

## **Exploding Individuals: What Indigenous Ontology lends to Classical Logic and Philosophy of Biology**

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The minute Trump Advisor, Kellyanne Conway referred, in an interview, to “alternative facts,” much of the country rolled their eyes and buckled down for a rough few years. Many have responded to this affirmation of alternative facts by doubling down on the definition a fact: a fact is a statement of the world that is true. Thus a fact (or proposition) cannot be both true and not true simultaneously. And, just so we’re clear, Conway, two opposite things—like two different statistics on the number of people at an inauguration—also cannot be true at the same time. Facts and alternative facts cannot both be true.

Although you may not have been able to put your finger on it, that feeling of nausea at the words “alternative fact” might have at least something to do with a subtle and often uninterrogated commitment within western society to classical logic. Classical logic is governed by two very famous laws: the law of the excluded middle (which claims a statement must be either true or false, but cannot be both or indeterminate), and the law of non-contradiction (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.

But there are alternatives to classical logics: paraconsistent logics. Though paraconsistent logics differ in subtle ways, 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 contradictions, therefore,

can be true. Paraconsistent logics are fully fleshed out logical systems that suggest certain aspects of the world cannot be accounted for under a two-valued system.

Logic scholars like Thomas Norton Smith, Anne Waters, Graham Priest, and Scott Pratt have each argued that the dominance of classical logics over paraconsistent in western societies is not a politically neutral fact. Norton Smith argues that many Indigenous philosophies are paraconsistent, and that the cultural genocide of Indigenous peoples in the Americas was in part justified by the claim that their unintelligible logics and philosophies rendered them in need of education, correction, and mastery.<sup>i</sup>

Paraconsistent logics do not claim that every possible or imaginable contradiction is true. They imply, rather, that the criteria we bring to bear when evaluating the truth of a contradiction are not entailed in the premises. We have to do a little more work.

So while Conway's claims are clearly problematic and seem more like a poorly thought out defense than a real example of a true contradiction, her espousal of alternative facts has highlighted a genuine and deep-seated disagreement within philosophy and logic. It is precisely in cultural moments like this, when the stakes over the truth or falsity of facts seem highest, that philosophy is able to slow things down, lend a critical lens, and offer careful analysis, if not also some solutions. While there is an imperative to resist Conway's particular claim, we ought not base our concern on the claim that contradictions, a priori, cannot be true. Let us not throw out the baby with the proverbial bathwater, or make claims about the nature of truth that reinforce the exclusion of Indigenous and other lives and systems of thought. If Conway's claim troubles us, let it be because it is a strategic deployment or misunderstanding of alternative logics by

privileged subjects in order gain concrete forms of political and material power over other lives, even as they deny the use of alternative logics by Indigenous populations.

This paper is an attempt to think more carefully about the role of logic in our lives, and about the value of paraconsistent logics in particular. By bringing together logic, Indigenous philosophy, and philosophy of science, I argue that paraconsistent logics make visible important aspects of politics, ethics, and ontology otherwise obscured by classical logic. Paraconsistent logics therefore provide unique resources for political resistance, and for better seeing and engaging the complexities of nature and our world.

In the first section, I lay out a critique of classical logics from the perspective of paraconsistent logic. Here I clarify what exactly is at stake in debates about true contradictions, two or more valued systems, and the principle of explosion. The second section argues that Indigenous philosophies offer robust alternatives in the form of paraconsistent logics.<sup>ii</sup> While classical logics render Indigenous ontologies irrational and inconsistent, I argue paraconsistent logics affirm and engage them as actual, complete logical systems. 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. To demonstrate this, I turn in my third section to one place from which alternative logics are often explicitly excluded, the sciences, and consider one logical problem in biology that would benefit from an Indigenous, paraconsistent analysis: the problem of the biological individual.

The examples of Indigenous philosophy and biology may seem like a strange pairing, but I think they enable an important conversation. Indigenous philosophy affirms that contradictions are true ontologically—that is, that contradictions are true in the

world—and are not mere epistemological or empirical shortcomings. Indigenous philosophy also demonstrates what is at stake in denying paraconsistent logics: namely, the exclusion of groups and entities with alternative logical systems. I then suggest that the sciences, which often seem hostile toward Indigenous knowledges and ways of knowing, are themselves replete with true contradictions. On their own, many sciences struggle to accept and solve many of these contradictions within the self-imposed limits of classical logic. 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 which has something to teach us, and to teach biology, about our own limits and about the non-binary nature of the world.

