

Confronting the contradictions between Western and Indigenous science: a critical perspective on *Two-Eyed Seeing*

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Abstract

In the mid-2000s, the term *Two-Eyed Seeing* was introduced by Mi'kmaw Elder Albert Marshall to suggest the complementarity of Western and Indigenous sciences. The concept has since been adopted and applied in a diverse range of research. This article examines the latent tension in *Two-Eyed Seeing* between a desire to foster dialogue—in order, ideally, to generate a trans-cultural “third space” of understanding—and the denial or suppression of major contradictions between predominantly wholistic Indigenous and predominantly reductionist Eurocentric worldviews. Examples are considered of both fruitful *Two-Eyed Seeing* collaborations and areas where antithetical approaches cannot be combined, for reasons that a more critical application of the *Two-Eyed Seeing* concept could help make clear. Conversely, revised in this way, *Two-Eyed Seeing* can deepen appreciation of those areas of Western science, such as the *delicate empiricism* of Goethean science, authentically resonant with Indigenous approaches.

Keywords

Indigenous science, Western science, *Two-Eyed Seeing*, complementarity, Eurocentrism, Goethean science

... the Mi'kmaw language has its own language of science . . .

(Sable & Francis, 2012, p. 100)

Introduction

When Tuscarora writer Dr. Jane Mt. Pleasant, director of the American Indian programme at Cornell University, reflected honestly about her relationship to corn, she pointed to the difficulties of an Indigenous scholar—an agronomist in her case—attempting to navigate between her academic training and an intuition borne of her Indigenous heritage. Mt. Pleasant recalls her experience of walking through a cornfield and registering a simple truth, that she was “among conscious living things—entities that were surely more than just plants”, which found no echo in the science she had mastered. The source of her *other* knowledge was obvious to her:

But I know that these feelings are rooted in an understanding of the natural world and of corn that extends back generations and reflects knowledge from another vantage point, a Native perspective. The cornfield as a place where science and Native culture meet is a metaphor for my life as I struggle to find my place and manage the tension between Western science and my Indian roots. I love working with corn, and as an agronomist I am in awe of its productivity. But I also know that it represents much more than a prolific agricultural crop. It is an enormous gift to human beings and speaks of life and connection to the earth in ways that are profoundly simple and complex at the same time. (Mt. Pleasant, 2001, p. 126)

The different “vantage points” of which she speaks is an invitation to think anew about the tensions between knowledge systems. In recent *years*, in one small part of Turtle Island, a concerted effort has been made, at the initiative of Indigenous Elders in alliance with Settler scholars, to bridge the chasm between Western and Indigenous approaches to natural reality that Mt. Pleasant so eloquently describes. *Two-Eyed Seeing*—a term coined by Mi'kmaw Elder from Eskasoni First Nation Dr. Albert Marshall—sets the goal of learning

to see from one eye with the strengths of Indigenous knowledges and ways of knowing, and from the other eye with the strengths of Western knowledges and ways of knowing, and to using both these eyes together, for the benefit of all. (Bartlett et al., 2012, p. 335)

This expression of the importance of seeing knowledge acquisition as a meeting place of different ways of knowing was then further developed in the academic context by Settler biologist Cheryl Bartlett who, in conjunction with Albert Marshall and his wife and fellow-Elder Murdena

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Marshall, devised the Integrative Science (IS) Program at Cape Breton University (CBU) in the 1990s, primarily in an effort to increase the desultory number of Mi'kmaw students studying science at the University. Bartlett had asked her friend and colleague Murdena Marshall why enrolment was so poor and was told, "Well, we Mi'kmaq have been here for thousands of years—don't you think we've learned something about plants and animals?" Marshall had also pointed out that Western science "tended to fragment the world into divisions" ("Two-Eyed Seeing," 2013, para. 7), which does not accord with the Mi'kmaw worldview.

In 2003, the IS Program expanded from its "birthing arena of post-secondary science education into the arena of science research and outreach" (IS Program, CBU, n.d.). To symbolize the guiding principle behind this advance into uncharted territory, an image often evoked by the late Mi'kmaw Chief of the Acadia First Nation, Nova Scotia Charles Labrador was adopted: *Trees Holding Hands*. When you "go into the forest", in Chief Labrador's words, "you see the birch, pine, maple. Look underground" and you'll see that "all those trees are holding hands. We as people have to do the same" (IS Program, CBU, n.d.). This simple and profound idea, soon adopted as the "iconic visual" of Two-Eyed Seeing, implies a deep, underlying, mutually supportive connection between seemingly different *trees*, or sciences, or worldviews. As Chief Labrador's son Todd noted in a 2003 interview, "Father used to say, believe in all people. It's not we and them. It's us" (IS Program, CBU, n.d.). Treating *others*—including non-human others—with respect is fundamentally an act of self-respect, a gracious and generous position for a leader of a grotesquely disrespected Indigenous people to adopt.

