

The Rain Ants of Sarayaku

by

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MA Media Arts, MA Game Design

Submitted in fulfilment of the requirements for the degree of
Doctor of Philosophy

Deakin University

October, 2022



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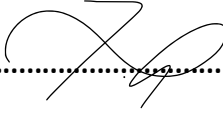
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List of Publications

Kuai Shen. 2022. "Metabolic rhythms of fungus-farming." *Antennae: the Journal of Visual Culture*, Issue 58, Summer 2022: 76-87. <https://www.antennae.org.uk/>

Kuai Shen. 2021. "Turning around and upside down." In *Distributed Perception: Resonances and Axiologies*" edited by Natasha Lushetich and Iain Campbell, 31-48. <https://doi.org/10.4324/9781003157021>

Kuai Shen. 2020. "Taki, Tiam and the Nomadic Rhythms of Rain Ants." *Art+Australia Journal*, Issue 8, Multinaturalism: 134-139. https://sites.research.unimelb.edu.au/__data/assets/pdf_file/0009/3639429/Aa-Multinaturalism_lowres_FINAL.pdf

Kuai Shen. 2019. "Tactical Ant Media: Amplifying the Invertebrate Aesthetics of Ants Using Transversality as an Artistic Process." *Society and Animals Journal*, Vol 27 (7): 678-696. <https://doi.org/10.1163/15685306-00001842>

Acknowledgements

Pagrachu! First and foremost, I thank the people of Sarayaku. I acknowledge their culture and vision. They welcomed my presence and artistic forays across their living forest. They gave me the opportunity to experience the beautiful alterity of their life. I also acknowledge the multiple beings and territorial dwellers of *Kawsak Sacha* and *Sumak Allpa*, who allowed me to be in motion amongst them.

My intellectual creativity comes from being inspired by how Sarayaku comes to terms with technologies, and how younger indigenous generations manage to locally produce community-led content about their situated worldviews. The people of Sarayaku are actively engaged in digital media production, films, and documentaries. Constantly circulating photos and videos through different social media channels, the people have learned to use simple technologies but are opening to more complex computing practices. I learned to respect the ways they work with technologies, especially, because their objective is clear: to amplify their sovereign culture and community practices for tending to forest beings who are alive because of the indivisible human and nonhuman relations interwoven within their fabrics. In this regard, one local filmmaker has achieved international acclaim with his cinematography about resistant territorial practices vis-a-vis environmental catastrophes and political injustices. I acknowledge Traya, publicly known as Eriberto Gualinga, who has produced influential films about Sarayaku. Two of his recent films will be revealed in a discussion in Chapter Four (page 118) about the inspirational local notion of ‘the turn’ as a creative metaphor and method in my practice.

Overall this practice-led research underlines local performative notions in Sarayaku, and culminates in a multi-sensory exhibition about very unique ants. My artworks, however, will not be shown in the typical fashion, walled within a gallery. The exegesis exhibition will take place in my studio located in Cologne, Germany, where, since 2010 I have been creating with ants. I mention this beforehand because the building and area around my studio have undergone a gentrification process throughout eight years, and with many up and downs. The site you will be entering is a special shelter of creativity for hundreds of artists, We have resisted being vacated by a real estate giant. The Kunstetage is an interstitial gem with twenty-eight years of history hidden now behind rubble, upturned concrete, brand new hipster offices, a club venue, and reconstruction scaffolds. I want to

acknowledge my small artist community amidst this chaos of urban postmodernity, as it is here where all my thinking took place, and where the rain ants will come to life.

My love to my family: Antje, Mika, Maël, Thea, Gitti, and Kurt. I am immensely grateful to them because without their warmth and unconditional support in the most difficult times of this journey, this PhD would not exist.

Finally, I want to acknowledge the thorough supervision of Eben Kirksey, David Turnbull, Cameron Bishop, Jondi Keane, and the proofreading done by Kate Hall. Thank you. Your patience, countless hours of reading, your guidance and feedback, helped me shape my ideas.

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“It was raining outside and they came to clean the house. They climbed to the thatch, 'corriendo patas arriba' (running upside down), and you could see from underneath the roaches fleeing, the mice running away, and bats flying, making noises, lamenting. They come, eat, and then they leave.”

(Hilda, May 11, 2019)

Prelude

This artistic study exercises a reevaluation of army ants from the situated Amazonian perspective of the Kichwa community of Sarayaku. Despite undergoing political territorial conflicts, this community remains strong. Though their culture has been devalued and underrepresented by the social complexities of colonial legacies in Ecuador, the Kichwa people of Sarayaku maintain their culture and their connection to the land. My practice-led research, carried out across the different settlements of the Sarayaku territory, sought to amplify the tensions and material sensibilities which characterise a fabric of human-forest relations. Inspired by local community practices based on weaving and informed by the people’s sociopolitical and ecological perceptions, army ants overcome militaristic analogies and become messengers. I followed ant trails looking at their social formations as performances, conceived as such through my personal appreciation of invertebrate movements and rhythms. The artistic results of my practice are exhibited in a multi-sensory installation composed of videos, sounds, algorithms, vibrations, electronics, and olfactory compounds, the documentation of which you can access [here](#). Overall, the work I conducted in the Sarayaku rainforest, and the experience I gathered, propose to assess army ants beyond scientific explanations.

In Sarayaku, army ants are known in the local Kichwa language as *tamya añanku*. *Tamya* means rain, and *añanku* means ants.¹ Crossing paths with them, or perceiving the sounds they make, announces the advent of rain to the Sarayaku people. For them, *tamya añanku* are rain messengers. *Tamya añanku* are always on the move, turning life over, and turning their bodies into living shelters and bridges over water and terrain irregularities. This identity as rain messengers contrasts

¹ An attached glossary is included as reference and lists concepts and Kichwa terms in detail (page 206).

with colonially biased scientific practices that classify their behaviours using militaristic analogies. Beyond scientific definitions, their movements and rhythms convey local meanings that imbricate “material practices of territorialisation, deterritorialisation and reterritorialisation” across Amazonian worlds (Deleuze and Guattari 1987; Wallin 2020: 105).

The burning question driving this research is: how to overcome representational practices, knowledge appropriation, and the exclusive dialectics of a hegemonic vision that has ascribed meanings via a logical system which is distant from local knowledge-making practices? My initial aim was to focus solely on ants. However, the constant interest of people in what I was doing, their generosity to engage me in conversations and invite me to drink when I passed by, turned my ant forays into frequent routines characterised by lively interferences and extended conversations in the middle of the rainforest. Above all, the immersive atmosphere of community which is distributed through their kind actions and continuous transit across places, informs a practice that seeks to turn perspectives around to value other forms of interacting and understanding ant worlds. In this respect, I knew I had to reframe my thinking and process of research. Instead of giving in to the habitual desire for “authorship of objective knowledge from above” (Haraway, 1999: 592), I needed to follow an inverted trajectory and find a path toward understanding ants differently from a situated perspective. Thus my practice weaves a different human-ant story from the grounds of a place where, outside rational linguistics, social performances of kin and kind become part of the territory. In this place, territorial relations are in constant motion, enabling a process of becoming coiled and entangled with subjects which are complex and difficult to follow.

Tamya añanku continuously move to new grounds, alternating fluid corporeal performances and weaving themselves with the territory. These ants are described as nomads in scientific literature, but I saw their invertebrate movements and rhythms as weaving performances. These performances were recorded in video and registered with sensors and contact microphones. Preceding and following the oscillating forces of rain, these ants signal moments of change for the people and impact ecologies. People regard them with respect. As hunters, their work is valued for cleaning houses from pests when they cross into human territory. In peoples’ dreams, they turn into messengers of territorial conflicts. Encounters with *tamya añanku* symbolise different possibilities. They announce the rain, clean houses, serve as figures of military incursions, or can become symbolic of extractive enterprises when they are seen hunting insects out of their burrows. The

variable antagonism of their messages is part of an entangled yet fluid world of territorial values, brought into life by the ongoing weaving of tensile relations with the world outside this rainforest.

Weaving is a local human practice in Sarayaku that creates tensions in the fabric of materials and the fabric of interspecies relations. Tensile relations also ensued in the ways I operated my technological apparatus of mediation with *tamya añanku*. The tech tools I put together to inspect the behaviour of these ants submitted to the great influence and conditions of a cultural and ecological environment that underscores different social ways of being and thinking with significant others. My media assemblage aimed to be non-extractive. However, in deep reflection, I reckon the technologies and electronic artefacts I brought into Sarayaku work because of the raw components extracted from mining operations; they function according to a capitalist system of industry regulations and blueprint designs enforced by European and Anglo-American standards. Additionally, sensors and computing processes inevitably enact a form of extraction: images and sounds are registered, stored and compressed, through a binary process that digitises physical world interactions. The results of these abstract processes are given value according to foreign capital cultures. I needed to challenge my media assemblage and the extractive, inherited processes it enacts. I needed to realign my technological apparatus of mediation to local worldviews and community practices. As I will demonstrate, I managed to do this alignment by working with local concepts to develop a novel methodology that re-evaluates media practices between arts and sciences. Yet, the outcome of my interspecies mediations, and the visibility I brought to this different world of human-ant relations, must be evaluated by the people of Sarayaku. They have to decide if the practice I created benefits their local territorial values.

Thus the task in my hands was difficult. Humidity, sudden rainfalls, and muddy grounds caused my electronic assemblages to malfunction. I was stung many times. Metaphorically speaking, my brain was stung many times too. Those moments of pain allowed me to think with ants as part of their chemical fluids penetrated my skin barrier, coalescing with my physiological self. Ant stings create spots of inflammation that are sensational and unique. The pain quickly amplifies, but it is bearable, sometimes burning, sometimes anaesthetic, even enjoyable, depending on how many stings one is willing to take. I think within that threshold of pain exists an understanding of tactile and sensory differences, which means recognising humans and ants have different skins, different chemical receptors, and different ways to feel the world. Yet, it is this awkward unpleasant feeling of being stung, which tells us we share a world together. Those encounters and skin negotiations with ants

conveyed moments of clarity, however, which allowed me to find my place in this Amazon world. Carrying a backpack full of audiovisual tech and electronics, I placed myself in Sarayaku to perform with ants, as they performed with the rainforest. I interfered in their lifeworlds, as they interfered in the lifeworlds of other inverts. I understood that amplification and interference were not exclusive to human-made media, but are operations enacted by ants too. In this practice-led research, amplification and interference became my initial and essential audiovisual operations to create novel performative interactions with ants that reveal alternative knowledges and interrelations.

I have always admired ants. I have created audiovisual installations that problematise scientific and artistic modes of knowledge about the ant world, proposing to look at them as communities and not as colonies; communities that create opportunities for other species to flourish. During the past twelve years, this ethos has matured into an ongoing learning experience seeking to explore alternative forms of human-ant relationships that contrast to conventional representations of ants within dominant research imaginaries. This ethos is also affected by my Ecuadorian origin and experience growing up in a polarised country, which I saw co-constituted by multiple creators and creatures creating practices of resistance against imposed political, social, and moral structures. In these troubled ecological times, I have developed a radical affection to see ants as figures of resistance and subversion. Relevant studies have revealed a worldwide decline in insect diversity, particularly in natural protected areas of industrialised countries (Hallman et al. 2017; Sánchez-Bayo and Wyckhuys 2019). However, ants do not figure as potentially endangered species, rather several species have made it into the list of the most globally invasive (Global Invasive Species Database 2022). Defiant and concealed from human sight, ants form invertebrate communities with significant others to conspire with the earth (cf. Choy and Zee 2015). They have travelled around the planet becoming keystone species for monitoring global warming (Cordonnier 2021). They could be considered eco-engineering communities, terraforming rebels who change biodiversity and topologic compositions. In general, their cosmopolitan territorialisation of the planet is a worlding agency for microbiota dispersion, seed distribution, and soil regeneration (Leong et al. 2017: 6).

Ants and their kin inhabit worlds underneath capital surfaces of the Anthropocene. Ants maintain intimate relations with myriad invertebrates mediating forms of resilient life, tunnelling through concrete across urban households and geopolitical boundaries. On one hand, their ecological performance cannot be disconnected from the geopolitics of the human world. On the other hand,

ants cannot be rendered valuable just by looking through the scientific lenses of Eurocentric and Anglo-American institutions or authors. My artistic aim was therefore to develop a creative practice, which inspired by weaving and tension, deterritorialises army ants from scientific encapsulations. With this in mind, my practice-led research seeks to demonstrate that lifeworlds in motion, like that of *tamya añanku*, can be better understood through territorial practices and community knowledges of the peoples who co-inhabit places with them.

For this exegesis, my work aligns with the situated knowledges of the people of Sarayaku. Guided by the people's spirit of resistance against impositions of *el mundo occidental*, what the Sarayaku refer to as the 'western world,' I took upon this project abiding as close as possible by their language and worldview. Between 2019 and 2020, I was welcomed in Sarayaku to set in motion a transversal practice with *tamya añanku* using cameras equipped with macro-lenses, audio recorders connected to contact microphones, and a variety of electronic sensors wired to micro-controllers and micro-computers. The interventions and audiovisual mediations I introduced in the world of *tamya añanku* build up from a long-standing experimental practice of using tech and hardware otherwise, from my position as mediator of alternative experiences about ant worlds.

I came to the Sarayaku Amazonian territory, because the undertaken artistic work and research I have been doing during the last twelve years with different species of ants taught me to be more responsible and ethical in my practice. Aware of the geopolitical tensions and unresolved conflicts between indigenous nations and capital powers in my birth country, Ecuador, I wanted to bring my view and understanding of ants to the Sarayaku community to contest, improve, or radically change the ways I have been mediating alternative ant worlds: from culturing leaf-cutter ants and their fungus in vitro, to amplifying their vibratory messages when they work and socialise in artificial terraria augmented with surveillance cameras and computer vision, I came to Sarayaku to exercise a better ethical form of tactical mediation, in which my intentions and technological apparatus of amplification had to adjust to the ecologies of ants, to the terms and conditions of indigenous cultures, and the situated complexity of operating technologies while immersed in the rainforest.

From this position, I began following *tamya añanku* by critically attending to sociopolitical and ecological underpinnings of life by the Sarayaku people. I repositioned my practice and ant love onto Sarayaku grounds, conditioned by knowledges for weaving territorial relations with forest and lands: on the one hand is *Kawsak Sacha, the living forest*—from *kawsay*, life, and *sacha*, forest; on

the other hand is *Sumak Allpa*, a good land and soil without evil—from *sumak*, meaning goodness, kindness, and beauty, and *allpa*, meaning land, earth, or soil. These knowledges primordially guide an ontology of place-making practices with earth beings (de la Cadena 2015). As I will show, *Kawsak Sacha* and *Sumak Allpa* offered me the necessary dimensional insight into a situated ontology of forest-human relations, from where I was able to invert the scientific image of army ants and amplify the local significance of *tamya añanku* as the rain ants of Sarayaku.

Inspired and informed by stories, community performances, and territorial relations, I demonstrate that the relationship people have with *tamya añanku* is a relation to place. This human-ant relationship is woven in territorial forms through active place-making practices attuned to movements and rhythms that are distinctive of this rainforest. The perception people have of *tamya añanku* as rain messengers differs from scientific representations which portray them as army ants of the species *Eciton burchellii*: insect predators organised in castes, nomads swarming in colonies with queens and soldiers. When evaluated from the Sarayaku perspective, it is possible to invert that colonial construction.

Inverting represents the artistic methodology in my work. It signals the need to follow opposite directions, turn perspectives upside down, and develop creative alternatives that value other culture's ways of perceiving and interacting with ants. Inverting is materialised through artistic operations that deterritorialise army ants from scientific enclosures. These artistic operations use computational and electronic media guided by concepts in the Kichwa language spoken in Sarayaku, which describe community practices and performances. I particularly draw from concepts for radical turns (*tiam*), rhythm (*taki*), and weaving (*awana*). These concepts are key in my work. These and other Kichwa terms I will introduce throughout my exegesis need to be expressed, not in English, but in the original tongue of the Sarayaku people, to avoid misunderstandings of their potential decolonial values. *Tiam*, *taki*, and *awana* are conducive to the weaving of social forms that are tangible and transitory, creating relational ties with the rainforest and its lifeforms according to local, ecological, and sociopolitical perspectives. I will show that *tiam*, *taki*, and *awana* provide sustenance to exercise a creative disruption of colonial legacies implicit in the scientific representations of army ants. Furthermore, these indigenous concepts also enacted a creative disruption in my own practice. My methodology morphed into a decolonial practice of weaving. My technological tools were put to work for indigenous values in order to rip apart colonial ant

depictions and tie together new opposite relations between different disciplines and forms of studying ants.

I invite readers to think with ants across the space-time of this Amazonian world, a place to entangle oneself, which is woven through and through with a different social sensibility. Kichwa concepts and technological mediations combine in my work, like the indivisible notion of spatiotemporality—*pacha*—that understands the world from a grounded position in relation to the cosmos, to challenge colonially imposed logics and forms of perception. Humanity ought to attend to indigenous sensibilities and different community practices with respect and include them as key (f)actors in the shaping of future ecologies. I claim this is more necessary than ever if we are to unlock ourselves from rigid capital structures and mental encapsulations. Foregrounding indigenous ways of knowing and being is vital, in order to invert priorities and force repositionings that grant us a new vision in which lifeforms of the forest become part of worlding practices in community.

In the next chapter, I offer an introduction to the overarching concepts which set the tone of my practice-led research around Sarayaku values of community, movement, rhythm and weaving.

Introduction

Weaving is a performance enacted in community by kins and kinds. I build my methods based on this core understanding to transform army ants into the rain ants of Sarayaku. Rain ants are weavers who perform with the rainforest. With their bodies, they weave temporary shelters and living bridges. These corporeal performances of the invertebrate kind resonate with the community practices of the Sarayaku people. Acknowledging and being aware of the available wealth of behavioural, molecular, and ecological data derived from scientific studies on army ants, this thesis actively chooses weaving as a way of understanding these ants and their lifeworlds.

My aim was to overturn scientific explanations of army ants as colonies and nomads by using local indigenous concepts to guide my audiovisual mediations. In specialised literature, a militaristic and colonially biased language has been continuously employed to name and represent their social behaviour (Schneirla 1944, 1954, 1971; Rettenmeyer 2011; Kronauer 2020). Besides Charlotte Sleigh's cultural study on the colonial tropes ascribed to army ants through European optics (2001), this language has remained uncontested, and no artistic attempt has been done to critically disentangle scientific claims. I re-evaluate their invertebrate performances through territorial values, movements, rhythms, and above all, weaving practices of the Sarayaku culture.

Led by the knowledge bearers of Sarayaku, who offered me their invaluable stories, voices, and testimonies, I understood that movements weave rhythms, rhythms weave movements, and a world is being brought into life by weaving. This echoes throughout my exegesis. Sarayaku inspired and showed me that, in Kichwa terms, turns (*tiam*), rhythm (*taki*), and weaving (*awana*) are essential for generating multi-scalar fabrics of relational tensions with the rainforest to resist external hegemonies. I adopted these specific local concepts to instruct my transversal operations of electronic media. Seen through decolonial lenses of *tiam*, *taki*, and *awana*, I work on audiovisual, olfactory, algorithmic, and interactive mediations to turn army ants into *tamya añanku*, the rain ants of Sarayaku.

By elaborating on the sociopolitical weavings and underpinnings of life in the indigenous culture of Sarayaku, I break away from dominant life models and power dynamics that have constructed the army ants' natural history. The new knowledge of my practice-led research resides in setting up a novel methodology in which visual, electroacoustic, and algorithmic mediations are elaborated to amplify the ants' behaviours as weaving performances. These weaving performances trace indigenous worldviews that are opposite to European and Anglo-American social conventions and expectations of order and productivity.

My work favours a local human-ant relationship which is tied to an understanding of collective co-production of territories, in which the term 'community' includes other species. To further sustain this understanding of community, I draw from Eduardo Gudynas (2017). According to him, the Amazonian and Andean concept of community is essentially multiple, since other entities can be considered community members with their own agencies, rights, and socio-ecological values (Gudynas 2017: 267). Gudynas addresses a biocentrism of Amazonian-Andean communities moving at the ground level (2017: 268), whose performances are marked by a socio-ecological integrity of being in touch with earthly rhythms of renewal and death. This notion is rooted in the recognition that many species participate in the place-making of territories.

The recognition that life is not only human and is co-constituted by many other lifeforms is at the core of appreciating the ties being woven between multiple entities in the construction of shared territories. Gudynas' conception promotes an artistic work that helps me focus on ants as communities, not colonies, which are composed of multiple species and whose interrelated ties are, in the words of Deborah Bird Rose: "better imagined as entangled connectivities, as interweaving paths and footprints, as waves of life and death" (Rose 2013: 60). Although she wrote from a distant geopolitical location, I chose to borrow Rose's symbiotic proposition as it inspired me to align my practice alongside a situated Amazonian worldview that does not shy away from dealing with foreign intersecting and opposing forces; Sarayaku is a world in formation where emergent encounters are being "enfolded into entangled modes of coexistence" (Kirksey 2015: 3). Taking note of Rose and Kirksey's insights, I work towards highlighting contingent and multispecies territorial weaving practices as integral activities of common world makings.

By positioning myself and my audiovisual apparatus on Sarayaku grounds, I bring to light those gestures and movements, which are common to this Amazonian fabric of entangled relations. Thus

fabrics emerge as important figures in this exegesis. Fabrics are the tangible results of weaving performances which include opposition, tensions, permeability, mutual and antagonistic associations. The figure of a fabric as a heterogeneous composition beyond textile signification can validate two things: first, it leads to an appreciation of other senses and sensibilities in the materialisation of indigenous place-making practices and perceptions which have been segregated from the functional structures and knowledge models of dominant cultures; second, a fabric evokes a sensory experience of tensions as elementary in the weaving of territorial relations. The figure of a fabric allows me to appreciate the creative and resilient world-making capacities of other species like rain ants. I envelop my practice with fabrics. I tie new knots and disentangle others to develop a transversal practice (Guattari 2000), which moves between environmental humanities and myrmecological studies, activating a transdisciplinary work between art, science, and technology. My way of operating starts at the boundaries between colonial and indigenous representations, but explicitly takes the turn towards following a decolonial and ethical imperative to foreground indigenous biocentric caretaking practices of what Ecuadorian sociologist Pablo Ortiz calls a “territoriality from underneath.”



2

The territoriality from underneath of Sarayaku

² Image from video documentation of an inverted nest of tanya añanku showing a thread of ants disentangling from the nest. A green laser of 533 nm wavelength illuminates hidden bodies concealed inside a fallen tree.

The territoriality from underneath, mentioned in Pablo Ortiz's literature (2016: 191, 196), briefly refers to the techniques and social practices for land cultivation of Kichwa nations in the Ecuadorian Amazon. Ortiz uses this concept only a few times in his cultural and sociopolitical analysis of the history of Kichwa nations struggling for territorial sovereignty. The territoriality from underneath is invoked in his work as an explicit opposition to the racist typification of indigenous life as peasantry by the class elites of Ecuador. Pablo Ortiz employs "*la territorialidad desde abajo*" (the territoriality from below) to indicate reterritorialisation practices which might seem ordinary, but which begin from the ground up to care for the vitalities of forest lands at large; spatiotemporal expressions of freedom and autonomy which have been exercised for as long as indigenous nations have been inhabiting these Amazonian worlds (191).

These practices are exercised with care and responsibility, valuing the cultivation of 'places' over 'spaces' to protect and maintain Amazonian forests. The territoriality from underneath of Kichwa nations contrasts to "the coloniality of space" (Ortiz 2016: 196) of capitalist governments and enterprises which seek to control resources from distant, disentangled, positions. Whereas the notion of space is uniform and structured, predefined by straight divisions that compartmentalise relations and actions, places are understood as being open, alive, and entangled in reciprocal practices, where boundaries are not fixed but blurred, in which growth and decay overlap. Places are characterised by resource-sharing and the cultivation of interspecies relational ties, in which human identities are rooted in and among the complex meanings of territorial negotiations with others (Uzendoski 2008: 24).

The Kichwa understanding of time and space is different. The value of cultivating places over spaces is encompassed in the Kichwa notion of spatiotemporality, *pacha*, which means "everything that exists anywhere" (Kinti-Moss and Masaquiza Chango 2018: 110). *Pacha* is the experience of being in a place in relation to the cosmos in which space and time cannot be divided. In Sarayaku, this is constituted by three dimensions: *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 are interwoven according to the collective voice of Sarayaku, so "separating them is like removing a heart from its body" (2014: 89). Sarayaku people cultivate forest relations that try to adjust to the phenomena of these three worlds. However, Ortiz's concept of territoriality is not sustained on *pacha*. Ortiz frames the territoriality from underneath to describe

Amazonian place-making practices of land cultivation that have been resisting colonial legacies, territorial dispossession, and politics of extractivism (Ortiz 2016: 188, 195). Ortiz hints at an encompassing mode of life that needs defending from ideas about the rights of nature and conservational policies originating from distant geopolitical powers at metropolitan and cosmopolitan centres.

In my work, I choose to reinforce Ortiz’s territoriality from underneath by invoking the concept of *pacha*. With *pacha*, I elaborate on a territoriality composed of interwoven worlds, from where one can make sense at the ground level of the territorial contributions of other land-dwelling communities. I propose to use the territoriality from underneath as a concept for understanding the ecological performances of rain ants in relation to the sociopolitical situation of Sarayaku. In this respect, I connect the territoriality from underneath with the nature of looking at ants as terrestrial insects, land-dwelling societies, invertebrate communities that participate in the weaving of territories, in processes of transformation and renewal across dimensions. In this sense, in the territoriality from underneath, place-making practices of ants and humans are forms of *worlding* — the active, careful, and responsible entanglements in lifeworlds of significant others to create interwoven fabrics of relations; this term is inspired by my reading of de la Cadena (2015), Escobar (2016, 2018), and Haraway (2016), and I take it along my journeys to properly address rain ants as territorial weavers.



3

³ Left: hand digging into the soil to harvest the tuber known as yuca, *Manihot esculenta*. Right: a corporeal bridge made of ant bodies to ease transit flow has been improvised on the soil litter.

Forms of worlding in Sarayaku are characterised by tactile interactions with soil and clay, corporeal reciprocities and collective performances in constant relational dialogues with lifeforms which cross between worlds. My invocation of the territoriality from underneath foregrounds the need to descend into an ant world which is in continuous contact with the organisms responsible for earthly processes. Therefore, I employ the term ‘underneath’ to point to the values of looking at rain ants underneath constructed knowledge impositions and models of the Anthropocene that have abstracted ant behaviour using colonial optics. With this in mind, the territoriality from underneath is a place for decolonising knowledges, a place in which weaving performances can be understood beyond the species barrier in the creation of territorial relations with this rainforest. The weaving performances of rain ants are brought into being by radical turns and rhythmic expressions, which I documented using a set of audiovisual apparatuses that were made portable and which I carried during my excursions across Sarayaku (Chapter One, *Inverting operations*, page 50).

First, I begin with *tiam*, which means a radical turn. *Tiam* manifests through opposite motions, performances marked by circulations, convolutions, and spiral formations. Secondly, I engage with *taki*, the Kichwa word for rhythm, which is also employed to refer to songs and tunes, including the sounds of the rainforest. Thirdly, I look into *awana*, which means weaving: refined tactile skills and sensibilities for reading and transforming rainforest materials into social vessels. Finally, I discuss how *tiam*, *taki*, and *awana* come together in recurrent social practices of community labour that reinforce people’s territorial relations with this place: *minga* is a traditional form of labour rotation and cooperation for building houses, field pruning, or for achieving any goal or necessity that requires team support, which is traditionally followed up by celebrations.

Tiam

Tiam is a local term only employed in Sarayaku which has a distinctive situated meaning. In the words of Tupak, the leader of the community council since 2020, *tiam* means turning around to radically change trajectory and perspective. Turning with rhythm leads to weaving, but also to tensions, in the fabrics holding ecological, sociopolitical, and cultural relations in place. Performances characterised by turning with rhythm constitute the basis for understanding a community-led biocentric perspective which imprints collective memories on forest lands and

weaves territorial relations with significant others.

On an early drizzling Saturday morning, at quarter to five, Tupak told me: “*Tiam upinge teande*, have you not heard? I mean, I have always been talking about *tiam*. *Tiam* is change. We have been seeing wrong. *Tiam* is a radical turn” (2020). Squatted next to the bonfire, he recited a line from his *tiam* song: “*un giro de 360 grados para salvar el mundo lo mas sagrado*—a 360 degrees turn for saving this much revered world.” After blowing into the incandescent wood logs, he drew a circular form with his finger and continued, “*tiam* is the beginning, and also the end.” Tupak's circle referred to an overturn of established powers, a way to turn impositions around, those life models projected by the lenses of Eurocentric and Anglo-American cultures.

Based on Tupak's insight, *tiam* is embodied in physical movements of turning around, but it also symbolises the notion of returning to the roots or place of original thoughts. As a term symbolising radical turns, *tiam* clearly describes Sarayaku as an Amazonian world where cultural resistance is important: a world in formation, where thoughts, matter, and beings become interwoven, tied, and entangled. According to Tupak, *tiam* can be used in daily contexts to describe the turning of the hands in handcrafting baskets and earthenwares, or instances of turning in the opposite direction when looking for something, turning around to find the way back, or finishing one's drink in a single, bottoms-up move (2020). He further explained that the origin of *tiam* came from his father, who then taught Angun. During Angun's period as leader of the council, between 2012 and 2014, he strongly promoted the idea of *tiam* to establish a politics of social change in relation to the increasing encroachment of the State into Amazonian territories (ibid).

Tiam also refers to radical turns and changes in motion that occur across species realms in this rainforest territory. It helps people to understand the spiral growth of plants, wilting as a process of returning to become part of the earth, or the completion of life cycles. *Tiam* guides my artistic exploration of the unruly movements of rain ants. With this in mind, *tiam* is essential for understanding how performances characterised by turns lead to the weaving of sociopolitical resistance, and to ecological mobilisations in other species that are not subject to evolutionary functions, but rather to intensities, indeterminacy, and tensions.



4

Taki

Taki means rhythm in Kichwa (Kinti-Moss and Masaquiza Chango 2018: 145). In musical contexts, it refers to a tune or song. For instance, the Kichwa verb *takina* means to sing, to tune in an instrument and make music. In Sarayaku's ceremonies, *taki* is the chant sung by a *yachak*—a wise elder, or what in the West is commonly referred to as a shaman. During festivities or common gatherings, a different *taki* is performed with instruments like drums or flutes. *Taki* also manifests through acoustic atmospheres and sounds performed by the rainforest in all its magnitudes. *Taki* as a local concept of rhythm guides my acoustic perception of territorial relations: starting with the greater acoustic temperaments of thunderstorms and rain, to the acoustic environment of Sarayaku expressed by drumming, dancing, shouts, and especially flute songs, and down to ecologically dominant invertebrate vibrations.

In this respect, Antonio, leader of *Atayak*, Sarayaku's community centre for ancestral wisdoms, correlates hearing the *taki* of rain ants as a good sign (2019). When *tamya añanku* tap incessantly

⁴ The rhythm of drums cues the dancing steps of women, who dance around men by turning left and right imitating the movements of the wild boar of the Amazon, known as *sahino*. The women taunt the drummers forcing them to also move around them.

along clay grounds, foliage and dry leaf litter, they sound like rain before entering a thatched house to sweep away concealed vermin. *Taki* encompasses the perception and creation of rhythmic expressions through movements and acoustic patterns that entangle with those of the rainforest and its lifeforms. Thus, I employ *taki* to attend to a situated notion of rhythm which is conducive to social, ecological, and political mobilisations trebling across the fabrics of Sarayaku.

Tiam and *taki* are taken into account in my practice as alternating each other. With *tiam* and *taki*, I trace radical turns and rhythmic expressions to render an artistic portrayal of rain messengers. Dependent on each other, *tiam* and *taki* are situated performative concepts leading to the weaving of fabrics across this territoriality from underneath.



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⁵ Left: detail of a typical nest woven with ant bodies. Right: detail of *ashanga* basket being woven by Santiago.

Awana

In Kichwa, *awana* means to weave (Kinti-Moss and Masaquiza Chango 2018: 17). In Sarayaku, people also extend the term *awana* to refer to the handcrafting of earthenware, baskets, and bags.

Women collect colourful forest clay, called *mangallpa* (from *manga*, malleable; and *allpa*, land, earth, or soil), to create pots and drinking vessels of various forms. Women touch the clay several times, reading its qualities, before selecting the earthy clumps that will be hand-woven into vessels, which have a special role in weaving relational ties with people of the community. Earthenware is important for fermenting and consuming a drink known as *aswa*. The fermentation process is called *aswana* and its Kichwa etymology relates to the term *awana*. *Aswana* is the process of mastication and fermentation to produce *aswa*. It is entrusted only to women, following the ancestral female connection with the cultivation of cassava, *Manihot esculenta*, a tuber popularly known across several Andean and Amazonian regions as *yuca*. Women collect *yuca*, cook it in batches, then masticate and spit chewed-up pieces with a special technique and the aid of bacterial communities living in their mouths. The dough made of saliva and *yuca* is put inside *tinajas*, earthenware pots filled with forest water, and left for days to ferment. During this time, the metabolism of multiple bacteria produces alcohol. The initial freshly spit-out drink is offered to kids, whilst the most alcoholic ferment is drunk during festivities by all adults.

Yuca is one of several vegetal kins which have been cultivated throughout ages across Amazonian forests by different indigenous nations (Maezumi et al. 2018; Fletcher et al. 2021). In Sarayaku this tuber populates every family forest garden, known as *chakra*. *Chakra* is the Kichwa word for a farming parcel in the forest which is itinerant and rotational. A *chakra* begins with a forest patch being cleared for temporal cultivation; once soil fertility reaches a tipping point, all crops are harvested, then, a new *chakra* has to be found, and seeds and roots are taken from previous to nascent parcels. The previous one is left to recover and regenerate, sometimes even up to twenty years before it can be intervened again (Franco 2019). This process of cultivation enacts a circulation of vegetal kins across the territory, a technique of agroforestry that lives by *tiam*. By means of this rotational system, people have domesticated—weaving long-lasting relations with—particular species of *yuca*, maize, and plantains. *Chakras* are integral to the weaving of territories as a place-making practice that attends to soil fertility and the selective caretaking of nonhuman

others. In particular, *yuca*, the main component of the *aswa* ferment, has been a successful beneficiary of *chakra* cultivation. *Yuca* has been transplanted and tended to through distinct rhythmic place-making practices, *taki*, that entangle this tuber species with Sarayaku's culture and tradition.⁶

Just as women use their hands to weave earthenware vessels from forest clay, men also use their hands to enact *awana*. Men interlace strips from tree lianas or threads from plant fibres, up and under, to form cross-patterned baskets and net bags. These handcrafts become vessels for carrying fruits from forest gardens, hunted animals, or fish from the rivers. They go into the forest in search for the resilient and pliable *tiamshi*, an epiphyte liana of twisted shape. The *tiamshi* epiphyte is a living embodiment of *tiam*. The liana's spiral and undulating characteristics reveal its resistant qualities for becoming basket material. The basket woven with *tiamshi* is called *ashanga*, while the net bag is called *shigra*, and is fabricated with fibres stripped away from a palm-like plant called *chambira*. Particularly, the collecting of *tiamshi* is an arduous task performed in tandem with other men. Two basket masters in Sarayaku reported that supporting each other when climbing the host tree of the *tiamshi* liana is necessary. One of them explained that the liana to be chosen is the one that resists getting ripped apart: "You wrangle *tiamshi* with your hands, if it becomes alive and twists your grip, then you know it is a good one."

Awana is an essential, responsible and responsive, weaving practice which enables a sensorial interconnection with the materiality of this rainforest. This weaving practice is guided by hand abilities for making sense of forms, textures, and resistant qualities. The hands take over the sensory experience, mediating the reading of good materials to transduce them into useful forms. This ability of the hands to derive meaning from forest materials is creative. Women in particular weave personal motifs into the *mukawa*, the special earthenware vessel, bowl-like in form, that is used for drinking *aswa*—the yuca fermented drink. During festivities, the nuanced intricate lines and shapes designed around the earthenware drinking vessel become digital signatures of the women creators: depictions of creation and imagination, combining animals, plants, fruits, insects, waveforms and zigzagging lines. These hand-woven earthenware bowls filled with the yuca fermented drink

⁶ This human-vegetal relationship is important and several other scholars have specialised on specific indigenous cultivation practices with this tuber (Rival 2001; Miller 2013). Within the scope of my work, however, I mention *yuca* exclusively to emphasise its role in the co-constitutive cultivation, fermentation, and creation of earthenware vessels as integral to Sarayaku's weaving of territorial relations.

circulate from hand to hand, and only keen Sarayaku vision and tactility can identify the name and origin of the maker.

This is where *tiam* and *taki* live. Turns and rhythmic expressions determine the weaving of organic threads up and under and across to create baskets or the spiralling of clay to craft drinking vessels. The fermented drinks are circulated almost mouth to mouth amongst community members, who drink from the same bowl while women's hands regularly dip in, removing chunks of *yuca* and swirling the beverage contents. When these woven vessels drop out of social circulation, they return to rainforest lands and get "transformed or disfigured by ecological processes of disintegration and regeneration" (DeSilvey 2017: 30): if the *mukawa* breaks, it returns to the soil; if the *ashanga* rips apart yielding to too much weight, it is discarded and its fibres become nutrients for soil decomposition; if the *shigra* rends, it is left to disintegrate in time, becoming part of earthly matters (Lyons 2020). The social vessels produced with *awana* enact a culture of interrelations in circular motion with this rainforest territory.⁷

Awana is characterised by *tiam* and *taki*. *Awana* is a weaving practice that reinforces community ties. It creates a fabric of relations with specific forest materials enfolding other lifeforms into the production of social vessels. The enactment of weaving social vessels and territorial relations with forest lands is exercised at all levels through movements and rhythms that adjust to a world in formation. *Tiam*, *taki* and *awana* come together in response to communal events occurring frequently in the life of Sarayaku: corporeal performances of work and socialisation that strengthen relational ties between people. These performances of community labour are known in Sarayaku, and other Andean-Amazonian cultures, as *minga*.

⁷ During extended festivities drunk guests are allowed to throw the *mukawa* and break it against the thatch of the host's hut. Traya explains, this is a traditional game, but it also symbolises a sign of returning the clay of the *mukawa* back to the earth where it belongs (2019).



8

⁸ Top: drinking the alcoholic ferment made of spit and yuca, *aswa*, from a *mukawa*. Mid-left: *ashanga* basket in process. Mid-right: carrying a load of yuca with a *shigra*. Bottom: *tinajas* and *mukawas* on the shores of the Bobonaza river awaiting the return of hunters.

Minga

Minga is a form of labour based on physical cooperation, a collective exercise of place-making which has been exerted for centuries by indigenous nations across political borders of Amazonian countries. It has transformed and shaped forest lands. It has made human coexistence with forest beings possible. In Sarayaku, *minga* is a community-weaving practice which is recurrent, rhythmical, and effervescent, because it is brought into life by *tiam*, *taki*, and *awana* altogether: a distinct organisation of recurrent labours, in which people take turns to collaborate, a momentary congregation for the joyful circulation of energies, where people dance around to the entrancing rhythms of the drums and the induced dizziness of alcoholic *yuca* ferments.

Minga functions as an alternative to the remuneration of work in a capitalist system. In *minga*, labour assistance is paid with drinks and food, or by returning the favour one day. A *minga* is convoked whenever people require physical strength in numbers, i.e., for building houses, constructing or repairing communal infrastructures, cleaning the paths between communities, or pruning forest gardens from overgrowing weeds. *Minga* encompasses a sense of physical reciprocity to accomplish greater tasks through cooperation. These forms of cooperative labour enact *tiam*, as turns are taken to share the load of work, and community work turns into celebration afterwards. At the end of the day, when people return from a *minga*, they dance in circles at the cue of the drums, while rotating highly fermented *yuca* drinks to enter joyful altered states, with a rhythm that defines community rapport, *taki*.

A *minga* is carried in circuit as people follow the music of the drums from one house to another in the aftermath of labour celebrations. Every *minga* distinguishes itself by its acoustic rhythms of community: footprints beating on forest lands, loud manifestations in working rapport, shouts of joy, and staccato laughs travelling through the canopy. In every house, women rotate their fermented drinks to all guests, who must finish it in a single, bottoms-up movement. *Tiam* and *taki* are brought into life through these performances. *Awana* is also deeply interwoven with *minga*, as without the *tiamshi* liana that makes the basket for carrying *yuca*—the main ingredient metabolised into alcohol, and without the *mangallpa*, forest clay, that makes the earthenware for drinking and fermenting—there would be no means to celebrate the fruits of community.

In my experience, *taki*, *tiam*, and *awana* are co-constitutive performances deeply ingrained in Sarayaku's community-weaving and place-making practices, like *minga*. Together they enable the reinforcement of human modes of inhabitation vis-a-vis the agencies of this rainforest. *Taki*, *tiam*, *awana*, and *minga* afford the continuous reassertion of Sarayaku identity with forest lands and kins. In particular, *taki*, *tiam* and *awana* facilitate the perception of community performances beyond and beneath the human that are also marked by rhythmic expressions and radical turns. In this vein, these concepts guide my artistic exploration of the weaving capacities of rain ants as invertebrate communities whose dominant movements and rhythms over terrestrial lifeforms contribute to the place-making of this territory. Guided by *taki*, *tiam*, and *awana*, my work grapples with a knowledge gap which neither scientific methods nor artistic production have dealt with so far: the value of a grounded human-ant relationship in a situated Amazon world, and the valorisation of the different social, political, and ecological resistant fabrics being woven in community.

This notion of fabric is essential in my work with rain ants and will be discussed in detail in the next section.



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⁹ Sarayaku people reunite with friends and other invited guests of the community on the shores of the Bobonaza river during the Uyantza festivity in February 2020.

Social Fabric

Through my experience in Sarayaku, I recognised that different rhythms, movements, and weaving practices of forest lifeforms combine, cross, and interfere with one another. This reflection was strengthened by watching *tamya añanku* forming a swarming carpet of ant bodies covering the forest canvas. This image was latent in my mind during my initial forays in search for their nests, and was strongly influenced by the scientific literature knowledge I gathered throughout the years. The nests of these ants are special shelters fabricated with their own bodies, always in different parts of the forest. This nesting style sets these ants apart from other species that usually establish permanent sites on which to build mounds with connected underground chambers. I originally came to Sarayaku with the influence of an ant knowledge that comes from western literature, which describes their restless, impermanent, lifestyles as nomadic, and their nests as bivouacs — a term based on military analogies. But to me, their invertebrate abilities to create shelters with their bodies in different places must have a deeper significance, one that deviates from mechanistic or structural descriptions of biological rhythms circumscribed by evolutionary observations. My experience in Sarayaku was hinting towards a different form of representation.

I was grappling with alternative descriptions for ‘nomadism’ and ‘bivouacs,’ until one day I met Franco outside the community council hut—*la casa del medio dia*. Franco is a former president of Sarayaku and the older brother of Tupak, the present head of the council. During his council period between 2001 and 2003, Franco had to deal with military incursions and politically-driven territorial conflicts. I had several conversations with Franco and he became an invaluable knowledge bearer of Sarayaku’s territorial practices. Franco confidently voiced his perspective and position in relation to the intricate but complicated socio-ecological activism within the community. Eventually, Franco became a critical source of inspiration in my work.

During one conversation at his hut, Franco revealed the Kichwa identity of army ants in Sarayaku. He told me they are not armies, “*tamya añanku* are forest messengers who tell the people when rain might come without looking at the clouds.” He also revealed that community life in Sarayaku is like a “social fabric” in which expanding and contracting relations are always in tension with thoughts, entities, and imported materials. He expressed that some conflicts within the Sarayaku community are not different “from ants working to do what is needed to supply its people.” By referring to ants

as people, and invoking the heterogeneous figure of a fabric made of tensile relations, Franco was sharing his vision of the resilience of life in this rainforest.

Franco envisions a fabric of community relations in tension with forces of extractivism, and what he believes is a continuous and inevitable introduction of capital commodities into Sarayaku. During the last twenty years, the people have increased the frequency of fluvial roundtrips to Puyo, the nearest city and capital of the province, whose name in Kichwa means “the city of clouds”. Steady interconnections and interactions with the nation’s politics and city culture have prompted a recurrent export of forest vegetables and fruits to markets in Puyo, but also a continuous introduction of commercial artefacts and an increasing dependency on foreign goods. Franco nonetheless remarks in this respect that challenging ideas and conflicts help co-constitute the “temperamental collective voice of Sarayaku.”

Franco’s vision of the social fabric is rich in meaning. This social fabric enables a grounded understanding akin to what de la Cadena calls a worlding practice, infiltrating and emerging in each other in the making of a “socionatural territory composed by relations among the people and earth-beings” (2015: 4). To this stream of thought, I might add, far from giving way to permanent structures and associations, there are several social fabrics in Sarayaku which are adaptable, elastic, resilient, and temporal. These fabrics also move, envelop, absorb, and get entangled. These fabrics can dominate the rhythm of other lifeforms. They can capture things and subjects. I was captured by the Sarayaku fabric and captivated by the socio-ecological and political complexities at stake.

The social fabric became a tangible and sensible earthly metaphor through which to place myself and my methods alongside Sarayaku's culture of resistance. In the social fabric of Sarayaku, tension emerges as a radical material property to reckon with. Tension is an important property in the composition of resistant fabric materials that can adjust their initial forms to withhold unforeseeable pressures and weights. Thus tension enables both flexibility and endurance for wrapping around and capturing intruding forms. Without completely breaking apart, a resistant fabric made of tensile relations can still be porous, allowing infiltrations of certain subjects and matters that change the warp and weft of the patterned weave in time, but without destroying its constitution. In this light, the social fabric of Sarayaku proposed by Franco is not just a weaving metaphor. The social fabric is continually performed and materialised to create kinships, multispecies habitats, social vessels,

and territorial relations, recomposing itself, mending rips and tears, amidst the influx of colonising systematisations.

In Sarayaku, tensions manifest and relations get tangled up with nonliving elements and artificial processes, ecological, political, and techno-cultural systems. Sarayaku's social fabric is interwoven in worlds of spatiotemporal dimensions—thinking with *pacha*. Such is the case of the interconnectivity with the world outside via satellite internet. According to Franco (2019), this is a relevant “learning process” for strengthening the intercultural imbrications of community and maintaining territorial identity amidst the power dynamics of the capitalist world. Sarayaku's active participation at the margins of the nation's politics is mediated. The Kichwa identity is in transformation with the opportunities of accessible technologies and the introduction of capital commodities. The people respond readily, organising workshops, inviting leaders of other communities, and circulating images and videos about their life alternatives to the rest of the world (Sarayaku 2022a, 2022b). They have turned into indigenous mediators who repurpose communication technologies in their own terms to intensify their collective voice in proclaiming territorial and cultural sovereignty.

Bringing again the idea of community multiple (Gudynas 2017), other beings like ants can be acknowledged to participate in the weaving of territorial relations as protectors of this forest. In this territoriality from underneath, the social fabric of Sarayaku offers a discursive material sensibility to refocus perspectives for watching *tamya añanku* weave a fabric of multispecies relations beyond the edges of Eurocentric and Anglo-American modes of knowledge. Thinking with the figure of the social fabric and inspired by community-weaving performances defined by *tiam*, *taki*, and *awana*, I explore the resistant invertebrate fabrics of *tamya añanku*.



10

Inverting as decolonial operation

I engage with invertebrate ways of being in worlds, which require mobilising critical understandings between different knowledge-making practices. Ants are invertebrate lifeforms, beings without backbones, without vertebrae. The prefix ‘in’ of the word invertebrate means a

¹⁰ Tip of the dagger: inverted nest protruding from inside a tree. Down under (unseen) is a creek formed after one night’s rainstorm. The last ant at the bottom is a so called major, or soldier. However, in Sarayaku they are known as *apatinkas*, the big-head elders.

negation or absence. Based on this, I call invertebrates, *inverts*, to facilitate a creative deterritorialisation of army ants from scientific enclosures. ‘Inverts’ is an alias popularised by Anglo-American insect lovers and marine biologists to refer to invertebrates. But it is also used by some queer theorists to speak about people who pervert meaning and invert power. The prefix ‘in’ of the word *inverts* denotes a change or turn. Eva Hayward gestures towards the etymological interlacing between *inverts* and invertebrates. She does so to trace alterities made possible by pliable, mobile, and transposable bodies that can destabilise the comfort zone of heteronormativity to break away from systematic gender binaries (Hayward 2010: 589). Different from, but at the same time close to, Hayward’s disruptive intentions, I weave an etymological and methodological interlacing between *inverts* and my aim for inverting the representation of army ants.

