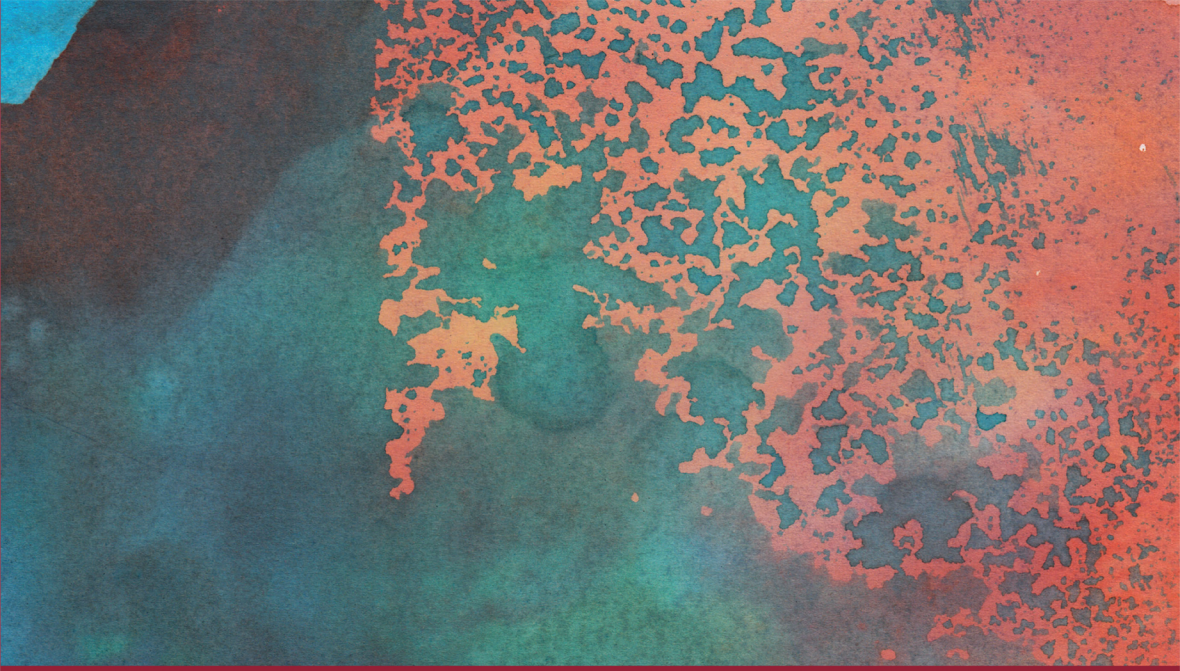
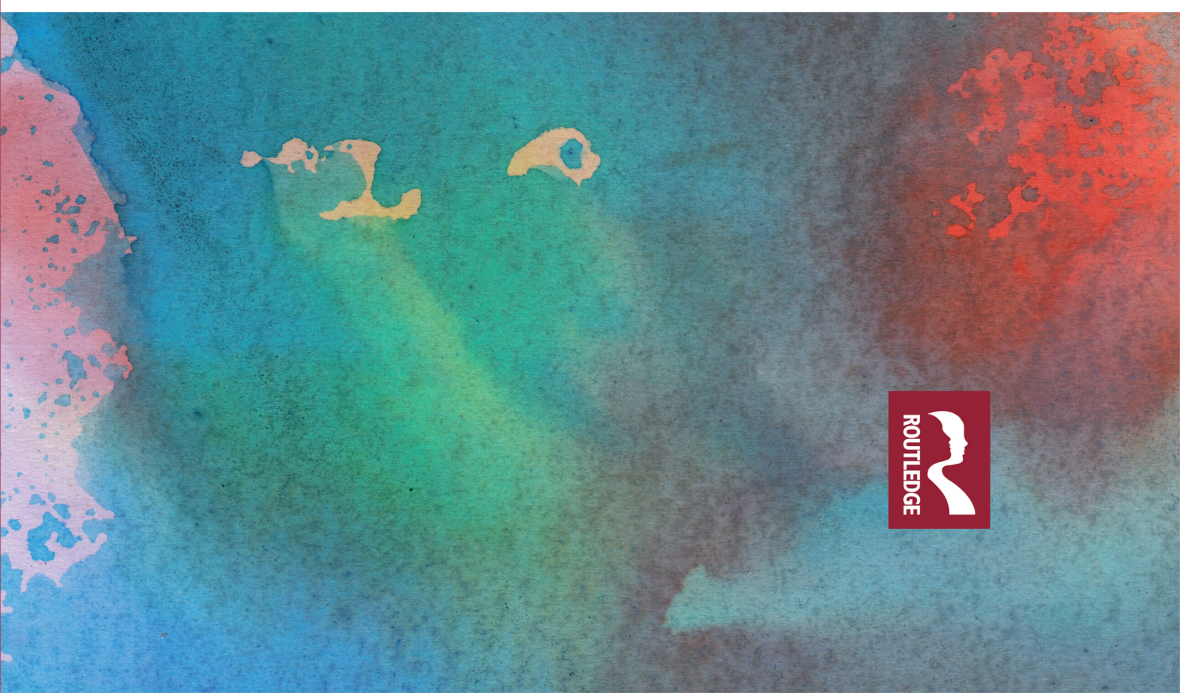


Routledge Studies in Science, Technology and Society

DISTRIBUTED PERCEPTION

RESONANCES AND AXIOLOGIES

Edited by
Natasha Lushetich and Iain Campbell



"What is perception? A presentation, as Husserl said? A bodily shaping, as Merleau-Ponty defined it? Or the mere illusion of reality, as Derrida affirmed? Neither, Lushetich and Campbell answer. Delocalising perception from the scene of the human world, they show, through this extraordinary set of essays, that perception does not focus on objects but navigates between thresholds. Trans-materiality, trans-temporality, natural artificiality or biological mechanisms are currently deconstructing the deconstruction of presence itself. A major achievement."