The *Trees Holding Hands* image, we believe, helps us better understand the commitment of Two-Eyed Seeing researchers to a mutually respectful, non-confrontational approach. Yet there would obviously have been many examples of Western imperialism, scientific and otherwise, that Chief Labrador would not have respected; or, rather, would have found disrespectful—and wasteful—of the inestimable gifts of Creation. So while Two-Eyed Seeing is sometimes presented as a straightforward way of considering two knowledge systems in tandem—with the positive result of a more wholistic understanding of the world in which we all live—that project is, very often and quite understandably, very far from straightforward. Indeed, Albert Marshall, while describing the concept as one people can easily grasp, has also often stressed a factor that considerably complicates it, namely, that one of those *eyes* itself already habitually cultivates and practices Two-Eyed Seeing in the sense of seeking a respectful relationship with nature:

I truly believe that this two-eyed seeing is a concept which is inherent in most aboriginal people because in years gone by when they were hunters and gatherers, it was imperative that we look at everything from another perspective . . . so that you don't compromise the ecological integrity of the area. (Two-Eyed Seeing, 2013, para. 13)

Thus defined, Two-Eyed Seeing offers the Western *eye* a chance to look at itself—and the world around it—afresh. Such a far-reaching revisioning, or even the sustained pursuit of such an aim, would constitute a major contribution to efforts to indigenize the academy at CBU and beyond given the profound respect for Indigenous knowledge that is demanded.

The more common use of the Two-Eyed Seeing concept, however, simply presumes the soundness of each perspective. This often unconscious tendency to "draw the sting" from the concept has been enabled by the explicit eschewal of confrontation: a commitment not so much to resolving but rather avoiding conflicts between worldviews. As four of its original formulators—including the Marshalls—insisted, an essential benefit of Two-Eyed Seeing is that it "avoids a clash of knowledges" (Hatcher et al., 2009, p. 146).

As we will demonstrate, in some areas of research, this presumption of equal validity—in the context of enduring colonialism, inside and outside the Academy—can produce powerfully positive results and experiences. In other areas, however, this aversion to controversy—the *reckoning* that reconciliation sometimes requires—has compromised the integrity of the concept itself, reducing Two-Eyed Seeing, we believe, to a shadow of its potential self.

One source of this self-constriction, perhaps, may be an enduring sense of protectiveness of the Two-Eyed Seeing venture, in its early years a sapling much in need of shelter, nourishment, and *hands* to hold, helping it take root in a sometimes hostile and uncomprehending academic environment. But after nearly two, fast-growing decades, Two-Eyed Seeing may well be strong enough to branch out, in more critically fruitful directions. Conflict-avoidance, after all, is not conflict resolution; nor does it reflect the reality that modern Western science is and has always been an arena of fierce clashes and endemic controversy, within and between disciplines. While constantly evolving, however, a basic reductionist orthodoxy has long prevailed, one antithetical to and dismissive of the radically distinct premises and practices of other cultural traditions, or indeed of alternative approaches—some of which we consider below—proposed and practised in the West.

What if, we need the courage to ask, one of the *two eyes* you wish to see with is essentially healthy, and the other partly diseased?

Two-Eyed Seeing: fused horizons and false dawns

From 2004 to 2007, we participated in a series of seminars on *Integrative Science and Philosophy*. Open to faculty, staff, and community members, the seminars were designed in part to test the parameters of Two-Eyed Seeing. From our experience then and since, there is no doubting the sincerity of the belief shared by Western scientists in the programme that their approach alone is inadequate to meet the vital ecological and related challenges of our time.

This goes far further than most Western scientists, or indeed philosophers or historians of science, are often

prepared to. To a significant extent, the path-breaking nature of the venture was positively acknowledged: from 2002 to her retirement in 2012, for example, Bartlett held a prestigious Tier 1 Canada Research Chair, and in 2011 was appointed a member of the Order of Canada “for her contributions to developing a new approach to integrating Mi’kmaw learning traditions into post-secondary science education” (Director’s Biography, n.d.). It has also, however, failed to persuade many sceptical observers, offended by the notion that different sciences exist to be *integrated*. Science is definitively singular, the orthodoxy runs, in the strict sense of reference to a set of principles, methods, and safeguards uniformly applied across a full spectrum of study. It is, in this moral as well as practical sense, a hallowed title unworthy of extension to clearly incommensurate modes and methods of inquiry.

