo, Stacy. 2008. Trans-corporeal feminisms and the ethical space of nature. In *Material feminisms*, eds. Stacy Alaimo and Susan Hekman, 237-264. Indiana University Press.

Alcoff, Linda. 2008. How is epistemology political? In *The feminist philosophy reader*, eds. Allision Bailey and Chris Cuomo, 705-717. McGraw-Hill.

Anzaldúa, Gloria. 2015. Light in the dark/Luz en Lo Oscuro: Rewriting identity, spirituality, reality. Duke University Press.

Barad, Karen. 2007. *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning.* Duke University Press.

Barad, Karen. 2008. Posthumanist performativity: toward an understanding of how matter comes to matter. In *Material feminisms*, eds. Stacy Alaimo and Susan Hekman, 120-156. Indiana University Press.

Behnke, Elizabeth. 2003. Contact Improvisation and the Lived World. *Studia Phaenomenologica*, vol. 3, Special Issue, 2003, pp. 39-61.

Bordo, Susan. 1987. *The flight to objectivity: Essays on cartesianism and culture*. SUNY Press.

Braidotti, Rosi. 2006. *Transpositions: On nomadic ethics*. Polity.

Braidotti, Rosi. 2013. *The Posthuman*. Polity.

Butler, Judith. *Precarious life: The powers of mourning and violence*. Verso, 2006.

Cheney, Jim. 1989. Postmodern environmental ethics. *Environmental Ethics* 11(2), 117-134.

Cheney, Jim, and Anthony Weston. 1999. Environmental ethics as environmental etiquette: Toward an ethics-based epistemology. *Environmental Ethics*, 21(2), 115-134.

Code, Lorraine. 1993. Taking Subjectivity into Account. In *Feminist epistemologies*, eds. Linda Alcoff and Elizabeth Potter, 15-48. Routledge.

Code, Loraine. 2008. Advocacy, negotiation, and the politics of unknowing. *The Southern Journal of Philosophy* 46(1), 32-51.

Dalmiya, Vrinda. 2001. Knowing People. In *Knowledge, truth, and duty: Essays on epistemic justification, responsibility, and virtue*, ed. Mattias. Steup, 221-234. Oxford University Press.

Descartes, Rene. 1971. *Discourse on Method*. In Philosophical writings: Descartes, eds. Elizabeth Anscombe & Peter Geach. Prentice Hall.

Despret, Vinciane. 2004. The body we care for: Figures of anthropo-zoo-genesis. *Body & Society*, 10(2-3), 111-134.

Despret, Vinciane. 2008. The becomings of subjectivity in animal worlds. *Subjectivity*. 23(1), 123-139.

Despret, Vinciane. 2016. *What would animals say if we asked the right questions?* Minnesota Press.

Despret, Vinciane and Michel Meuret. 2016. Cosmoecological sheep and the arts of living on a damaged planet. *Environmental Humanities*, 8(1), 24-36.

Dotson, Kristie. 2011. Tracking epistemic violence, tracking practices of silencing. *Hypatia*, 26(2), 236-257.

Dotson, Kristie. 2014. Conceptualizing epistemic oppression. *Social Epistemology*, 28(2), 115-138.

Fricker, Miranda. 2007. *Epistemic injustice: Power and the ethics of knowing*. Oxford University Press.

Grasswick, Heidi. 2004. Individuals-in-Communities: The search for a feminist model of epistemic subjects. *Hypatia*, 19(3), 85-120.

Grosz, Elizabeth. 2013. Bodies and Knowledges: Feminism and the crisis of reason. In *Feminist epistemologies*, eds. Linda Alcoff and Elizabeth Potter, 187-216. Routledge.

Gunnarsson, Lena. 2013. The naturalistic turn in feminist theory: A Marxist-realist contribution. *Feminist Theory*. 14(1), 3-19.

Haraway, Donna. 1991. *Simians, cyborgs, and women: The reinvention of nature*. Routledge.

Haraway, Donna. 2008. Otherworldly conversations: terran topics, local terms. In *Material feminisms*, eds. Stacy Alaimo and Susan Hekman. Indiana University Press, 157-187.

Haraway, Donna. 2016. *Staying with the trouble: Making Kin in the Chthulucene*. Duke University Press.

Harding, Sandra. 2008. "Strong objectivity" and socially situated knowledge. In A. Bailey & C. Cuomo (Eds.), *The feminist philosophy reader*, eds. Alison Bailey and Chris Cuomo, 741-755. McGraw-Hill.

Harvin, Cassandra. 1996. Conversations I can't have. On the Issues: *The Progressive Woman's Quarterly*, 5(2), 15-16.

Hendlin, Yogi Hale. 2019. Methodologies of curiosity: Epistemology, practice, and the question of animal minds. *Biosemiotics*, 12(2), 349-356.

Héder, Mihály and Daniel Paksi. 2018. Non-human knowledge according to Michael Polanyi. *Tradition and Discovery: The Polanyi Society Periodical*, 44(1), 50-66.

Jackson, Zakiyyah Iman. 2020. *Becoming human: Matter and meaning in an Antiblack world*. New York University Press.

Kimmerer, Robin Wall. 2013. *Braiding Sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants*. Milkweed Editions.

Kirby, Vicki. 2008. Natural convers(at)ions: or, what if culture was really nature all along? In *Material feminisms*, eds. Stacy Alaimo and Susan Hekman, 214-236. Indiana University Press.

Latour, Bruno. 2005. *Reassembling the social: An introduction to actor-network-theory*. Oxford University Press.

Leopold, Aldo. 1970. *A sand county almanac: With other essays on conservation from round river*. Outdoor Essays & Reflections.

Ong, Walter. 1969. World as View and World as Event. *American Anthropologist*.71(4), 634-647.

Podosky, Paul-Mikhail Podosky. 2018. Hermeneutical injustice and animal ethics: Can nonhuman animals suffer from hermeneutical injustice? *Journal of Animal Ethics*, 8(2), 216.

Piñeiro, Josué and Justin Simpson. 2020. Eventful conversations and the positive virtues of a listener. *Acta Analytica*, *35*(3), 373-388.

Plumwood, Val. 1993. *Feminism and the mastery of nature*. Routledge.

Plumwood, Val. 2002. *Environmental culture: The ecological crisis of reason*. Routledge.

Pohlhaus, Gaile. 2012. Relational knowing and epistemic injustice: Toward a theory of willful hermeneutical ignorance. *Hypatia*, 27(4), 715-735.

Polanyi, Michael. 1962. *Personal knowledge: Towards a post-critical philosophy*. University of Chicago.

Shotwell, Alexa. 2017. Forms of knowing and epistemic resources. In *The Routledge handbook of epistemic injustice*, eds. Ian James Kidd, José Medina, and Gaile Pohlhaus Jr., 79-88. Taylor and Francis.

Singer, Peter. 2011. A utilitarian defense of animal liberation. In *Environmental ethics: Readings in theory and application*, eds. Louis Pojman and P. Pojman (6th ed.). Cengage Learning.

Taylor, Paul. 1986. *Respect for nature: A theory of environmental ethics*. Princeton University.

Tuana, Nancy. 2008. *Viscous porosity: witnessing Katrina*. In *Material feminisms*, eds. Stacy Alaimo and Susan Hekman, 188-213. Indiana University Press.

Uexküll, Jacob Von. 2010. *A foray into the worlds of animals and humans: with a theory of Meaning*, trans. Joseph O'Neil. University of Minnesota Press.

Warren, Karen. 1990. The power and the promise of ecological feminism. *Environmental Ethics*, 12(2), 125-146.

Weston, Anthony. 2009. *The Incompleat eco-philosopher: Essays from the edges of environmental ethics*. SUNY Press.

Weston, Anthony. 2011. Modes of Multicentrism: Some Responses to my Commentators. *Ethics, Policy and Environment*. 14 (1), 113-122.

CHAPTER 4

Towards a Positive and Joyful Environmental Ethic: Gratitude, Gift Giving, and Nonhuman Epistemic Justice

Talking too loud, not knowing how to listen, this very (often innocent) clumsiness we now reconceive as the *fundamental ethical failure: failure to acknowledge and understand ourselves as living in a larger animate universe, and failure too—crucially—to draw out, to co-participate with, that very universe. Instead, we drive it into silence, and then take that silence to confirm our own centrality, as if we really were the only ones with anything to say*

—Jim Cheney and Anthony Weston

Perhaps the most important task for human beings is not to search the stars to converse with cosmic beings but to learn to communicate with the other species that share this planet with us.

— Val Plumwood

From that time forth he believed that the wise [person] is one who never sets [themselves] apart from other livings, whether they have speech or not, and in later years he strove long to learn what can be learned, in silence, from the eyes of animals, the flight of birds, the great slow gestures of trees.