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Distributed Perception

Who, what, and where perceives, and how? What are the sedimentations, inscriptions, and axiologies of animal, human, and machinic perception/s? What are their perceptibilities? Deleuze uses the word 'visibilities' to indicate that visual perception isn't just a physiological given but cues operations productive of new assemblages. Perceptibilities are, by analogy, spatio-temporal, geolocative, kinaesthetic, audio-visual, and haptic operations that are always already memory. In the case of strong inscriptions, they are also epigenetic events.

In physics, resonance is the tendency of a system to vibrate with increasing amplitudes at certain frequencies of excitation. In cybernetics and in theories of technology, it refers to systems' feedback. In Native science, resonance denotes the axiology of positions and events. It's a form of multi-species perception that emphasises emergent directionality and protean mnemonics.

This transdisciplinary volume brings together key theorists and practitioners from media theory, Native science, bio-media and sound art, philosophy, art history, and design informatics to examine: a) the becoming-technique of animal–human–machinic perceptibilities; and b) micro-perceptions that lie beneath the threshold of known perceptions yet create energetic vibrations. The volume shows distributed perception to be a key notion in addressing the emergence and persistence of plant, animal, human, and machine relations.

Natasha Lushetich is Professor of Contemporary Art and Theory at the University of Dundee and AHRC Fellow (2020–2021). Her research is interdisciplinary and focuses on intermedia; biopolitics and performativity; the status of sensory experience in cultural knowledge; hegemony and complexity. Her books include *Fluxus: The Practice of Non-Duality* (Rodopi 2014), *Interdisciplinary Performance* (Palgrave 2016), *The Aesthetics of Necropolitics* (Rowman and Littlefield 2018), *Beyond Mind*, a special issue of *Symbolism* (De Gruyter 2019), and *Big Data: A New Medium?* (Routledge 2020).

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Distributed Perception

Resonances and Axiologies

Edited by
Natasha Lushetich and Iain Campbell

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The nomadic rhythms of rain ants in Sarayaku

Kuai Shen

> Stories were taken from us and we find ourselves traversing a path obscured by shadows. Then shadows fade away. Forms, patterns, entangled relations, and swarm societies emerge. Nomad ants cover the sun to spawn the moon. With their rhythm, pheromone trails appear leading us to a different dimension. And they vanish with the rain.

My 2019 artwork *Nomadas*, an audiovisual portrait of Amazonian army ants inspired by the Kichwa community practices of Sarayaku in Ecuador, begins with these words. The nomadism of these ants – species *Eciton burchellii* – has been framed in Eurocentric and Anglo-American epistemologies from a military and imperial perspective: an army of ants organised in colonies, with soldiers and a queen, subject to zero-sum game contestations based on predatory dominance and resource competition. In non-Anglo-Eurocentric epistemologies, however, their invertebrate performances are not seen through the same lens. Social forms such as "story-telling, dancing, weaving, or any everyday aesthetic practice of re-existence" shape the perceptions of, and relations to, life-forms in Amerindian communities (Carcelén-Estrada 2017, p. 104). Specifically, the social fabric of the Kichwa people of Sarayaku offers an alternative discursive ground for exploring the movements and rhythms of army ants weaving living nests and passages with their bodies across forest dimensions. In Sarayaku, army ants turn upside down and become *tamya añanku* – the rain ants. They announce the advent of rain, clear pests from houses, and turn into messengers of territorial conflicts as they become entangled in more-than-human relations with the rainforest and with people.

Through a series of transversal experiments using electronic amplification and audiovisual media, I followed *tamya añanku* in situ to enact cross-species performances revealing a different understanding of their nomadism in relation to the rain, guided by the Sarayaku concepts of *taki* (rhythm) and *tiam* (radical turn).

The concepts of *taki* and *tiam* offer an alternative way to enact a knowledge-making performance that reveals a spectrum of rhythmic motions entwining rain with rain ants in the rainforest. The movements of *tamya añanku* convey meanings beyond scientific rationalisations as they turn life over and turn themselves into living nests imbricating "material practices of territorialisation, deterritorialisation and reterritorialisation" (Deleuze and Guattari 1987; Wallin 2020, p. 105). My

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transversal fieldwork challenges the portrait of army ants created by scientific knowledge regimes, overturning the colonial legacies of Western research practices that fail to take into account situated human–ant relationships. These situated human–ant relationships are grounded in modes of perception and performances attuned to broader socio-ecological and community practices rooted in the land-based ontology of Kawsak Sacha: the living forest. Kawsak Sacha constitutes an overarching culture of resistance for weaving complicit and antagonistic more-than-human relations with the rainforest, while opposing extractive and dominant forces that subject it as a resource to be managed or as a scientific object to be modelled.