This fear of contamination has been noted by many Indigenous observers, for example, Gregory Cajete, the Tewa Pueblo author of *Native Science: Natural Laws of Independence*. “Until Western science rejects its bias, dialogue with another culture will be problematic”, for while a few “individual scientists can sometimes see beyond” that bias, “Western science” as a whole “is caught behind institutional blinkers”. He continues,

That the Western scientific worldview is insecure and may feel threatened is evidenced by a total dismissal of the Indigenous worldview. A study of psychology would suggest that when Western science is threatened, its practitioners become defensive and unwilling to reconsider their point of view. (Cajete, 2000, p. 307)

If there are, as Blackfoot writer Leroy Little Bear (2012, p. 11) argues, “ideas” concerning natural reality and humanity’s place within it “that normally do not cross the Western mind”, there are also ideas about science that fail to register, except as shocks. Such as the basic consideration that if science is the “search for knowledge at the leading edges of the humanly knowable, then there are ‘sciences’ other than the Western science of measurement” (Little Bear, 2000, p. x). One of those other sciences is “Native American science”, “incomprehensible to most westerners because it operates from a different paradigm”, in which, while quantitative analysis—measurement—is important, it “is only one of many factors to be considered” and thus “does not play the foundational role that it plays in Western science”. And so—“In order to appreciate and ‘come to know’ in the Native American science way, one has to understand the culture/worldview/paradigm of Native American people” (Little Bear, 2000, p. x).

Despite this formidable ask, Cajete (2000, p. 307) believes some “bridge building is underway”, and that “both sides stand to gain from dialogue”. As he immediately adds, however,

given contemporary political realities, the playing field is unequal when practitioners or spokespersons of the two traditions come together. A crucial first step in making the dialogue and its effects truly authentic and practical would be for the Western scientific establishment to validate the study of Indigenous science.

This should not, though, imply that the latter requires validation, but rather “wants it for a dialogue that will benefit both sides” (Cajete, 2000, p. 308).

Two-Eyed Seeing is clearly an example of work undertaken to date almost exclusively in areas with comparatively bridgeable divides: ecology and environmental science, health and medicine, psychological disorders and therapies, and so on (Hovey et al., 2017; Marsh et al., 2015; Martin, 2012; McKeon, 2012; Rowan et al., 2015). Even here, however, as a recent comprehensive survey details, “guidance within the methodological literature remains vague on” the “practical application” of the concept, resulting in “inconsistent practices among researchers on how Two-Eyed Seeing is interpreted and applied” (Wright et al., 2019, p. 2).

Sometimes, for example, in fostering “diverse discussion within a hospitable ethical place”, Two-Eyed Seeing collaborators seek nothing less ambitious and profound than “a shared vision that can be neither situated within the Western or Indigenous way of knowing but somewhere in the space in-between or fusions of new horizons” (Hovey et al., 2017, pp. 1285–1286). What Hovey et al. are referring to is a specific research-area—Indigenous health promotion—well-placed to appreciate the need for what Hogue and Bartlett (2014) call “a third space, a liminal space, in which we build a sharing relationship while maintaining the integrity of each identity and voice” (p. 25). In this case, the participant-authors describe the application and exploration of Two-Eyed Seeing as a “hermeneutic relational process” grounded, appropriately, in both Western hermeneutics and “Haudenosaunee decision making” (Hovey et al., 2017, p. 1280).

But does this mean that Two-Eyed Seeing should be limited to exploring such fertile common ground, or, rather, extended into more hostile territory? The massive, atom-smashing particle-accelerators of contemporary *big physics*, for example, hardly lend themselves to collaborative ventures with Indigenous researchers likely to pose—to the reductionist *eye*—inexplicable questions such as those posed to the Western physicist David Bohm, at a remarkable *Sharing Circle* we shall return to:

The Native participants questioned Bohm about the ethical and moral dimensions of Western science. . . . There was . . . concern at the way physicists learned about elementary matter—by colliding particles together in a particularly violent way. We are also communicating with nature, the Elders explained, and entering into alliance with her energies. What are the moral dimensions of such actions? (Peat, 1997, p. 315)

What can possibly be *immoral* about having a simply smashing time with atoms? What can possibly be meant—in respect, for example, to CERN’s (European Organization for Nuclear Research) search for the Higgs boson, or *God particle*—by *violent*, or even worse *communicating*, or worse still *alliance*? Bohm himself reacted with humility, not hostility, to the civil but certainly not *clash-averse* probing of the Elders: but was that probing an illustration of the radical limits of Two-Eyed Seeing, or a tantalizing glimpse into its critical potential to expose the radical limits of certain established and hallowed perspectives?