To explore the invertebrate abilities of *tamya añanku*, I draw from the word ‘*inverts*’ and its inflections. I join its potential for inversion with the Sarayaku concept of *tiam*, which signals radical turns and changes in perspectives. By inflecting the word *invert/ed/ing*, and wrapping it around *tiam*, I turn the colonial representation of army ants upside down. This leads to an alternative imaginary in which rain ants’ ecological contributions and sociopolitical messages are valued in relation to Sarayaku’s territoriality from underneath.

In this respect, *tiam* guides my creative exploration of ant performances. *Tiam* enables an altered, inverted process for repositioning the senses to articulate changes in the use of methods and technological mediation; to explore artistic exercises that turn dominant modes of knowledge production around. I invert the validation of ant behavioural data, raising the qualitative, and socially situated, and minoring the quantitative, evolutionary analysis. In other words, I guide my artistic methods and technological operations with the grounded values of the Sarayaku world. Summoned by *tiam*, my methodology leads to an inversion of perspectives and looks at ants as invertebrate communities of a territoriality from underneath, instead of as colonies with queens and soldiers.

My conception of inverting becomes a decolonial operation that strongly resonates with what DeSilvey has called a “cultivation of an inverted perception that resists the urge to settle the identity of the things we encounter and instead remains open to their continual material becoming” (2017: 30). Here, I draw from DeSilvey’s view on decaying processes amalgamating with concrete in heritage ruins and colonial architectures. The inverted perception she refers to locates on a similar

plane of interaction as mine: underneath surfaces of colonial legacies, across a fabric of experience, where indigenous epistemologies becoming with species flow undeterred (Haraway 2008).

In this sense, inverting as a decolonial practice works in turning my artistic gaze upside down to mess around with the image of army ants, and see the weaving patterns of the fabric of rain messengers. The intricacies of this fabric encompass more than just ecological relations and need to be analysed in close proximity to the grounds of Sarayaku knowledges, which have resisted authoritarian impositions, colonial and capital legacies. I give emphasis to invertebrate performances that resonate better with local Amazonian community practices, rather than with those of scientific models from European and Anglo-American minds — the army ants of Schneirla (1944, 1971), Wilson and Hölldobler (1990), Kronauer (2020). Inversion guides my creative and decolonial operations, it signals divergent paths to place the local worldview of Sarayaku on top of prevalent knowledge models. New orientations are forced and perspectives are inverted in order to appreciate invertebrate modes of being in the world that are intimately interwoven with the forces of rain, the topological features of this rainforest, and the biocentric and sociopolitical place-making practices that continuously reshape this territory.

Much in line with my conception of inverting, as guided by *tiam* for turning perspectives upside down, is the Kichwa term '*pachakuti*,' which derives from *pacha*. *Pachakuti* has a powerful connotation for indigenous nations across Ecuador, Peru, and Bolivia as a cosmic change in the sun. However, it has been smeared with political misunderstandings. Gutierrez, in her thorough analysis of the Aymara sociopolitical movement in Bolivia, explains that *pachakuti* expresses a turning or inverting of time and space (2014: 50). She points to the understanding of *pachakuti* as a rhythmic force that brings into being an inversion of the fundamental order of things concerning the injustices carried out by authoritarian political powers: "What was inside, in the communities, such as their most intimate logic—and, of course, below—is now placed where it is visible, valid, legitimate, 'outside, and 'on top'" (2014: 51 - emphasis in original).¹¹ Indigenous nations across Amazonian-

¹¹ Gutierrez's analysis of the political conflicts between Aymara and neoliberal injustices in Bolivia is ample and complex; its focus concentrates on rhythms of political resistance, which lies outside the scope of my artistic work. However, her rendering of *pachakuti* offers a solid understanding which is invoked in my work to denote the interconnected values of what 'turning' and 'inverting' in different Quechua and Kichwa languages share in common: "another idea embedded in *Pachakuti* as a desired inversion is the change from 'inside to outside,' which cannot be understood simply as a symmetrical alteration. It assumes and demands a profound disruption of social coexistence. Conceptualizing the transformation of 'inside to outside' does not suggest an inversion produced by a symmetrical 'rotation' of top to bottom and vice-versa. Instead, it is a 'turning around'" (Gutierrez 2014: 51). Important, also, is to acknowledge the *Pachakutik* political party in Ecuador. Bearing upon the meaning of *pachakuti* for a country which has 18 widely established ethnic nations—not minorities. This party's agenda is a relevant force of indigenous mobilisations and national strikes, whose values have been compromised by political alliances limiting and undermining the origin and meaning of *pachakuti* as a practice for effecting change through community work (Becker 2011).

Andean regions have different locally situated terms to express the same desire for inverting orders, or which point to a premonitory overturn of powers. In Sarayaku, *tiam* is that term. Sustained by *tiam*, I open up to a radical process of artistic attunement that entails an impetus for opposition, for complicating aesthetic and scientific imperatives that are not in line with situated perspectives. Accordingly, I aim for an ethical and aesthetic overturning that demands a radical re-alignment of my artistic practice with ants.

In Sarayaku, the performance of rain ants is intimately connected to the forces of rain, and the fabrics of relations and experiences being woven across this territory. They weave invertebrate fabrics on the run through radical turns and rhythmic expressions that deviate from orderly aesthetic and scientific structures. To understand the significance of these weaving performances as part of this territoriality from underneath, I developed a decolonial methodology that works with inverting operations. In the next chapter I introduce this methodology. But first I offer a roadmap of this inverted journey into Sarayaku.

Chapter Outline

My inverting methods and operations sought to produce an ethically innovative knowledge about army ants. I have found myself exploring fields that combine multispecies ethnography with myrmecology, audiovisual amplification methods with media theories, and this has been transformative and transversal for my practice. In Chapter One, “Inversion: a decolonial and transversal methodology,” I introduce my core concepts and ways of programming and assembling electronics. I operated cameras, recorders, and electronic sensing devices by means of amplification, interference, syncopation, and convolution. These four operations echo the foundations of tactical media (Garcia and Lovink 1997). I tactically repurposed these operations guided by Sarayaku’s performative concepts of *tiam*, *taki*, and *awana*, and the sociopolitical objectives of the people to appropriate technologies for defending their territorial sovereignty. In particular, *taki* directs my operation of syncopation as the interruption of an established flow of rhythm. While *tiam* directs my operation of convolution as a process of twists and turns that leads to entanglements around subjects who are difficult to follow. My operations allowed me to produce a multi-sensory installation that recreates an audiovisual, tactile, and olfactory experience of being amongst rain ants. This multi-sensory installation diverges from aesthetics as a sensing regime

(Rancière 2013) and aligns with Mignolo's and Vazquez' ideas of decolonial aesthetics (2013). The combination of transversality, tactical media, and aesthetics, set the stage, and the boundaries, for conducting a decolonial work with ants as invertebrate performers weaving themselves with the territory, as they seek shelter from the forces of rain.

In Chapter Two, "Weaving Territory," I honour the weaving practices of Sarayaku, which provided my artistic views and intentions with meaning and purpose. In this chapter I pay respect to the experiences and teachings the people shared with me. The ethnographic study sustaining my decolonial and transversal methods is nested here, presented through people's stories and visions of territorial and political tensions. "Weaving Territory" introduces Sarayaku's land-based ontology of the living forest, *Kawsak Sacha*, which depends on cultivating a good land and soil without evil, *Sumak Allpa*. Invoking Marisol de la Cadena (2015, 2020) and Arturo Escobar (2016, 2018), *Kawsak Sacha* and *Sumak Allpa* can be acknowledged as earth beings, and the weaving practices of the people a form of worlding in a pluriverse of territorial relations with nonhuman others.

In Chapter Three, "Army ants turning upside down," I begin my transversal methodology of inversion. I discuss the legacies that constructed a natural ant history based on analogies of conquest and militarism. I then turn that image around, by convoluting scientific definitions and taxonomic histories (Schneirla 1944, 1954, 1971; Kronauer 2020). Influenced by Sarayaku's cultural and sociopolitical values, I describe ants from an intimate, personal, and inverted perspective. I also burrow from Deleuze and Guattari (1987), and Rosi Braidotti (2002, 2005, 2011), to reconfigure a new understanding of ants' territorialisations and subjectivities. In this way, I picture invertebrate territorialities in motion weaving corporeal passages and shelters. The last sections in this chapter prepare the transition into the final three chapters of my exegesis that showcase my artworks. *Chemical darkness*, *Rain syncopations*, and *Weaving invertebrate fabrics* foreground the flexible, chemosensorial abilities of these ants to create corporeal intimacies with other species, as they weave themselves with the rainforest in antagonism to the rain.

It was necessary to elaborate my narrative in this order: first, my artistic methods (*Inversion: a decolonial and transversal methodology*), then the territorial practices of the people and their sociopolitical values (*Weaving Territory*), and afterwards, proceed to deterritorialise army ants from scientific enclosures (*Army ants turning upside down*). This narrative guides a practice-led research that inverts the colonial descriptions of army ants by placing Sarayaku values and perspectives on

top. Practice-led research terms the work I conducted: a process of doing and thinking with significant invertebrates that led me into different modes of knowledge acquisition and inquiry, which enables “new social and other realities either marginalised or not yet recognised in established social practices” to come forth as guidance for artistic production (Barrett and Bolt, 2010: 4). This gives way to present the last three chapters that explain the artistic production of a multi-sensory installation based on Sarayaku’s *tiam*, *taki*, and *awana*. The artistic result of my practice posits that turning motions, rhythm, and weaving are essential performances to understand the identity of these ants as territorial weavers and rain messengers.

In Chapter Four, *Tiam Movements*, I introduce the first of three multi-sensory works built around the Sarayaku concept of *tiam*. *Tiam* means a radical turn in the Kichwa language of Sarayaku. It signals a change in trajectory and perspective and indexes a return to rooted and grounded values. Based on *tiam*, I argue that radical turns are not anomalies but features of their invertebrate movements: ants crossing each other, rolling on top of one another, and turning into bridges. These are weaving performances of the invertebrate kind visualised with algorithms for motion detection and augmented via olfaction. Olfaction, especially, provides a medium for recreating a closer ant experience, as their world is predominantly mediated by chemical signals. I worked on modes to synthesise scents that emulate being in the presence of these special ants. Recorded sounds of rain and ants running in Sarayaku set in motion a vibrating disc that contains water, creating woven patterns over the liquid film. A synthetic compound that smells like turned earth after rain is diluted in water and diffuses around the installation. With the assistance of Dr Latnikova of Fraunhofer Institute for Applied Polymers in Germany, we concocted this compound in her laboratory using soil and leaf samples from Sarayaku.

Tiam Movements was developed into a multi-sensory installation by working with operations of amplification, interference, and convolution. I especially focus on convolution, the state of becoming coiled or twisted, which is also a term that describes specific algorithmic machine learning programs to process transformations of audiovisual data. Using my transversal methodology of inversion, I amplified the movements and sounds of ants across Sarayaku. Patterns of interference were created in water with vibrations. Ant trails were visually rendered as weaving threads using convolutional algorithms. My methods are discussed together with works of artists, who employ audiovisual media and computer algorithms involving 'the turn' as a performative aspect, and which, to some extent, revolve around decolonial topics. I particularly focus my

attention on Traya, the Sarayaku cinematographer, who has produced several documentaries about the territorial conflicts with the military and the Ecuadorian State. I foreground his recent short film, “*Tiam, the return*,” as a paramount influence for my depictions of invertebrate turns. Departing from Traya’s film, I also examine media installations about invertebrate life by Robertina Šebjanič, Pierre Huyghes, as well as the inverted enactments of the art duo Mazonett and Quiroga, to consolidate my place within a niche of decolonial practices. *Tiam Movements* emphasises the creative and unforeseeable possibilities, which are brought into being by radical turns as expressions of resistance.

After *tiam*, I engage with the Kichwa performative term *taki*, which means rhythm and tune. In Chapter Five, *Taki Rhythms*, I elaborate on my second multi-sensory work, which focuses on sound amplifications of the acoustic fabric of rain ants: the vibrations and sound waves they create when they run across the rainforest. Myriad invertebrate feet scratch the forest floor and reproduce the sound of raindrops. With *Taki Rhythms*, I foreground the entanglement between rain, rain ants, and rainforest, which in the scientific study of army ants has been left unexplored. *Taki Rhythms* is an electroacoustic mediation to generate a textural, acoustic signature of a territoriality in motion performed by an ensemble of ants and insect guests in syncopation with the rain. I combine operations of amplification and interference, but I particularly work with syncopation as a disturbance in the flow of rhythm. Using syncopation, aligned with *taki*, I generate electroacoustic compositions that emphasise the ants’ interferences in the life of others, as well as the interferences of the rain, including myself with my apparatus, in the life of ants.

Taki Rhythms is mediated with data gathered from laser interferences created during ant migrations. The documentation of the ants crossing the laser barriers at different sites and in different situations is presented on a video screen as part of the installation. I used a laser-photocell device of my own making which registered variations in electrical resistance when laser beams were blocked by the ants’ corporeal motions. These data were then input into live coding software and node programming environments, e.g., Sonic Pi and Max Msp, to generate electroacoustic variations in time, and move electrical threads up and down into handcrafted Sarayaku bowls filled with water, which are connected to a conductive synthesiser. In *Taki Rhythms*, water is the medium for amplifying the rhythmic flows of rain messengers. The interrelation between rain and ants is the essence for understanding territorial place-making practices in Sarayaku beyond and beneath the human.

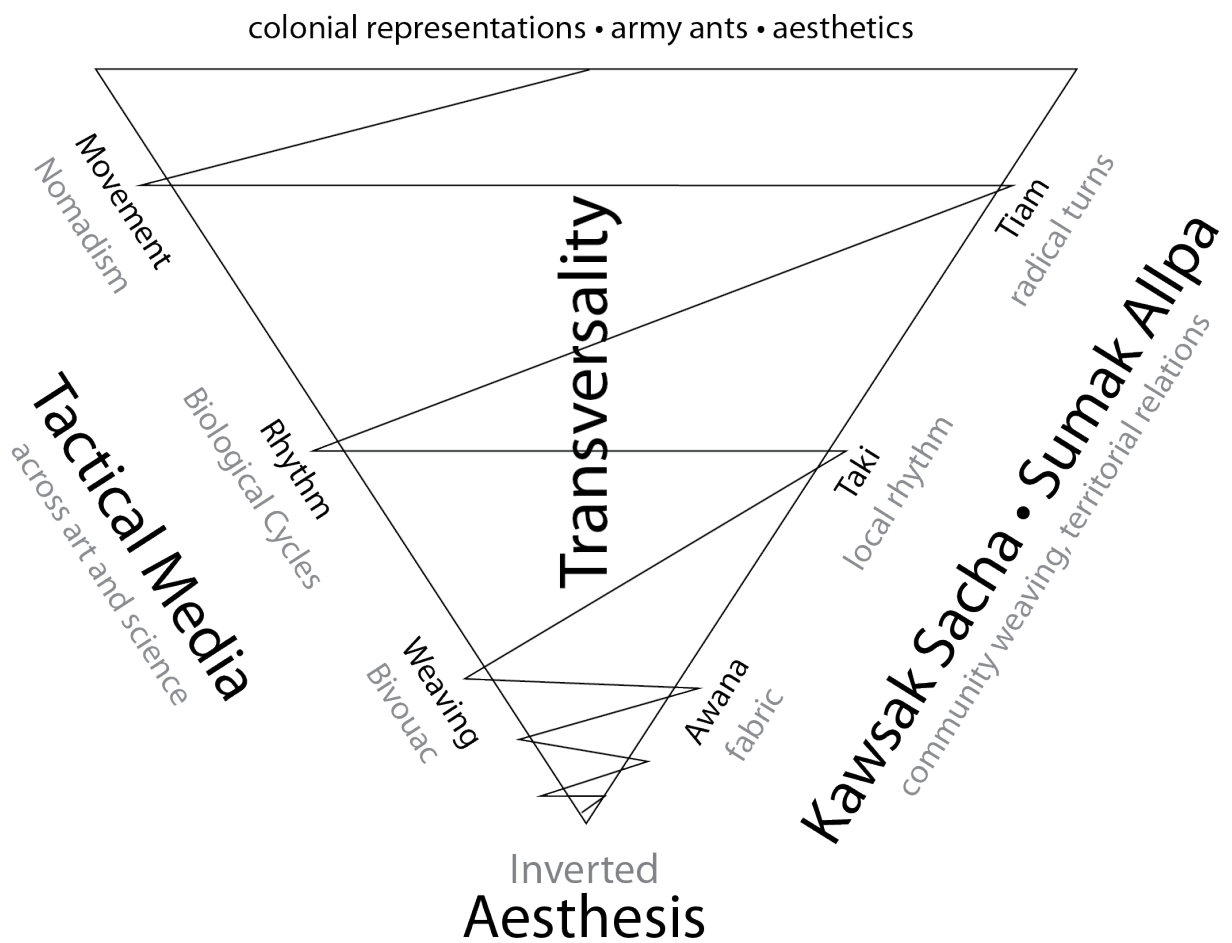
By working with *taki*, I demonstrate these ants have rhythm; a form of locally situated rhythmic awareness that allows them an invertebrate attunement to a rainforest world in formation. In *Taki Rhythms*, I support my transversal methods vis-a-vis the critical sound discourse of Anja Kanngieser, Tomas Saraceno's spider entanglements, and Gilberto Esparza's micro-organismic mediations. I also historicise my practice by honouring the electroacoustic methods pioneered by John Cage, David Tudor, and Alvin Lucier, which were influential in my operation of syncopation.

After *taki*, I transition into the final Chapter Six, *Rain Shelters*, where I present *Awana Fabric*, an audiovisual and interactive installation. This installation is based on my understanding that *tiam* and *taki* in rain ants — the alternations of turns and rhythms in their performances — lead to the weaving of invertebrate fabrics. *Awana* means weaving in the Kichwa language spoken across Andean and Amazonian territories. The weaving of invertebrate fabrics, understood through *awana* as a practice that creates tensile relations, offers a better representation of the multispecies ties composing communities of rain ants. By focusing on weaving, as brought together by turns and rhythms, I emphasise the vital entanglements existing between the local identity of these ants with the rain forces of this territory, and the sociopolitical perspectives of the people. *Tamya añanku*, the rain ants of Sarayaku, are tied to the fabric of territorial relations.

Awana Fabric complements my other two multi-sensory works and becomes a tribute to the weaving performed by kins and kinds in Sarayaku. This final work focuses on the corporeal tensions produced by invertebrate bodies when they weave themselves as shelters inside forest interstices. The four operations of my methodology combine to materialise *Awana fabric*. Amplification, interference, syncopation, and convolution are put to work to render a large video projection of ant shelters mapped onto a digital mesh. The projection reacts to manipulations of a real basket hanging in the exhibition, which I intervened with conductive threads and sensors for reading electric capacitance in human fingers. Touching and reshaping the basket modifies visuals and sounds. First, a decomposing palm tree, held in place by ant bodies tightly woven onto its barks, is used as a day shelter. As night falls, the ensemble of ants begins to migrate to a different site and a performance of weaving-unweaving tensions unfolds. A second, concealed rain shelter appears inside a fallen tree: suspended upside down, a mass of invertebrate bodies pulsates in and out, shape-shifting its form, creating viscous tangled threads that defy gravity, while a creek is

being created by increasing rains on the bottom. Corporeal tensions are highlighted in this interactive projection, and granular sounds are triggered when the basket is pressed or deformed.

The methods to produce *Awana Fabric* are discussed together with other critical artistic weaving practices, in particular the electronic textiles of Bolivian artist aruma, and the digital artist duo Soft Monitor. I then exercise a self-reflection and critique of my previous decolonial cooperation with artists Gabriel Vanegas and Katharina Klemm. In 2014 we produced a large media installation in Quito, Ecuador, using the agencies of leaf-cutter ants to create weaving metaphors between ancient Andean artefacts, land cultivation, and Southern-hemisphere constellations. In the conclusion of my exegesis, I do a critical revision of my transversal methodology and tactical mediations. I discuss issues and weaknesses of my inverting operations and argue for inverted aesthetics to better appreciate and evaluate the invertebrate abilities of ants. I also claim that a return to Sarayaku is necessary. The results of my work with *tamya añanku* need to be presented to the people of Sarayaku. They will decide the values of my practice-led research.



This diagram depicts my modes of thought and shows the transversal relations that emerge from my inverting operations to produce a decolonial practice.

1 _____ Inversion: a decolonial and transversal methodology

My artistic work with rain ants employs a methodology for turning colonially-biased scientific knowledges upside down. The performative value of *tiam*, understood as a radical turn, together with the creative figure of thinking and doing work with *inverted* bodies, constitute the main source of inspiration in devising my methods. Inversion is at the core of my creative practice. Sustained by a set of principles and apparatuses, I operated electronic media to deterritorialise the colonial construction of the image of army ants. By working with rain messengers based on the territoriality from underneath, invertebrate performances can be inspected on grounds of sociopolitical and ecological meanings outside dominant regimes of knowledge, through knowledges that favour weaving capacities and territorial values.

Looking at army ants as messengers of rain opens up creative avenues to reimagine invertebrate social agencies crossing disciplinary, physical, and mental boundaries. The crossing of boundaries was elementary in devising my methodology. Enabling a transdisciplinary understanding of ant abilities has been an integral part of my previous works. In Sarayaku, this acquired a stronger meaning. The first inspiration came from the physical and performative exigencies of moving, thinking, and following ants across the entanglements and through the thickets of this rainforest. These exigencies led me into modes of thinking and doing that deviate from usual scientific categorisations and compartmentalisations.

The acts of following ant trails became an attentive performance of cutting through the usual path to enter difficult places. I transited with them across Sarayaku's living barriers and artificial boundaries, between scientific and artistic methods, between western rationale and ancestral knowledges. Looking down as I followed them, I reflected on alternative reciprocal caretaking practices with rainforest lands, in particular considering that other response-abilities are so much needed in times of geopolitical crises (Haraway 2008: 71-72; Chao, Bolender and Kirksey 2022). Without the impetus of collecting specimens (the convenient scientific trade of placing ants in alcohol), extracting ants into laboratory settings, or elaborating on evolutionary analyses, I carried a backpack full of cameras, sensors, and electronics to mediate live encounters with the ants in situ, influenced by the local culture. I made artistic compromises as I carefully tried to adapt my methods

to their worlds. I performed with them as they performed with the forest, and I began thinking about ants as transversal beings.

Transversality originated in Felix Guattari's philosophy as a concept for freeing relations and crossing boundaries. Drawing from Guattari (2000: 113), I operated transversality to maximise the knowledge about these ants, cross-fertilising among different levels and in different meanings the values of looking at them as rain messengers. I elaborated my version of transversality inspired by the idea of a fabric of knowledges and practices woven together by heterogeneity and tension (Franco 2019). Inspired by the community-weaving practices of Sarayaku, I turned transversality into a weaving operation for cutting through, mending, interconnecting, and creating tensions between opposite modes of knowledge to exercise a decolonial practice.

This re-conception of transversality serves my artistic pursuit for thinking beyond, and working against, knowledge regimes of rigid territorialisation which have separated indigenous human-ant relationships, and reduced the natural history of these ants using colonial perspectives and militaristic terms. Transversality becomes a two-fold operation: first, to deterritorialise the scientific image of army ants from the epistemological enclosures in which they have been placed, and subsequently, reterritorialise them back into the Sarayaku world. Amidst environmental dangers and cultural exclusion enacted by capital powers, the transversal operation of following rain ants, and attending to the political, ecological and social meanings they invoke, not only breaks rigid knowledge models but enlarges the "scope of subjectivity" (Braidotti 2013: 82) of previously unattended relations.¹²

Using transversality in my research involves taking into account more than one point of view, and yet valuing one perspective more than the predominant other. Along this transversal path, I activate inversion as a methodology to work with the sensorial alterity of ants from a decolonial and inverted point of view. Inversion works as my direct statement of intent, driven by an ethical imperative to recognise ants' pliable and transposable bodies in relation to the fabric of territorial relations of Sarayaku. Inversion is conceived through a set of operations that invert the order of principles and values which have constructed the image of army ants, leading to a reverse of power relations in which cartographic and geopolitical perspectives are turned upside down, reassessed on

¹² Braidotti says, "we need to visualize the subject as a transversal entity encompassing the human, our genetic neighbours the animals and the earth as a whole, and to do so within an understandable language" (ibid).

indigenous grounds. Instead of extracting ants to make them aesthetic captives, I came to them with my assemblages and was compelled to respond to them guided by a situated experience of respect. I inverted my practice towards prioritising Sarayaku's territoriality from underneath, and the performative values of *tiam*, *taki* and *awana*, to portray tamyá añanku as invertebrate communities participating in the weaving of territories. A subjective repositioning is made possible by inverting the representation of ants' sensing abilities as distinctive to the places in which they are performed: rain ants' invertebrate modes of existence are tightly entwined with these forest lands and people's culture, thus, they can be perceived as being inverted in relation to colonially biased scientific evaluations.

Following this decolonial pursuit, I invert the uses of audiovisual techniques and work on the *tiam*, *taki*, and *awana* of rain messengers. With this in mind, I make use of sensors and computing operations as tactics, forcing them to operate in a manner that echoes tactical media (Garcia and Lovink 1997). Tactical media functions in my work as a critical apparatus for rethinking and reconfiguring my technological appropriations and previous ant mediations vis-a-vis those undertaken by the Sarayaku people in response to geopolitical conflicts affecting their culture. The keen interest of Sarayaku's younger generations in learning to use emerging technologies is the result of an intensifying, proud indigenous identity that seeks to elevate and proclaim sovereign practices to the world. Through film, photography, radio, and social media channels, Sarayaku people document their life and broadcast their sociopolitical views (Sarayaku 2022a; Sarayaku 2022b; Wayra Supay 2021). Sarayaku's younger generations appropriate tech tools on their own terms amidst environmental crises and encroaching Capital interests.

Furthermore, any artistic result and operation using algorithms and electronic media must decolonise aesthetic paradigms and be guided by Sarayaku's community-weaving practices. To achieve this, aesthesis is used as an alternative principle over aesthetics for evaluating rain ants' invertebrate capacities otherwise (Mignolo and Vazquez 2013). Aesthesis is understood as the perception of the world by the senses, and I use it to create a situated valorisation of tamyá añanku. By using aesthesis, I try to come to terms with the process of making sense of ant movements, rhythms, and weaving performances, on Sarayaku grounds, as guided by *tiam*, *taki*, and *awana*. Aesthesis enables a nuanced repositioning for an art practitioner such as myself to work on the performances of rain ants by following different sensorial evaluations.

Overall, my transversal methodology combines aesthesis and tactical media to invert technological operations, scientific evaluations, and Eurocentric aesthetics, placing Sarayaku community-weaving practices on top. Supported by aesthesis and tactical media, I use transversality to weave relations between art, science, and indigenous knowledge, to bring into light a decolonial portrait of ants as rain messengers—a portrait intimately connected to the fluid forces of rain on the one hand, and, on the other hand, invoked as such in relation to the sociopolitical perspectives and biocentric performances of the Sarayaku people.

Transversality

I discuss in this section the inspirational theories which gave impulse to my transversal methods. The essence of my transversal operations departs primarily from Felix Guattari's version of transversality.¹³

Transversality appears throughout Guattari's published work but went on multiple permutations and deployments. In 1964 Guattari introduced transversality as a concept for deterritorialising stereotypical categories coercing subjects in mental institutions (2000: 119, 113). In this regard, Genosko remarks that the initial understanding of the concept was overshadowed by a psychoanalytic scaffolding, primarily due to Guattari's extensive work in Clinique de La Borde psychiatric hospital: "the concept of transversality had for Guattari practical tasks to perform in specific institutional settings. Transversality was not a philosophical but a political concept [and] the idea was to use it imaginatively in order to change, perhaps not the entire world, but institutions as we know them" (2000: 106). It is important to note that Guattari's transversality was inspired by Jean-Paul Sartre's dialectical sociology, which already accounted for subjective relations between individuals without a specific hierarchy (Palmer and Panayotov 2016; Guattari 2000: 109). In this sense, transversality as a political, deterritorialising concept becomes "a creature of the middle" able to potentiate the crossing of boundaries and dissidence against systemic regulations (Guattari 2000: 115).

¹³ However, it is relevant to note that the concept of transversality is also employed in mathematical differential topology. It was a French mathematician, almost contemporary to Deleuze and Guattari, Rene Thom, who in his doctoral thesis of 1954 introduced the concept of transversality in differential topology as a generic and stable property of intersecting smooth maps (Greenblatt 2015: 1). For hardcore mathematicians this became known as "Thom's Transversality Theorem," which can be employed to formulate both finite and infinite dimensions using nonlinear equations (ibid).

Deleuze then employed the term in 1970 as a “transversal dimension” in which artistic expressions can be interrelated (2008: 108). To exemplify this, he drew an analogy with the transmission of a ray from one universe to another (ibid). For Deleuze, transversality worked in a dimension in which relations cross boundaries affecting each other while remaining different. Specifically, Deleuze’s transversal thinking referred to Proust’s literary strategies, arguing that in his stories relations were created without ever “unifying or totalizing objects or subjects” (108-109). In a similar vein, Dolphijn and Tuin suggest that transversality does not attempt to generate new epistemologies, but operates by disrupting previous representations (2012: 108).

I operate transversality to disrupt the representations of army ants. I employ transversality to overcome any kind of linearity, horizontality, or verticality and generate a different space of interactions with ants. From this I started building my transversal work across established ant representations, refocusing variable angles to look at their agencies, acknowledging and drawing inspiration from local territorial histories and cultures. I started conceiving transversality as a process of performing and moving with ants, a process in which movement itself becomes the material for artistic explorations.

Ants are transversal beings. They cross boundaries and territories. Their movements are neither entirely vertical nor horizontal, but vivid, impermanent, and performative (Kuai Shen 2019: 6). Ants bring materials and species across boundaries into contact with each other and produce mutual and antagonistic interrelations. Their movements could be categorised as invasive, but beyond that they are transversal, they create tensions with the world of other species and the world of humans. Ants can be considered creatures of the middle “in a space in which becomings are truly creative, radically open and simply not what is now actual” (Guattari 2000: 115). Ants, and in particular *tamya añanku*, become the spaces they inhabit by nesting between boundaries: they weave fabrics generating multi-species topologies in which insect beings and rainforest matter get tangled up.

In Sarayaku, rain ants are restless entities moving freely across borders occupying any territory they want to. Rain ants are epigeic, an animal's condition of living in close contact with soil surfaces. They move smoothly across any terrain. Despite the topological irregularities of the rainforest, and the territorial presence of Sarayaku people, rain ants envelop whole areas with ease by weaving passages and bridges to transit over obstacles, gaps and water formations (Powell and Franks 2007).

Using their bodies they weave fabrics which adapt, by elastically extending and contracting corporeal masses, to the variable dimensions and materialities of this rainforest. This invertebrate capacity for weaving themselves with the rainforest demonstrates a nonhuman sensoriality tightly integrated into this territoriality from underneath. Following them as transversal beings across this territoriality from underneath opens “previously closed avenues of movement and perception” (Palmer and Panayotov 2016) demonstrating an intense mode of distribution across a smooth space without borders (Deleuze and Guattari 1987: 380).

I elaborated transversality to examine the fluid corporeal performances of rain ants becoming territorialities in motion across human-made and ecological boundaries. The territorialities in motion of rain ants afford a transmission of messages across species barriers, which lie beyond philosophical and scientific reasoning. Furthermore, relying on transversality is not sufficient to appreciate their invertebrate performances worlding with the local environments they traverse. Before transversal operations are exercised, a form of evaluation different from aesthetics is required as a principle. In the next section, I introduce the principle of aesthesis to better allocate my artistic intentions vis-a-vis Sarayaku, and to approach invertebrate worlds from a decolonial perspective.

Aesthesis

Any aesthetic framework used to describe human-nonhuman entanglements in rainforests would be inevitably bounded by Eurocentric art history. Within the topological and ontological boundaries of Sarayaku, in which weaving is a tactile and territorial experience, I argue rain ants should not be seen as aesthetic performers. As claimed by Mignolo and Vazquez (2013: 2-4; Mignolo 2010), aesthetics have been devaluing other modes, indigenous modes, for sensing and perceiving otherwise since colonial times. Thus an alternative principle needs to come forth and challenge conventional notions of beauty and aesthetic regimes.

In my transversal practice, I propose aesthesis as an alternative to aesthetics to engage with the fluid performances of *tamya añanku*. Aesthesis came before aesthetics as the term originated in ancient Greece. Translated from the Greek *aisthenastai* as the awareness of stimulation, or perception of the world by the senses, aesthesis is the sensation of touching and being touched, strongly determined

by a sensing regime governing the moment of local experience (Mandoki 2015: 18; Mignolo and Vazquez 2013: 3). In this regard, Rancière (2013) writes that aesthesis concerns conditions and modes of perception in a “sensible fabric of experience” (9-10). Aesthesis is different from aesthetics and opens to an amalgam of sensing experiences that exist in situ, conditioned by the cultural situation; experiences which have been made invisible by the colonial matrix of power and the westernised imposition of the notion of beauty (Mignolo and Vazquez 2013: 3; Gomes-Barris, 2017: 135). Aesthesis is useful in my practice as it does not rely on exclusive visions outlined by Eurocentric theories of beauty, but rather opens to other sensations and relational meanings influenced by situated understandings.

Taken by this, I see Sarayaku’s fabric of experience diverging from the aesthetic regimes of Eurocentric and Anglo-American cultures. Fending off the remaining legacies of coloniality, which are still pressuring down on indigenous worldviews and evaluation forms, in a country like Ecuador that has been submitted to the US dollar economy and the aesthetic influence of its cultural commodities, is of uttermost importance. Drawing from Rancière, I understand aesthesis as a process of sense-making that comes before performances, images, objects, and sounds, are given artistic value within recognised and established aesthetic canons (Rancière 2013: 11-12, 29, 33). Thus, I use aesthesis to ground my sensing of movements, rhythms, and weaving performances as underpinned by *tiam*, *taki*, and *awana*. In this manner, I use aesthesis with a decolonising impetus to creatively value the performances of rain messengers on conditions and modes of perception inspired by the Sarayaku culture.

Aesthesis becomes a better principle than aesthetics for a creative assessment of rain ants’ corporeal abilities. The social sensibilities of rain ants are determined by free forms of being in motion across worlds. They read the terrain with their feet, sense chemical messages with their antennae, feel temperature and magnetic fluctuations with their body receptors, and taste and transmit food by mouth-to-mouth exchanges. Their invertebrate bodies afford them other-than-human sensibilities to perceive the world. I take on aesthesis to acknowledge the invertebrate sensibilities of *tamya añanku*. In this respect, aesthesis connects to inversion: aesthesis implies inverting the aesthetic normative on the colonised and the cultures of the South, including the ones beneath, the beings of the soil. I guide my transversal methodology with aesthesis as a critical principle in decolonising aesthetics to prompt a local re-evaluation of army ants as invertebrate communities and inverted

territorial weavers, whose performances are intimately bound to this rainforest's material compositions.

Aesthesis thus demands experimenting with audiovisual operations that compromise aesthetic guiding principles from distant and privileged positions. It is necessary to explore other modes of flourishing with awkward creatures (Ginn, Beisel and Barua 2014) in order to promote different human-ant relations. Considering that studies have linked a catastrophic insect decline to anthropogenic industrial factors (Sánchez-Bayo 2019; Hallmann et al. 2017), I see the need for articulating a different perception and sensorial forms of evaluation of insects (Klein and Brosius 2022). Invertebrates are largely portrayed by high-definition cameras and microscopes. Insect portraits with shiny gloss propagate through social media and conform to an aesthetic desire made possible by magnification technologies. This imaging process subdues insects to human time and anthropomorphisms, whilst the photographer, mastering and operating expensive tech and armatures, gets the spotlight. I claim this is a process of aestheticising insects which puts more value on the abilities of the author behind the camera and the technologies employed, than the insect's abilities to create relations with the worlds appearing blurred in the background of those portraits.

Outlined by this, I use aesthesis as a tactical approach for working out a different kind of ethical-artistic interaction with rain ants as invertebrate performers. This implies assessing and readjusting sensors and technologies, and learning when and how to touch. Adequating human interactions and apparatuses to the finer sensorial worlds of significant others involves being aware that reciprocity and respect require sometimes not touching or intervening at all (Kirksey 2013: 175; de la Bellacasa 2009: 308).

With aesthesis, I force the past trajectory of my artistic practice with ants to adjust to the influence of the Sarayaku performative concepts of *tiam*, *taki*, and *awana*. However, by diverging from aesthetic framings of ant worlds, I also need to be critical with my technological reappropriations. I need to invert operations to produce different audiovisual results and modes of inquiry that are in line with this territoriality from underneath. To come closer to an examination of *tiam*, *taki*, and *awana* in the performances of *tamya añanku*, the appropriations of technologies by the Sarayaku community need to be brought into the light.

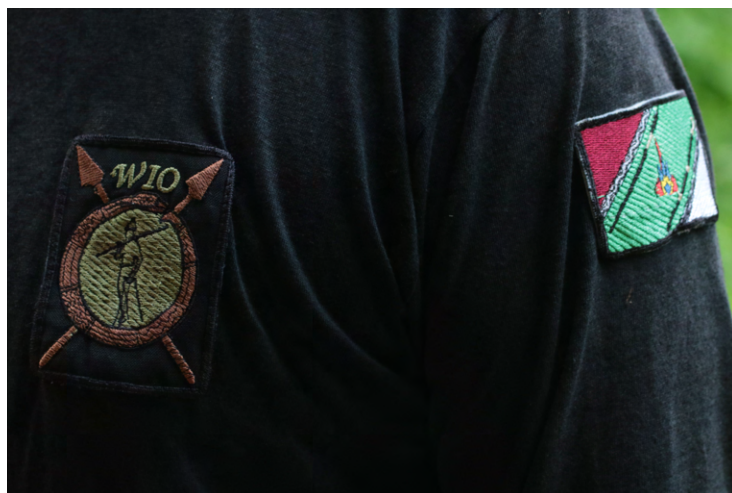
Tactical media

Ongoing incommensurable changes are at stake at the crossroads between Amazonian knowledges and indigenous appropriations of technological tools. Sarayaku's technical use of media is akin to what da Costa and Philips call a large strategy-based movement of resistance to hegemonic forces (2008: 18). In this case, Sarayaku is an Amazonian community inhabiting its own territory, partially dependent on strategic non-profit alliances, but not an institution operating from within an authoritarian regime. Yet, Sarayaku's engagement with technology enfolds community practices in complicated undertakings for the defence of territorial relations with a curiosity that infiltrates and absorbs systemic reliabilities and commodities (da Costa and Philips 2008; Garcia and Lovink 1997).

For longer than twenty years several territorial and political disputes have affected Sarayaku: military incursions, disagreements with neighbouring communities, and ongoing international litigations demanding the Ecuadorian State assumes responsibility for its complicity in the illegal planting of mining explosives. The Ecuadorian State has relied since the seventies on extracting fossil fuels from indigenous territories. In 1996, the State partitioned southern Amazonian provinces into blocks for oil and mineral exploitation. During authoritarian cartographic processes of arbitrarily drawing lines over paper, the ministry of energy and mines (*Ministerio de Energías y Minas*) under the auspice of the state oil company, Petroecuador, illegally conceded 200,000 hectares of the Sarayaku rainforest to an Argentinian oil company, CGC. Between 2002 and 2003 CGC, aided by a group of militaries, proceeded to illegally plant pentolite explosives for prospecting mining sites in Sarayaku territory, within what the State back then illicitly mapped as block 23 (Ortiz 2016: 311-313). Soon after initially undetected intrusions, Sarayaku people became aware. The community began raising their tone on sovereign territorial rights and cultural practices by using different strategies and forms of media. From radio communication to forging international alliances seeking justice in the international court of human rights in Den Hague, ongoing national marches and mobilisations into the capital, and then to today's use of social media channels, Sarayaku has potentiated tactics of political resistance.

Under the leadership of Franco, the community began organising a long-term plan for safeguarding their lands by coordinating a rainforest patrol of territorial vigilance called *wio*. *Wio* is the Kichwa

name given to the native *Wasmannia auropunctata*, a species known in the West as the little fire ant. The little fire ant, listed as one of the world's hundred most invasive species, is also known by the alias 'electric ant' as it delivers an electrifying-like painful sting, and often nests inside or near house appliances and electrical equipment (Global Invasive Species Database 2022; Electric Ant 2022). I witnessed the electric attraction of these ants during my time in Sarayaku when I stayed at Rumi's.



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Rumi is Hilda's son and he likes computers and electronics. He is part of *Watakchik*, the communication team of the Sarayaku council. Over the years, the financial support of European NGOs has enabled the council to equip *Watakchik* with computers, video and photographic cameras, GPS kits, and even a drone, amongst the already installed radio equipment, solar panels, and satellite Internet. Rumi has learned to use a Canon 50D camera and an AirBook computer. One day, I noticed a tiny ant running along the keyboard of Rumi's computer. Suddenly it entered into a narrow cranny between the keys. After a while I noticed more coming out of other keyboard interstices. Some were just barely visible, intermittently extending their antennae from inside the keyboard and waving them out of the computer. *Wio* is a tiny, barely visible, 1-mm-long ant of pale orange colour that delivers a painful burning sting, which is a characteristic defensive response. Gerardo, leader of the *wio* patrol, later told me that this ant represents "what we stand for because we are small (in reference to the height of the Kichwa people) but we hit hard like *wio*" (2019).

¹⁴ Left: the ant known in Sarayaku as *wio* carries an unknown prey along the wood plank of Rumi's hut. Right: the *wio* patrol emblem and the Sarayaku flag (on the left arm) stitched on a black shirt worn by Gerardo.

Gerardo (2019) emphasised to me that tactics were set in motion against threats of land expropriation: “*usamos tácticas de los motores fuera de borda para cubrir mas territorio...pero somos conscientes del daño que causa*” — we use motorboats as a tactic to cover more territory, but we are aware of the damage they cause [regarding fuel consumption and its emissions]. The illegal military incursions between 2002 and 2003 prompted not only a rise in consciousness in the indigenous identity of Sarayaku; it also increased the interest in technical means and reliance on motor boats for rapidly reaching the forest areas targeted by the military. Motorboats have become since then the principal means of fluvial transportation. Educational workshops have taken place over the years to instruct people how to operate and repair technical equipment and devices, but also to learn about fuel dependency. Gerardo argues the use of motorised canoes in Sarayaku and the invisible effects of burning fumes is a risky trade-off to ensure the continuous patrolling of the territory, the mobilisation of *wio* and *kaskirunas*, and the maintenance of life-making projects such as *sisá ñampi* (Chapter Two, *Weaving circles of florescence*, pages 76). Gerardo’s perspective entails not a harmonious but a friction-ridden ethical and political commitment of community response-abilities (Haraway 2016).

Technological communication systems and fuel dependency are already interwoven in Sarayaku’s biocentric ways of thinking and doing. These are everyday practices entangled with the foreign influences of cultures based on capitalism. In other words, as de Certeau claimed, these are tactics of insinuating “into the other’s place, fragmentarily, without taking it over in its entirety, without being able to keep it at a distance” (1984: xix). Sarayaku's everyday community practices continually adapt to pressing circumstances by appropriating tools and media in indigenous terms. The Kichwa people are constantly negotiating tensions between their complicit models of life and the pressing influence of cultural hegemonies. The use of technologies for activism has turned into a complicated affair of capital liabilities, overconsumption of Internet media, and opening the trap of mobile phone addiction in younger generations. However, Sarayaku has just started a journey of learning how to grapple with the trade-off of motorboats, technical operations, re-wiring cables, and recycling batteries for the sake of developing tactical mediations under their own terms.

As Franco alluded, technology is not made for storing knowledge that is woven in the land, but to use it to convey values of community practices (2019). Almost thirty years ago Garcia and Lovink prophesied that technology opens gaps for subversions, enfoldings, and reappropriations (1997: 3-4). In this vein technological appropriations by Sarayaku people are integral of a process of

decolonisation and resurgence of indigenous values with pits and slippery paths ahead. Unknown risks loom on the horizon as younger Sarayaku generations adopt the habits of social media in their lives to amplify their indigenous perspectives. Yet in my view, tactical mediations in Sarayaku while complicated strive as much as possible to be grounded on practices outside the screen and beyond productive rational models based on capitalism.

Sarayaku people are aware that the cultural and sociopolitical challenges they face require strategies of owning media in Kichwa terms to express their vision of the rhythms of rainforest life and death. The council has taken larger steps to instruct younger generations about technologies by organising workshops with specialists—from social activism using the Internet, to film-making, photoshop, 3D modelling, web design, and recycling. The communication team Rumi belongs to, *Watakchik*, is integrated by young members of the community, from 15 to 23 years old. They take turns in recording, editing, and uploading major events to Sarayaku's social media accounts, including the political meetings they take part in with fellow ethnic Amazonian communities (Sarayaku 2022). The arguments behind these mediations, as Rumi states, is to maintain a “digital identity” for creating and curating their own communication channels to the Occidental world, “*el mundo occidental*” (2019). In this way, the young Sarayakus learn to deal with issues of tech commodities to amplify cultural and territorial resistance.

Inspired by Sarayaku's entangled relations with technology, I have poached the critical apparatus of tactical media (Garcia and Lovink 1997). Employing transversality and following the principle of aesthesis, I cut “tactical media” apart and place one special “ant” in between—*wio*. Garcia and Lovink defined tactical media as a practice of crossing borders, “connecting and rewiring a variety of disciplines and always taking full advantage of the free spaces in the media, that are continually appearing because of the pace of technological change and regulatory uncertainty” (1997: 3). Thus the deployment of tactical media in my work becomes an apparatus for questioning the use of technologies. In this sense, my tactics using technologies must come to terms with the dimensional intricacies of the territoriality from underneath: a) to follow rain ants guided by *tiam*, *taki*, and *awana*; b) to turn scientific perspectives and artistic practices around and upside down; c) to problematise and diversify technological methods for the production of a different fabric to experience ant worlds.



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With this approach, I am strategically problematising ethical issues in practices that rely on technologies without regard for the insect subjects and their ecological habitats. Some of my early artworks were involved in this kind of media art production, especially with leaf-cutter ants. I created artificially mediated habitats and technologically augmented procedures to amplify ants' social faculties and forms of communication by technical means (Kuai Shen 2010). Under careful supervision, the ants I kept were constrained inside acrylic chambers, surveilled by cameras, and amplified with contact microphones. My previous practice forced ants into artificial time and aesthetically designed environments. I was an artist in love with and in control of their subjects. As hard as I tried, I failed them because I could not, and would never be able to, faithfully simulate the vital conditions they require. In healthy rainforests, the lifespan of a leaf-cutter community could reach 25 years or more (Wilson and Hölldobler 1990). In my studio lab I could not offer everything they needed—even though I managed to keep them alive for 11 years, the last leaf-cutter community passed away on April 2022. Moreover, my international agenda of exhibitions imposed a hardship on ants to travel in even tighter compartments. Exhibiting ants in transparent habitats has

¹⁵ Top left: one of the few solar panels installed in Puma, the centre of Sarayaku. Top right: kids watching a drone getting ready to record an event of the council. Bottom left: six teenagers watching a movie on a mobile phone. Bottom right: Valerio operating the drone over the river.

a detrimental effect on them. Leaf-cutter ants dig fungal chambers underground. They are free to decide when and how to open vents for thermoregulation. In artificial captivity, this requires the constant monitoring of temperature fluctuations, humidity levels, and ammoniac emissions from the refuse piles. The overall stress of forcing them into aesthetic containments and touring with me as part of my artistic agenda is a failed responsibility I hold myself accountable for, despite the invaluable support I received from curators and assistants. This recognition brought me to the “open whole” where I am today (Kohn 2013: 63) to invert the roles. I now force myself and my media assemblage to adjust to their environments and be subject to their conditions and world interactions.

Artists working with electronic mediation and live insects out in the open under similar decolonial imperatives to raise indigenous values are few. I, for once, just started this journey of completely moving from laboratory and studio settings out to a specific cultural site of ant motions. There are many artists who have created artworks with or about ants, the global extent of which is impossible to map into meaningful relations to my present decolonial arguments. Donna Conlon is, however, a predecessor worth mentioning. She intervened in a free community of leaf-cutter ants in Panama filming a parade of them carrying artificial leaves painted as flags of different nations and peace signs. Her work “Coexistence” (2003) was a political statement against the Iraq war, yet it did not engage indigenous perspectives. In relation to my practice-led research, I chose to do a particular exegesis of the art duo Mazonett and Quiroga, and Tomas Saraceno, in Chapters Four and Five, respectively. Mazonett and Quiroga did one performative intervention in the life of leaf-cutter ants in a Colombian forest which is being mined for gold. Saraceno’s long-term work with spiders employs similar amplification techniques as mine to sonically explore tingling senses and entangled webs.