### **I. Contradictions in Classical Logic vs. Paraconsistent Logic**

The standard view of logical contradictions in classical logic is that they are necessarily false—two opposite things cannot both be true simultaneously. This is known as the law of the excluded middle. 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 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:  $A \wedge \text{not-}A = B$ , 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) necessity of the principle of explosion.<sup>iii</sup>

First, there are certain aspects of the world that cannot be accounted for on 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.<sup>iv</sup> As Priest claims, "it is rationally obligatory" to believe that this sentence is both true and false.<sup>v</sup> Priest calls this a kind of "truth-value-glut," presumably because it has an excessive supply of value: not one or the other, but both.<sup>vi</sup> There are also truth-value gluts that "concern inconsistent laws, and the rights and obligations agents have in virtue of these."<sup>vii</sup> Priest gives the example of a 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.<sup>viii</sup>

Now 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.<sup>ix</sup> And, as I have just indicated, in order to solve it, one must bring to bear other criteria—in this case, hopefully justice—which are not logically necessitated by the premises themselves: one must make a choice or have other values at work. We find this third value, "both," in systems like LP and RM3. K3 also has three values: true, false, and indeterminate (or neither). In this third value system, we find there are statements like, "Sherlock Holms lives on Baker Street" which are neither true nor false, but are instead *neither* (or indeterminate). Priest calls these "truth gaps".<sup>x</sup> In FDE, one gains yet a fourth truth value: true, false, both, and neither. So on and so forth.

As you can see, we are not playing an abstract game with mere letters and symbols. We are concerned with the fact that two valued logics cannot account for real ways people actually speak and think in the world. We are dealing with real problems and contradictions that appear to exist in the world, and not just in our heads, and which need something more than a true/false binary. This is the problem with two valued systems in general.

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, 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 human and I am not human.”<sup>xi</sup>

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 that that 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’d end up with a hatched moon and the colonization of earth by orange toupees.

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.<sup>xiii</sup> Priest's story is, in a way, a response to the story of Schrodinger's cat.<sup>xiii</sup> Schrodinger originally created his thought experiment to demonstrate that the contradictory state of matter supposed by some interpretations of quantum mechanics must be resolved to fit the laws of non-contradiction and of the excluded middle.<sup>xiv</sup> By using a box, and by referencing this feline story, Priest refers us to debates about the actual, contradictory nature of matter in superstates—superstates that do not belong in farcical stories about boxes, but exist as genuine true contradictions conditioning and creating our own world. 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 do 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,” because we recognize that contradictions about boxes do not necessarily say anything about egg-laying cows. In paraconsistent logics—where contradictions can be true—the law of explosion does not hold.

### **Indigenous Ontology: on willful and true contradictions**

In her essay on Indigenous logic from *American Indian Thought*, Anne Waters suggests Indigenous logics are non-binary, or “nondiscrete, complementary dualistic logics,” which is to say that they contain more than two values:  $p$ , not  $p$ , and both. True, false, and both.<sup>xv</sup> As Thomas Norton Smith clarifies in his book on Indigenous logics, “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.”<sup>xvi</sup> 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.”<sup>xvii</sup> In other words, in Norton Smith’s account of Indigenous logic, neither the law of non-contradiction, nor the law of the excluded middle necessarily holds. There are circumstances in which a proposition can be both true and false, or where an entity might have and not have a certain property. Consider the aboriginal person who both has and does not have the right to vote at the same time. Or, to anticipate our affirmation of true contradictions and truth gluts in science, consider our basic understanding of electrons, which both are and are not particles, or which are both particles and waves.