—Ursula Le Guin

This paper is dedicated to my late dog, Sage. Sage was an incredibly joyful and intelligent dog that gave me many gifts. Of course, I have received gifts from many others. By sharing their gifts with one another, I hope to give back to Sage, Robin Wall Kimmerer, Karen Barad, and Vinciane Despret. By putting these authors in conversation, this paper advances an affirmative and joyful environmental ethic. This environmental ethic is based on Kimmerer's account of gratitude and reciprocity in which each person has a responsibility to share their unique gifts with the world in return for the gifts they received from nature. By framing ethical responsibility in terms of sharing our unique gifts, this paper aims to motivate people to continually invest the time and energy needed to address environmental problems on the basis that doing good can feel good. I

then turn to Barad's posthuman performativity to help substantiate how nature also provides ontological gifts by co-constituting the very being of humans. Given that reciprocity requires understanding ourselves and nonhumans, I finally draw on Despret's ethological work to defend open-ended curiosity as an onto-epistemic virtue. Open-ended curiosity enables humans to better understand nonhumans through the co-creation of common worlds and bodily attunement. Open-ended curiosity is ultimately a form of nonhuman epistemic justice that allows nonhumans to be heard and listened to as intelligent and active subjects.

Drawing on wisdom from her Potawatomi elders, Kimmerer provides an environmental ethic based on gratitude and reciprocity.[14] Despite ongoing environmental destruction, Kimmerer remains grateful because the earth still holds us, "giving us moments of wonder and joy" (2013, 327). From the air she breathes, strawberries she eats, to the baskets she weaves, Kimmerer's gratitude is an act of affirmation of the earth. It is an appreciation for things that Kimmerer has, which were provided by more than humans. More specifically, gratitude is an appreciation for the gifts that the earth gives.

Gratitude for the earth's gifts calls into question the status of nonhumans as inert, passive objects. Following the grammar of animacy within the Potawatomi language, earth's gifts are the product of evolving relationships between an indefinite number of nonhumans and humans, which are themselves contingent crystallizations of a moving, flowing nature. For instance, there is not simply a bay, but baying. The bay is a moment in a larger process in which "the living water has decided to shelter itself between these shores" (Kimmerer 2013, 55). Shifting from noun to verb—from bay to baying— "releases the water from bondage and lets it live" (Kimmerer 2013, 55). This

[14] While I specifically turn to Kimmerer, it is important to note that many other Indigenous scholars articulate and enact gift giving, reciprocity, and relationality in their own ways (e.g., Topkok 2015; Kuokkanen 2006; Todd 2106; Yazzie 2018; Coulthard and Simpson 2016; Simpson 2014).

shift presents nonhumans as active, relational, becoming individuals with singular histories, who also arise from the same flow of relationships. Consequently, the grammar of animacy establishes a kinship between humans and nonhumans.

While the earth is a gift, it is not something that is given. The earth, that is, cannot be taken for granted. Nature's gifts are not humans by right of our self-proclaimed superiority, nor human resources that can be permanently owned (Curley 2021). Due to the complex, dynamic web of relationships from which they arise, there is a contingency and unexpectedness to nature's gifts. In Kimmerer's words, "[g]ifts exist in a realm of humility and mystery—as with random acts of kindness we do not know their source" (Kimmerer 2013, 24). Its status as a gift reflects how nature exceeds human control. Nature is surprising. Despite knowing the plant and season, Kimmerer is still surprised to find the first strawberry because "it comes to you through no action of your own, freely, having moved toward you without your beckoning. It is not a reward; you cannot earn it, or call it to you, or even deserve it. And yet it appears" (Kimmerer 2013, 24). Nature thus overflows humans. Everything—even life itself—must be passed on and returned.

Gratitude for nature's gifts motivates an environmental ethic of reciprocity. To this point, Kimmerer asks, "[h]ow will people ever care for the fate of moss spiders if we don't teach students to recognize and respond to the world as a gift?" (2013, 221) Understanding nature as a gift—and not a right—reveals corresponding responsibilities that come with receiving a gift. Unlike the atomistic model of market exchanges that begin and end with self-interested independent individuals, gifts exist in a relational and process ontology. A gift creates, or reestablishes, a relationship between the giver and receiver (Kuokkanen 2006). Due to this relationship, the receiver has a responsibility to express their gratitude by caring for the gift and giving in return.

More specifically, reciprocity is a matter of sharing one's unique gifts in return for the gifts one has received. According to Kimmerer, birds have a responsibility to sing, and water has a responsibility to help plants grow and provide fish a home. If written language is a unique gift of humans, writing can be a form of reciprocity for humans. Reciprocity can also include ceremony, land stewardship, science, art, practical reverence, political action, or civic engagement (Kimmerer 2013, 174). An act of reciprocity ultimately involves "giving in return something of value that sustains the ones who sustain us" (Kimmerer 2013, 190). Hence, reciprocity is an act of affirmation of the relationships that sustain us.

Although reciprocity involves giving back in order to sustain the ones that sustain us, the point is not simply to not deplete environmental resources faster than they can regenerate. As Kimmerer's elders observe, such an idea seeks to enable humans to continue to take (2013, 190). Put differently, such an idea does not challenge the logic of commodification, extraction, and exploitation. Rather than taking being the end, and giving being a means to continually taking, reciprocity focuses on giving as an end. Taking is a means to giving. The things we take, furthermore, are always understood as temporary possessions that we must return.

A person does not have a general responsibility to reciprocate, nor does reciprocity involve a direct exchange of things of equal value. Kimmerer contends that each human person has a specific responsibility to share their unique gifts as an individual. As such, "[i]ndividuality is cherished and nurtured" through gift giving (Kimmerer 2013, 134). For instance, in *Staying with the Trouble,* Donna Haraway describes how women used their love of crocheting to weave coral reefs of yarn and trash to bring awareness to the bleaching of coral reefs. This act of reciprocity affirms both the receiver and giver. On the one hand, the receiver delimits the set of possibilities regarding what would be a gift based on what is good for them—what sustains them—or what

they might like as the individual they are. On the other hand, the gift affirms the giver because they choose what particular gift to give from among these possibilities and creatively choose how to use their gifts to make a gift that only they can give.

Gift giving thus escapes the binary star system of egoism and altruism. Doing good is not reducible to appeals to disinterested and undesirable actions, which as Stacey Alaimo notes are "hardly appealing" (2016, 27). Despite the work, even in non-ideal conditions, giving back can be a rewarding and joyful experience. Kimmerer maintains that there was nothing selfless or altruistic about her act to help salamanders cross a busy road on a cold, rainy night. Indeed, "[t]his night heaps rewards on the givers as well as the recipients. We get to be there, to witness amazing sights, and, for an evening, to enter into relationship with other beings, as different from ourselves as we can imagine" (Kimmerer 2013, 358). Giving can thus be an act of receiving. The joys of gratitude and giving provide the energy to "stay with the trouble" and continue to give despite the inability to fully reciprocate nature's gifts or address every environmental problem (Haraway 2016).

Gratitude, the grammar of animacy, and gift giving also provide a path around the blackhole of fear, guilt, and despair evoked by environmental doom and gloom narratives (Wallace-Wells 2020; Weeks 2011; Daggett 2018). On the one hand, gratitude challenges the despair felt when one jumps from specific environmental losses to the view that all is lost. Gratitude "plants the seeds of abundance" because when you stop to look around at earth with an open mind and heart, you "feel yourself awash in gifts" (Kimmerer 2013, 366; 154). Additionally, gratitude is accompanied by the positive feeling of joy associated with receiving the gifts of the earth, which the earth did not have to give but did so nevertheless. Despite the world being wounded, Kimmerer asserts, "I choose joy over despair. Not because I have my head in the sand, but because joy is what the earth gives me daily and I must return the gift" (2013, 327). Hence, in

addition to affirming the positive existence of the earth, gratitude affirms the positivity of a person's existence.

On the other hand, the grammar of animacy challenges the despair elicited by viewing the earth as permanently wounded. "Despair is paralysis," Kimmerer writes, "It robs us of agency. It blinds us of our own power and the power of the earth" (2013, 328). The current states of humans and nature are contingent, and so, can be otherwise. The joy of gratitude affirms the otherwise by appreciating the earth's gifts and open-ended process of becoming. This joy motivates environmental action through sharing our gifts. Gift giving waters the seeds of the otherwise—of change. Gift giving can regenerate and create the earth's abundance because "[t]he more something is shared, the greater its value becomes" (Kimmerer 2013, 27). In caring for relationships through the circulation of gifts, gift giving can thus be a revolutionary act.

Karen Barad's posthuman performativity provides a similar framework that helps sow the seeds of gratitude. Also moving from noun to verb, Barad challenges the substance ontology associated with the atomistic model of interactions with their account of intra-actions. The interactive account assumes that discrete, self-constituting independent entities (humans and nonhumans) with inherent meanings, boundaries, and agential abilities are ontologically primary. These entities subsequently interact. Rather than being given, Barad contends that "humans" and "nonhumans" are products of contingent, iterative intra-actions.[15] Intra-actions in the form of "practices/doings/actions" are thus ontological primary (Barad 2008, 122).

[15] Barad places "humans" and "nonhumans" in scare quotes to reflect that they are not given, nor fixed, but contingent and revisable products of intra-actions. For convenience, in the rest of the paper I omit the scare quotes from similar terms, but they should be read with them.

