All Life is Encounter

Quantum Physics and the Ethics of Relational Ontology

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The Flower Sermon

Toward the end of his life, the Buddha took his disciples to a quiet pond for instruction. As they had done so many times before, the Buddha's followers sat in a small circle around him, and waited for the teaching.

But this time the Buddha had no words. He reached into the muck and pulled up a lotus flower. And he held it silently before them, its roots dripping mud and water.

The disciples were greatly confused. Buddha quietly displayed the lotus to each of them. In turn, the disciples did their best to expound upon the meaning of the flower: what it symbolized, and how it fit into the body of Buddha's teaching.

When at last the Buddha came to his follower Mahakasyapa, the disciple suddenly understood. He smiled and began to laugh. Buddha handed the lotus to Mahakasyapa and began to speak.

"What can be said I have said to you," smiled the Buddha, "and what cannot be said, I have given to Mahakasyapa."[i]

Introduction

It is said that the birth of Zen began with a flower and a smile. In the simple, enigmatic gesture of the Buddha—silently holding up a lotus flower to his disciples—centuries of Buddhist thought has meditated on the apophatic nature of truth and the tender, fragile beauty of existence.

What was it exactly about this vision of the lotus flower that provoked in Mahakasyapa such a legendary smile? Two and a half millennia later, the sonorous depth of this silent sermon calls out to us with urgent insistence. Wordlessly, it gestures. Can we hear it amidst the hum and whir of technological civilization?

We know this much: The challenges of the 21st century are only just beginning. In the gathering roar of ecological collapse—a moment in which even the honey bees find themselves exhausted and disoriented in their floral ministrations[ii]—what message can we find in the silent gesture of the Flower Sermon?

Hope and possibility are linked in our world like lightning and fire. What we cannot hope for, we cannot become. Just as a flash of hope can illuminate, an intimation of possibility can ignite. Amidst the rising waters of a warming planet, there is still yet the possibility for the future to become *differently*. The answer lies not in more knowledge, but at the intersection of knowing and being—in the entangled embrace of flesh. Do we understand the nature of our roots and our rootedness? Or do we imagine ourselves only as the petals that grow above the surface? In the difficult times to come—in the moments of disruption and dislocation when we find ourselves raised up out of the water, our roots dripping with mud—we may gain the chance to see ourselves differently and so to *be* differently. Gardeners know there is a narrow window of possibility for a lotus plant to survive dislocation. Timing is crucial: the roots have to be ready.[iii]

Perhaps we might find some further measure of hope in the remarkable fact that preserved lotus seeds are known to remain potent in their vitality for *centuries*, patiently waiting for the right conditions to sprout. The oldest revivification on record now stands at 1,300 years.[iv] If we were to come across an ancient lotus seed today, buried somewhere deep in our cultural discourse, might we still

find a way to see it blossom? Perhaps, in the mud and muck and silt of our civilizational shores, there are seeds of vitality waiting to be found. Seeds whose roots can teach us new patterns of how to live and grow *together*, rather than apart. Indeed, we are approaching the boundaries of an era of either shared abundance, or ecological apartheid. No sermonizing here: These stakes are real.

As we shall explore, there is reason to hope for just such a seed, waiting to bloom in the heart of modern civilization. It is an ancient seed: one that has sprouted in various times and places in history. By different names this seed has been known. "Dependent origination" is the way the Buddha described it. "Relational ontology" would be its name in contemporary philosophy. Our most proximate reason for hope is the way in which modern science has developed in the last century into a vision of reality that happens to coincide "spookily" with ideas that have so often been the province of mystics and saints. Perhaps, in the disruption to come, and with the weight of modern science's empirical grounding, we might find a way to hear anew the message of the Flower Sermon and be drawn into engagement with its message about the delicate, fragile beauty of being and becoming in the world.

To guide our journey—this search for a seed, folded in the muddy dark where science and sermons meet—we will be drawing upon the lively discourse of contemporary philosophy. In particular, the work of Karen Barad, whose 2007 *Meeting the Universe Halfway: Quantum Physics and*

the Entanglement of Matter and Meaning, is an exposition of the ontological implications of quantum physics and its relevance to an urgent ethics of relational ontology. Through her work, we learn of the conceptual obstacles that have prevented a century's worth of debate in the scientific community from coming to consensus about the *meaning* behind the math of quantum physics. These obstacles have made it difficult to accept the root-level implications first perceived and developed at the inauguration of the field by its founding physicist: Niels Bohr. Barad convincingly argues in support of Bohr's vision, for a way to retain key scientific principles of objectivity and realism in the midst of a relational ontology that differs so radically from the two-thousand-year-old Aristotelian "substance ontology" that has dominated Western science and philosophy. The tradition of Aristotelianism has prevented generations of scientists, including even Albert Einstein, from being able to accept quantum theory's implications about the nature of reality. With Barad, we will imagine the development of an empirically-grounded relational ontology whose ethical implications stretch into considerations of political and ecological justice as urgently today as for our spiritual forebears: a demand for universal compassion, justice, and liberation in a world of suffering.

Before we proceed further, however, let's begin with a brief meditation of our own and imagine what we modern readers might perceive if we lingered for a moment in stillness by the pond.

Flower, Roots, Mud, and Water

First, the flower. Certainly, the radiant beauty of the flower itself might be the most immediate observation to come to mind. Having at last begun traversing in contemporary thought the false divide of a Cartesian dualism and its ancient Platonic roots, we can now recognize the remarkability of a flower like the lotus in a new way. The lotus–which beyond its aesthetic beauty has been shown to *maintain its own body temperature*, and which provides food and medicine to millions around the world[v]–stands for us as a provocation to a new consciousness of the material world and its vibrant aliveness. With contemporary philosophers like Jane Bennett and the school of New Materialism[vi], we might see in the Flower Sermon an invitation to a new identity in the natural world–leaving behind the anthropic exceptionalism that has allowed us to consume and extract from ecosystems as if we weren't actually a vulnerably dependent part of them.

Continuing our meditation, we might find our attention drawn to the pond itself, and to the fundamental *groundlessness* of a flower like the lotus that grows and floats on the surface of water. Recalling with Heidegger and the deconstructionists the 17th century mystical verse –"the rose is without why"[vii]–we might see in the Lotus Flower a liberatory symbol of post-foundationalist thought. In the exhilarating thrownness of groundless becoming, we hear in the Flower Sermon an exhortation to recognize meaning and value in a new way–one that emerges as an expression of diversity and difference, rather than from a transcendent source of value beyond, behind, or below.