The nomadic turn from army ants to *tamya añanku*

Army ants have been described in great detail by Europeans and Anglo-Americans (Wheeler 1910; Rettenmeyer 1963; Schneirla 1971; Hölldobler and Wilson 1990; Kronauer 2020). However, the language used in these descriptions has been fraught with colonial legacies (Sleigh 2001). Within the scientific perspective, ant nomadism is understood as the frequent relocation of colony nests in direct relation to mass predation and cycles of reproduction (Kronauer 2020). On this view, all army ants, comprising a rich diversity of species across eight genera over three continents with colonial legacies – America, Africa, and Asia – are known to be nomads. Yet, the lifecycle of the Amazonian species *Eciton burchellii* has been categorised into two divisions: the statary phase with an average of 21 days, during which the nest remains stationary, and an average of 14 days of nomadism, during which the ants migrate every night to a different nesting site (Teles da Silva 1977). I claim that these scientific descriptions are biased by military and colonial terminologies. This contestation departs from the idea that 'nomadism' is a strongly anthropocentric projection influenced by the imperial gaze on nomadic people as stateless (Deleuze and Guattari 1987; Pratt 1992). Furthermore, the term 'statary' references English settlers and formerly denoted soldiers equipped for combat (Bradford 2017). Lastly, the temporary nest army ants assemble with their bodies has been described as a 'bivouac', the military function of which is to build an 'infantry's encampment', while alternatively it could also mean 'sheltering in place'. If names and classifications "shape the worlds we make and inhabit" (Bolender 2020, p. 78), then these notions are problematic when observed vis-à-vis the lively entanglements of the Sarayaku rainforest, and deserve – and demand – a broader exploration outside of scientific disciplines.

Guided by the Kichwa concepts of *taki* and *tiam*, I rearticulate ant nomadism in relation to the countercultural practices of Sarayaku. This allows me to tunnel through the species barrier and trace the local dimension of bodies in motion and situated community practices, broadly aligning with Rosi Braidotti and Gilles Deleuze and Félix Guattari's conceptions of nomadism (Braidotti 2005; Deleuze and Guattari 1987).[1] This different concept of nomadism journeys into Sarayaku's "territoriality from underneath" (Ortiz 2016, p. 191) and coils discursively around the entanglements of this rainforest as a spectrum of rhythmic motions. Sarayaku is a Kichwa nation living in complicity with forest life-forms under the increasing

Figure 2.1 Tip of the Dagger. Kuai Shen. 2019. Inverted corporeal performance of the rain ants' nest, concealed inside a fallen tree, prior to forming a hunting trail on the ground.
Source: Courtesy of the artist. © Kuai Shen.

pressures of extractivism, land displacements, and the never-ending ingressions of capital commodities. Places, materials, entities, and imported elements – both tangible and ideological – are here entangled in the land-based ontology referred to as Kawsak Sacha (Sarayaku 2020). In this land-based ontology,

boundaries are entwined with more-than-human relations, characterised by movements and rhythms that elude Cartesian notions of space and time. In Kawsak Sacha, the circulation of water through rain and the porous skins of forest life-forms animates a world of rhythmic life-forces, which corresponds to what the Kichwa call *kawsay* – life, vital energies flowing across the spatiotemporality of the Amazonian world (Uzendoski 2008, p. 15). This spatiotemporality, which will be discussed in more detail in the third section of this chapter, is a stage for inter-dimensional relations between the rainforest, rain ants, and rain as an exchange of energies, which in Sarayaku produces a specific auditory and transformational rhythm and forms part of the continual generation of territorial histories of this medium in-formation (Ingold 2007b, p. 31).

My first encounter with *tamya añanku* took place in May 2019, during an early concert of nocturnal insects. It was Rumi, my friend and host in Sarayaku, who showed me their nest (Rumi 2019). It was also Rumi who introduced me to the six 'knowledge bearers' who will appear in this narrative. One of them, Franco, a former leader of the local council, revealed the true Kichwa identity of these ants: "*tamya añanku* are forest messengers who tell people when rain might come without the need of looking at the clouds" (Franco 2019). On that evening, it started to drizzle as I carefully placed my audio recorder over a multicoloured bundle of leaves, next to an endless stream of ants. Bending their rears and dragging their glands over the metallic surface, innumerable carbon-black ant bodies with open mandibles enveloped the apparatus in seconds. The collective response induced by my intrusion syncopated the rhythms of ant hunters returning home between sunlight and rainfall. On the way back to Rumi's hut after this first mediated encounter with *tamya añanku*, distant drums and songs could be heard from the main plaza; the Sarayaku people were rehearsing for Pachamama, a yearly celebration for which the seven Sarayaku communes gather for several days. Although the word 'Pachamama' usually means Mother Earth, or Earth Being, to people outside the cultural Amerindian South (Gómez-Barris 2017, p. 135; de la Cadena 2015, pp. 181–182), its translation from the Kichwa and its invocation are deeply rooted in community place-making and human–nonhuman relationships to the fertility of the land (Sarayaku 2014). When locally situated, Pachamama comes close to terms such as 'environment', 'habitat', or even 'the natural world' (Gudynas 2017, p. 267). For some Kichwa and Quechua cultures in the Amazon and the Andes, Pachamama still represents a fertility deity. But here in Sarayaku, Pachamama is not a word to be translated; it is a grounded experience commemorating two vital, recurring events of its history. It is primarily a celebration of life through dancing, drinking, sharing fruits from itinerant forest farms known as *chakras*, drumming, playing *piwano* – the traditional flute handcrafted from wild bamboo – and engaging in playful competitions based on physical endurance. But more significantly, Pachamama is a celebration of social resistance and collective memory: the 1992 march to the capital to demand the return of territorial rights seized by the government (Marlon 2019; Ortiz 2016, pp. 287–290).

