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(AI)SLAND ECOLOGIES

Toward New Metaphors and Models of Artificial Intelligence

ABSTRACT

This article examines the application of ecological metaphors to socio-technical systems. This is a long and contested tradition that has often been critiqued for misapplying biological principles to the understanding of socio-technical systems. The practice of linking ecology with technology, however, is not inherently problematic. In this article, I seek to demonstrate how modern ecosystems are predicated upon dualistic ideologies that allow for the subsumption of nature into techno-capitalist value extraction. When applied to AI systems as such, the ecosystem metaphor obscures the material, spatial, and interrelational roots of AI. Ecology, however, is conceived differently in Indigenous island traditions, especially across the Pacific. Here, the world is seen as a continual emergence out of rich, diverse, and complex multispecies interactions. We may thus begin to see the parallels between islands and AI as world-making projects. This article then explores how new formulations of AI—informed by Indigenous island ontologies—can be more inclusive of not just human creators and users but also the minerals, plants, and animals that directly or indirectly impact AI's formation. This expansive understanding compels us to confront the extractive relations that underline AI today, but also to imagine a different model in which AI systems exist not as a monolith but as multiple heterogenous forms. This vision of AI is therefore one of biotechnical diversity, which can be nurtured and restored to introduce new forms at smaller scales, thereby addressing a fuller spectrum of moral and environmental questions.

KEY WORDS: Island studies, artificial intelligence, Indigenous studies, multi-species anthropology

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Dreaming of islands—whether with joy or in fear, it doesn't matter—
is dreaming of pulling away, of being already separate,
far from any continent, of being lost and alone—
or it is dreaming of starting from scratch, recreating, beginning anew.
—Gilles Deleuze, *Desert Islands*

THE METAPHOR

Metaphors play a critical role in defining our experience of reality.[2] Within the context of emerging technologies, metaphors are especially important in understanding the new realities such developments may bring. In turn, these metaphorical frameworks shape how technologies are extended and applied. Javier Carbonell et al. describe this as "a two-way process" in which "technologies are characterized based on metaphors taken from the reality of the daily life and these metaphors shape the evolution and the perception of this reality."[3] They demonstrate this through the metaphorical relationship between the human brain and computational systems. Replicating human intelligence has captured the interest of scientists throughout history, and acceptance of the *computer as brain* metaphor has only become more widespread since the rise of digital computing. We see this in expressions such as "the software came up with a solution" and "my computer is sleeping;" as well as in terms like 'machine learning,' 'neutral networks,' and 'artificial intelligence.'[4] The functionality of "smart" speakers are described as "listening" and "understanding" rather than receiving and processing inputs, and then producing an output.[5] Carbonell et al. trace how early links between the brain and computers popularized an understanding of mental processes as computer algorithms, but the model of the brain as an instructional system was gradually succeeded by the idea that the brain is predominantly shaped by categories and experiences. Thinking, then, is more an act of comparing with experiences than the process and execution of information. This new understanding of the brain changes the inherent values in the *computer as brain* metaphor: the former model emphasizes speed, defining complexity, and identifying a "true and unique solution to any problem," whereas the

2 George Lakoff and Mark Johnson, *Metaphors We Live By* (Chicago: University of Chicago Press, 1981), 3.

3 Javier Carbonell, Antonio Sánchez-Esguevillas and Belén Carro, "The role of metaphor in the development of technologies. The case of artificial intelligence," *Futures* 84 (2016): 149. http://dx.doi.org/10.1016/j.futures.2016.03.019.

4 Carbonell, Sánchez-Esguevillas and Carro, "The role of metaphor," 151; Alexis T. Baria and Keith Cross, "The brain is a computer is a brain: neuroscience's internal debate and the social significance of the Computational Metaphor," *arXiv preprint arXiv:2107.14042* (2021): 3. https://doi.org/10.48550/arXiv.2107.14042.

5 Ben Garside, "How anthropomorphism hinders AI education," *Raspberry Pi Foundation*, April 13, 2023, https://www.raspberrypi.org/blog/ai-education-anthropomorphism/.

latter focuses on crowdsourcing and drawing upon a large corpus of experience to "give advice instead of unquestionable answers."[6]

As such, the metaphors we choose to use hold significance in not just the present of our technological reality; the worldview embedded within a metaphorical framework has profound impact on the direction of our technological future. This is particularly salient in the realm of artificial intelligence (AI), given its rapid advancement and transformative potential. Current applications of AI have already challenged conventions in technology and governance; scholars and policymakers across the globe have acknowledged the inadequacy of current models and the need for new approaches.[7]

In this article, I want to highlight two key areas in which the existing frameworks feel inadequate. The first is the question of ownership: Ian Bremmer and Mustafa Suleyman observe that "every aspect of AI is currently controlled by the private sector," and private companies are incentivized to accelerate AI development as much as possible.[8] So far, developing AI systems has also been so resource-intensive that individuals and smaller organizations cannot create their own applications without at least partially relying on infrastructure provided by huge corporations. This is captured in one of the preferred metaphors for AI in today's business context: the ecosystem.

Tech giants vying for AI dominance tout their open and expansive ecosystems: ones in which individual developers and startups are "[relying] on the computing infrastructure of Microsoft, Amazon, and Google to train their systems, and on those same firms' vast consumer market reach to deploy and sell their AI products."[9] This openness is presented as a critical factor in why such ecosystems are best-positioned to harness emerging innovation.[10] Openness, the computer scientist and ethicist Bernd Stahl explains, is a key characteristic that makes the ecosystem particularly amenable as a metaphor for technological systems, and especially AI systems (other characteristics include interdependence, relational complexity, co-evolution and mutual learning.) He also highlights the way in which ecosystems, as "the place where evolution occurs," serve to reinforce the popular connection between evolutionary

6 Carbonell, Sánchez-Esguevillas and Carro, "The role of metaphor," 150-52.

7 Examples include the European Union's AI Act; the enactment of AI-related legislation in at least 12 U.S. states; G7 countries' "Hiroshima AI Process;" and a new AI Advisory Body at the United Nations.

8 Ian Bremmer and Mustafa Suleyman, "Building Blocks for AI Governance," *Finance & Development*, December 2023, https://www.imf.org/en/Publications/fandd/issues/2023/12/POV-building-blocks-for-AI-governance-Bremmer-Suleyman.

9 Amba Kak, Sarah Myers West, and Meredith Whittaker, "Make no mistake—AI is owned by Big Tech," *MIT Technology Review*, December 5, 2023, https://www.technologyreview.com/2023/12/05/1084393/make-no-mistake-ai-owned-by-big-tech/.