Or possibly, it would be the *roots* of the lotus that call our attention, dripping with water and earth. With poststructuralist delight, we might notice that lotus flowers exhibit the rhizomatic 'no-trunk-all-branches' structure that Gilles Deleuze celebrated as a model for ontologies of difference rather than the ontologies of identity that have dominated Western philosophy. As a rhizomatic plant, capable of growing indefinitely in networked webs of relationality, the lotus exhibits the kind of resilient, distributed, decentralized structures of mutuality and justice that we seek to build into the politics and economics of our fraught 21st century.

Lastly, we might be chagrined if, in our reverie, we forgot to notice *the gesture itself* of the Buddha's extended hand, silently presenting a gift to his circle of friends. Could we find in this moment of encounter, in the gift and its reception, an evocation of the kind of relational ontology that contemporary feminist thought, queer theory, and eco-theology lift up as a necessary step forward into amorous entanglement? We might find further resonance with the existential ethics of Martin Buber, whose 1923 landmark *I and Thou* declared: "I require a You to become; becoming I, I say You. All life is encounter."[viii] In the moment of encounter itself, before the face of another, Buber finds reason to smile a Mahakasyapan smile. His philosophy of identity-in-relationship—like the Buddha's teaching of the "dependent origination" of all things—stands in stark contrast to the sovereign self that has dominated the Western imagination. Indeed, it

beckons us towards a different path entirely. Into the mud: where roots and earth embrace.

Dependent Origination

As we conclude our flower meditation by the pond, then, let us be sure to consider the meaning it has held for Buddhism itself. Buber's idea that *all life is encounter* actually gets quite close to the meaning it held for the great 2nd century Buddhist philosopher Nagarjuna, whose philosophy of "dependent origination" articulates one of the central tenets of Buddhist thought. The theory of dependent origination holds that everything that exists emerges in a radically contingent fashion, appearing from within a boundless chain of nested causal relationships, with no independent existence of its own. For Nagarjuna, this means there is no enduring or independent reality, and no such thing as essence or substance. Rather, as he explains: all is emptiness (*sunyata*). "Things derive their being and nature by mutual dependence and are nothing in themselves," he wrote in his famous *Mūlamadhyamakakārikā*.[ix] Nagarjuna was not articulating a philosophy of nihilistic despair, and nor did he wish to deny the reality of that which emerges in our experience, but his goal was to resist the idea of *independent existence*, separate, prior to, or beyond relationship. Nagarjuna saw the fundamental source of suffering in the world to be related to this false reification of reality, in violation of the truth of its dynamic, emergent, interdependent relationality. *Sunyata*, though usually translated as 'emptiness', is best understood as referring to the universal groundlessness of contingent existence.

For students of philosophy, Nagarjuna's ontology of 'emptiness' stands in direct opposition to the ontology of *substance* that has been the bedrock of the Western tradition since Aristotle articulated his "first philosophy" of Metaphysics in the 4th century BCE. Aristotle's ontology of Being as essence (*ousia*), represents a belief in precisely the enduring, discrete, independent existence of material substance that Nagarjuna explicitly rejects.

The contrast between these two philosophical positions frames the investigation that follows. As it turns out, Nagarjuna's doctrine of dependent origination and Buber's philosophy of identity formation and ethics of relational encounter--"I require a You to become"–is precisely what contemporary science is coming to believe about the nature of reality. In the words of one contemporary philosopher of science, quantum physics shows us that "matter does not refer to a fixed substance; rather, matter is substance in its intra-active becoming–not a thing but a doing, a congealing of agency."[x]

This is a significant statement. Generations of western scientists trained in the context of Aristotelian metaphysics have struggled to reconcile their views with the quantum physics-inspired idea that we live in a fundamentally interwoven and entangled cosmos, and that we exist not as discrete and separate entities with our own essences but rather that we emerge from, within, and as, relationship itself.

In the pages that follow, our attention will be focused on this remarkable development in the history of science

and philosophy. In particular, we want to explore the ways in which we can draw upon quantum physics as an empirically grounded justification to argue for a *relational* ontology in contemporary philosophy. Our purpose is to support and strengthen a larger project in critical theory that aims to resist ideologies of oppression and extraction that have so often accompanied philosophical systems that have prioritized identity as substance rather than as something that emerges from relationship, *as response*. In doing so, our goal is to explore how we might understand the meaning and implications of these ideas if we take them seriously at the level of ethics, politics, economics, and ecology. After all, in light of the ways in which our conception of identity drives so much of the conflict of our world—and the ecological crisis that threatens our very existence—we might be well-served by an exploration into how we are more deeply connected with each other and with the world around us than we have traditionally assumed.

To begin, let's fast forward two millennia from the edge of our quiet pond, to the bustling city of Brussels, 1927: it is early morning, at the dawn of the quantum revolution.

Chapter 1 - Quantum Physics

Bohr vs. Einstein

While much has been learned and experimentally verified over the past century regarding the mathematical accuracy of quantum physics, the determination of *what it means* about the nature of reality has been in contention since its very earliest days. Famously, Albert Einstein devoted much of the second half of his career to disputing the early interpretations of quantum mechanics by physicists like Niels Bohr. The Bohr-Einstein debates at the Fifth Solvay Conference on Physics in Brussels in 1927 have been memorialized into a historic clash of worldviews—with Einstein on one side, holding firm to a classic belief in a deterministic physical reality, and with Bohr on the other, espousing a view that

the material world is fundamentally entangled and incapable of being analyzed into discretely separate physical objects.

Laboratory experiments at the time were beginning to reveal unexpected results when scientists peered down to the sub-atomic level. Light seemed to behave contradictorily as both wave *and* particle, depending on how it was observed; and particles that came into contact with one another seemed to become intertwined in ways that scientists had never seen before—responding instantaneously to actions performed on the other, even when separated. Einstein was convinced that such "spooky action at a distance"[xi] was impossible because instantaneous communication violated the laws of relativity, which set a strict speed limit to the universe: nothing can travel faster than the speed of light. In *Meeting the Universe Halfway,* Karen Barad explains that Bohr was not troubled by Einstein's concerns because "Bohr did not share the same metaphysical beliefs."[xii] For Bohr, the "so-called instantaneous communication between spatially separated systems is explained by the fact that these allegedly separated states are not really separate at all, but rather 'parts' of one phenomenon." In stark contrast to 2,000 years of Aristotelian metaphysics, Niels Bohr believed that something was being observed that challenged the classic notion of the identity of separate substances: These particles seemed to become *actually* intertwined with one another in a state of interrelationship. Einstein and others, however, were convinced there must be an answer, a hidden variable

perhaps, that if discovered would retain the classic model.

