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INDIGENIZING AND DECOLONIZING FEMINIST PHILOSOPHY

Exploding Individuals: Engaging Indigenous Logic and Decolonizing Science

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Abstract

Despite emerging attention to Indigenous philosophies both within and outside of feminism, Indigenous logics remain relatively underexplored and underappreciated. By amplifying the voices of recent Indigenous philosophies and literatures, I seek to demonstrate that Indigenous logic is a crucial aspect of Indigenous resurgence as well as political and ethical resistance. Indigenous philosophies provide alternatives to the colonial, masculinist tendencies of classical logic in the form of paraconsistent—many-valued—logics. Specifically, when Indigenous logics embrace the possibility of true contradictions, they highlight aspects of the world rejected and ignored by classical logic and inspire a relational, decolonial imaginary. To demonstrate this, I look to biology, from which Indigenous logics are often explicitly excluded, and consider one problem that would benefit from an Indigenous, paraconsistent analysis: that of the biological individual. This article is an effort to expand the arenas in which allied feminists can responsibly take up and deploy these decolonial logics.

This essay emphasizes the important role Indigenous paraconsistent logics play within Indigenous philosophies more broadly, and specifically as tools for understanding difficult, often conflicting truths about political, ethical, and ecological relations. Indigenous logics organize and witness important if seemingly inconsistent realities otherwise obscured or sometimes even perpetuated by classical logic. Thus responsibly engaging Indigenous philosophy means understanding and affirming paraconsistent logics, which provide unique resources for decolonial resistance, and for better seeing and engaging the complexities of identities and our world.

Despite the stated importance of logic for many Native scholars, very little attention is given to Indigenous logics and the role they play in organizing Indigenous ontological and epistemological practices. Nor is due attention given to the way Native logics decolonize both a universal conception of reason and its everyday operation in the material world. Perhaps this lack of attention is in part because of broader skepticism about the abstract projects and implicit values of a *particular* group of logics, collectively called *classical logic*. Classical logic is arguably deeply Eurocentric and patriarchal, despite its claims to be the most pure, neutral, and objective form of reasoning,

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possessing unmitigated access to the deeper truths of the world. As Andrea Nye argues, classical logic often privileges the abstract over the concrete, and uses the logical operations of division and negation to deny the sense and value of "the emotional expression of women, the subrational words of slaves, the primitive political views of barbarians, the tainted opinions of anyone who does manual labor" (Nye 1990, 50).

Yet it is not only inaccurate but also deeply problematic and even colonizing to criticize an imagined logic "as such," which would precisely ignore the existence and importance of alternative, decolonial logics like those found in Native American traditions. The problems with classical logic lie not in its symbolic attention to the organization of and relation between propositions, but in the logics of domination that accompany classical logic, with their emphasis on dualisms, resulting hierarchies, and deeply entrenched exclusions of *other* logical systems. If some "logics can be constructed which tolerate *even contradiction itself*, logic itself can have no silencing role and no unitary authority over language" (Plumwood 2002, 16, emphasis mine).

For Indigenous logician Thomas Norton-Smith, the ongoing project of settler colonization is, among other things, a conflict of logical systems. He argues that North American settlers used the differences between their own and Native logical systems to justify the cultural genocide of Indigenous peoples in the Americas. By claiming Native logics and philosophies were incoherent, invalid, and irrational, settlers understood native communities as in need of education, correction, and mastery (Norton-Smith 2010, 2). For Norton-Smith, one of the key differences between classical (settler) and Native logic is the possibility of true contradictions. According to the central laws of classical logic (the law of noncontradiction and the law of the excluded middle), contradictions are necessarily false: a proposition and its opposite cannot both be true at the same time.[1] But American Indian logics are *paraconsistent logics*, that is, they support the possibility of true contradictions. For many American Indian communities, true contradictions are a crucial manifestation of the belief in a nondiscrete, nonbinary world (Waters 2004b). In short, Indigenous logics are characterized by the acceptance of a principle that classical logic fundamentally rejects, making it difficult for Native Americans to make legible important ecological and political realities that classical logic fails to see. Thus the organizing ontological and epistemological principles of the West—governed by commitments to the impossibility of true contradictions—are part of what Patrick Wolfe calls a "logic of elimination" that supports and rationalizes settler colonialism (Wolfe 2006).[2] Yet rather than abandoning the project of logic altogether, Native scholars continue to foreground the ways their paraconsistent logical systems offer much needed resources, both for resisting the logics of domination and elimination, and for making important truth claims about the sometimes contradictory and paradoxical nature of reality.

In an effort to both rightly engage Indigenous scholars and expand the arenas in which native allies can responsibly take up and deploy decolonial logics, this essay amplifies the voices of Indigenous philosophers, logicians, and storytellers in pointing toward the existence, coherence, and importance of their decolonial logics. To do this, I will begin, in my first section, by using both Indigenous and non-Indigenous authors to critique some of the limits of classical logic. Because true contradictions are one of the central differences between classical and Native logics, this section focuses on what exactly is at stake in debates about true contradictions, and demonstrates why classical logic's account is sometimes insufficient and could be helpfully bolstered by Native approaches.

In the second section, I argue that Indigenous philosophies offer robust alternatives in the form of paraconsistent logics.[3] Whereas classical logics render Indigenous ontologies irrational and inconsistent, I advance the work of Indigenous scholars who

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demonstrate that Native paraconsistent logics represent actual, complete logical systems. But I also highlight that in addition to their inherent value to Indigenous peoples—which is sufficient reason to affirm and take them seriously—Indigenous logics make visible complex aspects of the world excluded or ignored by classical logic. In this way, Native logics are not only important because of the role they play in sustaining Indigenous ontologies and relationships; they are important because they uniquely affirm opposing truths that two-valued logics do not or cannot name.