More specifically, intra-actions are primary because they involve boundary drawing practices that enact a local resolution within an otherwise state of ontological indeterminacy.[16] An intra-action enacts an agential cut that separates agency of observation from observed agency, subject from object, or human from nonhuman. These cuts co-constitute the boundaries, meaning, and agential abilities of the resulting entities, making them matter in particular ways while excluding other ways from mattering. Given that intra-actions enact a local resolution within an otherwise state of ontological indeterminacy, and not an epistemic indeterminacy, doing and practices are ontologically primary. This is an act of performativity because the properties of an entity are not simply revealed, but are produced as the effect of particular practices, involving particular material-discursive apparatuses.[17] Moreover, these doing and practices are open-ended in that they can perform substantive changes. Intra-actions are "productive evocations, provocations, and generative material articulations or reconfigurings of what is and what is possible" (Barad 2007, 389). Like the grammar of animacy, Barad thus presents the world as a contingent, ongoing, open-ended process of becoming.

While intra-actions enact an agential cut that separates human from nonhuman, this does not result in the absolute exteriority of atomism. The particular material-discursive configuration of the agency of observation differentially constitutes the observed agency in a particular way. The result is an "entangled relation of difference" (Barad 2006, 236). For instance, a rigid ruler fixed

[16] The difference between ontological and epistemic indeterminacy is at the center of the debate between Heisenberg and Bohr. Heisenberg believed that while humans are unable to simultaneously know the position and momentum of a particle because of technical difficulties, the particle nevertheless has a definite position and momentum—humans just cannot not know them at the same time. Niels Bohr pushed against this view with his complementarity principle.
[17] Seeing that intra-actions involve apparatuses such as human bodies and laboratory equipment, one might object that Barad's account is still atomistic insofar as it based on things. However, Barad avoids this objection through their definition of an apparatus: "apparatuses are not mere static arrangements in the world, but rather, *apparatuses are dynamic (re)configurings of the world, specific agential practices/intra-actions/performances through which exclusionary boundaries are enacted*" (2008, 134). Barad thus presents a process ontology, which underscores how an apparatus is what it is in relation to the activities/processes/practices that produced it as well as the activities/processes/practices that it performs.

to a table makes an atom matter in a particular way, namely disclosing its position. The materiality of this measuring apparatus simultaneously excludes the particle's momentum from mattering, which requires a material-discursive apparatus with movable parts. Because the atom that is disclosed is the effect of particular practices, involving particular material-discursive apparatuses, the ruler and the atom are entangled. As Barad puts it, "an atom includes the apparatus that helps constitute it" (2006, 472). Consequently, to give an account of the atom requires giving an account of the apparatuses, which are enfolded into atom.

In addition to the tangible, external gifts of the earth, Barad's posthuman performativity reveals how nonhumans also provide ontological gifts to humans.[18] Unlike the inter-active model in which humans and nonhumans exist *in* the world as pre-existing, independent, and self-contained entities, Barad's account maintains that humans and nonhumans are *of* the world. Similar to the atom being constituted in relation to the fixed ruler, humans are produced through iterative intra-actions with more-than-human others. Intra-actions enfold nonhumans into humans such that the two are entangled in particular ways. In Barad's words, "the other is not just in one's skin, but in one's bones, in one's belly, in one's heart, in one's nucleus, in one's past and future" (Barad 2007, 393). As active participants in the world's becoming, particular nonhumans co-constitute the very being of humans—making us matter in particular ways by co-constituting our materiality, boundaries, meaning, and the gifts associated with our agential abilities. Nonhumans not only affect humans, but also co-constitute how humans can be affected and how we can affect. In addition to co-constituting individual humans, nonhumans also co-constitute humans at the

[18] While Barad articulates this point in relation to quantum mechanics, a similar point can be found in Indigenous philosophies. For instance, Vanessa Watts explains how "we humans are made from the land; our flesh is literally an extension of the soil" (2013, 27). Melanie Yazzie also points out how the values underlying "Water is Life" and "Sheep is Life" present a "theory of politics premised on a definition of life rooted in a philosophy and practice of relationality" (2018, 35).

societal level. “The entanglements we are a part of,” Barad writes, “reconfigure our beings, our psyches, our imaginations, our institutions, our societies” (Barad 2007, 383). Additionally, humans are entangled with nonhumans from their past. A person’s history of previous intra-actions with nonhumans stays with them. It is “written into their materialization, their bodily materiality holds the memories of the traces of its enfoldings” (Barad 2007, 383). Accordingly, particular nonhumans actively co-constitute and re-constitute human identity and agency.

Bruno Latour’s account of nonhumans helps elucidate how nonhumans re-constitute the minds and bodies of humans. Latour describes nonhumans as “mind-churning substances” and “soul generating entities” (Latour 2007, 216). Adopting Latour’s example, given that a person is not a puppeteer by nature, the puppet is initially a foreign object that the puppeteer moves in a clumsy, awkward fashion, struggling to make it move accordingly. Regular practice, however, can transform the puppeteer’s body and intentions according to the material configuration of the puppet and its strings. The practice enfolds the puppet’s form into the puppeteer’s being, thereby creating an interface—a commonality—that allows the two to better connect. As a result of this internal transformation of the puppeteer, “[t]he puppeteer’s fingers are itching to move in a way the marionette indicates” (Latour 2007, 216). Thus, despite being the one holding the strings, Latour suggests that puppeteers will claim that “‘their marionettes suggest them to do things they will have never thought possible by themselves’” (Latour 2007, 59-60).

Similar to the literature on Haraway’s cyborg figuration, which often focuses on the wired rather than fleshy materiality of humans (Alaimo 2008, 244), Latour’s puppeteer example remains too wooden and stilted. Latour’s focus on nonhumans in the form of artifacts underappreciates the affective entanglements between humans and nonhumans in the form of plants and animals. But I believe my companion Sage provides an insightful supplement that reveals how animals can re-

constitute humans. When I was just starting college, I inherited Sage as a puppy from a friend who found her abandoned, living underneath a car. Growing up together, Sage re-constituted my being. She gave me the gift of seeing, feeling, and thinking about the world differently. Through the iterative process of going on walks with Sage, squirrels and other dogs became particularly salient and a source of anxiety because she tended to get too excited and dash after them. She also reconfigured my body such that I found pleasure and pain in different things. There was the sadness of being without her, but also a new appreciation for walks. Her joy for the world rubbed off on me. I found myself creating songs and singing them to her as we went on walks. While I was partially "unbound" by the loss of Sage, she still positively affects my thinking (Butler 2006). Certain authors and ideas are particularly compelling because they make sense based on my experiences with Sage. The intuitions and ways of thinking she left me with were the basis of this paper. Indeed, this paper is an act of thinking with Sage.

Beyond co-constituting human gifts through reconfiguring human agential abilities, nonhumans provide ontological gifts in the sense that they affect the dynamics of gift giving and the world in which giving takes place. As active participants in intra-actions, nonhumans can change the possibilities of change through re-constituting the material-discursive apparatuses of humans and nonhumans. When nonhumans (re)produce different human and nonhuman bodily apparatuses with different bodily boundaries, meaning, and properties, this simultaneously produces different corresponding spacetimes and causal structures. With respect to causality, Barad explains that "causal relations do not preexist, but rather are intra-actively produced. What is a 'cause' and what is an 'effect' are intra-actively demarcated through the specific production of marks on bodies" (2007, 236). That is, if entities are not given, but produced through intra-actions, cause and effect are also not given but subsequently inferred based on the markings and

characteristics of the resultant entities. Kimmerer makes a similar claim regarding time while observing water trickling down through a forest during a rainstorm: "[i]f time is measured by the period between events, alder drip time is different from maple drip. This forest is textured with different kinds of time" (2013, 299). In other words, if causality is based on one material apparatus measuring the way in which bodies interact, then different material apparatuses will produce different accounts of causality. For seemingly similar reasons, Latour describes nonhumans as reflexive metaphysicians that have "their own ontologies" (2007, 147). As he explains, nonhumans are

> able to propose their own theories of action to explain how agencies' effects are carried over….[having] their own meta-theory about how agency acts…They will not only enter into a controversy over which agency is taking over but also on the ways in which it is making its influence felt (2007, 57).

Put differently, in addition to materializing other bodies in meaningful ways, nonhumans also affect how these bodies can relate and interact. Nonhumans confer ontological gifts through actively participating in "world-making activities," making materiality, bodies, spacetime, and causality matter in particular ways (Latour 2007, 57). Nonhumans thus co-constitute the meaning and materiality of the human activity of gift giving. Making a similar point, Rosi Braidotti notes how "Deleuze's remark on the grasshoppers flying in at five p.m. on the back of the evening wind also invokes the non-human cosmic elements in the creation of a space of becoming" (2006, 197).

Given the gravity of gratitude, it is necessary to determine how to reciprocate the earth's gifts. If a person has a specific responsibility to share their unique gifts with the world, the fulfilment of this responsibility requires knowing themselves and their unique gifts. This consequently entails understanding the more-than-human others that co-constitute their identity

and gifts.[19] A person must also understand the other to understand what qualifies as a gift for the other. They must understand what sustains and enriches the recipient to make a gift appropriate for this particular other. Furthermore, a person must know the nonhuman other insofar as reciprocity follows from a sense of gratitude for the gifts of the earth. That is, reciprocity is premised on receiving a gift, instead of taking something by an act of theft. Consequently, a person must be able to "distinguish between that which is given by the earth and that which is not," which requires knowing the nonhuman other (Kimmerer 2013, 185). Reciprocity therefore requires epistemic virtues that promote the understanding of oneself and nonhumans.