The sense of tension in the drawing rooms and dining halls at Solvay was palpable. The world's leading physicists were all gathered: Ernst Schrodinger, Max Planck, Werner Heisenberg, and many others. (17 of the 29 attendees were, or would become, Nobel laureates.[xiii]) The debates were polite, but impassioned. If Bohr was correct, it meant that the idea of objective truth—the cornerstone of the scientific method for five hundred years—was in jeopardy. Taken further, it even seemed to imply that the idea of objective reality as we know it could be merely an illusion. Despite the radical implications of such a view, and despite Einstein's impassioned attempt to ground quantum physics in a larger framework that would maintain the fundamental discreteness of separate objects in space and time, by the morning of the last day the general consensus was that Bohr had won the scientific debate.

Not everyone was convinced, however. In fact, to this day there remains no consensus among physicists on how to understand quantum physics. Everyone agrees on this much—*the math works*—but Barad, citing another theorist in the field, explains that the ongoing search for alternative interpretations to the one originally developed by Bohr "is motivated by trying to evade its radical consequences."[xiv]

Shut Up and Calculate!

At stake in the debates between Einstein and Bohr were a set of issues so fundamental to the modern scientific worldview—issues of objective truth and objective reality—that the inability to reconcile the picture of reality it seemed to provide resulted in a collective agreement in much of the physics community after the 1930s to simply ignore the question of meaning entirely and to leave the issue of interpretation to the realm of philosophy. The debates continued heatedly in the 1930s, but as the world fell headlong into the Second World War, philosophical issues of how to understand the meaning of quantum physics were largely abandoned as the military and commercial value of applied quantum mechanics became more immediately valuable. Karen Barad points out that a recent re-opening of the discussion has emerged "only in the past decade,"[xv] prior to which the computational success and technological application of quantum physics has dominated the culture of the field. Informally, the rallying cry for many decades in the physics profession became the apocryphal command: "Shut up and calculate!"[xvi]

As a philosopher of science, Karen Barad has been concerned to resurrect the terms of this century-old debate and push more forcefully for a reckoning with the full implications of Bohr's strikingly bold, original interpretation of quantum physics. Even though Bohr today is recognized, along with Werner Heisenberg, as the architect of the reigning "Copenhagen Interpretation," Barad points to the critical way in which Bohr's interpretation has been effectively ignored by the

majority of the science community, which prefers to blend his thought together with Heisenberg's famous "Uncertainty Principle" that limits what can be known at the quantum level.

Bohr was insistent that Heisenberg's epistemological uncertainty did not go far enough. "For Bohr, what is at issue is *not* that we cannot know both the position and momentum of a particle simultaneously," but rather "that particles do not *have* determinate values of position and momentum simultaneously."[xvii] Thus, while Heisenberg was focused on uncertainty, Bohr was pointing to the nature of material *indeterminacy.*

The difference between uncertainty on one hand and *indeterminacy* on the other is the difference between epistemology and ontology, between knowing and being. While Heisenberg's contribution emphasizes the limits of what we can *know*, Bohr's emphasis is on the ontological indeterminacy of material reality itself. Barad continues: "In essence, Bohr is making a point about the nature of reality, not merely our knowledge of it. What he is doing is calling into question an entire tradition in the history of Western metaphysics: the belief that the world is populated with individual things with their own independent sets of determinate properties."[xviii] Bohr's emphasis is on the irreducible entanglement at the heart of matter itself—an entanglement so deeply interwoven into the fabric of reality as to make it impossible to distinguish where one object ends and another begins.

While the views of Bohr and Heisenberg both acknowledge the epistemological limitations that quantum physics reveals, Barad sees Bohr as taking up the more radical question of *why* such a limitation exists. Bohr grappled with "what he took to be the heart of the lesson of quantum physics: *we are a part of that nature that we seek to understand*."[xix] Not only does this idea undermine the anthropic exceptionalism that has grounded the Cartesian dualism and rationalism of modern science, but it also undermines the very foundation of the scientific method itself. Traditionally, the scientific method has focused on distinguishing between the observer and the observed, and of isolating the "object" of observation from any disturbance generated by other objects or by the act of measurement. When scientists began to peer into the quantum realm, however, they ventured into the level of material reality in which the differentiation between observer and observed blends into indistinguishability. Heisenberg and others maintained that this indistinguishability was an epistemic issue, pointing to the limitations of what we can know. For Bohr, however, the implications were more far-reaching: indistinguishability was related to the fact that absolute boundaries between objects in the world *do not properly exist*. The ability to achieve a fully objective view of nature, therefore, by removing ourselves from our observation of it becomes impossible. Even more importantly according to Bohr, this implies that *we participate in the construction of the very objects we study.* As a result, quantum theory requires that we reconfigure our understanding of science to be studying not independently existing objects but rather *phenomena*, by

which he means the composite interaction of the object and the measuring apparatus. In scientific observation, according to Bohr, "the experimenter introduces a constructed cut between an object and the agencies of observation."[xx] In doing so, the experimenter participates in the experiment itself, helping to define the boundaries, and the very identity, of what is to be measured

Saving Reality

This idea—the idea that *relationships* exist prior to *things*—is what has been so difficult for scientists operating in the Western metaphysical tradition of Aristotle's substance ontology to accept. For Einstein and others, the absolute exteriority of things—their fundamental *separability* from one another—is the necessary condition for not only objectivity in science but also of objective reality itself. If we deny that there is a stable reality of ontologically separate objects on the other side of our representations, we are perceived to be denying reality itself. Barad explains that "most forms of realism presuppose a metaphysics that takes for granted the existence of individual entities, each with its own roster of nonrelational properties."[xxi] Essentially, what Einstein was resisting in Bohr's interpretation of quantum theory was its removal of absolute boundaries of separation between entities. For Einstein, the "the spatial separation of observer and observed guarantees their ontological separability and consequently secures the condition for the possibility of objectivity."[xii] Even more troubling, if quantum entanglement was true, it meant that we could not assume that any particular object we wanted to study was *actually a "complete" object*; it could simply be just a

component part of a larger 'whole' whose boundaries were unknown, porous, shifting, or even random. (Indeed, where *do* the rhizomatic roots of one lotus end and another begin?) With entanglement, the very idea of 'identity' would become a fluid approximation–an idea whose radical implications trouble a conservatism that, then as now, goes far beyond the field of physics.