In order to demonstrate that Native logics have wide-reaching implications, I argue that they can bring important insights to key debates in the sciences, ultimately affecting fundamental settler conceptions of the world. Thus, in my third section, I consider one logical problem in biology that would benefit from an Indigenous, paraconsistent analysis: the problem of the biological individual. This may seem like an odd pairing. For many American Indian scientists and philosophers, Western sciences often seem hostile toward Indigenous knowledges and ways of knowing, often explicitly excluding or ignoring them. Yet the sciences are themselves replete with true contradictions. On their own, many sciences struggle to accept and resolve many of these contradictions within the self-imposed limits of classical logic. But what might the sciences gain from an engagement with Native American scientists, philosophers, and communities that affirms that contradictions are true ontologically—that is, that contradictions are true in the world—and are not mere epistemological or empirical shortcomings? By bringing together Indigenous philosophy and philosophy of biology, I affirm the significance of Indigenous ontologies on their own terms, but also acknowledge that they have a fully functioning, third-value validating ontology that has something to teach us, and to teach biology, about our own limits and about the nonbinary nature of the world. I thus build both a case and a tentative model for productive conversations between Native logic and the sciences.

As a settler in Kalapuya and Sahaptin territory in what settlers call Oregon, I attempt in this article to support the important work being done by Indigenous communities and scholars by highlighting the significance of decolonial logics within Indigenous philosophy, and in logic and scientific inquiry more broadly. I follow Anne Waters in attempting to decolonize logic, both in and outside the classroom, in the hope that our thinking *and teaching* may come to reflect the diversity of logics that exist, and in so doing, build more responsible relations with one another and the living world.

Contradictions in Classical vs. Paraconsistent Logic

Classical logic is governed by two very famous laws that are likely familiar and intuitive to those with Eurocentric and settler-colonial educations: 1) the law of the excluded middle, which claims a statement must be either true or false, but cannot be both or indeterminate, and 2) the law of noncontradiction, which claims two opposite statements cannot both be true in the same sense and at the same time. Within these systems, propositions must have one of only two values: true or false, but not both. In classical symbolic logic, true contradictions entail explosions, because, so they say, when the laws of classical logic cease to make sense, things disintegrate into a realm of anything goes.

Thus the standard view of logical contradictions in classical logic is that they are necessarily false. Contradictions are necessarily false such that no inference with a contradictory premise can possibly lead into any other contradiction: if you begin from a contradiction, then one is already in logical error, so it simply does not matter what

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kind of inference one makes after that. In short, anything can be true in a world where logical order does not hold. This position in logic is written as follows: A^ not-A = B, where B stands for any possible proposition. This is called the principle of explosion. In what follows, I will address and critique 1) the sufficiency of two-valued logic, and 2) the necessity of the principle of explosion.

First, certain aspects of the world cannot be accounted for in a two-valued system in which things must either be true or false. Consider the famous liar's paradox: "this sentence is false." Here, the sentence itself *necessitates* at least a third value: true, false, and *both*, as it is *both* true and false at the same time (Priest 2008, 127).[4] Graham Priest calls this a "truth-value-glut," because it gluttonously affirms an excess of value: not one or the other, but both (127). There are also truth-value gluts that "concern inconsistent laws, and the rights and obligations agents have in virtue of these" (128). Priest gives the example of an Australian county whose constitution contains two contradictory clauses:

1) No aborigine shall have the right to vote.
2) All property-holders shall have the right to vote. (128)

Of course, one hopes to resolve this situation so that the more just of the two circumstances comes to be true for the aboriginal individuals involved. But before this resolution, this contradiction remains true. Furthermore, in order to solve it, one must bring to bear additional criteria—in this case, hopefully some concept of decolonial justice—that are not logically necessitated by the premises themselves. One must make a choice or have other values at work.[5] As this example demonstrates, true contradictions are about more than letters and symbols. The deeper concern is that two-valued logics cannot account for the real conditions of contradiction in which people (both human and nonhuman) might live, or the real ways people actually speak and think in the world.

Writing from a Native feminist perspective about relations between logic and gender, Waters argues that the insistence that the world conform to classical logic is part of the Platonic legacy of truth, conceived as immaterial, unchanging, and abstract (Waters 2004b, 99). By inexorably linking the abstract with purity, the good, and truth, "Plato created a hierarchy in which the nonchanging, abstract Forms of Truth and the Good were valued higher than the impure material world which only functioned to distract and restrict thought" (Eichler 2018, 4). This led to strict divisions of and hierarchies between mind and body, the abstract and the concrete. As a result, classical logic divides form and content, emptying its abstractions of their relations to the material world, and then applying the form "to the world with the expectation that everything will fit into it" (4). But for Andrea Nye, Val Plumwood, Graham Priest, Thomas Norton-Smith, and Anne Waters (Waters 2004a), classical logic fails precisely on this account, when it is unable to make sense of, or in fact refuses to see, the real problems and contradictions that exist in the world, and not just in our heads. For those problems that refuse to conform to classical logic, we need something more than a true/false binary.

My second concern is with the principle of explosion, which assumes that literally anything can follow from an inconsistency or contradiction. In classical logic, different contradictions all have the same conclusion or implications: anything follows. As a reminder, the claim is that once you stop following the basic laws of classical reasoning, you enter a domain that ceases to make sense, where no rules apply at all, and therefore anything can be entailed. But according to Priest, not all contradictions are the same,

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and thus not all contradictions are going to lead to the same conclusion. He suggests that contradictions have a status similar to other statements, and as with other statements, certain things do follow from them and certain things do not. That is, "A and not-A," or "I can vote and I cannot vote" is not the same statement and does not entail the same thing as "B and not-B" or "I am an individual and I am not an individual."