The revolt of 1992 resonates in the collective memory of Sarayaku, both through ambivalent emotions[2] and the spirit of social resilience and collaboration

characteristic of its people (Marlon 2019). Marlon, who was elected Tayak Apu – leader of the Tayjasaruta council[3] – between 2003 and 2005, is one of Sarayaku's main voices. Tayjasaruta is the collectively governed Kichwa council that represents Sarayaku in both national and international affairs, recognised since 1979 by the Ecuadorian government (Sarayaku 2020). In Marlon's words, the revolt of 1992 is an expression of Indigenous social movements: "we have exerted peaceful resistance that transcends borders and utopias, because Kawsak Sacha transcends as a fundamental defence of life" (Marlon 2019). Invoking the model of the living forest, Marlon emphasised that territorial rights are not just a human political cause. In Sarayaku, territorial sovereignty and relational practices in and with the rainforest follow an ecological conception that goes beyond the one-world ideal and rigid legal frameworks established by the colonial matrix of geopolitical powers (Escobar 2016).

Community-weaving practices of Kawsak Sacha

Community life in Sarayaku is like a "social fabric" where expanding and contracting relations are in tension with thoughts, materials, and entities (Franco 2019). Franco served as Tayak Apu between 2001 and 2003; his voice and vision are representative of community practices weaving human–nonhuman relations with the rainforest. Hand-weaving skills for crafting social vessels, physical performances, communal labour, and convivial gatherings are practices that tighten kinships and afford the continuous reassertion of Kichwa identity, reinforcing human modes of inhabitation vis-à-vis the overwhelming agencies of the rainforest.

Within the world of Kawsak Sacha, two essential Sarayaku concepts helped me to understand community-weaving practices: *taki* and *tiam*. *Taki* means rhythm and rhythmical performance. *Taki* can be performed by singing and with instruments such as drums or flutes. However, it also manifests in acoustic atmospheres and animal sounds. *Tiam*, in the words of Tupak (2020), Tayak Apu elected in 2020, means "turning around to radically change trajectory and perspective". Drawing a circular form with his finger, Tupak explained that "tiam is when a beginning meets an end and turns again". But *tiam* also symbolises a mindset of returning to the roots or place of original thoughts. It can be used in daily contexts to describe instances of social interaction like a physical change of perspective when looking for something, a radical turn in the opposite direction, or even finishing one's drink in a single, bottoms-up movement (Tupak 2020). In my Sarayaku experience, *taki* and *tiam* constitute idioms of performativity that facilitate the perception of the spectra of rhythmic motions of ecological and social activisms brought to life through entangled territorial forms of inhabitation in the in the Amazonian world. *Taki* and *tiam* are at the base of reciprocal activities of community-weaving, circumscribing resonant boundaries of human place-making with the rainforest: *sisa ñampi*, the path of flowers planted in circles to delimit different areas of the Sarayaku territory; *minga*, the collaborative exchange of physical labour when building houses and pruning fields: *chakra*, a sustainable and

itinerant farming agriculture based on human–plant relations that avoids soil degradation; *awana*, the hand-weaving technique used to craft baskets and form earthenware pots with forest clay; *aswana*, the process of fermentation entrusted to women whose buccal bacterial communities turn yuca into the life-giving *chicha* (following the ancestral female connection with the cultivation of this tuber); and *kajana tushuna*, the time when the community spirit is celebrated through altered states set in motion by the entrancing rhythms of men drumming, women dancing around them, and *chicha* shared in earthenware vessels, which, once accepted, must be emptied. (For a discussion of comparable practices among the Chumash, see Chapter 1 in this volume.)

These rotatory motions of dancing, weaving, cultivating, drinking, and sublimating transduce forest matter in tactile and creative ways. For example, women examine forest clay with their fingers; they 'read' the clay's malleable form and fire-resistant qualities in order to select the right lump to transform into an earthenware vessel. Men enter the forest in search of the valuable *tiamshi*, an epiphyte twisted liana, whose resilience and undulations are needed for weaving *ashanga* baskets. These tactile abilities to make sense of and transduce forest materials extend to the corporeal capacities of *tamya añanku* as terrestrial kin in Sarayaku for weaving living nests and passages (Reid *et al.* 2015). Using their invertebrate bodies, they turn themselves into messengers of rain (Antonio 2019; Tupak 2020), forming part of the inter-corporeally and inter-sensorially resonant human–nonhuman Amazonian entanglements. (For an extended discussion of resonance, see Chapter 9 in this volume.) *Taki* and *tiam* manifest in community-weaving and human–nonhuman practices that generate transient sound patterns in specific places and moments (Hill 2013, p. 326): spoken cadences, wind intonations, terrestrial vibrations, and atmospheric notes of the rainforest. Nested in the land-based ontology of Kawsak Sacha, these expressions resonate beyond the spatio-temporal agency of humans. While the resonance of urban environments is a result of soundwaves interacting with human-made spaces (Augoyard and Torgue 2006), the resonance of the rainforest results from the oscillating rhythms and territorial temporalities of continuously growing and decaying places.

