

Nga manawataki o te koiora: biological rhythms, posthuman design and decolonial thought.

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Abstract

Western science, in fields such as computational ecology, has grown to accept the truths that Indigenous culture have long known: that computational ecology accepts that ecological models are too complex to be summarised in computational form. Since this complexity evades the codification of mere indexing, how then, should we work with computational companions (code, algorithms, programs, platforms). What new ways of intra-acting can we develop alongside computational frameworks, which bring us one more step closer to sentient machines? Most importantly, how can ethical ways of thinking and doing motivate transformations in the computational space, in areas such as machine learning where extreme problems of bias are now embedded? This research does not answer these complex questions, for they are genuinely 'wicked problems' that reach toward wider issues of equity, sustainability, and economy. Our aim is to use creative practice to generate gestures and markings that tentatively trace a way forward. This research contributes to new modalities of human computer interaction that attempt to restore the dynamic pathways developed by Indigenous thinking, challenging artificial boundaries such as nature/culture, instead giving respect to concepts of interconnection. Examining some of the differences between Western epistemology and Indigenous thinking opens a pathway toward Indigenous Futures that are crafted in support of a decolonial ecology.

Keywords

Decolonial art, Touch Designer, Plant signals, 'More-than-human' Design, Intra-action, mātauranga Māori.

DOI

[10.69564/ISEA2023-35-short-Wright-et-al-Nga-manawataki-o-te-koiora](https://doi.org/10.69564/ISEA2023-35-short-Wright-et-al-Nga-manawataki-o-te-koiora)

Introduction

Through imaging technologies such as electron microscopes, quantum physics has been slowly proving to itself that all particles in the universe are deeply entangled. Now, the curious situation exists where Western science has 'validated' what mātauranga Māori (Māori knowledge) has known and preserved for thousands of years. A close analogy for the unseen movements of quanta is mauri (transitory and shifting states of being), while the structure these quanta form with other particles, emerges in wairua (felt interconnections between all living things). In the Māori world view, people and nature are inseparable and share genealogy. This resonates with current scientific opinion which has only come around too lately to the perspective that plants are to be as valued as humans. Indigenous thinking is in fact far ahead of Western science, in that we never lost the intuitive ways of knowing and being, and we never blindly accepted the artificial separation of mind and body of Descartes' Enlightenment edict. Through quantum imaging in the 1990s, physicists finally saw that the whole world was connected, every nanoparticle and atom is entangled with every other. This was not new to mātauranga Māori, which for thousands of years had preserved that intuitive knowledge of deep entanglement in our concepts of wairua (life force, shared between all living things) and mauri (transitory and shifting states of being). Underscoring the radical cosmological contingency that materially binds humans to all other entities, the concept we know as mauri is expressed to a degree in quantum physics. That is, the principle that nano level particles indeed bind together very entity in the universe. Our work is about the entangled connections that are intuitively felt, and join humans, nonhuman/more-than-human kin and algorithms in a constant state of becoming. Our research thinks alongside evolutionary biologists such as Monica Gagliano and Stefano Mancuso, who argue that plants are intelligent [2,4]. Situated agency emerges as a tangled network of augmented reality infrared vision, gestural and plant bio-electrical data, audible through a bespoke sensing network of hardware devices and custom software. Understanding the invisible world humans cannot see is important, therefore, to weave an understanding of interconnection back into the process of everyday life. In our work, plants signal to one another as part of their growth process, and we captured these signals as MIDI, an audible expression of their invisible movements. The arhythmic and micro-temporal signals were then incorporated as a foundation to co-create a sound scape with our plant companions. Contact/Sense

explores the entangled connections that are intuitively felt between humans and other life forms, sentient or not. Framing the eco-digital within our artistic practice is the scientific context of evolutionary plant biology, on the one hand, and the spiritual Indigenous approach to knowledge as beyond human, assembled in complex networks that are not only empirical but acknowledge unseen unquantifiable forces and the insights it gives as to human behavior and thinking in relation to plants. Agential realist accounts such as those elaborated by Barad [2008], go some way toward destabilizing, at least within posthuman philosophy, the Humanist/Enlightenment duality, opening space for extended speculation on matter and meaning. However, these Western systems occlude the cosmology of knowledge systems like mātauranga Māori. Underscoring the radical cosmological contingency that materially and spiritually binds humans to all other entities, mātauranga Māori traverses both material and spiritual realms, pointing toward a universe that is not entirely knowable, where empirical claims to deep knowledge about the production of matter by material forces are only partially relevant. Permeated with temporal and spatial relations that defy the "arrow of time" and granulate past, present and future into a non-linear series of instances, mātauranga Māori affirms the validity of techniques and methods that trace speculative knowledge.