As we know, things do not explode when we address true contradictions or truth gluts in our lives. Think back to the aboriginal property owner. Something is entailed and something must happen. But we do not suppose this contradiction entails the claims "Donald Trump's 'hair' is a mind-controlling alien" or "the moon is a large egg laid by a prehistoric space dinosaur." If you were following classical logic, however, you would end up with a hatched moon and the colonization of earth by orange combovers.

Priest gives another example in his story "Sylvan's Box," in which an individual gazes into a box at a little figurine that both is and is not there: the box is and is not empty (Priest 1997, 576). Priest's story is in part a response to the tale of Schrödinger's cat. Schrödinger created his thought experiment originally to demonstrate that the contradictory state of matter supposed by some interpretations of quantum physics—the existence of light as both wave and particle—must be resolved to fit the laws of noncontradiction and of the excluded middle (578). By referencing this feline story, and anticipating our affirmation of true contradictions and truth gluts in science, Priest refers us to debates about the actual, contradictory nature of matter in superstates—superstates that do not belong in farcical stories about cats in boxes, but exist as genuine true contradictions conditioning and creating our own world. Though one might argue with interpretations of constitutions, it is harder to argue with quantum physics. By this, Priest not only reminds us that fictions are not the only places where true contradictions arise, but also that the true contradiction in his story does not lead to just any old explosion. If you read this story outside the context of this debate, you might think it odd, but likely would not suppose that this contradiction entails that "a cow both did and did not lay eggs" (578). We recognize that contradictions about boxes—or language, or legal property status—do not necessarily say anything about egg-laying cows.

In their criticisms, Priest and Waters point toward the fact that classical logic is not value neutral, but rather has particular ontological commitments that limit its ability to account for and address real states of being in the world. But they simultaneously point to the need for, and the already vibrant existence of, an alternative class of logics, known as paraconsistent logics, in which contradictions can be true and the law of explosion does not hold. There are many kinds of paraconsistent logics and they differ in many ways, but their unifying trait is the affirmation of more than two values (for example, true, false, and both). In other words, in paraconsistent logics, the value of a proposition can be both true and false, and therefore contradictions can be true. Paraconsistent logics are fully fleshed out, logical systems that attempt to capture certain aspects of the world that cannot be accounted for under a two-valued system. However, paraconsistent logics do not claim that *every* possible or imaginable contradiction *is* true. They simply allow for sophisticated ways of assessing the possibility of a true contradiction. Finally, paraconsistent systems recognize that the criteria we bring to bear when evaluating the truth of a contradiction are not entailed in the premises. An additional value or proposition must be brought into the conversation in order to resolve, affirm, or evaluate a true contradiction.

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Indigenous Logic: Leaning into the True Contradictions

After recognizing the limits and fallibility of classical logic, and having demonstrated the need for alternative logics that can account for and track contradictory realities without causing explosions, we can now turn to the third-valued logics of American Indian traditions. Without treating all Native philosophical and logical traditions as the same, or arguing for the validity of a single, Indigenous paraconsistent system, this section draws on Native philosophers, creation stories, and teachings to highlight some leading but contingent principles that characterize Native logics and wed them to Native ontologies, epistemologies, and ethics.

American Indians have a long and diverse tradition of resisting settler ontologies expressed through Eurocentric logics. Charles (Ohiyesa) Eastman tells the story of a 1911 encounter between a missionary and group of Indians in which they shared creation and origin stories. Believing that only one of the stories could be true, the missionary exclaimed in disgust, "What I delivered to you were sacred truths, but this that you tell me is mere fable and falsehood!" In awed defiance of the law of noncontradiction, the offended Indian replied, "My brother … it seems that you have not been well grounded in the rules of civility. You saw that we, who practice these rules, believed your stories; why, then, do you refuse to credit ours?" (Eastman 1980, 30). The story makes clear that true contradictions are not just important principles of native reasoning, but a crucial part of ethical and right knowing. The native peoples in the story recognize that there are values implicit in logical systems, and call out their companion for the uncivil values implicit in his logic.

More recently, Indigenous philosophers have begun to translate these fully fledged logical systems into the formal terms of propositional and predicate logic. This has been part of an ongoing effort to demonstrate that Native philosophical systems, which have often looked nonsensical and outlandish to untrained settler eyes, do in fact represent fully functioning, logically consistent worlds, governed by rules and demonstrable through propositional languages. That settlers need to see Native logics formulated in abstract syllogisms before believing their coherence speaks to the narrowness of treating classical logic as singular, hegemonic, and universal. Yet Native scholars continue to demonstrate that not only are their logics complete and valid, they can critique and decry the colonial uses of classical logic, while also serving as valuable alternatives.

The leading difference between classical and Indigenous logics remains their respective relationships to true contradictions. Waters notes that many American Indian logics are nonbinary, or "nondiscrete, complementary dualistic logics," which is to say that they contain more than two values: p, not p, and both (Waters 2004a, 98). True, false, and both. As Norton-Smith states, within American Indian logical worlds, neither the law of noncontradiction nor the law of the excluded middle necessarily holds. He clarifies: "It is not the case that for any proposition p, either p is true or not-p is true, but not both; it is not the case that for any object o and any property p, either o is p or o is non-p, but not both" (Norton-Smith 2010, 44). Furthermore, it may be the case that "some thing is both p and not-p at the same time in the same sense, without one excluding the other; something may be both good and evil at the same time without the good excluding the evil" (44). There are circumstances in which a proposition can be both true and false, where opposite propositions can be true, or where an entity might have and not have a certain property.