In this respect, Antonio, leader of Atayak – Sarayaku's community centre for ancestral wisdoms – interprets *tamya añanku* making the sound of rain as myriad ants interact with the soil litter when they run into one's thatched house as a good sign: "apatinkas stand next to the small runners and direct the hunt" (Antonio 2019). The so-called army ant 'soldiers', with large sickle-shaped mandibles, are known in Sarayaku as apatinkas, which means 'elders with the big heads'. The sight of these elder ants is not a good sign for everyone as some people believe "they come to tell you that you are going to leave this place"; however, others welcome *tamya añanku* because they clear houses of city cockroaches and rats (Antonio 2019). This essential notion of comings and goings resonates with the rhythmic perception of the sounds of *kawsay* flowing across the rainforest. The pervasive sounds of the rainforest take precedence over sight, promoting a collective awareness "of being in continuous movement to allow us and other forms of life to continue their cycle" (Sarayaku 2014, p. 79).

Pacha transversality: amplifying relations across Amazonian worlds

The history of Sarayaku is a recollection of distributed memories told in fragments by particular knowledge bearers, so it is only fully revealed when all the stories are woven together. People like Antonio hold key moments of Sarayaku's timeline. When I asked him about the other relations people have with *tamya añanku*, he mentioned they were useful in the days of the *tayaks* – wise ancient pioneers and the "first scientists" who migrated to Sarayaku from the South many centuries ago (Antonio 2019). They named the animals, identified medicinal plants, communicated with the spirits, and used the sickle-shaped mandibles of apatinkas as angling hooks. They had the vision of maize floating on a river, symbolising the land's fertility: *sara* means 'maize' and *yaku* means 'river/water' (Hilda 2019; Franco 2019; Marlon 2019; Antonio 2019; Tupak 2020). In the collective memory of Sarayaku, this land is made of fluid energies, traversing between worlds.

There is a concept of world dimensions in the Quechua and Kichwa cultures of the Andes and Amazon, in which space and time cannot be divided. *Pacha* is the notion of spatiotemporality as "everything that exists anywhere" (Kinti-Moss and Masaquiza Chango 2018, p. 110). *Pacha* is the experience of being in a place, in an open whole (Kohn 2013, p. 63), in relation to the cosmos. In the entanglements of the Sarayaku rainforest, this is constituted by three worlds: *Kaypacha* (this world); *Hawapacha* (the exterior or the world beyond); and *Ukupacha* (the interior or the world below, beneath the soil or deep in the forest). These three worlds comprise a whole, so "separating them is like removing a heart from its body" (Sarayaku 2014, p. 89). In *Kaypacha*, Kichwa people cultivate relations with the land, water, animals, and plants, and in so doing affect seen and unseen entities and energies inhabiting *Hawapacha* and *Ukupacha*. In other words, the people perform active place-making practices, valuing 'places' over 'spaces' by cultivating relations that try to adjust to the phenomena of the three worlds. Similar to Deleuze and Guattari's "smooth space", *pacha* is akin to a heightened sensorial awareness of being in a place "occupied by intensities, wind and noise, forces, and sonorous and tactile qualities" (Deleuze and Guattari 1987, p. 479). From my perspective, *pacha* allows for a situated understanding of living beings and relational tensions entangling space, time, and social forms across the Amazonian world. In this sense, ants are terrestrial beings, one could say of *Kaypacha*. However, some ants are entirely subterranean, cryptically out of sight, dwelling underground in *Ukupacha*; others spend their whole lives in the canopy; and the majority of ant mothers have wings and fly high in the skies of *Hawapacha*. Ants are terrestrial/territorial beings of a different kind; they weave intimate relations with other species, parasites, and symbionts, and nest across interstitial places. Their movements are neither entirely vertical nor horizontal, but performative, bringing materials and species transversally across boundaries.

I align transversality with the Kichwa concept of *pacha*, and use it as a tactic for following rain ants across physical, mental, and technological worlds, focusing on their social-fabric-weaving movements and rhythms.[4] Originally introduced by Guattari, transversality is an operation that intensifies relations among "different

levels and … above all … different meanings" against hierarchies of coercion and territorialisation (Guattari 2000, p. 113). Thus, transversality becomes an artistic tactic for materially producing new sensibilities in order to deterritorialise army ants from their scientific enclosures, and take them back to the living forest territory of Sarayaku, comprising *Kaypacha, Hawapacha*, and *Ukupacha*. In all my encounters with rain ants, I adjusted to the social magnitude of their motions and rhythms: laser and photocell arrays were used to register movements interfering with light, and piezoelectric amplification was used to record vibrations of the moving swarm. Post-fieldwork, I experimented with audiovisual synthesis through machine-learning algorithms based on convolutional neural networks, and computer vision for detecting motion. I call this practice "tactical ant media" (Auson 2019, p. 684) in reference to David Garcia and Geert Lovink's classic manifesto. They defined "tactical media" as a practice of crossing borders to connect and rewire a variety of disciplines, taking full advantage of free spaces that are "continually appearing because of the pace of technological change and regulatory uncertainty" (Garcia and Lovink 1997, p. 3). In my project, tactical ant media were used transversally to amplify and induce local cross-species responses, which differ from scientific methods that have inscribed a convoluted natural history about army ants.[5]