Anne Waters suggests Indigenous non-binary, 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. That is, while contradiction in voting rights can be resolved to prefer either  $p$  or not- $p$  (voting or not voting), the particle example more accurately clarifies that for Indigenous logics, these contradictions are part of the fabric of the world—they are ontological claims—and are not just the fault of the scientists’ experiential or perspectival shortcomings. 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.”<sup>xviii</sup> Supported by an ontology that sees the world and its categories as multiplicitous, fluid, complex, and entangled, Indigenous logics offers solutions to problems that arise from the laws of non-contradiction and the excluded middle, and provides vast resources for recognizing



aspects of the world that western, binary logics explicitly exclude or otherwise fail make visible.

We see affirmations of this Indigenous logic in a number of Indigenous creation histories, and in contemporary writings and Indigenous philosophies. In her play, *The Girl Who Swam Forever*, Anishinaabe, Canadian Métis 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.<sup>xix</sup> The story takes place in the sixties, on the 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.<sup>xx</sup>

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.<sup>xxi</sup> 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 love and sexuality. He tries to control her and police her body, her desires, and her sexuality, regulating her complexly burgeoning identity that is more fluid and novel than he would like.

This story affirms a third truth-value —“both”—in several ways. Forever is both human and non-human, 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 imbeddedness with land and her non-human kin. Ray is also human and non-human, 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 non-human status allows 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.

In their article, *Muskrat Theories*, a group of Indigenous scholars and activists (hereafter Bang, et al.) use a similar logic in their discussion of land education.<sup>xxii</sup> Borrowing from Marcia McKenzie, the group affirms the idea of a “willful contradiction” that rejects the binary logics of colonization which generate us/them dichotomies and instead affirm decolonial imaginaries. McKenzie defines 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.”<sup>xxiii</sup> In other words, for McKenzie as well as Bang et al., Indigenous ontologies must resist the temptation to flatten the world into a set of either/or propositions, or to propose a linear history which 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 temporality of Indigenous lives and land as a means of resisting the colonial logics.

In “Muskcrat Theories,” Bang et al. look to the lands of Chicago, formerly known as Shikaakwa, 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. And the wetlands are not totally filled in or erased, as native wetland plants like tobacco grow up through the concrete.<sup>xxiv</sup> 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.”<sup>xxv</sup> 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, non-binary relationship in the cracks of Chicago.<sup>xxvi</sup> Importantly, the claim is not that *some* wetland plants have emerged in the middle of a concrete jungle. Rather, for Bang et al., 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. Bang et al. thus willfully contradict colonial logics which attempt to place Indigenous lives and lands in the past, and which seek binary, either/or designations of land. But, as part of their decolonial 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. 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 and the ways this true contradiction is a source of resistance.

This is why Bang et al. refer to willful contradictions as “muskrat theory.” As Gerald Vizenor suggests, “Muskrat is an earth diver” who “finds home in shadowy wetlands – relational dynamisms between land and water.”<sup>xxvii</sup> He is a creature who both is and is not of the water, and the ability to not only exist but 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 between humans, land, and non-human lives, that two-valued systems simply cannot name.

### **Philosophy of Biology: Are we individuals are not? Yes!**

It might seem like a leap to now move into the sciences for more alternative logics, since they have long been explicitly committed to classical logicians like Willard Van Orman Quine and to the laws of the excluded middle and non-contradiction.<sup>xxviii</sup> But the sciences are actually brimming with truth-gluts and gaps and with true contradictions.<sup>xxix</sup> We have already discussed the famous particle/wave problem, and there are many others. But let us consider just one important and current example:

whether or not the individual is the basic unit of biological measurement, and if so, why we cannot find a single set of criteria to designate and identify all individuals. Given that the individual is the taken-for-granted ground of many sciences, it is important to ask how and why a paradoxical answer to this question does not throw the science into crises? But it is also significant that we consider this question in light of the aforementioned Indigenous ontologies, in which entities are not strictly singular and individual, but are multiple and are quite commonly two things at once.