Open-ended curiosity is one onto-epistemic virtue that enables a person to understand nonhumans.[20] Inspired by Barad, the dash between "onto-epistemic" is intended to convey the interconnection and mutual constitution of ontology and epistemology as well as the mind, body, and environment. Open-ended curiosity ultimately aims "to hold possibilities open," by "learning attentiveness to the infinite ways of being affected and of affecting" (Despret 2016, 35). Curiosity involves taking an active and involved interest in nonhumans. As an epistemic virtue, a person with open-ended curiosity is open to transforming their beliefs, values, and questions in relation to nonhumans. As an ontological virtue, a person with open-ended curiosity is open to transforming their bodies, other material-discursive apparatuses, and practices in relation to nonhumans. Such openness reflects a "mutual adjustment process" (Plumwood 2002, 178). It is a

[19] This notion of understanding does not mean that humans can perfectly and completely understand nonhumans, nor that humans have direct access to the experiences, life, or world of nonhumans. A human's understanding of nonhumans will remain always partial—an incomplete translation of a particular nonhuman.

[20] The onto-epistemic virtue of open-ended curiosity seeks to further substantiate and flesh out work that has argued for the ethical importance of openness, responsivity, and attentiveness such as Thomas Birch (1993), Jim Cheney (1998), Cheney and Anthony Weston (1999), Weston (2004), Traci Warkentin (2010), Elizabeth Behnke (1999), and Val Plumwood (2002). To be clear, onto-epistemic openness does not involve a radical openness to anything and everything. Not only is such radical openness not possible due to human finitude, embodiment, and situatedness, it is also not necessarily desirable when it comes to understanding a particular nonhuman within a specific context.

matter of encountering nonhumans as "one who can alter us as we it" (Plumwood 1993, 137). Understanding nonhumans requires both the epistemic and ontological dimensions of this virtue.

Following Kimmerer's elders, there are not universal ethical norms that apply to everyone for every situation, telling them how to distinguish between gift and theft and what they should reciprocate. Open-ended curiosity is simply intended to help a person understand nonhumans and themselves. This understanding puts a person in a position to decide for themselves whether they are receiving or stealing and how to fulfill their ethical responsibility by using their gifts to provide a gift in return for the gifts of the earth. Accordingly, open-ended curiosity serves as a condition for the possibility of ethical action. In this sense, it is a transcendental virtue.

Open-ended curiosity is also a transcendental virtue in the sense that it applies to *intra-actions*. As Jim Cheney and Anthony Weston argue (1999), environmental ethics is often epistemology-based insofar as there are certain, given facts about humans and nonhumans that determine how human-nonhuman interactions should occur. Barad's account of intra-actions helps de-center epistemology-based ethics by providing a "genealogical investigation into the practices through which 'humans' and 'nonhumans' are delineated and differentially constituted" (Barad 2007, 32). This genealogy reveals how, in addition to an (environmental) ethic of interactions, it is necessary to not only attend to the ways that apparatuses and practices co-constitute the bodies, abilities, needs, meaning, and values of particular humans and nonhumans, but also ethical theories and the application of these theories (Hinton 2013). Adeline Johns-Putra (2013) makes a similar argument, contending that intra-actions can perform different conceptions of care, which correspond to the particular humans and nonhumans produced by an intra-action. In other words, an ethics of intra-actions is also needed to take into account Octavia Butler's claim that "[a]ll that you touch, you change" and the moral of Naomi Mitchisons's *Memoirs of a Spacewoman*: all

forms of contact are acts of interference (2012, 1; cited in Haraway 2008). Even seemingly innocent acts like making objective measurements with either a rigid or movable apparatus affect the world's becoming, re-constituting nature and culture as well as individual nonhumans and humans. As Weston writes, "*[w]hatever* we do, including withdrawal, has consequences, ripple effects: it reshapes the space, both social and physical, in which the world goes on" (2011, 115). Open-ended curiosity is intended to guide how to intra-act, which create the conditions for the possibility of (ethical) interactions. In particular, open-ended curiosity seeks to facilitate more just forms of communication in order to understand nonhumans.

Curiosity must be open-ended because nonhumans and humans are open-ended singularities. In other words, open-ended curiosity is an onto-epistemic virtue because it enables a person to understand nonhumans as relational and becoming individuals. Like a human person, a nonhuman is a singular individual. Each nonhuman is an individual with unique boundaries, meanings, and agential abilities because of its history of intra-actions with particular more-than-human others. This history of intra-actions marks more than the surface of their bodies. This history is an essential property insofar as it uniquely co-constitutes their very being such that they would not be the same nonhuman without it. Put differently, each nonhuman is singular because of its unique history of intra-actions, which enfolded particular others into its being in particular ways. Like an origami figure, each nonhuman has a unique form due to its unique series of folds, which enfold particular others in particular ways. Kimmerer draws a similar conclusion about the singularity of relational nonhumans. While in the forest during the rainstorm, Kimmerer observes how

> There are different kinds of drops, depending on the relationship between the water and plant…Sshhhh from rain, pitpitpit from hemlock, bloink from maple, and lastly popp of falling alder water…voices of the rain….Every drip it seems is dripped by its relationship

> with life, whether it encounters moss or maple or fir bark or my hair…Maybe there is no such thing as rain; there are only raindrops, each with its own story (2013, 299).

Nonhumans are not determined by their history of intra-actions, though. Barad maintains that the future is never closed—never determined. Due to the inherent exclusionary nature of intra-actions, in which some things come to matter in particular ways while other ways of mattering are excluded, the future remains open and subject to revision. New (human and nonhumans) beings can consequently emerge with different bodily boundaries, meanings, agential abilities, possibilities, causal structures, and spacetimes. More specifically, current intra-actions with particular more than humans re-constitute a nonhuman's being by enfolding them into it. This intra-active reconstitution involves a substantive change. It is an event—a becoming. It changes the possibilities of change by not only reconfiguring their agential abilities, but also engendering new causal structures and spacetimes. Furthermore, according to Barad's posthuman performativity, nonhumans have agency: they can change the possibilities of change (2007, 235). Put differently, they can not only change by realizing a particular possibility within a given set of possibilities, but they can also change the set of possibilities insofar as they are always open to others reconfiguring their bodies and reconfiguring the bodies of others. Due to their singularity and agency, "no one knows ahead of time the effects one is capable of" (Despret 2016, 16). To return to Kimmerer's description, nonhumans are surprising beings. Nonhumans are thus similar to human subjects. Due to their singularity, becoming, and agency, it makes sense to understand nonhumans as "nonhuman persons" (Kimmerer 2013, 57)

While the future of nonhumans is open due to the agency of nonhumans, this openness is not arbitrary, but conditioned. Not every type of change is possible. Intra-actions also involve a congealing of agency. The agency of observation makes a determinate agential cut, a local resolution, which differentially constitutes the observed agency in a particular way. Additionally,

insofar as nonhumans exist in particular places for extended periods of time, their history of intra-actions is often not a random series of encounters, but regular encounters with particular others. These regular encounters entangle them, structuring and stabilizing their bodies, which correspond to the development of particular behaviors or habits—tendencies to act in certain ways. A nonhuman is stabilized by more than its personal history of intra-actions, though. Within each animate nonhuman is enfolded a larger evolutionary history of intra-actions in the form of DNA and instincts. Consequently, it is possible to speak about a (semi)stable identity of a nonhuman. Despite their open and becoming nature, there is still something to know about nonhumans, something in particular to know about each individual nonhuman, which can be used to differentiate harmful and beneficial gifts.

Thus, open-ended curiosity is a virtue that reflects the fact that nonhumans cannot be adequately understood through a general universal essence, animal nature, or species being.[21] Nonhumans are also not determined by their history or the past in general. Like human persons, nonhumans are becoming, relational individuals "with their own personalities, friends, intentions, likes, and fears" (Buchanan 2015, 23). Due to the unexpectedness of nonhuman agency, in which no one ever knows in advance the effects nonhumans are capable of, curiosity must be open-ended. As Vinciane Despret maintains, attempts to understand nonhumans should not be interested in the being of a nonhuman—what a nonhuman is—but what it might be rendered capable of as an individual that is iteratively enacted in relation to others. Relaying Deleuze, who relays Spinoza, Despret's ethology is premised on understanding nonhumans in terms of how they are actually

[21] This existential understanding of nonhumans is substantiated by Sean Lema (2014). Lema brings together research that demonstrates how the phenotypic development of animals is not determined by genetics but depends on an animal's particular environment, which they actively reconstruct through their lives.

affected and affect others. The openness of open-ended curiosity thereby allows humans to "follow the [nonhuman] actors themselves" in terms of such affects (Latour 2007, 61).