Army ants' convoluted natural history

The denomination of *Eciton burchellii* as 'army ants' stems from a convoluted history that goes back to the imperial invasion of the Americas. The first European account of army ants weaving a bridge on a guava tree was illustrated by Maria Sibylla Merian during her 1699 expedition to the Dutch colony of Surinam (Deutsches Museum 2020), and published in 1705 in her *Metamorphosis Insectorium Surinamensium*. Later in the eighteenth century, the father of taxonomy, Carl Linnaeus, and his student Johann Christian Fabricius gave colonial settlements' specimens Latin names. Fabricius mistakenly identified the first *Eciton burchellii* soldier as *Formica hamata: formica* is the Latin term for ant; *hamatus* means 'hook-shaped' (Kronauer 2020, pp. 26–27). The British then journeyed to the Neotropics between the 1840s and 1870s – the period when Alfred Russell Wallace and Charles Darwin developed their respective theories of natural selection and evolution (Sleigh 2001, p. 42). Among these explorers were Henry Walter Bates and Thomas Belt, who came across army ants and described them in imperially inflected tones "clustered around colonial themes" that arguably contributed to their personification as armies in the West (64). It was not until 1842 that the first male army ant was collected in Brazil by John William Burchell, and subsequently identified as *Labidus burchellii* at Oxford University (Kronauer 2020, p. 36). Competing revisions and renamings took place throughout the remainder of the nineteenth century, until the name *Eciton burchellii* was finally accepted in the records of scientific taxonomy (38). While the species carries the name of the Englishman Burchell, my speculation is that *Eciton* derives from the Latin *exitus*, which means moving away, discharging, escaping (Glare 1968, p. 645).

As stressed by army ant expert Daniel Kronauer, it is a "convoluted story of how the magnificent swarm raider *Eciton burchellii* ended up with the incorrect scientific name" (Kronauer 2020, p. 38). This notion of convolution illustrates the need to escape the contrivances of formal science when names and observed behaviours get tangled up in formalities which do not take into account local languages or situated forms of relationality. In this sense, my artistic operations follow Sarayaku's convoluted process of becoming coiled around life-forms in motion, like *tamya añanku*, which resist Western epistemological capture. Convolution is by no means a faithful rendering of Sarayaku's dynamics of community-weaving, but in terms of turning to the rhythms of others, it provides a way of appreciating the twists and turns of lives in Amazonian worlds. In tactical ant media, convolution turns into a technological artistic conduit (Auson 2019), a process for whirlpooling Western concepts, bringing forth "what has been made invisible or devalued by the modern-colonial order" (Mignolo and Vazquez 2013, p. 3).

Taki and *tiam* operations: attending to invertebrate nomadic performances

Thinking with *taki* and *tiam*, the nomadism of rain ants turns into collective waves of invertebrate bodies amping up an increasing resonance, similar to that of raindrops interacting with the skin of the forest. In Sarayaku, rain is an oscillation of energies, arguably a nomadic performance of life and death itself. It is vital but can also be destructive, causing floods and increasing river currents. The Sarayaku people attend to rain correlations of water rising from the rivers, and rain ants crossing into their lands. They welcome *tamya añanku* because they exterminate unwanted insects that feed on their crops and infiltrate their homes. "*Tamya añanku* move faster than the rain," Hilda, the first woman to hold the position of Tayak Apu, told me when I asked her about the origin of the Kichwa name (Hilda 2019). By attending to her perceptive remarks on *tamya añanku*, an encompassing oscillatory character emerges entwining rain with rain ants in the rainforest.

Ants perform what is known as grounded running or six-legged oscillating contact with the terrain (Reinhardt and Blickhan 2014, pp. 2367–2369). This exemplary locomotion of terrestrial insects enables a particular sensorial ability to pick up resonant signals across the terrain. Each ant's exoskeleton, primarily composed of chitin, is in itself a resonant body covered with hair-like sensitive receptors known as sensilla (Kirksey 2015, p. 21). The sensitivity of these receptors allows ants to decode changes in temperature, particular volatile chemicals, and immediate vibratory variations (Auson 2012, p. 69). As I have shown in my previous artistic work, ants from the genera *Atta* and *Acromyrmex* sense vibrations with their legs and bodies, and produce these using specialised corporeal organs (Auson 2012). The vibrations oscillate in variably low frequencies and can be amplified using piezoelectric sensors. In Sarayaku, I used these sensors over rain ants' trails to trace what Karen Barad has called "patterns of differencing" (Barad 2007), which, in this case, operate through media experiments *in vivo*, at the site of ant motions. Piezoelectricity is the transduction of physical differentials into

Figure 2.2 *Difference/Diffraction*. Kuai Shen. 2020. Top: nest of *tamya añanku* found in a fallen tree, showing ants interacting with a force sensor connected to a Raspberry Pi. Middle: data from the sensor, basically resistance variations, were processed with Touchdesigner software to visualise a fabric using texture and surface operators. Bottom left: bark spectrogram (range 200–7000 Hz) of ants walking around a piezoelectric disc – time snapshot of 0.3 seconds from original recording of 90 seconds' length. Bottom right: ants moving, biting, and dragging their stingers on a piezoelectric disc; two can be seen carrying parts of dismembered ants.

Source: Courtesy of the artist. © Kuai Shen.

electrical waves; vibrations make the ceramic layer of the piezo disc oscillate, generating electrical currents which can be amplified as airborne sounds. With this technique I amplified the cross-scale rhythms of organisms and artefacts, generating interferences, inciting ants to inspect, pull, or just run over these assemblages.