One way of framing the debate about biological individuality is as a problem of insufficient criteria.<sup>xxx</sup> 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.”<sup>xxxii</sup> But, as Clarke notes, the numerous sets of criteria that define what counts as a biological individual mostly disagree. Not only do these sets of criteria contradict one another at every turn, they also each 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, while 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, while 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.<sup>xxxiii</sup> First, the definition of the individual by the 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.”<sup>xxxiii</sup> 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.<sup>xxxiv</sup>

Second, the genotype model suggests that individuals have a unique genotype, different from others of its species.<sup>xxxv</sup> 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 Portugese 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 which 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 individual pretty thoroughly and plunged us into an emergent mess of truth gluts (true contradictions). In recent years the ideas of the holobiont or hologenome have developed to help biologists understand how humans and their necessary obligate symbionts, microbes, act together genetically and functionally, both in evolution and over the span of a single life.<sup>xxxvi</sup> Microbes dramatically affect an individual's behavior and sociality, and even affect the development of new species. 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 criteria 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. Which is it? In general, the result of these contradictions lead to some unintuitive claims: that a Portuguese man o'war, which looks and operates like an individual, becomes instead a colony, while the tongue eating louse, who chews out and replaces the tongue of a fish and then functionally integrates into their physical system, counts as a biological individual with its fish. But none of these claims seem 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.<sup>xxxvii</sup> Instead, each science might have its own criteria to correspond with the aspects of life it hopes to measure. Lets name it an epistemological or empirical shortcoming, and call it day. But as Karen Kovaka suggests, this obviously does not actually solve any debates, and merely moves the marker of disagreement to whether or not narrower criteria are adequate. As Kovaka diagnoses the problem, the idea of the individual is so fundamental as the taken for granted ground for good science, that many

scientists feel they cannot do good science without a clear individual paradigm. But for Kovaka, the individual concept is not a necessary condition for good science. Instead, it has led to the privileging of concepts over the material and empirical complexity of the lives the concepts are supposed to track. For Kovaka, the solution is for scientists to consider the material world more closely, letting new questions and theoretical paradigms arise from the complexities they find there. This would lead to an emergence of new questions and more careful theoretical grounding that does not allow the preconceived idea of the individual to do most of the intellectual heavy-lifting.

Kovaka's solution, framed as an attention to the complexities of the material and concrete rather than a privilege of abstract concepts, corresponds to Indigenous affirmations of the complex contradictions of the now over the ease of binary logics. I also agree with Kovaka that as long as the sciences take the idea of the individual as their foundation or 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, non-contradictory definition.

But, learning from Indigenous logic and ontologies, I want to go a step further. I suggest the solution does not merely involve a shifted epistemological emphasis, though that is important. I additionally suggest that, just as Forever is both human and sturgeon, and as the electron is both wave and particle, earth's creatures are ontologically *both* individuals and not-individuals *at the same time*. As Waters suggests, for Indigenous philosophy, the world is composed of nondiscrete, unbounded entities who defy the binary logics of western philosophy.<sup>xxxviii</sup> What if the man o'war and the ant colony, the



fungus grove, the dog, and the human with its microbes, are both individual and a multiplicity? What if the plant, both collective and individual, is the model for all of us?

By situating the reality of these contradictions in the world, I move away from the claim that some unifying intellectual or epistemological criteria is achievable. In fact, if we affirm this as a true contradiction, it means that the criteria are necessarily going to conflict. It means, following Indigenous methods, that we need to find ways of writing about true contradistinctions, being extra careful about what *is* entailed from these true contradictions and how we arrive there. It means we cannot, as Kovaka suggests, allow our abstract binary paradigms to do the heavy lifting. We must instead find novel ways of tracking specific, conflicting kinds of information, and then to hold these answers in tension. By orienting to a reality like this, the kinds of questions one might ask, and the kinds of answers or material relations one might track, will change. A multiplicity of perspectives or tactics might still be required. But those will need to be developed, as Kovaka claims, within the confines of the “mutual dependence between empirical and theoretical biology,” where theoretical biology affirms and offers tools for thinking through the existence of a much more complex reality than it is currently ready to allow.

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 logics and ontologies, rather than a loss of all meaning and sense. At the very least, we now know that we need not look 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.