In practice, open-ended curiosity enables humans to understand nonhumans by engaging with them in a way that creates the conditions for nonhumans to speak for themselves (in relation to particular others). As Cheney and Weston put it, these conditions "create the space within which a response can emerge or an exchange can coevolve" (1999, 126). Nonhumans speak for themselves in terms of how they are affected by others, affect others, and what they might become. While we cannot directly ask questions to nonhumans and expect a verbal answer, Kimmerer contends that experiments are a kind of conversation. As she explains, "[p]lants answer questions by the way they live, by their responses to change; you just need to learn how to ask…Experiments are not about discovery but about listening and translating the knowledge of other beings" (2013, 159). Human-nonhuman communication is therefore a matter of learning how to ask, listen, and translate. Open-ended curiosity is a virtue that describes one aspect of asking, listening, and translating well. Despite lacking the same propositional language, humans can therefore learn to speak the corporeal language of nonhumans, which makes the way plants live and respond to change intelligible.

To be clear, the understanding between human and nonhumans that this communication generates is not reducible to a human propositional idea that accurately represents the being of nonhuman. Such accounts of understanding are implicitly premised on an ontology of interactions in which humans have an immediate form of knowledge, psychologically mirroring the independent state of the other, as it is in and of itself. Such an interactive understanding is based on a substitution of points of view, such as trying to put oneself in the other's position. By retaining a distance between absolutely exterior entities, such an understanding remains superficial insofar

as it is simply a passive reception of a given other. According to Despret, this understanding is limited to merely understanding "what it is to be (like) the other" (Despret 2004, 128). Not only is such an understanding limited, but, according to Despret, it reduces nonhuman agency in that nonhumans can only affects humans by inducing a change in their psychological state.

Open-ended curiosity pursues an understanding that arises through a more substantive, corporeal relationship. Such an understanding is about what it is to be *with* the other (Despret 2004, 128). Being with the other involves a type of communication that exceeds linguistic exchanges. As Donna Haraway explains, this communication involves "constructing a historically specific form of life" (Haraway 2008, 165). In other words, communication involves the co-creation of common worlds, practices, and the attunement of bodies. Unlike the interactive understanding, Despret argues that the construction of this historically specific form of life transforms both entities, creating a we that extends the subjectivities of each through an exchange of properties and desires. It is this common form of life that is responsible for "making some effective meanings rather than others," and ultimately creating a shared sense of meaning (Haraway 2008, 165).

For instance, according to Despret's analysis (2004), when zoologist Lorenz Konrad forms a relationship with a jackdaw, he does not understand the jackdaw as jackdaw, in and of itself. Instead, Konrad comes to understand a jackdaw-with-human. Lorenz's body is a material-discursive apparatus that enacts an agential cut that co-constitutes the jackdaw in relation to Lorenz, engendering particular boundaries, meaning, and agential abilities. Each is differentially articulated in relation to the other. The intra-action enfolds each into the other through an exchange of properties, which entangles the two. Each entity not only produces different passions in the other, but also affects how the other can be affected and affects others such that they differentiate the world differently, now in relation to the other. It is this jackdaw-with-human that Lorenz

subsequently forms a relationship with. An ethics of intra-actions will focus on the nature of this exchange, promoting intra-actions that engender mutual communication between humans and nonhumans (among other values). Despret's ethological case studies help articulate how open-ended curiosity is both an ontological and epistemic virtue.

While open-ended curiosity seeks to develop an attentiveness to the infinite ways of affecting and being affected, I will primarily focus on developing ways of being affected. This focus is partially a strategic move meant to counter the history of Western relations with nature, which has been predominately a matter of affecting nature. Accordingly, it is important to emphasize that communication requires listening. In order to listen a person must have the ability to 'hear'.[22] These abilities are not necessarily given. Hearing and listening to nonhumans are not simply a matter of opening one's ears and turning one's head in their direction, as if humans have an inherent ability to completely and immediately understand the world. Insofar as hearing and listening are agential abilities of the body, and the body is a product of intra-actions, then the ability to hear and listen are products of a particular history of intra-actions with more-than-human others. Furthermore, insofar as these intra-actions make the body matter in particular ways, while excluding other ways from mattering, at any particular time, a human's particular body will only be able to hear and listen to some nonhumans in particular, always partial, ways, and not others. While the ability to hear and listen are conditioned by the material configuration of the body, they are also contingent. Given that intra-actions are ongoing, and the body is always already open to others, the body can be reconstituted through subsequent intra-actions with more than human others. A person's ability to hear and listen, that is, can change through their efforts in subsequent

[22] While listening often connotes the subjective psychological state of the listener, hearing connotes a physical bodily ability. Similar to how understanding is not necessarily propositional, and communication is not necessarily linguistic, by hearing the other I do not intend to merely refer to the auditory receptivity of a listener's ears. Rather, I will use it metaphorically to capture bodily receptivity in which the speaker moves the listener.

relations to particular others. Simply put, rather than being given, inherent, and fixed, the ability to hear and listen to this particular other are achievements that require work.

To this point, Latour describes the problems encountered while attempting to view websites by early internet users. A user could not view the website if they did not have the right "plug-ins," which required "a bit of software which, once installed on your system, will allow you to *activate* what you were unable to see before" (Latour 2007, 207). The software allowed the person to plug-in to the internet. But first they had to "pay the connection with another site through some displacement" by downloading the requisite software (Latour 2007, 223). This download would change the computer by incorporating the form of the website. As Latour explains, this "form is simply something which allows something else to be transported from one site to the other" (2007, 223). The software provides an interface—a connection site.[23] This connection site allows for an exchange of meaningful information between website and computer, and action between computer user and website. Latour emphasizes that these plug-ins are not downloaded all at once but are acquired incrementally. The competence associated with the plug-ins

> doesn't come in bulk…but literally in bits and bytes. You don't have to imagine a 'wholesale' human having intentionality, making rational calculations, feeling responsible for his sins, or agonizing over his mortal soul. Rather, you realize that to obtain 'complete' human actors, you have to compose them out of many successive layers, each which is empirically distinct from the next (Latour 2007, 207).

Becoming a competent puppeteer, for example, requires building up one's bodily skills and muscle memory over time through repetitive practice (i.e. downloads).[24]

[23] Without a connection site, or commonality, the two entities would represent a substance dualism. If they have nothing in common, then it would be not possible for them to affect one another.

[24] In addition to downloads not being all at once, they are not universal. Computer software does not provide access to everything in the computer world, let alone outside of it. Moreover, the plug-in competences that one acquires to connect with one aspect of the world can prevent one from connecting with other aspects. Accordingly, acquiring the ability to hear and listen can also require first unlearning—uninstalling—certain software.

Latour's metaphor of plug-ins and software reveals how agential abilities are not individual properties, but a network phenomenon. Nonhuman software can include everything from laboratory equipment to the musical instruments and media that composed Jill Nollman's "floating rhythm section," which allowed him to jam with orcas (Cheney and Weston 1999, 129). Nonhuman software can also include the built-in environment. For instance, designing a neighborhood for darkness and quiet creates possibilities to connect with nonhuman animals in that it "invites animal dwelling and migration" (Weston 2004, 38). This point also extends to humans. For instance, in the case of Hans the horse, who initially appeared to be able to solve math problems but was actually an excellent reader of human body language, the successful researchers had relaxed bodies that were more responsive to Hans. One point that Despret draws from this example is how "[l]ong dealings with abstract thoughts, for example, weaken the [bodily] capacity to be relaxed" (2004, 114). Given that academic training might interfere with the ability to listen to animals, it is therefore important that networks also include non-academics. Within the academic world, Linda Alcoff (2008) argues that diverse scientist working together propels scientific progress. Each person has a unique history of experiences based on their gender, race, socioeconomic standing, culture, and mental and bodily abilities. These experiences lead scientists to use different models and metaphors to conceptualize and solve problems. Likewise, it is important to listen to and learn from other people and communities with more experience and richer cultures of listening to and connecting with nonhumans. Thus, the ability to hear and listen in particular ways is a product of one's associations and connections with more-than-human others.

Similar to the website that shows an error message prior to downloading the software, while it might appear that there is nothing to listen to when it comes to nonhumans, this is not necessarily because nonhumans are not saying anything meaningful and are unintelligent. Humans simply

might not have downloaded the software that allows one to register, be affected, and hear what nonhumans are saying. Moreover, if listening requires software, and software involves change, then the ability for humans to hear and listen to nonhumans will require an epistemic and ontological openness to transforming one's body, practices, beliefs, and associations in relation to the particular nonhuman that one is trying to understand. Epistemic openness is particularly important for listening because epistemic closure would prevent the uptake of what we learn from nonhumans. Ontologically, openness is particularly important for hearing because a change in one's body, and corresponding bodily abilities, is required to physically hear them. Like Cheney and Weston's environmental etiquette, open-ended curiosity involves a "willingness and ability to make the space, not just conceptually, but in one's person and in the design and structure of personal and human spaces" (Weston 2004, 31). As Despret puts it, it is a matter of "giving the situation the power to obligate you…it's about compromising oneself" (2016, 27). Thus, to be affected by nonhumans requires enfolding nonhuman forms into the human body such that there is a common connection site. This corporeal commonality and attunement allows nonhumans to affect humans such that humans can understand nonhumans.

For instance, the iterative intra-actions with the jackdaw metamorphized Lorenz. The intra-action enfolded the nonhuman other such that his body took the form of a jackdaw-with-human. He came to walk like and talk like it. As Despret explains, "Lorenz produces a goose's body to allow a goose's world to affect him" (2004, 131). Lorenz thus pays the connection site through the iterative intra-actions he has with the jackdaw, which metaphorize his body and practices. Lorenz's goosomorphic body allows the jackdaw to affect him such that he can listen to it. Consequently, "what was a specific signal, a specific bird's pattern that induces a bird to feed its offspring, this time worked on him" (Despret 2004, 129).