While following *tamya añanku* across Sarayaku, I also enlarged my reflection on the rainforest as a landscape of acoustic resonance. Sarayaku possesses an authentic sonic character and 'soundmarks' that define a distinct place and community (Schafer 1994, p. 13; cf. Ingold 2007a).[6] Sarayaku's soundmark is composed of motorboat drones, drums, the *piwano taki*, and the laughter of women and the shouts of men, all of which resonate from the leaves of the canopy. From the perspective of *taki* and *tiam*, the acoustic resonance of Sarayaku is produced by bodies in motion, including ants, turning to the rhythms of a medium in-formation. As Kronauer puts it: "the crackling of one million tiny feet closing in on fleeing insects that scurry through the leaf litter sounds like a constant drizzle of rain" (Kronauer 2020, p. 151). Rain ants are intimately interwoven with the agencies of the rainforest. However, a death spiral – or suicidal ant mill Schneirla (1971) – occurs when heavy rainfall washes away pheromone trails, cutting off a group of ants from the rest of the migration. When the rain finally ceases the separated ants will try to find the lost trail by forming prolonged centripetal swarming circles as they follow their own pheromones until they all eventually die from exhaustion (Schneirla 1944, pp. 8–9). However, Kronauer remarks that the death spiral is an artificially enacted phenomenon that emerges "only in featureless man-made environments" (Kronauer 2020, p. 116), when ants cross over to non-natural roads or sidewalks, such as those in tropical research stations. There is here a potential connection to the performative concept of *tiam*: as Schneirla (1944, p. 17) highlighted, in the absence of natural ground, the "chemo-tactual" responses of these ants forces them to turn to follow themselves. In other words, there is an intimate relation between the ant body, the forest topology, and the agencies of rain. Their invertebrate capacity is attuned to the material entanglements of the rainforest, demonstrating that living ties are woven between forms in motion and organic matter. The spectrum of rhythmic motions of *tamya añanku* aligns with the vibrant composition of the rainforest territory, and *taki* and *tiam* coil in a maelstrom of life and death through evanescent inverted transformations.

Bivouac: an inverted social fabric

Both the human community of Sarayaku and *tamya añanku* enact place-making practices that generate vital rhythms and resonances which contribute to the weaving of Kawsak Sacha as a living forest. As Franco (2019) noted: "we learn from the diverse behaviours of animals in the forest because external hierarchical models based on capitalism do not rhyme with our reality". Inspired by this insight, I claim the spectrum of rhythmic motions of *tamya añanku* rhymes with the reality of the Sarayaku rainforest. It is a performance characterised by invertebrate choreographies and discharges of volatile chemicals, mediated by pheromones and

Figure 2.3 Clemencia's *Life Spiral*. 2019. In marked contrast to Schneirla's (1971) notion of a suicidal ant mill, the talented Clemencia wove a special *mukawa* (earthenware drinking bowl, hand-woven with forest clay) that depicts *tamya añanku* huntresses returning to their mother in the living nest. Her vision is an emblem of *tiam* and Sarayaku's community-weaving practices in relation to the turning motions of Amazonian worlds.
Source: Photograph by Kuai Shen. © Kuai Shen.

tactile intimacies that synchronise and syncopate with Amazonian worlds. From the perspective of *taki* and *tiam*, *tamya añanku* can sense when to turn their bodies into a tensile fabric for covering gaps in the terrain to smooth ant transversals. Inbound ant hunters, with captured prey, follow the middle path, while outbound ants run along side lanes. Computational models visualise this as an efficient, self-organised traffic, in which the flow is dependent on the ants' ability "to detect others and the rate at which they turn during avoidance manoeuvres" (Couzin and Franks 2003, p. 141). Yet, based on *taki* and *tiam*, I see this as a choreography of invertebrate bodies in which collisions occur, but are rather taken as stimulating corporeal intimacies.

At the break of dawn, "pushing parties" (Schneirla cited in Kronauer 2020, p. 89) roll out like a viscous fluid, turning inwards and outwards, weaving an invertebrate fabric in motion. At times, streams of ants carrying inverted larvae can be seen – the labial glands of the larvae in close proximity to the ants' mouths. During this mode of transportation, the larvae are lowered and raised intermittently against the trail surface. This is the pupation stage when the larvae secrete silky substances for weaving cocoons, which must be spun onto a substrate. Cocoon-spinning is a performance of turning motions – ant larvae spinning cocoons, metamorphosing, and finally turning into adults. On the one hand, this performance is a manifestation of attunement and care, as the adult ants nurture and protect the offspring. On the other hand, it draws attention to another intimate and necessary connection between *tamya añanku* and the rainforest, as the ant larvae need to integrate detritus from the organic Amazonian terrain.

When the larvae begin their cocoon-spinning performance, the intensity of migrations progressively decreases and the ant mother with a swollen abdomen begins laying eggs. At this moment, the metabolic rhythms of *tamya añanku* synchronise a transitional move. The ants weave a much larger protective cocoon that is suspended in inverted fashion inside a concealed rainforest interstice. This living shelter is known as a bivouac, a word that derives from the German military term *Beiwacht*, which means taking turns to guard an encampment (Bradford 2017). Yet, seen from the grounded perspective of *taki* and *tiam*, this ought to be perceived as an inverted social fabric. Popularised by entomologists and insect lovers, the word 'invert' is a friendly alias to refer to an invertebrate. In my work, I inflect invert/ed/ing to highlight relational pathways between the worldling capacities of ants as invertebrate beings and the performative agencies of *tiam* for turning perspectives around and upside down. The inverted social fabric shows fluid entanglements and shape-shifts in place. It gives birth to new ants emerging from their cocoons while spitting out raiding parties that forge relations with other life-forms – organisms that are attracted to living in close proximity to ants and are therefore scientifically described as myrmecophiles or 'ant lovers' (Rettenmeyer et al. 2011). These creatures range from antbirds that memorise nest locations and feed on fleeing insects (Swartz 2001) to rove beetles that mimic the ants' morphology and chemical profiles by constantly cleaning and rubbing against their exoskeletons (von Beeren *et al.* 2018).[7] My approach to appreciate the bivouac as an inverted social fabric is an acknowledgement of the following conclusion: the nomadic lifecycle of army ants can be abstracted from the dimensions of the rainforest, understood through scientific methods, and modelled by computer simulations. However, *tamya añanku* manifest an extraordinary invertebrate sentience, weaving social fabrics on the run – deterritorialising, reterritorialising, and turning life over and around. These social fabrics are intimately entangled with the vital rhythms of the rainforest. *Taki* and *tiam* in the rhythms and movements of *tamya añanku* offer a situated appreciation of Sarayaku's Kawsak Sacha, the living forest, as a cosmos of more-than-human relations.