Still, the aforementioned artists did not underline their approaches to invertebrate life with tactical media. Tactical media instigated a critical discourse that set me on a conversion path for venturing beyond the regulated space of art production and scientific methods. With tactical media I was able to develop electroacoustic and algorithmic mediations with *tamya añanku* at the interstices of art and science that amplify a territoriality from underneath and the worldview of Sarayaku people; tactical media open the opportunity to get out of my previous artistic comfort zone and test out the same electronic apparatus of sensors, this time rewired and adjusted to ant habitats, carefully acknowledging I am a guest in this world of earth beings. By assembling and improvising portable technologies, I amplified invertebrate weaving forms at the site of ant motions and on the grounds

of the Sarayaku culture. In the next section, I present the transversal operations that combine aesthetics and tactical media in the materialisation of artworks using digital technologies.

Inverting operations

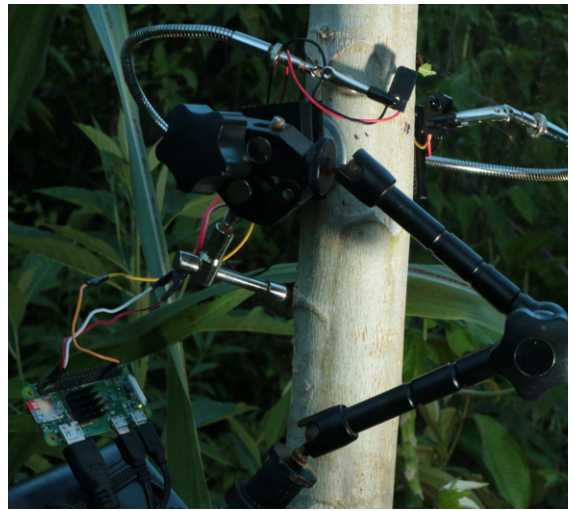
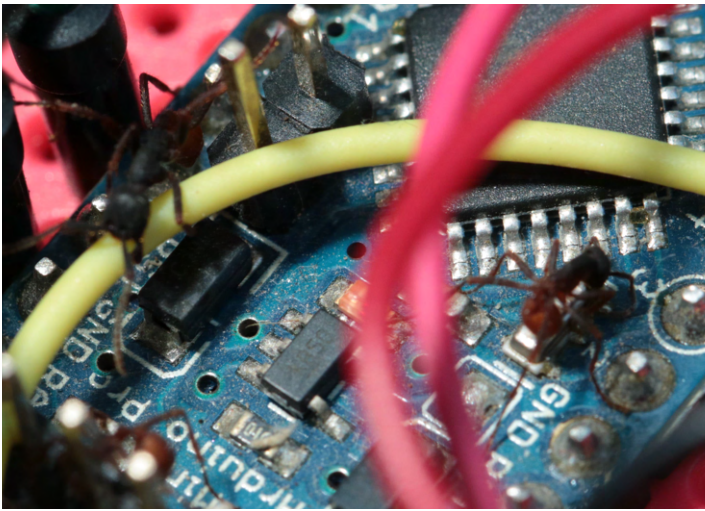
My transversal use of technologies consists of re-purposing and re-programming electronic assemblages in order to see, listen, and attend to ants as invertebrate communities weaving themselves with the territory. Thinking with aesthetics and tactical media, I tinkered with electronic media, rewired sensors, and re-coded programs. The human perception of the world of ants is heavily mediated by vision. Patient observation is required to make sense of what ants do and where they go. Scientific behavioural analyses depend on algorithms for motion detection to rewind, pause, and fast-forward the moving agencies of ants. I intended to complicate the primacy of the eyes and the technological gaze by involving other modes of interspecies interaction. Through a series of experiments, I interfered with and amplified the territorialities in motion of rain ants using intrusive and non-intrusive methods, combining audiovisual operations and electronic devices:

- non-intrusive: positioned at careful distances, time-lapse photography and infrared thermal cameras documented migrations and nest transformations;
- intrusive: devices assembled with micro-controllers, conductive, and piezoelectric sensors were placed across ant trails to pick up acoustic frequencies and electromagnetic variations. Conductive sensors work by reading the electrical conductivity within an electric circuit (Landwehr and Kuni 2013); commonly embedded in touchscreens, for example, I repurposed these sensors to register the physical interactions of ants forms in transit. Whilst piezoelectric sensors worked as contact microphones to amplify sounds transmitted over a surface or material, and with them I was able to record ant vibrations as they flow across the forest.
- intrusive: laser and photocell arrays were placed on the sides of running columns during migration and hunting, beneath nests and sudden clusterings. This allowed me to register the collective movements of ant bodies blocking and scattering the incidence of laser beams. The photocells at the other end recorded the differences in laser intensities, a string of numbers measuring variations in electrical resistance as the laser beams were diffracted and interrupted by the ants' corporeal performances.

- non-intrusive: computer vision and machine learning algorithms were used post-fieldwork to visually render rain ants in different postures and situations; to detect and trace their movements. By applying these algorithms to my fieldwork collection of photographs and video footage, playing with parameters and tweaking configurations, I created the portrait of *tamya añanku* as territorial weavers and rain emissaries.

Some of these assemblages were carried in my backpack during my Sarayaku forays. I challenged their technical capacity to register the aesthesis of ant movements and rhythms under the environmental pressures and cultural influences of this rainforest territory. I challenged their technical functionality under extreme humidity. Failures ensued without repair. Electronics got wet and malfunctioned. Batteries ran out and mediations were abruptly interrupted. Programs crashed and did not work on time. These, I reckon, were important aspects in the exercise of transversal operations that depend on improvisations on the run, learning from mistakes, and levels of attentiveness to properly engage with the invertebrate fabrics of *tamya añanku*.

My transversal operations gathered qualitative data from the above-listed intrusive and non-intrusive methods. I worked with these data through the use of four processes: amplification, interference, syncopation, and convolution. I claim the portrait of army ants as model organisms is rendered valuable by operating computing processes such as these. As I will demonstrate, amplification, interference, syncopation, and convolution were chosen because the processing modes of acoustic and visual signals they enable are much in line with technological operations widely accepted and employed in art and science practices—especially in the analysis of animal behaviours. I transversally repurposed these processes and operated them to invert the scientific representation of army ants and generate audiovisual results outlined by *tiam*, *taki*, and *awana*.



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16 Top left: a mini Arduino computing assemblage being raided by rain ants. Top right: failed setup experiment with infrared sensors. Middle: ants crossing the main path in Shiwakucha intervened with my laser-photocell array (red laser of 650 nm wavelength). Bottom: when I was photographing rain ants, I stepped on branches that were interconnected with their woven nest—a regular event during my forays. In less than ten seconds, they came to say hello. It took over 12 minutes until I could return to get my flash.

Amplification

Amplification can simply be understood as the process of increasing the volume of sound, or the amplitude of an electric signal. Amplification is also a common process used in molecular genetics to obtain multiple copies of a DNA sequence, an increasingly common practice for identifying ant species. In sound synthesis, via hardware synthesisers or computing processing algorithms, a basic amplification is accomplished by increasing decibel units of any given signal.¹⁷

Amplification is a visual process too, as any image or video footage can be amplified via diverse software or electronic processing techniques. In this aspect, it is relevant to take into account that were it not for technologically-mediated visual amplifications in scientific methods, e.g. microscopes, and scanning-electron-microscopy, the knowledge acquired about ants would not have been possible. In other words, the meanings ascribed to the microscopic details of ant worlds, their social and spatiotemporal magnitudes, have been strongly mediated by observation and computer vision. It is only recently that the turn to molecular genetic methods to analyse the chemical nature of ants has been increasing in popularity and yielding new results. This brings into focus a critical assessment of relying too much on audiovisual amplification. Besides molecular genetics, I recognise other potential modes of amplification, i.e., chemical and olfactory, as artistic means of mediation to better come to terms with the world of ants.

While the process of amplification has many uses in different disciplines, I employed it by means of macro-photography, SEM¹⁸, piezoelectricity, and in experimental olfaction. Experimental olfaction occurs with synthesised scents spreading in the artworks I exhibit (Chapter Four). Piezoelectric amplification enabled me to record rain ants' vibrations in situ. Visual amplification with macro-lenses was conducted by placing cameras on tripods and holsters attached to branches, following a non-intrusive approach to avoid disturbing the ants' natural flow. Yet, sometimes this process became intrusive, as things fell out of hand, or I mistakenly stepped onto concealed roots that were

¹⁷ In sound production and for musicians, synthesis refers to the composition of new sounds, while processing refers to the modification or manipulation of sound compositions, pre-recorded samples, notes, or patterns.

¹⁸ SEM, short for scanning-electron-microscopy, is a process in which a beam of electrons interacts with a conductive coated specimen, prepared beforehand, enclosed in a vacuum chamber. Usually this concerns any kind of organism or material whose microscopic features are in the nanometer scale. The resulting image gets magnified in great resolution by the reflected electrons carrying information from the specimen. In this way thinking transversally with aesthetics and tactical media, my practice using SEM looks at the intricacies of ant bodies as micro-topologies.

interconnected with the fabric of ants. Precisely in those instances, transversality was issued by acknowledging that interferences induce displacements and create unforeseeable encounters, such as ants amplifying aggressive responses.

Another related aspect of amplification that accompanies my exegesis links to decolonial practices in the community. Sarayaku possesses a collective voice. Within the territory, people labour together, perform loud music with drums and flutes, shout to announce arrivals, and all these sounds generate a collective rhythmic presence that gets amplified across the rainforest: an acoustic territoriality announcing human rhythms of activity. Besides, Sarayaku's political and ecological activism echoes forms of amplification, i.e., convocations to support the indigenous social movement in national strikes. In this regard, people employ social media to amplify their knowledge and share different opinions, but also for communicating organisational tactics across regional and political boundaries. In their terms, they combine radio and the internet with traditional forms of bringing messages across rivers to notify convocations.

Amplification is an elementary operation that works on the social microscopic world of rain ants by implementing image and sound processing technologies to enlarge their spectrum of rhythmic motions. As part of my transversal methodology, amplification allowed the enlargement of rain ants' performances beyond aesthetically pleasing or scientifically conformed contexts. Amplification is my first operation to reveal different aspects of ant movements. The second collateral operation that follows amplification is interference.

Interference

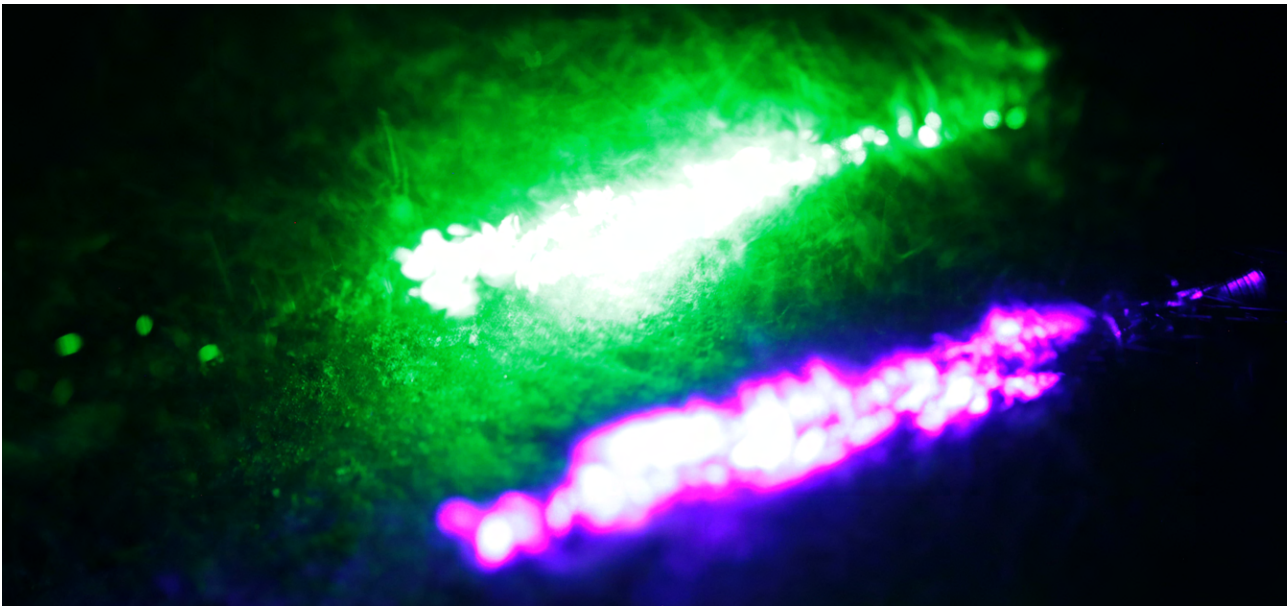
An interference is a disturbance caused by unexpected interventions. In physics, interferences are defined as two or multiple waveforms combining to produce a resultant wave, in which the displacement is either cancelled or reinforced. I understand interferences as both means for elimination and creation. Barad's difference/diffraction studies in this aspect deserve special attention (2007; 2014). Diffraction is an interference phenomenon that creates patterns of difference resulting from the superposition of waves (Barad 2007: 77, 80). Following the diffractive figures of Barad, I look at the superposition of amplifications and interferences created by rain ants' turns and rhythms. By working with interferences in this manner, I operated at the crux of technological and

ecological understandings, acknowledging the capital-driven interferences in the lives of the people, my own interferences in the life of ants, and the trajectories of ants interfering in the life of others.

Rain ants, considered key predators of the Amazon, interfere with stronger rhythms setting in motion processes of redistribution, renewal and death, in the lives of other species. In this light, their interferences can be seen transversally, cutting apart living processes. Also, the invertebrates that depend on rain ants act as interfering agents. A wide range of parasitic and mutualistic relations oscillate between interferences and reinforcements in the vital performances of *tamya añanku*. It is at the threshold of interferences that noise appears as both a disruptive and creative force, like the parasite, as a “differential operator of change” (Serres 1982: 196). In this regard, the noise of rain hitting the foliage and the noise of rain ants running across forest lands are forces of interference.

In my practice, interferences arose from intrusive technological mediations to create electromagnetic difference, e.g., as a product of piezoelectric amplification. Piezoelectricity here exemplifies interference as a process of transduction of physical differentials into electrical waves; physical vibrations and deformations make the ceramic layer of the piezo disc oscillate, generating electrical currents which can then be amplified as sounds. Interferences caused by rain ants running over piezoelectric discs might be understood with what Barad (2014: 168) calls a “cut together-apart (one move)”: different sound waves overlapping, coalescing, and ultimately becoming fluid sounds that metamorphose into the sounds of rain.

Another way interference worked in my practice consisted of laser-photocell arrays to register ants interfering beams of light. Ants crossing the lasers blocked and scattered the intensity of the beams, producing diffractions that were visually documented and electronically registered in situ. The data collected from these interferences were stored as numerical values for later creating algorithmic modifications. This form of experimentation with laser interferences at the site of ant motions lends a different character to rain ants’ performances. Barad says that “the temporality of re-turning is integral to the phenomenon of diffraction” (2014: 168). My laser interferences on rain ants play with her notion of making a cut that differentiates-entangles (185) to work on a novel materialisation of ant movement. In this light, I also invoke *tiam* as a radical turn: the corporeal flow of ants returning to the nest reflect and diffract the laser beams back to the photocell receptors creating radical imagery.



5 0.02
 6 0.02
 9 0.03
 3 0.01
 12 0.04
 1 0.0
 3 0.01
 5 0.02
 10 0.03
 4 0.01
 3 0.01
 2 0.01
 28 0.09
 8 0.03
 28 0.09
 18 0.06
 17 0.05
 18 0.06
 25 0.08
 7 0.02
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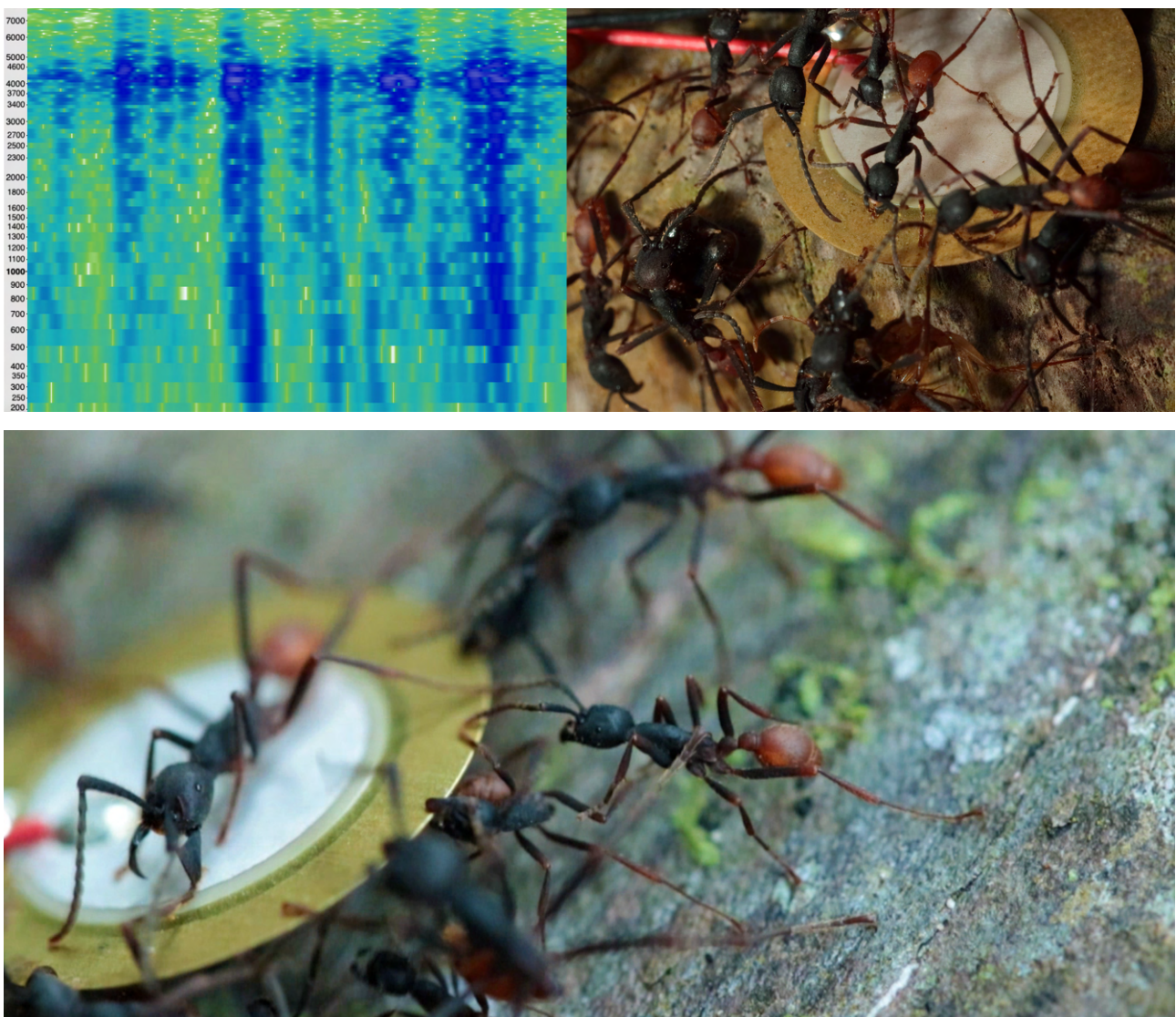
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Interferences can endeavour tactics for cutting apart systems of lines and colonial legacies. However, interferences have also been historically perpetuated by colonialism and capitalism. The community practices in Sarayaku in this respect entangle continuously with hegemonic forces interfering in their lives. Sarayaku creates waves of interference during national strikes, too. Raising voices and crossing rainforests and mountains, they adhere to the indigenous social movement in

¹⁹ Top: photograph showing a rain ant manipulating a photocell next to a corporeal passage during a registry of laser interferences. The data on the right shows an excerpt of the string of values registered with this operation. Bottom: photo of laser interferences placed across a night migration of rain ants in Shiwakucha.

Ecuador creating cataclysmic marches, with larger-than-life rhythms, that interfere with the status quo of civil order (Becker 2011; Gutiérrez 2014).

Interference and amplification were consistent operations in my practice. Transversal operations driven by amplifications and interferences enabled me to initiate the process of inverting the representation of army ants. Still, the operation of audiovisual technologies using amplifications and interferences was not sufficient; two other complex operations are needed to fulfil the transformation of army ants into *tamya añanku*. I first discuss syncopation in the next section and then, for the last part, convolution.



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²⁰ Top left: bark spectrogram (range 200–7000 Hz) of 0.3 seconds from an original recording of 90 seconds length using piezoelectric amplification. Top right: rain ants walking over a piezoelectric disc, two can be seen carrying dismembered prey they hunted from inside a wooden cabin. Bottom: rain ants moving, biting, and dragging their stingers on a piezoelectric disc.

Syncopation

The process of syncopation incorporates and intersects with that of interference. The idea to use syncopation was inspired by extensive sessions observing and listening to the displacing rhythms of *tamya añanku* when they traverse across the rainforest. Syncopation is a musical term. It means the placement of rhythms where they are not expected to occur, causing a disturbance or interruption in the regular flow of rhythm.

I employ syncopation to align with *taki*, the local notion of rhythm in Sarayaku, to describe the unruly rhythms of *tamya añanku*. Syncopation is employed in my transversal methodology to honour the sonic experiences of Sarayaku, and the forces of rain entangling with the migrations of rain ants. Syncopation enabled me to convert the performativity of invertebrate bodies in motion that impose their rhythms on other lifeforms into sounds.

I use syncopation to work on acoustic expressions of invertebrate rhythms that do not necessarily submit to harmonic music patterns.²¹ Syncopation brings the former processes of amplification and interference into play to generate acoustic fabrics. According to Wright (2008), electronic music composer and one of the creators of MaxMSP, a software I use in my operations, syncopation is also known as offbeat: a beat “lying between the pulses of a higher metric level” (27). As remarked by Wright, syncopation “operates by defying the expectation that every beat will be articulated by a sound event” (ibid). In other terms, syncopation describes those asynchronous moments of improvisation during which certain instruments or sounds emphasise beats which do not necessarily match or follow an ongoing beat of a composition. Eventually, different beats either create even more rhythmic displacements or coincide, strengthening a new rhythmic force.

My perception and use of syncopation is an entry into *taki*. Syncopation can be used as a decolonial acoustic operation that inverts harmonies. It focalises on unconventional rhythms and sudden emergent sounds which evoke a kind of acoustic resistance. Across different times and places, Sarayaku emerges as a landscape of acoustic resonance that is syncopated. Sporadic unexpected sounds of interference emerge through frequencies and drones emitted by running motorboats, shouts and laughter, or distant shotguns of people hunting: a composition of acoustic textures,

²¹ For instance, the Western’s twelve-tone chromatic scale, a defined set of twelve pitches for notes used in musical composition, and which standard, classic, instruments produced in Europe are able to reproduce.

polyphonies, and bioacoustics oscillating all at once. This is most remarkable during *minga*, when people take turns transporting materials, improvising work together with a characteristic offbeat rhythm through the forest which at the end gets the task done; or when people drum and dance the *kajana tushuna*. In *kajana tushuna*, the initial beats of the drums are out of tune. Progressively, drummers join in and a temporary cohesive body of sound is achieved, which cues the turning motions of women dancers.

In electronic music composition, syncopation, with a properly intuitive tact and flow, becomes in time an identifiable offbeat one can follow and move to. However, syncopation bears an imminent risk of quickly diverging from a cohesive compositional body, turning into dissonances and distortions. I explicitly wanted to focus on dissonances and distortions, as for me these are sonic manifestations emitted by rain ants scratching and displacing the rainforest. I combined field recordings of airborne acoustics and substrate-borne vibratory sounds to experiment with different accents, patterns, and samples. I experimented with generating oscillations by applying granular algorithms to sound recordings of rain ants, using creative coding environments, and software such as MaxMsp, Sonic Pi, and Touchdesigner. I also worked on layering rain sounds on top of the sonic textures created by rain ants. This approach turned into an iterative creative process for electronic acoustic syncopation, a process that materialised alternative sonorous expressions of the acoustic convergence of ants reproducing the sound of rain.

Across Amazonian dimensions, syncopation arises as an alternative process of rhythmic attunement to a local world in formation, in which rain can be seen as a force of syncopation. Tamyra añanku turn into shelters and weave passages to evade rain and water. Their invertebrate fabrics pulsate in and out in syncopation with the rain. At the same time, the turns taken by rain ants interfere in the lives of other species. These turns, guided by *tiam*, constitute a fundamental performance in the creation of invertebrate fabrics. The last visual operation I employ in my methodology approaches these turns as convoluted processes.

Convolution

The final component of my transversal methodology is convolution. Convolution can be defined as the process of becoming twisted or coiled. This definition applies to environmental, social, and

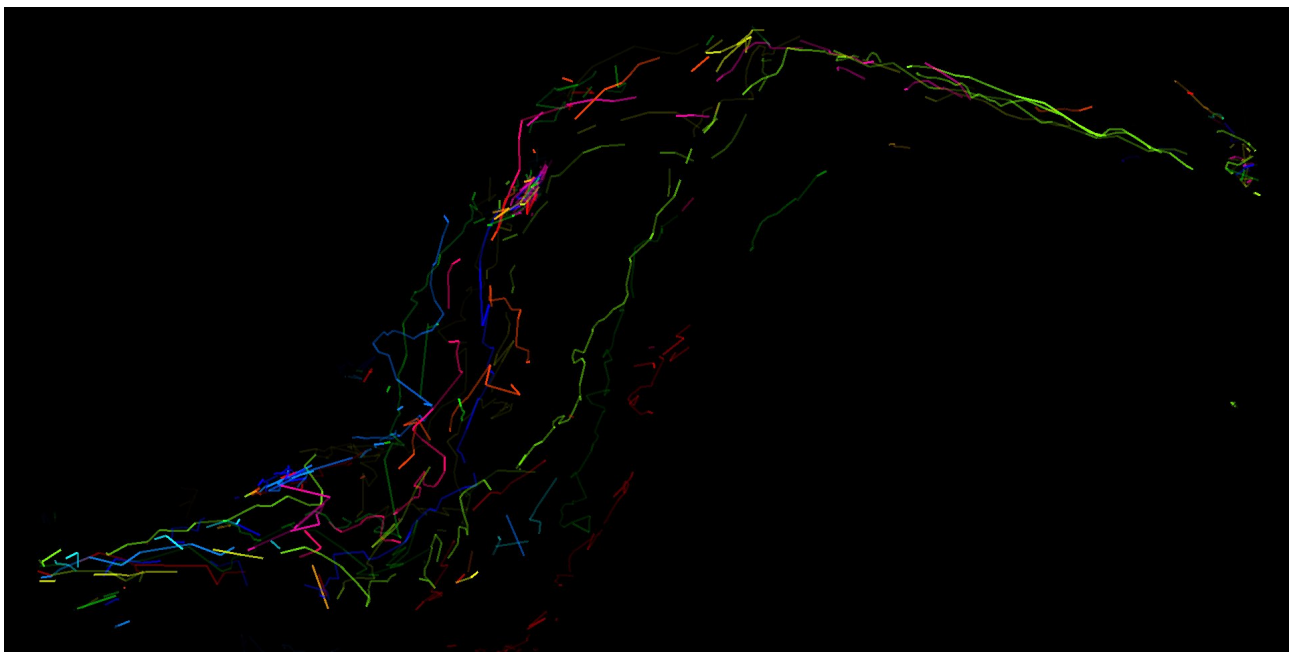
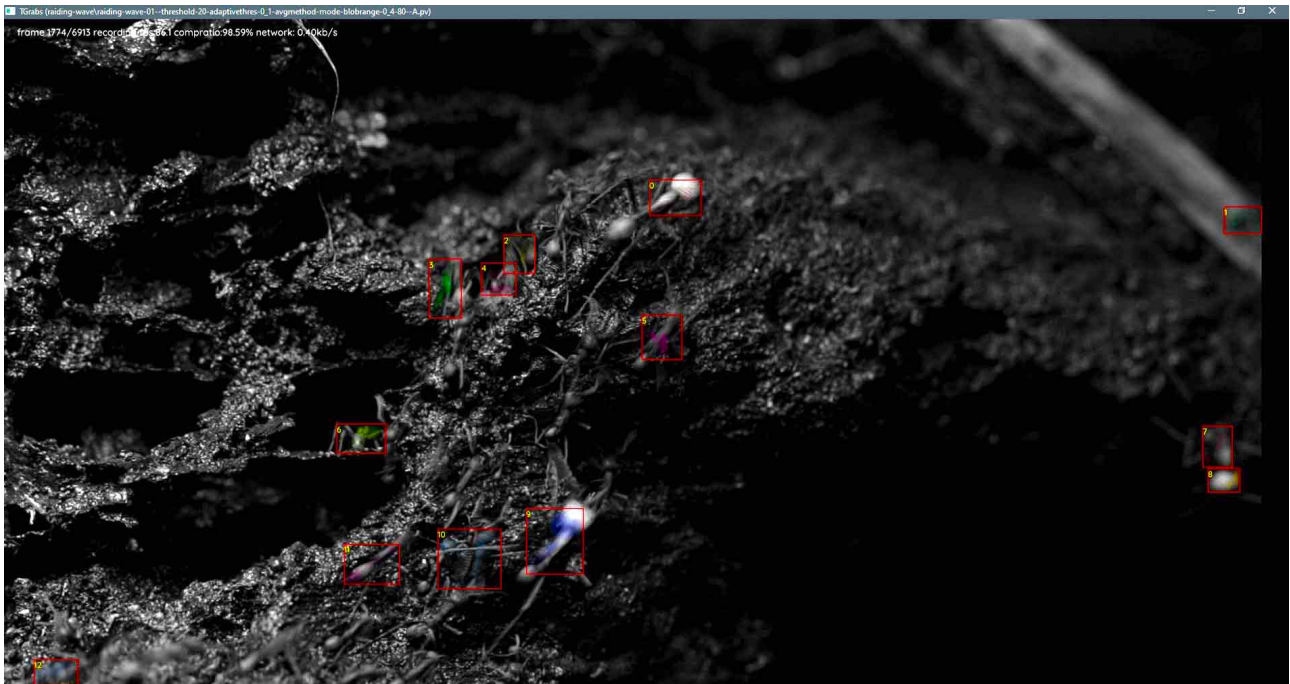
mental movements (Guattari 2000: 112) when following complex subjects and difficult trajectories. In this sense, convolution describes an ontological process of getting caught or becoming captivated by the interplay of movements and rhythms of rain ants, as they force you into uncomfortable positions, making you turn around and upside down.

Convolution is a process of turning motions. It induces circulation, spins, spirals, and vertigo. Convolution can be conducive to entanglements and irregular or unexpected forms of weavings. Convolution interconnects with *tiam*, as a radical turn, in this sense. Convolution involves radically inverting perspectives, a continuous overturning. I underpin my artistic perspective and intent on using convolution by departing from the following definitions in botany, mathematics, and computer science:

- Botanic convolution describes spirally tangled elements such as leaves rolling around themselves forming an identifiable pattern. Under certain conditions, epiphytes, branches, roots, and rhizomatic formations convolute.
- Mathematical convolution is an operation on two functions that produces a third function, which expresses how one shifted and reversed function is modified by the second function.
- In computer science, a convolutional neural network, also known by the acronym CNN, is a set of classification algorithms for signal or image processing that uses mathematical convolution operations. The name of convolutional neural networks is inspired by the animal visual cortex, which relies on receptive layers of neighbouring neurons that respond to a set of stimuli to produce particular image outputs. The functional interconnectivity of a CNN is usually illustrated in computer science by matrices or interconnected layers. This image, once situated onto Sarayaku's territoriality from underneath, is evocative of a fabric.

Convolution was materialised via a transversal operation that interconnects its botanical, mathematical, and computing meanings. Looking through transversal glasses, an encounter with rain ants is a convolutional process: ants crossing each other, rolling on top of one another, a viscous mass spiralling down, disentangling from woven nests, becoming multiple in intimate adjacency as they weave themselves into passages and shelters. The human mind has to alternate attention on individual ants in order to progressively make sense of the moving whole. Individual trajectories and traces are extremely difficult to follow without the control of time by technical means. This process of identification is facilitated by employing computer vision algorithms for

motion tracking. In my practice, I specifically use algorithms for convolutional neural networks to detect and draw the moving patterns of rain ants.



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By repurposing these algorithms, I visualise radical turns and the weaving of invertebrate fabrics. I also worked with convolutional algorithms for image processing by transferring styles from one photograph to another. The visual results are shown in photo prints and on multi-screen installations

²² Top: still from a video sequence of rain ants going hunting, processed with algorithms for motion detection based on convolutional neural networks (TRex). Bottom: I reconfigured the tracking parameters to visualise weaving trails.

presented in the examination exhibition, especially in my artwork *Tiam Movements*, presented in Chapter Four. I basically used open-access algorithms for image transfer published by Athalye (2015), and the tracking system for markerless identification called TRex by Walter (2021). By operating these two open-access algorithms with the imperative of inversion, I created visualisations of the world of tamyá añanku that emphasise their fluid and entangled identity with the Sarayaku territory.

Adapting code and playing anarchically with algorithms has been integral to my past line of work with ants in “Oh!m1gas” and “Thermotaxis” (Kuai Shen 2010, 2017).²³ In my tactical work now, I utilise open-source applications as part of a transversal critical-making practice that cross-fertilises “creative powers of invention with which life among media must be taken up” to involve innovative schemas of confrontation and insertion (Fuller 2005: 10, 5). My own methods of coding are messy, and exercised by means of trial and error for creative experimentations. I have always programmed my interfaces and media installations. Every artist should learn to code their own programs. For me, coding practices can represent a statement of ethical proportions and subversive creativity against software monopolies and technological propriety. I claim deviations from aesthetic standards using computing algorithms are imperative in times of global crises and social unrest, particularly concerning learning algorithms that are exclusively trained with visual content using images solely based on European and Anglo-American cultures.²⁴ Artistic explorations bending the limits and exposing biases in programming languages are anarchic acts against the system of technocracy.

However, open-source coding and free software encompass a wealth of tactical practices and critical aesthetic-political discourses, the discussion of which lies outside the main scope of my present project. My transversal operations focus on machine learning algorithms that can be repurposed to convolute moving images and also sounds. Regarding the latter, I worked on granular synthesis using an artificial network of algorithms called self-organising maps, or SOM for short. SOM has been deemed by its creator as a topological computing neural network, which organises itself based on the input patterns that it is trained with (Kohonen 1982). In this case, the input

²³ There are numerous open-source programs available to implement convolutional neural transfer algorithms. These are accessible via Github repositories under sharing licenses such as Creative Commons. Basically, GitHub is a public online platform with a free-to-use share-alike mentality, hosting a myriad of developers who follow the open source credo: to contribute utilities and applications, whose code is open for reprogramming, collaborative debugging, and reinvention.

²⁴ For example, the text-to-image DALL-E machine learning model from OpenAI, which generates entire digital worlds by taking a text prompt as input. The scope of my present decolonial methods does not involve this technology. However, I am considering working with this in the future as I see the need for a serious exegesis of its artistic employment in order to decolonise its uses.

patterns are audio files, instead of images as in the case of convolutional algorithms. By passing in sounds, the synthesised result acquires a granular acoustic texture. This sonic texture is meant to invoke a carpet full of ants and can be played back in different iterations, in the manner of a weaving pattern that transforms and mutates in time. This method of weaving sounds is inspired by the weaving performed by *tamya añanku* and builds on the notion of pattern-making, which is a commonplace practice in electronic music composition. The result of implementing self-organising maps with recorded sounds of rain ants is part of the artwork *Taki Rhythms*, presented in Chapter Five.

By reworking machine algorithms with images and sounds of ant origin, I exercise a critique of the programming and classification bias persisting even in open-source technologies. It is crucial to point out that most datasets, i.e., the image models used to train algorithms of recognition, have been exclusively compiled with objects, figures, and human features of Anglo-American and European cultures. Machine learning algorithms are commonplace, enforced by the infrastructures of technology-hungry societies in which unsupervised computer tasks have capital value. Integral to my tactical media discourse is to become transversally creative with the limits and sociocultural issues hidden in codes, without losing a critical-making impetus of origin and trajectory with respect to Sarayaku. With this in mind, I combine amplification, interference, syncopation, and convolution to express the *tiam*, *taki*, and *awana* in the aesthesis of *tamya añanku*.

My transversal methodology explores a new form of inquiry and re-presentation of this species of ants. However, it is necessary to take into account that tactical mediations with algorithms are placed in confrontation with the Amazonian world of Sarayaku. Levelling with audiovisual programming, circuit-bending, and coding practices, vis-a-vis the Sarayaku reality, is not free of issues. I am aware that lessons need to be learned and adjustments need to be made in the deployment of this methodology. These will be discussed in the final chapter.²⁵ For now, it is important to remember that coding practices, like the ones I engage with, are still foreign to the people of Sarayaku, as programming languages are mostly written in English. A debate has to ensue

²⁵ I reckon my practice still has to be contested by the people of Sarayaku in order to know the values of my artistic contribution. For the purpose of achieving the ethical contribution I seek, and to merit their local practices and culture of territorial relations, the artworks and ideas I have developed need to be shown in Sarayaku. This is discussed in my conclusion (pages 179-184).

about computer programming that dares to include indigenous languages and logics, or else offer opportunities for them to learn coding languages.²⁶

A spectrum of rhythmic motions

I created media installations that amplified, interfered with, syncopated and convoluted the colonial image of army ants. These were transversally operated to produce a diversity of visual and electroacoustic compositions. Ant movements were rendered as visual threads, and ant rhythms as sound waves, crossing and weaving invertebrate fabrics. The variable results mediated through my transversal operations show a spectrum of audiovisual oscillations emerging from the unruly performances of rain messengers. The notion of spectrum is key to understanding what comes in the next chapter. My notion of spectrum incorporates oscillations, dissonances, frictions, and tensions, ongoing processes of differentiation and diffraction, which result from the application of transversal operations to understand ant worlds in Sarayaku. This spectrum is materialised, on the one hand, in photographic prints and dynamic visualisations, which I produced using algorithms of convolutional neural transfer and motion detection (Athalye 2015; Walter 2021), and on the other hand, are shown in photographs taken during night migrations of ants crossing laser beams: these images depict colourful diffractions and displacements caused by the interferences of ant bodies.

A spectrum signals divergences from fixed and stable definitions. Following my ethical intention for inverting colonially biased scientific representations of ants, I use the term spectrum to indicate that rain ants' mode of existence demonstrates indeterminacy. This indeterminacy, however, is deeply affected by the territorial relations being woven in this rainforest. The notion of spectrum emerges as an appropriate exponent of rain ants' invertebrate territoriality in motion, as this is being affected by the fabrics of Sarayaku. Inherently transversal, rain ants' territoriality in motion transcends barriers bearing ecological, sociopolitical, and meteorological significances. It is by recognising radically variable movements and rhythms in rain ants' invertebrate performance that they become territorial weavers. As territorial weavers, they adjust their corporeal fabrics to this Amazonian world and evade the epistemological confines of 'a colony,' of militaristic analogies and obsolete imperialist perspectives. By working with the notion of spectrum, guided by *tiam*, *taki*, and

²⁶ This is a considerable possibility, however, which bears its transcultural issues and complications. The interest is emerging especially in the younger generations of Sarayaku, who already are bilingual (Kichwa and Spanish) and not shy of learning another foreign tongue.

awana, I create an artistic rendition of *tamya añanku* that is not categoric nor strictly defined, but open and unruly. *Tamya añanku* are active participants in the weaving of territorial resistance and their movements and rhythms unfold a spectrum of possibilities. Theirs is an inverted world freely woven (*awana*) by radical turns (*tiam*) and rhythmic oscillations (*taki*).

In Sarayaku, movements weave rhythms, rhythms weave movements, and a world is being brought into life through weaving. This encompassing understanding is my canon. With this understanding, I turned transversality into a weaving method that inverts army ants into rain messengers. This transformation is done by crisscrossing between disciplines, linking different processes across the territoriality from underneath of Sarayaku, along a sociopolitical culture, and ecological place of territorial relations with greater earth beings. In the following chapter, I present these earth beings, and the territorial relations woven with them, by invoking the Kichwa concept of *kawsay*.

2 _____ Weaving territory

Kawsay

Across the fabrics of Sarayaku, there are seven interconnected communal settlements: *Sarayakillu*, *Puma*, *Kushillu Urku*, *Kali Kali*, *Shiwakucha*, *Maukallacta*, and *Chuntayaku*. They constitute a territory woven by the lifeforces of water and rain circulating through the porous skins of forest lifeforms. These lifeforces correspond to what Kichwa nations address as *kawsay*—vital energies flowing across spatiotemporalities of Amazon worlds (Uzendoski 2008: 15-6). *Kawsay* means life and it is often translated into the Spanish “ser,” as in the meaning of existing or being (Kinti-Moss and Masaquiza 2018: 65). In the words of Dionisio, leader of Sarayaku’s forest guards, *kawsay* is “*ser, vivir, existir...no confundir con lo espiritual, kawsay es una energía de vida* (it means to be, to live and exist...*kawsay* is not to be confused with a spiritual energy, *kawsay* is a living energy).”

Kawsay is not simply biological life. *Kawsay* is a lifeforce in motion traversing through bodies of contribution, weaving territorial relations in the form of social fabrics. In my artistic work, I imbricate transversality with *kawsay* to establish that the state of territorial relations large and small are not fixed structures. *Kawsay* demonstrates that this Amazonian world is a world in formation. In my artistic reading, *kawsay* is brought into being by multiple lifeforces traversing between worlds. This notion prompts thinking about trails, footprints, and ecological imprints of forest lifeforms enacting place-making weaving performances. *Kawsay* enables the apprehension of multiple modes of life, and the disruptive and co-creative mobilities that bring forth challenging encounters and unforeseeable life associations between forest entities. *Kawsay* appears as oscillating vital threads of energy in the fabrics of Sarayaku. This vital thread changes its magnitudes according to the tensile properties being woven vis-a-vis capital forces and cultural influences from outside.

In Uzendoski’s exploration of the healing plants used by the Naporuna, a fellow Kichwa population in the province of Napo, he suggests the circulation of *kawsay* entangles human identities in complexities of “becoming connected, of having a history and specific social meanings tied up” in the coauthoring of places with other entities (2008: 21, 24). *Kawsay* is in this sense a significant, powerful concept in the culture of Sarayaku, particularly considering that the Kichwa meaning of

the name ‘Sarayaku’ indicates fertility and fluidity: *sara* means maize, and *yaku* means water or river.

Rain is life, *tamya ñukanchik kawsayman*. Water is life, *yaku ñukanchik kawsayman*. During my time in Sarayaku, I was captivated by the lifeforces of rain weaving patterns on water, generating ponds, creeks, currents, and becoming turbulent, flooding lands and taking organisms along for a wild ride. *Kawsay* lives in the rain and water flowing across Sarayaku, just like it is embodied by rain ants flowing across its territorial bodies. The forest lands of Sarayaku have been woven with the passing of *kawsay* as lifeforces across times, through torrential rains and geological-meteorological encounters between earth and water.



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Kawsak Sacha and Sumak Allpa

These forest lands are continuously being redefined by multiple lifeforces in a shared field of life-taking and life-giving performances. These multiple lifeforces contribute to the weaving of

²⁷ View from *Kushillu Urku*.

territorial relations with what the people here call, *Kawsak Sacha*, the living forest. Composed of the words *kawsay* and *sacha* (forest), *Kawsak Sacha* rises as a more-than-human entity through the lifeforces flowing across its territorial bodies. In *Kawsak Sacha*, humans, animals, plants, insects, energies, and unseen beings co-exist in tension with one another, continuously mending and tying relations. *Kawsak Sacha* constitutes an elementary understanding of this Amazonian forest as being alive.

In the words of Traya Muskuy, relaying the wisdom of his father, Sabino, the last *yachak* (wise healer) of Sarayaku, the essence of *Kawsak Sacha* encompasses: “all beings, from the smallest and infinitesimal to the largest and most supreme, including the worlds of animals, plants, minerals, and the cosmos” (2019).²⁸ In Sarayaku this statement is elementary of reciprocal and attentive practices that engage with the subjectivity of other species, including non-visible energies and forces (van Dooren, Münster, Kirksey and Rose 2016). The idea of *mundos* in Sabino’s statement resonates with Jakob von Uexküll’s *Umwelt*, a formulation that asserts that lifeforms must be perceived as close as possible from their situation in the world, and “by virtue of the environments that they inhabit” (2010: 7). Buchanan noted that Uexküll meant animals are “capable of discerning meaning from environmental cues” (2013: 8) to create separate phenomenological worlds that are distinct from what some humans deem to be ‘the world.’

Despite acknowledging that each living being creates its subjective world, Uexküll's phenomenology still enclosed each organism’s environment into a harmony determined by “nature’s plan” (2010: 86, 92). Uexküll’s big picture of nature's plan is composed by tones and resonances of organisms harmonising with each other (Buchanan 2013: 8). In this sense, within *Kawsak Sacha* lifeforms like rain ants could be said to tie “contrapuntal relationships to the tones of other animals” (Uexküll 2010: 187). However, *Kawsak Sacha* cannot be reduced to a plan of nature or a harmonious *Umwelt*. *Kawsak Sacha* invokes common living experiences shared between worlds, which generate multiple tensions, multispecies accordances and discordancies. Uexküll’s *Umwelt* does not engage like *Kawsak Sacha* with the meaning of community from a biocentric indigenous perspective, and the circulating lifeforces (*kawsay*) which cross between the world of humans, the non-humans and more-than humans.

²⁸ Traya Muskuy and his films require a broader treatment which are unfolded in Chapter Four, *Tiam Movements*, page 117.

In contrast, Sabino's vision clearly indicates *Kawsak Sacha* is a cosmos, in which the lifeforces of each and everyone are reciprocally captured in coexistences (Haraway 2008; Stengers 2011). This view of *Kawsak Sacha* is more in line with Marisol de la Cadena's earth beings (2015). Earth beings are not to be understood as anthropomorphic personifications of environments or land formations in a world separated from other worlds. Earth beings are world kin existing through relational place-making dialogues and caretaking practices with forests, lands, waters, and mountains (de la Cadena 2015: 17-19) to resist territorial dispossessions. Sarayaku people are aware of this and engage in relational place-making dialogues with *Kawsak Sacha* as a sovereign earth being composed of multiple other rhythms and lifeforces in motion. The people respect the different thresholds of forest life by tending to particular vital soil compositions and healthy decompositions as part of the weaving of territorial relations.

For the Sarayaku, *Kawsak Sacha* does not represent an abstract space drawn on a map. It is not merely a place with fixed boundaries, devoid of life. It is a world of earth beings (de la Cadena 2015). This resonates with the significance of territory I learned from Marlon, head of the community council between 2003 and 2005. Territory does not mean property which can be owned. Territory is tied to specific cultural identities and collective efforts that replenish instead of exhausting lands and forests. Marlon is one of Sarayaku's principal voices in the indigenous political arena in Ecuador. At the time of this writing, he was holding the chief position of the CONFENAIE (*Confederación de Nacionalidades Indígenas de la Amazonía Ecuatoriana*), a federation founded in 1986 which represents indigenous nations of the Ecuadorian Amazon.

For Marlon, territories are shaped by a good sense of place-making practices with forest lands. Marlon defines the Sarayaku territory as “*una tierra buena, un territorio sin mal*,” or “a good land, a territory without evil.” Evil for Marlon means “practices of ex-appropriation of lands that extract valuable resources to benefit a few.” A clear difference exists between the use of territory by politics of extraction and the cultural understanding of territorial relations in Sarayaku. For instance, the Spanish words *terreno* (land), *tierra* (earth), and *suelo* (soil), are encompassed by the Kichwa word, *allpa*. In Sarayaku, the notion of *allpa* involves a good sense in people, and in the active engagements of other beings, for weaving fruitful relations with forest lands against inadequate intrusions and political injustices (Sarayaku 2014: 79-80).