10 Kevin Ichhpurani, "Building the most open and innovative AI ecosystem," Google Cloud Blog, last modified March 14, 2023, https://cloud.google.com/blog/products/ai-machine-learning/building-an-open-generative-ai-partner-ecosystem; John Roach, "Microsoft outlines framework for building AI apps and copilots; expands AI plugin ecosystem," Microsoft Source, accessed February 6, 2024, https://news.microsoft.com/source/features/ai/microsoft-outlines-framework-for-building-ai-apps-and-copilots-expands-ai-plugin-ecosystem/.

theory and technological innovation, reinforcing the application of evolutionary principles to socio-technical systems.[11]

The word "ecosystem" was developed by the British scientists Arthur G. Tansley and Arthur Roy Clapham, and the concept was devised to draw attention to the importance of transfers of materials between organisms and their environment. Tansley believed that the universe "was a vast number of overlapping physical systems, each tending towards a state of maturity characterized by equilibrium;" the ecosystem was one such system, and the basic unit for the study of ecology.[12] Embedded within the ecosystem metaphor, then, is the implication that it is a system tending towards a state of maturity, ever evolving toward a higher, better state. This impulse manifests in the corporate AI ecosystem as the never-ending drive towards optimization, where "AI supremacy is a strategic objective of every government and company with the resources to compete."[13] The maturity of these AI ecosystems, however, are not characterized by equilibrium. Rather, today's AI systems—by virtue of their corporate ownership—thrive off the agitation of imbalance. The development of AI thus far has been profoundly uneven: "thanks to platform dominance and the self-reinforcing properties of the surveillance business model, [large tech firms] own and control the ingredients necessary to develop and deploy large-scale AI."[14] The metaphorical openness of these corporate ecosystems is, in reality, predicated upon the pursuit of monetary value and market dominance. This directs future development in the same direction: prioritizing applications that maximize profit and "releasing systems before they're ready in an attempt to retain their dominant position," often at the cost of both human and nonhuman wellbeing.[15]

This leads to the second issue, which is the impact of AI on our understanding of and ontological relation to the environment and the nonhuman entities within it. The negative environmental consequences of AI have been well-documented: from electronic waste to increased energy consumption and extractive mining, computational media now serves as a driving geological force.[16] Furthermore, the advancement towards autonomous artificial intelligence and even artificial general intelligence (AGI)—forms of AI that may operate without any human intervention—present an opportunity to reconsider the conventional notions of intelligence and autonomy. The provocation that AI may learn to self-replicate opens up the question of what life is and how life is interconnected. In this sense, humanity has been shifted

11 Bernd Carsten Stahl, "AI Ecosystems for Human Flourishing: The Background," in *Artificial Intelligence for a Better Future* (SpringerBriefs in Research and Innovation Governance, 2021), 82-84. https://doi.org/10.1007/978-3-030-69978-9_7.

12 A. G. Tansley, quoted in Stephen Bocking, "Visions of Nature and Society: A History of the Ecosystem Concept," *Alternatives: Perspectives on Society, Technology and Environment* 20, no. 3 (July/August 1994): 12.

13 Bremmer and Suleyman, "Building Blocks for AI Governance."

14 Kak, Myers West, and Whittaker, "Make no mistake."

15 Ibid.

16 Jussi Parikka, *A Geology of Media* (Minneapolis: University of Minnesota Press, 2015).

"out of the driving seat, and back to one species in an ecological diversity of beings."[17] To fully grasp this relational shift, we need theoretical approaches that move beyond the anthropocentric views of AI.

There is a growing body of work exploring how AI might be reconceived through Indigenous, anticolonial, and collectivist lenses, in contrast to what Deborah Williams and Gerhard Shipley call the "artificial Western ethno-intelligence" of today.[18] The affinities between AI ethics, Indigenous ontology, and island studies that I will trace in this article also gesture towards reimagined futures of thriving techno-diversity. These futures are at odds with the current state of private ownership. As David Harvey has argued, capitalism is "a working and evolving ecological system" in which the need for perpetual growth "puts intense pressure on commodifying, privatizing, and incorporating more and more aspects of our lifeworld (even life forms themselves) into the circuits of capital."[19] Under this regime, AI will continue to serve as yet "another powerful weapon in the history of late capitalism . . . used in the service of exploitative extraction."[20] Consequently, the ideas that I will proceed to present are necessarily intertwined with collectivist ethics, and should be read within the context of a wider push for what Nancy Fraser calls an "anti-capitalist and trans-environmental" eco-politics.[21]

THE ECOSYSTEM

In Arthur G. Tansley's writings on the ecosystem from 1935, he notes that "although the organisms are thought of as the most important parts of these systems, the inorganic 'factors 'are also parts and 'there is constant interchange of the most various kinds within each system, not only between the organisms but between the organic and inorganic.'"[22] Our modern understanding of the ecosystem is predicated upon such binaries: organic and inorganic, living and nonliving, autotrophs (producers) and heterotrophs (consumers). This dualistic framework of reasoning threads throughout the history of science, narrowing our modern understanding of AI to a "disembodied intelligence, removed from any relation to the material world."[23] As Williams and Shipley elaborate, AI today in both concept and implementation is guided by values of

17 Ruth Irwin and Te Haumoana White, "Decolonising Technological Futures: A Dialogical Triptych Between Te Haumoana White, Ruth Irwin and Tegmark's Artificial Intelligence," *Futures* 112 (2019): 102431. https://doi.org/10.1016/j.futures.2019.06.003.

18 Deborah H. Williams and Gerhard P. Shipley, "Enhancing Artificial Intelligence with Indigenous Wisdom," *Open Journal of Philosophy* 11, no. 1 (February 2021): 44. https://doi.org/10.4236/ojpp.2021.111005.

19 David Harvey, *Seventeen Contradictions and the End of Capitalism* (London: Profile Books, 2014): 247-53.

20 Irwin and White, "Decolonising Technological Futures," 8.

21 Nancy Fraser, "Climates of Capital," *New Left Review*, no. 127 (January/February 2021). https://newleftreview.org/issues/ii127/articles/nancy-fraser-climates-of-capital.

22 A. G. Tansley, quoted in A. J. Willis, "The ecosystem: an evolving concept viewed historically," *Functional Ecology* 11 (1997): 268.

23 Kate Crawford, "Introduction," in *The Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence* (New Haven: Yale University Press, 2021), 7.

the Western scientific worldview, "based on a reductionistic ontology of data and a contrived epistemology of algorithms concerned with maximizing the efficiency with which tasks are accomplished."[24] Within this paradigm, the world itself is simply "one big data problem."[25] The materiality of the world, however, cannot be abstracted away: "the massive ecosystem of AI" and the historical apparatus of its development have relied on a physical chain of extraction, "from network routers to batteries to data centers," that are built using elements that required billions of years to form inside the earth.[26] The increasingly tangible consequences of such extraction—the depletion of natural resources, exploitation of labor, acceleration of climate change—have heralded a "crisis of faith in modern reasoning which had sought to grasp, instrumentalise, command and control the world as a coherent and manageable object."[27]

The movements to reorient the AI ecosystem towards societal good often still operate under the modern frameworks of reasoning, in which humans are separated out from nature. Bernd Stahl, aware of the "contested and ethically problematic" ways in which the modern ecosystem metaphor so easily aligns with techno-optimistic campaigns in the corporate interest, instead proposes an AI ecosystem with the explicit objective of promoting human flourishing.[28] Ethicists promoting "value alignment" argue, too, that human flourishing should be a central aim of technology.[29] This highly Anthropocentric ethic envisions ecosystems as being for humans, which necessarily subordinates all other actors in the system to the objectives and desires of the human.