In fact, even with respect to obviously *suitable* subjects, Two-Eyed Seeing sometimes fails to function in the way defined above, as a relational process in which two scientific traditions create a transcendent, trans-cultural *third space*. In an ambitious and influential 6-year study into the environmental health impacts of a notorious, recently closed pulp mill in Nova Scotia—a venture explicitly presented as an exercise in Two-Eyed Seeing—no attempt was made to create a *fused* scientific horizon. Instead, Western science was deployed at the request of a marginalized and suffering Indigenous community to document the scale of the crisis and pierce the pseudo-scientific defences of the mill operator. Thus, in the project's final report, Stella Francis, Past President of the Pictou Landing Native Women's Group, thanked "the University members of our Research Team who helped with the scientific part of the project" (Pictou Landing Native Women's Group et al., 2016, p. ix). The political logic of commissioning such a study is, of course, undeniable—but only because the Settler-colonial status quo would all too quickly have denied, would not have regarded as serious science, an equally thorough study conducted by Indigenous researchers doubtless incorporating such alien concepts as the need to communicate and establish *alliances* with natural energies.

In all the Two-Eyed Seeing projects we have studied, and in all the scholarly literature on the fledgling concept, a dominant theme is the importance and value of mutual respect, the sometimes electrifying impact on Indigenous and Settler participants of the culturally novel spectacle of "Western researchers" cast in the "back seat" role of "follower, listener, and learner" (Wright et al., 2019, p. 16). To be sure, "there are differences in the literature as to whether Two-Eyed Seeing is considered as an ethical protocol . . . , a guiding principle . . . , or a framework", with "these key terms used interchangeably in the original and subsequent authors using Two-Eyed Seeing" (Wright, et al., p. 1). Indisputably, however, the *ethical protocol* is of the essence of the venture so far. The issue we seek to raise is whether that protocol should include the requirement, in all cases, of avoiding a clash of worldviews? What if one of those worldviews is rooted in methods—vivisection, clear-cutting—antithetical to the establishment of an *ethical protocol*, or alliance, between researchers and their *objects* of study? Does Two-Eyed Seeing have the potential to exercise a *therapeutic* influence over Western science *as a whole*, not just in demarcated *safe zones* of already-friendly territory—a very small part, alas, of that *whole*? If so, it has a duty to confront what has very often proved an enemy force, not just in the lives of Indigenous peoples, but the life of the planet. It is not unethical, only vital, to acknowledge that authentic therapy—intended as a prelude to integration and healing—often involves traumatic encounters.

Through two eyes or in two minds? Contra-dictions between Mi'kmaw and Western science

As the hyphen in our subheading suggests, by *contra-dictions* we mean opposing ways of speaking about natural

phenomena, distinct *languages of science* in turn shaping how human–nonhuman natural relations are established and maintained. In themselves, such differences—if examined and discussed in a spirit of respectful dialogue—can be of great value, helping the two sides build a fuller composite picture of the phenomena in question. But such differences never exist *in themselves*, reflecting instead core cultural assumptions, privileging certain patterns of perception, and modes of inquiry, over others. One test for the efficacy of Two-Eyed Seeing, then, is whether it can distinguish the helpful from the harmful differences at play, in the process exposing and reducing the degrees of prejudice involved.

Within Western science, the high value attached to seemingly irreconcilable explanations of phenomena is seen most clearly in *complementarity*, a core concept in quantum physics elaborated in 1927 by Niels Bohr in response to the newly discovered *uncertainty principle*, Werner Heisenberg's proof that the velocity and position of a subatomic particle can never be simultaneously determined (Howard, 2007). Perforce relinquishing the search for a single coherent picture—a self-contained, exhaustive description—of the atom, Bohr advocated the next best option, an *integrative* overview encompassing mutually *exclusive* descriptions. Is the electron a particle or a wave? The answer, Bohr insisted, depended on what kind of question you asked, the overall experimental situation established to enable the inquiry to be made. By varying the angles from which the subject is approached, a more "harmonious comprehension" (Bohr, 1957, p. 2) becomes possible—though never of the *thing itself*, only ever of its partial manifestations.