Figure 2.4 RRR^R. Kuai Shen. 2020. A basic living passage: two *tamya añanku* cover a hole to ease the traffic flow of other ants. Created using machine-learning algorithms based on convolutional neural networks, transferring an image of laser beams projected onto the forest soil to style the original photo. This process enhances intricacies of the substrate and the hairy receptors on the ants' bodies.
Source: Courtesy of the artist. © Kuai Shen.

Conclusion: movement weaving rhythm weaving movement

Interacting from the Sarayaku perspective with the social forms created by rain ants implies aesthetic, ethical, and ecological challenges in re-evaluating adequate performative languages that can account for Amazonian forms of knowledge and promote countercultural community-weaving practices. Inspired by the Kawsak Sacha land-based ontology, I used technologies and epistemologies to deterritorialise army ants from scientific enclosures and colonial legacies. Guided by *taki* and *tiam*, I attempted a transversal exercise of convoluting dissent that repurposes the status quo of the Western discursive and technoscientific apparatus to generate an alternative knowledge about army ants in relation to the territorial practices of the Sarayaku culture: army ants turn into rain ants, and the bivouac turns into an inverted social fabric woven by a spectrum of rhythmic motions. This transversal operation shows that a more-than-human world is brought into life through ongoing performative turns of movement weaving rhythm weaving movement. Notwithstanding, enacting a transversal fieldwork in Amazonian rainforests comes with its risks and responsibilities. Artistic practices such as mine require ethical and aesthetic repositionings in order to account for knowledge extractivism, cultural appropriation, and the deepening of colonial wounds (Gómez-Barris 2017, p. 42). In this regard, the Sarayaku concept of *tiam* is a reminder that perspectives can and must be changed. This sensible awareness is possible when one is immersed in the Sarayaku world. However, endeavours such as mine require artistic compromises and attention to the overuse and misuse of technologies that might displace

active community practices and grounded interactions. Transversality is a method of breaking away from disciplinary constraints opening onto other possible weavings of knowledge-making practices. Scientific methods and technologies ought to be open indeed, not in the sense of free-to-use applications that are already available, but rather shared in complicit interaction with communities across the Amazon, so that they can understand them and amplify the sovereign knowledge they possess *in situ* and in creative ways. In a world of pervasive technologies, where human authorship and distributed agency are increasingly mediated by machines and algorithms, inevitable transculturation processes are occurring in contact zones where epistemologies cross (Pratt 1992, p. 6). Artistic practices that use machine-learning algorithms and Western-based media to sense the nonhuman world need to be woven with earthly entanglements in order to remain attentive to how inventive approaches can be carried out ethically. With this in mind, my tactical mediation with rain ants performed a diagrammatic deterritorialisation of data away from technoscientific quantifications, affording creative reinterpretations and materialisations aligned to the ontological boundaries of Kawsak Sacha: a different sonic–visual–social fabric of human–ant relationships, one that resonates with a spectrum of rhythmic motions.

Notes

1 These nomadic discourses provide rich epistemologies for resisting immobilisation, space, time, and corporeal categorisations. However, they are out of sync with situated Amerindian perspectives and do not do justice to the history and land-based ontology of Sarayaku. Correlations worth mentioning are the nomadic war machine as a tactic for resisting enclosures and subordination, and nomadism as an intense mode of distribution in a smooth space without borders (Deleuze and Guattari 1987, pp. 380–382), as well as becoming a nomad synchronised by multiple differences and interrelational forces (Braidotti 2005, p. 11).
2 The march of 1992 is known in Kichwa as *Allpamanda, Causaimanda, Jatarishum*.
3 Tayjasaruta is a Kichwa term created from the words *tayak* (the first wise elders), *yuyayta* (spiritual strength to live in harmony), *jatachik* (cultural identity), *Sarayaku* (maize river), *runakuna* (people with cultural and ethical principles), and *tandanakuy* (unity to defend indigenous rights).
4 By tracing these stories and framing my artistic study within *taki* and *tiam*, I am honouring the situated and tactful sensitivity of the Sarayaku people towards weaving relations with the rainforest. I want to revitalise long-neglected community values of Amazonian knowledges, which are still overshadowed by aesthetic, scientific, and colonial legacies (Mignolo and Vazquez 2013).
5 It compromises a creative process that is different from scientific methods because it results from interventions and interferences not in controlled environments but in the world of ants, which is beyond human control.
6 Soundmark derives from landmark. Inhabitants of a particular place are able to make sense of these sonic symbols, which in turn enables their demarcation of – and identification with – the place's social dimension (Schafer 1994, p. 13).
7 The extensive topic of myrmecophilous associations is part of my ongoing artistic research. However, the subject deserves a broader treatment than is possible here, so I will present it in a future instalment of this project.

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