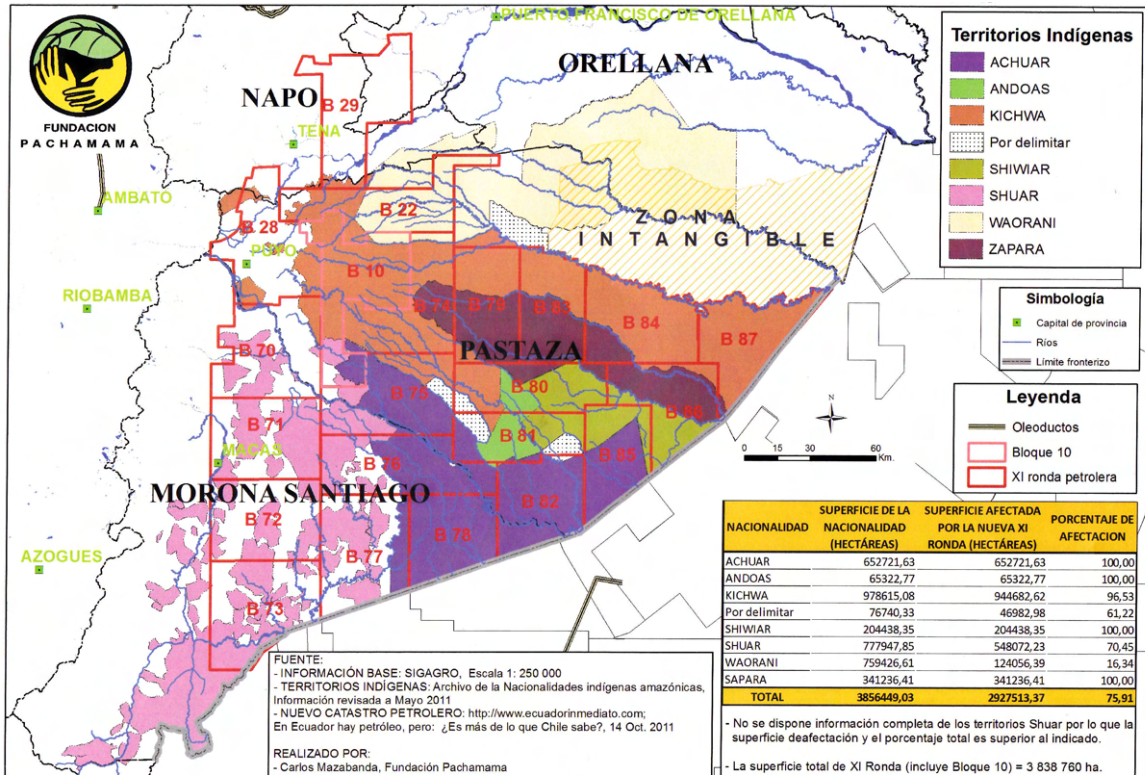
This good sense is intrinsic in the understanding of another earth being called *Sumak Allpa*. *Sumak* can mean goodness, kindness, and beauty, whereas the word *Allpa*, as explained before, can refer to land, earth, or soil. Hilda, the first woman elected head of the council from 2005 to 2006, enlightened the values of *Sumak Allpa*. She told me one day that *Sumak Allpa* does not just mean a good land, but *a good land without evil*. Hilda is a leader with a firm voice, ready to represent the women in Sarayaku. She is open to conversations with visitors like me and actively participates in deliberating decisions with the council. Her council period was characterised, as she claims, by strengthening the rights of women and celebrating the valuable social labours of mothers in the caring of forest gardens.

Sumak, as Hilda made clear to me, signifies a good and kind attribute that characterises fertile lands (2019). In this sense, *sumak* addresses the benevolent character of lands and soils as constitutive of an earth being, which is good and kind, but can turn evil if not cared for in a reciprocal manner. Thus, *Sumak Allpa, a good land without evil*, is embodied in community practices that strive for cultivating good relations with forest lands. This echoes Kristina Lyons' remarks that the vital decompositions of life in Amazonian-Andean communities extend beyond political boundaries across South American countries (2020). Distinct and reciprocal, these are historically situated community forms of cultivation with lands, forests, mountains, and waters (7-8). According to Lyons, extractive, agrarian, and chemically imposed regulations are displacing well-situated practices, forcing a negligent degradation of roots, enacting soil violence on micro-organic communities, and affecting other reciprocal terrestrial lifeforms and "ecologies of places" not accounted for in the beginning (2020: 5-8). I think along these lines and imagine land-dwelling communities, like rain ants, as major actors participating in the weaving the vital decompositions across the Sarayaku territory.

In Sarayaku, territorial relations with *Sumak Allpa* are enacted through itinerant forms of inhabitation and cultivation practices that perform changes with a temporal impact on forest lands: people tend to more than one hut (*wasi*) which they seasonally occupy, and forest gardens (*chakras*) are rotated frequently, seeds and seedlings included, to different patches once fertile thresholds are reached. Harmful practices are mitigated as people are aware of respecting the fragile rhythms of land recuperation that characterise *Sumak Allpa*.

Weaving territorial resistance

From Marlon and Hilda's accounts, I understand that *a territory without evil* entails a situated historical responsibility for weaving relations with earth beings to exclude oppressive interests, models, and imposition of boundaries from outside. The territorial basin surrounding Sarayaku has been geographically circumscribed by the political cartography of the Ecuadorian Republic. Throughout the 19th century, after the Ecuadorian Republic was founded in 1830, the mestizo elite in power was expanding the central administration of lands by declaring Amazonian territories as empty (Ortiz 2016: 141-143). The governmental apparatus took cartography as a mechanism for appropriating indigenous lands and delimitating their cultural mobilisations. Distant, displacing visions of power opened the door for illegal operations without peoples' consent. Under the eyes of the Ecuadorian State, the geographical region surrounding Sarayaku, named on the maps as the province of Pastaza, has become a trading zone for extractive enterprises. Logging, mining, and oiling have increased the rate of deforestation, water poisoning, and soil degradation, gravely severing vital compositions, territorial relations and community practices of different indigenous nations besides Sarayaku, which have been culturing these forests for centuries.



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²⁹ Map showing the indigenous territories in the Ecuadorian Amazon, overlaid with numbered blocks painted with red lines of the State's intended zones for oil exploitation. Kichwa nations are coloured orange. Data from the Archive of Indigenous Nations of the Amazon; graphic by Carlos Mazabanda, Pachamama Foundation (2011).

Cartographically delimited by national geopolitical interests, the ecosystems contained within this large Amazonian territory are often celebrated by the governmental apparatus for sustaining a highly diverse flora and fauna. Pastaza represents in the cartography of the nation a treasure of natural resources to be centrally managed. For the past five decades, this province has been continuously reconfigured and diagrammed on the maps into fourteen blocks for oil drilling (Ortiz 2016: 187-189). In 2006 a renewed Ecuadorian constitution, taking strategic advantage of Kichwa terms, legally inscribed the rights of nature and the ancestral territories of Amazonian communities as intangible. *Pachamama* was then inscribed in that constitution as mother nature, while *Sumak Kawsay* ('the good living'), which indexes *Kawsak Sacha* and *Sumak Allpa*, was inscribed in the same constitution as a 'responsible form of sustainable life' which the government is in charge of administering.³⁰

This dissonance between the rights of nature rhetoric, and state policies supporting oil and mining industries in the Amazon, as Lyons points out, is continuously exerting ontological violence which denies the voices and ingrained practices of land care, flattening the incommensurable different realities of local communities (2022: 56). Centralised authorities co-opting indigenous terms to impart legal rights on nature fail as a legal system. They do not involve a cosmopolitical justice, as Lyon calls it, which is only achieved through involving indigenous people in "processes of continuous interethnic dialogue and informed citizen-led participation in all stages of public policy making, territorial planning, and environmental governance" (2022: 57). *Pachamama* is not a being who can be generalised as a subject of rights from a secular and morally correct distant point of view.

Although the word *Pachamama* usually tends to be translated as Mother Earth (Gómez-Barris 2020: 135), its invocation is deeply rooted in specific local understandings of place-making and caring practices of land fertility (Sarayaku 2014). Several Kichwa and Quechua cultures across the Amazon and Andes consider *Pachamama* a fertility deity. But in debates around the climate crisis,

³⁰ Articles 57 and 71 in that constitution recognise that natural life cycles and those of ethnic nations need to be respected and protected, the people living there are free to maintain, develop, and strengthen their ancestral traditions, cultural identities, and forms of social organisation (Ecuadorian Constitution 2006, Art. 57 and 71, translated: 41, 52). However, the Ecuadorian State deliberately declared jurisdiction over how these forms of natural restoration and indigenous rights ought to be enforced, proactively making clear how extracted resources ought to be managed: "the State will establish the most effective mechanisms to achieve restoration, and will take appropriate measures to eliminate or mitigate harmful environmental consequences [...] Environmental services shall not be appropriated; their production, provision, and utilisation shall be regulated by the State" (Ecuadorian Constitution 2006, Art. 72-74, translated by author: 52; Appendix E).

Pachamama gets tangled up with terms such as environment, habitat, or even the natural world (Gudynas 2017: 267). Following de la Cadena's suggestion, *Pachamama* should be embraced according to local cultures' reciprocal practices of guardianship to lands, mountains and waters, and if anything, *Pachamama* ought to be appreciated as an earth being from the perspective of each community (de la Cadena 2020: 384-385). For instance, in Sarayaku *Pachamama* encompasses a grounded experience of commemorating two vital recurring events of its history: a collective celebration of gratitude towards land fertility and remembrance of territorial resistance. Before the solstice transition into a new agricultural year around May, people harvest all the yuca from forest gardens, ferment large quantities of *aswa*, and conduct a large *minga* for cleaning, preparing, and embellishing the seven communes for a celebration of territorial sovereignty.

Pachamama is a celebration of *kawsay*, a celebration of life: people tour from house to house around the seven communal settlements following the drums, drinking highly fermented *aswa*, playing flute songs, dancing in circular patterns, engaging in playful competitions based on physical endurance, and showing off who got the largest and most delicious fruits and vegetables from forest gardens. Women perform a taunting dance, while men set the rhythm (*taki*) by playing drums. Women turn left and right and around men (*tiam*) by imitating the movements of the Amazonian wild peccary. The drums fabricated and played by men are made of the skins of that same animal, on the inner side, and that of a woolly monkey, for resonance, on the outer side. In parallel to resonant and effervescent celebrations of land fertility and community rapport, *Pachamama* significantly represents the commemoration of social resistance: the 1992 march to the capital to demand the return of territorial rights taken by the government, which successfully forced the State apparatus to finally recognise (in papers but regrettably not in actions) land sovereignty of several Kichwa nations, including Sarayaku (Marlon 2019; Ortiz 2016: 287-290).³¹

The revolt of 1992 resonates in the collective memory of Sarayaku, both through ambivalent emotions and the spirit of social resilience and collaboration which is characteristic of its people. In Marlon's words, the revolt of 1992 is an expression of Sarayaku's community spirit of resistance: "We have exerted peaceful resistance that transcends borders and utopias because *Kawsak Sacha* transcends as a fundamental defence of life" (2019). Invoking the living forest, Marlon emphasises that territorial rights are not just a political cause driven by human interests alone. In Sarayaku,

³¹ The journey to reach Quito from Sarayaku by foot lasted 20 days, according to Franco and Hilda (2019).

territorial sovereignty and relational practices with the rainforest follow a biocentric conception. This conception goes beyond the one-world ideal and legal frameworks of conservation established by the colonial matrix of geopolitical powers, which have fragmented the cultural subjective relations of indigenous people with earth beings (Gudynas 2004; Escobar 2016).

In this sense, Marlon's statement resonates with Arturo Escobar's notion of the pluriverse, which draws inspiration from the Zapatista movement as well as several other Andean-Amazonian biocentric livelihoods (2016, 2018). Escobar's pluriverse posits that intra-relations between different worlds are never driven by just one actor (2018: 86). In the words of Joanna Page, the pluriverse is a rooted understanding of the different and multiple "world-makings of other species" whose agencies and meanings are indelibly interconnected with those of humans (2021: 216). The pluriverse involves the interrelated multiplicity of diverse worlds and the different interconnected ontologies that make those worlds possible. This is what makes Marlon's words so relevant in contrast to conservation policies from the State apparatus because Sarayaku's ontology demands a plural and distributed sociopolitical worldview that includes worlding practices with earth beings.

Against a controversial constitution, which derives from a legacy of colonial dispossessions and authoritarian interests for capital revenues, the people decided to employ *Kawsak Sacha* as a model of resistance to fortify Sarayaku's cultural, social, and ecological sovereignty. During the leadership periods of Franco and Marlon in the community council, *Kawsak Sacha* was elevated as an entity of territorial defence. The people promoted *Kawsak Sacha* as a model of resistance to counter neoliberal enterprises, like the illegal intrusion of the Argentinean mining company CGC which left explosives underground.

In conversing with Franco about *Kawsak Sacha* as a life model, he was adamant to stress that *Kawsak Sacha* "existed for us ages before scientists and politicians came here to see what was going on [during the conflict], it has always been here before us" (2019). His critical remark invited me to reflect on the use of scientific models as part of a system of ecological values reified exclusively by Eurocentric conservation policies to protect natural habitats. Franco, for his part, was keen in pointing out that *Kawsak Sacha* should not be regarded as "a model" for any society outside the rainforest to take advantage of. He explained that the living forest is "our world which has to be respected as it is conceived by our culture and the relations we have in this place."



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Kawsak Sacha together with *Sumak Allpa* set in motion ways of thinking and doing that oppose “dominant regimes and disrespectful authorities” (Marlon 2019) that try to subject the natural world as a jurisdictional property from a distance. These prime earth beings set a radical paradigm in ecological and political relations. Sarayaku’s vision is heterogeneous and multiple. It entails an awareness of community woven through tensile relations, in which different lifeforms come into being through a continuous process of becoming. This notion echoes Bolender’s “acts of passing through” places with a mindset and effort that is, as much as it can be, inclusive of other species (2020: 294-5), and where the subject gets regrounded in a “sense of responsibility and ethical accountability for the environment s/he inhabits” (in Bolender 2020 citing Braidotti 2011: 122). As earth beings *Kawsak Sacha* and *Sumak Allpa* demand active participations and reciprocal inhabitations. As earth beings, they relentlessly resist being immobilised by foreign divisive notions of space and time, politics of capitalist extractivism, or scientific boundary mechanisms.

Kawsak Sacha and *Sumak Allpa* are earth beings of a territoriality from underneath. They are cared for by a good sense of community-weaving practices responding to a world in formation with other

³² First day of *Pachamama* celebration: students of the Sarayaku school perform with drums during the graduation ceremony.

worlds. In Sarayaku, this elementary creative act of weaving becomes a worlding exercise between earth beings and communities. Territorial fabrics are woven through tensile relations and need to be tended to in order to reciprocate the gifts these forest lands offer.

Weaving circles of florescence

The manifestation of community-weaving practices as a form of worlding with earth beings becomes evident through the nourishment of habitats for other species. In Sarayaku, there is a large strategic project of enlisting multiple significant others in the co-creation of a flourishing diagram of the territory: the circles of florescence, *sisá ñampi*.

The Kichwa word *sisá* means flower whilst *ñampi* means path. *Sisá ñampi* consists of three rings of different native flowering trees that were planted about fourteen years ago (Antonio, Dionisio 2019). These rings encircle the Sarayaku territory with frontiers of florescence that can be visible from the skies. According to Antonio, the idea originated from a vision of Sabino, the father of Trayak Muskuy and the eldest retired wise healer of Sarayaku, who passed away of old age in March 2022. Sabino was a renowned *yachak* (a wise healer) across the Andes and Amazon of the Pacific region. Sabino was Antonio's teacher before the latter assumed the leadership of the centre for ancestral wisdom in Sarayaku, *Atayak*. In honour of Sabino's memory, I recall an excerpt of a story Antonio told me about the origin of *sisá ñampi*:

“Sabino used to do a ritual, the *sisá taki* which is the song of the flower. That is where the idea [of the *sisá ñampi* project] came from: *sisá kawsay*, good energy, flower energy. Sabino had an ayahuasca vision from a tree that was in full bloom. All kinds of birds are coming. They form circles and circles that can be seen from the sky as frontiers of life [...] *Sisá ñampi* consists of three circles. First is Julunchi Ruya which blooms yellow. The second circle is Leche Ruya, it flowers purple, and it is edible for us and the animals; it is like a fruit that transforms, like gum, when you chew it. It has rubber which you can cut and use as resin for crafting *mukawas* (the drinking vessels for *aswa*). There are also chonta trees. In another circle there is morete. All these trees are in the three circles. But they are also mixed in other places. If there is no Leche Ruya, there is Chuku Ruya, another tree that knows how to bloom in red. In other parts, if there is no Chuku there is Julunchi. All know how to

flourish. Some of them bloom in red, yellow, purple, dark green, all flowers, all flourishing...”

From Antonio’s invocation of Sabino’s vision, I see the circles of florescence as a tactic of weaving life into forest lands, of cultivating living thresholds bound to territorial relations instead of dividing the rainforest with fences, topographic maps, and artificial limits. By growing trees in concentric boundaries, the Sarayaku people understand life as forces in motion—*kawsay*. The people enact a complex flourishing strategy of territoriality, a redistribution of subjective perspectives, or as Deborah Bird Rose put it, “a cosmopolitics of togetherness produced through heterogeneous ways of being amongst creatures who need each other, who seduce and sustain each other” (2012: 110). Bird Rose was not writing about the Amazon, but about the Australian flying fox. Her metaphor of the flying fox ‘kissing’ blossoming trees to suck up nectar and propagate pollen grains raises the value of intimate “life-affirming, mutually giving and receiving” (ibid) interrelationships, which strongly resonates with the purpose of the circles of florescence project in the Amazon.



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The circles of florescence are supposed to be seen from the skies—by satellite images—to counteract the scheming and mapping of territories in lines by distant powerful people who see like

³³ A blooming tree as seen from the hills of *Sarayakillu*.

the state and ignore indigenous peoples' sharing of commons (Scott 1998: 49). The circles of florescence, unlike enclosures of colonial cartography, demonstrate a tactful awareness of people who culture multispecies relations by weaving ties with vegetal flourishing kin. The act of planting specific native trees creates a living territorial diagram in which flourishing, wilting, and decomposition are part of life and death processes turning in, and returning energies to forest grounds for new rhythms of growth to begin (Rose 2012). The florescence rhythms of these trees take different periods—from ten up to twenty years—which attract different generations and aggregations of species to pollinate and feed from them, to live and die with them.

This emergence of nonhuman life and death is entangled in the sociopolitical activism of the Sarayaku for protecting their territorial sovereignty. The weaving of “the path of flowers,” as phrased by Dionisio, leader of the forest guards *kaskirunas*, can be understood as a labour carried by multiple lifeforces and multispecies communities. The *kaskirunas* monitor the species within the circles of florescence. They are “bearers of ancestral knowledge” who know how and when to move into far areas not inhabited by humans, and what paths to wander to be able to return home (Dionisio 2019). Like Sarayaku's forest guards, the trees also act as sentinels guarding over the territory, enlisting other species in the production of common worlds, and weaving lifeforms into emergent ecologies (Kirksey 2015: 18, 195-6).

Only certain people of the community, like the *kaskirunas*, are allowed to visit and roam through the circles of florescence. These areas are explicitly reserved for the recuperation of fauna, and are populated by other entities— “not spirits, but beings of a world beyond this one,” Dionisio stated empathetically. He insisted that spirits are western inventions: “*inventos del mundo occidental*” (2019). He prefers to use the Kichwa ‘*supay*’ to refer to entities who do not submit to rational or scientific explanations; beings outside the physical laws defining this earth, who “can wander across worlds at the same time.” Rather than being a supernatural being, a *supay* can be imagined as a multinatural being. According to Viveiros de Castro (1998), the Amazonian world is populated by different subjective agencies and perspectives, and the manifest form of each is a mere envelope “only visible to the eyes of the particular species or to certain trans-specific beings” (471). Some trees like *huichuputu* are regarded as kin, for example. A *huichuputu* is an old tree in the genus *Ceiba*. Teeming with life, it stands out from the surrounding ecology with a lively identity. It is deemed as sacred, considered a haven for forest lifeforms and a dwelling place of a *supay*, who can present itself at particular times showing different faces according to the ways the tree gets

treated. Dionisio said that the number of species a tree *huichuputu* in the custody of a *supay* can harbour is immense, procuring nesting habitats for birds, monkeys, flowers, and becoming pollinating edens for bees, and, as Dionisio remarked looking at me with a smile, “ants as well.”

The circles of florescence, *sisá ñampi*, surrounding the Sarayaku territory thrive with a living beauty that contrasts conventional representations of boundaries. In this respect, Hilda points out that *sisá* symbolises not just a flower but “a strong kind of flower”. By drawing from her statement, I grasped that notions of flourishing have a distinctive meaning charged with political and territorial sovereignty. Beauty cannot be reduced to an imported aesthetic concept in Sarayaku. For instance, during *Pachamama*, and for other special occasions, people generally paint their bodies, hair, and faces using a deep black purple ink extracted from *wituk*—the fruit of *Genipa americana*. This tree is found in specific areas of the Sarayaku rainforest, and some families have it planted in their forest gardens. People paint themselves and each other with *wituk*, drawing a diversity of wave and zigzagging emblems, depicting animal motifs like birds and snakes amongst other creative designs. People also dye their hair with this deep purple ink to reinforce the vibrance of their dark colours. Beyond symbolic meanings, the practice of skin painting with the ink of *wituk* embodies more than aesthetic representations or enhancements. Through wave and zigzagging emblems, skin painting with *wituk* embodies a territorial identity tied to the beauty of this rainforest, it embodies the strength and beauty of the *kawsay* of the living forest as transient, oscillating, lifeforces.

Skin painting with *wituk*, Hilda said, grants a “temporary beautiful protection and strong attitude to the person who paints her body with pride”. This organic ink is alive. It vanishes within a week from the skin. Hilda emphasised “a flower is like a fruit, it is part of the turning of life,” *la flor es un fruto parte de las vueltas que da la vida*. Her way of thinking about flowers and flourishing brought me to reflect, from the perspective of *taki* (rhythm), on transformational metabolic processes that decompose and revitalise rainforest soils. If imagined as part of the metabolic, microscopic, processes of heat exchange taking place in the human body, the ink of *wituk* slowly returns via sweat to the tropical atmosphere.



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The frequent application of the ink of the fruit of *Genipa americana* on people's bodies, or the blooming of trees in the circles of florescence, are part of situated rhythmic flourishing processes (*taki*). These are vital lifeforces (*kawsay*) that traverse between lifeforms. In Sarayaku, life is not wasted but transformed or set in motion by a good sense for place-making practices with forest lands. *Sisa ñampi* is an example of Sarayaku's *taki* for weaving an ecological and political world against the extractive powers of the Ecuadorian ministry of renewable energies, whose officials look at the Amazon as a "manageable resource," *un recurso manejable* (Marlon 2019).

The Sarayaku recognise that multiple performative agencies of seen and unseen beings are at stake in the flourishing of *sisa ñampi*. The situated worldview in Sarayaku comes close to a pluriversal, multinatural, and cosmical perspectivism beyond legalisation models of property perpetuated by imperialist perspectives (Viveiros de Castro 1998; Gudynas 2004; Escobar 2016): an alterity of co-production of biodiversity rendered tangible through the practice of weaving territorial relations, of getting hands dirty, in messy entanglements with the soil, of worlding with earth beings. *Kawsak Sacha*, *Sumak Allpa*, *Pachamama*, and *sisa ñampi* co-constitute a land-based ontology of community-weaving practices, in which forest lands are reckoned as entities because of their

³⁴ Painting with *wituk*.

vitalities—beings amongst beings, beings within beings, who respond according to the ways they are treated.

With this in mind, the lively performances and lifeforces of *tamya añanku* as rain messengers must be recognised in accordance to this local ontology. In Sarayaku, weaving is a worlding practice with earth beings (de la Cadena 2015, 2020). People treat the rainforest, its lifeforms, lands, and soil compositions as sentient entities. *Kawsak Sacha*, the living forest, and *Sumak Allpa*, the good land and soil without evil, encompass a grounded understanding of rainforest life. This offers a well-situated ground to explore the invertebrate performances of *tamya añanku* in relation to the warps and wefts of this territoriality from underneath. Patching gaps by tensing their bodies over terrain irregularities to ease the flow of other insect kin, and tightly interconnecting corporeal forms to create shelters, the world of rain ants is also brought into life through weaving.

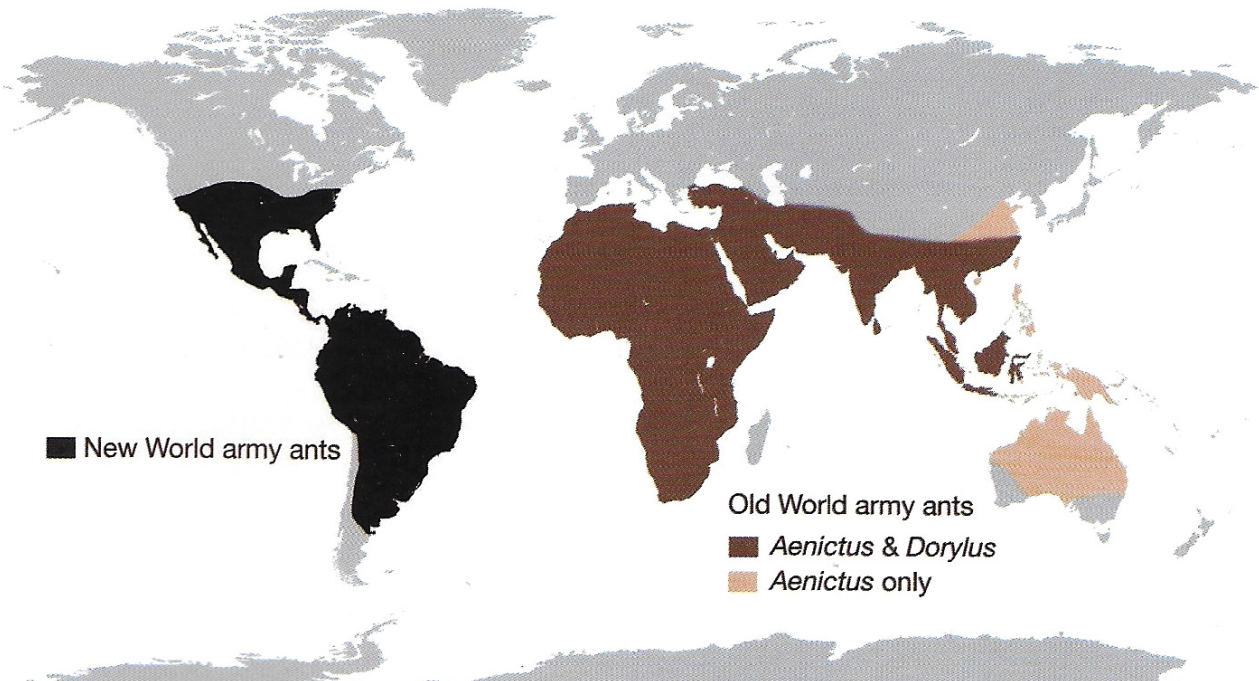
The scientific image of army ants, biased by colonial legacies through descriptions of nomadism and terminologies like queen, soldiers, raids, and bivouacs, turns around and upside down in Sarayaku. Insect armies turn into rain emissaries, earth communities of *Kawsak Sacha* and *Sumak Allpa* who weave shelters and bridges over water using their invertebrate bodies in syncopation with the rain.



3 _____ Army ants turning upside down

Tamya añanku are invertebrate communities that announce the advent of rain and weave themselves with this territory. This understanding of ants promotes thinking beyond the imported perceptions based on militaristic analogies. Terms like army, queen, soldiers, and colony elide local perceptions of the meaningful and lively agencies these ants bear for Sarayaku people. Drawing from Carcelen-Estrada, other modes of Andean and Amazonian forms of apprehension that are based on “story-telling, dancing, weaving, or any everyday aesthetic practice of re-existence,” shape the perceptions of lifeforces in motion (2017: 104). Such is the case in Sarayaku as there is no movement without rhythm and no rhythm without movement. Inspired by Sarayaku’s community-weaving practices and territorial relations with earth beings, a nuanced alternative passage to the performative tensions between rain, rain ants, and rainforest is opened which overturns military and colonial languages.

If names “shape the worlds we make and inhabit” (2018: 78) as Karin Bolender suggests, then notions of army ants as colonies are problematic when observed against the lively Sarayaku’s culture of resistance. The way we look precedes descriptions of behaviours. For example, the way ‘colony’ is employed as a biological term refers to a group of individuals of the same species that cooperate to raise offspring and build nests (Kronauer 2020: 316). But the term ‘colony’ inherits violent histories of colonialism when it is used to describe insect societies in places like the Amazon. The social traits and features of ants could be better apprehended with the word ‘community’. Therefore the lenses with which army ants are seen need to invert, the ways visual technologies are employed in scientific methods need to invert. Army ants deserve, and demand, a broader exploration beyond scientific disciplines and languages derived from militaristic analogies. Army ants can be rendered more valuable and meaningful outside dominant Anglo-American and European knowledges when regarded from a local perspective as inhabitants of the living forest, *Kawsak Sacha*. Their terrestrial mobilisations acquire a different meaning when seen running across the good land and soil without evil, *Sumak Allpa*. Their invertebrate capacities weave social fabrics in motion, which are not defined by biological cycles of reproduction, but through a spectrum of performances marked by *tiam*, *taki*, and *awana* across this territoriality from underneath. This undergirds my artistic representation of tamya añanku.



35

35 Top left: Plate 18 from “Dissertation in Insect Generations and Metamorphosis in Surinam,” second edition, by Maria Sibylla Merian (1719); hand-coloured engraving on paper. Top Right: “The Spring Cleaning,” by T. Carreras, which originally appears in a publication of 1887, taken from Kronauer (2020: 62). Bottom: world map showing army ants’ geographical locations, from Kronauer (2020: 37).

The invertebrate worlds of *tamya añanku* are brought into life through weaving performances in which turning with rhythm plays a major role. On this basis, I begin this process of inverting army ants with particular attention to Braidotti's, Deleuze and Guattari's nomadic theories. But first, I address the historical accounts and taxonomic intricacies that named these ants as *Eciton burchellii*. Then, I proceed to introduce contested scientific definitions of nomadism and biological lifecycles. Lastly, I invert the image of army ants by describing them through *tiam*, *taki*, and *awana*.

A convoluted natural history

For over three hundred years, dominant knowledge-making practices have produced a putatively scientific knowledge about army ants based on evolutionary criteria. The study of army ant biology in the Amazon has produced valuable insights into their social behaviours and ecological relationships. However, the results of these scientific studies have benefitted from fieldwork observations and specimen collections within Amazonian and Amerindian territories. The natural history of what has come to be known by Eurocentric and Anglo-American scientific disciplines as the neotropical army ants of Central and South America, species *Eciton burchellii*, was fraught with colonialisms and convoluted intricacies.

Particularly in regard to social behaviour, three characteristics compose the army ant lifestyle: mass raiding, nomadism, and colony fission. Mass raiding refers to the collective movement of ants creating an expansive and initially chaotic raiding front, which organises itself into different trails over time for hunting prey. Nomadism, on the other hand, is the characteristic lifestyle of hunting and nesting driven by continuous migrations across the rainforest. Lastly, colony fission refers to the creation of an incipient colony by means of splitting into two, during which a queen led by a group of ants separates from the former nest.

Scientific narratives inevitably prioritise over other languages and forms of knowledge the nomadic, predatory and raiding character in the hunting behaviour of army ants. The army ant lifestyle has been assigned to a variety of ants across eight genera, comprising more than 400 species, over three continents with colonial legacies: America, Africa, and Asia. Undermined by colonial legacies, the local histories and understandings about ants' territorial significances to peoples' visions and place-

making practices have been marginalised. As a result, situated human-ant relationships and their worlding practices have been excluded; practices which existed long before European scientific regimes came to the Amazon to impose taxonomic divisions.

The origin of the scientific name of *Eciton burchellii* can be traced back to imperial invasions and colonial intricacies that claimed rainforest territories as undiscovered new worlds. Three hundred years ago, monarchs sent expeditions with different agendas that sailed from Europe to South American colonies, where, among other things, they collected insect specimens (Sleigh 2007: 7-8; Kronauer 2020: 25-34). The collectors involved were for the most part solitary explorers of different backgrounds. But a few of them were naturalists cooperating in science projects during the nascent time of disciplinary entomology and taxonomy (ibid).

The first European account of army ants weaving a bridge on a Guava tree was illustrated by the German Maria Sibylla Merian, during her expedition to the Dutch colony of Surinam in 1699 (Deutsches Museum 2020). Her book, *Metamorphosis Insectorum Surinamensium*, published after her return to Europe in 1705, can be considered the first artistic study on tropical insects and butterfly-plant relations. Sibylla Merian's seminal work included detailed illustrations in collaboration with her daughter that were partially named using the local accounts of native people working in the Dutch plantations (ibid). Later in the same century, Carl Linnaeus was expanding his taxonomic quest which formalised the use of binomial nomenclature in Latin to classify species and bring order to what he believed was God's creation (Kronauer 2020: 32). It was Linnaeus who encouraged priest José Celestino Mutis to study ants during the Spanish territorial occupation in 1760 of what now is Ecuador, Colombia, Venezuela, Guyana, and Panamá (Kronauer 2020: 25). The cleric ant enthusiast is credited to be the first to have described migrations and population numbers of army ants consistently, while he was preaching Catholicism to indigenous people (Wilson and Gómez Durán 2010: 42, 73).

Linnaeus's taxonomic quest implied massive collaborations, like the one with Mutis, across territories under colonial regimes. The Danish student Johann Christian Fabricius worked in tandem with Linnaeus and took on insect taxonomy. He described specimens that were sent from remote parts of the world, including rainforests of Central and South America (Kronauer 2020: 26). It was Fabricius who in 1782 rendered the first description of a tropical army ant in his treatise *Species Insectorum*. He gave the ant a name which was later disputed: *Formica hamata*—*formica* is the

Latin for ant, and *hamatus*, means hook-shaped, in reference to the conspicuous large mandibles of the soldier caste of army ants (Kronauer 2020: 27). It took almost a hundred years of contested revisions until Fabricius' ant with the hook-shaped mandibles was given its final taxonomic name, *Eciton burchellii*.

With the advent of Russell Wallace's natural selection and Darwin's evolutionary theory in the mid-19th century, several British explorers came to the rainforests of Central and South America (Sleigh 2007: 6-8). Among them were Henry Walter Bates, famous for his insect mimicry studies conducted throughout the Brazilian tropics, and Thomas Belt, famous for describing the mutualism between Acacia plants and *Pseudomyrmex* ants of Nicaragua (Sleigh 2001: 42; Sleigh 2007: 7). On several occasions along their separate expeditions Bates and Belt met with army ants, and arguably rendered imperially-biased stories "clustered around colonial themes" which might have contributed to their personification as armies in Europe (Sleigh 2001: 64). This was a time during which the adventures of English and European naturalists were acclaimed, largely published and circulated among elite readers (Pratt 1992: 33). As noted by Sleigh, during the colonial era "entomology was invariably conceptualised in the language of human combat" in relation to the spread of power and territorial control, while insects and natives were both seen as part of oppositional forces against imperial plans of conquest and order (Sleigh 2001: 38).

Then, in 1842, in Brazil, the first male army ant collected by a foreigner, John William Burchell, was sent to Oxford University. The specimen was subsequently identified as *Labidus burchellii* by entomologist John Obediah Westwood to honour the name of the man who discovered it (Kronauer 2020: 36). Later, throughout the 19th century confusing revisions and renamings took place, involving the French priest Pierre André Latreille, the Swiss myrmecologist Auguste Forel, his Austrian peer Gustav Mayr, and his Italian colleague Carlo Emery, before the latter finally formalised the name *Eciton burchellii* in the records of scientific taxonomy (Kronauer 2020: 30-31, 34). While the species denomination *burchellii* carries the English name of a white man, Burchell, I speculate that Latreille's choice, who ascribed the name *Eciton* for the genus type species, was perhaps inspired by the Latin *exitus*, which means moving away, departing, terminating (Glare, Bryan-Brown, and Lee 1968: 645).

As emphasised by army ant expert Daniel Kronauer, it was indeed a "convoluted story of how the magnificent swarm raider *Eciton burchellii* ended up with the incorrect scientific name" (Kronauer

2020: 38). The identification of army ant behaviours has largely relied on white men's observations biased by colonial histories.³⁶ Thus, I take this notion of convolution to illustrate the need to move away from the contrivances of taxonomic science when names and behaviours get tangled up in externalised formalities. In this sense, my transversal operations will follow an opposite path along a convoluted process of becoming coiled around lifeforms in motion that cannot be exclusively defined by Eurocentric and Anglo-American logics of understanding. Departing from the convoluted taxonomic history of *Eciton burchellii*, it can be postulated that army ants have resisted scientific categorisations which do not take into account local experiences, languages, or situated forms of relationality. This in turn points to the difficulties of defining ant nomadism from a limited and colonially biased perspective that persists in naming species in Latin, instead of drawing inspiration from locally situated indigenous knowledges.

Ant nomadism

The validation of nomadism continues to promote a successful picture of these ants' nature in military disguise. Through colonial optics, these ants were represented as a force to reckon with in a time in which the Amazon was a frontier to be conquered. But a definitive classification of army ants is elusive. As Kronauer indicates, many species "fall along a continuum of army ant-like behaviour" in which some characteristic features of their nomadic lifestyle are irregular or completely absent (2020: 81).³⁷ While Kronauer clearly points to the fact that observations have been inconsistent, and more scientific data are needed to validate what an army ant really is, I take on his suggestion to rather follow a radical explorative path outside scientific knowledge structures. This will be progressively unfolded throughout this section.

Ant nomadism is technically defined as the frequent relocation of colony nests in direct relation to mass predation and cycles of reproduction (Kronauer 2020: 321). Based on this definition,

³⁶ It is important to note there are women scientists studying army ants; two of them have pushed through white men ranks with tenacity: Monika Swartz and Maria Teles da Silva.

³⁷ For instance, two different subspecies have been identified in Costa Rica: *Eciton burchellii foreli*, on the Atlantic side, and *Eciton burchellii parvispinum*, on the Pacific side. Kronauer is careful to remark that the two subspecies are in fact separate species according to state-of-the-art genetic analyses. He takes a diplomatic scientific stand, by emphasising "the gap in knowledge" due to a "current lack of taxonomic resolution" (Kronauer 2020: 271). However, by gleaning from his statement, which is commonplace in scientific argumentation (the separation to create complexity), the burdens and obstacles of the scientific method delineate a territory of discussion in which formulations of questions and answers are limited to the boundaries of its realm.

nomadism is a consequence of a reproductive necessity of moving to new hunting grounds to meet the large food demand of growing larvae. After all, a community of rain ants can amount to several hundred thousand to roughly a million individuals. However, this massive hunting unfolds without producing catastrophic effects on particular insect species. Instead, it can be elucidated, they set in motion processes of reterritorialisation by redistributing insect species, which flee or leave their burrows to escape being captured—an ecological service for controlling overpopulation (Kaspari et al. 2011).³⁸

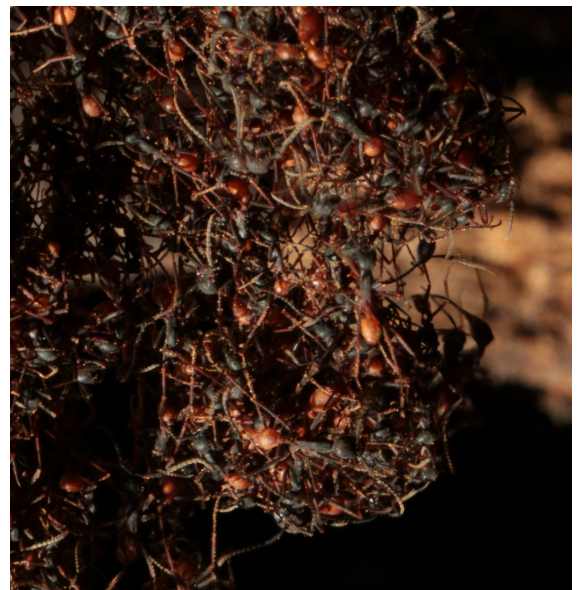
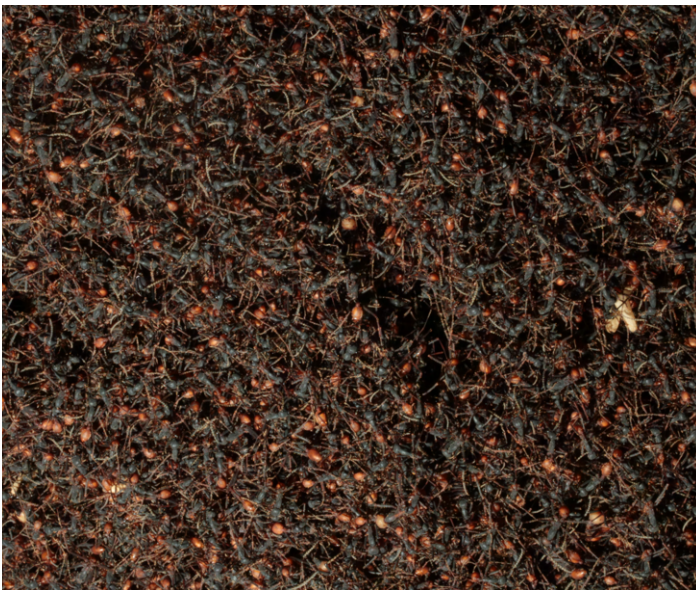
The nomadism of *Eciton burchellii* has been encapsulated in reproductive biological contingencies. The interplay between hunting large numbers of prey and the assessment of reproduction economies has been a long-standing argument in defining them as nomads. Moreover, the preferred language used to describe the biological life cycle of *Eciton burchellii* has been fraught with colonial and military legacies. Its biological life cycle turns between two alternating phases: the “nomadic,” or brood care phase, during which intense raiding and constant migrations take place for approximately 14 days; and the “statory” phase, or reproductive phase, during which new eggs are laid, pupae emerge as adult ants, and hunting activity is minimum or completely absent for about 21 days (Teles da Silva 1977). Altogether, 35 days have been calculated as the average duration to complete one cycle (ibid).

In scientific studies, nomadism is a characteristic ascribed to all army ant species. This definition and the calculation of army ants’ reproductive lifecycles do not always prove to be true. On the one hand, I claim ant nomadism is a notion from the colonial era that is strongly influenced by an obsolete imperialist understanding of nomadic people as stateless, whose territorial forms of life in transit resist permanent immobilisations (Deleuze and Guattari 1987; Pratt 1992). The controlling gaze of capitalism sets still-existing nomad cultures apart from modern world economies (Ingold 1985). At the same time, nomadism has been co-opted in the age of globalised technocracies into an exclusive economic system of travel leisure, of freedom to consume other cultures. The nomadic tendencies of capitalism are “dangerous, irremediably destructive” in the words of Isabelle Stengers

³⁸ *Eciton burchellii* ants are considered generalist predators. It has been estimated that on any given day over 30,000 invertebrate items—dismembered or whole—could be returned to the nest (Kronauer 2020: 103). Interestingly, Hoenle et al. (2019) determined in a study with army ants in the scientific biotope La Selva, Costa Rica, that 87% of prey returned to the nest were the offspring of other ants—the remaining 13% consisted of a mix of various insects and other unknown dismembered pieces. However, ant populations ‘raided’ by rain ants are not totally decimated, but rather forced to move to new locations. Certain ant species preyed upon respond on time to intrusions by leaving nests with their offspring; other species manage to exert successful resistance by blocking entrances and meeting them head to head (tree ant species of *Cephalotes*), or sending waves of defenders that cut bodies in two (leaf-cutter ants, predominantly of *Atta* species), or becoming invisible by immobilisation (spiders). In all these cases ‘turning’ as a performative evasion and strategy for catching prey is essential.

(2011: 373), as opposed to grounded cosmopolitical worlds. On the other hand, the scientific term “statory” is an old-fashioned term referencing English settlers, which formerly used to mean soldiers being equipped for combat (Bradford 2017: 189).

The unique form of nesting of army ants has also been generalised using militaristic analogies. The ants assemble with their bodies a “bivouac,” approximately between 100 to 200 meters of distance from the previous foraging area (Teles da Silva 1977). Bivouac, from the German use of the word *Beiwacht*, means taking turns in watching an infantry's camping site. The bivouac has also been called a “basket-like nest” due to the body tensions exerted to sustain the weight of the overall structure (Berghoff et al. 2009). The bivouac is often suspended from the inside cavities of logs, or buttress roots of trees. Every bivouac is distinct, adapting to the dimensions of forest interstices chosen by the ants. But in each phase, bivouacs have their particularities.



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During the nomadic phase, the bivouac is built at exposed locations (Gotwald 1982). This bivouac sports a fabric of frantic ants antennating, incessantly shifting places, and releasing corporeal tensions as they continuously go hunting. The form of this nest drastically changes shape throughout time (first picture below). Whereas during the reproductive “statory” phase, the bivouac location is rather concealed and sheltered within narrow crevices, secluded from any potential

³⁹ Two photographs of the living basket-like nest known as *bivouac* in scientific literature. Left: detail of external woven fabric of a nest of *tamya añanku*. Right: instance of the same ant fabric disentangling itself and forming a basket, which lasted only a few seconds.

disturbances or dangers (second picture below). The stately bivouac is characterised by a decrease in hunting activity, demonstrating a change in priorities: a protective sensibility for respite, nursing, the care of young larvae, and thermoregulation to create conditions of possibility for new generations to emerge.

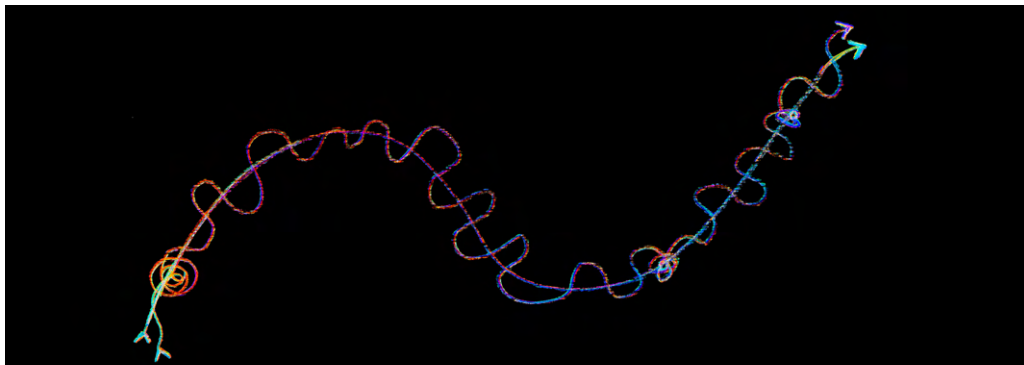
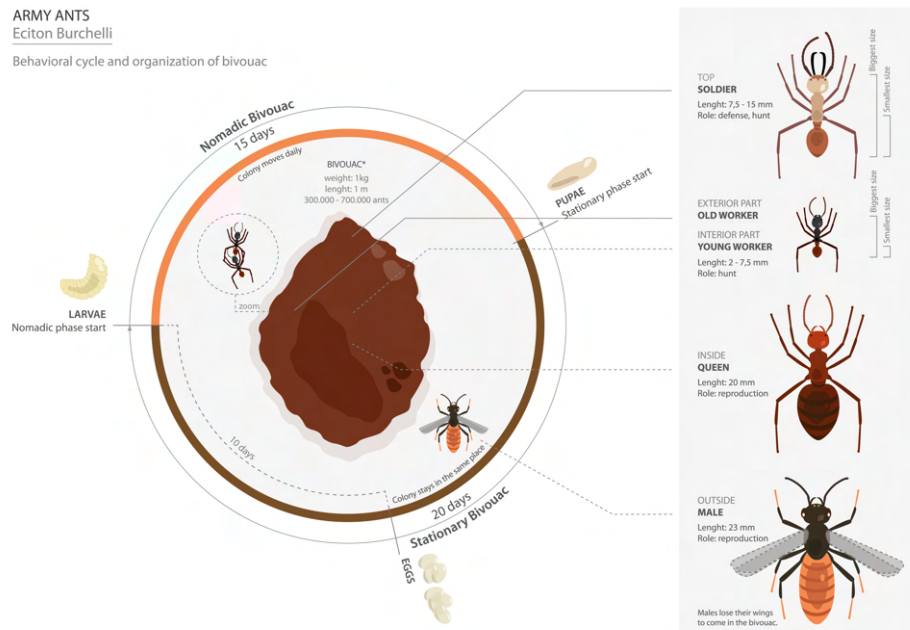
Theodore Schneirla, a North American psychologist deemed as a pioneer of army ant studies, promoted the term “stately” describing this as a period during which foraging activity is poor and emigrations seldom occur (Schneirla 1954, 1971; Kronauer 2020: 324). Schneirla’s studies on the lifecycles of army ants, which were principally conducted in the Smithsonian station of Barro Colorado Island, in Panama, set a milestone for all scientific studies on *Eciton* species. Schneirla describes the transition from stately to nomadic as a process when “brood-excitation factor is high” and qualitative operations for “appropriating space and food are correspondingly high and complex...reaching a threshold at which an emigration results almost invariably” (Schneirla 1971: 155).

This “excitation” Schneirla described is caused by an interplay between internal biological rhythms and external factors that show an oscillatory character. This has been proven by Kronauer with a laboratory species of clonal raider ants, *Ooceraai biroi*, claimed to be related to army ants. In *Ooceraai biroi*, the transition from one phase into another arises from a “simple negative feedback loop” (2020: 212-214). On the one hand, developing larvae induce chemical signals that tell the ants to feed them while suppressing the production of new eggs, so migrations and hunts continue on a daily basis. On the other hand, when the ant larvae enter pupation the signal begins to decrease its intensity. Rippling across the community this signal cues a collective behavioural change that reduces migrations and hunts. ‘The queen’ starts ovulating again and a protected bivouac site is preferably chosen for concealed nesting. This is the transition back into the stately phase.