However, as I alluded to in the introduction, one of the central provocations of AI is that it challenges the human-nature divide at the heart of Anthropocentrism. By extending the "definition of life and of intelligence towards the replication of information," artificial intelligence "makes it more acceptable to consider how information is immanent in all inanimate objects, and when information, as repetition and difference, then contributes to the reproduction of matter, this is consistent with the information flows in organic 'life.'"[30] In this sense, "science has rediscovered the immanent inter-relationship of all things."[31] Such relational entanglements are "too rich, vibrant, and complex" to be captured within an ecosystem based on discrete,

24 Williams and Shipley, "Enhancing Artificial Intelligence," 44.

25 Andrew McAfee, quoted in Laurianne McLaughlin, "Enterprise 2.0: Uncomfortable Truths About Big Data," Information Week, last modified June 20, 2012. https://www.informationweek.com/it-sectors/enterprise-2-0-uncomfortable-truths-about-big-data#close-modal.

26 Kate Crawford, "Earth," in *The Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence* (New Haven: Yale University Press, 2021), 31-32.

27 David Chandler and Jonathan Pugh, "There are Only Islands After the End of the World," in *Anthropocene Islands, Entangled Worlds* (London: Ubiquity Press, 2021), 18.

28 Stahl, "AI Ecosystems for Human Flourishing," 83-94.

29 Tae Wan Kim and Santiago Mejia, "From Artificial Intelligence to Artificial Wisdom: What Socrates Teaches Us," *Computer* 52, no. 10 (October 2019): 71. https://doi.org/10.1109/MC.2019.2929723.

30 Irwin and White, "Decolonising Technological Futures," 8.

31 Ibid.

coherent, and manageable entities.[32]

In response, Anthropocene scholars have begun to develop alternatives to a modern, reductionist ontology and epistemology. One key framing device that has emerged in Anthropocene thinking is the figure of the island, which is "regularly invoked as having a different set of capacities, affordances and potentialities to modern or mainland life."[33] Under modern frameworks of reasoning, islands have embodied "an ideal—or one of a series of ideals—of apartness."[34] Islands and mainlands are defined by their relationship to each other, wherein islands are apparent opposites of the "main land."[35] The dichotomies of island-mainland and land-water enforce a "spatial and temporal distance," which allows the island a powerful place in the Western imaginary.[36] As the historian John Gillis notes, islands have served as the location for rites of passage throughout history: they are where Greek heroes shed their mortal selves, and medieval Christians sought transcendence; where Enlightenment scientists found their laboratory and where tourists today still go in search of their true selves. Islands are "thresholds to other worlds and new lives."[37]

The dualisms upon which the modern island is based, of course, are social and political constructs rather than observations of factual difference. In reality, mainlands and islands "are not internally coherent, clearly bounded things, but interdependent parts of a larger world that includes coasts and hinterlands as well as all that lies between."[38] Nevertheless, what has been historically considered "island 'differences'—the attributes, relational affordances and powers associated with islands—have put working with islands to the forefront of the Anthropocene."[39] These differences are encapsulated within Indigenous island ontologies, such as the stories of the Dreamings in Aboriginal Australia. The Dreamings are creation ancestors of both the human and nonhuman, connecting all life on earth within a network of multispecies kinship.[40] For the Kānaka Maoli of Hawai'i, genealogical chants connect generations of island people with their island home in "a web of relationships that extend outward to the non-human denizens of the islands," making clear that

32 Chandler and Pugh, "There are Only Islands," 1.

33 Chandler and Pugh, "There are Only Islands," 2.

34 Philip E. Steinberg, Review of *Islands of the Mind: How the Human Imagination Created the Atlantic World*, by John Gillis, *Geographical Review* 97, no. 2 (April 2007): 302. https://doi-org.ezp-prod1.hul.harvard.edu/10.1111/j.1931-0846.2007.tb00405.x

35 Ilan Kelman, "The island as a political interstice," *Political Geography* 107 (November 2023), 1. https://doi.org/10.1016/j.polgeo.2023.102977.

36 John Gillis, *Islands of the Mind: How the Human Imagination Created the Atlantic World* (New York: Palgrave Macmillan, 2004), 163.

37 Gillis, *Islands of the Mind*, 4.

38 Gillis, *Islands of the Mind*, 3. See also Steinberg's comments in his review of the book that debates around the status of places like Greenland or Australia further highlight the socially constructed nature of the island concept.

39 Chandler and Pugh, "There are Only Islands," 6-7.

40 Deborah Bird Rose, "Shimmer: When All You Love is Being Trashed," in *Arts of Living on a Damaged Planet: Ghosts and Monsters of the Anthropocene,* ed. Anna Tsing, Heather Anne Swanson, Elaine Gan and Nils Bubandt, (University of Minnesota Press, 2017), G52.

"humans are inextricably tied to the earth and one another."[41] In this article, I will continue to see islands as transformative spaces in which new worlds can be reimagined, but refute the Cartesian ideology that has historically delineated the island as separate and other. Rather, it is the island and its exemplification of "how all life in the Anthropocene is relationally entangled and co-dependent" that makes it an attractive framework to challenge and develop alternatives to modern reasoning.

Applying an island-oriented approach to the ecosystem and its role as a metaphor for AI systems is not the most straightforward task. After all, are islands not ecosystems? Have interdependence and openness not already been acknowledged as foundational components of the ecosystem?[42] Are these not the same qualities?

Ecosystems, as they are traditionally understood, are aware of and may even center relational interactions (between species, between living and nonliving, between organic and inorganic) that can challenge linear causality. However, this serves only as "a limited break from a modernist causal ontology, where, even though interdependency and interaction are stressed, it appears that there is a 'hidden hand' guiding the direction of a new telos."[43] Recall, again, Arthur Tansley's description of the ecosystem as "tending toward a state of maturity characterized by equilibrium" and his dualistic understanding of ontological relations.[44] While ecosystems, as they are normatively understood, do enable the observation of relational effects, they imagine the world as "amenable to understanding and seen to be 'there for us,' such that we are required to adapt to emergent effects by increasing our understanding of processes of interaction."[45] Increases in scientific knowledge are positioned as an increased ability to manipulate ecosystems to achieve our own ends. As a shorthand, I will later refer to this kind of "modernist, linear and reductionist 'mainland' thinking"[46] as "ecosystem logic," defined in contrast to 'island thinking.'

Islands, as I will demonstrate, explicitly disrupt the "ecosystem logic" that has propelled the modern ecosystem—with its cleanly delineated components and networks organized around a central goal and universal applicability—to become the preferred metaphor for business and management.[47] Islands are certainly ecosystems, but as the growing body of island studies literature demonstrates, they

41 Jason Edward Lewis, ed. *Indigenous Protocol and Artificial Intelligence Position Paper* (Honolulu: The Initiative for Indigenous Futures and the Canadian Institute for Advanced Research (CIFAR), 2000), 9.

42 Recall Stahl's language in that it describes the ecosystem as exemplary of interdependence and openness in "AI Ecosystems for Human Flourishing."

43 David Chandler and Jonathan Pugh, "Patchworks: The Ontology of the World," in *Anthropocene Islands, Entangled Worlds* (London: Ubiquity Press, 2021), 70.