According to plant neurobiologists Mancuso and Viola, plants are not "passive machines" for processing light, water and food: In fact, they are "intelligent" and show this by constantly signaling to one another and to the world, for example, giving off scents that attract or repel insects and even sharing resources, such as water, amongst their communities [4]. Tracing the connections between quanta and nanoparticles as mauri and wairua as a starting point for a discussion of new media art in a decolonial framework, this paper reflects upon intersectional threads within art, physics, data and posthuman design, to weave an interconnected path between Western and Indigenous science, philosophy and cosmology. We use our practice in media art blending computational networks, human bodies, and plant signals to explore the metaphysical and embodied knowledge manifest through a decolonial symbiosis or science, art and technology, and inclusive to all humans as well as our "more-than-human" interlocutors (plants and algorithms). Concepts of symbiosis may seem attractive since they indicate hybridity, however, as art practitioners we need to be mindful of the power relations in any merger: so that in our writing we

approach symbiosis in a decolonial sense, to alleviate the tendency for a more powerful force to overtake a lesser one.

"More-than-human" creativity

"More-than-human" creativity is an emergent thread that reaches toward forming relations with more-than-human kin, organic and silicon, such as plants and algorithms. Through research that bridges plant signaling with augmented and extended reality, machine learning, and interaction design for virtual environments, this project explores the entangled quality of human creativity in the computational networks and living ecologies. This embeddedness, or interdependency, or entanglement, between the organic and the silicon enables new forms of creativity, where artists' partner with nonhuman kin via iterative acts of co-creation.

This approach destabilizes traditional principles of design, which emanate from the intentionality of the artist or designer. A more-than-human approach allows for an open space of generative creativity where unplanned events and phenomena can unfold, shift, and disrupt the final work. Through practice-based and traditional research, the installation project *Nga manawataki o te koiora: Biorhythms*, has several interconnected aspects. Indigenous art is conventionally seen as manifesting tradition and not technology. However this work overturns that power relation, where embodied cultural knowledge is allowed to flow through computational networks.

Embodied knowledge and algorithmic design

Nga manawataki o te koiora: Biorhythms, is a projection mapping and installation piece that takes you on a journey into a computational transduction of the forest, rivers and oceans of Aotearoa/New Zealand. Visually, an interconnected natural ecology is translated into the real-time world of audio reactive geometries and mesh topologies. The concept was to convey the feeling of these things, without literal interpretation. Traditional kete (woven baskets) inspire fluid movements which become pixel topologies. Animated motion made with noise oscillators, shift from reimagined nets used to catch eel (hiinaki), to seed pods exploding from pixel plants, such as the red pōhutukawa. The soft blue/green of kina (sea eggs) become fluffy vectors transparently overlaid on a fluid mesh of waves. Following and

modifying the tradition of naturalism and curvilinear geometry that marks traditional Māori art, this piece visually encapsulates the feeling of the natural world without being a literal representation that vested in Western pictorial traditions of realism. This 20-minute piece, recorded as live audio reactive in Touch Designer, is sonically a composite of human-nonhuman music, alternately interspersed and mixed together. From the "human" side, music consists of three original electronic compositions by Simon Howden. From the plant side, we intersperse original recordings of plant sonics captured in research since 2019. We consider plant to be co-composers of this work. A previous installation, *Contact/Sense* was performed at the SIGGRAPH Asia Art Gallery in Brisbane 2019, and combined plant sonics with mixed reality. Donna Haraway introduced the notion of "companion species" to describe non-human organic life forms that we cohabit alongside in society and culture. Plants and humans have lived alongside one another for thousands of years, in a co-dependent relationship of care and cultivation. Applying the decolonial philosophy of mātauranga Māori (Māori epistemology), combined with posthuman lens to art and science, our hope is that through this artwork, people will feel a little closer to the hidden bio-electrical processes of plants, and consider plants not as a resource for extraction, but as a 'companion species' in a sustainable ecology.