In addition to a person being open to "growing ears" and transforming their body in relation to nonhumans, ontological openness—being corporeally open to the other—involves a bodily receptivity and sensitivity. Returning to the case of Hans the horse, citing Oskar Pfungst who solved the case of Hans, Despret explains how the successful questioners of Hans had

> the ability and tact in dealing with animals. They have the power of intense concentration in expectation. They show a greater facility for motor discharges or are gesturally inclined…During the state of concentration (while working with Hans), this control is relaxed, and our musculature becomes an instrument for the play of non-voluntary impulses' (2004, 114).

In this relaxed state, Hans "could make human bodies be moved and be affected…without their owners' knowledge" (Despret 2004, 114). B reading the unintentional, miniscule muscular motions that Hans elicited in the researchers' bodies, Hans was able to infer the right answer to the problems. The researcher's concentration thus relaxed their bodies such that they were more sensitive and responsive to Hans' movements. This bodily receptivity and sensitivity in turn allowed the researchers and Hans to communicate—Hans affected the researchers, whose bodily movements in turn affected Hans. This example helps explain the dash between onto-epistemic virtue in that it shows how the mind (i.e., the mental state of concentration) is connected with the body.

On the other hand, this bodily sensitivity connotes an awareness of the bodily language of the nonhumans. Without the ability to linguistically contextualize the testimony of nonhumans, accurately understanding them requires deferring to the corporeal context to infer the intended meaning. Drawing on Gregory Bateson, Cary Wolfe (2003) explicates how human language is not simply about generalization and abstraction, but also specification. Similar to the preverbal communication of mammals, human communication is able to specify something through involuntary kinesic and paralinguistic significations. Wolfe explains how bodily movements, the

magnitude of gesture, the loudness of voice, the length of pause in speech, muscle tension, bodily movements, and irregular respiration help articulate something in a particular way. Making this point in reference to animals, Bateson contends that "[i]f you want to know what the bark of a dog 'means,' you look at his lips, the hair on the back of his neck, his tail, and so'" (cited in Wolfe 2003, 40). Hence, understanding nonhumans will require a sensitivity to nonhuman bodily movements.

This corporeal contextualization extends beyond the body to the coordination of movements in general. Understanding nonhumans also depends on the co-creation of a shared world of common practices. As Rosi Braidotti puts the point, "[t]ranspositions require precision in terms of the [spatio-temporal] coordinates of the encounters" (2006, 171). This spatio-temporal coordination is witnessed in Despret's observations of the working relationship between sheep and shepherds. This relationship involved the inhabitation of a common time and space. In Despret's words, "[a] common time, different from the previous flow of time, is established, and this common time, this shared time creates the flock—it is herding time" (2016, 32). Herding time reflects the creation of a shared rhythm of movement between the shepherd and sheep. A time is established for when to rise in the morning, when to eat, when to walk, and how fast to walk. This common world of bodies in motion creates a meaningful context that makes the other intelligible. For instance, if a sheep is not at a particular location at a particular time, this could signal a problem such as an injury. Consequently, in addition to having an attuned body, humans must be open to adjusting to nonhuman rhythms to create a common human-nonhuman rhythm, from which it is possible to understand nonhumans.

While the ability to listen requires the physical ability to hear (receive information from another), the ability to listen does not guarantee that a person will hear something. Hearing also

requires that there is something to hear. Whether there is something to hear is not always given in a becoming world, nor is it completely independent of humans given that humans are *of* the world. Rather, whether there is a nonhuman response to hear can depend on human actions and beliefs.

A human must attune their body such that it not only can be affected by nonhumans but can meaningfully affect nonhumans. Affecting nonhumans in a meaningful way is sometimes needed to elicit responses from nonhumans for humans to hear. In these cases, a person's body and movements must make sense and be interesting to the nonhuman such that they attempt to engage in the back and forth of communication. For example, the communication that occurs while riding a horse is premised on the rider's body being "transformed by and into a horse's body" (Despret 2004, 122).[25] Such a human body is one that "a horse can read" (Despret 2004, 122). Talented riders, in other words, have talented bodies which can generate meaningful responses because they make sense to a horse. Ultimately, this attunement between bodies results in the phenomenon of isopraxis:

> the rider thinks about the movements the horse should perform. The horse feels them and, simultaneously, reproduces them…The human's right hand imitates (and anticipates) what the horse's right front leg will do…and so on…They have learned to act in a horse-like fashion, which may explain how horses may be so well attuned to their humans, and how mere thought from one may simultaneously induce the other to move (Despret 2004, 115).

Understanding nonhumans is thus not simply about making the horse more intelligible to humans. Humans must also make themselves more interesting and intelligible to nonhumans in the attempt to enact the intelligence and agency of nonhumans. For this to occur, humans must be open to corporeal transformations to connect and communicate with nonhumans.

[25] While Despret focuses on a different example, this idea is certainly not new. Indigenous literature is replete with such accounts. For example, Sean Topkok notes how "Qayak even learns life as a caribou by becoming a caribou" (2015, 65; cited in Cuomo 2021). Similarly, Leanne Simpson writes about Nishnaabeg intelligence and how "[Kwezens] already understands the importance of observation and learning from our animal teachers, when she watches the squirrel so carefully and then mimics its actions" (2014, 6).

Open-ended curiosity also involves an epistemic openness towards nonhumans. On the one hand, epistemic openness is a matter of believing in nonhumans as becoming, open-ended, individual subjects. Drawing on the experiment of psychologist Bob Rosenthal, Despret evinces the performative, ontological power of belief to evoke interesting becomings. In the experiment, Rosenthal gave each of his students a rat, which he told them was either dull or bright. While Rosenthal explained that the bright rats were selectively inbred at Berkeley to better navigate mazes, in actuality the rats were all the same. According to Despret, Rosenthal's stature and Berkeley's prestige authorized the students with bright rats to believe in them in order to fulfill his expectations.[26] They proposed to the "animal to give the best of what *may* be expected…giving chances to many more entities to belong to the real world" (Despret 2008, 120). The students' belief was not merely an intellectual conjecture. The supporting environment: Rosenthal's expectations, the teacher-student relationship, and Berkeley's prestige evoked new affectivities in the students. They cared about their rats. In Despret's words, the students became passionate in that they made "an effort to become interested, to immerse [themselves] in the multitude of problems" of their rat (2004, 131). The affects produced in the students, in turn, led the students to affect the rats in a different way. The students with the "bright" rats listened to them in the sense of paying greater attention to them, treating them with greater care, handling them more gently, and encouraging them more (Despret 2004, 118). These beliefs and affectivities made the students available to an event: the "bright" rats actually performed better and became bright rats.[27] In

[26] Expanding on the work of Thomas Birch (1993), Jim Cheney (1998), and Cheney and Anthony Weston (1999), Despret's concept of authorization evinces how the acquisition of open-ended curiosity is not simply an individual affair, depending on an individual's belief and will. Open-ended curiosity depends on socio-political, cultural, and environmental factors. The transformation in students that resulted in believing in and being passionate about their rats depended on the appropriate supporting environmental relationship: the cultural standing of science in the West, the academic reputation of Rosenthal, the student-teacher relationship, and the prestige of Berkeley. To be fair, the work of Birch, Cheney, and Weston helps authorize this type of open-ended belief in nonhumans.

[27] Despret observes the same phenomenon occurring in the case of Hans: "the [researchers] who succeeded with Hans did so as long as they were confident of success: 'when they did not anticipate success, they failed'" (2004, 114).

Barad's terms, these beliefs, affectivities, and practices were part of the material-discursive apparatus that made an agential cut, which performed real bright rats.[28] Thus, while listening requires there is something to listen to, this is not always given from the outset. The epistemic openness associated with believing in nonhumans can produce interesting nonhumans to listen to.[29]

The performative power of belief extends outside Rosenthal's laboratory. Kimmerer repeatedly calls on her readers to trust the land. Similar to Rosenthal providing the appropriate environmental support to authorize his students to believe, Kimmerer provides ample evidence, reasons, and stories that authorize her audience to believe in nonhumans. For example, Kimmerer argues that nonhumans can and should be trusted because of the wisdom they have from being on earth longer than humans. This helps authorize her audience to have an open-ended curiosity, which leads them to stop and listen to nonhumans.