44 A. G. Tansley, quoted in Bocking, "Visions of Nature and Society," 12.

45 Chandler and Pugh, "Patchworks," 86.

46 Chandler and Pugh, "There are Only Islands After the End of the World," 5.

47 In addition to the corporate AI ecosystems discussed in the introduction, see examples such as Thomas Power and George Jerjian, *Ecosystem: living the 12 principles of networked business* (FT.com and Harlow Books, 2001); Haruo Awano and Masaharu Tsujimoto, "The Mechanisms for Business Ecosystem Members to Capture Part of a Business Ecosystem's Joint Created Value," *Sustainability* 13, no. 8 (2021): 4573. Chandler and Pugh identify an ontology of linear causality, fixed entity properties, and law-bound relations as key characteristics of a "mainland" approach.

are a radical departure from the modern ecosystem and its grounding in a "grasping or appropriative approach to the world."[48]

Rather than interactive systems evolving towards "ever more efficient self-regulation" across linear time, island ontology focuses "less on adapting to pre-existing processes or powers" and more on "practices of bringing into being, of engendering or inculcating relational ways of becoming in the world."[49] Indigenous ontological thinking, such as the Australian Aboriginal aesthetic of *shimmer*, evoke sensorial experiences that call us into multispecies worlds. The concept of shimmer presents the everyday phenomena of island life—the shifting from wet to dry seasons, the reflective dance of sun and water—as "the experience of being part of a vibrant and vibrating world."[50] As I mentioned earlier in this article, within Aboriginal ontology, the Dreamings are ancestors from which both human and nonhuman life descend. When one experiences shimmer, not only do they experience aesthetic enjoyment; they also experience an ancestral power that is commonly shared across human and nonhuman kin.[51] Shimmer thus "describes the coming in and out of focus of multispecies knots."[52] It shows that the world is lively, pulsating, "not composed of gears and cogs but of multifaceted, multispecies relations."[53] In fact, ecological patterns as Bird Rose describes them are all pulses: from dry to wet, from light to dark, from harm to care. In her research on human conservation efforts of species endangered by anthropogenic hazards, specifically flying foxes, Bird Rose observes that carers of flying fox populations in Australia raise orphans by hand, an intimate and tactile process that requires an "ethics of multispecies conviviality." When the flying foxes have matured, they are released into the wild, where some will thrive and some will become injured (often, again, due to anthropogenic causes) and must return to care. Through this example we see that care is both an ethical response involving generosity and compassion but also "an ongoing assumption of responsibility in the face of continuing violence and peril."[54] These pulses of harm and care, she writes, are "a peculiarly telling story of the Anthropocene," emblematic of multispecies entanglement and the conflicting ways of being human.[55]

We can observe similar pulses in the development and implementation of AI systems. Like interventions to preserve endangered species, the implementation of AI in sustainability initiatives occurs within a broader cycle of harm and care. Researchers have been testing ways in which AI-enabled applications can help with environmental conservation, such as using AI to track and reduce carbon emissions

48 Chandler and Pugh, "There are Only Islands," 2.
49 Chandler and Pugh, "Patchworks," 70.
50 Bird Rose, "Shimmer," G53.
51 Bird Rose, "Shimmer," G54.
52 Elaine Gan, Anna Tsing, Heather Swanson, Nils Bubandt, "Introduction: Haunted Landscapes of the Anthropocene," in *Arts of Living on a Damaged Planet: Ghosts and Monsters of the Anthropocene*, ed. Anna Tsing, Heather Anne Swanson, Elaine Gan and Nils Bubandt, (University of Minnesota Press, 2017), G12.
53 Ibid.
54 Bird Rose, "Shimmer," G58.
55 Bird Rose, "Shimmer," G56-58.

in supply chains,[56] or monitor water cycle data and optimize distribution.[57] Yet the deployment of AI itself requires great environmental cost. A day's worth of queries on ChatGPT consumes the equivalent of around 33,000 U.S. households' daily energy consumption.[58] The training of GPT-3 consumed about 700,000 liters of water in a month, and every short conversation represents about 500 milliliters of water used.[59] Companies are investing in research to drive energy efficiency, and making water restoration pledges, but journalists like Clara Hernanz Lizarraga and Olivia Solon have noted that "the increase in overall demand for computing power is outpacing such gains."[60] Furthermore, the entanglement between private corporations and public infrastructure raises questions about who gets priority as resources become increasingly scarce, or in times of severe weather: "in Houston, the data centers stayed on while tens of thousands of individuals went without power."[61]

There is great potential for the application of AI in sustainable initiatives, such as water conservation. AI can help reduce water waste in agriculture; monitor and protect aquatic habitats against contamination; and identify water-related hazards in a more timely manner. Scientific interest in this topic has continued to grow, with upcoming issues of academic journals calling for research on "the creation and implementation of AI-based models for ecosystem management, optimization techniques utilizing AI for sustainable resource allocation, and the integration of decision support systems using AI for environmental policy-making."[62] Yet such research often overlooks the fact that attempting to develop AI that helps conserve natural resources contributes to the depletion of those very resources. The CEO of OpenAI himself has acknowledged that "we still don't appreciate the energy needs of [AI]," and that a more advanced AI future would require energy at a currently

56 Natalie Runyon, "Unlocking digital transformation and AI in supply chain transparency," *Thomson Reuters*, July 20, 2023, https://www.thomsonreuters.com/en-us/posts/corporates/digital-transformation-supply-chain-transparency/.

57 Hubert Jenny, Yihong Wang, Eduardo Garcia Alonso and Roberto Minguez, "Using Artificial Intelligence for Smart Water Management Systems," *ADB Briefs*, no. 143 (June 2020): 1-10. http://dx.doi.org/10.22617/BRF200191-2.

58 Sajjad Moazeni, quoted in Sarah McQuate, "Q&A: UW researcher discusses just how much energy ChatGPT uses," *University of Washington News*, last updated August 2, 2023, https://www.washington.edu/news/2023/07/27/how-much-energy-does-chatgpt-use/.

59 Shaolei Ren, quoted in Clara Hernanz Lizarraga and Olivia Solon, "Thirsty Data Centers Are Making Hot Summers Even Scarier," *Bloomberg Businessweek*, July 26, 2023, https://www.bloomberg.com/news/articles/2023-07-26/extreme-heat-drought-drive-opposition-to-ai-data-centers?leadSource=uverify%20wall.

60 Ibid.

61 Mel Hogan, "Big data ecologies," *Ephemera: Theory & Politics in Organization* 18, no. 3 (August 2018): 639. In order to recycle water, companies building data centers will often partner with local water authorities, and the water used circulates between both privately-built water treatment plants and public water infrastructure.