Barad believes that there is a solution to this dilemma. Like Nagarjuna many centuries prior, Barad does not want to deny the reality of objects in the world or our experience of them. However, building on Bohr's conceptual framework, Barad wants to redefine both 'reality' and 'objects' to move away from the idea of "things" towards a compositional structure of *phenomena*. She explains that her position "does not take separateness to be an inherent feature of how the world is. But neither does it denigrate separateness as mere illusion."[xxiii] Like Einstein's notion of objectivity, Barad's ontology is founded "on a condition of separability," but relies on a different kind of separateness she calls "agential separability." This separability is what generates distinct phenomena. Barad explains: "Reality is composed not of things-in-themselves or of things-behind-phenomena, but of things-in-phenomena."[xxiv]

Barad defines phenomena as "the ontological inseparability of agentially intra-acting components."[xxv] This term "intra-action" forms the basis of what Barad wants to lift up as a new, quantum-informed, theory of realism she calls "intra-agential realism". In contrast to the usual nomenclature of *inter*-action, "which assumes

there are separate individual agencies that precede their interaction," the notion of intra-action "recognizes that distinct agencies do not precede, but rather emerge through" relational encounter. The resulting phenomena is not an illusion, it does not lack *reality*, but it *is* contingently formed as "a dynamic and shifting entanglement of relations."[xxvi]

The practice of scientific observation in this shifting entanglement of relations requires an expanded consideration of the role of the observer and of the observational apparatus used to take measurement. Barad argues that "our ability to understand the world hinges on our taking account of the fact that our knowledge-making practices are material enactments that contribute to, and are part of, the phenomena we describe."[xxvii] The conceptual challenge of objectivity in the midst of ontological indeterminacy is thus resolved through a recognition of the role that scientific practices play in defining the very form by which phenomena can be made observationally visible. What we "see" in scientific observation is thus intimately bound up in the mode by which we look. (A truth, Barad points out, with implications for economics and politics as much as science.)

Barad explains these practices as "boundary-drawing practices"[xxviii] that define observability by making an "*agential* cut" between observer and object, in contrast to "the more familiar Cartesian cut which takes this distinction for granted."[xxix] This notion of the agential cut is crucial for Barad, because "in the absence of a classic

ontological condition of exteriority between observer and observed, it provides an alternative ontological condition for the possibility of objectivity."[xxx] Barad's philosophy, therefore, is a realism, "but unlike traditional conceptions of realism, 'objectivity' is not preexistence (in the ontological sense) or the preexistent made manifest to the cognitive mind (in the epistemological sense). Objectivity is a matter of accountability for what materializes, for what comes to be."[xxxi]

Participation Matters

This accountability for what comes to *matter* in the world –in the double sense of both materiality and meaning–is the ethical charge that gives Barad's analysis such an important relevance to the larger field of contemporary philosophy. When we realize our active participation in boundary-making practices that determine what is considered "real" or visible in the world, the ethical dimension of our epistemological practices comes clearly into view. Barad points to the ways in which "we are responsible for the world within which we live, not because it is an arbitrary construction of our choosing, but because it is sedimented out of particular practices that we have a role in shaping."[xxxii] She insists that we have to attend to the consequences of the "cuts" we make and the exclusions that they entail.

These exclusions go beyond epistemological concerns, as they ultimately involve the determination of which perspectives or identities are deemed visible and legitimate in the world. Consider, for example, the material consequences of identity formation around

gender, race, sexual orientation, and species, especially when those identities are not recognized or are deemed deficient or deviant. Of particular concern is the need for an ethics that goes beyond humanism, and that eschews the anthropic exceptionalism at the heart of the ecological crisis of the 21st century. "A humanist ethics won't suffice," Barad writes, "when the 'face' of the other that is looking back at me is all eyes, or has no eyes, or is otherwise unrecognizable in human terms." What is needed instead is "a posthumanist ethics, an ethics of worlding."[xxxiii]

An ethics of '*worlding*' understands that "accountability and responsibility must be thought in terms of what matters and what is excluded from mattering"[xxxiv] Barad is concerned not only with exclusions from belonging but also with the kind of exclusions that delimit what becomes *possible* in the world—that restrict what is allowed *to become. She invites us, therefore, to consider the ethics and politics of possibility*.[xxxv] "Intra-actions reconfigure both what will be and what will be possible—they change the very possibilities for change and the nature of change."[xxxvi]

As we close this section and proceed to a reflection on how we might take up Barad's empirical grounding for a posthumanist 'politics of possibility' we share her concluding paragraph at length for its impassioned articulation of what can become of, and in, an ethics of relational ontology:

> *"A delicate tissue of ethicality runs through the marrow of being. There is no getting away from ethics—mattering is an integral part of the ontology of the world in its dynamic presencing. Not even a moment exists on its own. "This" and "that," "here" and "now," don't preexist what happens but come alive with each meeting. The world and its possibilities for becoming are remade with each moment. If we hold on to the belief that the world is made of individual entities, it is hard to see how even our best, most well-intentioned calculations for right action can avoid tearing holes in the delicate tissue structure of entanglements that the lifeblood of the world runs through. Intra-acting responsibly as part of the world means taking account of the entangled phenomena that are intrinsic to the world's vitality and being responsive to the possibilities that might help us flourish. Meeting each moment, being alive to the possibilities of becoming, is an ethical call, an invitation that is written into the very matter of all being and becoming. We need to meet the universe halfway, to take responsibility for the role that we play in the world's differential becoming."*[xxxvii]

And the universe breathes a solemn response: *Amen*.

Chapter 2 - The Ethics of Relational Ontology

Each Meeting Matters

Amen indeed. We can detect Buber's Mahakasyapan smile as a silent partner throughout *Meeting the Universe Halfway,* as Barad weaves an (admittedly *not* wordless) modern Flower Sermon of her own—lifting up a quantum lotus of entangled relationality for our urgent 21st century ethical consideration. Indeed, subtly woven into the very passage that gives Barad's book its name, we find Buber's quote—*all life is encounter*—referenced in her footnotes: "We have to meet the universe halfway, to move toward what may come to be in ways that are accountable for our part in the world's differential becoming. *All real living is*

meeting. And each meeting matters."[xxxviii] (emphasis added)

Each meeting *does* matter, which is why it is so surprising to find one particularly fruitful encounter that seems *not* to have happened yet in Barad's expansive philosophical investigations. A curious reader finds no mention in the nearly five hundred pages of *Meeting the Universe Halfway,* or any of her writings since, of the early 20th century philosopher that most directly anticipates and complements her own engagement with the relational ontology of contemporary quantum physics: Alfred North Whitehead.

The fruitfulness of such an encounter, if ever it were to occur, would come from the way in which Whitehead's "philosophy of organism" builds out a more robust articulation of the actual *process* of becoming in an entangled world, to which Barad's work so compellingly gives empirical observational authority. The value of reading Whitehead and Barad together would be in sketching a more detailed framework for what it means to *become intra-actively*, and for the opportunity that Whitehead's robust cosmological framework offers for a more detailed investigation of the ethical dimensions of not only the quantum encounter, but also of its materially dynamic states of superposition, diffraction, and entanglement that Barad introduces. In this final section of our investigation, therefore, we will be creatively diffracting Barad's framework of entangled relationality through Whitehead's philosophy of "process" in

preliminary anticipation of a more direct encounter yet to come.