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Unlike many classical logics that struggle to admit the ontological and epistemological values implicit in their various systems, Indigenous logics explicitly affirm and draw attention to these values. Nonbinary, many-valued logics are made possible by Indigenous ontologies that affirm the fluidity, relationship, and change of categories and identities, rather than their permanence and fixed essence (Waters 2004a; 2004b; Norton-Smith 2010). Although contradiction in voting rights can be resolved to prefer either p or not-p (voting or not voting), the particle example, and the examples from Native scholars I explore below, more accurately clarify that for Indigenous logics, these contradictions are in the world. True contradictions are ontological claims about the nature of the world, and are not merely the fault of epistemological shortcomings. They affirm a world more complex than their categories might admit, and are prepared to adjust their logics accordingly. Waters suggests that Indigenous "ontology, as animate (continuously alterable), will be inclusive (nonbinary) rather than exclusive (discrete binary), and have nondiscrete (unbounded) entities rather than discrete (discretely bounded) entities" (Waters 2004a, 107). Supported by an ontology that sees the world and its categories as multiplicitous, fluid, complex, and entangled, Indigenous logics offer solutions to problems that arise from the laws of noncontradiction and the excluded middle, and provide vast resources for recognizing aspects of the world that Western, binary logics explicitly exclude or otherwise fail to make visible.

Although this formalization of Indigenous logic is valuable to the logician and the teacher invested in exposing students to a multiplicity of logics, some of which are decolonial, the most robust accounts of Indigenous logics do not come in propositional form. They are found in Indigenous creation histories, traditional stories about morality and politics, and contemporary writings and Indigenous philosophies. In what follows, I explore two such contemporary examples of the use of third-valued logics. The first example demonstrates the way Indigenous logics render visible complicated and conflicting truths about political, ethical, and ecological relations. The second example also focuses on ecological relations, while gesturing toward the importance of true contradictions for an engagement between Indigenous and non-Indigenous science.

In her play *The Girl Who Swam Forever*, Anishinaabe author Marie Clements tells the story of a Katzie girl named Forever, who is also a sturgeon, and her brother Ray (Brother Big Eyes), who is also an owl (Clements 2011). The story takes place in the 1960s, on a river near a Catholic boarding school from which the girl is escaping. But it also takes place in an earlier time, when sister sturgeon first enters the native river, and brother owl first commits to watching his sister from the trees.

This story is set against the backdrop of colonial logic, one in which young, Indigenous boys and girls are to abandon their histories, ontologies, and temporalities to become "civilized" by white institutions. In a way, this mirrors the struggle Waters witnesses between Native American students and the formal logics that fail to account for and even exclude Indigenous knowledges and ways of knowing. In this story, Forever escapes the boarding school, but falls in love and in desire with a white boy as she spends her newly free days swimming in the river and becoming a sturgeon. Brother Big Eyes is angry at their mutual colonization and grieved by Forever's plight at the school, but also distressed by her wallowing in the river and by her multifaceted and uncolonizable love and sexuality. He tries to control her and police her body, her desires, and her sexuality, regulating her complexly bourgeoning identity that is more fluid and novel than he would like.

In order to understand this story that is also a history, one must be open to the possibility of a third truth-value—both—for this story relies on and affirms paraconsistent

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logics in several ways. Forever is both human and nonhuman, present and ancient; and her fluidity defies the categories the colonial entities would place on her. It is only because of this animacy—the simultaneity of her human and animal self—that Forever escapes the oppression of human-centered thought, and can imagine a world that does not undermine her agency or her embeddedness with land and her nonhuman kin.

Ray is also human and nonhuman, present and ancient. He is also both oppressed and the oppressor. He is oppressed by the standards of purity and uniformity imposed by settler colonialism, and he oppresses Forever, imposing on her these same standards of purity and control. Without acknowledging both of Ray's relations to oppression, we miss fundamental aspects about the way colonization changes gender norms and relational dynamics. Highlighting Forever's simultaneous human and nonhuman status enables us to understand her as human—a creature governed by religious and colonial norms that attempt to control her *sapiens* language, body, and desires—and as a sturgeon—always already tied to the land and water, who belongs uniquely to that place, and who always slips free. Supposing a strictly two-valued logic in which "both" is not possible precludes the recognition of the complex and contradictory nature of colonization on human and nonhuman persons.

In their article "Muskrat Theories," a group of Indigenous scholars and activists uses a similar logic in their discussion of land education (Bang et al. 2014). Borrowing from Marcia McKenzie, the group affirms the idea of a "willful contradiction" that rejects the binary logics of colonization that generate us/them dichotomies and instead affirm decolonial imaginaries. Megan Bang and her colleagues follow McKenzie's definition of a willful contradiction as an intent to work within the tension between seeing the "world as shifting, messy, and fictional, and a desire for real social change" (McKenzie 2004, 180). In other words, Indigenous ontologies must resist the temptation to flatten the world into a set of either/or propositions, or to propose a linear history that places Indigenous lives and knowledge of land always in the past. Instead, as part of their decolonial imaginary, they have to affirm the complex and never settled shape and multiplicitous temporality of Indigenous lives and land as a means of resisting the colonial logics.

Bang and her colleagues look to the lands of Chicago, known as *Shikaakwa* to the land's Indigenous peoples, as an example of this willful contradiction and decolonial imaginary as a form of resistance. They remind us that Chicago was established by the settler removal of Indigenous peoples and by the filling in of wetlands. And yet the Indigenous people are not removed, but are still present everywhere, intermingling and co-creating Chicago culture and life. Nor are the wetlands totally filled in or erased, as native wetland plants like tobacco grow up through the concrete (Bang et al. 2014, 38). They insist, "Chicago is a wetland that becomes part prairie and part oak savannah. It's hard to see with the layers of colonial fill, but actually it's hiding in plain sight. The wetlands are (re)becoming themselves" (38). They continue, "Literally, *asema* (tobacco, and not the genetically altered form bred for colonial agriculture) grows in the cracks of pavement here" as land and water continue their dynamic, nonbinary relationship in the cracks of Chicago (38). Importantly, the claim is not that *some* wetland plants have emerged in the middle of a concrete jungle. Rather, for Bang and her group, the tobacco makes it clear that *Shikaakwa*, the wetland, is still there. This land is both Chicago and *Shikaakwa*, it both is and is not wetland. The authors thus willfully contradict colonial logics that attempt to place Indigenous lives and lands in the past, and that seek binary, either/or designations of land. But, as part of their decolonial

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imaginary, they also willfully inhabit true contradictions. These lands both are and are not wetland still, and Indigenous lives are and are not removed.