Thus, oscillating turns define the lifecycle of *Eciton burchellii*. With transversality, I invert the lenses to see this oscillatory character between phases as a rhythmic complexity marked by a spectrum of turns, chemistries, and tactile interactions entangling with the rain and *pacha* (the spatiotemporality) of this forest world. In my view, this entanglement offers an artistic window to explore variations, oscillations, and intense territorialities in motion beyond genetic and laboratory

studies.

In Sarayaku, ant performances respond to the attributes of this rainforest. For example, the weaving of shelters can be altered, delayed or expedited, by heavy rains or by the impact of people's agroforestry. The ants' lifecycle can be affected by the lack of sufficient prey in a given foraging area. Rain and changes in the landscape alter forest sites ants use to bivouac themselves in. Moreover, the final metamorphosis before becoming adults requires caretaking practices of thermoregulation for the larvae, which partially depend on insulation and water-repellency of the forest niches they choose to occupy. Lastly, ant larvae require substrate materials to spin themselves into protective cocoons, for which adult ants carefully bring them to places where they can roll over soil particles. Overall, radical turns and convolutions characterise these ant performances at the threshold between oscillatory phases.



⁴⁰ Top: "Behaviour and organization of a bivouac," by Enrica Lo Cicero (2014). Created during "DensityDesign Integrated Course Final Synthesis Studio" at Polytechnic University of Milan. Image is released under CC-BY-SA licence. Bottom: Author's rendition of the lifecycle of rain ants as a never-ending oscillating thread, which convolutes around and along *pacha* entangling from time to time.

Convoluting nomadism

The invertebrate performances of these ants cannot be simply understood as a social nomadic order reflected upon European and Anglo-American perspectives. Looking through diverse optics like Claire Jean Kim (2015), I convolute nomadism by engaging with “multiple vantage points from which to engender new ways of seeing, imagining, and being in relation to” ants. A different evaluation of ant nomadism can be elaborated in connection to how rainforest territories are conceived and changed by the interplay between local cultures and lifeforces.

With this in mind, I choose to convolute colonial projections by transversally combining scientific behavioural descriptions with *tiam* to make army ants drop their armours and shine their naked inverted bodies under Sarayaku sunlight. For this, I employ *tiam* to inspect, filming with my camera and recording with my various apparatuses, the turning motions that lie outside a narrative measured in terms of evolutionary success. I choose to see how ‘the turn’ connects to convolutions that lead to entanglements, but also to intricate woven fabrics. By combining convolutions with *tiam*, I focus on the performative effects of an intense and radical mode of turning which is in permanent contact with the fabric of these forest lands. Looking at the ways ants move with *tiam*, their invertebrate performances can be visualised not as aesthetically beautiful or efficient, but rather as having an intimate connection with the feature-rich materiality of the territories they traverse.

This is the starting plane on which discourses on nomadic theory, such as Braidotti's or Deleuze and Guattari's, intervene and interpolate, providing the radical complexity that is needed for moving away from the scientific definition of nomadism, for destabilising rigid boundaries. Borrowing specific ideas from Braidotti and Deleuze and Guattari, I suggest that the nomadism of army ants can be better appreciated in relation to radical subjectivity and territorialities in motion. Looking through these lenses, army ants appear gnawing and growing in all directions, forming a fluid collectivity that flows unhinged over terrain irregularities, making any forest dimension their own. Their nomadism rather appears as an intense mode of distribution in a smooth territory without borders (Deleuze and Guattari 1987: 380).

In thinking about ant nomadism using Deleuze and Guattari's ideas, it is worth noting that their nomadic treatise was never articulated in specific relation to army ants. It is, however, important to recognise parallels with the nomadic war machine of forever mobilising trajectories that evade capture. "The nomad," they write, "is one who does not depart, who clings to the smooth space left by the receding forest" (381). These ants' vortical, swirling, and rhizomatic movements occupy and hold the vastness of the rainforest (Deleuze and Guattari 1987: 410). Here, they are permanent residents everywhere. They become with the places they inhabit. These ants live through creative ruptures and oppositions resisting being permanently captured or appropriated by more dominant systems (1987: 331, 435). When perceived as rain messengers of Sarayaku, they become "engendered in a series of local operations of varying orientations" (382). In adapting Deleuze and Guattari's idea of the nomad as a "local absolute," army ants turn into an ever-mobilising existence that is indelible from these territories and indigenous values. In light of this, my media assemblage interferes with and convolutes military notions embedded in the scientific image of army ants, producing an inverted nomadism; a nomadism that aligns with the values of this territory and then dissolves with the fluid movements of invertebrate communities. The media assemblage itself, carried along to intervene and register other qualities of this ever-mobilising existence, is a form of nomadic machinery with which I, as operator and artist, become with the ants and the territory.

Deleuze and Guattari mention ants as an example of resilience and subversion in relation to the figure of the rhizome: "You can never get rid of ants because they form an animal rhizome that can rebound time and again after most of it has been destroyed" (1987: 9). This reflection contains a two-fold message. On one part, there is the misconception, widespread in urban environments, that ants are pests, misfits, and invasive creatures. On the other part, there is the subterranean and territorial nature of ants, which does not extend only along horizontal or vertical planes but creates material affiliations and perforations by burrowing into the Earth. "The burrow is an animal rhizome," they say (Deleuze and Guattari 1987: 12). While rain ants are not burrowers like other subterranean ant species, they hunt inside the burrows of their prey and use available burrows to weave themselves into the Earth. In this vein, I am particularly thinking of burrowing as a

subversive process in which ants enter “into fidelity with the planet,” breaking away from the submission of life to exclusive “anthropocentric colonial optics” (Wallin 2020: 108-109).⁴¹

But Deleuze and Guattari’s multifaceted use of the war machine concept is ambivalent. The war machine is tightly integrated with territorial strategies of colonial apparatuses and Eurocentric visions, just as it is open to decentralised notions of subversion and dissidence. Yet, the fragments I selected from their nomadic theory are turned upside down for working with these ants as territorial weavers. I invert convolution with *tiam*, and syncopation with *taki*. I value the localised subjective perception of the Sarayaku people over scientific quantitative proliferations conformed to see reproductive ends and genetic results (Braidotti 2005: 11). I choose to focus on qualitative processes of becoming, as the ants metamorphose into more than just ants weaving a multispecies community. Around 300 other species have become their companions: birds, mites, flies, butterflies, and beetles (Rettenmeyer et al. 2011). Especially, rove beetles, in the genus *Ecitophya* and *Ecitomorpha*, mimic the ants’ morphology and chemical profiles, their stride and antennating behaviour (Fig. 46, page 104). Looking and smelling like them, these beetles become with rain ants in intergenerational and co-evolutionary dances. And I become part of them, too. Captivated by their corporealities, I become other-than-human mediating invertebrate messages.

When regarded as territorial weavers, their performances and corporeal abilities align well with Braidotti’s notions of becoming (2002). They create corporeal contractions and expansions capable to flex into apparently inhabitable interstices. These ants are openly exposed to inter-relational forces: their soft larval bodies undergo multiple transformations through different stages of metamorphoses, in which forest matter is absorbed in the spinning of cocoons; as adults, they are subject to “constant becomings and flows of transformations” in the encounters with multiple others (2002: 86, 100). Along their trails, they attract and repel different species, weaving mutual and parasitic associations, and entangling others in deathly situations. “Relationality doesn’t mean harmony, it means confrontation,” she suggests (Braidotti 2018). The value of difference raised by Braidotti, in her approach to nomadic subjectivity, is essential to a broader understanding of these ants creating multispecies ensembles and not colonies of the species *Eciton burchellii*.

⁴¹ Therefore, one can argue that ants are not invasive; they are made invasive. Such is the case of the fire ants, *Solenopsis invicta*, and the Argentinian ants, *Linepithema humile*, native to South America, which are ranked in the world’s top ten list of most invasive species—a list curated by Anglo-American and European conservation agencies (Global Invasive Species Database 2022). Looking through rhizomatic lenses, the expansion of these ants into North America and Europe, where they came to be labelled as invasive, was made possible by the “supply, movement, and breakout” in all directions of globalised shipping commerce (Deleuze and Guattari 1987: 12). In other words, it was at the expense of human forms of deterritorialisation that certain species become invasive.

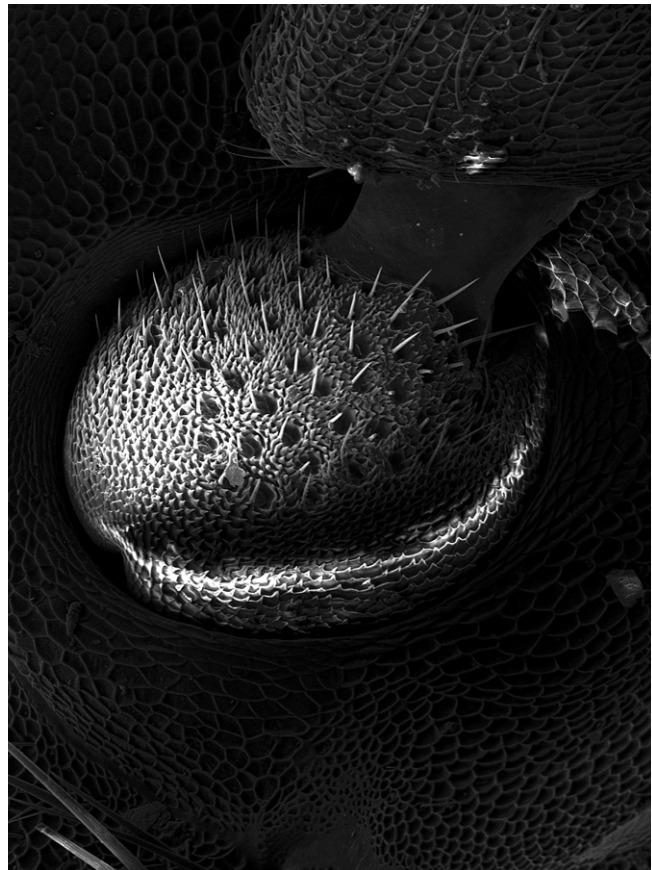
Braidotti's nomadic subjectivity enabled me to reflect upon rain ants embodying a continuous process of becoming with the Sarayaku territory. I think of binaries and units metamorphosing into multiples, just as I think about homelessness as a condition to becoming nomad, for on the run and everywhere these ants are able to become home/shelter/nest themselves (2011: 17). This also prompted me to think about ontological relationality in the ways they attract different species and disperse others along their fluid trajectories, and how this, in turn, transitions into moving thoughts of rain precipitations charged with sociopolitical meaning in the minds of Sarayaku people.

Notwithstanding, Braidotti's, Deleuze and Guattari's wealth of ideas on nomadism can also be quite overwhelming, and out of place, in relation to situated Amazonian perspectives. Both epistemologies are critical in making sense otherwise of power relations at large, yet they do not fully represent the situated knowledge-making practices in Sarayaku. However, what they have written awoke ideas that match my transversal intention for weaving different knowledges together in order to create enough tensions to invert the colonial image of army ants. The ideas of Braidotti, Deleuze and Guattari help me understand the subjective void in the logical primacy of scientific practices that have been exclusively built on Eurocentric values. They offer an onto-epistemological and methodological unflattening (Kirksey and Chao 2022: 4, 11) of scientific and colonial legacies that stand in conflict with the lived experiences and perceptions of ants as rain messengers.

I build on Braidotti, Deleuze and Guattari to propose that rain ants are local absolutes perpetually moving in all directions and becoming more than just ants. Theirs is a territoriality in motion, an intense force of becoming and moving in all directions across space-time, across *pacha*—the unified Kichwa concept of indivisible spatiotemporality. In this dimension, army ants are rain messengers who do not build bivouacs, they use their bodies to weave themselves as nests—this is *awana*. Disentangling from the woven nest, and rolling out like a viscous fluid, they begin advance-and-retreat performances, moving outwards and then inwards again, hesitant to fan out entirely: ants at the front frequently turn back while others push to the front—this is *tiam*. Expansions and contractions continue until a critical mass branches away at steady speeds of approximately 12 to 14 metres per hour—this is *taki*.⁴² I let the perception of rhythmic motions in rain ants be guided by *tiam*, *taki* and *awana*, and accordingly, I establish a transversal ground of operations for my

⁴² The running speed of a single rain ant depends on its size, but also on many other environmental factors. Individual ant velocities range between 5 to 13 centimetres per second (Kronauer 2020: 102).

audiovisual and algorithmic mediations: for the visual amplification of *tiam*, I combined the operations of amplification, interference, and convolution, as introduced in my methodology, to produce the first installation of my exegesis, *Tiam Movements*; and for the acoustic amplification of *taki*, I used the operation of amplification, this time combined with interference and syncopation, to produce the second installation of my exegesis, *Taki Rhythms*. The exegesis of these two artworks is explored in full length in Chapters Four and Five, respectively.



43

Chemical darkness

When running, their legs oscillate contact with the terrain. Ant locomotion is grounded: three legs are lifted in the air, while three are placed on the ground (Reinhardt and Blickhan 2014). Having six legs oscillating contact with the terrain provides advantages such as balancing body position versus gravity on uneven floors; increasing the chances to get a grip over irregularities; and most

⁴³ Left: SEM picture of ant foot, the tarsus. Right: SEM picture of the antenna joint on the head of a rain ant. Electron microscopy of one specimen of rain ants from the Yasuni station of Universidad Católica del Ecuador; using EVO-50 EP, imaging conducted at Vilnius Centre for Physical Sciences and Technology in 2017. Both images done by the author.

importantly, multiplying tactile contact with the earth. Two hooks, known as tarsal claws, form the tarsus or foot of the ant. The tarsus enables ants to secure anchoring knots to any rugged surface, interlock each other's legs, and create weaving tensions on any substrate.

Inverting perspectives, the foot of the ant appears not as a claw. The tarsus is a sensory organ for weaving with the world. A soft tissue in between those claws allows rain ants to have a high degree of territorial fidelity, and a tactile sensing ability for feeling forms, textures, and substrate vibrations. Additionally, an other-worldly epidermic nervous system, known as *sensilla*, covers their chitinous invertebrate bodies, sensitive hair-like receptors for making sense of chemicals, even changes in temperature. The pair of antennae, covered with *sensilla*, work as chemosensory appendages, extending and rotating in all directions, allowing them to sniff and decode chemical messages left by others. In a world where movement is swift and subjects travel fast, images are expensive retainers of information (Morgan 2008). In fact, rain ants are blind. Their world is a world of darkness.

This is an olfactory world where odours linger longer than visual cues for relaying information and signalling navigation (Morgan 2008). Knowing how to create meaning out of odours and chemical molecular compounds becomes the most reliable and effective form of communication for responding to worlds in motion across forest lands. Rain ants produce pheromones, chemical substances that transmit messages, through a variety of glands such as mandibular, metapleural, poison, anal, and Dufour glands. These are usually called exocrine glands, from the Greek word *exo*—outside. This distinctively differentiates them from vertebrate mammals producing internal hormones. Their world is chemically inverted.

A great variety of hydrocarbons of fluid and volatile compositions are produced and secreted by ants' glands, complex molecular chains of metabolites and alkaloids which they can decode with olfactory receptors. The poison, anal, and Dufour glands are located at the ant's rear. Particularly, the Dufour glands are responsible for producing volatile hydrocarbons. These are the pheromone-tracing signatures of rain ants, scents of varied chemical concentrations for marking trails to signpost the hunt and migration, and beaconing the location of the woven nest. A recent genomic study of the olfactory system of *Eciton burchellii* showed they possess a reduced repertoire of olfactory genes compared to other ants (McKenzie et al. 2021). However, the study also detected this ant species has remarkably developed a high number of hydrocarbon-sensitive hairs in the

antennal lobes (ibid). Hydrocarbons are produced by all carbon-based lifeforms. It is suggested these hydrocarbon-sensitive receptors could play a role in the recognition of other odours and chemical cues coming from non-ant organisms. An altered imaginary opens up when foregrounding aesthesis to define invertebrate worlds and reconsider that ants' olfactory receptors provide them with chemical sentience.

I see rain ants venting these compounds through returns and reruns in their movements. Thinking with *tiam*, these radical turns create a circulation of pheromones, and thus olfactory navigational tunnels that rain ants smell to make sense of directions. I see these as invisible transversals, which through continuous turning motions retain an olfactory character. The rhythm with which ant pheromones are deposited, reinforced by others, and drifted into immediacy at the site of ant motions, plays a role in their occupation of territory. I also consider that ants can taste chemical messages transferred via trophallaxis—the sharing of food mouth-to-mouth between adults, larvae, and even interspecifically with other insects (Sleigh 2002). When rain ants open their mandibles, they expel short-lasting volatile compounds that work as alert signals (von Beeren et al. 2018). Von Beeren, Brückner, and Hoenle (2018) identified twelve different volatile compounds which they referred to as a “chemical bouquet” (ibid), substances like ketones and alcohols which are shared in different degrees amongst different army ant species.

One characteristic volatile compound produced by *Eciton burchellii* is *3-methyl-1H-indole*, commonly known as skatole. In the perfume industry, skatole is employed to reduce sweet notes. Skatole could be considered an anti-aesthetic odour. It is produced naturally by mammals and birds as a scent-marking substance, which human noses identify as the primary note of faeces. Skatole is a characteristic pungent and musky scent mostly notable when standing in front of woven nests. Repugnant for humans, skatole is a very important identifier of chemical metabolisms of invertebrate bodies moving in place, feeding from dismembered prey, and cleaning each other in intimacy. Inverting the aesthetic olfactory regime of humans, skatole is the scent of rain ants. However, the majority of volatile chemicals ants secrete are undetectable to human noses. These undetected odours need to all be accounted for in the creation of a distinctive olfactory signature of these ants' territoriality. Furthermore, the metapleural glands of each ant, orifices located on both sides of the thorax, are responsible for secreting waxy substances that cover their chitinous bodies. These waxy coatings, known as cuticular hydrocarbons, vary from member to member within a species, giving each ant its odorous identity: what she does, and where she comes from.

Skatole and the other expelled metabolites of rain ants depend on the combination of acids and alcohols being produced inside the ants' glands. Interestingly, these chemical substances, whether on the cuticle or in volatile form, are hydrophobic, they dilute with water. I ponder, this indicates an incompatibility, a chemical kind of antagonism to water, and therefore to rain.



44

Rain syncopations

The social chemistry of ants gets washed away by rain. Rain becomes the antagonist of *tamya añanku*. Rain is a rhythmic lifeforce of syncopation directing the pace of *tamya añanku* to turn themselves into living passages and shelters over water. During intensifying drizzle, they begin to move away from the rhythm of droplets drumming over the entangled surfaces. When sudden rainfall separates ant trails, they form nascent assemblies, distributed and tightly packed gatherings

⁴⁴ Corporeal bridge woven over a shallow creek in *Sarayakillu*.

of ants. They form refuges from rain's inclemency. They evade being displaced by flooding creeks and emerging water veins, which for them surely appear as turbulent currents.

“Tamyá añanku move faster than the rain in search for shelter,” Hilda told me as part of a vivid story quoted in the epigraph of my prelude above. When I asked her if the way *tamyá añanku* moves could predict the type of rain, e.g., stormy, torrential, or drizzle, she responded: “*no le revelan a cualquiera no mas*” (they do not reveal this just to anyone). Her response reflects an intimate yet concealed territorial relationship between lifeforces. There is an oscillatory character, a rhythmic correlation entwining rain with rain ants in this rainforest. In Sarayaku, rain is an oscillation of energies, arguably, a meteorological performance of life and death itself. Rain plays a major role as a planetary agency in drastically reshaping geological constitutions and biotic interactions. Rain is a vital, life-bearing, and cleansing energy, which can also be destructive, causing floods and increasing river currents that displace entire human settlements, flushing insect communities, uprooting trees, and turning bridges into rubble.⁴⁵

Sarayaku people attend to rain, water rising from the rivers, and rain ants crossing into their lands. The presence of *tamyá añanku* invokes the rain in the minds of Sarayaku people. Antonio explains that when *tamyá añanku* come to clean your *wasi*, they “make the sound of rain” (2019). Like rain, they flush away unwanted insects hidden in the thatch. The import of commodities and goods from the capital of Pastaza into Sarayaku has brought clandestine city creatures, Dionisio says, most prominently the common cockroach, *Periplaneta americana*, and *Rattus norvegicus*, the common rat (2019). Antonio says that some people like him welcome the cleaning agencies of *tamyá añanku* as they come to tidy and sweep your house: “*vienen a limpiar tu casa de plagas*” — they come to get rid of pests (2019). But he also told me other people prefer to pour water over ant trails to deviate their trajectories and stop them from entering houses. ~~Rains~~ ants flow across the territory and water is their fluid antagonist. Dimensions coalesce and lifeforces entwine in perceptions of fluids in motion.

⁴⁵ This dreadful event occurred when I left Sarayaku in February 2020, as the iron bridge between *Shiwakucha* and *Kushillu Urku* was torn apart and carried away by the turbulent Bobonaza river current, which was generated by a torrential rainstorm. Rumi recalls this was “the strongest rainstorm we have felt in years.” This iron bridge stood for over twenty years and was constructed as an offering to the people for getting reelection votes during the political campaign of the ministerial cabinet of President Gutierrez (2020).

Some people believe, according to Antonio, that *tamya añanku* come “to tell you are leaving this place, this house” (2019). The rain messengers carry ambivalent meanings, which have to be ruminated in dreams, or as Antonio says, shared with a *yachak* to be properly interpreted (ibid). For his part, Franco mentioned that in the time of the elders, the crossing of *tamya añanku* into human territory used to mean that a rival tribe would soon come to wreak havoc and steal children and women (2019). One day, Franco told me of an antagonistic encounter during his time as head of the council, which he had to process in his dreams.

He was returning from his forest garden when he witnessed a group of ants fighting each other on the road. Upon closer inspection, he noticed a conflict of forces between *tamya añanku* and *ukuy*—the name for leaf-cutter ants in Sarayaku. Completely captivated, Franco was grappling to describe the encounter and the meanings it conveyed. With his particular position as a political leader of the council, at a time of territorial crisis with the illegal ingression of the Argentinian mining enterprise CGC, Franco was seeing *tamya añanku* as invaders of the lands of *ukuy*. This was transposed in his dreams and acquired a particular meaning. According to him, *ukuy* defeated *tamya añanku* by timely organising and by forming an impenetrable resistance on the perimeters which fended off the invaders. In Franco’s dream, *tamya añanku* represented the military forces commanded by the State who were violating the territorial rights of *ukuy*, the people of Sarayaku. His oneiric interpretation echoed the back-then territorial political dispute that was affecting Sarayaku during the historical time in which the community was working on safeguarding and protecting their lands with the promotion of *Kawsak Sacha*. The relationship between territorial conflicts and Franco’s perspectivism was convoluted through interrelated bodily idioms of expression. His capacity to think with ants radicalised an experience of continuity in which social identity and subjective perspectives get woven together, localised through a reflexive form of active affects (Viveiros de Castro 2004).

Tamya añanku, it could be said, carry messages that syncopate with the current state of capital world affairs and the dynamics of human-made worlds. Unbound from scientific encapsulations, *tamya añanku* weave themselves across Sarayaku in syncopation with the rain. They turn with and against the rhythms of rain. The agencies of rain can be interwoven with the agencies of *tamya añanku* by interconnecting syncopation, as an interruption in the flow of rhythm, with *taki*, as a local notion of rhythm. Here, the Sarayaku meaning of *taki* works as a situated concept of attunement to local unruly rhythms crossing and creating a fabric of interrelations.

My transversal operation of syncopation interconnects with *taki* to invert nomadism, transforming it into an invertebrate performance of rhythmic motions capable of turning places upside down while tuning in the sound of rain. With this in mind, *taki* encompasses in my work the rhythmic oscillations manifesting through dominant acoustic atmospheres such as rain, but also through the sounds, forms, and encounters brought into life by rain messengers. Particularly I attend to the acoustic textures and frictions when *tamya añanku* weave corporeal bridges to cover terrain gaps or water ponds created by rain.

The *taki* of rain envelops the rainforest like *tamya añanku* envelop others. Rain becomes a meteorological force imposing its rhythm over the rhythms of *tamya añanku*. Rainfall interrupts the lifeforces in motion of *tamya añanku*, just as the ants interfere in the lives of others. Following the understanding that in Sarayaku *kawsay* are lifeforces traversing the rainforest, I see vital threads as oscillating sounds that circulate through both rain and *tamya añanku*. In this world of earth beings composed of *Kawsak Sacha* and *Sumak Allpa*, the interwoven sonic character of these oscillations can be approached with syncopation. The sounds I recorded from rain and ants are overlaid in two soundtracks to displace the rhythms that build up from putting together similar sound waves: ants running over the ground and the sound of raindrops. I then employ data collected from my diverse interventions on the ants as variables to create syncopations in the final acoustic compositions (Chapter Five, *Taki Rhythms*, page 137).

Across this territoriality from underneath, *tamya añanku* can be considered a fabric of multispecies lifeforces in motion that interferes in other processes. This invertebrate fabric vibrates, respire and transpires. It also releases an intense chemical bouquet of pungent odours that create an olfactory footprint of their performances. On the ground, these performances are better appreciated through the notion of *kawsay* as flows of territorialisation, deterritorialisation, and reterritorialisation, which are marked by sudden radical turns (*tiam*) and rhythmic oscillations (*taki*). Preceding and following the lifeforces of rain, *tamya añanku* and their companions weave invertebrate fabrics on the run (*awana*) which cannot be ripped apart from the intricate, interwoven, materialities of this world of earth beings.



46

Weaving invertebrate fabrics

When rain is falling, *tamya añanku* weave themselves into shelters and passages over water to avoid being swept away. They wait for the cascading rhythm of rain to pause entangled with other invertebrate kin. Rain is not their only *antagonist*.

Tamya añanku communities are not composed only of ants. Other insects and animals interfere as *antagonists* creating different acoustic and corporeal oscillations in this invertebrate fabric. *Tamya añanku* maintain intimate tensile relationships with other lifeforms. A great diversity of myrmecophiles—from the Greek *myrmecos*, six-legged creature, and *philia*, love, affinity, attraction—live in permanent association with the ants, running and hunting along with them. The rhythms of antbirds, beetles, flies, and mites, act upon *tamya añanku*'s weaving of invertebrate fabrics. These myrmecophiles become part of the rain ant community. They all move around, contorting and exchanging places, licking, grooming and sometimes biting each other. Loosening up tangled bodies and tensing legs again between organic matter and carbon black exoskeletons, they tie up new corporealities.

⁴⁶ Invertebrate fabric of *tamya añanku*: the circles show two different species of staphylinid beetles, also called rove beetles. I presume these to be *Ecitomorpha* (left) and *Ecitophya* (right, centre).

Myrmecophiles mimic ant morphology and chemically disguise in their scent—yes, they acquire the skatole smell of rain ants; beetles clean their bodies, hide in refuse piles, and prey on their larvae, while mites ride on their mandibles, and attach onto body parts (see below, Fig. 47). Antbirds perch on the branches of the canopy singing tunes about them. Antbirds of various species oversee the invertebrate fabric from higher altitudes to opportunistically feed from fleeing insects, while parasitoid flies buzzing around dive in from the air to oviposit eggs into escaping insects. Myrmecophiles turn into disruptive and creative co-authors of this invertebrate ensemble amping up an increasing resonance similar to that of raindrops interacting with the skin of the forest. This becomes a rhythmic performance marked by metronomic touches, corporeal torsions, and chemical intimacies. They continually re-weave themselves to hold the tensions of this fabric in place. Elaborate woven passages over the terrain can be seen across hundred-meter-long migrations and hunting trails. These olfactory trails only linger as long as rain does not fall.



47

With the rain and myrmecophiles as *antagonists*, *tamya añanku* weave themselves into the Sarayaku territory. This image is reminiscent of Franco’s vision of the social fabric being composed of complimentary as well as opposing relations. In this inverted view, woven nests and corporeal passages make up a fabric in motion that defies gravity and geometrical classifications. This fabric is viscous, fluid, and eludes “the scientific cornerstone of exact reproducibility due to their continual variance over time” (Salter 2010: xxx). I borrow from Chris Salter’s appreciation of Hans

⁴⁷ Left: photograph of a major rain ant, called *Apatinka* by Sarayaku people, with *Circocylliba* mite attached to the right mandible; photo by the author. Right: image of *Planodiscus* mite attached to an ant leg (Rettenmeyer 2015, “Associates of *Eciton burchellii*,” 41:35).

Diebner's (2006) research into dynamic systems to exemplify that this invertebrate fabric manifests a spectrum that lies beyond scientific validations, whose rhythmic lifeforces entwine with the agencies of rain. Turbulent flows, radical turns, tensile relations, tactile intimacies, chemical metabolisms, and oscillations attune to the topologies and cultural situations of Sarayaku's territoriality from underneath.

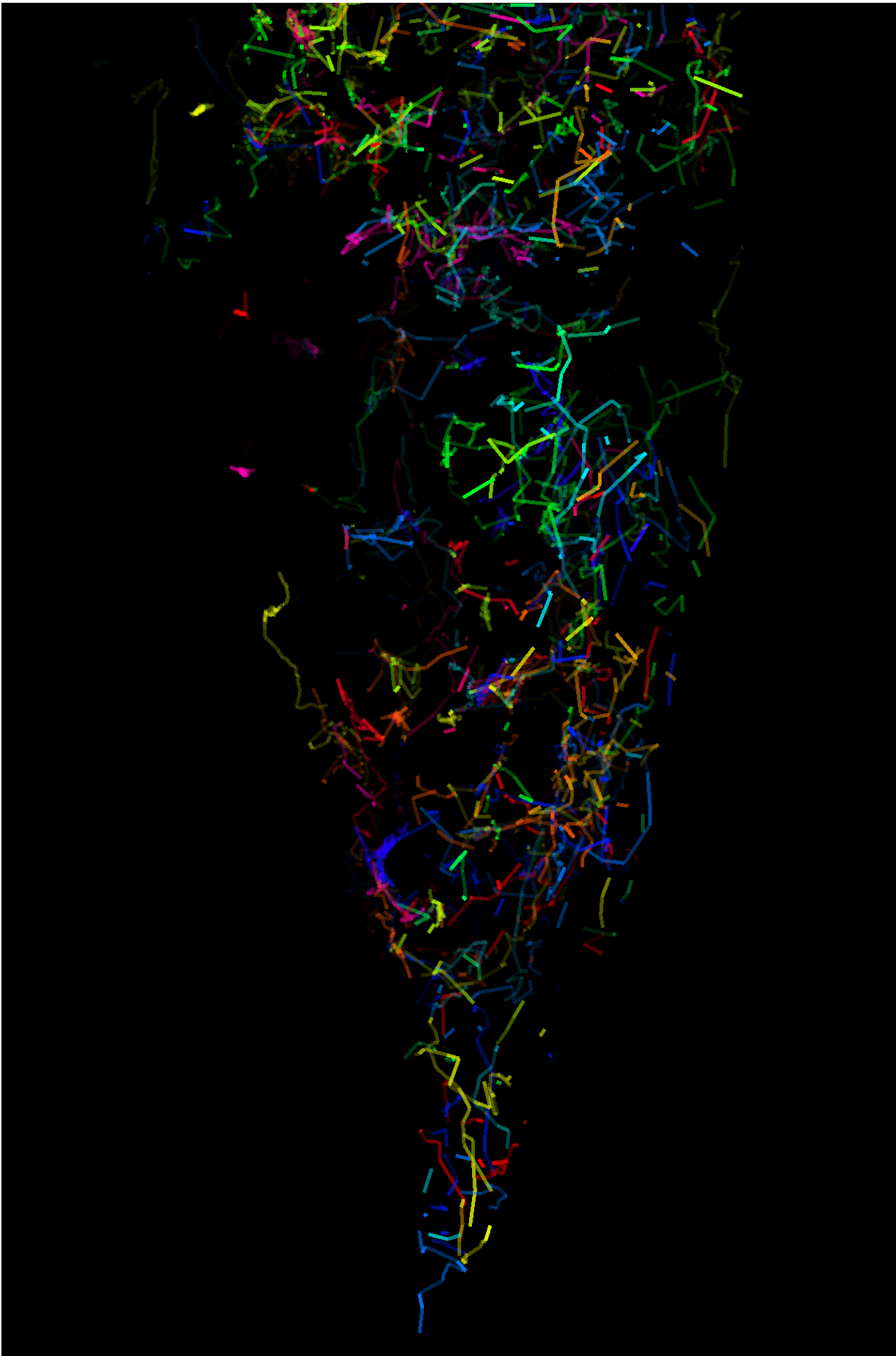
In this inverted world in formation, the notion of spectrum, illuminated by *tiam*, *taki*, and *awana*, enables me to expose the shape-shifting, relational forms, of invertebrate fabrics. With *tiam*, *taki*, and *awana*, I guide my transversal operations of amplification, interference, syncopation, and convolution, to work on revealing invertebrate performances from a different point of view. The next three chapters present a three-part multi-sensory installation materialised with these transversal operations, focusing on *kawsay* as a vital thread that weaves ants, rain, and territory together.

The first installation, *Tiam Movements*, illustrates *kawsay* from the perspective of *tiam* to visually render the turns in the weaving of invertebrate fabrics: trails crossing each other and other lifeforms, entangling with the territory, and creating fabrics made of ant bodies, appear on screen as threads being woven on the run. The second installation, *Taki Rhythms*, approaches *kawsay* from the perspective of *taki* to compose acoustic fabrics: sound waves crossing, oscillating, and interfering, tuning into a rhythmic lifeforce which resonates like rain. The third installation, *Awana Fabric*, involves *kawsay* as a thread of tactile conductivity that joins with the community-weaving practices of Sarayaku: I intervene in an *ashanga* basket with electric conductive yarns, turning it into a vessel for fluid audiovisual interactions. Altogether, my artistic compendium honours the value of community-weaving practices beyond and beneath the human, and the warps and wefts woven in the knowledges of *Kawsak Sacha* and *Sumak Allpa*.



48

48 Three different instances of the same woven nest, sheltering from rain inside a fallen tree in *Sarayakillu*.



4 _____ Turning Lifeforces

Tiam, taki, and awana of rain ants

Building on the previous three chapters, I bring back my principal claims: in Sarayaku, movements weave rhythms, rhythms weave movements, and a world is being brought into life through weaving. This is the essential inspiration giving sustenance to the artistic process honouring rain ants, which I will present here, and throughout the next two chapters. Drawing from Bishop's notion of "the activated viewer of installation art as a political subject [...] who physically enters into the work to experience it" (2005: 10), I mediated this ant world as I experienced it. I convey that experience to the imagination of the 'activated viewer' so that she is transported to that original place, where visual, acoustic, tactile, and olfactory phenomena act on the senses, recreating the site-specificity of being amongst rain ants.

As rain messengers of *Kawsak Sacha* and *Sumak Allpa* — the living forest, and the good land and soil without evil — I draw their invertebrate performances using *tiam, taki, and awana*. Guided by these three key concepts, I activate my inverting methodology and show how army ants turn into *tamya añanku*. They bring forth intertwined ecological effects and meteorological messages as they cross Amazonian worlds. They turn life over with a rhythm syncopated by the rain. I contend with this core idea that rain and all the water forms it brings into being are antagonistic forces setting the stage for the weaving performances of *tamya añanku*. Through my inverting operations, *tamya añanku* and their companions become a fluid invertebrate ensemble that weaves itself to the feature-rich, irregular, soil topologies of this territory form underneath.

My transversal methods combine with tactical media and aesthesis to present invertebrate communities territorialising, deterritorialising, and reterritorialising themselves across Sarayaku, weaving shelters when it rains. The modes of existence of rain ants are intimately interrelated to the forces of rain: *tamya añanku* and rain succeed one another; an encounter with *tamya añanku* means that rain is coming, or that rain came (Rumi 2019; Hilda 2019). According to Hilda, their movements convey the meaning that they are running to shelter from impending downpours, or that

with receding rain, they resume mobilisations across forest lands. This demonstrates an alternation of lifeforces preceding and succeeding one another.

I express this interplay between rain and *tamya añanku* through *tiam*, as radical turns, *taki*, as rhythmic oscillations, and *awana*, as weaving performances. *Tiam*, *taki*, and *awana* are interrelated forms of corporeal expression in the life of *tamya añanku*. These three Sarayaku performative concepts allowed me to work with transversal operations that invert army ants into rain messengers of a territoriality from underneath. Employing my transversal methodology of inversion, I reterritorialise the fabrics that rain ants weave across Sarayaku. Seeing these ants as territorial weavers creates a shift in awareness from scientific depictions built on nomadism and military analogies. In this manner, I raise the values of an integrative indigenous perception which I contend is unique, when it comes to creating reciprocal relations with forest lands and lifeforms. People in Sarayaku recognise the role these ants play in the weaving of a heterogenous Amazonian fabric which is entangled in tensions with other worlds. *Tiam*, *taki* and *awana* are indexical of a Sarayaku biocentric worldview, in which the rainforest is not made up of divisions, but rather of mutual and opposing lifeforces threading along and across different fabrics that stretch beyond material realities. Here, it is opportune to remember that *pacha* is the definition of spacetime in Kichwa; space and time are not separated but interwoven in this Amazonian ontology (*The territoriality from underneath of Sarayaku*, page 11).

Weaving becomes the environmental, social, and mental means to reinforce a territorial sovereignty that includes other species as kin vital players in the place-making of this rainforest. After all, as put by Haraway, weaving is a sensible cosmological performance (2016: 91). Therefore, describing the weaving performances of *tamya añanku* as being distinctly marked by *tiam*, *taki*, and *awana*, serves to strengthen the Sarayaku vision of a world of earth beings that is woven by tensile lifeforces in motion.

My audiovisual, algorithmic, and electroacoustic mediations of the lifeforces in motion of *tamya añanku* work with *tiam* using the inverting operations of amplification, interference, and convolution. Likewise, the *taki* of *tamya añanku* is demonstrated by working with amplification, interference, and syncopation. These operations foreground the alternation between turns and rhythms in the weaving of invertebrate fabrics. 'Turning with rhythm' is an essential mode of existence in the life of *tamya añanku*, which leads to the weaving of corporeal passages and rain

shelters. This weaving can be understood through *awana*. With this in mind, I have developed three multi-sensory installations which are exhibited in my studio-turned-into-gallery space.

Tiam Movements is the first installation based on my video documentation of rain ants' massive migrations, hunting forays, and weaving of corporeal passages. *Tiam Movements* combines recorded sounds of ants, visualisations of turning motions processed with convolutional algorithms, and a scent diffusion of a compound that smells like wet earth. Inspired by their identity as rain messengers, I employ a synthetic compound that evokes the scent of wet earth after rain: a geosmin derivative created with Sarayaku soil samples. Geosmin is a bicyclic alcohol whose earthy odour is identifiable by humans when rain falls on woods or forests, or when soil is being turned. In *Tiam Movements*, the geosmin olfactory compound indexes the territorialities in motion of rain ants; it is diluted in a film of water over a metallic disc which vibrates with rain and ant sounds.

Taki Rhythms, is the second installation, an electroacoustic video installation about the rhythms of *tamya añanku*. These ant rhythms create an acoustic fabric which sounds like rain: an auditory textural signature of their lifeforces in motion scratching the forest floor during night migrations. Amplified through the use of syncopation and aligned with *taki*, I generated sound compositions that emphasise the rhythmic oscillations involved in the incommensurable entanglement between rain, rain ants, and rainforest, which, in the study of army ants has been left unexplored. This is accompanied by a video documentation of laser interferences caused by rain ants' crossings.

My third installation, *Awana Fabric*, is audiovisually interactive and focuses on the corporeal tensions produced by *tamya añanku* when they weave themselves into rain shelters. *Awana Fabric* brings ant performances of 'turning with rhythm' into being as they weave shelters in syncopation with the rain: a handwoven basket of Sarayaku is used as a vessel for tactile interaction with a visual projection of the ants. Rain shelters are woven through a spectrum of rhythmic motions, and I emphasise this as an embodiment produced by *tiam*, *taki*, and *awana*. Using *tiam*, *taki*, and *awana*, all three media installations correspond to each other. Together they make up a whole multi-sensory installation—audiovisual, tactile, and olfactory—that turns army ants into rain messengers on the grounds of the Sarayaku knowledge and its entwined human-nonhuman territorial practices.

Tiam Movements

“It is important to be reborn, to reconnect with Pachamama again, with Kawsak Sacha. It is a question of the interior, a question of wisdom. The closer we get, the better Pachamama can continue to recover her health. We call it ‘tiam,’ the return, turning around to change perspectives, a new look. That is the meaning of tiam” (Angun from an interview with Hogendoorn 2019).⁴⁹

The enactment of *tiam* carries along a continuous adjustment for self-interfering with your present state of being, it radicalises positions to dare to look from another point of view. I used *tiam* as radical turns to guide an artistic process that adapts to rain ants’ indeterminate and unruly movements. Performances marked by radical turns need to be accounted for as factors in the corporeal expressions of these ants. I present the exegesis of my first installation, *Tiam Movements*, working on several ideas linked to the performative and creative values of ‘the turn’ as articulated by the meaning of *tiam*. In this way, *Tiam Movements* focuses on the invertebrate movements of rain messengers weaving through and across the Amazonian world of *Kawsak Sacha* and *Sumak Allpa*.

My artistic production methods of amplification, interference, and convolution allowed me to work on the radical turns performed by *tamya añanku*. The combination of amplification, interference, and convolution traces and processes that which is imperceptible and difficult to follow: ant movements crossing and entangling, leading to the weaving of invertebrate fabrics. The concept of *tiam* has been applied in the way I deployed and used my camera, sound equipment, and electronic sensors to bring into being a radical shift in perspective. In this artwork, *tiam* is inspected through changes in ants’ trajectories which lead to processes of reterritorialisation. Not all ants move together in the same direction. Some turn left and right, others suddenly decide to return, until a critical mass achieves a steady motion. Variations and hesitance in every individual’s movement characterise a process of rolling in and out of the woven shelters. *Tiam* points to that process of becoming, of turning into invertebrate fabrics, into shelters and bridges.

Tiam enables us to imagine inverted worlds. *Tiam* invites us to see from the ant perspective. From

⁴⁹ The translation from Spanish to English differs from the original subtitles in the video source. I have corrected words in relation to what Angun told me in one occasion we talked at the table with his family.

an inverted position, *tiam* allows us to look anew at the corporeal performances of rain ants. *Tiam* is embodied in convolitional motions and spirals, in rolling performances over uneven surfaces. *Tiam* is embodied in repelling and attraction forces in motion in the wake of hunts and migrations. *Tiam* aptly addresses those sudden unexpected turns certain ants make. Radical turns signal deviations and divergences on the run, which can quickly lead to branching trails into uncharted territories, improvisations of passages over gaps, and tensile fabrics to avoid water contact. Transversal operations combine to conduct a visualisation and sensorial representation of rain ants' territorialities in motion, in which radical turns are key signature performances: turning bodies into bridges to ease ant transit, turning bodies into rain shelters, turning left and right as hunting strategies, turning other species population upside down.

The visual part of this artwork is materialised by using convolitional algorithms for motion detection to trace ant movement. Computing processes based on convolitional neural networks are capable of analysing vast amounts of data to detect ants and trace their trajectories. I worked with TRex, an open-access application created by Tristan Walter (2021; Walter and Couzin 2021), to trace the movements of ants. I purposely configured this algorithmic application to visualise trails of individual ants as woven threads. Through convolitional lenses, I look at the lifeforces in motion of *tamya añanku* as threads being woven across Sarayaku. On the exhibition monitor, colourful threads appear as woven, sometimes entangled, patterns which over time turn into complex fabrics. Impermanent invertebrate choreographies of another kind emerge, dissolving, dissipating, and deranging in time.

The acoustic part of this artwork is materialised with amplification and interference. Amplification was processed via piezoelectric recordings of ant sounds and the regular deployment of cameras with macro-lenses; acoustic interferences were enacted via the same apparatuses placed in situ, at the site of ant motions, over which oscillatory vibrations of ants scratching the forest floor, insects running around, and raindrops interacting with organic matter occur. In *Tiam Movements*, rain is involved as a turning force that changes the forest environment and washes away pheromone trails. Rain interferes with their territorialities in motion. Rain acts against the hydrophobic volatile chemical cues of ants. The ants thus turn away from the rain. During heavy rainfalls, they turn into shelters, tightly weaving themselves onto substrates and concealed topologies over the ground until rain recedes. The intimate antagonism between rain and *tamya añanku* is given prominence in *Tiam Movements* by transversally repurposing computer processes with olfactory synthesis to reproduce

this rain-ant interrelation.

Rainfall turns the earth over releasing olfactory molecules. The scent of rain, petrichor, is a complex bouquet of molecular compounds produced when droplets hit the soil and water builds up trapping air bubbles underneath. Petrichor is a combination of geosmin, the smell of wet earth produced by soil bacteria like *Streptomyces*, and fatty acids released from plants. The scent of petrichor diffuses through rainwater into the atmosphere. Rising as a mist, rain helps spray the smell of wet earth across the surroundings. This olfactory experience is recreated in my artwork with a synthetic scent of wet earth poured onto a water film, which is excited with a transducer playing amplified ant sounds as modulations. The synthetic geosmin was concocted from soil and leaf samples of Sarayaku in the lab of Dr Latnikova of Fraunhofer Institute of Applied Polymers in Potsdam, in February 2021.⁵⁰ The smell of turned earth/wet earth is interconnected with the visualisation of rain ants crossing and turning. Visual woven trails, olfactory notes, and oscillating sound patterns in water combine in this artwork. Rain, tanya añanku, and rainforest are bound together through visual, acoustic, and olfactory processes to represent the lifeforces of this territoriality from underneath.