Of particularly insightful guidance in navigating this as yet imagined encounter is the relational theopoetics of Catherine Keller, whose work has featured a sustained engagement with the process philosophy of Whitehead and its implications for contemporary philosophical and theological dialogues within feminism, ecology, and politics. In her 2015 *Cloud of the Impossible: Negative Theology and Planetary Entanglement*, Keller pulls precisely upon Karen Barad's interpretation of quantum theory to weave it into direct conversation with Whitehead, Gilles Deleuze, Judith Butler, and other prominent philosophers of relational ontology. The result is a compelling account of an overlooked thread of mystical, apophatic theology in the West and the implications of its ontology for modern questions of faith, politics, and hope in the face of planetary peril.

Processual Becoming

Perhaps it was Barad's brief flirtation with the language of "processual becoming"[xxxix] in *Meeting the Universe Halfway* that first drew Keller's attention to the properly cosmic connection with Whitehead. Explicitly processual or not, Barad emphasizes that quantum physics is not to be understood as confined to an inaccessible sub-atomic realm, nor to scientific observation alone, but rather that the entire cosmos operates according to the same principles. "The universe is agential intra-activity in its becoming,"[xl] she writes, leaving a more detailed description of quantum "becoming" still to be developed.

The potential connections to be made with Whitehead's 1929 magnum opus *Process and Reality* are tantalizing. Whitehead—who had previously established himself as one of the world's leading philosophers of logic and who co-wrote with Bertrand Russell the landmark work on the foundations of mathematics, *Principia Mathematica* in 1910-13—was profoundly impacted by his own encounter in the early part of the 20th century with the emerging science of relativity and quantum physics. At the height of his career as a philosopher at the University of London, he departed for Harvard University in 1924 to begin a new career in the particularly unfashionable field at the time of metaphysics. The reason for his abrupt turn in the direction of cosmology was due to what he perceived in the mathematics of relativity to be a radical overturning of two thousand years of Aristotelian metaphysics and the consequent need to reevaluate the very foundations of Western philosophy. Einstein's equations had demonstrated that space and time were not, in fact, absolute, as Newtonian physics demanded. Instead the very fabric of reality had to be reimagined, away from substance towards an event-based ontology that Whitehead called "the philosophy of organism." The result, which became more widely known as 'process' philosophy, was a highly original formulation of a cosmological metaphysics based on the notion that the fundamental nature of reality was comprised *not of substances floating in space and time but of organic temporalities emerging and relating through intersectional trajectories of evolution.*

Given our previous discussion of Einstein's philosophical commitment to substance ontology, it might not be a surprise to learn that Whitehead actually pointedly and publicly disagreed with Einstein about the interpretation of the mathematics of relativity. Whitehead even published an alternative theory of gravitation[xli] that was intended to better account for the internal relations between particles. While this theory is generally regarded as a marginal historical rival to Einstein's general relativity, we have seen how Einstein's philosophical commitments kept him from being able to accept the experimental results of quantum theory. We can appreciate all the more, therefore, Whitehead's early insight of the underlying problem: the new physics required a theory of *relational becoming* at the particle level that Einstein's belief in a "block universe" of four-dimensional spacetime could not accommodate. What then if now, with the benefit of decades of further scientific inquiry, we bring Whitehead's metaphysics of processual becoming into dialogue with the contemporary world of quantum physics?

We would need to leave the mathematics of such an investigation in more qualified hands, but undoubtedly when Whitehead asks how it can be that "other actual entities, each with its own formal existence, can also enter objectively into the perceptive constitution of the actual entity in question"[xlii] he is articulating the very issue of entangled intra-activity that Barad traces through concepts like diffraction, superpositionality, and entanglement. In rhetorical response to this question of "the problem of the solidarity of the universe,"

Whitehead offers his own framework of "mutual immanence" in which actual entities in the world form through a process of 'ingression', 'prehension', and 'concrescence' and emerge into the objective datum of the universe as the material by which other entities thus come to be in turn. Like Nagarjuna's articulation of dependent origination two millennia prior, Whitehead's process philosophy is thus a framework for describing how entities originate from and evolve *through* each other, in striking similarity to Barad's "dynamic and shifting entanglement of relations."

Folds and Cuts

This is precisely the cross-disciplinary connection Catherine Keller traces in *Cloud of the Impossible*, in which she finds in Barad a much-welcomed articulation of modern scientific support for a philosophical position that understands "the minimum unit of the universe as a 'place of active relationship.'"[xliii] Keller is interested in the way that Barad's work explicates a relational ontology of "nonseparable difference" in which each actual entity in the world "emerges within the relational field that it differentiates–by its very becoming."[xliv] In both Whitehead and Barad, Keller finds agreement that what a creature *is* "cannot be determined in separation from its formative relations."[xlv] Rather, each "actual individual–yourself or one of your innumerable electrons–takes place *as* an actualization" that occurs in and through relational encounter. In a helpful summation that brings otherwise abstract concepts into direct meaning at a personal level, Keller explains: "There is not an enduring identity of matter or of you; there is a materialization in

this moment. And the next moment. And the next. And at each moment we can say that you enfold the prior moments, and the great manifold of events—electronic, molecular, genetic, social—making up your universe; and in that moment unfold it all otherwise."[xlvi] Keller here, in her distinctive poetic style has recapitulated Whitehead's own memorable formulation of interdependent becoming: "The many become one, and are increased by one."[xlvii]

But Keller does more here in these words than merely echo the congruence of a Baradian or Whiteheadian cosmology. Keller offers her own distinctive contribution by diffracting the two frameworks together into an ontologically-charged vocabulary of folding, unfolding, and enfolding. With the inflection of a theological attunement that understands its subject matter to be an issue of apophatic response to the ineffable rather than doctrinal certainty, Keller's *Cloud of the Impossible* becomes an evocative exploration of a relational ontology understood in the language of *folds*—which she takes from the 15th century Catholic scholar Nicholas of Cusa—rather than Baradian "cuts". And, as we know, the difference *matters*.

The difference between 'folds' and 'cuts' is not one of contradiction but of emphasis and effluence. For Barad, "agential cuts" are the mechanism by which phenomena come to objective reality in the midst of ontological indeterminacy. The boundary-making practices of agential cuts reconfigure the phenomena of the world by "[cutting] things together and apart."[xlviii] While the

concept of “cutting together” is helpful in its visceral intersectionality, the image that it can tend to evoke is one of bisecting geometries—of paper and scissors, of planes and angles. As a result, ‘cuts’ don’t convey as readily the kind of relational convexity and concavity we might imagine from the swirling dynamism of cosmic intra-relationship. Keller’s ontology of folds-within-folds—emanating from Cusa’s vision of “all in all and each in each”[xlix]—more fully evinces the kind of relational *dimensionality* that an ethics of relational ontology requires if it is to address the fullness of lived experience and not merely the behavior of quarks and electrons.