If one tries to read this as a synthesis, rather than a contradiction, one runs the risk of invisibilizing the substantial material, political, and natural forces that push and pull these bodies and places in different directions and with opposing aims. To say it is partially a wetland, or the wetlands are reclaiming Chicago, misses the reality that, in a very real sense, the land has always been a wetland, even though sometimes it has also been otherwise. That is, to acknowledge Chicago and *Shikaakwa* as a contradiction helps us track that opposite things are true of the world at the same time, as well as the ways this true contradiction is a source of resistance.

This is why Bang and her co-authors refer to willful contradictions as "muskrat theory." Recalling Gerald Vizenor's discussion of the contradictory ontological status of muskrats, they suggest "Muskrat is an earth diver" who "finds home in shadowy wetlands—relational dynamisms between land and water" (Bang et al. 2014, 37).[6] She is a creature who both is and is not of the water, and the ability not only to exist but to thrive in the wetlands of true contradictions is an important reminder for those who would resist a logic that makes one choose either water or land, Chicago or *Shikaakwa*. In other words, these contradictions are not fictional, but represent ontological facts about the nature of bodies and relationships, the way power and violence work, and the kinship among humans, land, and nonhuman lives that two-valued systems simply cannot name.

Philosophy of Biology: We Are and Are Not Individuals

I have argued that Indigenous logics affirm true contradictions as ontologically real, which is to say they play an important role in making legible not only political realities, but also ecological and biological bodies and relations. In part because of this nonclassical approach to truth claims, Indigenous communities, scientists, and ecologists often have difficulty rendering their claims legible to the Western sciences (Kimmerer 2013; Tallbear 2013a; 2013b; Bang and Marin 2015). Native knowledges are often understood as mythical speculation, whereas settler science understands itself as logical, evidence-based fact-gathering. But having already shown some of the limits of classical logic and having demonstrated both the need for third-valued logics and the validity and importance of Native paraconsistent logics, I now want to propose that the sciences have much to gain from engaging Native logic. In short, rather than treating Native philosophies and settler sciences as incompatible projects with irreconcilable logics and aims, I argue that Native logic can supplement and enrich the sciences in a number of important ways. To make this case, I consider one significant and current question that might result in a true contradiction and that could be substantially aided by the deployment of Indigenous logic: is the world composed of biological individuals (as opposed to more complex multiplicities), and if so, why can we not find a single set of criteria to designate and identify all individuals?

Before diving in, however, I want to highlight some of the tensions that Indigenous scholars have thematized between Native and Western (or what Bang and Marin call "settled") scientific approaches (Bang and Marin 2015, 533).[7] According to Gregory Cajete, Native science tends to go beyond the conceptual limits of objective measurement, where concepts can take priority over complex material relations (as is the case with the problem of the biological individual), and instead honors the "primacy of direct experience" (Cajete 2004, 52). Indigenous scientific knowledges thus focus

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on incorporating observations, even when they do not align with current conceptual or logical frameworks, and revise their organization of the world accordingly (Cajete 2004; Atleo 2011; Pierotti 2011; Whyte 2013). Perhaps one of the most common claims (or accusations, depending on your position) of Indigenous, subjugated knowledges is that they emerge from and limit themselves to the local, in contrast to Western science's goal of making increasingly generalizable claims (Pierotti 2011, 7). But both Indigenous and settler scientific approaches quest for truth in order, among other things, to quantify and predict.

Many scholars have criticized the sciences for their implicit masculinist and Eurocentric values, and essentializing and universalizing tendencies, documenting instances wherein evidence was dismissed or methodological shortcomings overlooked because of conflicts with social or political values and hierarchies.[8] At their best, Western sciences are also more focused on revision and refinement than on absolutes, though this is not always so in implementation, and it is certainly not true at the logical level (Feyerabend 1978; Munevar 1982; Feyerabend 1987; Deloria 1999). Refinement might include making new claims, but it rarely includes revising the fundamental logical relations between scientific statements. Instead, "contradictions are usually occasions for distress, even scandal, not indications that science *may* overrule the dictates of logic" (Munevar 1982, 75). But by "logic," Gonzalo Munevar refers only to classical logic. The sciences have long explicitly privileged classical logic, especially Quine's scientific naturalism, with its laws of the excluded middle and noncontradiction (Magnani 2015). Yet many sciences are actually brimming with truth-gluts and gaps and with true contradictions that are difficult to address without paraconsistent logics and, specifically, the ontological affirmations of those logics.

The problem of biological individuality—what it is and how we count it—represents one rather massive biological dilemma that could be framed in terms of a contradiction or a truth-glut.[9] This is an important problem not only because the biological individual is the taken-for-granted ground of many sciences, and one wonders why a paradoxical answer to this question does not throw the sciences into crisis.[10] It is also important, and perhaps more so, because answers to the question or problem of biological individuality gesture toward a more entangled and relational view of the universe. Both scientists and philosophers have critically documented the overlap between the scientific focus on individual organisms and scientific reliance on problematic Enlightenment metaphors, concepts, and values (Lewontin 1982; Keller 1996; 2010; Douglas 2016). And although scientific theories of the biological individual cannot be straightforwardly indicted for grounding or justifying the legibility and sovereignty of the discrete, selfsame individual who has been the basis for ethics, politics, and metaphysics in the West, there are certainly uncomfortable parallels to be explored. But at the very least, I suggest that the tendency to see the world as composed of essential, clearly delineated individuals is part of a wider settler-colonial philosophical project that justifies the subjugation and attempted erasure of Indigenous relational science and knowledge. Thus bringing Indigenous logics to bear on this particular issue starts the conversation between Indigenous logic and the sciences in a place where the stakes for both are quite high, but where they stand to make great progress.