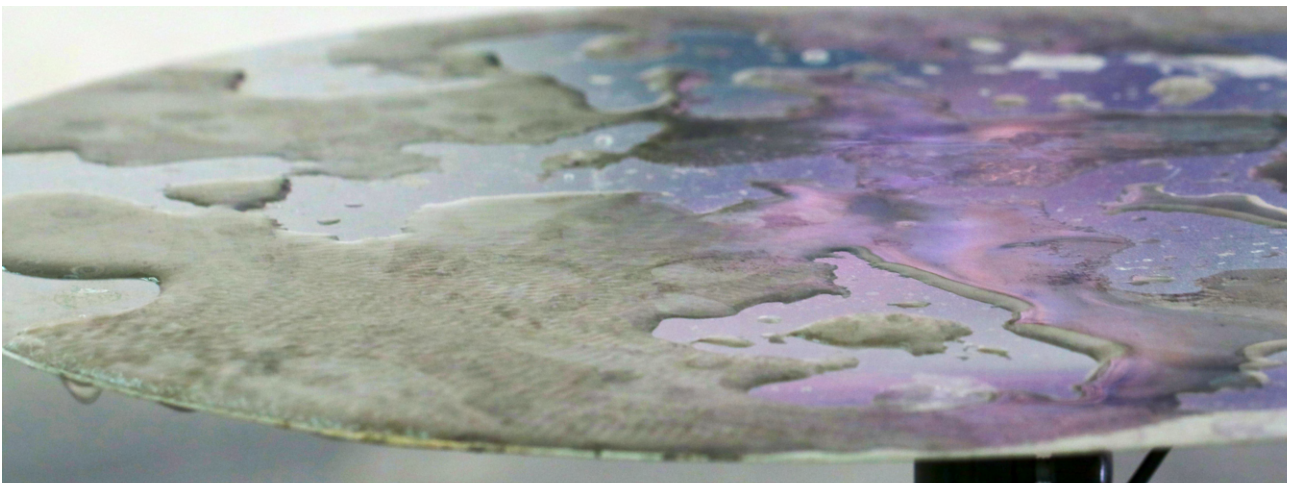
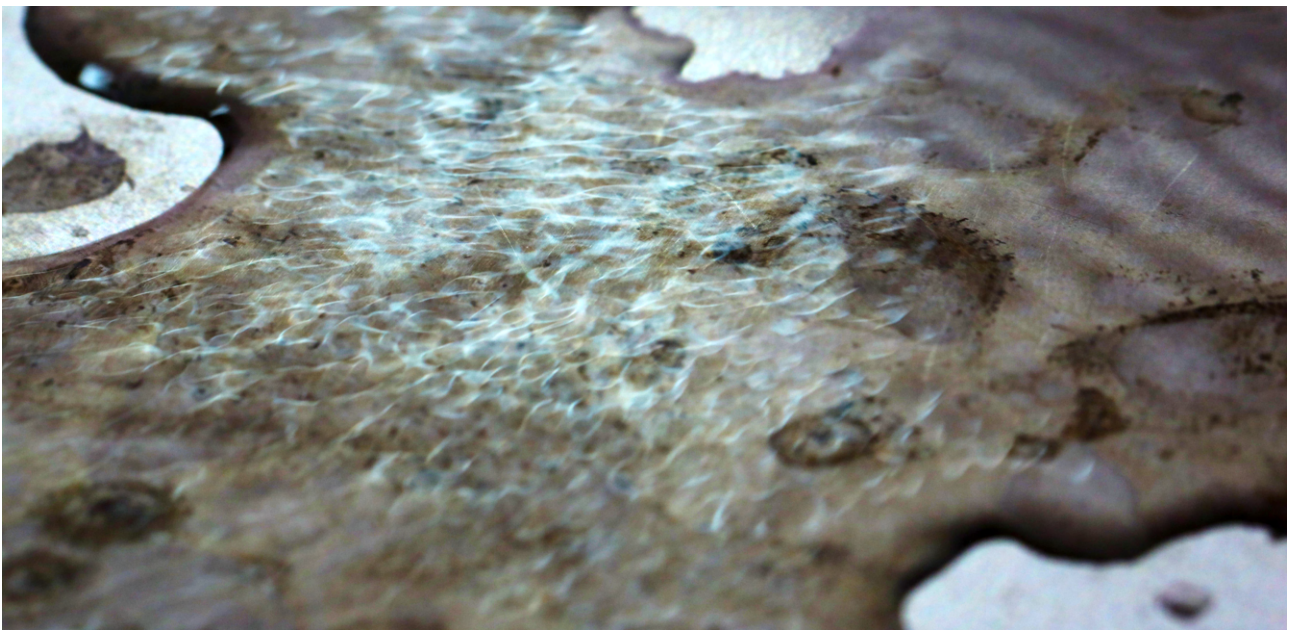


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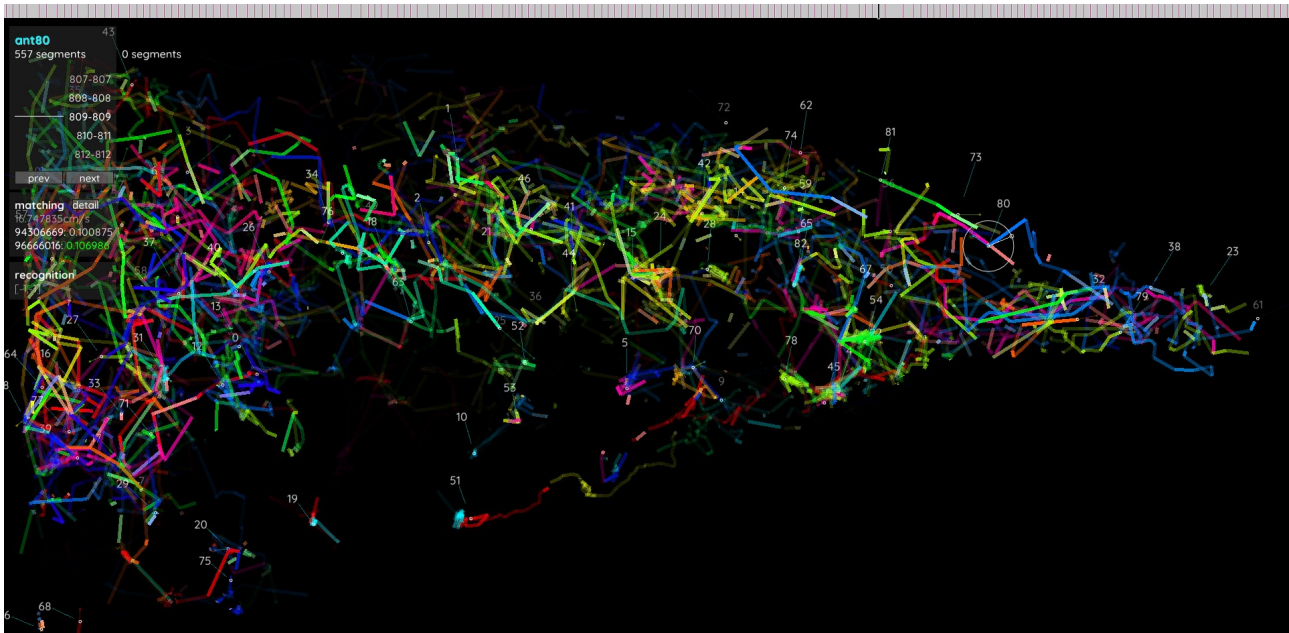
⁵⁰ Leaves and soil samples are mixed in ionised water and then broken down by heating them to high temperatures, over 265 degrees Celsius. A dark liquid mixture is left with bits and pieces which is stirred with a small centrifuge at velocities of 550 rpm. The liquid is put into an ultrasound bath, condensed and filtered. Then through a distillation and polymeric coating process patented by the Fraunhofer Institute, the substance is turned into micro particles of 30 micrometers in diameter.

⁵¹ Left: leaf samples are being boiled and stirred. Middle: liquid extract of geosmin in first ultrasound bath. Right: detail of experiment using sound vibrations played over an aluminium plate in my studio.

Tiam Movements demonstrates a territoriality in motion that is inverted, characterised by turns, and adaptable to the lifeforces of this rainforest. The visualisation of woven trails, oscillating water patterns, and the olfactory experience of wet earth activates a nuanced subjectivity of the local meanings *tamya añanku* carry. Guided by *tiam*, I operated my transversal methods to evoke the intimate relation existing between *tamya añanku*, rain, and the Sarayaku forest as a pluriverse (Escobar 2016, 2018), a world of earth beings (de la Cadena 2015), a territoriality from underneath conceived through *Kawsak Sacha* and *Sumak Allpa*.



⁵² Images showing water-weaving patterns in action using a sound composition of ant and rain recordings, played with a transducer (from installation, *Las Hormigas de la Lluvia*, shown at the 14th Bienal de La Habana, Cuba, May 2022).



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Radical turns: artistic and inverted perspectives

In the rainforest, matter is transforming, matter is turning. This is the *tiam* of *Kawsak Sacha* and *Sumak Allpa*. In my artistic representation of the *tiam* of *tamya añanku*, I imagine a process of invertebrate attunement to the living places of this forest, across lands and soils without evil, which the ants traverse. It is by turning that ants find their way back home. By turning, they make sense of preceding and following bodies in motion, and the complexities of the spaces they want to occupy. The act of turning reinforces trail communication, as ants deposit pheromones creating olfactory tunnels for their navigation. Turning around becomes essential for bringing back news of what lies ahead. The salient branching trails, a signature of rain ants' hunting strategies, are formed because some individuals dare to turn in a different direction, inciting others to follow them into uncharted territories. Radical turns, availed by the local understanding of *tiam*, can be apprehended as processes of continuation of that which was initiated by others. In this light, it is important to discuss a Sarayaku filmmaker, who has set an example with *tiam* for my present work with rain ants.

Traya Muskuy has opened a creative path with his films for the younger minds of the community. He is the son of the late *yachak* Sabino, and the first internationally recognised filmmaker of the

⁵³ Screenshot of video footage of the ants processed with convolutional algorithms using TRex (Walter 2021).

community. *Tiam* is fulfilled cinematographically in two of his recent films, in which he made good use of digital recording techniques and aerial shots with drones. Traya is not only a filmmaker, but a musician too, who discovered making movies “is a medium for sending messages across barriers” (2019). His films are dedicated to amplifying the Sarayaku worldview vis-a-vis capital models, particularly the State's dependency on the exploitation of natural resources. His new film “Helena, Sarayaku Manta” (2022) depicts the coming of age of his niece, who studies in Finland and lives between two worlds: the progressive social system of Nordic culture, and the grassroots of her Sarayaku identity. The film follows her awakening as a teenager who recognises her life is at a crossroads. Helena turns into an activist to promote *Kawsak Sacha* amidst the sheltering-in-place restrictions due to the pandemic, and a sudden flood due to catastrophic rainstorms, which gravely affected Sarayaku, destroying the main bridge that connected *Puma* with *Shiwakucha*. She realises the world needs to radically change. This film can be seen as a continuation of Traya’s previous one, which more directly conveys the meaning of *tiam* amidst the global pandemic crisis.

“*Tiam, the return*” (2021) is Traya’s short film about the Covid-19 outbreak in Sarayaku which sadly took the life of one elder. It tells the story of Yutzu, a young boy and his family who turn to the forest to seek shelter. It was produced during the first 2020 pandemic, when Covid-19 infections in Ecuador rocketed and the governmental health system collapsed, leaving indigenous populations on their own. The film reveals *tiam* as an action for returning to the roots of knowledge. In times of crises, *tiam* is a mode of returning to the gifts of medicinal plants of a forest which offers everything one needs to keep on living: “Our connection with the earth is in the everyday things,” appears as the English translation of a phrase Yutzu says in the film (Traya, “*Tiam*,” 9:08).

Tiam is brought onto the screen by images of the boys' family performing some of the community-weaving practices I described in this exegesis; practices which Traya has cleverly edited to highlight how *tiam* subtly lives in everyday enactments and not necessarily in words. Throughout the film, there is no verbal mention of the *tiam* concept, but there are ongoing moments showing *tiam* in action. One of these is a close-up of kids playing ‘trompo,’ a top set in rotation by hands over a plastic covering a metallic pot (Traya, “*Tiam*,” 11:40). Instead of depending on the meagre response from the government, people started collecting herbs and plants and decocting brews. During the pandemic, I kept in contact with some of my closest friends there. I was made aware of the community consensus to respond to the pandemic by returning to ancestral recipes with healing plants that boost the immune system against the virus. Fluvial travels are shown in the film,

sequenced with images of Yutzu and the *kuraka* (chief of the commune) brewing and handing out herbal beverages, whose properties have been almost forgotten, and were now revived, returned to the people (Traya, “*Tiam*,” 14:24).

Radical turns characterise the alternation of life-taking and life-giving energies circulating in *Kawsak Sacha* and *Sumak Allpa*. This circulation of energies is most notable when looking, with similar *tiam* lenses, like those Traya employed in his film, at rain ants traversing through the territory. The ants are relentless hunters. They continuously enact life-taking and life-giving processes that capture other invertebrates to transform them into food for their offspring. Rain ants act as a flooding wave, flushing away unwanted insects from the dwellings of the Sarayaku people. Across the rainforest, the evacuation of invertebrates out of their burrows creates a feast for guests and followers of rain ants, like antbirds, which dive in from the canopy to dine on insects that the ants could not manage to catch. Radical turns also distinguish the last developmental stage of the ant pupae, which consists of spinning performances to turn into adults. Their sticky soft bodies spin around organic debris to weave protective cocoons. These spinning performances make sense when validated with *tiam*. Ant metamorphosis becomes a performance characterised by radical turns. Cocoon-spinning signals the incommensurable material connection between *tamya añanku* and the rainforest, as ant larvae need to integrate soil particles and feed from the Amazonian fabric in order to be born.

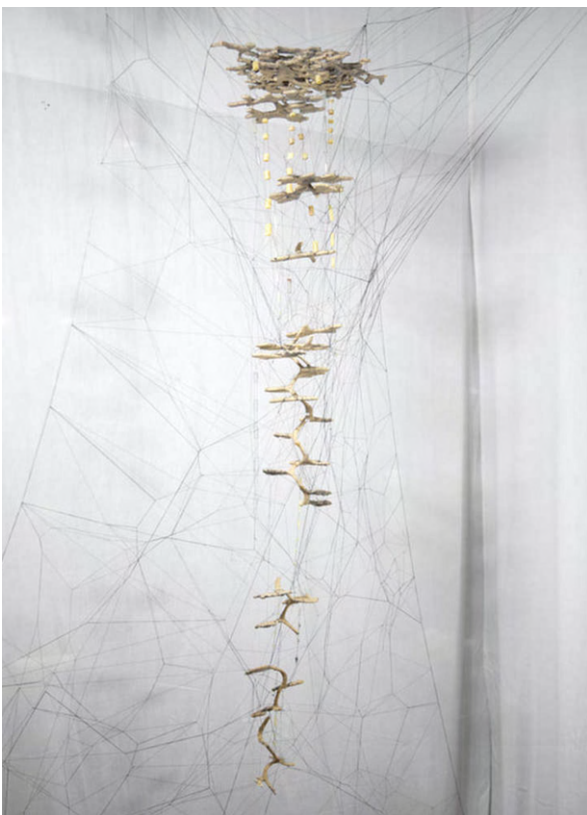
In my view, rain ants’ radical turns are encompassed by a spectrum of rhythmic motions worlding with the rainforest. My postulation of ‘spectrum’ refers to the breadth of unforeseeable possibilities, wavelengths, encounters, and mutations, which are brought into being when focusing on *tiam* and *kawsay* as vital threads turning and turning: a form to represent the intensities demonstrated by the territorialities in motion of rain ants. The term spectrum thus emphasises indeterminacy, impermanence, and fluidity for seeing and describing entwined worlds, in which multiple performances and encounters occur simultaneously. These turns and threads are materialised by the new media relations that I have introduced into the ants’ world that go beyond anything that has been done before. Instead of discarding turns as accidental, as deviations in orientation, as anomalies of expected efficiency, I see the performative value of *tiam* leading to unexpected weaving of tensions in the corporeal forms that rain ants create to ease their transit. In the bridges they weave, ants take turns, some leave, new ones weave themselves in. Every fabric they create is unique, composed accordingly to terrain irregularities. Ants continually invert their roles, as some

runners sometimes switch tasks, instead of running above, they stay under to become living passages that cover gaps.

These field observations I made were possible by thinking radically with *tiam*; this ant behaviour appears on screen in my installation, visualised via convolutional algorithms that enabled the processing of *kawsay* as threads. In *Tiam Movements* the use of convolutional algorithms for tracing ants enabled me to draw their trajectories as threads which cross and eventually are woven as passages and bridges. In this vein, I now turn to a discussion of artists working in galleries, institutions, and venues, outside the spectrum that binds my work to the specificity of the Sarayaku rainforest. Some employ similar computing techniques as myself, others produce more performative or sculptural works. The works I will delve into are relevant nonetheless, as they all deal with ‘turning’ as a performative action for changing perceptions and generating alternative views.

I begin by linking my work with radical turns to the experimental practice of Gabrielle Duggan. While I situate my transversal practice with *tiam* to look at rain ants turning themselves into corporeal passages and shelters, she brings into mind the notion that ant nesting in general could be deemed to be a living architecture that is never truly finished, a “snapshot of a temporary condition” (Duggan 2018). Gabrielle Duggan created an ant-inspired vertical sculpture, with the scientific collaboration of Rob Dunn and Adrian Smith, which was made of threads holding fragments of plaster casts excavated from underground ant nests. On one hand, her sculpture brings into the light—and above the surface—the inverted worlds of the majority of ant species, which vertically build underground nests by burrowing into earth and soil. On the other hand, she draws parallels between ants’ continuous performances of repairing and rebuilding nests, and her artistic production, as both being works in progress without ever completely achieving finitude (ibid). For me, her artistic thinking weighs in on ant performances as impermanent, fluid, and inverted. But the ethical extent of her sculptural intervention on ant nests remains unclear concerning the number of ants that were killed in the creation of casts; or if the nests of ant species selected were invasive, thus probably validating the asphyxiating action of pouring plaster to exterminate whole invertebrate communities. With this transversal reflection, I claim radical turns are needed in artistic practices to continually question techniques and tactics of enforcement of other lifeforms into aesthetic co-productions. The inverted nests of ants are better appreciated when technologies of visualisation are deployed out in their world, non-intrusively, instead of extracting entire ant communities or their living architectures into galleries.

A radical change is needed for de-centring and destabilising conventional art practices with living beings who can transform matter and themselves into something else. Bodily transformations can be linked to dance and theatre performances, where metamorphosis as an act of turning into something or someone else plays a major role. In dance, turning is immanent and recurrent, a motion-conducting manifestation of body energy. In theatre, the actress transforms on stage turning herself into a different character, not only in appearance but physically and viscerally, assuming the characteristics of a different self. The turn as a performative act is however not limited to stages or choreographies. For instance, the recent group exhibition at MU in Eindhoven builds from the transformative political embodiments of dance. “MOVE! Body Politics in Motion,” curated by PLASMA and Jess Oberlin (2022), showcases various artists' performances and video installations that display dance expressions and contortions as sources of tension and release, pleasure and protest. The core theme according to the art press release is: “Movement speaks the non-verbal language of rhythm and emotion. Especially in times of radical changes and major crises, dance can allow our bodies to speak in all their unity and diversity” (PLASMA and Jess Oberlin 2022).



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⁵⁴ Left: Gabrielle Duggan’s untitled sculpture made of casts of underground ant nests (2018); top right: “I Dance Alone - Crowds and Gestures” (ongoing 2014 - 2022) by Bogomir Doring; bottom right: “The politics of Ecstasy” (2019) by Chiara Baldini & Rafael Kozdron. These last two are part of the exhibition “MOVE! Body Politics in Motion.”

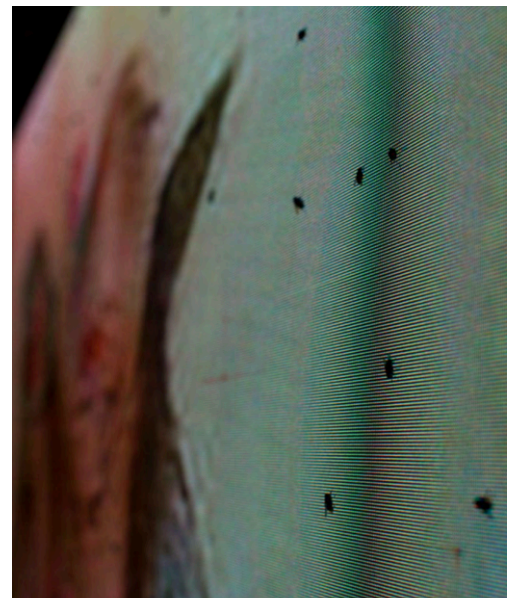
As expressions of performative language, body contortions in humans can evoke an aesthetic kind of metamorphosis. But far from the human body, turning motions in invertebrates effectuate real metamorphosis. Rain ants carry developing larvae upside down, so that the labia are in close contact with the adults' mouths. Not only food exchange but chemical signals are produced by this means of kissing, a circular transmission of vital information about the next stages in metamorphosis (Kronauer 2020: 213-214). In thinking metamorphosis, two artworks by Pierre Huyghe and another one by Robertina Šebjanič come to mind. They deal with metaphors of metamorphosis in water which partially align with my inverting operations.

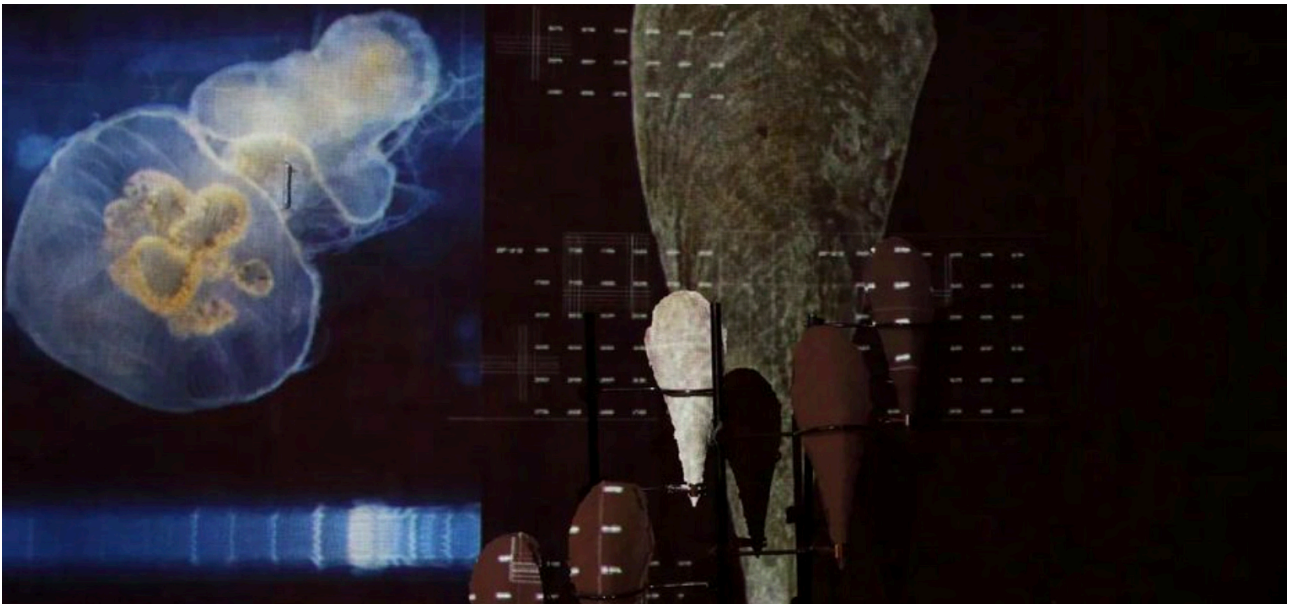
Huyghe's aquarium installation "Zoodram 4" (2011) hosts a hermit crab which uses the head of a sleeping muse, a replica of Constantin Brancusi's 1917-1922 classic work, to encrust itself inside. The underwater invertebrate turns into a performer in disguise in Huyghe's installation. "Zoodram 4" elicits reflections and refractions about the aquatic capacities of hermit crabs inside an artificial water environment. In as much as it is an aesthetic performance, the hermit crab is also a captive of the aesthetic gaze. It is forced into containment inside a glass aquarium and given human-made objects instead of sea shells. Perhaps "Zoodram 4" draws attention to the hermit crab's invertebrate capacity to turn any object into its house, prompting the viewer to consider the anthropogenic factors at play in the pollution of oceans. But the work accentuates the aesthetic in containment more than the invertebrate's Umwelt outside the aquarium.

Precisely, the idea of Umwelt was taken by Huyghe to generate radical visualisations using algorithmic mediations. "Umwelt" (2018) was exhibited at London's Serpentine Gallery and displays large LED screens with fMRI scanner data: images of unidentified persons' memories morph into one another via transfer algorithms. Throughout the day, variable atmospheres are created through the use of sound, light, scents, temperature and humidity sensors. The combination of these elements influences the spectator's perception of the metamorphosing images. Flies of unknown species are specifically harboured in the gallery space, arguably as part of a co-existing habitat, according to curator Rebecca Lewin (Huyghe 2018). To a certain extent, the production methods employed in these two artworks blend technologies and invertebrates to elicit a transformation of perceptions of other worlds. Nevertheless, the sensorial perception stays within an aesthetic regime of distant observation. Both hermit crabs and flies, for example, remain abstract unknown entities, cut off from environmental relations. They are employed as performative vessels

for the sake of aesthetic valorisations.

In contrast to Huyghe's work, Šebjanič, in collaboration with Crespo and McCormick, use computer algorithms to demonstrate how an inverted medium affords sensorial turnarounds in a media installation called "AquA(I)formings - Interweaving the Subaqueous" (2021). In this installation, the use of computer algorithms forces sensorial turnarounds, water becomes an inverted medium in which corals and jellyfish could be seen as weavers of worlds in peril. "AquA(I)formings" is specifically employing computing algorithms to address the large-scale changes in marine environments caused by human activities. Visualisations of underwater invertebrates metamorphose into uncanny creatures. Submersing sounds recorded with hydrophones are recomposed to signify the emerging development of interspecies relationships in endangered water worlds. For Robertina Šebjanič, the algorithmic mediation of images and sounds from the sea are imagined as new chemical compositions of how rising levels and ocean temperatures are affecting its inhabitants: "Seas and oceans record such environmental changes in biological or geological time as memories, either within individual organisms or as marked shifts in ecosystem structures" (2021).



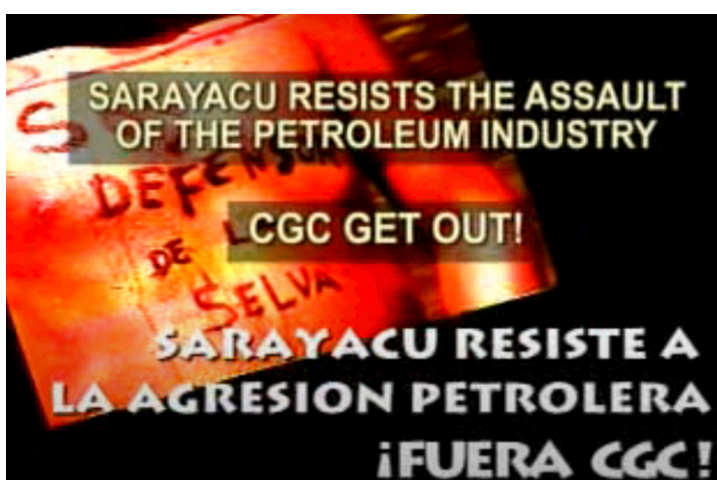
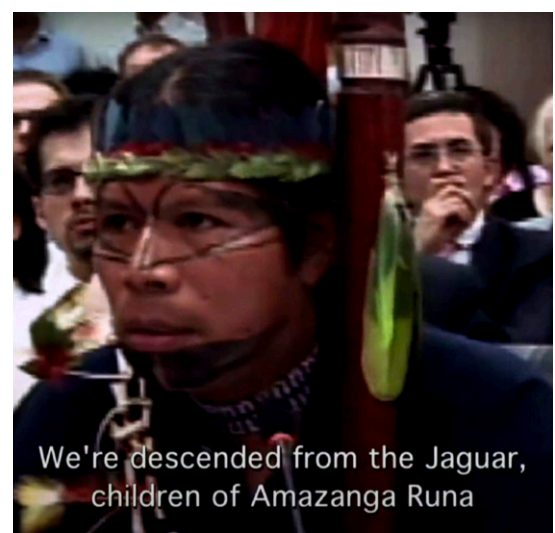


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I depart from submerged inverted worlds in transformation, shown in gallery spaces, to return to the Amazonian rainforest again. I return to Traya, whose cinematographic techniques focus on principles and cultural values that are ingrained, but in transformation. The initial films he produced relay the resistant collective voice of his people against the pressures of external hegemonies and extractive enterprises. “Soy defensor de la Selva” (2002) and “Los descendientes del Jaguar” (2012) were the first documentary films Traya made. Both films work in tandem as documents of the illegal incursion perpetuated by the CGC oil company with the military. These movies, which are accessible online, successfully worked as evidence in Sarayaku's defence of territorial rights against

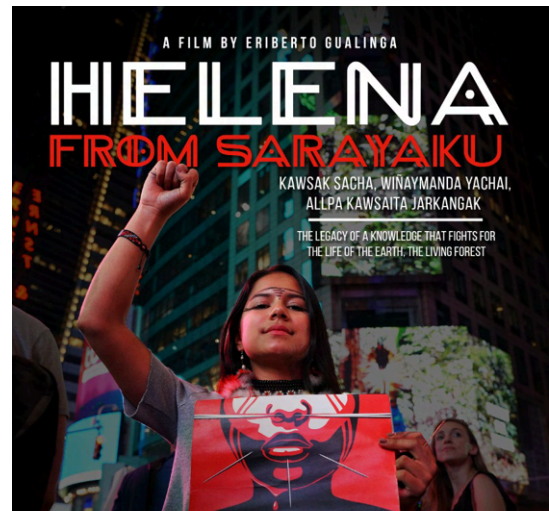
⁵⁶ “Aqua(I)Formings - Interweaving the Subaqueous” by Robertina Šebjanič, Sofia Crespo, and Feileacán McCormick (2021).

extractivism. Especially in “Los descendientes del Jaguar” he contextualises the Sarayaku voices of elders and leaders, like Hilda and Angun, in scenes of conflict encounters with the military posts that settled on the shores of the Bobonaza river without permission (Traya 2012, 7:00). This film contrasts the political agenda of extractivism and repression forces vis-a-vis the community's organisational efforts in 2011 to present the Sarayaku case at the Inter-American Court of Human Rights in Costa Rica. Drawing on the figure of resistance invoked by the jaguar as a powerful being of transformation and strength, Traya's film sends the central message that Sarayaku people will relentlessly defend this rainforest territory over and over again: “We’re descended from the jaguar, children of Amazanga Runa” (Traya 2012, “Los descendientes del Jaguar,” 0:58).



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⁵⁷ Top left: the top sequence from “Tiam, the return” (2021). Top right: Angun speaking in front of the Inter-American Court of Human Rights, scene from “Los descendientes del Jaguar” (2012). Bottom left: still from “Soy defensor de la Selva” (2002). Bottom right: scene when Traya and Hilda got stopped by militarys, from “Los descendientes del Jaguar” (2012).



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Traya's films work around the tensions of well-rooted practices and community knowledges that continuously turn to look anew and reposition themselves to face conflicts; practices and community knowledges which are resistant to change, and nevertheless are entangled in processes of transformation. He told me, "*hay que darle vuelta a las cosas*—things must be turned around," in reference to using cinematography as a foreign medium appropriated for other purposes (2019). Indigenous artists endeavouring tactical mediations to denounce political injustices like Traya are emerging in South America. A radical turn has been occurring in terms of artistic practices. Throughout the continent, audiovisual artists are more inclined to be inspired by indigenous views to destabilise science and arts and exercise decolonial practices (Page 2021). This aspect is elegantly explored by the Colombian artist duo Mazonett and Quiroga.

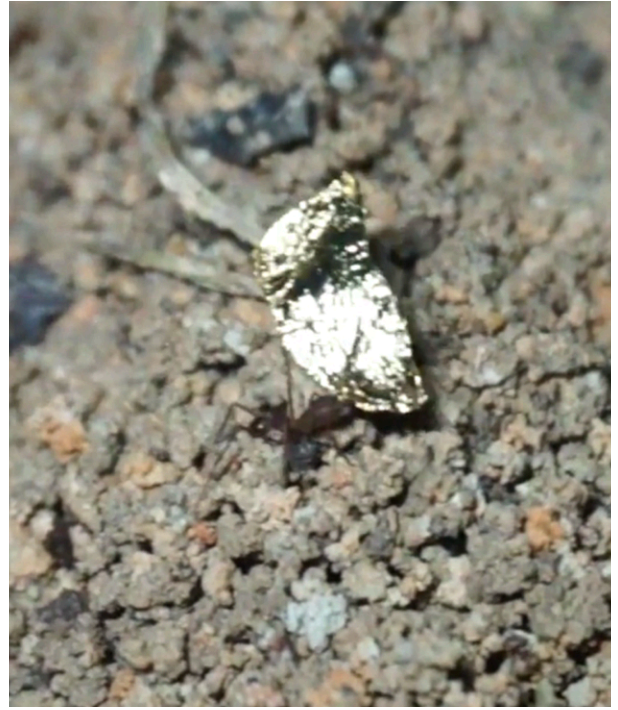
In relation to Traya's jaguar film, yet materialised with different performative elements, Mazonett and Quiroga painted labour uniforms of industry workers with jaguar spots. In "Hombre Jaguar" (2019a), these suits were distributed to factory workers to be worn during their routines. This intervention is underlined by Page in the following manner: "representations of the jaguar are not fixed in a past mythology, but (literally) marked with everyday practices, as paint, grease and other chemical stains were added to the animal's own spots. In this way, the ancestral is shown to cohabit with the contemporary, the natural with the technological, the rural with the urban, as indeed they do in many Amazonian, Andean and Mesoamerican cultures" (2021: 119). For me,

⁵⁸ Left: the flood of March 2020, at the onset of the Covid-19 pandemic, from "Helena, Sarayaku Manta" (2022). Right: poster of the same film.

while subtle, this performative intervention does transversal work that inverts industrial functionality with a cosmological subjectivity. It turns an everyday capital and labour-related garment into a symbol representing the metamorphosis occurring between opposites, the Amazonian world of the jaguar and the industrialised world. “Hombre Jaguar” prompts reflection on industrialisation in South America as an overwhelming accumulation and expansion of low-wage labouring services, which are often jobs enforced on territories of ethnic populations; or enforced as the only option for people with indigenous backgrounds to earn their living under a system that has been imposed on them.

Two other artworks by Mazonett and Quiroga evoke inverting as an artistic move: “Sun Disc” (2019b) and “Reinserción en circuitos ecológicos” (2019c). The latter is a performative intervention with leaf-cutter ants. Leaves of yuca are carefully covered with thin layers of gold originally extracted and converted through industrial processes, and in collaboration with the ants (as per the artists’ intention) “returns and extends into the subsoil of the Amazon forest” (Mazonett and Quiroga 2019c). In “Sun Disc” they work with the topic of gold mining, contrasting the economic profit of the metallurgy industry with ancestral Andean-based practices of looking to star constellations. “Sun Disc” consists of a golden disc engraved on one side with a map and perforations to indicate mining sites across the world. On the reverse side, these holes appear interconnected by a drawing chart of stars, “reminding us that all the gold found on Earth comes from stars,” according to Page’s evaluation (2021: 120-121). For me, the artists evoke in both artworks the creative power of turning and inverting. “Sun Disc” and “Reinserción en circuitos ecológicos” contextualise relational tensions that exist between top-down extractive practices and bottom-up worlding practices.

In retrospect, the compendium of artists I present here brings forth deep reflections about radical turns as tactics for inverting perspectives. *Tiam* activated with a decolonial mind points to centripetal forces that bring opposites into rotation, swirling attractions that absorb surrounding elements, entangling capital commodities and technologies. Convolution applied through algorithmic processes and guided by a decolonial mindset can materialise artistic renditions of *tiam*, in which tensions are the key material for artistry. Problematising the use of technologies with inverting imperatives enabled me to produce different images and sounds of what science regards as army ants, as part of my tactics to turn them into the rain messengers of Sarayaku.



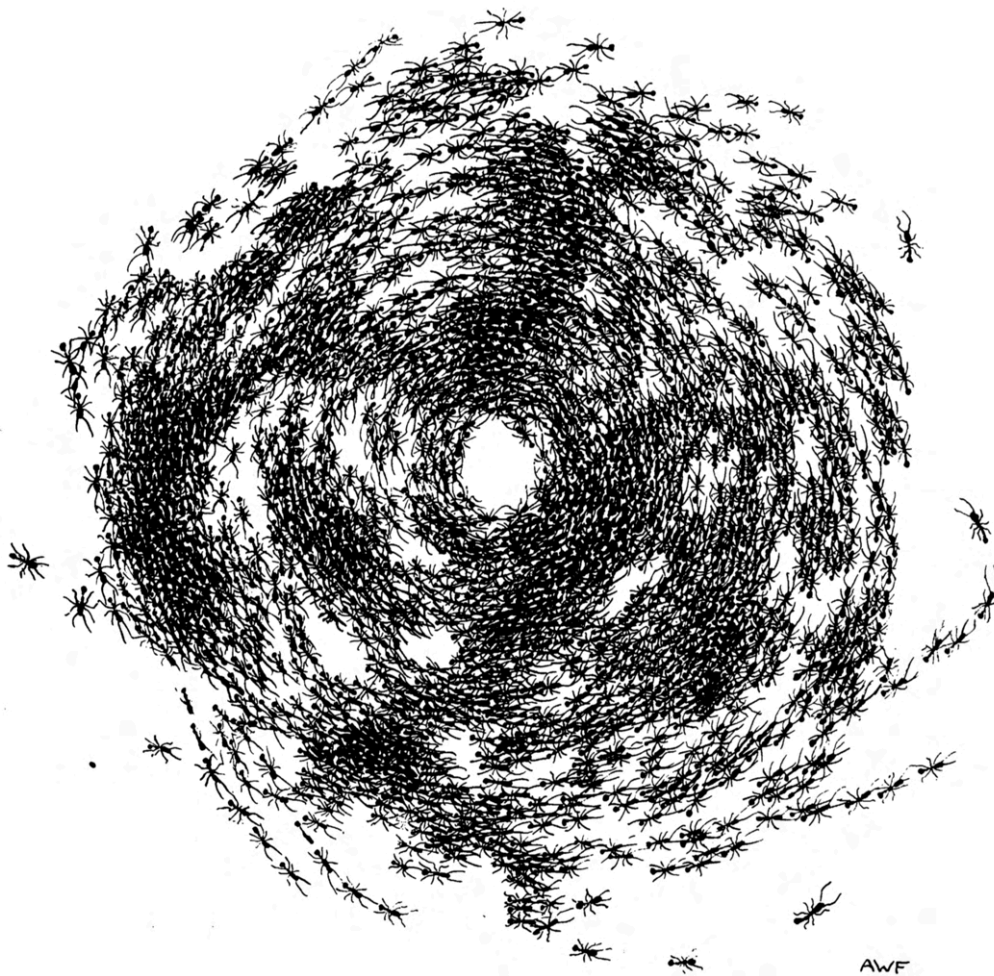
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My transversal operation of aligning convolution to *tiam* enables an initial decolonial exercise for dismantling scientific methods. While there is much to explore ahead, my technological mediations with *tiam* for now concentrate on conceiving an onto-epistemological turnaround that revokes the rights of science claiming universal knowledge on ants. Instead, with *tiam* I invert knowledge

⁵⁹ Works by Mazenett and Quiroga from 2019: “Hombre Jaguar” (top left); “Reinserción En Circuitos Ecológicos” (top right); “Sun Disc” (bottom).

orders. This is a radical move, similar to what Springgay calls an ethico-aesthetic move (2011), to overturn the long-standing biased perspectives based on warfare and predation that are implied in the scientific analysis of insect behaviours. Yet in my vision of *tiam*, this ethico-aesthetic move is replaced with aesthesis to overcome the aesthetic regime and reorient my practice towards decolonial work. My multi-sensory installation with the *tiam* of rain ants, through olfaction plus audiovisuals, seeks to emphasise their invertebrate aesthesis for worlding with *Kawsak Sacha* and *Sumak Allpa*. In this light, their social formations appear as malleable and ever-changing, diffusive and ephemeral, as continuously engendering movements, forces, and intensities rather than being enclosed by a semiotic regime of signification and representation fixed by distant understandings (Springgay 2011: 78).

Sustained on the indigenous value of *tiam*, radical turns are the cornerstone for a transversal artistic study of ants. Turning as a performance evokes defiant modes of existence. Turning as a performance, mediated with convolutional operations—on the video screen through algorithmic motion tracking—demonstrates rain ants' unruly movements are inverted, deeply interwoven with the grounds of this rainforest and Sarayaku's fabrics of relations. *Tiam Movements* reconfigures the nomadism in army ants to bear upon the meanings *tamya añanku* carry for the Sarayaku culture. The mediation in this artwork is set to change how technologies can be used beyond scientific laboratory frameworks, and aesthetic practices in galleries, to open to new cultural and technological imbrications, and sensory experiences, in the interaction with ants.



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Ant mill: a spiral explained with *tiam*

The relentless alternation of rain ants' movements and rhythms constitute fundamental turns of their ongoing ecological impermanence across the territoriality from underneath of Sarayaku. This fundamental alternation of movements and rhythms unfolds as a spectrum of invertebrate performances adapting to specific situations. However, the outcomes of these performances ought not to be modelled or predicted by scientific means, without involving *tiam*, *taki*, *awana*, and the multiple tensions at stake beyond the biological and molecular genetic realm. The world of rain ants cannot be separated from the political, capital and techno-global pressures affecting Amazonian territories. A window opens to reconsider that these performances are not solely determined by the species' genetic and evolutionary traits, but driven by affective capacities which are intimately and

⁶⁰ Ant mill from Schneirla's "A Unique Case of Circular Milling in Ants, Considered in Relation to Trail Following and the General Problem of Orientation" (1944: 7).

ineffably in touch with terrains, the materiality of organisms and forest organs, and the sociopolitical struggles of the people tending these territories. More significantly, the unruly movements and turns of these ants are bound to the greater agencies of rain. Rain forms bodies of water across their travelling paths. Rain cues when shelters need to be woven. And when rain ceases, it sets in motion ant migrations. But sometimes during heavy rainfalls, when the rugged textures of the forest topology are absent, like on paved roads or clean tiled floors, the ants engage in a convoluted performance of lethal proportions.

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. Schneirla highlighted that the “chemo-tactual” responses of these ants, in the absence of natural ground, force them to turn to try to find the lost trail; they end up following their own pheromones forming a prolonged centripetal circle which eventually leads to death by exhaustion (1944: 8–9, 17). However, Kronauer remarks that this death spiral is an artificially enacted phenomenon. It emerges “only in featureless man-made environments” (2020: 116) when ants cross over to non-natural roads or sidewalks, such as those in tropical research stations. An elementary indivisibility exists between rain, ants, and the rainforest grounds upon which they move.

In marked contrast to the notion of a suicidal ant mill coined by Schneirla (1971), who, as Sleigh pointed out, “consistently focused on simple bipolar responses, not complex symbolic communication” (2007: 173), the talented Clemencia wove me a special *mukawa* depicting rain ants. Although she did not want to name her artistry, I call it “Clemencia’s Life Spiral” (2019): an earthenware drinking bowl, hand-woven with forest clay that depicts *tamya añanku* returning to their mother, creating a *tiam* that shows ants carrying larvae back to a rain shelter. Her vision is an emblem of Sarayaku’s worldview of lifeforces in motion across Amazonian worlds. The performance of *tiam* by *tamya añanku* is pressed by Clemencia’s hands on the earthenware. Her artistic signature inverts the suicidal ant mill of scientific lenses with an alternation of life-taking and life-bearing energies—the ants bringing hunted larvae to feed their larvae.

“Clemencia’s Life Spiral” represents the intimate interrelation between rain ants’ bodies, the forest topologies, and the agencies of rain as lifeforces in motion: *kawsay*. Aligned with the vibrant composition of this rainforest territory, *tamya añanku* coil in a vital maelstrom, instead of suicidal mills, through evanescent inverted transformations. Rain ants are attuned to the material

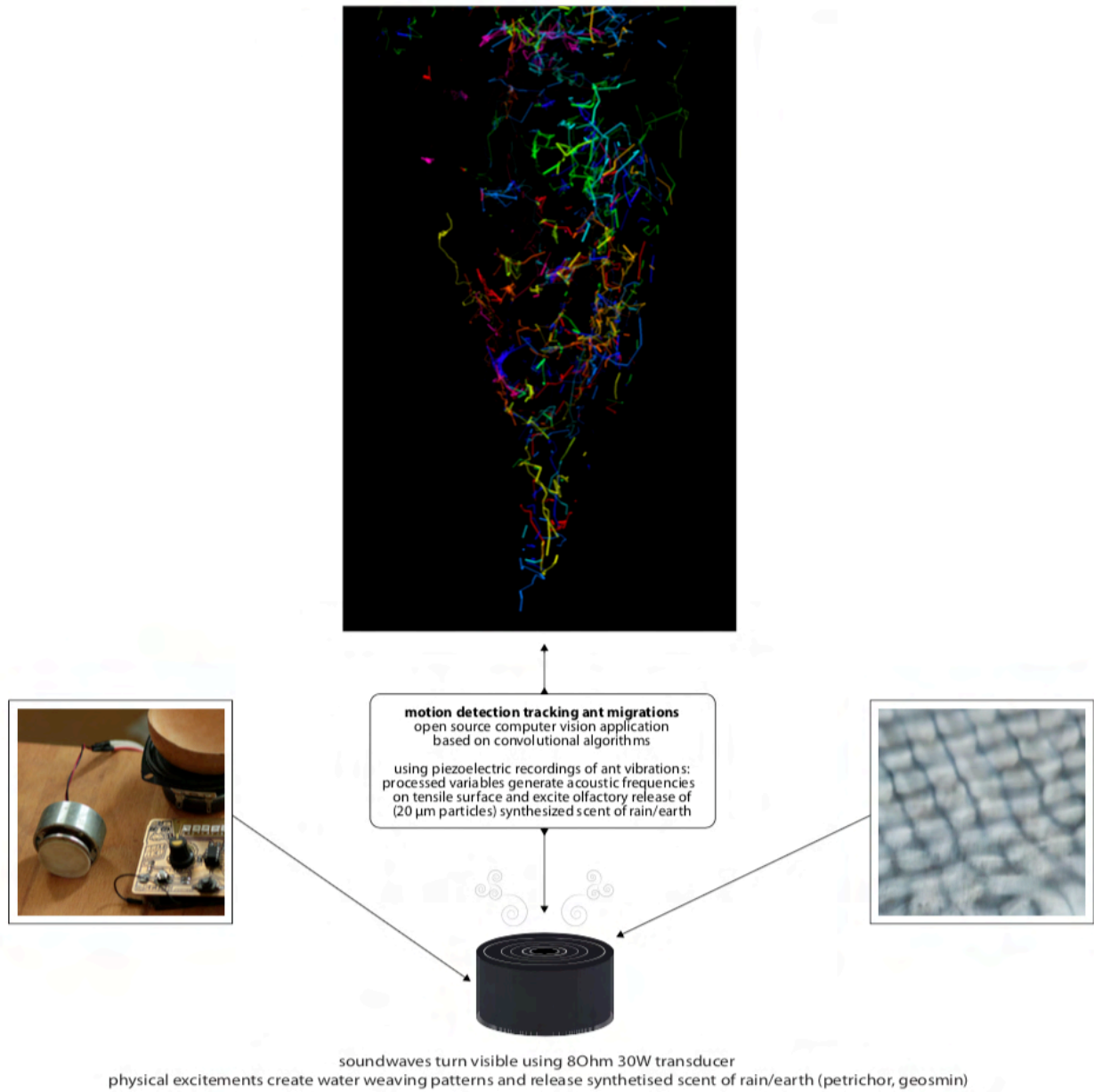
entanglements of this rainforest, demonstrating that living ties are woven between them and *Kawsak Sacha* and *Sumak Allpa*. It is only on even grounds, symbolic of human concreteness and artificiality, that the ants lose track of themselves and get trapped by their own turning forces.

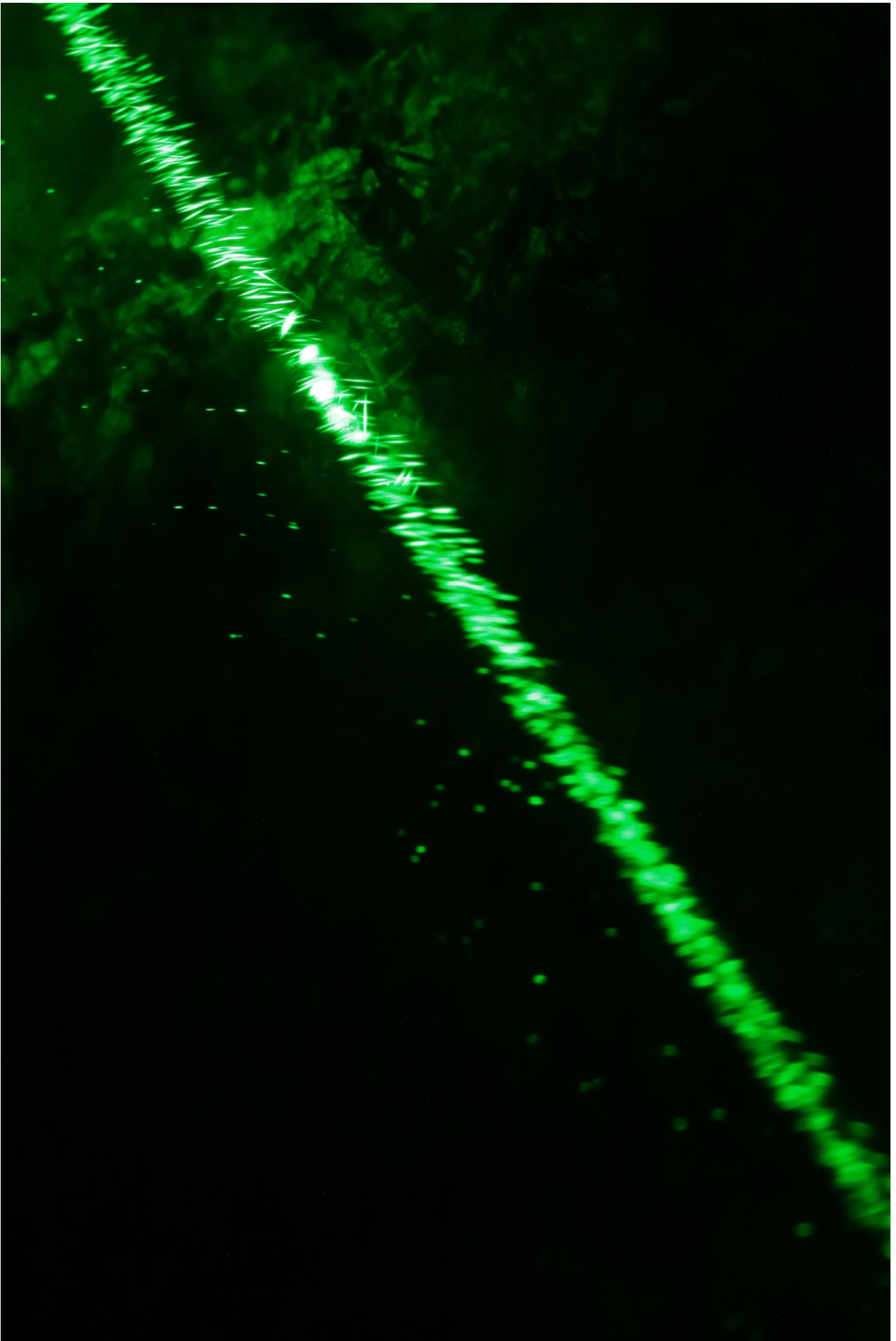


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⁶¹ Clemencia's Life Spiral (2019). In marked contrast to Schneirla's notion of a suicidal ant mill, the talented Clemencia wove a special *mukawa* that depicts *tamya añanku* returning to their mother in the living nest. Her vision is an emblem of *tiam* and Sarayaku's community-weaving practices in relation to the turning motions of Amazonian worlds.