Both Bohr and Heisenberg came to envisage a deeper, broader role for complementarity, namely, establishing respectful cultural relations between science and other crucial areas of human life—the humanities, the arts, even religion and spirituality. Complementarity, Heisenberg wrote, "raises the hope that . . . many cultural traditions may live together and may combine different human endeavors into a new kind of balance between thought and deed, between activity and meditation" (Heisenberg, 1990, p. 194). What remained anathema, however, was the idea of complementary *sciences*, any challenge to *the* language of inquiry rooted in *the* scientific revolution: a revolution, spread by Conquest, uprooting alternative modes and methods of study. As Linda Tuhiwai Smith argues, the West views itself "as the centre of legitimate knowledge, the arbiter of what counts as knowledge and the source of 'civilized' knowledge" (Smith, 1999, p. 63). And precisely because *science* must be harmonized with non-scientific ways of knowing, *it* has to be preserved intact, its borders secure from incursion.

From the Mi'kmaw vantage, Two-Eyed Seeing was intended as a decisive rejection of this monopolistic Western claim. In numerous presentations at CBU and elsewhere (Marshall et al., 2006), however, a deeply problematic dichotomy was proposed between the *rigour* of the Western approach and the *vigour* of the Mi'kmaw approach, a case almost of opposites attracting—a spurious, stereotypical *complementarity* not exactly complimentary to those on the *vigorous* side. Indeed, as Cajete insists,

“Native science may be said to be the ‘science of the subtle’”, which, “rather than seeking to control natural reality . . . focuses its attention on subtle, inner natures wherein lie the rich textures and nuances of life” (Cajete, 2000, p. 17)—and the rigorousness of perception and intricacy of insight such subtleties demand is personified in the patient reverence of Indigenous scientists like Cajete, and Elders like the Marshalls.

The irony of the vigour–rigour dichotomy, in short, is that it fails to subject Two-Eyed Seeing to the kind of *rigorous* questioning it deserves. But though *two-science seeing* is surely the intended meaning, what happens when close examination of specific problems discloses not the potential for complementary solutions but rather the need to embrace one worldview and eschew the other?

Eelgrass equations: beyond the mainstream lake

In 2012, three young Mi’kmaw scientists from the Unama’ki Institute of Natural Resources—Shelley Denny, Angela Denny, and Tyson Paul—produced a report titled *Kataq: Mi’kmaq Ecological Knowledge—Bras d’Or Lakes Eels*. The *Kataq* are the *Eel People* of a “large estuarine body” (Denny et al., 2012, p. 5) formed approximately 10,000 years ago, a timeframe roughly equivalent to the duration of Mi’kmaw settlement. Bras d’Or—*arm of gold*—is the recent, French colonial name for the lakes, a UNESCO-designated biosphere reserve traditionally referred to, and revered, as *Pitu’paq*, that *to which all things flow* (Denny et al., 2012, p. 6), a finely tuned, and thus acutely vulnerable, ecosystem.

One of the most delicate balances maintained by the Mi’kmaq with the other peoples of *Pitu’paq* is their relationship with the *Kataq*, a species exquisitely embodying the supple strength of its environment. The flow of eel-grass, to give one beautiful example—a qualitative equation of flux, flow, and form—is vital to eel survival, “slowing down water currents and making the area suitable for eels” to thrive (Denny et al., 2012, p. 11).

The authors write that “traditional management of eels is directed by Mother Nature and guided by the Mi’kmaw world view that encompasses the belief and practice of ‘take only what you need’” (Denny et al., 2012, p. 16) This is the core concept of *Netukulimk*, explained here as best as English allows:

At the soul of everything we do at UINR [Unama’ki Institute of Natural Resources] is *Netukulimk*. *Netukulimk* is the use of natural bounty provided by the Creator for the self-support and well-being of the individual and the community. *Netukulimk* is achieving adequate standards of community nutrition and economic well-being without jeopardizing the integrity, diversity, or productivity of our environment. (Unama’ki Institute of Natural Resources, 2009).