Keller does not directly draw this contrast. She recognizes the helpful role ‘cuts’ play for Barad in bringing the epistemological and ontological dimensions of intra-activity together. Barad herself uses descriptive terminology of quantum enfolding, and we are certainly not faced with a mutually exclusive choice. With Barad’s prodding towards intra-agential realism, however, we can move with her in the direction of a cosmology of folded complication. (From the French *pli* for ‘fold’, Keller and Cusa both use a language of com*pli*catio and ex*pli*catio: enfolding and unfolding). In particular, the ethical dimensionality of becoming together as an unfolding within relationship evokes a tender intimacy and suppleness that onto-epistemological scissors don’t convey—even those that can cut *together*.

Chapter 3 - All Life is Encounter

Apophatic Hope

And so, with Keller's helpful weaving of Barad's quantum theory into conversation with Whitehead (and with Deleuze—who drew in important ways from both Whitehead and the concept of folds in his own work, publishing *The Fold* in 1988), we are invited to think further with Keller about the ethics of a relational ontology of intersectional com*pli*cation. Barad has lifted up our roots. Keller, smiling, points to the muddy deep: to the place of earthen embrace. There is a seed down there, folded in the mud. Quantum physics isn't only about atoms and electrons. It's about the future, open and full of possibility—even at this late hour. Quantum computing has the potential to bring abundance—to operate green energy smart grids, fold molecular proteins, and develop vaccines. If only we

could build an *economy* to match our quantum ecology– we might emulate the resilient networks of mutuality that materialize vibrantly around us.

Rhizomatically, our buried seed is seeking its path; sending up shoots in the tender hope of a greater embrace. It's complicated. It always is. But it's not hopeless. Apophatic hope, if we can properly speak of such a thing, is expressed in a gesture: an extended hand, a gift, an embrace.

In closing, we would want to contribute to this vision of apophatic hope and amorous entanglement by making a few important affirmations and offering up a line of inquiry that could indicate a path forward for the future– a path for a deepened ethics of relational ontology that might occur through further development of this imagined encounter between Barad and Whitehead.

Creative Affirmations:
First, let's affirm that intra-agential realism should not be interpreted to deny the reality of *inter*-agential activities that occur in the world as it com-plicates itself. We should affirm with Barad that quantum physics is not merely confined to the microworld but rather describes the world at all levels, and furthermore that the understanding we gain from quantum physics should inform how we engage with the material tissue of the world in our enfolding entanglements with it. We should also be attentive to the ethical considerations involved in the performance of boundary-making. But, we cannot limit our ethical concern to the formation of boundaries

alone. We need to be careful not to ignore the dimensional layering of the world as woven strands of diffractive relationships that iteratively feed and fold into each other at various levels of complexity. We should be sensitive to the context of intra-activity as describing the dynamic, processual configuration and reconfiguration of the world into actuality—an actuality that is complicatedly layered, thick, and dimensional. In other words, we can affirm with Nagarjuna an ontology of "dependent origination" without needing to deny the reality, significance, or value of what *does* materialize, however briefly, around the boundaries we *do* make and the identities we *do* form. Nor should we forget to attend to the ethical considerations of the higher-order *inter*-activities that occur between these configurations as they materialize and as they iteratively influence the reconfigurations that continue to occur. Our ethics at the intra-agential level should inform our ethics at the inter-agential level, and vice versa.

This leads us to the second point we need to address: the reality of "agents" themselves. Intra-agential realism is helpful and provocative in showing how agentiality is not an activity performed by separate individuals, but is rather a shared movement of diffractive entanglement and cutting-together. However, this should not be construed to deny the reality of actual agents that emerge processually from the intra-activity of the world. Nor should we ignore the reality of (responsible) selves acting in the world. Our conception of responsibility, however, needs to change—as does our conception of self. The world complicates into actual entities, and we, whatever

we are, are one of those actual entities. Our actuality as individuals (or "dividuals", as Jane Bennett suggests[l]) should not be deemed any less real by virtue of our nonseparable entanglement. Our emergent actuality as distinct agents, persons, 'dividuals' is what intra-activity *becomes*. We can affirm the reality of our experience as actual selves just as much as we can affirm that a drop of water is real even though its reality is emergent from and constituted by a deeper layer of diffractively woven sub-atomic relationships.

Barad is not silent about these issues, but the force of her emphasis is on intra-activity, so it is important that we think along with her to affirm the connection between the intra-active and inter-active dynamics as they materialize between actual "agents" in the world.

This brings us to the last reflection, which is to affirm Barad's account within an embrace of a larger vision of ethics—one that is not fully described by the act of "cutting", even if it's a *cutting-together*. The ethical tissue of life is more intricately woven than scissors alone can accomplish. To this end, we need to see intra-activity as capable of diffractively weaving through *itself* as a superpositional complication of repetitional affirmation. We must, therefore, attend to more than only the initial performance of boundaries *but also to the ethics of superpositionality*, the ethics that are required when inhabiting the porous interiorities created by these very boundaries as events of embrace. The instantiation or reconfiguration of boundaries, after all, are precisely the kinds of events that constitute relationships,

communities, and ecologies, and we must attend to what happens within these boundaries after they have formed, not only to their initial conditions.

To this end, we might find great value in the future by exploring the ways in which Barad's language of diffraction, superpositionality, and entanglement could map to Whitehead's concepts of 'ingression', 'prehension,' and 'concrescence'. In particular, we could then think along with Keller about the ethical dimensionality of these three Whiteheadian terms. (1) Might we find in the diffractive moment of 'ingression'–the moment of encounter in Whitehead–an ethics of *historicity*, a responsibility over what the world *encounters* when it encounters us? Certainly, discussions of racial equity and historical privilege imply an accountability over a past which came to shape our different and disparate experiences–at work, at home, in court, and in the boardroom. The idea of historical accountability for *what we have already been helped or hindered to become* is still working its way through contemporary cultural discourse. (2) Similarly, in the moment of superpositional 'prehension' in Whitehead, in which we affectively register and welcome what intra-actively approaches us, we see the ethical dilemma of Derridean hospitality and Jean-Luc Nancy's "dis-operative community". Are our personal and communal borders structurally open, or have we built the egoic walls and checkpoints of anticipatory exclusion? (3) Finally, in the ethics of entangled 'concrescence', in which we are faced with the decision of how to *respond* to the world, and in

which we effectively *become our response*, we find the heart of ethical response-ability itself.