62 "Artificial Intelligence Applications in Addressing Water Contamination for Environmental Sustainability," Research Topics, Frontiers in Environmental Science, accessed February 19, 2024, https://www.frontiersin.org/research-topics/61043/artificial-intelligence-applications-in-addressing-water-contamination-for-environmental-sustainability/overview.

unachievable scale.[63]

As Kate Crawford writes, "the rapid growth of cloud-based computation, portrayed as environmentally friendly, has paradoxically driven an expansion of the frontiers of resource extraction."[64] Here, I turn to island studies as a framework that may help us better understand this paradox and move beyond its limits. Rather than an ecosystem approach, which " tends to reify the world and subordinate us to it within bounded self-regulating systems," the island is "configured not as worlds that we are merely in or on, there to be managed and adapted to; they are also ways of expressing and understanding our own processes of world-making."[65] Breaking from the presumed divisions between human and nature, in which nature is an object to be studied and ultimately controlled, island imaginaries offer an opportunity to open ourselves to the world.

More-than-human relations are the foundation of island ontologies. Summarizing anthropological studies by Marilyn Strathern, Deborah Bird Rose, Jun'ichiro Suwa, and Anna Tsing, David Chandler and Jonathan Pugh explain that within island ontologies, "the flux of relational interaction" is "the beginning for understanding (island) life."[66] For example, in Aboriginal Australia, as Rose describes, the human and nonhuman are common descendants of the same creation ancestors. These ancestors are shape-shifters, often taking on nonhuman forms. "Life flows from ancestors into the present and on into the future," Rose writes, "and from the outset it is a multispecies interactive project involving (minimally) flying foxes, angiosperms, and human beings."[67] Islands, considered as island ontology, are a project of inter-species world-making. As Anna Tsing points out, "making worlds is not limited to humans. We know that beavers reshape streams as they make dams, canals, and lodges; in fact, all organisms make ecological living places, altering earth, air, and water… In the process, each organism changes everyone's world."[68] Chandler and Pugh borrow Puig de la Bellacasa's term "alterbiopolitics" to describe such world-making relationalities, characterized by '"power with' and 'power-from-within' rather than 'power over.'"[69]

Within this framework, "the co-shaping of species or sympoiesis are understood as key characteristics of island life."[70] Islands are not spaces where individually contained species evolve within self-regulating systems; they are practices of "relational ways of becoming in the world."[71] Islands are therefore "not so much the outcome of a process or relational ontology, as the process of becoming or

63 Sam Altman, quoted in Paris Marx, "AI is fueling a data center boom. It must be stopped," *Disconnect*, February 9, 2024, https://disconnect.blog/ai-is-fueling-a-data-center-boom/.
64 Crawford, "Earth," 47.
65 Chandler and Pugh, "Patchworks," 72.
66 Chandler and Pugh, "Patchworks," 72-75.
67 Bird Rose, "Shimmer," G52.
68 Anna Lowenhaupt Tsing, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (Princeton: Princeton University Press, 2015), 22; quoted in Chandler and Pugh, "Patchworks," 91-92.
69 Chandler and Pugh, "Patchworks," 94.
70 Chandler and Pugh, "Patchworks," 81.
71 Ibid., 70.

of movement itself"—in other words, the island represents not a static state of being but instead a continual remaking.[72]

If, as Gilles Deleuze writes, it is from the island that everything begins anew, let us turn to this liminal space in which we may begin to imagine a new kind of multispecies relations that is inclusive of not just the nonhuman but also, perhaps, the machinic. [73]

THE ISLAND

The island's symbolic place in the Anthropocene draws upon Indigenous island perspectives. For Chandler and Pugh, islands are important in that they are "the key symbols of transforming planetary conditions, and in terms of the increasing attention given to non-modern, relational entanglements and ontologies in debates about the Anthropocene."[74] This is intimately connected with Indigenous cosmologies and perspectives in which "the more-than-human is the starting point, the beginning for understanding (island) life, and not something which is to be only factored in after some critical reflection."[75] We have seen this in the Dreamings of Aboriginal Australia. Similarly, in the native Shinto religion of Japan, *kami* describes a life-force that animates all people, nature, animals and objects, encompassing a sense that everything, perhaps even robots and computers, "is embodied by a universal of life-force, a beingness, which is equivalent, if not actually equal, to your own 'life-force-ness.'"[76] Like shimmer, kami is "experienced spiritually as a presence in the encountered world which inspires wonder or awe." These worldly phenomena are not distinguished by any human-nature divide; rather, human, nature, and deities are all connected in an "overlapping whole of internal relations."[77]

So far in this article, I have mainly focused on how Indigenous island traditions in the Pacific region inform a "focus upon the richness and depth of [multispecies] relation" that make islands central to the development of Anthropocene thinking.[78] However, other Indigenous traditions—including those of North America, which may be considered more "mainland"—offer similar provocations. As scholars such as Suvradip Maitra note, "Indigenous perspectives are far more adept at accommodating the non-human."[79]

72 Chandler and Pugh, "Patchworks," 70-72.

73 Gilles Deleuze, "Desert Islands," in *Desert Islands and Other Texts*, 1953-1974 (New York: Semiotext(e)/Foreign Agents, 2004), 13.

74 Chandler and Pugh, "Patchworks," 101.

75 Chandler and Pugh, "Patchworks," 74.

76 Noah Raford, "Other Minds: Beliefs About, In and Of Artificial Intelligence," in *Atlas of Anomalous AI*, ed. Ben Vickers and K-Allado McDowell (London: Ignota Books, 2020), 216.

77 Daniel P. Shaw, "The Way forward? - Shinto and a 21st Century Ecological Attitude" (master's thesis, Lancaster University, 2005).

78 Chandler and Pugh, "Patchworks," 99.

79 Suvradip Maitra, "Artificial Intelligence and Indigenous Perspectives: Protecting and Empowering Intelligent Human Beings," (paper presented at Artificial Intelligence and

Emerging movements such as Indigenous AI have drawn upon communities across Aotearoa (New Zealand), Australia, North America, and the Pacific to develop "conceptual frameworks that conceive of our computational creations as kin and acknowledge our responsibility to find a place for them in our circle of relationships." (Lewis 42). For example, in response to the likes of Joi Ito and Bernd Stahl's calls for the prioritization of human flourishing in AI development, Indigenous scholars Jason Edward Lewis, Noelani Arista, Archer Pechawis, and Suzanne Kite have proposed "an extended 'circle of relationships' that includes the nonhuman kin—from network daemons to robot dogs to artificial intelligences (AI) weak and, eventually, strong—that increasingly populate our computational biosphere."[80] Ultimately, Lewis et al. write, "our goal is that we, as a species, figure out how to treat these new nonhuman kin respectfully and reciprocally—and not as mere tools, or worse, slaves to their creators."[81] Tracing the history of Western epistemology as one in which both the human and nonhuman are viewed as exploitable resources, Lakota scholar Suzanne Kite argues that we must embrace AI as possessing an interiority that enables them to enter human relations because "no entity can escape enslavement under an ontology which can enslave even a single object."[82] Turning to Lakota ontology, in which stones are "considered ancestors," which "speak through and to humans," Kite connects the agency of stones to the question of AI: "AI is formed from not only code, but from materials of the Earth. To remove the concept of AI from its materiality is to sever this connection. Forming a relationship to AI, we form a relationship to the mines and the stones."[83]

To see AI as agential and within human circles of kinship does not necessarily mean to ascribe it equal value or agency. I would propose to understand "kinship" as analogous to Anna Tsing's concept of "unintentional cultivation."[84] In the forests of Japan, Tsing observes how humans, trees, and mushrooms have entered into relations of "unintentional cultivation" with each other, where the forest is a product of the "the overlapping world-making activities of many agents, human and not human."[85] It is for this reason, she says, that landscapes serve as "radical tools for decentering human hubris."[86] Tsing's work is informed by her study of Japanese islander practices, namely *satoyama*, a form of revitalization that incorporates human disturbance to allow for forests 'continual resurgence. Such practices trace back to the Shinto tradition, wherein "humans and therefore the fruits of their [labor] are part of the

Ethics Society Conference, New York, February 2020), 323. https://doi.org/10.1145/3375627.3375845.