Schematic of *Tiam* Movements





5 _____ Rhythmic Syncopations

Taki Rhythms

I understand rhythms as a consequence of sustained movements. Rhythms are generated through timed movements across space (Jirousek 1995). Attending to rhythmic processes is essential for making sense of tensions playing out in the co-habitation of territories. The work I present here concentrates on invertebrate rhythms from a local perspective. *Taki Rhythms* presents the acoustic fabric of tamyá añanku. *Taki*, I remind the reader, means rhythm, song, or tune, in Kichwa. I build from this understanding and the inertia of turning motions, observed in rain ants at the onset of hunting and migration trials, to emphasise the inseparable alternation between movement and rhythm in tamyá añanku. *Taki Rhythms* is my second installation. It is a visual electroacoustic mediation which is meant to be experienced together with *Tiam Movements*, as the ants achieve that collective momentum in their motions after their radical turns become fluid, leading to a steady invertebrate ensemble traversing across the rainforest and reproducing the sounds of rain.

Rain ants manifest an acoustic territoriality created in syncopation with the rain, and through diverse interactions with this rainforest, its lifeforms, and the people's sociopolitical practices. *Taki* allows us to listen to this acoustic territoriality as produced by bodies in motion turning to the rhythms of rain. The *taki* of tamyá añanku results from territorial interactions, relations of affinity, of touching, affecting and being affected by this environment. *Taki* is a motion-conducting expression. *Taki* offers a grounded acoustic sensibility to address the invertebrate rhythms of rain ants.

The sounds of *Taki Rhythms* reproduce a textural quality of millions of tiny feet running across the forest floor, scattering and scratching the organic debris as if manipulating a material fabric. I work on this acoustic fabric employing operations of amplification, interference, and especially syncopation. By combining *taki* with syncopation, I try to highlight rhythmic values, which, on the one hand, can only be locally experienced in this rainforest, whilst on the other hand, differentiate themselves from harmonic and aesthetic conceptions. In my production methods using amplification and interference, I re-articulate the classic definition of rhythm as movements “marked by the regulated succession of strong and weak elements, or of opposite or different

conditions” (Anon 1971: 2537) to work on rhythmic relationships in terms of territoriality. Departing with this notion in mind, I then use syncopation to create acoustic patterns which hint at the displacing forces of rain over ants, and rain ants over other insect fauna.

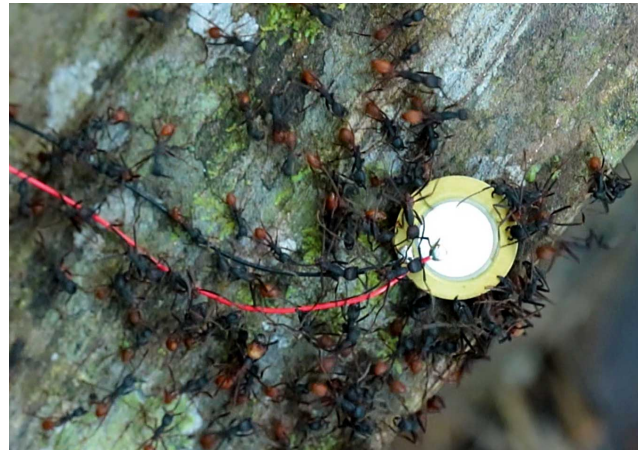
Combining amplification, interference, and syncopation, I experimented with an auditory exposition of invertebrate corporeal performances in relation to rain, water, and Sarayaku's acoustic temperament (next section, *Sonic governance*, page 141). I deployed electronic registering devices that depend on physical interaction and interference. Piezoelectric amplifiers were used to record substrate vibrations in diverse situations, including unexpected ant interactions of dragging, stinging, or licking. A self-made artefact of wires and sensors using laser beams and photocell resistances was deployed during migrations to create non-intrusive barriers at night. This enabled the registry of invertebrate bodies running across. These performances of ants interfering with lasers were video documented and are presented as the visual elements of this installation. The data of those laser interferences was employed to modulate field recordings and also to generate patterns of syncopation in electroacoustic compositions.

In *Taki Rhythms* the laser interferences of ants are data processed with a micro-controller to raise and lower conductive threads into *mukawa* bowls filled with water. This mechanism creates a dripping effect of water drops. The oscillating threads are directed by numeric values, recorded from the lasers that were interfered by ant crossings in Sarayaku. Whenever the threads contact the water, an electrical circuit is closed: a signal is sent to one of the 16 channels of a conductive synthesiser which triggers tones and modulates notes, timbre, and frequencies of sound compositions.



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⁶² Left: test experimentation with Clemencia's *mukawa* (depicting *tamya añanku* carrying their larvae) and conductive assembly. Right: setting up a photocell for the laser interference experiment during a night migration of rain ants.



```

8 use_random_seed [69, 68, 70].choose
9 #use_random_seed 179
10 #notes = (scale :a3, :minor_pentatonic).shuffle
11 notes = (scale :a2, :hex_phrygian).shuffle
12 8.times do
13   with_fx :echo, decay: 0.65, phase: 0.544 do
14     #with_fx :echo, decay: 0.65, phase: 0.844 do
15     #use_synth :cnoise if one_in(6)
16     #use_synth :mod_beep if one_in(2)
17     play notes.tick, release: 0.36, cutoff: rrand(38, 98), attack: 0.3, amp: 0.33
18     sleep 0.25
19   end
20 end
21
22 end
23
24 live_loop :groom do
25   use_bpm 180
26
27   with_fx :reverb, room: 0.8, damp: 0.1 do
28     with_fx :slicer, phase: 3.3, phase_offset: 0.36 do
29       sample :vinyl_rewind, attack: 0.01, release: 0.9, beat_stretch: [2.69, 1.67, 0.34, 0.07].choo
30       | amp: 0.2, rate: -0.7 if one_in(4)
31     end
32   end
33 end
34
35 end
36
37 live_loop :rnd_scaledrumz do
38   use_bpm 140
39   use_synth :subpulse
40   use_random_seed 38
41
42   8.times do
43     sample :perc_impact2, attack: [0.1,0.4,0.7].choose, release: 0.16, time_dis: 2.2,
44     | amp: [0.0,0.1,0.2,0.3,0.4,0.5,0.6,0.7].tick, rate: 6
45     sleep 0.248
46   end
47 end
48

```

```

log
{run: 1, time: 53.6743, thread: :live_loop_rnd_scaledrumz}
└─ sample "/Applications/Sonic Pi.app/Contents/Resources/etc/samples"
  "perc_impact2.flac", {attack: 0.4, release: 0.16, time_di
{run: 1, time: 53.75, thread: :live_loop_rnd_scaledrumz}
└─ synth :beep, {note: 55.0, release: 0.36, cutoff: 57.3176, attack:
{run: 1, time: 53.7806, thread: :live_loop_rnd_scaledrumz}
└─ sample "/Applications/Sonic Pi.app/Contents/Resources/etc/samples"
  "perc_impact2.flac", {attack: 0.1, release: 0.16, time_di
{run: 1, time: 53.8114, thread: :live_loop_rnd_scaledrumz}
└─ sample "/Applications/Sonic Pi.app/Contents/Resources/etc/samples"
  "bass_hit.c.flac", {attack: 0.01, release: 0.16, beat_str
{run: 1, time: 53.8869, thread: :live_loop_rnd_scaledrumz}
└─ sample "/Applications/Sonic Pi.app/Contents/Resources/etc/samples"
  "perc_impact2.flac", {attack: 0.4, release: 0.16, time_di
{run: 1, time: 53.9931, thread: :live_loop_rnd_scaledrumz}
└─ sample "/Applications/Sonic Pi.app/Contents/Resources/etc/samples"
  "perc_impact2.flac", {attack: 0.7, release: 0.16, time_di
{run: 1, time: 54.0, thread: :live_loop_rnd_scaledrumz}
└─ synth :beep, {note: 53.0, release: 0.36, cutoff: 90.262, attack: 0.

```

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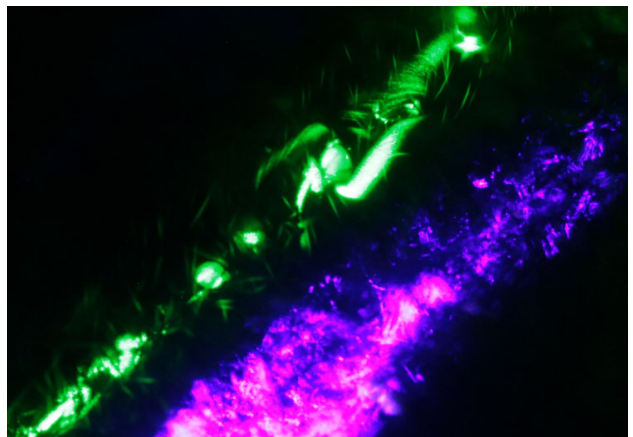
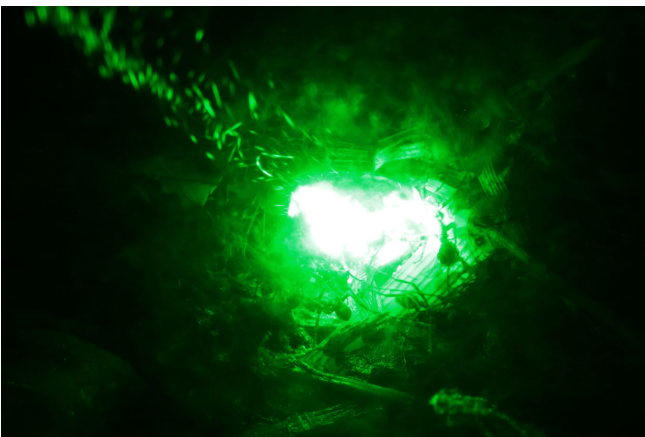
It is important to note that the acoustic fabric of rain ants mediated in this way does not exist

⁶³ Top left and right: piezoelectric interventions. Middle: laser-photocell interferences during a hunting run. Bottom: screenshot of Sonic Pi, a free-to-use program for live coding by Sam Aaron — showing a snippet that calls the laser data as numeric variables for creating syncopations.

without the reverberant and persistent sonic mantle of peoples' territorial activities. The sonic landscape I experienced while recording rain ants across Sarayaku entangles in a sound spectrum of varied textures and ample frequencies. Sonic manifestations of human presence, the water currents of *Sarayakillu* river, and the sounds produced by rain are all involved in my electroacoustic compositions to render a faithful acoustic score of the territoriality in motion of ants bringing messages of rain. In the aural immersion of this rainforest territory, listening becomes multiple, demanding different attentional dispositions (Bonnet 2016: 249): "Sound territories are encapsulated one within the other, they supplement each other, contest each another, join with or cover over one another" (252). Tracing Bonnet's declaration that listening is territorialising, I place my ears and my transversal apparatus of syncopation close to the grounds to interrelate the acoustic spectrum of rain ants with the territorial culture that identifies them as rain messengers.

In a similar vein, Lyotard posits "a sound, in so far as it is bound, has value not for its sonority but for the network of its actual and possible relations" (1984: 92). Under this premise lies the importance of decolonising the ear by interrelating audible worlds across scales to produce other meanings outside aesthetic regimes. So, I pair *taki*, as a situated rhythmic notion, with syncopation in order to attune to the interwoven sounds playing out in this territory. With *taki* as guidance, the perception of sonic phenomena in ants is not tied to aesthetic sensations, rather sounds appear to have meaning tied to territorial presences enacting relational practices.

Taki Rhythms is an electroacoustic mediation about the fabric of rain ants moving across Sarayaku's territoriality from underneath. This is an acoustic fabric that emerges from sonic correspondences between rain as a sound force and the tensile relations at work woven with invertebrate rhythms. This acoustic fabric emulates cascading raindrops, when waves of ants march across, setting forth a buzzing and scratching of sounds. Eventually one hears water currents forming, peoples' territorial performances and antbirds singing to announce the hunting direction of the ants. Immersed in this acoustic spectrum, the sounds produced by rain ants are manifestations of *kawsay*. In *Taki Rhythms*, the *kawsay* of rain ants are reproduced as sound waves crossing, eliminating, or reinforcing each other: oscillations flowing and giving aural life to a territoriality from underneath, in which the minimal, imperceptible sounds of ants become part of a whole in formation. This way of tracing *kawsay* in acoustic terms provides sustenance to the Sarayaku conception of the living forest — *kawsay* is life, and in *Taki Rhythms* this becomes a vital thread rendered audible.



Sonic governance: an acoustic spectrum of territoriality

From the acoustic perspective of *taki*, the Sarayaku territory expresses different rhythmic magnitudes and sonorous boundaries. In other terms, sonic boundaries are not fixed nor physical, but bound to timed relational presences and territorialities in motion.

Sarayaku is for me a territory of acoustic confluence which is continuously being syncopated by multiple rhythms. There are collective voices and multiple audible and inaudible expressions composing a vibrating territory of earth beings. Substrate frictions and entangled vibrations of variable intensities orchestrate resonances and polyphonies that contribute to the weaving of territorial relations. With this in mind, my creative work with *taki* tries to honour territorial sounds. Many of these acoustic manifestations are difficult to make sense of, others can only be felt, and the great majority exists within an inaccessible acoustic spectrum. Reckoning with audible sounds that are meaningful to the human ear, and those which can be made audible through a variety of processes, thus requires respecting local understandings tied to long-termed relations of place and purpose.

Sarayaku's sonic character is for me the result of multiple and temperamental expressions of earth beings and community-weaving practices negotiating territorial boundaries. It is possible to say that Sarayaku possesses an authentic soundmark (Schafer 1994: 13). The rhythms of community life generate specific sounds and acoustic messages that define the aural character of this place. By moving along with *taki*, Sarayaku's acoustic spectrum is characterised by rhythmic tensions playing out between strong dominances and lesser more subtle rhythms.

Placed within the cultural grounds of Sarayaku, *taki* enables the listening of rhythmic tensions in correlation to sociopolitical, ecological, and technological activities. In Sarayaku, sound waves of various nature oscillate at the same time, composing what I initially thought of as a dissonant cacophony: songs of birds and treehoppers mixed with drums announcing meetings, people shouting names out loud, the sound of spitting yuca into earthenware pots, kids laughing and the din of people's gatherings interposed with music from mobile phones, the doppler effect of motorboat drones navigating along the river, the racket of chickens and dogs barking, and the occasional

chainsaw rumble interrupting flute tunes. In Sarayaku the use of technology, such as mobile phones connected to bluetooth speakers, and even large system amplifiers for council meetings and festivities, are becoming part of the community's livelihoods and sociopolitical activism. The apparent cacophony, as I originally perceived it, intervened in the appreciation of the acoustics of rainforest lifeforms and ant vibrations.

At the beginning of my fieldwork, my mind was pre-formatted by a desire to hear the forest alone, where the origin of the sonic environment and its resonance would not be masked by any human intentionality. I originally came to Sarayaku with a compartmentalised hearing sense, which was taking over the process of listening (Kanngieser 2020). I was biased by an abstract acoustic model of the rainforest, expecting to hear the sounds of nature imposing its sonic governance over human-made sounds. From sound artist Anja Kanngieser (2020), who uses the term transversal geographies to describe her practice, I learned that sonic governance refers to the production and deliberate exposure of sounds that greatly impact behaviours and perceptions. But sonic governance also refers to the violence done by listening or trying to record that which does not want to be heard (ibid).

Several past experiences of having conducted audiovisual research on ants in scientific stations, such as Yasuni and Tiputini, were preconditioning my sonic perception of wanting to listen to a 'harmonious' soundscape. These are places devoid of territorial sounds of indigenous cultures. These places are explicitly designed for scientists to appreciate sonic ecologies existing on their own, without the interventions of artificial sounds, or at least where human-made sounds are kept to minimal levels—an autocratic creation of "places in conformity with abstract models," is what de Certeau would have called them (1984: 29).

Kanngieser's notion of sonic governance gives sustenance to my rhythmic approach using *taki*. *Taki* became for me a politically-localised understanding of territorial rhythms which ought to be listened to through Sarayaku's cultural and ecological values. Once attuned to this acoustic world, I realised that Sarayaku's sonic governance was not a dissonant cacophony but more like a '*polylogue*' (Kreuzzieger 2022): the coexistence of multiple and different voices in conversation, sonic manifestations enunciating vital activities and place-making relations. It was only after I adjusted to Sarayaku's sonic governance and its multiple acoustic thresholds, that I came to realise sound waves are territorial sounds ingrained in the *kawsay* of this world; they interfere with each

other, announcing the activities and occupations of the different lifeforms and forces within *Kawsak Sacha* and *Sumak Allpa*. This acoustic approach to the territoriality from underneath enabled the deletion, or at least a dilution of, my sonic preconceptions.

The sonic governance of the Sarayaku community is overwhelming and pervasive. The sounds of human origin were imposing at daylight, but as the night approached nocturnal beings took over the acoustic spectrum. It was then that the sonic governance changed its acoustic patterns, textures, timbres, and voices. It was in the darkness of the night, and with the ample sound spectrum of singing toads and chirping insects, that the hour-long migrations of rain ants in search for new nesting sites are performed. Thinking with sonic governance, I reckoned with interferences and syncopations. To avoid compartmentalising ant sounds, my transversal operations tried out electroacoustic processes that align with *taki* to include in my compositions the rhythmic tensions playing out in Sarayaku's sonic governance, as a territory composed of multiple sonorities.

To support my transversal operations, I acknowledge the pioneering influence in electroacoustic composition of John Cage, Alvin Lucier, and David Tudor. I consider their techniques of sonic interference a basic reference for my electroacoustic mediations. In the next section, I elaborate on them, and discuss my amplifications of ant sounds in relation to several Latin American artists, who have worked with invertebrate lifeforms: mainly Saraceno, Esparza, and Interspecifics collective. Overall, in *Taki Rhythms* my transversal operations are acoustic tools that turn ant rhythms into audible oscillations, interrupting and reinforcing one another to compose an acoustic fabric amongst earth beings. This acoustic fabric, in which rhythmic flows are in constant syncopation, aligns in various aspects with the compositional methods and artworks of the artists mentioned above. But before beginning, I gesture towards another artist who produced a site-specific sculptural artwork, without sound, using the concept of syncopation in an entirely different manner.

Syncopations: rhythmic interferences in art

“Spotted LanternFly: Zones of Syncopation” by Elisabe Dixon is inspired by an emerging invasive species of lanternfly in the US, *Lycorma delicatula* (Dixon 2019; USDA 2022). While her artwork does not work on the acoustic amplification of invertebrate rhythms, it trades with the essential meaning of syncopation as a disturbance, in this case, of biological rhythms. Dixon in collaboration

with residents and students collected adult lantern fly specimens to interfere with its reproductive lifecycles, hindering its invasive propagation. “Spotted LanternFly” is conceived through collective efforts to collect lantern flies, pin them down, and create an artwork with their wings. The artistic production began by issuing an open call for participation through workshops led by the artist. The urban community of Penn State Lehigh Valley area, where the art intervention took place, was informed about the detrimental effects the lantern fly creates in the local environment. The flyer stated: “Syncopation is a disturbance to the normal flow of rhythm. Spotted lanternflies have disturbed our rhythm” (2019).



For me, the ways in which this artwork was co-produced by summoning efforts to interfere in the biological rhythms of an invasive species, exemplifies one mode of using the syncopation concept. However, I take some issues with the final artwork. One, it is predominantly visual and aesthetic. Two, it is composed of several discs that show the entomological trademark of pinning down insect specimens with needles for preservation. Lanternflies have intricate and appealing spotted patterns on their wings, which Dixon focuses on to demonstrate the thin edge that separates beautiful from dangerous in the aesthetic representation of an invasive species. “Spotted LanternFly: Zones of Syncopation” is an artistic reference for me that approaches the topic of invasion from a perspective of anthropocentric rhythms playing out relations of power on invertebrate rhythms. In the imaginary of European and Anglo-American societies, invasive species are entities which need to be stopped from crossing geopolitical borders. Yet it is relevant to invert perspectives here. Crossing geopolitical borderlines is an inherent action of continuity in the moving performances of invertebrates, which care less about respecting geopolitical borders. I consider invertebrates as remarkable agents of crossing. Rain ants, exemplary in this view, are transversal beings, invertebrate communities continually crossing sides, and crossing other species out. Their transversal movements enact syncopations within worlds of earth beings in which life-taking and

life-giving forces are in continuous exchange.

In contrast to Dixon's work, *Taki Rhythms* uses syncopations to represent forces of creation, in which interferences—mine and those of ants—become acoustic expressions. This mode of using syncopation goes hand in hand with electronic music performances, in which certain sonic patterns are purposely inserted to displace an existing flow of rhythm. In this light, the compositions of Cage, Lucier and Tudor pioneered creative interferences in the acoustic field, defying the order of conventional sound compositions and pushing sonic perceptions outside limitations. They created arrangements that deviate from classic musical notation and instantiated a wave of experimental modes dedicated to amplifying the ever-changing and transient nature of sounds, transducing the impermanence of the acoustic spectrum of physical world interactions. I ponder the ways in which their compositions are syncopations, in which sounds have rhythmic lifespans which not necessarily 'evolve' into melodies, nor are synchronised, but are characterised by an interplay between interferences and flows.

Alvin Lucier's performances are a solid reference to what then were unorthodox methods that turn acoustic spaces into tunable instruments (Salter 2010: 201). In "I am sitting in a room," an open mic constantly re-records the gradual increase of resonance of the room, in which a magnetic tape with a pre-recording of his voice is being played back: "until the resonant frequencies of the room reinforce themselves so that any semblance of my speech with perhaps the exception of rhythm is destroyed" (Lucier 1969). The sound quality degrades in interrogation with the space, as the magnetic tape wears out while it is continuously being re-inscribed with feedback. In Lucier's approach, every minimal sound incident reverberates. This is most notable in "Shelter" (1970), where Lucier experimented with sensors placed on surfaces inside a concealed space to amplify sound waves transmitted through the materials. This amplification system counters the expectation of silence in apparently empty spaces. Sheltered sounds "that would never in ordinary circumstances reach our ears" (Salter 2010: 201) resonate from within a self-contained atmosphere demonstrating their boundary-less nature for crossing artificial surfaces. Via mediations of electroacoustic amplification, "Shelter" makes audible an acoustic spectrum existing outside the human threshold of attention.

"Shelter" works with the permeability of sound waves interpenetrating and crossing concrete barriers. My amplifications of substrate-borne ant sounds follow a similar tactic by employing

piezoelectricity as the main method. This, in particular, interconnects with the idea of inverting as an operation that makes sonic exchanges between insides and outsides audible. Within the rain shelters *tamya añanku* weave, expressions of the invertebrate kind are concealed, and fluctuations of energy are transmitted between the niches they occupy and the surroundings — a sonic governance to be listened to with tact. Ants ‘listen’ with their legs (Kuai Shen 2019). The massive runs they perform generate a substrate resonance through friction, perhaps even creating a charged field only ants and their invertebrate companions can make sense of. Amplification with piezoelectric sensors and transducers enabled me to creatively register these invertebrate expressions on the basis of tactile proximity and corporeal intimacy.

In line with piezoelectric amplification, John Cage’s “Cartridge Music” (1960) and “Variations II” (1961) use this method to enable the amplification of tactile manipulations on a diversity of objects. In “Variations II,” David Tudor collaborated using his own devised piano turned into an unpredictable electronic instrument by attaching phonograph cartridges and contact microphones, not only to the strings but to the whole corpus. Tudor followed Cage’s graphical notation of dots and lines drawn on transparency sheets, which could be superimposed in multiple ways. Cage’s graphical notations are reminiscent of ant trails (see page 148, Fig. 65). Interpreting the distance from a point to a line determines diverse parameters of sounds to be played. This way of composing opens the performer’s subjective interpretation in a manner that compares to an analogue calculation of non-linear functions. I drew inspiration from this, in particular his sequencing of acoustic gestures employing water. Water was an audible medium for Cage, its fluidity and turbulence could be instrumentalised (Kahn 2001: 250). This was exemplary in Cage and Harrison’s “Double Music” (1941), in which a Chinese gong is submerged and raised from water during the production of tones, deforming its sonic envelope and creating a different kind of percussion (Kahn 2001: 249). Cage suggested in his influential manifesto, “The Future of Music – Credo,” that amplitudes and frequencies of noises like that of rain can be controlled with amplification techniques to produce “rhythms within or beyond the reach of anyone’s imagination” (1937). In this respect, rainfalls and raindrops dripping and pouring on the foliage, sound within a range of certain acoustic thresholds very similar to those rain ants create when running across the forest canvas. I worked on this fabric of interrelated rhythms, the unpredictability and indeterminacy of its acoustic flow, with the aid of algorithms and computing coding techniques.

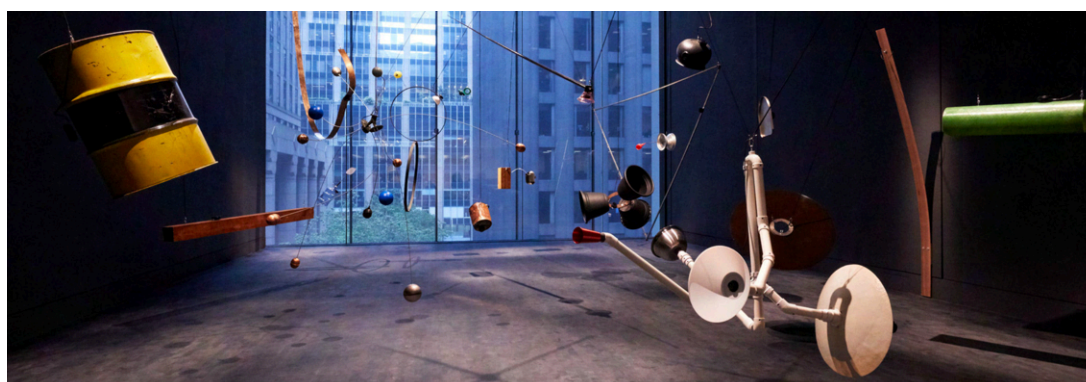
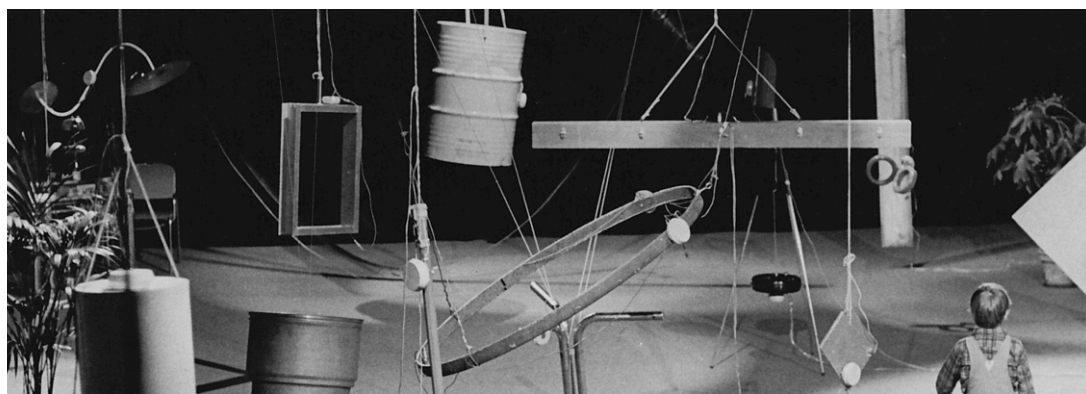
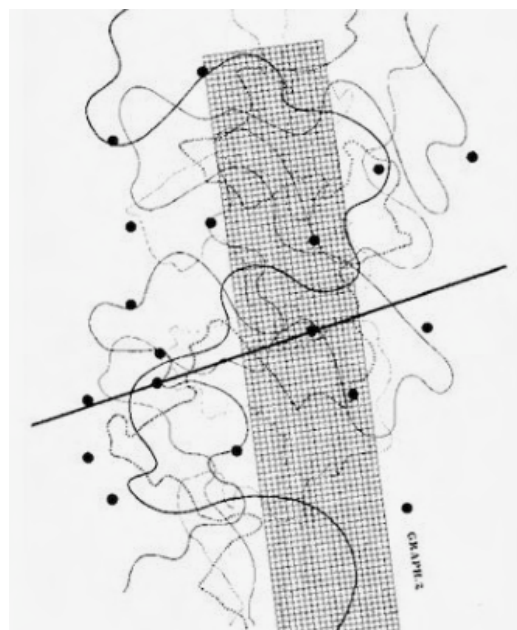
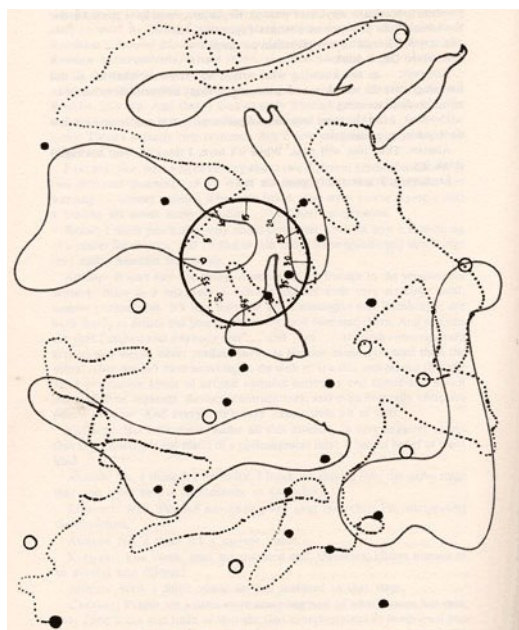
Besides Cage and Lucier, David Tudor’s use of circuit bending electronics as compositional tools

better matched my transversal operations. Tudor's methods of introducing tiny changes in feedback loops, like in his amplified piano, could potentially lead to large-scale unstable effects that complicate the search for harmony and mesmerise the senses (Salter 2010: 195). This was the case in his performance of Cage's "Variations II." Yet, to me, Tudor's sound installation entitled "Rainforest" (1968) is the best example of his experimental electronic techniques. "Rainforest" was created by turning various everyday table-top objects into loudspeakers via piezoelectricity and transducers. Both techniques, employed in my practice too, function via electromagnetic excitation. A differential in physical forces brings any material in contact with these devices into oscillation, turning it into an acoustic membrane.

Tudor's original "Rainforest" was a sound score for Merce Cunningham's dance company. I appreciate the sonic soul Tudor infused into the objects. He transformed these into sonorous entities: friction-riddled acoustic phenomena of animal worlds, metallic reverberations, and echoing sounds that syncopate each other based on the physical dimensions, positions, material resonance or deformations of the objects. As a matter of fact, "Rainforest" has been reworked, performed, and exhibited several times by different ensembles, introducing new objects and sounds that adjust to the corresponding spaces. It has been exhibited at the MoMA, where computer operations were used to generate random sequences of sounds, particularly tailored to the constitution of each object (Janevski and Joseph 2019). Similarly, The Eastman Audio Research Studio recreated Tudor's Rainforest in 2017. Using Max Msp Software, the same software I am using in several of my compositions, they relayed the sounds throughout the exhibition space from one metallic object to another, thus generating a sensation of rhythms in motion (Eastman Audio Research Studio, "Rainforest IV," 3:56).

The aforementioned electroacoustic masterpieces of Lucier, Cage and Tudor emphasise subversive creativity for amplifying the impermanence and variability of sonic phenomena. This aligns with my inverting operations employed in *Taki Rhythms*. By experimenting with piezoelectricity and computer algorithms I pay homage to what Tudor, Cage, and Lucier have done: sound waves, in this case of ant origin, interposing, displacing one another, and generating indeterminate oscillations and feedback loops. In this way, I create syncopations. I create patterns of rhythmic interference, honouring the *taki* in rain ants as part of Sarayaku's acoustic temperament. Syncopation in this sense was operated to hint at the lifeforces of rain displacing ants, and ants displacing other insect fauna. Different iterations of the syncopation process resulted in several electroacoustic

compositions in which frequency, timbre, duration, and amplitude recreate textures of an acoustic fabric that entangles the sounds of ants running or rain falling.



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⁶⁵ Top left: John Cage's notation for "Cartridge," 1960. Top right: John Cage's notation for "Fontana Mix," 1958. Middle: "Rainforest IV" performed at L'espace Pierre Cardin, Paris, France, 1976. Bottom: "Rainforest V (variation 1)" installed in 2019 at New York's MoMa by Phil Edelstein and John Driscoll.

Supporting my electroacoustic syncopations with ants solely based on Cage, Lucier, and Tudor does not appropriately match the tactical exercise of decolonisation I am pursuing with *taki*. After all, efforts in decolonising science by artists require negotiations between different world-makings to take place not only with instruments but amongst and with other species (Page 2021). Along these lines, my tactical mediations share a crossing discourse with Tomas Saraceno's spider vibrations.

Saraceno's longtime work with spiders is remarkably similar to my enduring obsession with ants. We both work with piezoelectricity to make vibratory energies audible. For example, Saraceno's acoustic performances with spider vibrations in "How to Hear the Universe in a Spider/web: A Live Concert for/by Invertebrate Rights" (2020), and "How to Entangle the Universe in a Spider Web" (2017), mirror my tactics of amplification of ant vibratory messages, "Stridulation Amplified" (2012) and "Plectrum: bioacoustic ants and electroacoustic visions" (2014). Yet his *arachnophilia* is more expansively sophisticated than my *myrmecophilia*. Saraceno has developed a large platform of collaboration with specialists, scientists, and scholars, creating a vast archive of spider sounds, performances, exhibitions, and documentation, including the "Arachnomancy App" (Saraceno 2020). Furthermore, his "Spider/Web Pavilion 7" (Saraceno 2019), created for the 58th Venice Biennale, plays with the skills of divination of spiders, which for certain African cultures can predict earthquakes and weather events (Page 2021: 224). For Page, Saraceno's research into arachnid behaviour and web architecture stresses the sensorial entanglements of spiders as worlding capacities. On the one hand, he focalises on biotremology, the study of vibrations with which spiders sense tensions in the web to allocate prey. On the other hand, Saraceno is inspired by spiders' synanthropic nature, their ability to "live in close proximity to humans and benefit from the kind of environments humans create" (223-224).

Page paired us both in the last chapter of her nominal publication on decolonising science, 'Sensory Worlds and the Pluriverse' (2021: 215-240). She remarks, however, that the focus of our artistic practices is different. In contrast to Saraceno's speculative entanglements, Page claims my community focus with ants rather emphasises their ways to "create opportunities for the world-makings of other species, drawing more direct comparisons and contrasts with human societies" (2021: 226-7). Nonetheless, Saraceno's work and mine do entangle, as we both devise tactics to explore and enhance the sensorial worlds of invertebrate beings. The shared field of vibratory amplification we conduct with piezoelectric devices resonates those invertebrate rhythmic

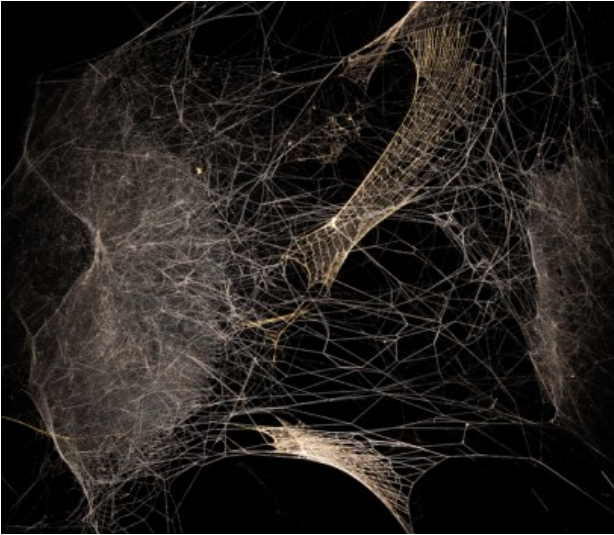
energies with which ants and spiders materialise resilient forms and relations with human environments. Yet, my present pursuit differs from Saraceno’s work with spiders. From a decolonial perspective, I propose ant rhythms ought not to be listened to on the basis of scientific or aesthetic discourses, but based on an indigenous discourse of territorial relations.

However, it is notable to mention “Fly with Aerocene Pacha,” a decolonial and aerosolar project (Saraceno 2020). “Fly with Aerocene Pacha” is a site-specific intervention of protest for the rights of indigenous people and nature in the salt flat of Salinas Grandes, Argentina. Saraceno allied with a diverse range of people, environmental activists, and, most importantly, thirty-three indigenous communities of Salinas Grandes, to develop a site-specific project against lithium extraction. A black air balloon lifts one person with the power of the sun: “Ultraviolet rays of solar radiation are captured by the membrane and absorbed into the internal body of air, raising its temperature above that of the external, and thus generating lift into the atmosphere” (2020). The physics at work benefits from the salt territory, reflecting sunlight as a mirror and generating ideal conditions for convections. In the introduction, I described *pacha* as the Kichwa notion of the indivisibility of space and time (*The territoriality from underneath of Sarayaku*, page 11). Similarly, Saraceno states that the namesake for his project honours the aerosolar movement of the balloon as a “spatiotemporal connection of the subterrestrial, terrestrial and celestial realms” (2020).



66

⁶⁶ Saraceno's “How to Hear the Universe in a Spider/web: A Live Concert for/by Invertebrate Rights,” Milan (2020).



“After a day of weaving, the thread circled the equator... and after ten days, the thread reached the moon...”

El tiempo de la Arañas/The Time of Spiders. Maximiliano Laina and Tomás Saraceno, 2017



67

Departing from aerial lifts as decolonial activism, and returning to sensor/algorithmic mediations of territorial sounds tied to water worlds, Mexican artists Gilberto Esparza and Interspecifics collective are worth mentioning. They work with the metabolic rhythms of water microorganisms, employing computing algorithms and sensors to measure electrical activities and trophic interactions. Interspecifics have produced projects like “Ritmos No-Humanos” (2016), in collaboration with Theresa Schubert, and “Micro-Ritmos” (2016), which generate sounds and light patterns from the bioelectrical activity of *Physarum polycephalum* and bacterial fuel cells. These are interspecies performances, presented live on stage, in which interferences and amplifications are mediated by computer vision programs, Raspberry Pi cameras, Python languages, and live coding audio synthesis—tools and artefacts I have used now and in my previous artworks (“Oh!mlgas” 2010, “Playing with ants” 2012, “Thermotaxis” 2017). In the same line of work of the Interspecifics collective, yet contextualised differently, my transversal operations create sonic arrangements characterised by oscillations, fluctuations, and “unpredictable bursts of sound” that function as

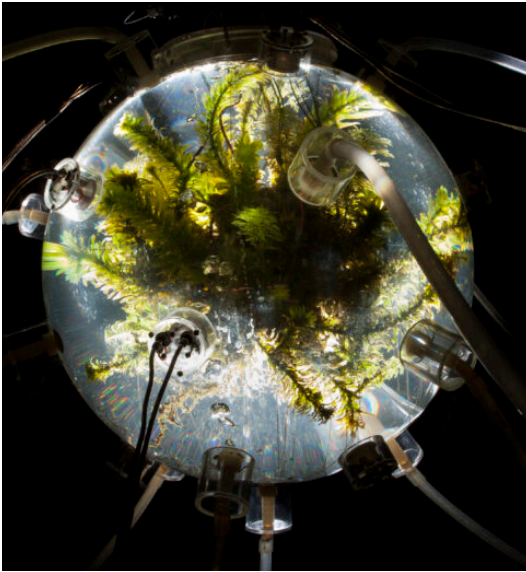
⁶⁷ Top left: Saraceno's “How to hear the universe in a spider/web: A live concert for/by invertebrate rights,” Frankfurt (2020). Top right: text excerpt of publication in the context of the Buenos Aires exhibition. The exhibition was done in collaboration with social spiders, *Parawixia bistriata*. Bottom left and right: stills from Fly with Aerocene *Pacha* (2020).

syncopations of ongoing frequencies, offering a glimpse into dynamic activities of nonhuman worlds (Page 2021: 166-7).

The utilisation of sensor technologies to render metabolic rhythms audible and visible, as elucidated by Förster (2021), impacts the human subjective experience in ways that can be co-opted to convey a variety of meanings. Tech-mediation of metabolic rhythms can prompt a shift in the aesthetic perception of the different sense modalities of unseen entities (2-4). The performances of the Interspecifics collective do this but fall short of posing an elementary inquiry: where do these bacteria come from, and what are the conditions and greater environments, in which these microorganisms exist? Esparza works on that, revealing interrelations between microorganisms and human environments of waste and pollution. Esparza's works introduce technologies in the life of plants, bacteria, and microorganisms which have managed to adapt to the heavily polluted water worlds in Mexico City. In his media installations, water could be considered the main medium for metabolic rhythms that thrive amidst industrial waste. He employs a diverse array of sensing devices to monitor and translate microorganic rhythmic processes of surplus production into expressions of energy. "Plantas Nomadas" (2009), for instance, is a hybrid entity carrying a local plant species, whose roots and soil microfauna can transform polluted waters into energy for locomotion. The hybrid entity is a host, protector, and plant symbiont at the same time. The hybrid entity in "Plantas Nomadas" could also be considered an anti-capitalist nomad. It moves with a slow pace rhythm contrasting the intensive and progressive contamination, industrialisation, and privatisation of waters that are spreading over the Mexican region and across Central and South America.

His other installation, "Plantas autofotosintéticas" (2014), grapples with the issue of the capitalisation of drinking water as a commodity, versus the increasing contamination of potable water reservoirs in Mexico. This techno-ecological mediation raises awareness of the socio-political authoritarian complexities in his country which have taken over the power to privatise water, cut off water flows, deciding who deserves to drink water, and what lives and dies in water. The installation also resembles an entity, consisting of a hydraulic network of pumping mechanisms and monitoring devices, that redistribute polluted water across microbial fuel cells. Sounds and flashes of light are generated by means of reading the photosynthesis of resilient microorganisms, which Esparza collected from sewers and ponds. "Plantas autofotosintéticas" express metabolic rhythms of microbial life turning contaminated fluids, not into clean water for human consumption, but into

self-sufficient energy, being shared and redistributed exclusively within the microorganic community, demonstrating a possible post-human scenario.



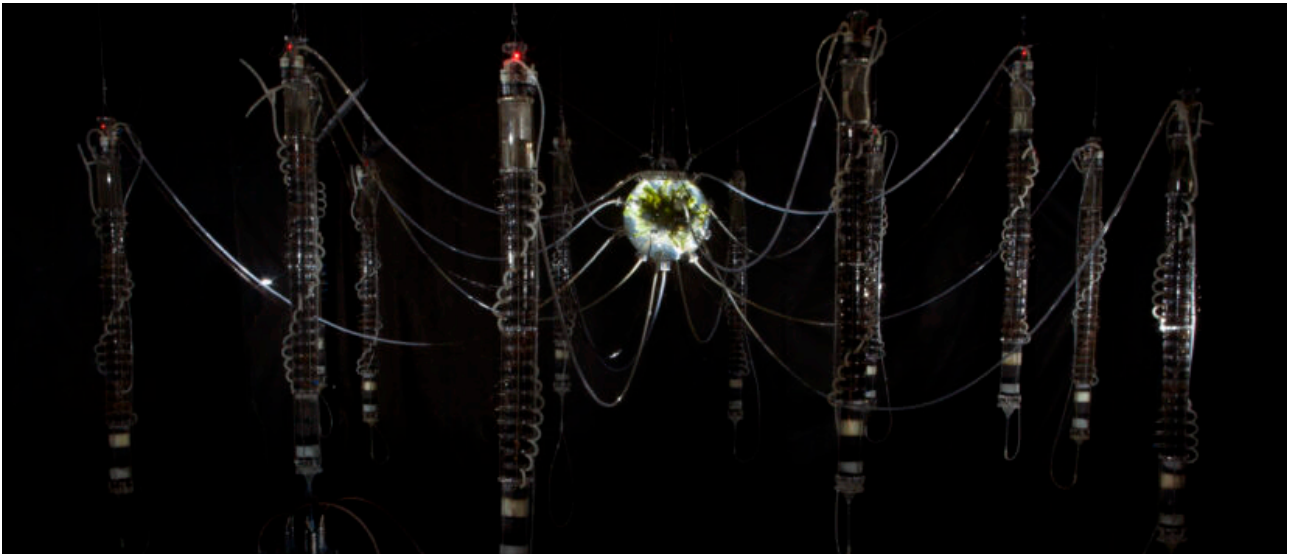
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Esparza's artistic methods instigate a critical reflection on the ambiguity of technologies employed for amplifying microorganic rhythms, and for bioremediation of the capital spills of industrial waste. On the one hand, the sound synthesis of biological rhythms of resilient microscopic worlds creates an acoustic imaginary of post-human time. On the other hand, Esparza raises critical questions about the dependency on technologies, which can be regarded as the cause and effect of worldwide water pollution; the energy storage of most tech-mediations (including mine and his) rely on lithium batteries, and thus involve a collateral toxicity linked to the global mining industry. While in *Taki Rhythms* I do not explicitly engage with anthropogenic factors driving environmental pollution, I do use sensors and computing algorithms seeking to elicit an altered awareness similar to the messages Esparza conveys: rhythm is a force for changing environments; and water is a medium of fluidity and turbulence, which cannot be separated from the turmoils of industrial sociopolitics in the Anthropocene.

Nevertheless, my work differs from Esparza's in one relevant aspect. The rhythms I work with are sustained by indigenous performative languages. *Taki Rhythms* works on a local formulation of ant rhythm that seeks to subvert biological definitions of nomadism. In my installation, *kawsay* is

⁶⁸ Gilberto Esparza's "Plantas autofotosintéticas" (2014).

traced as life-bearing and life-taking oscillations of invertebrate rhythms that exchange sonic magnitudes with the greater forces of rain.



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Flooding the acoustic spectrum

I understood the territorial sounds of rain ants create syncopations. Interacting with the constitution and constraints of the habitats they cross, this fabric unfolds as an acoustic spectrum generated by the relentless friction of material interactions at the ground level. Using piezoelectric amplification, interference, and the concept of syncopation, I turn the fabric of rain ants into an acoustic

⁶⁹ Top: “Plantas autofotosintéticas” (2014) installed at Ars Electronica. Bottom: “Plantas Nomadas” (2009) somewhere in Mexico.

territoriality. This is contextualised in relation to the ways earth beings and earth communities collectively conceive and affect this territoriality from underneath.

Much like visualising the movements of rain ants as threads of lifeforces, in *Tiam Movements*, I worked in *Taki Rhythms* to listen to *kawsay* as sound waves crossing and weaving acoustic patterns. These sound waves are expressions of invertebrate vitalities that traverse as oscillating energies across physical and fluid barriers, for instance, when ant bodies form bridges over water. In other words, the *taki* of rain ants emerges as a fluid and turbulent acoustic spectrum.

In Sarayaku, the sound waves enacted by *tamya añanku* interrelate with the imminence of rain. The sounds of rain ants weaving through the forest recreate the acoustic mantle of the rain. This acoustic similarity is foregrounded in *Taki Rhythms*. The vital rhythmic tensions between ants and rain have been left unexplored in the study of army ants. I use *taki* to amplify these rhythmic tensions: rain is the antagonist of rain ants; they weave shelters and bridges when rain falls. With *taki*, I invert sonic preconceptions and flood our listening skills with sounds that may appear as white noise, but which express the sound waves of a territoriality from underneath, indicating the relation of opposite lifeforces. Rain imposes its rhythm bringing other dominant activities to a halt. In this regard, rain is a syncopating force interfering with the *taki* of *tamya añanku*. Rain is a magnanimous force of interference affecting the relentless territorial mobilisations of these ants. Drawing inspiration from this interwoven tension, I worked on composing a dynamic sonic portrait of rain ants that floods the acoustic spectrum. With the aid of amplification, interference, and syncopation, *Taki Rhythms* articulates this oscillatory antagonism by generating an acoustic space that is overwhelming and ever-changing.