In the biological literature, the most common way of framing the debate about biological individuality is as a problem of insufficient criteria. In her aptly titled essay "The Problem of Biological Individuality," Ellen Clarke suggests that, at the level of intuition, individuals are merely "familiar skin-bound entities" (Clarke 2010, 312). But, as Clarke notes, the numerous sets of criteria that define what counts as a biological individual

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mostly disagree. Not only do these sets of criteria contradict one another at every turn, they also all fail, on their own terms, when they are unable to identify at least some bodies we think of as individuals. That is, some criteria leave out entities we would otherwise consider individuals, whereas others include entities (like ant colonies) most would not consider individuals. The problem, in short, is that many things we want to identify as individuals for the purposes of tracking, predicting, or even protecting their genes, productivity, bodies, and capacities turn out to be multiplicities or groups, whereas many things we want, for the same reasons, to track as groups, end up counting as individuals.

Let us consider the contradictions in just three of the nine criteria for individuality Clarke outlines.[11] First, the definition of the individual by spatial boundaries is the intuitive one mentioned above and suggests individuals are spatially discrete phenomena "with their parts attached to each other and nothing else" (Clarke 2010, 212). This is the criterion that allows rhizomatic fungi or aspen groves to count as a single individual in the same way and to the same degree as an octopus or dog. Even if one agrees that Pando, the world's largest colony of aspen, is an individual, is it fair to say that Pando is an individual in the same way as a rhinoceros, a dolphin, or even a single tree? And now that I mention it, plants are particularly difficult to count as individuals, since, as Clarke notes elsewhere, many are both clonal and modular, groups and individuals at the same time (Clarke 2012).

Second, the genotype model suggests that individuals have a unique genotype, different from others of its species (Clarke 2010, 316). But already this definition conflicts with the former. Consider clones—two entities discrete in space but with identical genotypes—who would count as individuals in one system but not the other. Or better still, consider the Portuguese man o'war: a collection of genetically identical individuals who are physically distinct and each responsible for different processes (reproduction, floating, feeding, capturing prey), but who are connected by a single digestive tract and who cannot survive without one another. How do we categorize this entity on these two models?

Third, the immuno self-definition considers the way parts get integrated such that the whole recognizes and defends itself against entities that are not itself (through immune responses). But how then do we understand the parts of an individual's genetic material that its body resists, as with cancer cells or autoimmune diseases? And how would we explain the acceptance and necessity of microbes within supposedly closed systems like those of mammals (especially when we consider that they have distinct genotypes from their "hosts")? Indeed, the microbial revolution has jostled ideas of the individual thoroughly and plunged us into an emergent mess of truth gluts (true contradictions). In recent years, biologists have proposed alternative paradigms like the holobiont, superorganism, or ecosystem (Bordenstein and Theis 2015) to better understand how humans and microbes act together genetically and functionally, both in evolution and over the span of a single life. If we use the criterion of genetic sameness, these microbes are not part of the human individual, but are their own individuals. If we use the criterion of functional integration, which suggests symbiont and host can be integrated into each other's life systems, then microbes are part of us as individuals. So which is it? In general, the result of these contradictions leads to some unintuitive claims: that a Portuguese man o'war, which looks and operates like an individual, becomes instead a colony, whereas the tongue-eating louse, who chews out and replaces the tongue of a fish and then functionally integrates into its physical system, counts as a

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biological individual with its fish. But none of these claims seems sufficient to explain what is going on.

Given this problem's popularity, many solutions have arisen. One strategy has been to simply give up on the idea that any single criterion can name every possible individual (Kovaka 2015). Instead, each science might have its own criteria to correspond with the aspects of life it hopes to measure. Let's name it an epistemological or empirical shortcoming, and call it day. But as Karen Kovaka suggests, this does not resolve any debates so much as move the marker of disagreement to whether or not narrower criteria are adequate (Kovaka 2015). In Kovaka's diagnosis, the concept of the individual is believed to be so fundamental that it is taken-for-granted grounds for good science, and many feel they cannot do good science without a clear individual paradigm. But for Kovaka, the concept of the individual is not a necessary condition for good science. In fact, it has led to the privileging of concepts over the material and empirical complexity of the lives the concepts are supposed to track. As long as the sciences take the idea of the individual as their foundation or as a precondition of their inquiry, and as long as they are likewise committed to the impossibility of true contradictions (something either is or is not an individual, but not both), they will be both trapped in and thwarted by their efforts to produce a single, noncontradictory definition.

What if, as Forever is both human and sturgeon, and the electron both wave and particle, earth's creatures are *both* individuals and not-individuals *at the same time*? I suggest that in their affirmation of true contradictions, Indigenous logics provide three valuable resources for analyzing this problem. First, Native logics privilege complex observations of the world over fixed conceptual equations. For Kovaka, the problem lies with the prioritizing of concepts (and propositional relations) into which the world is then forced to fit, or else explode. But for Native logics, it makes little sense to have a crisis because the world does not conform to our concepts or logics if the very goal of these logics is to understand the world. True contradictions are one way to affirm that our propositions and statements, and the relations between them, matter only as long as they can predict and attend to real relations and bodies. Framed as epistemic attention to the complexities of the concrete rather than a privilege of the abstract, this solution recalls Cajete's claim that Native science attunes its concepts and propositions to the shifting, multiplicitous nature of the world, letting new questions and theoretical paradigms arise from the complexities found there (Cajete 2000).