On the other hand, epistemic openness is a matter of asking good questions. Despret is critical of experimental practices in which humans submit nonhumans to questions that have been constructed and defined solely by humans. Insofar as these questions have nothing to do with the nonhuman, Despret contends that they are not likely to evoke (interesting) responses. Such experimental questions and practices reduce nonhumans to mechanical reactions, rather than allowing them to respond in their own terms. In the words of Val Plumwood, a potential dialogue becomes a mere monologue in which the nonhuman is reduced to "a reflection of [human] self and self's needs, as a resource or shadow" (Plumwood 2002, 189-190). Consequently, there is nothing

[28] While not citing Barad, Despret remains consistent with Barad's posthuman performativity in noting that it was not simply the human students who were responsible for performing the rats as bright. Despret mentions that the rats have an active role in the outcome of the experiment and did not have to comply with the wishes of the students.
[29] This point is another reason for the 'dash' between onto-epistemic. Beliefs about the intelligence of a rat can transform the world to include rats with greater abilities to navigate mazes. The world involving the prestige of Rosenthal and Berkeley and the entire material institution of higher education can transform beliefs, authorizing students to have faith in their rats.

interesting to listen to—that is, there is not another individual voice to listen to. In order to listen to a nonhuman as a becoming, relational individual, Despret contends that it is necessary to ask questions that not only make sense, matter, and are interesting to this specific nonhuman, but also allow them to respond in their own way. Hence, instead of experimenting on nonhumans, humans must experiment *with* nonhumans such that the nonhuman is an active, collaborative partner who has the power and authority to change the question such that it is more appropriate to them. One aspect of epistemic openness is thus being open to changing one's beliefs, questions, and epistemic norms in relation to nonhumans.

Asking good questions and evoking nonhumans as active collaborative partners to be listened to requires an environmental context that is open.[30] Rather than experiments that create docility, an open experimental context is characterized by availability (Despret 2004). An experiment in availability uses apparatuses and practices in a way to maximize the chances for misunderstandings.[31] Instead of misunderstanding being contrary to understanding, Despret maintains that a "profound interest in misunderstandings" is essential to understanding (2008, 125). Experiments that are open and available to misunderstandings provide opportunities for nonhumans to resist questions that are inappropriate to them.

This profound interest in misunderstanding allows a shared world and common meanings to develop. If there is no pre-existing world of understanding to discover, humans and nonhumans must create this world together As Despret puts it, "[m]eanings are constructed in a constant movement of attunement, which makes them emerge" (2008, 125). In order for humans not to

[30] Traci Warkentin draws a similar conclusion, writing, "the bodily enactments of openness and responsivity in interspecies interactions matters as much as where and how the meeting takes place" (2010, 118).

[31] While I am sympathetic to Despret's overall project, she seems to make the same oversight that Haraway makes with regards to agency. As Zipporah Weisberg argues (2009), while stressing the agency of animals such as Oncomouse, Haraway overlooks the power imbalance between humans and nonhumans. For example, while the rats in Rosenthal's experiments act on the students, the experiment does not seem to be available to the misunderstanding concerning whether the rats want to be a part of the experiment.

project and force their meanings on nonhumans, but allow them to speak for themselves and answer in their own way to questions that appropriate to them, humans must be open to being wrong and sensitive to the partiality and translations enacted by particular apparatuses and practices. Being open and available to misunderstandings ultimately motivates one to engage in a recursive process of "continually adjusting and negotiating what is understood" through a "continuous reprisal of translations and betrayals of meaning" (Despret 2008, 126). This recursive process tunes meanings and can ultimately create a shared understanding.[32] Epistemic openness therefore involves not only asking questions, but asking attentive, open-ended questions "that lead to more questions," which allow for the further refinement of one's understanding (Buchanan 2015, 23).

For instance, in her research on the working relationship between shepherds and sheep, Despret created a space of availability by activating the shepherds as knowledgeable subjects through the phrasing of her questions. By prefacing her questions with "according to you, as breeders," she positioned the shepherds as experts. Her acknowledgement of shepherds as expert breeders encouraged them to resist, uproot, and displace her questions. As Despret observed, "when they found the right way of formulating it, they answered" (2008, 133). Thus, the silence of others is not necessarily a sign that they have nothing to say or are not knowledgeable. Rather, the silence could reflect how researchers are not asking the right questions.

The same point also applies to human-nonhuman relations. The psychologist Irene Pepperberg successfully taught Alex, a grey parrot from Gabon, to speak, by asking the right questions and creating an experiment in availability. According to Despret, this accomplishment

[32] This recursive approach underscores the value of curiosity in the sense of Despret's understanding of passion. Being passionate means "to make an effort to become interested" (Despret 2004, 131). By continuing to make an effort with this recursive approach, a person has a better chance of eventually understanding nonhumans.

was made possible because Pepperberg agreed to situate herself in a "regime of transformation" such that she, her questions, and experimental practices became a part of the experiment (Despret 2008, 128). To keep Alex interested in learning to speak, Pepperberg showed Alex how language could be used to influence his environment, including the actions of Pepperberg. Pepperberg would give Alex a reward if he correctly identified an object. If he did not want that reward, but preferred to go on a walk, Pepperberg would comply. That is, Pepperberg followed the actor (Alex) himself. "The reward, then," Despret explains, "translates for Alex as the right to 'want' and to take a position in relation to what is offered to him" (2008, 125-6). Similar to the careful phrasing of Despret's questions, the rewards and Pepperberg's receptivity positioned Alex as a subject of authority that makes claims on others. In such a position, Alex could resist and change the experimental questions and practices such that they remained interesting to him and allowed him to answer them in his own terms. By subordinating her desire "to what makes sense for Alex in the matter of speaking," Pepperberg was able to "negotiate with Alex over what in speech could interest him" (Despret 2008, 127). Consequently, Alex continued to be responsive such that there was something to listen to.

The manifestation of misunderstandings requires epistemic humility. Due to the exclusionary nature of apparatuses and the open-ended becoming of a relational world, a human must have the humility to embrace how they do not, and will not, understand everything about nonhumans once and for all (Alaimo 2008).[33] Humility entails not jumping to conclusions in the attempt to regain control and mastery of the situation through absolute universal Truths regarding who/what the other is. Regarding the results of Pepperberg's experiment, Despret stresses that "[i]f the parrot can talk, we do not know what it is, nor what parrotness is, nor anything about the point

[33] Behnke also emphasizes the importance of not-knowing, advocating a "genuine attitude of not-knowing what was going to happen next" (1999, 107).

of view of parrots on the world" (2008, 128). Put differently, it is important to resist the urge to move too quickly from concrete particular nonhuman (Alex) to a general, abstract nonhuman (parrotness), or from a general, abstract nonhuman (parrotness) to concrete particular (Alex). An individual nonhuman does not speak for all members of its species, and one species of nonhumans does not speak for all nonhumans.[34]

The problem with such universals is that they decrease one's epistemic openness to the nonhuman other as a relational and becoming individual. When a person assumes they already know the answer to who/what the other is and who/what is acting, they no longer need to continue to pay attention to the actions of the other because the other will inevitably conform to this answer, essence, or stereotype. As Ronald Regan put it, if you have seen one redwood, you have seen them all; thus, there is no need to go see *this* one or get upset about *that* one being cut down. Moreover, even if you go to encounter an individual nonhuman, these stereotypes make it "quite likely that we will be unable to recognize [the intelligence, activity, viewpoints, desires, and projects] in the nonhuman sphere even when we are presented with good examples of them" (Plumwood 2002, 176).

Epistemic openness seeks to appreciate how the result of an intra-action is an open question due to the relational and dynamic nature of identity. That is, if identity is a congealing of agency based on a differential articulation between an agency of observation and observed agency, it is not always clear who is acting. Did Alex not answer because he cannot, and maybe never could, or did he not answer because the question was a bad question? Despret (2004) helps make this point with William James' theory of emotions and his example of wine. Does wine make our body

[34] Plumwood makes a similar point, critiquing the impulse to stereotype nonhumans as a homogenous, interchangeable group of "mindless 'objects', non-intentional mechanisms with no potential to be communicative and narrative subjects, as lacking potential viewpoints, well-being, desires and projects of their own" (2002, 175).

joyous, or does our body make the wine joyous? Rather than accepting either option of this false dilemma, the point is to linger in the in-between to allow something more interesting to emerge. In Despret's words, "leaving it undetermined and hesitate allows many more entities to be active" (2004, 123).

More specifically, epistemic humility allows (mis)understandings to manifest through the temporal openness associated with patience and hesitation. Patience and hesitation provide an occasion for the process of "waiting, watching, learning, and playing" (Buchanan 2015, 23). As Nietzsche puts it, this involves "accustoming the eye to rest, to patience, to letting things come to it; learning to defer judgement, to encircle and encompass the individual case on all sides. This is the first preparatory school for intellectuality: not to react immediately to a stimulus" (2008, 41). When a person defers judgement, they open their bodies and prolong the corporeal encounter with the other. This prolonged encounter enables them to follow the actor themselves and to be affected in new, different ways by the different sides of nonhumans. Similar to the welcoming state of the relaxed bodies of Hans' researchers, understanding nonhumans as an open-ended question—in which no one knows completely in advance what exactly to expect—makes humans more receptive to the surprising events precipitated by the quirkiness of nonhuman individuals. In other words, being patient and hesitating allows humans to better understand a nonhuman as a relational becoming individual in terms of how they actually affect the world and are affected by it.[35] In doing so, humans have the chance of being "referred to another mode of existence" (Despret 2008, 126). Thus, epistemic openness does not begin and end with the acknowledgement of nonhumans as unknowns, but ultimately seeks to better understand and appreciate nonhumans.

[35] Of course, lingering, patience, and hesitating require time. Time is unfortunately a privilege not shared by everyone. For instance, if a person has to work more than one job, this takes away time from being with their family and friends, let alone leisurely lingering in the presence of nonhuman animals. Accordingly, to make temporal openness more universal requires confronting exploitative capitalism, patriarchy, and white supremacy.