Rigorous adherence to *Netukulimk*, one would think, would yield only modest dividends, precluding as it does maximal *resource extraction*. While “one area” of *Pitu’paq*,

for example, has been “identified as having more of the larger eels”, these creatures “are not fished because of the belief that they are there for a reason. This reinforces the spiritual relationship and belief that a greater purpose exists and must be respected” (Denny et al., 2012, p. 9). Likewise, “freshwater habitats . . . are not targets for eel spearing”, instead serving as “refuge” (Denny et al., 2012, p. 16). Yet just *taking what you need* provides more than meets the—at least Western—eye:

All parts of the eel can be used. Eel skins have been used as boot/moccasin soles, ties, bindings, and to stabilize limbs that are sprained or broken. The tail of the eel is used as bait for other fisheries and may be preserved until needed. The skins were also used as fat to cook other foods and as medicine. *Npisun*, or Indian medicine as it is commonly referred to, was taken as part of regular maintenance of the body (preventative rather than as a treatment or cure). Oils from larger eels were used to treat ear infections and loosen ear wax. The fresh skins of larger eels were used to set bones and relieve joint pain. (Denny et al., 2012, p. 13)

For so long a “pristine system”, that *to which all things flow* now stands in danger of becoming *that into which much is dumped*, from “several sewage treatment plants that do not treat for chemical products that potentially disrupt fish reproduction”, together with “logging and habitat destruction in the freshwater streams that feed into the Lakes”, “dumping of munitions”, and “land development practices . . . changing the shoreline forever”. Understandably, many Mi’kmaw “feel that nature has been destroyed without really understanding the relationship between the land and the lakes and the species that rely on them” (Denny et al., 2012, p. 18).

Under the influence of such poisonous affluence—faced with “concerns such as land run-off and sedimentation, climate change, pollution . . . [i]nvasive species and commercial fisheries”—eels, suffering primarily from “declining abundance, changing distribution, and presence of a parasite”, unsurprisingly “need our help” (Denny et al., 2012, p. 18). But what kind of help, and from who?

In *Steps to an Ecology of Mind*, Gregory Bateson examined the “epistemological error” of identifying as “units of survival” separate parts of an ecosystem—“individual, family line, subspecies, species” (Bateson, 1972, p. 483)—in truth dependent on a whole Way of Life. “What happens”, he asked, when you choose “the wrong unit”?

You end up with the species versus the species around it or versus the environment in which it operates. Man against nature. You end up, in fact, with Kaneohe Bay polluted, Lake Erie a slimy green mess, and “Let’s build bigger atom bombs to kill off the next-door neighbors.” There is an ecology of bad ideas, just as there is an ecology of weeds, and it is characteristic of the system that basic error propagates itself. It branches out like a rooted parasite through the tissues of life, and everything gets into a rather peculiar mess. . . . You forget that the ecological system called Lake Erie is a part of *your* wider ecological system—and that if Lake Erie is driven insane, its

insanity is incorporated in the larger system of *your* thought and experience. (Bateson, 1972, pp. 483–484)

And in Bateson's sense, the ongoing abuse of the eels of *Pitu'paq* is *insane*:

Eels are still commercially fished while their population is declining. Eels taken for aquaculture, killed by dams and turbines, and prevented from reaching their spawning destination are not balanced by a reduction in commercial effort. There appears to be a "prove it first" mentality even though common sense would paint a different scenario. By proving it first, it may be too late. . . . Commercial fisheries have failed because of lack of balance. Too many fish were removed too quickly. These fisheries have yet to return even after more than a decade of moratoriums. Why would eels be an exception? (Denny et al., 2012, p. 19)

Exceptions are made by whoever sets the rules, and the point about rules set by Settlers is that they too often fail to grasp the true significance of *Kataq*, the Lake-People they're dealing with. No wonder, then, that

Mi'kmaq fear that the economic worth of eels, their export value, the level of income they sustain, and the number of people employed will be given more importance than their intrinsic value to the cultures that depend on them for sustenance, maintenance of health, culture, tradition, and necessity to the ecosystems. There must be a shift in evaluation and emphasis from the economic value and approach to an ecological and cultural perspective and value. (Denny et al., 2012, p. 21)

Many Settlers "argue", the authors lament, "that the Mi'kmaq wouldn't care if they couldn't fish eels, that protein can be derived from other sources, and there are other ways to satisfy their spiritual needs". But outside the *blinkers*, the picture is far, far bigger:

There is no substitute for the American eel, *katew*. No other fish can provide the nutrition, fishing experience, spiritual relationship, and traditional medicine that eels provide the Mi'kmaq people. (Denny et al., 2012, p. 21)

In sum, *Kataq: Mi'kmaq Ecological Knowledge* is a superb example of the subtle science of life practised by the Mi'kmaq.