Collectively, these three layers of Baradian-Whiteheadian intra-activity are helpful in unpacking the complexity of ethical responsibility in a world of processual becoming. On its own, Barad's framework gives a powerful description of the accountability we have over what *becomes*—over what is allowed to matter—as a result of our intra-actions in the world. In Whitehead too, the process of becoming produces the raw material by which other processual becomings form in turn, linking the cosmos in webs of mutual vulnerability to the positivity or negativity that issues forth. However, finding a way to bring these two frameworks together at a more granular level allows us to point in more specificity to an ethics of relational ontology that is woven from these component strands. Perhaps a more thorough engagement in the future with these strands of correspondence between Barad and Whitehead can help to ex*pli*cate, in Kellerian fashion, the complicated ethical cosmos we navigate.

Conclusion

The complicated cosmos beckons once more to us for a smiling gesture of recognition. Roots and petals, mud and water. In the extended hands of Barad and Keller and Whitehead and Bohr–holding up for us this strange new image of ourselves–do we recognize what we have been searching for, folded up in the mud? Have we encountered the seed of a new, interdependent model of consciousness, dormant for ages but now ready to sprout up most unexpectedly in the midst of modern civilization?

Certainly, we must be able to see *something* of this demand for recognition. If not, it's time to open the windows and look at the streets. Activists and abolitionists and ecologists; protesters and priests and playwrights. The "blessed unrest"[li] of a dawning consciousness of interdependent vulnerability and an ethics of mutuality are drumming differentially the

neglected rhythm of an ancient song. Awareness isn't enough. Justice, even, isn't enough. Cornel West says it best: "Never forget, justice is what love looks like in public."[lii]

This provocative quote memorably captures a crucial message for those who seek justice in our world, and for those who, in pursuit of justice, seek to develop an ethics of relational ontology we have explored in these pages. Let us make sure to remember what Cornel West tells us never to forget. The ethics we seek is no mere academic exercise of dry formalism. It is lived and embodied, or else it is just words. It is not satisfied with the baseline of justice, but seeks the deeper amorousness of vibrant hands and hearts. West reminds us: Justice is only the *approximation* of what we seek. Justice isn't enough.

The vision that animates our pursuit of an ethics of relational ontology is a vision that goes beyond ethics, even in a certain sense "*against* ethics."[liii] *Our task, therefore, is to trace the path of an ethics that signifies more than itself.* Relational ontology, and the ethics that flow from it, should be understood to be a threshold condition, forming the very possibility of love, the possibility of love's actuality. Ethics may be a prerequisite for justice, but *justice is what love looks like in public*. The goal is love-in-action, a love beyond justice and beyond ethics. Embodied love, love incarnate.

As we have progressed in these pages across two thousand years of consideration over how to understand what it means to be, become, and inhabit the entangled

folds of our shared world, we must remember that the impetus for these concerns has to do with suffering, compassion, healing, and liberation. Justice—recognized often only in the breach—isn't enough; and even the most relationally sensitive of ethics can quickly become empty of heart and soul if not animated by a deeper *affection* for what matters, for what comes to be. At the conclusion of *Cloud of the Impossible,* Keller gives voice to this concern about the danger inherent in relational thought: "It is not that relation itself is good or responsible. It is *mindfulness of relation* that plies the ethical—as opposed to the corporate *mindlessness* of [mere] entanglement."[liv] We must not be mindless! Hannah Arendt's "banality of evil" is a universal warning.[lv] Keller's response is to advocate for an "amorous" entanglement and to see in each encounter the cosmic command: "Entangle mindfully!"[lvi] Roots in hand, she points to the incorporated thoughtlessness that results in the contaminated soil and plastic-filled oceans of our suffering planet and asks for a vision that goes beyond mere cosmic globalization. She hints again at the mud. "Might enfolding then become embrace?"[lvii]

Embrace is a key word to end our engagement with the ethics of relational encounter, human or sub-atomic. We wish to speak towards an ethics of relational ontology that is *relationally* robust enough to allow for the fullness of life—the love, joy, and agonistic encounter of it all. We seek to encourage an ethics of relational ontology that does not attend only to the negativity of "exclusions," but also to learning the amorous arts of touch, of kissing, blessing, and embrace. And at no time is this message

more needed and important than in confronting the dark destiny of ecological apartheid and its rapidly forming boundaries between untouched and 'untouchables'. We need to imagine more than quarantined survival on a warming planet. And as millions find their homelands becoming uninhabitably dry, hot, barren, or wet in the decades ahead, we need to quickly learn the political arts of living much more intimately together. Consequently, we need an ethics whose vision does not confine its mandate to merely the initial threshold of justice but that attends to the entire movement of relational encounter, beyond the initial welcome of unconditional hospitality and into the sustained co-habitation implied by an entangled cosmos. We need an ethics of relational ontology, therefore, that issues beyond itself and commits itself to a repetition that com*pli*cates its initial affirmation of welcome with the affirmed affirmation of blessing, of embrace, of intimacy, of community…of love.

In the repetitional affirmation of relational becoming that *Cloud of the Impossible* traces, we see this shape of a 'yes, yes'—a repetitional affirmation that is more than the primordial 'yes' of desire because of what it means to *diffract* a second 'yes' through the first. The second 'yes' is not merely chronological, not merely sequential, but *ontologically effectual*. The concept of intra-activity on its own does not capture the rhythm and meter of becoming if it obscures the ongoing relationship that continues to occur *after the encounter*, in relationships of mutuality, intimacy—in the lingering and inhabiting of shared space and shared time. The second 'yes' of affirmation and embrace is the concrescence that

emerges from the primordial hospitality of prehension. It calls as response to a call that precedes it. The second yes is what we mean by blessing. It is the repetitional 'yes' responding to the primordial "It is good" of Genesis.

We become in response, as response: becoming-as-response, each in our own way. The 'yes' is more than speech. It is the embodied practice of doing truth, of *making* love. It is the praxis of faithful response: truth as *emet* (Hebrew for 'faithfulness'). And it is embodied in the process of becoming itself. It is, as Donna Haraway describes, "materially semiotic"[lviii]: embodied ethics.

The Buddha who holds up a silent flower offering to his followers is practicing the amorous arts of material semiotics. In Nagarjuna's Buddhism, the highest ideal, universally accessible, is that of the 'bodhisattva'—one who has achieved enlightenment but remains present in the world in compassionate dedication to the liberation of all beings. As we depart from this extended meditation on the ethics of relational ontology and proceed processually out into a world of tender beauty and watchful woundedness, may we remember each in our own way the lotus roots of our diffracted, entangled existence, dripping with mud and water. May we find a way to embrace each other in amorous expectation of what can ever *become* in a world of love, lived out in responsive action. "All life is encounter," calls Buber. Smiling silently in response, we know, now in a new way: *Each encounter matters*.