Second, and relatedly, Indigenous paraconsistent logics affirm that contradictions are part of the fabric of the world, and not merely epistemological errors. By situating the reality of these contradictions in the world, we move away from the claim that some ultimate, unifying intellectual or epistemological criteria are achievable if we simply observe the world long enough. Instead of finding ways of solving the contradiction, we need to find novel ways of writing about, researching, tracking, but all the while affirming these conflicting realities, being careful about what *is* entailed from these true contradictions and how we arrive there. Oriented to a reality like this, the kinds of questions we might ask, the experiments we might conduct, and the relations or effects we might predict will inevitably change. A multiplicity of perspectives or tactics will no doubt still be required, but those will need to be developed within the relationship between empirical and theoretical philosophy and biology, where the logical possibilities of a theoretical biology affirm and offer tools for thinking with a much more complex reality than it is currently ready to allow.

Third, because Indigenous logics are entwined with beliefs in a nonbinary universe composed of nondiscrete and unbounded entities, using these logics to affirm the

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individual as a true contradiction (both multiplicitous and singular) opens us onto decolonial, relational ontologies (Waters 2004a). Recall from the previous section that many Indigenous communities already affirm the possibility of complex entities that are not strictly singular and individual, but are multiple and are quite commonly two things at once. These true contradictions are not only crucial for rendering certain harms legible. They are also crucial for resisting colonial, either/or logics of exclusion, and for prompting the decolonial imagination that is the source of resistant thinking otherwise. Recognizing ourselves and others as simultaneously singular and multiple removes the Enlightenment injunctions for self-same, unified, and coherent identities, while also permitting us to sometimes experience ourselves that way, and to track specific relations and parts of our existence that seem to operate at that level. To admit that we are, at the same time, ecosystems, or physically irreducible networks of cohabitants enables us to simultaneously attune ourselves to the fundamentally embedded and relational aspects of our nature and the world. This helps us to track and predict altogether different kinds of phenomena. What if the man o'war and the ant colony, the fungus grove, the dog, and the human with its microbes are all both individual and a multiplicity? What if the plant, both collective and individual, is the model for all of us?

Of course, none of this means the world will explode, or that anything at all can be entailed. Something does follow from this contradiction of individual and not-individual, but it looks a lot more like an adjustment of scientific inquiry and an engagement with Indigenous relational ontologies than a loss of all meaning and sense. At the very least, we now know that we need not look for Schrödinger's cat, or into Sylvan's box, to see true contradictions: just look in an ocean, an anthill, a mirror, or under your feet the next time you are in a forest.

Inhabiting Contradictions

These connections among Indigenous philosophy, logic, and science are a starting point for the important ongoing work of decolonizing our frameworks of knowledge not only at the level of statements, but also at the level of the relations between statements. Rather than refusing or critiquing all logic as an inherently Eurocentric, colonial, masculinist project—political in its implicit biases but impotent in its revolutionary potential—Indigenous philosophies show us a powerful, robust logic, packed with decolonizing fervor. This also forces us to take seriously Indigenous claims as part of complete, consistent, and coherent logical systems, even when they appear strange or contradictory given our uninterrogated reliance on classical logic. If we do not address the existence and importance of Native logics both for Indigenous philosophy and for ongoing decolonial political projects, like rendering *Shikaakwa* visible again and restoring its ecological balance, we risk reproducing an abstract critique of classical logic that simultaneously ignores the grip it still has (especially the laws of noncontradiction and the law of the excluded middle) on our ethical, epistemological, and ontological imaginations. Affirming Indigenous and decolonial philosophy without attending to the kinds of truth claims they make possible means we are only ever seeing half the story, and only ever signing up to fight half the battle.

Non-Native settlers thus have a political and ethical imperative to participate in the ongoing project of foregrounding the consistency and integrity of Indigenous logical systems. Going forward, there is much work to be done challenging the colonial limits of classical logic, especially when they undermine Native truth claims about, for example, *Shikaakwa* land restoration, pipeline access, ecological harms, violence against

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women, treaty rights, and so on. We must responsibly engage these logics to help make Indigenous ethical, political, and ecological claims legible, and to articulate the validity and ethical import of willful contradictions and their role in decolonial imaginaries.

Though I have applied Native logic and its underlying ontological affirmations to the problem of the biological individual in particular, there are many other problems and connections to be explored at the intersection of Native logic (and Native philosophy more broadly), science, and philosophy of biology. For example, the problem of the biological individual parallels quite closely the problem of the biological organism, which would also benefit from a similar Indigenous analysis (Wilson 2005).[12] A slightly different but equally exciting problem to which Indigenous logic is immediately applicable, and to which I turn elsewhere in my research, is the problem of species. Like the problem of the biological individual, exactly what a species is (an individual, a set, or a kind) and how the bodies within species are connected and counted (through morphology, genes, ecological niches, and so on) remains another of biology's most persistent problems.[13] By turning to the insights of Native logic, and by drawing on the centuries of scientific knowledge found in American Indian communities, we are likely to be shown novel ways (at least novel to settlers) of framing the problem and imagining alternatives.

Furthermore, more recent solutions to the problem of the biological individual have turned away from ontologically essentialist and classical notions of fixed, discrete bodies, and toward process and pluralist ontologies. Process ontologies suggest that individuals are not static or set entities; rather, individuals are processes (of emergence, formation, maintenance, and so on) (Bueno, Chen, and Fagan 2018; Nicholson and Dupré 2018). Though similar to and often compatible with process ontologies, pluralist approaches to individuation strive to give accounts of how different kinds of individuals, different criteria, and different processes of individuation might all be ontologically real (Guay and Pradeu 2016).[14] Importantly, many pluralist accounts hope to account for contradiction within their various parts, and are intended to hold and address, without collapsing, fundamentally irreconcilable truths. Both process and pluralist accounts potentially have much in common with, but also likely a great deal to learn from, Native logic and ontologies, which have precisely been companioning and accounting for nondiscrete and contradictory states and bodies for centuries.[15][16] Though I have focused on the way Native logic addresses the problem of the biological individual, much work remains to be done exploring how Native logics and ontologies might productively advance emerging discussions on pluralism and process. When done respectfully, much fruitful work can be done at these intersections for the benefit of both Native communities and settler scientific communities.