## Conclusion:

I have tried to defend paraconsistent logics, and to suggest they offer resources for engaging and understanding real world problems that classical logics cannot address. I have demonstrated that Indigenous philosophies affirm three-valued logics and true-contradictions as ontologically true, and not only as temporary contradictions, as mere slippages, or the limits of human knowledge. It is politically and ethically imperative that we recognize the consistency and integrity of Indigenous systems and become critical of the classical western logics that have excluded them. It is also imperative that we engage Indigenous logics and ontologies in order to affirm and join their modes of resistance and decolonial imaginings. Beyond this, I located one place within biology where Indigenous paraconsistent logic is both true (even if resisted) and where further paraconsistent analysis needed. There is much more scientific and collective work to be done in order to fully affirm, support, study, 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.

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<sup>i</sup> Thomas Norton Smith, *The Dance of Person ad Place*, SUNY Press, New York, 2010. 2.

<sup>ii</sup> I intentionally use the language of Indigenous, rather than Native American, American Indian, or Aboriginal. I do this first, because it follows the terms use in the authors I deploy, from Thomas Norton Smith to Megan Bang, to Anne Waters. Second, I use this term because it does not confine the indigenous groups and methods I engage to the colonial geographies implicit in designations like American Indians, etc. But there are plenty of scholars, including Norton Smith, who, when referencing specific territories, readily uses the language of American Indian as a way of designating a specific collection of Native populations.

<sup>iii</sup> Though framed differently, the two criticisms I suggest are similar to Priest's own list of the conflicts between classical and paraconsistent logics in "What's So Bad About Contradictions," in *The Journal of Philosophy*, 1998. 410. The remaining three—contradictions cannot be believed rationally, if contradictions

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were acceptable, people could never be rationally criticized, and if contradictions were acceptable, no one could ever deny anything—are in some ways implicitly addressed in my arguments regarding the first two, and in my affirmation of Indigenous and scientific true contradictions.

<sup>iv</sup> *An Introduction to Non-Classical Logic*, 127. *An Introduction to Non-Classical Logic*, 127. Technically, the value is indeterminacy, and how that indeterminacy gets cashed out in various paraconsistent systems is a bit different. But it did not seem possible to address indeterminacy and its implications in the space I have here.

<sup>v</sup> Graham Priest, “What’s So Bad About Contradictions,” in *The Journal of Philosophy*, 1998. 410.

<sup>vi</sup> Priest, *An Introduction to Non-Classical Logic*, 127. He calls this particular kind of truth glut the problem of self-reference. Interestingly, in a longer version of this paper, I might supplement this example of self-reference with Derrida’s work in *The Monolingualism of the Other*, which relies precisely on a series of self-referencing truth gluts (famously beginning with “I have but only one language; that language is not mine”) as tools for disrupting colonial linguistics and nationalist, geopolitical frameworks.

<sup>vii</sup> Priest, *An Introduction to Non-Classical Logic*, 128.

<sup>viii</sup> Priest, *An Introduction to Non-Classical Logic*, 128.

<sup>ix</sup> *Ibid.*, 128.

<sup>x</sup> *Ibid.*, 129.

<sup>xi</sup> Likewise, and the two contradictions most relevant for this paper, “Animals are people and animals are not people,” is not the same contradiction as, “the individual is the basic unit of biological measurement and the individual is not the basic unit of biological measurement.”

<sup>xii</sup> Priest, *Sylvan’s Box*, 576.

<sup>xiii</sup> Which Priest basically admits in his reference to that story within his own.

<sup>xiv</sup> Priest, *Sylvan’s Box*, 578.

<sup>xv</sup> Anne Waters, “The Alchemical Bering Strait Theory: American’s Indigenous Nations and Informal Logic Courses,” *American Indian Thought: Philosophical Essays* (Blackwell Publishing; Malden, Ma, 2008). 74. While these logics might have various dualisms (e.g., male–female, good–evil, animate–inanimate) because they are non-binary, the dualisms are not regarded as opposites or as mutually exclusive possibilities.

<sup>xvi</sup> Norton Smith, *The Dance of Person and Place*, 44.

<sup>xvii</sup> Norton Smith, 44.

<sup>xviii</sup> Waters, 107. The quote continues: “many Indigenous gender categories are ontologically without fixed boundary. They are animate, nondiscrete, and grounded in a nondiscrete and thus nonbinary dualist ontology.”