The plant sonics were recorded during earlier live audio-visual performances with an *agave attenuate*, a series of vines, several palms, and a multitude of grasses, tropical and sub-tropicals since 2018. Rewa Wright has developed a unique mode of mixed reality performance with plants and algorithms networked with the human body. The plant signals are essentially bio-electrical impulses, which we then assign to MIDI and apply sound design to, so that soft wooden drums with loose skins and resonant tapping highlight the micro temporality and asymmetry of plants, whose signals sound unstructured to the human ear. Plant rhythm is phenological, and traces their processes such as photosynthesis and osmosis as they follow patterns of growth. Several plant neurobiologists have noted the signals that plants emit are akin to intentional communication and sentience, and this is now a recognized area of scientific study.^{1, 2}

Plant neurobiology speaks to the material reality, unraveled by quantum physics, that every particle in the universe is connected to its nearest neighbors, and through those neighbors to all other things. Quantum imaging has provided visual proof of this connection, as discussed extensively by philosopher Karen Barad,³ whose concepts of "situated knowing" and "intra-action", both grounded in quantum (meta-)physics, have

resonance with Indigenous notions of deep time/space and interconnectivity. As a foundational concept, the deep interconnection of life forces (i.e., quantum entanglement) has always been known to indigenous people, and in my culture, Māori from Aotearoa/ New Zealand, we understand this unbroken link between vegetal, organic, silicon, geological forms (to name just a few categories) to underpin all material and cosmological reality. Understanding the invisible world humans cannot see is important, therefore, to weave an understanding of interconnection back into the process of everyday life. In our work, plants signal to one another as part of their growth process, and we captured these signals as MIDI, an audible expression of their invisible movements. The arhythmic and micro-temporal signals were then incorporated as a foundation to co-create a sound scape with our plant companions. Using computer art to translate emotions about place from bush into pixels, this work explores the potential for a symbiosis of data, plants, ecology and algorithms. This work is deeply influenced by Rewa's cultural background as a First Nations Māori artist, from the Ngai Tawake, Te Kaimaroke, and Te Uri o Hau hapu of Aotearoa/New Zealand. Her ancestry recognizes human and plant relations going back thousands of years, and Rewa is committed to multi-species justice and sustainable living on Planet Earth. Mixing the biorhythms of plants and the calls with human produced electronic music, reveals a co-creative mesh of human and nonhuman kin, an entanglement that is fundamental. For example, in Rewa's pepeha (personal genealogy), she traces lineage to the maunga (mountain) called Tokatoka, the awa (river) called Wairoa, and the moana (sea) called Kaipara. These connections are at the base of her identity and this is the same for all Māori, since our genealogy is tied to the whenua (land). Transducing this physical connection with the land into computational space is only ever partial. However, hints at the ways Indigenous knowledge might be embodied as data and algorithms, nurturing a framework that advances decolonial thought and gestures toward Indigenous futures. While quantum imaging has provided visual proof of this connection between all vibrating atoms and matter, it is a concept that has always been known to indigenous people, and in my culture, Māori from Aotearoa/ New Zealand, we understand this connection between vegetal, organic, to underpin all material and cosmological reality.

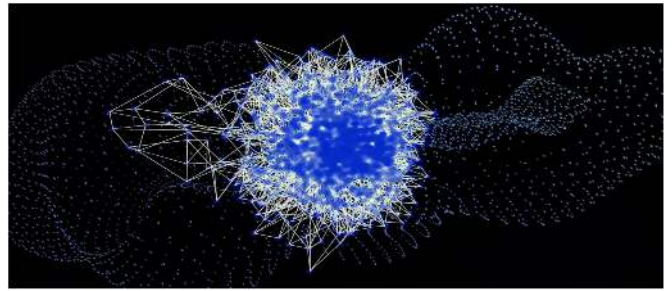


Figure 1. Screenshot from 'Nga manawataki o te koiora'.

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Authors Biographies

Dr. Rewa Wright (Ngai Tawake/Te Uri o Hau/ Te Kaimaroke) is Senior Lecturer in Film, Screen and Animation at the Queensland University of Technology, Australia. Simon Howden is a sound designer and independent music producer. Both humbly reside in Meanjin/Brisbane on the lands of the Turrbal and Yugara, First Nations owners. We recognise that these lands have always been places of teaching, research and learning, and that sovereignty was never ceded.