These productive exchanges will also greatly benefit the nonhuman communities, ecosystems, and persons at stake in discussions of individuality, organism, and species. I have focused on the sciences as a place where Native logics might offer much needed support and enrichment because for Norton-Smith, Waters, and others, decolonization is not only about so-called human lives, but about righting relations with and improving understanding of all the peopled world. The function of truth in American Indian philosophy is to acknowledge and bring about right relations, ethical relations, within and between communities. Thus decolonization is about sturgeon, owls, muskrats, rivers, jellyfish, men o'war, anthills, and tree colonies, as much as the Native communities who have lived with and cared for them. How one answers questions about the biological individual or nature of species has serious implications for how we understand, care for, and study the world. But this is only the beginning of the work we must do to fully

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affirm, support, examine, and track the individual who is also a multiplicity. Ultimately, I hope that by continuing to dwell and think critically at the intersection of logic, science, and Indigenous philosophy, we can validate the lives that classical logic makes invisible—from Indigenous lives, to the complex biological individuals above—while clarifying the importance of having a plurality of logical systems, and the responsibility of knowing when to choose which.

Notes

1. Here and throughout the article, I follow philosophers like Anne Waters, Thomas Norton-Smith, V. F. Cordova, and Vine Deloria, who refer to the commonalities among Native philosophies, without reducing the diversity of Indigenous communities to a homogeneous unity. As Cordova suggests, although Indigenous philosophies have always been irreducibly diverse, settler colonialism has highlighted that they differ more from Western philosophies than they do from one another (Cordova 2007). Thus a kind of Indigenous philosophy has emerged that nevertheless still allows for internal differences.

2. Though there are more materialist strains of American Indian thought that focus on the ways the physical dispossession of land and the organization of bodies and livelihoods preceded and subsequently justified colonization, Norton-Smith follows a long line of native scholars who track the incommensurability of Western and Native ideological and logical differences.

3. I use the language of Indigenous, Native American, and American Indian more or less interchangeably. I do so because the authors I follow all prefer different terms, but refer primarily to the same groups of people: North American Indigenous nations and communities.

4. Technically the value is indeterminacy. But indeterminacy gets cashed out in various paraconsistent systems quite differently, and evaluating those technical details, though interesting, is beyond the scope of this article.

5. Logic systems LP and RM3 contain the third value: "both," and K3 has the three values of true, false, and indeterminate (or neither). In FDE, one gains yet a fourth truth value: true, false, both, and neither. And so on and so forth.

6. Vizenor's book, *Earthdivers: Tribal Narratives on Mixed Descent* (1981), is an important discussion of the way Indigenous historical and cultural ontologies have taken up and praised muskrats as contradictory figures living in tension. As in many of his novels, which also feature and explore the positionality of Indigenous persons of mixed race or descent, Vizenor's attention to muskrats and other earthdivers theorizes and affirms the contradiction experienced by those who are two things at once—things which supposedly cancel one another out.

7. There are Native scholars who prefer not to refer to Indigenous ways of knowing as scientific (Deloria 2004). But the Native scholars I cite explicitly refer to Native science, perhaps more as part of a project to create bridges than the earnest recognition of ontological commonalities.

8. For a representative sample, see Harding 1986; Haraway 1989; Tuana 2004; and Lloyd 2005.

9. I am not making the claim that logic is the only or even best way to frame or solve this problem. I only suggest that it is one way to address this problem, and that Native logics are especially equipped to do so.

10. The short answer is that the sciences do not lapse into crisis because the contradiction does not necessarily occur at the level of practice, as each biological field of study can choose the criteria or perspective that best suits its needs without needing to worry about how this might conflict with other criteria. This is not a solution to the problem, but rather a displacement or deferral of the theoretical level.

11. To be clear, Clarke pulls the nine criteria she develops in her essay from a far vaster list of candidates that she does not include, for one reason or another.

12. Although Clarke, following the traditional view in the individuality debate, sees the biological individual and biological organism as synonymous, this is not a unanimous view. There are plenty of biological individuals—things that are distinct, genetically unique, and so on—that are not organisms (for example, in the evolutionary sense, a species is a biological individual, but obviously not a single organism), and there are many entities that we need to count as biologically individual that are many organisms (like insect colonies or symbionts). So organism and individual are sufficiently distinct debates, both of which warrant attention from Native logic and philosophy.

13. For summaries of the problem and some proposed solutions, see Orr and Coyne 2004 and Slater 2013.

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14. Clarke herself could be viewed as supporting a kind of pluralism in her later work, when she suggests that we treat the existing definitions of the individual as referring to the different functions through which beings secure and maintain individuality (such as immune systems), rather than as categorizing the beings themselves. This has the benefit of still locating these mechanisms in reality (rather than treating them only as perceptual or logical criteria strategically deployed by biologists), while also recognizing there is a plurality of ways bodies might secure their status as individuals. Furthermore, it then becomes important to track the processes, treating the processes as real, rather than merely counting discrete, fixed individual organisms (Clarke 2013, 427).

15. Both Native and classical logics provide rich accounts of pluralism. Much work could be done comparing these different accounts and their respective ontological implications. One could build further still by looking at how these differing accounts of pluralism would affect scientific pluralism with respect to the problems of the individual, species, and so on.

16. Using companion as a verb—companioning—is my admittedly small effort to recover the ongoing activity, effort, and intentionality often lost when simply referring to someone or something as a companion. Companioning gets closer to what I mean here: Native peoples have long been attending to, caring for, protecting, and advancing these complex states of being in the world.

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