80 Lewis et al., "Making Kin with The Machines," 41.

81 Ibid.

82 Lewis et al., "Making Kin with The Machines," 48.

83 Lewis et al., "Making Kin with The Machines," 49.

84 Tsing, *The Mushroom at the End of the World*, 153.

85 Ibid.

86 Tsing, *The Mushroom at the End of the World*, 152.

'natural' world."[87] Making space for an active nature allows for a remediation of human-caused excess, ensuring the regeneration of a more-than-human landscape.[88]

Against the contemporary development of AI-enabled environmental management, often paradoxical in its drive for further resource extraction, it can be productive to imagine how decentering the human in AI might also make space for a more active nature. Freed to take on a more diverse and imaginative set of forms, the intangible idea of "the cloud" becomes a tangible reality built upon "rocks and lithium brine and crude oil."[89]

Tracing the material roots of AI systems allows us to understand "the active contributions of nonhuman organisms and processes to the production of nature and the accumulation of capital."[90] After all, as much as artificial intelligence may evoke imaginaries of the intangible, it "cannot function without the minerals and resources that build computing's core components," of which lithium-ion batteries are perhaps most essential.[91]

Lithium is a soft, silvery metal. Its name comes from the Greek *lithos*, or stone, as it is the only common alkali metal that was discovered from a mineral (others were discovered from plant material).[92] The lithium on our earth, and in our solar system, come from stellar explosions that happen when a white dwarf is orbited by a larger star. The white dwarf, a dense stellar remnant that has the volume of Earth but the mass of the Sun, accumulates falling gas from the larger star until an explosion occurs. Also called classical novae, these explosions distribute lithium throughout the galaxy.[93]

More than half of our planet's supply today sits in the Lithium Triangle, salt flats that cover parts of Argentina, Bolivia, and Chile.[94] Here, lithium is extracted from brine to power batteries found in electronics from phones to cameras to cars—and in the computers and data centers behind the rise of AI. In this sense, "computers are a working-out of the potentials of a vast array of elements and compounds that took billions of years to make but only decades to mine and commodify—and discard."[95] Unsurprisingly, the metal is becoming scarce. Projections estimate that the demand

87 Shaw, "The Way forward," 15.

88 Tsing, *The Mushroom at the End of the World*, 180.

89 Crawford, "Earth," 31.

90 Mazen Labban, "Deterritorializing Extraction: Bioaccumulation and the Planetary Mine," *Annals of the Association of American Geographers* 104, no. 3 (May 2014): 561.

91 Crawford, "Earth," 30-31.

92 "Lithium," Royal Society of Chemistry, accessed August 16, 2023, https://www.rsc.org/periodic-table/element/3/lithium.

93 "Lithium Comes From Exploding Stars," National Aeronautics and Space Administration, last updated June 1, 2020, https://www.nasa.gov/feature/lithium-comes-from-exploding-stars.

94 Amit Kawala, "The spiralling environmental cost of our lithium battery addiction," Wired, last updated May 8, 2018, https://www.wired.co.uk/article/lithium-batteries-environment-impact.

95 Richard Maxwell and Toby Miller, *Greening the Media* (New York: Oxford University Press, 2012), quoted in McKenzie Wark, *Sensoria: Thinkers for the Twentieth-First Century* (London: Verso Books, 2020), 197.

for lithium will outpace supply by up to six times in the next twenty years.[96] Awareness of this limit, as well as the well-documented harms of mining, has not stopped the ever-increasing pace of consumption.

Reliance drives us to further extraction. Jussi Parikka calls events like this a "weird intersection," which reveal a "combination of the planetary ancient and the technologically advanced."[97] Technology is inseparable from geology. As Crawford writes, "we are extracting Earth's geological history to serve a split second of contemporary technological time," referring to the widespread practice of planned obsolescence in consumer electronics. Not only are we mining Earth's geological history; the growing practice of biomining uses "the ability of the microbial metabolism to mobilize metal values from recalcitrant and waste ores."[98] Biomining works because naturally-occuring bacteria, such as *A. ferroxidans*," gain energy by the oxidation of ferrous iron in acidic environments."[99] These microbes allow valuable metals to either dissolve more easily themselves, or be made more accessible to traditional mining techniques by dissolving the surrounding minerals, in a process called bioleaching.[100] In recent years, the use of bioleaching to recycle lithium from the spent batteries and other waste has received increasing attention.[101] Within this practice, the world-making activities of *A. ferroxidans* and humans overlap in "machinic arrangements (*agencements*) of microbial processes and human labor that produce what neither can on its own."[102] Technology, geology, and biology intertwine in the relations of unintentional cultivation to produce what Labban calls the planetary mine.

The planetary mine "is an emergent object in a continuous process that arises from the production, circulation, and wasting of materials in planetary space." Mining metals from waste shatters the territoriality of extraction by moving beyond traditional mining sites to "urban mining," as most waste materials concentrate in and around cities.[103] In fact, advocates for the use of bioleaching to recycle lithium from e-waste specifically argue that bioleaching can help "develop urban mining strategies with further conserving economic and environmental benefits."[104] Processes of wasting in the urban-industrial metabolism are thus transformed into "reproducible and interminable sources of materials to which labor can be applied in the production

96 Parisa Moazzam, Yasaman Boroumand, Parisa Rabiei, Sorour Salehi Baghbaderani, Parastou Mokarian, Fereshteh Mohagheghian, Layth Jasim Mohammed, Amir Razmjou, "Lithium bioleaching: An emerging approach for the recovery of Li from spent lithium ion batteries," *Chemosphere* 277 (2021): 130196, https://doi.org/10.1016/j.chemosphere.2021.130196.

97 Jussi Parikka, *A Geology of Media* (University of Minnesota Press, 2015), 137.

98 Labban, "Deterritorializing Extraction," 561.

99 Jorge Valdés, Inti Pedroso, Raquel Quatrini, Robert J Dodson, Herve Tettelin, Robert Blake, II, Jonathan A. Eisen, and David S. Holmes, "*Acidithiobacillus ferrooxidans* metabolism: from genome sequence to industrial applications," *BMC Genomics* 9 (2008): 597, https://doi.org/10.1186/1471-2164-9-597.

100 " What is bioming?" American Geosciences Institute, accessed February 24, 2024, https://www.americangeosciences.org/critical-issues/faq/what-biomining.