Notes

[i] Quoted in Smith, Rodney. *Touching the Infinite: a New Perspective on the Buddha's Four Foundations of Mindfulness*. Shambhala Publications, Inc., 2017, p. 260.

[ii] *Neilson, Susie. "More Bad Buzz For Bees: Record Number Of Honeybee Colonies Died Last Winter." NPR, NPR, 19 June 2019, https://www.npr.org/sections/thesalt/2019/06/19/733761393/more-bad-buzz-for-bees-record-numbers-of-honey-bee-colonies-died-last-winter.*

[iii] How to transplant a lotus. Recommends, Richard. *Transplant Your Lotus Now!*, Pond Passion, 2 Mar. 2012, http://pond-passion.blogspot.com/2012/03/transplant-your-lotus-now.html.

[iv] Shen-Miller, J., et al. "Exceptional Seed Longevity and Robust Growth: Ancient Sacred Lotus from China." *American Journal of Botany*, vol. 82, no. 11, 1995, pp. 1367–1380. *JSTOR*, www.jstor.org/stable/2445863. Accessed 13 May 2021.

[v] Gohain, Manash Pratim. "The Lotus Can Generate Heat and Regulate Its Temperature like Birds, Mammals: Study - Times of India." *The Times of India*, 13 May 2013, https://timesofindia.indiatimes.com/home/science/the-lotus-can-generate-heat-and-regulate-its-temperature-like-birds-mammals-study/articleshow/20031896.cms.

[vi] See Bennett, Jane. *Vibrant Matter*. Duke University Press, 2010.

[vii] Scheffier, Johann, et al. "Rhymed Sayings of the Cherubinic Wanderer." *The Journal of Speculative Philosophy*, vol. 4, no. 1, 1870, pp. 31–37., www.jstor.org/stable/25665706. Accessed 13 May 2021. P. 32.

[viii] Buber, Martin. *I And Thou*. Touchstone, 1996, p. 62.

[ix] Nāgārjuna, and Michael Eido Luetchford. *Between Heaven and Earth: a Translation of Nāgārjuna's Mūlamadhyamakakārikā, with Commentary and Grammatical Analysis*. Windbell Publications, 2002.

[x] Barad, Karen Michelle. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Duke University Press, 2007, p. 151.

[xi] Einstein, A., & Born, M. (1971). Letter from Einstein to Max Born, 3 March 1947. In B. M. Walker (Ed.), The Born-Einstein Letters; Correspondence between Albert Einstein and Max and Hedwig Born from 1916 to 1955 (pp. 157-158). New York.

[xii] Barad, *Meeting the Universe Halfway,* 174.

[xiii] Beenakker, Carlo. "Lorentz & the Solvay Conferences." *Instituut Lorentz*, Leiden University, www.lorentz.leidenuniv.nl/history/Solvay/solvay.html.

[xiv] Ibid., 287.

[xv] Ibid., p. 253.

[xvi] For a discussion on the disputed origins of this quote, often attributed to Richard Feynman, see Mermin, N. David. "Could Feynman Have Said This?" *Physics Today*, American Institute of PhysicsAIP, 1 May 2004, https://physicstoday.scitation.org/doi/10.1063/1.1768652.

[xvii] Barad, *Meeting the Universe Halfway,* 19.

[xviii] Ibid., 19.

[xix] Ibid., 67.

[xx] Ibid., 196.

[xxi] Ibid., 55.

[xxii] Ibid., 173.

[xxiii] Ibid., 136.

[xxiv] Ibid., 205.

[xxv] Ibid., 33.

[xxvi] Ibid., 224.

[xxvii] Ibid., 247.

[xxviii] Ibid., 140.

[xxix] Ibid.

[xxx] Ibid.

[xxxi] Ibid., 361.

[xxxii] Ibid., 203.

[xxxiii] Ibid., 392.

[xxxiv] Ibid., 394.

[xxxv] Ibid., 225. Barad sources the idea of a "politics of possibility" to the work of Ruth Wilson Gilmore.

[xxxvi] Ibid., 391.

[xxxvii] Ibid., 396.

[xxxviii] Ibid., 353.

[xxxix] Ibid., 142. The full quote is: "The world is an open process of mattering through which matter itself acquires meaning and form through the realization of different agential possibilities. Temporality and spatiality emerge in this processual historicity."

[xl] Ibid., 141.

[xli] See Whitehead, A. N. (2011-06-16) [1922]. The Principle of Relativity: With Applications to Physical Science. Cambridge University Press. ISBN 978-1-107-60052-2.
[xlii] Whitehead, Alfred North, et al. *Process and Reality: an Essay in Cosmology*. The Free Press, 1985, p. 56.
[xliii] Keller, Catherine. *Cloud of the Impossible: Negative Theology and Planetary Entanglement*. Columbia University Press, 2015, 128.
[xliv] Ibid., 139.
[xlv] Ibid., 148.
[xlvi] Ibid., 142.
[xlvii] Whitehead, *Process and Reality*, 21.
[xlviii] Barad, *Meeting the Universe Halfway,* 381.
[xlix] Nicholas of Cusa, *De docta ignorantia,* in *Nicholas of Cusa: Selected Spiritual Writings,* trans. H. Lawrence Bond (New York: Paulist, 1997), *140.*
[l] See Bennett, Jane. *Influx & Efflux: Writing up with Walt Whitman*. Duke University Press, 2020, xii.
[li] See Hawken, Paul. *Blessed Unrest: How the Largest Social Movement in History Is Restoring Grace, Justice, and Beauty to the World*. Penguin Books, 2008.
[lii] I first heard this quote in a 2008 documentary *Call + Response* that sought to raise awareness of modern day slavery. During the film, which received positive reviews and invigorated a modern day abolitionist movement, Dr. Cornel West is quoted delivering a message he has shared repeatedly over the years: "Never forget, justice is what love looks like in public." Dillon, Justin, director. *Call + Response*. Fair Trade Pictures, 2008, www.endslaverynow.org/act/action-library/watch-call-plus-response.
[liii] See Caputo, John D. *Against Ethics: Contributions to a Poetics of Obligation with Constant Reference to Deconstruction*. Indiana University Press, 1999.
[liv] Keller, *Cloud of the Impossible,* 255.
[lv] See Arendt, Hannah, and Amos Elon. *Eichmann in Jerusalem: a Report on the Banality of Evil*. Penguin Books, 2006.
[lvi] Keller, *Cloud of the Impossible,* 294.
[lvii] Ibid., 288.
[lviii] See Haraway, Donna Jeanne. *Staying with the Trouble: Making Kin in the Chthulucene*. Duke University Press, 2016.

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