Hardworking trees: clear-cut contradictions

How does a forest appear, viewed first through a mechanistic, then a holistic, *eye*—and can the two images thereby gained be truly viewed as complementary? The question was answered in the negative by Albert Marshall in a talk titled "Two Countries, One Forest", delivered at a conference of the same name in Montreal in 2007. The "forests of the earth", he declared, "can be viewed from two different perspectives":

one being an acknowledgment and celebration of the life given to the forests through the hard labour of the living earth, and one being a view which places value only on the products we humans manufacture from the forests. The first view is inherent in First Nations societies around the globe. The second is a Eurocentric view which predominates in current culture. When we speak of preserving our forests, from these two perspectives, we mean very different things. For someone outside First Nation culture and beliefs, a person means the preservation of the forest industry to serve the *wants* of people. When we speak from inside First Nation culture and beliefs, we mean the preservation of the forest to provide for our *needs*. (Marshall, 2007)

Marshall argues that this human—ecologically humane—perspective is inspired in part by the example set by the forest itself, the way trees not only, in Chief Labrador's phrase, *hold hands* but "work hard to gather their sap, to bloom, to let go of their spring life, and to live again when a new cycle begins" (Marshall, 2007). This sense of radical kinship is the obverse of the human supremacism coded deep into a "Eurocentric perspective" that "depends upon forgetting that the earth and forests live". From this hubristic vantage, the only teachers "are other humans" (Marshall, 2007) and what they teach is that *Man* is the only true labourer, the heroic exploiter of *wilderness*.

The ironic result of such Conquest, of course, is the replacement of the real world with a Waste Land, bio-diverse forests with clear-cut moonscapes. "We, as a First Nation people, grieved for this", Marshall (2007) states. The grief is, of course, in part for the forest itself, an irreplaceably diverse community of being, but in part too for the defeat of an irreplaceable way of seeing—and, thus, of *doing* science—that deepens the humanity of the *seer* by respectfully incorporating non-human perspectives.

But while Eurocentric science contributed to the defeat of Indigenous science, it certainly did not *disprove* it. Or make it disappear.

Conclusion

In her 2014 collection *Generations Re-Merging*, Mi'kmaq poet Shalan Joudry (2014) asked, "how can something known/become unknown/in so little time" (p. 11). The *something* was simply *The Known World*, the world the Mi'kmaq came to know so well, and Eurocentric science and society came so quickly to ignore, even attempt to erase. Obviously not all Settlers or Western-trained scientists suffer from this amnesia. Bateson, for example, *remembered* how to really *think* about reality in ways resonant with Indigenous *ecologies of mind*. Many other challenges to reductionist orthodoxy have been mounted, both philosophically—for example, Bergson's (1907/2005) celebration of *creative evolution* and Whitehead's (1933) *organicism*—and scientifically—in biology, for example, by Lynn Margulis & Dorion Sagan (1995), Barbara McClintock, and her biographer Evelyn Fox Keller (1983, 2000). The most instructive case, we believe, is Goethean

Science, the “delicate empiricism” Goethe (1996, p. 72) proposed in contra-diction to reductionism’s “coercive imperatives” (p.72), the “grim torture chamber” of “mechanism” (p. 31).

Although a subject for another paper, it is striking that Goethe incorporated a version of Two-Eyed Seeing into his own science, identifying two complementary modes of comprehension: *Verstand* (“Understanding”) and *Vernunft* (“Reason”). In Goethe’s (1996) sense, *Verstand* “deals with what has become formed and congealed, in order to put it to use”, while *Vernunft* “is concerned with what is evolving and living” (p. 51), becoming rather than being. And a Goethean scientist needs both *eyes* in order to *see* the phenomena, as a whole, as clearly as possible.

Goethe’s belief in “the divine life in nature” is akin to the *Great Spirit* central to Indigenous Science: the *Reason* for being that cannot be *understood* by the beings it creates. As Little Bear writes, “What Native Americans refer to as ‘spirit’ and energy waves are the same thing. All of creation is a spirit. Everything in creation consists of a unique combination of energy waves” (Little Bear, 2000, pp. x–xi). In this sense, *spirit* is a rational, indeed indispensable, *scientific* concept, a *guiding principle* integral to both theory and practice. It is also akin to Bohm’s theory of the *implicate* and *explicate* orders of reality: the Two-Eyed Seeing he sought to incorporate into his post-mechanistic physics. In *Wholeness and the Implicate Order*, Bohm defined what he assumed was “the germ of a new notion of order”:

Generally speaking, the laws of physics have thus far referred mainly to the explicate order. Indeed, it may be said that the principal function of Cartesian coordinates is just to give a clear and precise description of explicate order. Now, we are proposing that in the formulation of the laws of physics, primary relevance is to be given to the implicate order, while the explicate order is to have a secondary kind of significance (e.g., as happened with Aristotle’s notion of movement, after the development of classical physics). Thus, it may be expected that a description given in terms of Cartesian coordinates can no longer be given a primary emphasis, and that a new kind of description will indeed have to be developed for discussing the laws of physics. (Bohm, 1983, p. 149)

Bohm became convinced that in order to develop this *new kind of description*, a new *language* of inquiry was necessary, a verb-based rheomode (*rheo* = *to flow*) transcending the verb–object–subject fragmentation of Indo-European grammar. In the 1970s, his colleague and biographer F. David Peat recalls, Bohm (1983) led efforts to create a revolutionary, verb-all language which “describes actions and movements, which flow into each other, without sharp separations or breaks” (pp. 29–30). But he couldn’t get the *mode* to flow:

After one of their rheomode-speaking sessions, Bohm noticed that everyone felt as if they were on one side of a gap, trying to reach the other. . . . The more perceptive noticed how, over time, the group began to use the rheomode’s verbs as stand-ins for nouns, defeating the very purpose for which the language had been created. (Peat, 1997, p. 251)

In 1992, with the *rheomode* project regrettably abandoned, Bohm attended a Sharing Circle organized in part by linguists—Alan Ford of Université de Montréal and Dan Alford of the California Institute of Integral Studies—specializing in “the strongly verb-based Algonquian family of languages” which includes the Mi’kmaq. In the Circle was Chickasaw writer James *Sa’ke’je* Youngblood Henderson who made the incredible—to Indo-European ears—claim that “I can spend a whole day without uttering a noun” (Peat, 1997, p. 315).

“At last”, Peat (1997) wrote, Bohm “had found a people whose metaphysics strongly mirrored his own, and whose language, not to mention the role it played in their reality, echoed his own rheomode” (p. 315). Although it would be fairer to say he had found a *people* whose language successfully *surmounted the difficulties* bedeviling his rheomode, the resonance between implicate–explicate Two-Eyed Seeing and Indigenous sciences has been acknowledged by numerous Indigenous scholars (e.g. Parry, 2005–2006; Stonechild, 2016, pp. 193–195), as well as emboldening Peat, casting his blinkers aside, to write *Blackfoot Physics: A Journey into the Native American Universe*.

A passage in Peat’s book leads back to the cornfield where Jane Mt. Pleasant lamented the dissonance between the mechanistic genetics of her Western training and her “heretical and intuitive” sense of “walking among conscious living things”. How, Peat asks, did the miracle of corn occur? As one eye sees it,

all that happened was that corn, wheat, and rice grasses happened to undergo a particularly striking, though random, genetic transformation. Observant human farmers, the Western scientific account goes, amplified this chance effect by collecting and replanting seeds from the best plants, practicing a method of selection and even crossbreeding. (Peat, 2002, p. 180)

Does, Peat dared wonder, “Indigenous science offer a different kind of answer?” “I believe”, he writes,

the ancient peoples of Central America entered into a deep relationship with the plants around them, including the grasses. The grass that gave birth to corn was not simply a plant but a manifestation of a spirit or energy that moved within the complex pattern of relationships of the natural world. When a people entered into direct relationship with the spirit of the corn, there was an exchange of obligations, a contract between the god of corn and the needs of the human race. (Peat, 2002, p. 181)

Crucially, Peat then tries to use the power of this vision to strengthen his *other* scientific eye, to practice his own Two-Eyed Seeing:

Within Western science it turns out that there is another way of looking at corn or any other plant or animal. The physical form of corn is the manifestation of genetic information, for within every cell of that plant are an unfolding set of directions that chart the course of its biochemical processes. Corn is the material manifestation of the activity of this unfolding

information. And when this sequence changes, then, too, the physical corn itself is changed.

Indigenous Science also teaches that corn is the manifestation of something deeper, of something that transcends the particular individual plant and links all corn together—in this case spirit. Moreover, it is possible for human beings to enter into relationship with this spirit, this active power, that brings about the form of the corn plant. (Peat, 2002, pp. 181–182)

This, then, is the way to enrich the concept of Two-Eyed Seeing, allowing Indigenous Science and *resonant* areas of Western science to *enter into relationship*.

Which areas? Two-Eyed Seeing has the potential to help us see.

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