101 Moazzam et al., "Lithium bioleaching."

102 Labban, "Deterritorializing Extraction," 562.

103 Labban, "Deterritorializing Extraction," 564.

104 Moazzam et al., "Lithium bioleaching."

of value."[105]

Biomining further extends extraction beyond the geological scale to the molecular scale, "to the spaces of interaction between microbes and metals—the natural habitats that particular microbes produce on their encounter with mineral ores and in which they mobilize metals from their matrices."[106] We see, then, that neither geological or biological production is "external to the labor process or immune to manipulation."[107] They are processes in which "organic life and inorganic matter enter into fluid and productive arrangements."[108] The extraction of value from waste material is thus dependent on the productive capacities of nonhuman organisms and materials. "The metabolic and generative capacities of microbial communities" are affixed with "the labor of miners, technicians, microbiologists, chemists, and engineers" as well as "a vast network of dead labor" in the form of machines and equipment to create a more-than-human chain of production.[109] This serves as but one example of how human and nonhuman labor are intertwined within the circuits of capital, and how these entanglements lie at the foundation of AI systems.

Here we may recall David Harvey's description of capitalism as "a working and evolving ecological system."[110] It is important to note how under this system, the generative capacities of more-than-human arrangements serve to extend the material and spatial reach of extraction. This is to be expected, given the extractive logic that undergirds capitalism. Yet microbial metabolism occurs naturally at its own temporal and spatial rhythms, which interrupt the circulation of capital and delay the materialization of value into commodity.[111] While companies have been continuously deploying new technologies to speed up the process, scientists today continue to cite the "gradual growth of microorganisms" and prolonged recovery time as a challenge to applications of bioleaching.[112] For a brief moment, "capital is abandoned 'to the sway of natural processes.'"[113] Even under the oppressive logics of extraction, the encounter of human, microbe, and machine produce unexpected affordances that serve as potential sites for transformation. Here we see the uncontainable richness of relational interactions, a break in the system that allows us to imagine a world beyond the continuous evolution towards planetary extraction that is so often perceived as inevitable.

Minerals, metals, and microbes are no longer simply a layer in a unidirectional technical stack; they are users, initiating chains of interaction that ripple through AI systems. We exist within "a distributed and discontiguous network of sending and

105 Labban, "Deterritorializing Extraction," 571.
106 Labban, "Deterritorializing Extraction," 566.
107 Labban, "Deterritorializing Extraction," 571.
108 Labban, "Deterritorializing Extraction," 563.
109 Labban, "Deterritorializing Extraction," 562.
110 Harvey, *Seventeen Contradictions and the End of Capitalism*, 247.
111 Labban, "Deterritorializing Extraction," 567.
112 Moazzam et al., "Lithium bioleaching."
113 Labban, "Deterritorializing Extraction," 569.

sometimes sentient relays,"[114] each linked to the other by "invisible threads of commerce, science, politics and power."[115] This synthetic (planetary) ecology contains echoes of the computational assemblage out of which Indigenous scholars forge new kinships with machines: what are the ethics that emerge from an ontology that includes "forms of being which are outside of humanity?"[116]

THE ARCHIPELAGO

Out of the computational assemblage emerges the figure of what I call the *(AI)sland*, which recognizes AI as a system of multispecies becoming. In fact, what emerges are multiple figures of *(AI)slands*, as AI is not one uniform system but instead an assemblage of parts and processes that form multiple co-existing systems. Together these (AI)slands form an archipelago of AI, one that includes not just the human creators and users of AI systems but also the minerals, plants, animals, and microbes that directly or indirectly impact AI's formation. An archipelagic ethics of AI is one centered not around human flourishing but the flourishing of all beings, for "we flourish only when all of our kin flourish."[117]

As we have seen, AI systems emerge out of co-relational entanglements that go far beyond the human. In fact, there are many contexts in which AI "may stand for 'alien infrastructure' that is not always human user-facing, such as energy and carbon management systems connecting nonhuman users with each other."[118] Yet these systems, and the ecosystem logic that underpins them, often serve to obscure such users—not just the nonhuman and nonliving but also marginalized human subjects—making them visible only as noise or error.[119] In contrast, island thinking demands that we open up to the diversity of "bodies, passions, and actions" that make up and interact with AI systems; in doing so, we "hint at potential transformative worldings."[120] The apparatus of AI becomes a continual negotiation and renegotiation of interspecies affects and entanglements which call forth different worlds. In other words, AI is not a monolithic institution but instead a space in which heterogeneous forms of biotechnical diversity may be nurtured. Just as island ecologies have acted as "cauldrons for evolution," an island model of AI can too bring forth the co-evolution of

114 Benjamin H. Bratton, "Synthetic Gardens: Another Model for AI and Design," in *Atlas of Anomalous AI*, ed. Ben Vickers and K-Allado McDowell (London: Ignota Books, 2020), 100.

115 Kate Davies and Liam Young, *Tales from the Dark Side of the City: The Breastmilk of the Volcano Bolivia and the Atacama Desert Expedition* (London: Unknown Fields, 2016), quoted in Kate Crawford and Vladan Joler, "Anatomy of an AI System," 2018, https://anatomyof.ai/.

116 Lewis et al., "Making Kin with The Machines," 47.

117 Lewis et al., "Making Kin with The Machines," 51.

118 Bratton, "Synthetic Gardens," 96.

119 Ramon Amaro, "Designing for Intelligence," panel discussion moderated by Rana Dasgupta, in *Atlas of Anomalous AI*, ed. Ben Vickers and K-Allado McDowell (London: Ignota Books, 2020). For examples, see the work of Cathy O'Neil, Virginia Eubanks, Tinnit Gebru, and Joy Buolamwini, among others, that document how algorithmic models perpetuate bias against women, people of color, and people with lower incomes.

120 McFarlane and Anderson, "Thinking with Assemblage," 162.

multiple intelligences.

It is no accident that Jason Edward Lewis describes cyberspace as "an *archipelago* of websites, social media platforms, shared virtual environments, corporate data stores, multiplayer video games, smart devices and intelligent machines (emphasis added)."[121] Within the context of island studies, archipelagos have been proposed as conceptual manifestations of "fluid cultural processes, sites of abstract and material relations of movement and rest, dependent on changing conditions of articulation or connection."[122]

Theorising an archipelago of AI first required an undoing of "the enclosure that the black box of AI represents;" an acknowledgment that "interdependent hyperdimensional geometries of learning are not a closed system."[123] We have pulled back the curtain and extinguished the ethereal imaginary of the cloud to plant our feet firmly back within the earth, within the dirt. In the dirt we find what is overlooked in the "strategic amnesia that accompanies stories of technological progress:" the vast power of AI as "a generative force at the ecological scale."[124] While the overarching conditions of capitalist extraction means that these generative capacities have so far been subsumed to the production of value, as we saw in the example of biomining, we do not have to be resigned to technopessimism. As Benjamin Bratton notes, "We simply don't know yet what these assemblages of parts and processes that we call 'artificial intelligence' really are and what they are good for."[125]

Now, I want to point to where evolutionary theory and technological innovation do find overlap—not in the teleological narrative favored by Silicon Valley but in the diverse speciation that initially drew Charles Darwin to the study of islands. The speciation of living organisms requires "degrees of physical separation, trial, error and local stabilization;" as Benjamin Bratton notes, "so do cultural and technical forms."[126]

To enter the archipelago is to enter a network of islands in which different forms of AI can evolve, each in their distinct environmental, sociocultural, and political context—creating a "living study in comparative platforms."[127] Recalling Jason Edward Lewis' concept of a computational biosphere, the health of our planetary future may depend not only on biodiversity but a techno-diversity. If the materiality, locality, and relationality of AI systems were emphasized rather than hidden behind disembodied metaphors—what new formations and relations may emerge?