<sup>xix</sup> In the tradition of recognizing the chain permission, of story tellers and receivers, I was told this story in Many Nation’s Longhouse, at the University of Oregon, where an Indigenous cast performed in February, 2017.

<sup>xx</sup> My first contact with this play was in the Many Nation’s Longhouse, at the University of Oregon, where an Indigenous cast performed it beautifully. The play was difficult to get a hold of, so all references will come from

<sup>xxi</sup> Interestingly, the nuns in the story, who are always out looking for Forever, are understood as frogs and toads. Their rumblings are mostly nonsensical to Forever and the audience—mere croaks, “ribbit”s, and slurpings—and are only occasionally rendered in English, in binary terms and exclusive categories. They call her “slut,” “girl,” and “Indian,” without realizing that those categories do not capture her.

<sup>xxii</sup> Megan Bang, Lawrence Curley, Adam Kessel, Ananda Marin, Eli S. Suzukovich III, and George Strack, “Muskrat Theories, Tobacco in the Streets, and Living in Chicago as Indigenous Land” in *Environmental Education*, 2014, 2.

<sup>xxiii</sup> Marcia McKenzie, “The willful contradiction of poststructural socio-ecological education” in *Canadian Journal of Environmental Education*, Spring 2004, 180.

<sup>xxiv</sup> Bang, et al., 3.

<sup>xxv</sup> Bang et al., 3.

<sup>xxvi</sup> Bang et al., 3.

<sup>xxvii</sup> Gerald Vizenor, *Earthdivers: Tribal Narratives on Mixed Descent*. Minneapolis, MN:

University of Minnesota Press, 1981; and Bang et al., 1. Interestingly, Vizenor’s engagement with the muskrat in the context of mixed race decent points us toward yet another domain of sustained true contradiction within indigenous ontology. In *Earthdivers*, Vizenor redirects the conversation about mixed

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race from one that focuses on purity or synthesis, to one that focuses on contradiction and affirmation of two simultaneous if different truths.

<sup>xxviii</sup> Part of this paper's explicit aim is reflection on this idea or sense of a leap, and to challenge the intuition that Indigenous philosophies and philosophy of biology have very few things in common or cannot speak with one another meaningfully.

<sup>xxix</sup> As I look back on my last three papers, every one of them involved some aspect of a scientific problems that could be clarified by the language of true gluts and three-valued systems: the paradoxes in vector biology, the zoological classification and treatment of animals, and the feminist critique of philosophy of mind (particularly focusing on bats). And that's not to speak of the famous examples, from quantum physics, to certain problems within evolution, to the emergent mess of truth-gluts into which microbes have plunged us, etc.

<sup>xxx</sup> There are other ways of looking at this problem in the philosophy of biology, including the emergent conflict regarding whether or not individuals are single organisms or in fully functioning ecosystems. But the answer is the same: yes, they are both. And that discussion would require slightly longer explanations. So in the longer version of this essay, in addition to the criteria approach, I will also consider is Lewontin's argument that the ecosystem is a better paradigm, because it allows us to attend to individual and multiplicity, closedness and openness, at the same time.

<sup>xxxi</sup> Ellen Clarke, "The Problem of the Biological Individual" in *Biological Theory*, Volume 5, Issue 4, 2010, 312.

<sup>xxxii</sup> And to be clear, Clarke pulls the nine criteria she develops in her essay from an even vaster list of candidates that she does not include, for one reason or another.

<sup>xxxiii</sup> Clarke, 317.

<sup>xxxiv</sup> Ellen Clarke, "Plant Individuality" in *Biology and Philosophy*, January 2012.

<sup>xxxv</sup> Clarke, 316.

<sup>xxxvi</sup> For a comprehensive article on holobionts, see Seth Bordenstein and Kevin Theis, "Host Biology in Light of the Microbiome: Ten Principles of Holobionts and Hologenomes" in *PLOS Biology*, August 2015.

<sup>xxxvii</sup> Karen Kovaka, "BioIndividuality and Scientific Practice," *Philosophy of Science*, Vol. 82, No. 5 (December 2015).

<sup>xxxviii</sup> Waters, 101.