To end where this paper began, Kimmerer recounts a classroom experience in which her students eagerly seek to spread the word upon learning about a particular example of environmental destruction. The rationale being that "if people only knew." But, as Kimmerer notes, "[p]eople *do* know the consequences of our collective damage, they *do* know the wages of an extractive economy, but they don't stop" (2013, 328). Kimmerer's anecdote reflects how people's lack of action to mitigate environmental problems is not merely caused by not knowing the relevant facts. For this information to move people to act appropriately, they first need to acquire different affectivities. In order to learn to be affected in different ways, people must wait, watch, listen, put their hands in the soil, and ultimately play in and with nature. As Kimmerer explains, "[i]t is not a question of first getting enlightened or saved and then acting. As we work to heal the earth, the earth heals us" (2013, 340). For a Westerner audience who currently lacks a rich culture of interspecies etiquette, there are many ways to get one's hand in the soil that are not environmentally beneficial. By sharing the gifts of Kimmerer, Barad, and Despret, this paper has sought to help authorize and extend work calling for greater attention, openness, responsiveness, and the ethics-based epistemology of an environmental etiquette. In particular, open-ended curiosity was advanced as an onto-epistemic virtue that sets the stage for ethically interacting and intra-acting with nonhumans. By being open to changing one's beliefs and questions as well as one's body and the larger network of associations in relation to nonhumans, open-ended curiosity creates the possibility that human-nonhuman encounters will result in more attuned affectivities. This attunement produces human bodies and minds that are attentive to nonhumans. Such bodies and minds create the occasion to not only listen to nonhumans, but also to be moved by what is heard.

The question is ultimately whether Westerners will commit to 'studying up' so that they are in a position to better understand the complexities of nonhumans. As Plumwood explains, studying up "is not so much a question of whether earth others are good enough for ethically rich relationships, but whether we (western) humans are" (2002, 168). While it is tempting to point to the climate crisis and the sixth mass extinction, among a litany of other environmental problems, to motivate people to acquire open-ended curiosity, this would re-introduce a logic of scarcity that has been partially responsible for the exploitation of the environment (Daggett 2019). Such a line of reasoning motivates people based on the fear of ensuing loss, violence, and death. Nature continues to have a threatening presence, this time threatening retaliation for human neglect and abuse. Kimmerer's environmental ethic performs another possibility, though. Nature is no longer reduced to a threat. It is a source of being and joy. Nature provides humans not only with external things, but gives humans their gifts and agential abilities, which are essential to a thriving and flourishing life. Moreover, with Kimmerer, ethical action goes from being a disinterested duty to a joyful affair. Each person has a specific responsibility to share their gifts with the world to give back for everything they have received from nature. By cultivating the virtue of open-ended curiosity, humans can better understand nonhumans, which ultimately allows humans to be better gift givers with more joyful existences.

References

Adeline Johns-Putra. 2013. Environmental care ethics: Notes toward a new materialist critique. *symplokē*, 21(1-2), 125-135.

Alcoff, Linda. 2008. How is epistemology political? In *The feminist philosophy reader*, eds. Allision Bailey and Chris Cuomo, 705-717.McGraw-Hill.

Alaimo, Stacy. 2016. *Exposed: Environmental politics and pleasures in posthuman times*. University of Minnesota Press.

Alaimo, Stacy. 2008. Trans-corporeal feminisms and the ethical space of nature. In *Material feminisms*, eds. Stacy Alaimo and Susan Hekman, 237-264. Indiana University Press.

Barad, Karen. 2007. *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning.* Duke University Press.

Barad, Karen. 2008. Posthumanist performativity: toward an understanding of how matter comes to matter. In *Material feminisms*, eds. Stacy Alaimo and Susan Hekman, 120-156. Indiana University Press.

Behnke, Elizabeth A. 1999. From Merleau-Ponty's Concept of Nature to an Interspecies Practice of Peace. In *Animal others: On ethics, ontology, and animal life*, ed. H. Peter Steeves, 93-116. SUNY Press.

Birch, Thomas. 1993. Moral considerability and universal consideration. *Environmental Ethics*, 15(4), 313-332.

Braidotti, Rosi. 2006. *Transpositions: On nomadic ethics*. Polity.

Buchanan, Brett. 2015. The metamorphoses of Vinciane Despret. *Angelaki*, 20(2), 17-32.

Butler, Judith. 2006. *Precarious life: The powers of mourning and violence*. Verso.

Butler, Octavia E. 2019. *Parable of the Sower*. Grand Central Publishing.

Cheney, Jim. 1998. Universal consideration: An epistemological map of the terrain. *Environmental Ethics*, 20(3), 265-277.

Cheney, Jim, and Anthony Weston. 1999. Environmental ethics as environmental etiquette. *Environmental Ethics*, 21(2), 115-134.

Coulthard, Glen, and Leanne B. Simpson. 2016. Grounded normativity/place-based solidarity. *American Quarterly*, 68(2), 249-255.

Cuomo, Chris. 2021. Respect for nature: learning from Indigenous values. In *The virtues of sustainability*, ed. Jason Kawall, 135-161. Oxford University Press.

Curley, Andrew. 2021. Resources is just another word for colonialism. In *The Routledge handbook of critical resource geography*, eds. Matthew Himley, Elizabeth Havice, and Gabriela Valdivia, Routledge Press.

Daggett, Cara New. 2018. Petro-masculinity: Fossil Fuels and Authoritarian Desire. *Millennium: Journal of International Studies*, 47(1), 25-44.

Daggett, Cara New. 2019. *The birth of energy: Fossil fuels, thermodynamics, and the politics of work*. Duke University Press.

Despret, Vinciane. 2004. The body we care for: Figures of anthropo-zoo-genesis. *Body & Society*, 10(2-3), 111-134.

Despret, Vinciane. 2008. The becomings of subjectivity in animal worlds. *Subjectivity*, 23(1), 123-139.

Despret, Vinciane and Michel Meuret. 2016. Cosmoecological sheep and the arts of living on a damaged planet. *Environmental Humanities*, 8(1), 24-36.

Haraway, Donna. 2008. Otherworldly conversations: terran topics, local terms. In *Material feminisms*, eds. Stacy Alaimo and Susan Hekman, 157-187. Indiana University Press.

Haraway, Donna. 2016. Staying with the trouble: Making kin in the Chthulucene. Duke University Press.

Hinton, Peta. 2013. The quantum dance and the world's 'extraordinary liveliness': Refiguring corporeal ethics in Karen Barad's agential realism. *Somatechnic*s, 3(1), 169-189.

Kimmerer, Robin Wall. 2013. *Braiding sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants*. Milkweed Editions.

Kuokkanen, Rauna. 2006. The logic of the gift: Reclaiming Indigenous peoples' philosophies." In *Re-ethnicizing the Minds?: Cultural Revival in Contemporary Thought*, eds. Thorsten Botz-Bornstein and Jürgen Hengelbrock, 251-271. Rodopi.

Latour, Bruno. 2007. *Reassembling the social: An introduction to actor-network theory*. Oxford University Press.

Lema, Sean. 2014. The ethical implications of organism-environment interdependency. *Environmental Ethics*. 36(2), 151-169.

Nietzsche, Friedrich. 2008. *Twilight of the Idols*. Oxford University Press.

Plumwood, Val. 1993. Feminism and the mastery of nature. Psychology Press.

Plumwood, Val. 2002. Environmental culture: The ecological crisis of reason. Routledge Press.

Simpson, Leanne. 2014. Land as pedagogy: Nishnaabeg intelligence and rebellious transformation. *Decolonization: Indigeneity, Education & Society*, 3(3), 1-25.

Todd, Zoe. 2016. An Indigenous feminist's take on the ontological turn: 'Ontology' is just another word for colonialism. *Journal of Historical Sociology*, 29(1), 4-22.

Topkok, Sean. *Iñupiat Ilitqusiat: Inner views of our Iñupiaq values*. PhD Dissertation, University of Alaska at FairBanks.

Wallace-Wells, David. 2020. *The uninhabitable earth: Life after warming*. Tim Duggan Books.

Watts, Vanessa. 2013. Indigenous place-thought & agency amongst humans and nonhumans (First Woman and Sky Woman go on a European world tour!). *Decolonization: Indigeneity, Education & Society*, 2(1), 20-34.

Weeks, Kathi. 2011. *The problem with work: Feminism, Marxism, antiwork politics, and postwork imaginaries*. Duke University Press.

Warkentin, Traci. 2010. Interspecies etiquette: An ethics of paying attention to animals. *Ethics and the Environment*, 15(1), 2010.

Weston, Anthony. 2004. Multicentrism. *Environmental Ethics*, 26(1), 25-40.

Yazzie, Melanie K. 2018. Decolonizing development in Diné Bikeyah. *Environment and Society*, 9(1), 25-39.

Wolfe, Cary. 2003. *Zoontologies: The question of the animal*. University of Minnesota Press.

Weisberg, Zipporah. 2009. The broken promises of monsters: Haraway, animals and the humanist legacy. *Journal for Critical Animal Studies*, 7(2) 23-62.