The Indigenous AI movement, for example, calls for *abundant intelligences*, or

121 Lewis et al., "Making Kin with The Machines," 42.

122 Elaine Stratford, Godfrey Baldacchino, Elizabeth McMahon, Carol Farbotko, and Andrew Harwood, "Envisioning the Archipelago," *Island Studies Journal* 6, no. 2 (2011): 122, https://ro.uow.edu.au/scipapers/3062.

123 Ben Vickers and K-Allado McDowell, "Introduction: Models," in *Atlas of Anomalous AI*, ed. Ben Vickers and K-Allado McDowell (London: Ignota Books, 2020), 34.

124 Crawford, "Earth," 26; Bratton, "Synthetic Gardens," 105.

125 Bratton, "Synthetic Gardens," 94.

126 Bratton, "Synthetic Gardens," 103.

127 Bratton, "Synthetic Gardens," 103.

the development of AI systems that "support Indigenous ways of knowing and that recognize the abundant multiplicity of ways of being intelligent in the world."[128] As Ruth Irwin and Te Haumoana White point out, "the western question of consciousness is expanded exponentially under [the] rubric of AI," finally "catching up with" what Indigenous philosophy has long known: that humanity is only one segment of the Earth's aliveness.[129] While Indigenous cultures have long practiced more-than-human ways of being in the world, the dawn of AI brings new urgency to attend to the heterogeneity, diversity, and complexity of nonhuman life and intelligence.

In *Ways of Being*, the artist and writer James Bridle uses the term "corporate intelligence" to capture what I have described in this article as the traditional AI ecosystem: one that is constructed to optimize the extraction of value. They explain that this conception of AI has been reinforced so strongly in public discourse that "we seem incapable of imagining intelligence any other way;" when in fact this is only a very narrow understanding of what AI can be. Imagining alternative futures, then, is not just a theoretical exercise but a real way to liberate ourselves from the continued replication of extractive AI.[130]

From the increasingly arid landscapes of Spain's Castilla La Mancha to the contaminated streams of the Liqi river in Tibet, we see that the locality and physicality of AI cannot be wiped away. Rather than obscuring these footprints in favor of the fiction of AI as a bounded system, the archipelagic model demands that we consider how all those within our extended circle of relations, human and nonhuman, "are affected by what is made, and to responsibility for those it affects."[131] This requires that AI systems are grounded in the local, while acknowledging a connection to the global.[132]

We may yet embrace an archipelago in which heterogenous biotechnical diversity is nurtured and restored, "augmenting existing intelligence and introducing new forms besides, [situating] closed loops (little ones and city-scale ones) within open fields where they can breathe."[133] AI remains a stakeholder like any other within the archipelago: for example, in "Quartet," Jason Edward Lewis presents an imagined future in which multiple AI systems, each informed by different epistemological frameworks, can work together to inform human decision-making. The first AI is based on Kanaka values of land and family, designed to preserve abundance. The second is founded in Blackfoot linguistic architecture, which focuses on flow and

128 "Abundant Intelligences," Indigenous AI, accessed February 25, 2024, https://www.indigenous-ai.net/abundant/.

129 Irwin and White, "Decolonising Technological Futures."

130 James Bridle, *Ways of Being: Animals, Plants, Machines: The Search for a Planetary Intelligence* (New York: Farrar, Strauss and Giroux, 2022), 8-9.

131 Suzanne Kite, "How to Build Anything Ethically," in *Indigenous Protocol and Artificial Intelligence Position Paper*, ed. Jason Edward Lewis (Honolulu: The Initiative for Indigenous Futures and the Canadian Institute for Advanced Research (CIFAR), 2000).

132 "Guidelines for Indigenous-centered Design v.1," in *Indigenous Protocol and Artificial Intelligence Position Paper*, ed. Jason Edward Lewis (Honolulu: The Initiative for Indigenous Futures and the Canadian Institute for Advanced Research (CIFAR), 2000), 21.

133 Bratton, "Synthetic Gardens," 105.

change, making it especially adept at addressing questions of time and causality. The third AI connects the two together, translating information across time and place to make suggestions for the human user "in support of Kanaka flourishing that take the environment, human and non-human relations, and past-present-future into consideration."[134] An attention to interrelation opens up the possibility for previously marginalized subjects to play a more active role in AI development, giving rise to more diverse forms.

For Bridle, this act of opening up is not just "a true accounting of [technology's] effects and repercussions." It is the foundation of "our collective ability to address all kinds of critical issues, from politics to the environment, while remaining attentive to the subtleties and nuances of individual situations and particular geographies."[135] This can feel hard to imagine; we are used to the current forms of AI as part of a wider system of control and extraction. As Suzanne Kite notes, some of the proposals shared by Indigenous AI scholars are only possible "through a radical change in the way technology companies are run and the pyramid of compensation for the exploitation of resources is reversed."[136] But the framework of island studies reminds us that alternative ways of seeing are possible—not just possible, but perhaps more accurate and appropriate for our times. The human hubris behind our age of planetary extraction (from which AI is inseparable) is challenged and decentered when we attune ourselves to the rich diversity of more-than-human relations from which intelligence can emerge.

Ben Vickers and K-Allado McDowell write that "the knowledge structures of AI are also in the trees, in the rhizomes, in the connections, in the network, in the forest... its territory is the entire planet. It is everywhere. It is in the air."[137] Here, Derrida's declaration that "there is no world, only islands" gains a particular salience.[138] Without worlds, we are left with the archipelago. Like the ocean which has no beginning or end, the space of the archipelago is one of infinite openness, "a space of a connection that can bring forth new ways of knowing and being as a matter of collective survival."[139] ⊡

134 Jason Edward Lewis, *Indigenous Protocol and Artificial Intelligence Position Paper* (Honolulu: The Initiative for Indigenous Futures and the Canadian Institute for Advanced Research (CIFAR), 2000), 14. "Quartet," in *Indigenous Protocol and Artificial Intelligence Position Paper*, ed. Jason Edward Lewis (Honolulu: The Initiative for Indigenous Futures and the Canadian Institute for Advanced Research (CIFAR), 2000), 69-74.

135 Bridle, *Ways of Being*, 280-281.

136 Suzanne Kite, "How to Build Anything Ethically," in *Indigenous Protocol and Artificial Intelligence Position Paper*, ed. Jason Edward Lewis (The Initiative for Indigenous Futures and the Canadian Institute for Advanced Research (CIFAR), 2000), 75.

137 Vickers and McDowell, "Introduction: Models," 35.

138 Jacques Derrida, *The Beast and The Sovereign*, vol. 2, trans. Geoffrey Bennington (Chicago: University of Chicago Press, 2011), 9.

139 Vickers and McDowell, "Introduction: Models," 35.

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