My sonic experience in Sarayaku taught me that sounds as expressions of *taki* are always in motion, opening to other sonic mutations, sound waves reinforcing and diminishing, and therefore transforming other acoustic oscillations. Rhythm encompassed by *taki* is a performance in motion, where the sources of sounds are never stable, never the same: an acoustic territoriality composed by multiple transmissions of tunes and sound waves of earth beings and earth communities entering into dialogue with each other. “Sounds move us,” Kanngieser says (2020), and it is within this rhetoric that I nest my acoustic conceptualisations with *taki*. The meaning attributed to sounds, the transmission of acoustic messages, and the modes in which sounds are produced and perceived, must be first nested within local languages and cultural practices in order to know where they can

go. Focusing on rhythm with *taki* opens up a different regime of sensorial experience, one conflated by sociopolitical indigenous perspectives and decolonial significations. It is by drawing a subjective relationship between the sound of rain and the trepidation of ant steps that listening, as an attentive practice influenced by indigenous forest relations, ascribes meaning.⁷⁰

In this respect, the message I convey with *Taki Rhythms* is that it is not nomadism, but *taki* as unruly oscillating interferences of political, cultural and meteorological magnitudes at play in this territory, that act upon ant migrations, disrupting and giving impulse to their invertebrate territorialities. In this manner, I employ *taki* to enact a decolonial work that values the performative, communal, and territorial, over evolutionary, military, and mechanistic perspectives. *Taki* accords to regimes of cultural and ecological values at play in situated territorial encounters marked by movements and sensations of being with, inside, or among other moving presences. The sounds produced by *tamya añanku* and the rain share a common vibrant acoustic identity, because they exist by contact, friction, and adjacency with this rainforest as maintained by the practices of people and earth beings. With this aural understanding, I guided my inverting operations with *taki* as rhythm in Sarayaku terms, in Kichwa terms.

Taki Onqoy

Before I turn the page to my final chapter, I want to offer a personal revision of a historical movement that provides sustenance to the meaning of *taki*. I want to acknowledge that *taki* comes from a rooted understanding of performances marked by nonverbal forms of expression, in which moving with rhythm becomes a form of resistance—to resist being immobilised, restricted, oppressed, encapsulated, and systemically classified. In the context of my decolonial practice for challenging the misconception of army ants guided by the *taki* of Sarayaku, I see the need to recollect a very important anti-colonial historical movement of insurgency.

In the 16th century, an indigenous revolution began spreading across the Andes in what now is Peru. An embodied rebellion was performed by people dancing, trembling, and convolving in public spaces to expel the Christian God of the conquerors from lands, mountains, volcanos, rivers,

⁷⁰ “To listen is already to be in a position of decoding, to already perceive the audible beyond the sonorous,” says Bonnet (2016: 201).

and lakes, which were considered ancestral sites of immense power and energy (Ostria González and Henríquez Puentes 2016). These land sites, particular geological formations and landmarks, are known by the Quechua peoples of the Andes as *huacas*, ceremonial places of connection with the cosmos and ancient pre-Incan gods (ibid). *Taki onqoy*, translated as ‘*enfermedad del canto*,’ or ‘dancing sickness’ by Spanish clerks and priests of that time, was a performative movement of anti-colonial resistance which incarnated the rebellion of *huacas* (ibid).

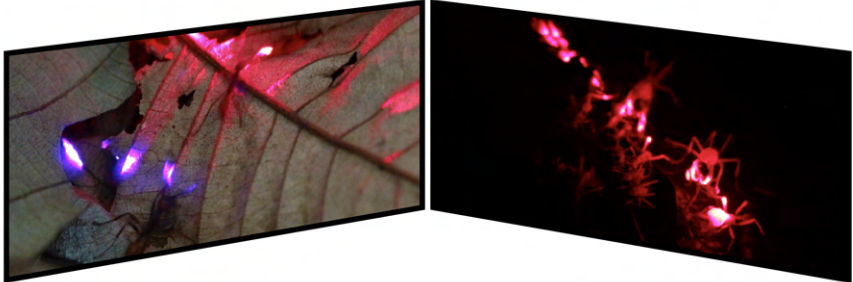
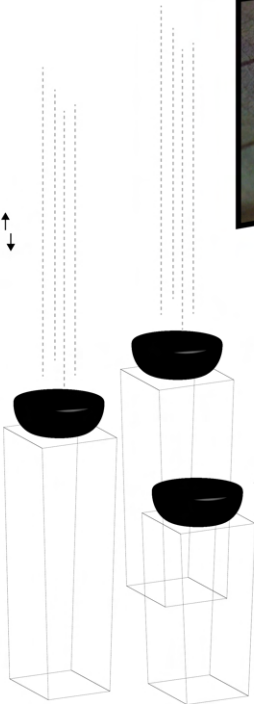
The complexities of *taki onqoy* as a rebellion embodied through dance, Ostria González and Henríquez Puentes state, sought not to recover ancient practices as they were, but to incarnate a *pachakuti* to turn Christianity around: “*Taki onqoy* truly incarnates a cosmic revolution, now the world turns” (2006; translated by author). *Taki onqoy* was a strategy of corporeal resistance to try to invert the order of dominance. *Taki onqoy* was performed with anger and ecstasy, entering altered states through frenetic body movements to expel spiritual values not connected to the rhythms of *huacas* and the rhythms of local territorial practices with earth beings.

Although this embodied revolution was promptly ended by the violent apparatus of colonisation, *taki onqoy* never entirely disappeared; it transformed by constantly absorbing imported customs into a heterogeneous fabric of performances in Peru. When deeply analysed vis-a-vis the sociopolitical racism and systematic negligence against indigenous people across South America, *taki onqoy* reveals that indigenous movements of resistance embody the rhythms of territories and earth beings: they are volcanic and emotionally explosive; like strong river currents, these rhythms are still fluid, and malleable like mineral soil clay, exerting performative resistances yet adapting certain features of hegemonic models.

In my work with rain ants, I side with performances of resistance in the process of becoming; I side with the roots of indigenous rhythms promoting reciprocity towards earth beings and earth communities. Like *taki onqoy* as a purging, expelling, manifestation expressed through body movements, my artworks initiated a process of expelling colonialisms by convoluting and syncopating the genus name of army ants: *Eciton* means to exit, to move away (*A convoluted natural history*, page 87).

Schematic of *Taki Rhythms*

conductive threads
 up and down
 contact water
 create raindrops
 threads are conductive
 connected to synthesiser
 for sending signals



geosmin scent - from the Greek (geō-) meaning earth, and (osmé), meaning smell

Water diluted with geosmin:
 chemically created compound
 at Fraunhofer Institute using
 leaf and soil samples from Sarayaku



6 _____ Rain Shelters

Awana Fabric

In Sarayaku, movements weave rhythms, rhythms weave movements, and a world is being brought into life through weaving. In my work, *kawsay* means life force and is depicted as a vital thread running through the fabrics and territorial relations being woven in Sarayaku. Inspired by this understanding, I aligned with the community-weaving practices in Sarayaku to draw the *kawsay* of rain ants as they weave themselves with the territory. The transversal practice I conducted was guided by Sarayaku values, through the application of aesthesis and tactical media, and this allowed me to open new ways of thinking about the sensorial invertebrate worlds of these ants. In this way, my two installations, *Tiam Movements* and *Taki Rhythms* combine with the one I will present here. Altogether, my three works constitute a multi-sensory installation about the rain ants of Sarayaku. Following Bishop's definition of installation art, my aim was to fabricate a sensorial experience for an "embodied viewer whose senses of touch, smell and sound are as heightened as their sense of vision" (2005: 6).

The third and final work of my multi-sensory installation is *Awana Fabric*, which is dedicated to the corporeal tensions *tamya añanku* perform when they weave themselves as rain shelters. To create this work, in which *tiam*, *taki* and *awana* come into being, I was essentially inspired by Franco and Hilda's key observations of *tamya añanku*. Their ideas lent me the vision of ants as an invertebrate social fabric, moving faster than the rain, running upside down, and weaving shelters. Rain is a syncopating force in the life of these ants in Sarayaku. I see rain ants as invertebrate performers turning to the rhythm of rain. This installation focuses on the corporeal performance of rain ants weaving invertebrate shelters from the perspective of *awana*. Instead of seeing a bivouac, through scientific lenses, constructed during nomadic and stary phases (*Ant Nomadism*, page 89), I see *tamya añanku* weaving shelters when the rhythmic intensity of rain increases.

While my other two multi-sensory works render audiovisual and olfactory experiences about rain ants' turns and rhythms, *Awana Fabric* focuses on invertebrate tactile abilities creating corporeal tensions. This is presented by means of an interactive projection that reacts to tactile deformations

of a basket woven in Sarayaku, the *ashanga*. In Sarayaku, *awana* designates crafting activities like weaving baskets, or pottery with forest clay—it is important to emphasise, again, that people employ the term ‘to weave’ (*tejer* in Spanish, *awana* in Kichwa) to refer to the handcrafting of both *mukawa* (drinking vessel made of clay) and *ashanga* (basket made of *tiamshi* liana). In Sarayaku, weaving is understood as a creative practice, in which hands read, value, and make sense of good resistant materials, e.g. lianas, fibres, or clay, to create social vessels for drinking and carrying. *Awana* as a weaving practice is very much akin to what Ingold has claimed as transduction, a process that converts “the ductus—the kinetic quality of the gesture, its flow or movement—from one register, of bodily kinaesthesia, to another, of material flux” (2013: 102).

Flowing in and out in correspondence with the Sarayaku territory, *tamya añanku* as rain messengers move and turn to new directions in syncopation with the rain. Looking through the lenses of *awana*, they cross others’ lives, and when it rains, they cross each other’s legs, interlocking their feet together, to weave themselves as shelters. Bringing back Ingold’s idea, their inverted bodies work like transducers, too. Ants’ chemical receptors and tactile abilities are well adapted to read the intricate materiality, contours, entanglements, and irregularities of this rainforest. They become the places they inhabit. They become territory. In this territoriality from underneath, rain shelters can be looked upon as a resistant fluid fabric that results from bodies weaving tensions with this rainforest world. Transitory, pliable, tensile, and shape-shifting, this form of nesting adapts to any forest interstice available. As a fabric made out of inverted bodies moving to the rhythm of rain, it is fluid, multiple, and enters in a relational dialogue with the territory and its earth beings.

The insect symbionts that move to the rhythm of rain ants are integral to this invertebrate weaving of shelters. In particular, the beetle residents of rain shelters are *antagonists* exerting invertebrate tensions in these performances: they syncopate. Staphylinid beetles mimic the morphology and chemical odour of rain ants. They are ant look-a-likes which traverse freely amongst their ranks, some feed either on leftovers or ill ants, others actively lick and clean ant bodies which are tangled up in these invertebrate fabrics. My work visualises these beetles roaming around ant bodies. Patience and tedious observation were rewarded: I took photographs and processed them with convolutional transfer algorithms to create a different artistic rendition that highlights their inverted bodies, which I have printed in large format for the exegesis exhibition.

Awana fabric is an interactive installation based on one *ashanga* basket woven by Santiago with *tiamshi*, the spirally-shaped tree liana. The malleable resistant form of the *ashanga* works as a vessel for tactile and digital interaction. Pressing or manipulating the shape of the basket modifies a sound composition and alters a visualisation of two unique woven shelters that exemplify the ant-territory relation, as well as the intimate rain-ant antagonism. The first shelter is at a decomposing palm tree in Shiwakucha, held in place, and stitched together by ant bodies (the cover of this chapter, page 160). Tightly woven onto its barks, the ants progressively migrate as the night expands over the forest. As the ants leave, the barks of the palm tree begin to fall apart. The second shelter is concealed inside a fallen tree. Suspended within, it shape-shifts its form over six days, while a creek created by increasing rain begins forming on the bottom (Fig. 72, page 165). Tensile forces and water evasive performances are carried out during this time. Corporeal tensions are shown in the video projection, when the *ashanga* basket, acting as an interactive vessel, is pressed. From the entrails of the tree, shed cocoons of newborn ants rain into the bottom creek—this rain shelter is special, it was woven in the last days of transition from the stary to nomadic phase. At the end of the sixth day of my filming sessions, throughout which the sheltered nest remained woven within the same tree, the ants begin a massive migration in which a thick flow of cocoons, larvae-carrying ants, and concealed insect symbionts are revealed.

In *Awana Fabric* the audiovisual interaction is facilitated due to conductive threads embedded in the *ashanga*. These are woven into the basket to make it electronically responsive to human touch. This intervention with conductive threads between the gaps of the *ashanga* made me aware of my transversal enactments of *tiam* and *taki* guiding my inverting operations: passing the thread in a spiral fashion, underneath, in and out, made me reflect on turns and interferences, on convolutions and syncopations. I realised I was enacting a transversal transduction, a meeting of two opposite practices, as my electronic intervention was following the form of the handcrafted *ashanga* and creating a different vessel. This one vessel enables a tactful interconnection between the *ashanga* and *tamya añanku*. By these means, *Awana Fabric* draws on tension as a material and sensible property of resistant fabrics across mediums, and across species. *Awana Fabric* represents a tribute to Sarayaku's *awana* as a practice for creating resistant materials and tensile relations, a place-making practice which in rain ants comes to life through *tiam* and *taki* in their invertebrate performance of weaving rain shelters.

Ants and symbiotic *antagonists* are all acting upon each other in this invertebrate weaving performance, and the visualisation I worked on interactively attempts to display the tensions that bring these fabrics to life. I claim my inverting operations on the *ashanga* produce a valorisation of tactile sensibilities that accord to my use and conception of aesthesis. At the same time, I reflect at the end of this journey on my overall operations using technology as a tactic for repurposing art and media tools to emphasise different cultural values, which have been made invisible by dominant life models and aesthetic practices (Mignolo and Vazquez 2013). In this way, my methodology of inversion is being materialised, as I invert the grounds on which ant performances are being evaluated. I will return to this discussion in a later section. Now, I discuss the production methods of *Awana Fabric* vis-a-vis other relevant interactive and critical forms of weaving, which offer support to my decolonial aims, and illuminate the path to the conclusion of my work.



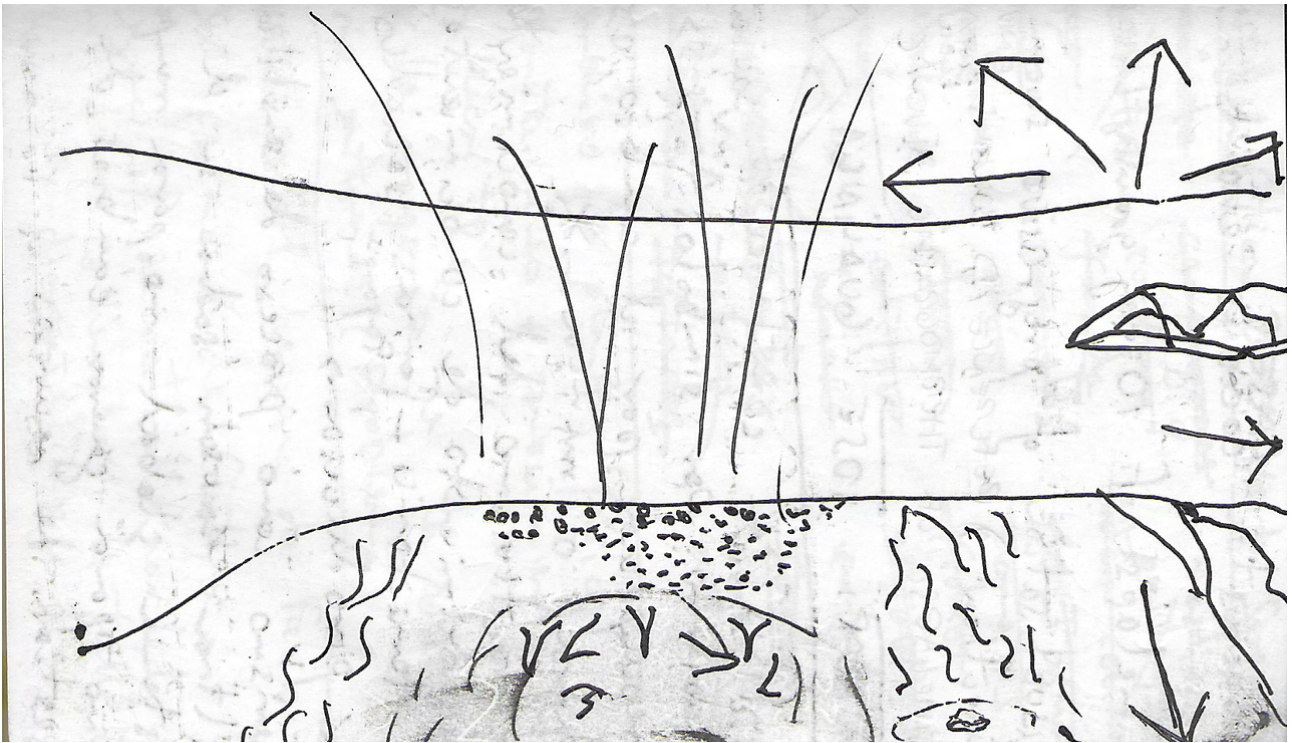
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⁷¹ Interfering and syncopating with sensors on rain shelters in *Shiwakucha*.



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⁷² Photos of different instances of the rain shelter of *tamya añanku* found suspended upside down from inside a fallen tree. Notice the shed cocoons, and also, encircled in the upper corner of the top image, a beetle myrmecophile roaming around the ants' fabric.



Statory Bivouac - Sarayaquillo (6 days: 22-27 Oct 2019)

GPS location:

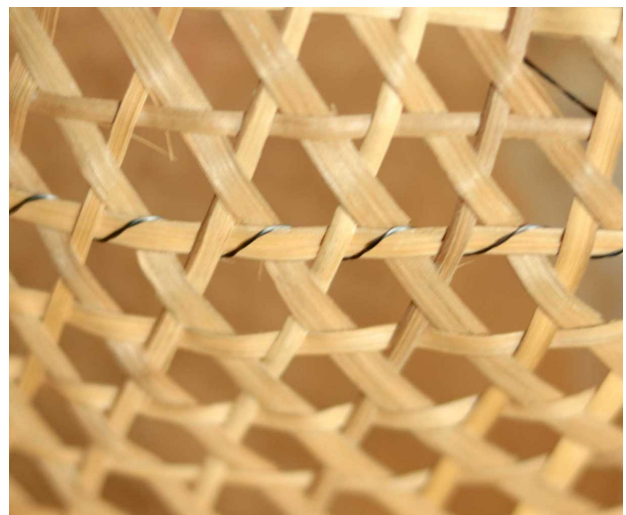
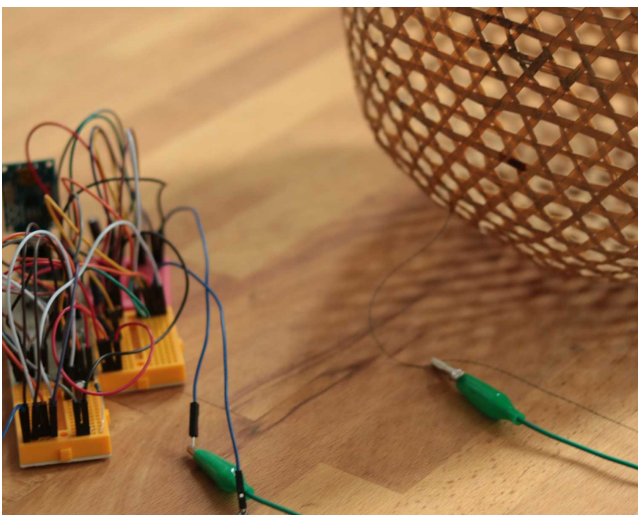
Latitude: 143.5043S

Longitude: 7728.7836W

Altitude over sea level: 399,2 meters

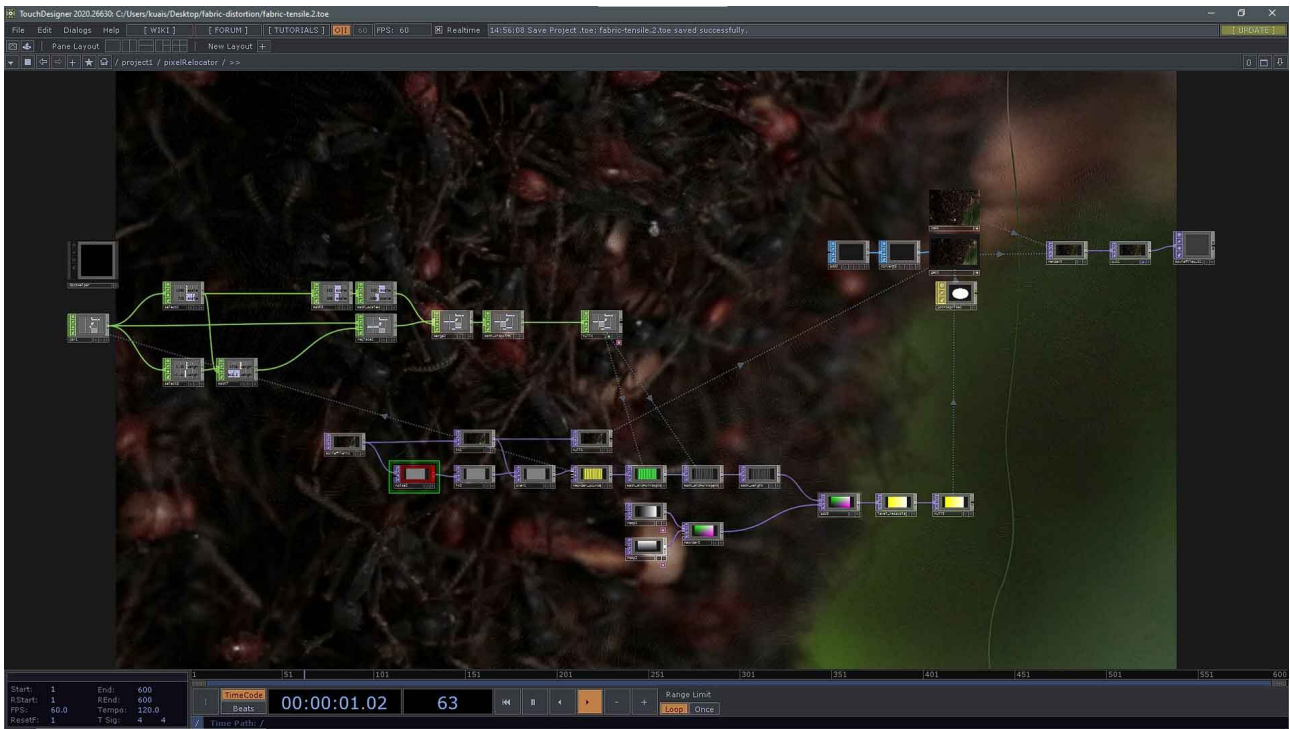
Forest location:

Bivouac inside a fallen tree, within a hollow section on the lower part of the trunk pointing downwards, protruding from this section was a mass of ants hanging over the ground forming an initially inverted mound in the shape of an ellipsoidal-elongated bulk that gravitated towards the bottom - it changed its vibrant architecture throughout the following days



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⁷³ Top: original drawing from my notebook of the fallen tree site where I found the rain ants' shelter in *Sarayaquillo*; the arrows show the different directions of the hunting trails taken by the ants on each different day. GPS location recorded with a DIY self-assembled GPS receiver (a so called hat add-on for Arduino micro-computer). Bottom: photos showing the *ashanga* connected to the circuit and intervened with conductive thread.



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Weaving tensions and resistances in arts

Awana Fabric is reminiscent of practices that use tactile interaction with electronics to intervene in weaving processes. This kind of artistic production spawns a wide range of experimental practices, the majority of which surpass the central topic linking ants to indigenous culture. The artworks I will refer to concern themes of tension and resistance. Tension and resistance are two essential properties I want to highlight in my approach. These two properties can be observed in rain ants weaving shelters, and in the crafting of baskets with *tiamshi* materials. As discussed throughout my exegesis, tensions and resistances are common to social interactions and the negotiation of territories. In Sarayaku tensions are essential for the creation of fabrics (*Social Fabric*, page 22).

Tensions are also key in artistic practices that do not necessarily deal with weaving per se. Tensions across scales of social conflict and systemic injustices regarding forms of nomadic dwelling in city contexts were explored by the artist Michael Rakowitz. In 1998 he initiated a series of public interventions in New York by handing out shelters to homeless people; the shelters were stitched together with plastic bags, packing tape, hooks, and polyethylene tubing. Rakowitz'

⁷⁴ Screenshot of Touchdesigner node environment program. I use this software to create the interaction between the *ashanga* and the visualisation for *Awana Fabric*.

“paraSITE” (1998-ongoing) deals with ideas of nomadic sheltering about homelessness. Rakowitz' work intersects with my radical view of rain ants turning into living shelters, alternating nesting places across the rainforest that are fit to their collective dimensions, in which they can weave themselves together with parasite beetles to form a heterogeneous fabric made of tensile interspecies relations.

“paraSITE” is a white inflatable plastic shelter which parasitises city infrastructures. The shelter works only if it is attached to vents and ducts of buildings, profiting from the release of warm air. As a parasite, it exists by attaching to a host, extracting energy resources, and inhaling the air of buildings or houses to grow. Rakowitz even offers downloadable step-by-step instructions on his website to customise your shelter (2022). Originally Rakowitz talked to people to design personal shelters that adjust to the sizes, whims and wishes, of the pertinent inhabitant.

“paraSITE” is an intervention into a different world than mine, but it draws metaphors and concepts, shining light on social processes that are in line with my work on *awana*, as a defiant, anti-systemic, practice. The issues raised by Rakowitz' artistic intervention are centred on social protest. paraSITE(s) inflate the inefficiency of policies and regulations, and point to the prejudices of seeing the homeless as rejects or misfits. These shelters emerge in the urban landscape of city monsters, demanding radical attention and better care for homeless people. From a different angle, the idea of a parasite shelter brings visibility to an ever-growing problem in the capital world, the increase in people losing jobs and houses who turn to live outside as nomads across the concrete, underneath highways, and along avenues of steel forged giants. On the one hand, this sharply contrasts with Sarayaku freeform territorial practices and traditional communitarian work (*minga*, *chakra*); the people are still in the custody of their own realm of possibilities and forms of inhabitation, however under the continuous pressure of capital forces. On the other hand, Rakowitz' work plays with homelessness as a form of parasitism. Under this view, thinking about parasites draws attention to processes of losing resources, tactics of inhabitation in the other, tactics of appropriation, and contingent interrelations with a host. Thinking transversally with ants as inverts, these ideas can be reformulated.



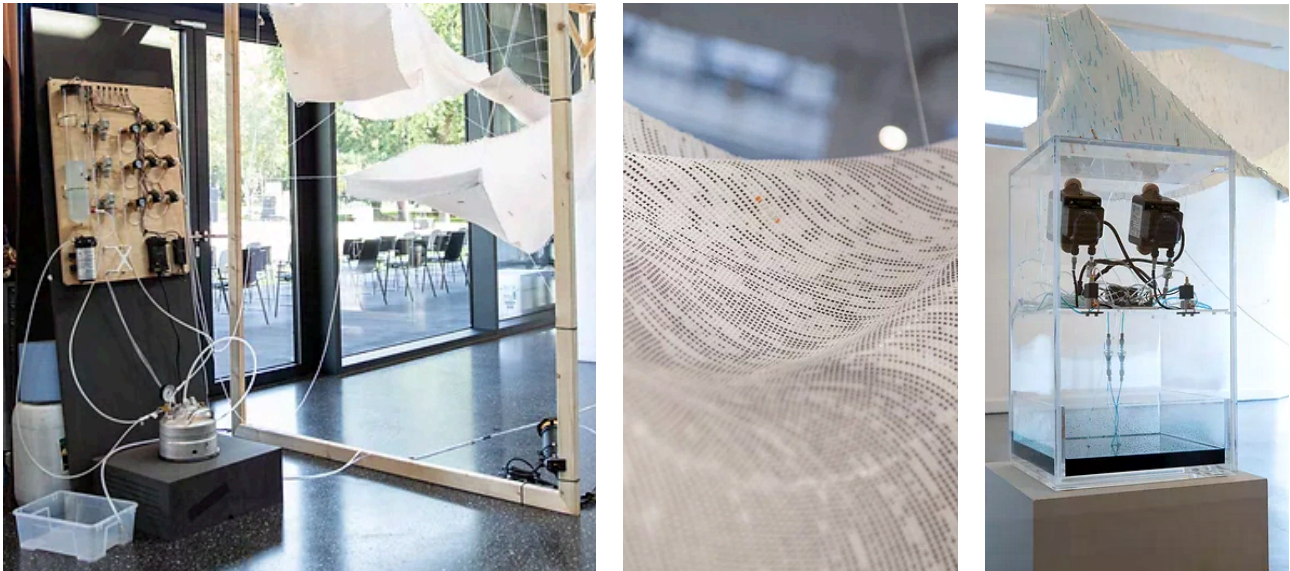
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Rakowitz' use of parasite shelters in public spaces intertwines in some aspects with my vision of rain ants weaving shelters as invertebrate communities, not colonies. In this inverted view, beetles of genera *Ecitophya*, *Ecitomorpha*, and *Tetradonia* or *Cephaloplectus*, are not parasites, but *antagonistic* performers of rain shelters. Their participation is visualised as co-constitutive performances of tension, of 'turning with rhythm' in syncopation with the rain. Tactics of visibility like in Rakowitz' paraSITE execute a critique of systemic public space regulations and complicate the aesthetic expectations of urbanised order. My work also complicates the systemic knowledge about army ants and tries to evade aesthetic representations. Yet, weaving as the core practice itself is not involved in paraSITE, neither is electronic media. Other art examples are required that better align with my weaving interventions.

In this regard, the artist duo composed of Julian Goldman and Victoria Manganiello, Soft Monitor, produced a large-scale textile computerised fabric. *computer 1.0* (2020) is composed of natural fibres hand woven around semi-transparent tubes in which the coloured fluids are pumped via computer-controlled valves that parse data from the immediate surrounding. The installation is autonomous and visually prominent, centred on the large fabric suspended in mid-air. But Goldman

⁷⁵ Michael Rakowitz's "paraSITE," somewhere in New York (1998).

and Manganiello explicitly show the system at work, making all the apparatus, scaffold, sensor arrays, and electric circuitry visible to the audience. They enforce a tactic of visualisation, too, that makes the black box of media, which usually is backgrounded or not conventionally visible in the art gallery, a part of the show.



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Soft Monitor explains this “functions as a historical lens showing how our relationship to computing technology has always been fraught with opposed promises of utopian and dystopian futures” (2022). Their statement draws on data privacy surrounding the communication infrastructures of techno-capital giants that now more than ever produce closed computing systems and technological commodities that cannot be repaired, whose inner components cannot be opened and replaced in a DIY fashion. Their main inspiration for *computer 1.0* was to recreate a digitised cloth of the 1801 silk weaving loom by Joseph Marie Jacquard. The Jacquard loom revolutionised the industrial fabrication of textiles across Europe through the operation of punched cards, which became precursor mechanisms of early computing hardware and programming languages; the cards could be replaced and put in a different order, enabling a sort of playful factor for open programming. *computer 1.0* departs from that idea as a hybrid between plastic tubes and silky threads to recreate a woven display. The general view of the fluid being pumped in between the threads of the textile resembles a binary visual system, similar to that of the punching cards. This work affords the same visual importance to the technical operation of a system of

⁷⁶ “Computer 1.0” (2020) by Soft Monitor.

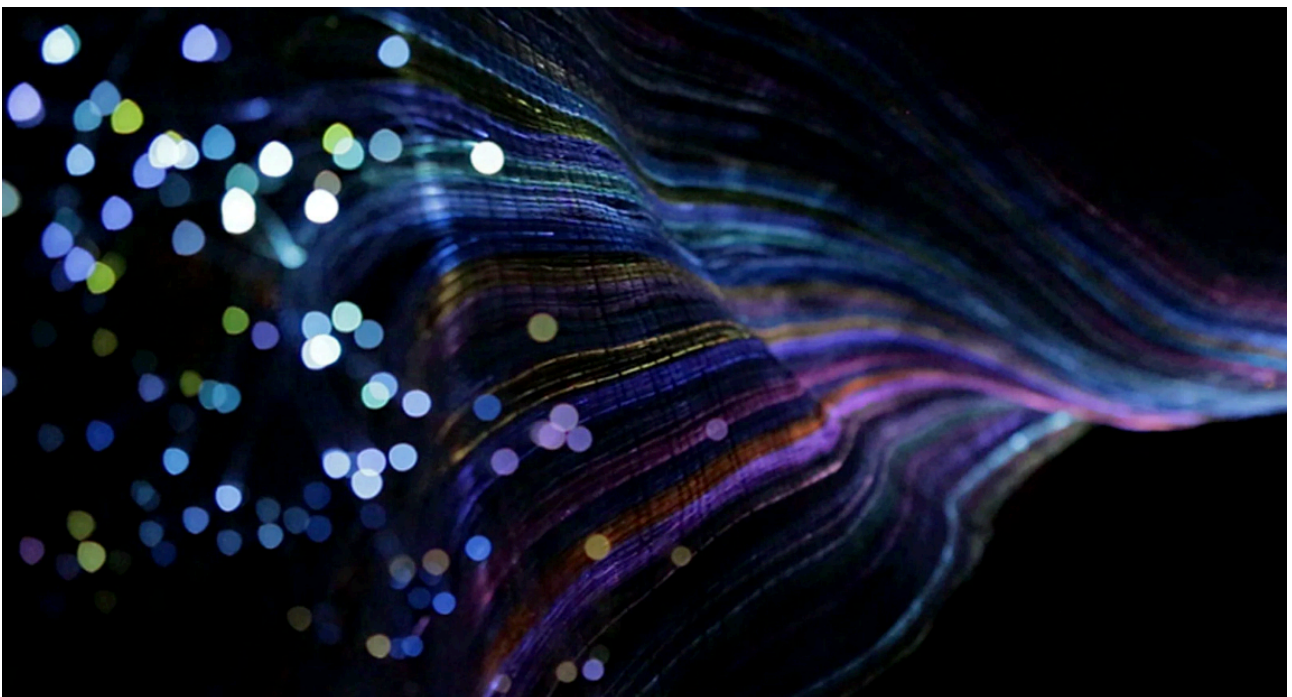
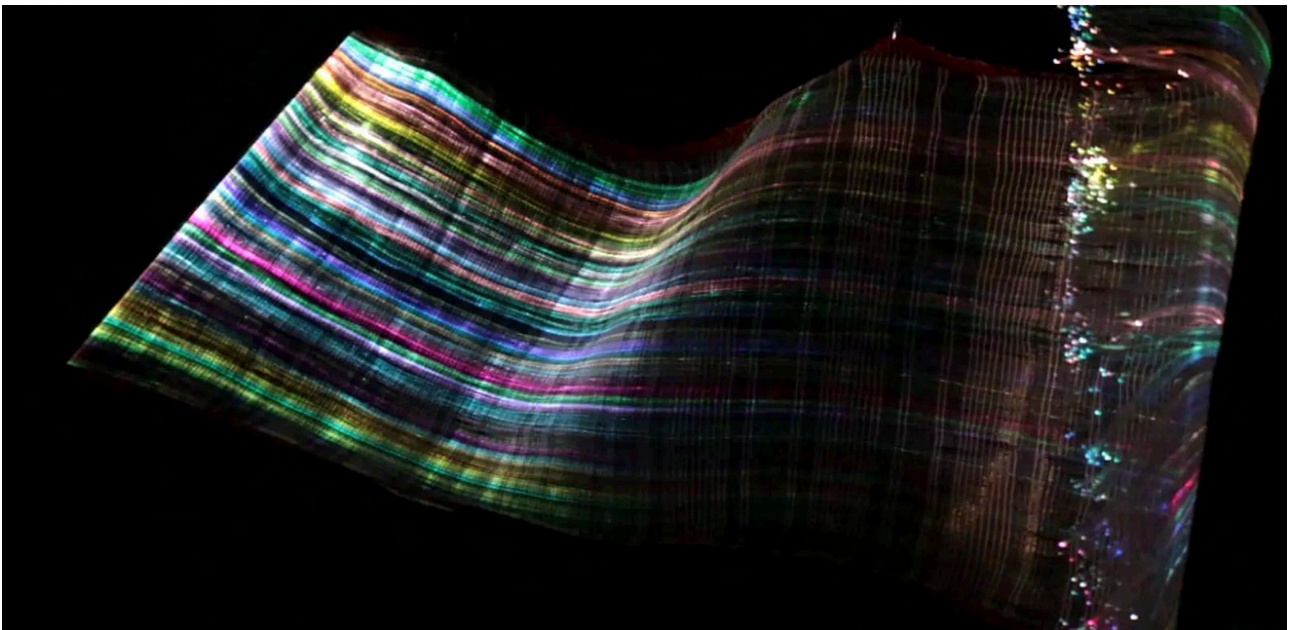
computer-controlled valves, electronics, and sensors, as the main aesthetic object which is the hybrid large-scale textile.

Works that imbricate technologies with handcrafts bring attention to the interconnected tensions arising in the encounter of different worlds. While Soft Monitor projects in general are highly stylised and aesthetically designed, *computer 1.0* is more a prototype closely related to my inverting operations with *awana*. Yet, more relevant and seamlessly related to my decolonial aims is the work combining traditional Andean textiles with electronics by “aruma.” The Bolivian artist Sandra de Berduccy—aruma is her artistic name—spans a wealth of weaving interventions that imbricate ancestral practices for textile production with electronic media. In *e-awayo* (2017) she took optical fibres, the ones used for internet transmission, and repurposed these as threads for weaving fabrics that follow traditional Aymara techniques. These transversally woven fabrics transmit light “like the band of colours of Andean textiles, which are still transmitting information about the origin of their weavers” (aruma 2017). Employing LEDs, copper elements, and proximity sensors these fabrics make optical fibres shine in different colours when hands gesturally approach or touch the intricate patterns.

aruma’s textile works avoid employing rhetorics about recovering or rescuing ancient Andean weaving practices. As an expert weaver herself of Bolivian origin, she raises the value of these weaving techniques as practices that are very much active, and above all, exercised in continuity for the wellbeing of Andean communities. Conducting workshops is a key part of her artistic practice. She is not interested in art exhibitions as a typical exposure stage. Rather, she is interested in a circularity of knowledge, sharing tactics for implementing techno-globalised electronic components in traditional weaving techniques. In this respect, she can be considered a mediator of Aymara traditions, emphasising the values of adaptability and change that characterise the Andean handcrafting of textiles.

Combining local weaving practices with sensor electronics steps up the level of importance of active communal exercises that have changed through transculturation processes, but are eager to appropriate technical means for different purposes. Weaving natural threads into electronic circuits, or electric resistances into textiles, honours the adaptive, curious, and transformative knowledge-making practices across frontiers that characterise indigenous younger generations of the Andes and Amazon. In times of political crises and capital domination, indigenous peoples are not passive.

They take matters into their own hands to weave new forms and solutions. Artistic interventions like that of aruma, and my present art intervention with Sarayaku's *ashanga*, ponder that neither political colonial histories nor technological progress should be disembodied from resistant cultures that create relationships with the changing and affected environments in which they exist. When it comes to weaving practices, Andean and Amazonian communities, despite geographical divisions, still produce interwoven textiles and social vessels with the fabrics of their respective traditional knowledges, which have survived the violence of colonisation.



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⁷⁷ "E-Awayo" by aruma (2017).

With reference to the philosophy of Isabelle Stengers, Joanna Page proposes that the first stage for decolonising science is to understand that western knowledge has been constructed as an objective truth that eradicates the messiness of the world (2021: 112). Stengers advocates for reweaving those messy relations with significant others (2018: 120), relations that have been abstracted by scientific models of life and “its quest for frictionless speed” (Page 2021: 112). Scientific methods claim a territory of knowledge devoid of peoples' histories, the influence of colonial legacies, political, economic and technocratic contexts. Aligned with Stengers and Page, I want to close this section by mentioning a previous South-situated project of mine that attempted a decolonial work in collaboration with two other artists.

Yupana Emergente, in cooperation with Gabriel Vanegas and Katharina Klemm, attempted the kind of reweaving Stengers proclaims. It was an installation exhibited in three large galleries of Museo de Arte Contemporaneo in Quito in 2014. *Yupana Emergente* drew complex parallels of territorial coexistence between leaf-cutter ants and ancient Andean practices under terms of land care and shared community labour. We used the agencies of Ecuadorian *Acromyrmex* species to draw audiovisual metaphors that reanimated land-based artefacts and practices such as *yupana*, *kipu*, *chakana*, *ceques*, and *huacas*: concepts which cannot be easily translated and must be expressed in the original language. I will explain their interrelation and the work we did. My art partner, Gabriel Vanegas, went to Sajama in Bolivia to conduct a walking study on *ceques*, the geological lines across the desert that are aligned astronomically with ceremonial sites, *huacas*, which are still standing (*huacas* are explained in *Taki Onqoy*, page 156).

He studied archaeological findings and noticed that *ceques* were woven on the lands creating a fabric of territory: paths that reflect specific star constellations visible in the Southern hemisphere and interconnect *huacas* as ritual sites. The *chakana*, which the Spanish colonisers took advantage of, is the constellation of the Southern Cross. *Chakana* is a stepped cross with twelve corners which usually represents a powerful symbol of cosmic and earthly order for indigenous peoples across the Andes region.

Digging deep into the available archaeological literature, we found out that a *kipu* functions as a digital archive. It consists of tying knots, in which finger digits do the encoding and decoding. A *kipu* is made from a main horizontal thread of interlaced alpaca fibres from which other similar

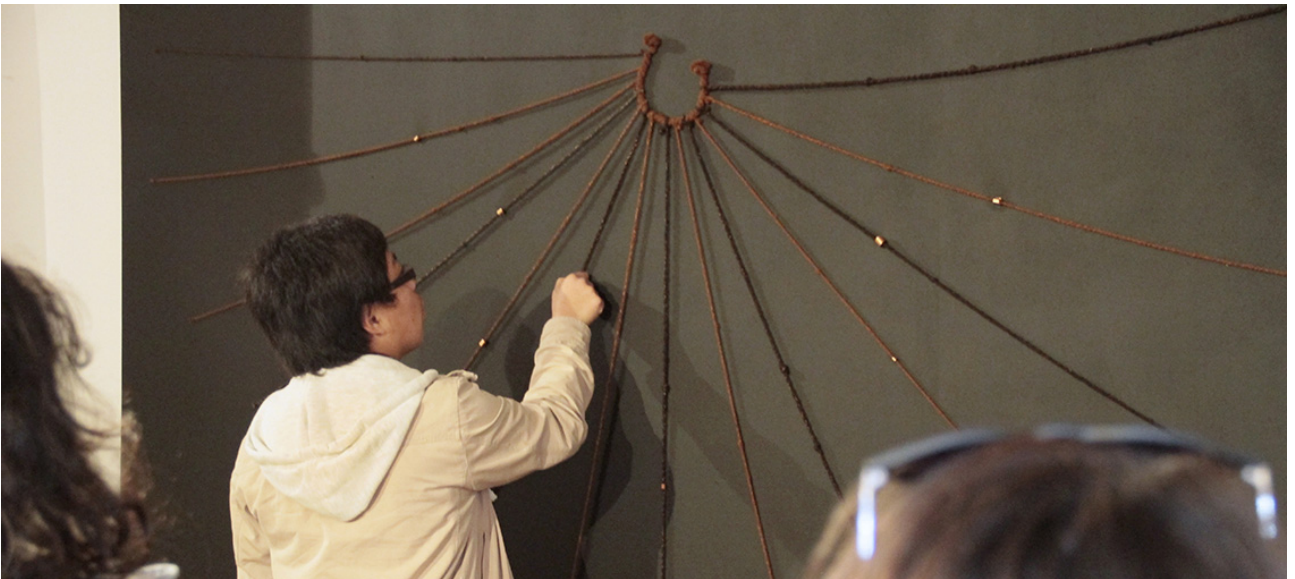
threads are attached and hang vertically. Each thread represents a point in a story or place of occurrence (Urton 2003). Each of the knots, tied in the hanging threads, archives a digit from one to nine based on how many turns are tied around it, with zero being represented as an empty space between the knots (ibid). We claim in our project that stories and numbers could have been registered with the *yupana*. *Yupana*, according to Urton (2003), was speculated to be a seasonal calculator to foresee rainy and sunny seasons, and for counting the harvest, which was to be encoded in the *kipu* (ibid). Later, *kipu* and *yupana* were appropriated by the Incan Empire and co-opted to record and administer the tributes of the population (González Vargas, Rosati and Sánchez 2002).

Inspired by these pre-Incan Andean practices, we set out to conceptualise a cosmic-land interconnectivity through technologies of ancient times that could be reanimated by ants. In *Yupana Emergente*, ants inhabited open glass terraria, which we designed as *huacas*, in which different models of *chakana* and *yupana* were placed. The *huacas* were interlaced together by suspended bridges, which we conceptualised as *ceques*. The ants adapted after ten days to this suspended interlacing, which they conveniently used to traverse between *huacas* habitats to harvest leaves and cultivate their fungus gardens. On two opposite walls, we hung two outstretched versions of an interactive *kipu*, which visitors could touch, tracing the same ancient practice of digit reading, to activate ant sounds and ritual songs in Quechua and Aymara. By these means, we set to mediate a rich past knowledge that has transformed, largely forgotten, but was never entirely obliterated. We tried to weave life into past biocentric logics of Andean cultures that did not separate grounded community practices of land cultivation from the cosmos.

However, *Yupana Emergente* lacks the attention I am conducting in this present research. In *Yupana Emergente* I admit the exercise of species extraction. The leaf-cutter ants were removed from their original habitats, the natural reserve of Otonga, and reinserted into artificial environments (the museum galleries and the *huacas*) for the sake of mediating a rich past cultural knowledge. By weaving the fungus-ants-bacteria symbiosis into this installation art, I carried an instrumentalisation of invertebrate communities. At the end of the exhibit, my initial commitment succeeded, as I returned the three ant communities to Otonga. But in retrospect, this did not compensate for the individual losses caused by enforced displacements and other life-threatening perils during transportation. Furthermore, I failed to conduct a thorough monitoring of the ants' re-habitation to make sure they successfully returned to their ecological routines.

Now I claim I have adapted my practice to the lifeworlds of rain ants. The recordings and interventions I made with my transversal operations have nowhere near the impact that my previous work with ants had. I argue that the work I conducted in Sarayaku was adaptive to the ants' environments. Although I deployed a set of intrusive and non-intrusive artefacts, I claim I achieved a balance in which respect was my priority. Rather than displacing ants, as I did in the past by breeding them in artificially augmented habitats in my studio, and forcing them to a foreign environment which is uniform and surface-oriented, I displaced myself out of that comfort zone and privileged position of an artist in control. I submitted myself and my apparatus to them, to the unruly, indeterminate, earthly and wet entangled conditions of their territories.

Reflecting on this, I claim that a proper ethico-aesthetic paradigm shift in artistic practices with invertebrate life requires a conduit, a conduit which I tried to form with my combination of transversality, tactical media, and aesthesis. In the most generalised understanding, a conduit is a tube or trough that protects wires in an electrical circuit. A conduit is also a channel that conveys fluids. Having worked with the fluid movements and rhythms of rain messengers, I conceive a conduit as composed of a set of technological tools in practice (my inverting operations) and a set of concepts in theory (transversality, tactical media, and aesthesis), which altogether convey and protect the transmission of values of this situated indigenous human-ant relationship. Thus a conduit is more than a metaphor to me. A conduit is a practical guide in the circuit-bending of media assemblages that lends purpose and direction to channel and protect the transmission of decolonial activities and creativities seeking to invert anthropocentric priorities, Eurocentric and Anglo-American impositions, the scientific and aesthetic order of things and thoughts. Now the ants are not only rain messengers, they become, through the work I did, emissaries of the land-based ontology of Sarayaku, of the values of *Kawsak Sacha* and *Sumak Allpa*, of *tiam*, *taki*, and *awana*.



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78 “Yupana Emergente: bio-lógicas Andinas reanimadas por hormigas” by Kuai Shen, Gabriel Vanegas and Katharina Klemm, Museo de Arte Contemporaneo de Quito, Ecuador (2014).

Returning and inverting

An unfathomable number of beings on this planet are invertebrates. Invertebrate bodies are turned inside out, they are pliable and multiple. Invertebrates can have numerous members and expandable organs. Some invertebrates are airborne. Others are entirely subterranean, buried underneath the soils of the earth. Many are aquatic living submerged in the deepness of oceans. The largest group of known invertebrates to humans are insects. Life on the planet is untenable without invertebrates. There is no life without them.

It is interesting to revise the meaning of the word invertebrate. The term invertebrate is a powerful creative episteme that reveals potentials of opposition and inversion. The etymology of the word ‘invertebrate’ originates from the Latin *vertebra*, which derives from the Latin root of *verto*, and *verto* means ‘to turn.’ In Latin, the prefix ‘in’ at the beginning, as explained in Chapter One, signifies absence, and translates as ‘without.’ Indeed, strictly speaking, the term invertebrate is without formal significance in scientific studies. It has no taxonomic use for describing any genus, phylum, or family of animals. Nonetheless, it has become a widely employed term of convenience, both in the literature and outside scientific circles, to describe living beings other than vertebrate animals which do not develop notochords, beings that do not possess central, vertebral columns made of bones.

I imagine, perhaps the colloquial currency of invertebrates has persisted over centuries because it facilitates division and binaries that help distinguish vertebrates from the great majority of living beings. This binary arguably implies a hierarchy that leads to systematic reductions of invertebrates, as beings without the sentience that characterises humans. What if this systematic vertebrate/invertebrate binary is turned around and the value of invertebrates is placed higher than that of vertebrate species, appraised and celebrated by virtue of their worlding abilities and performances?

Ants are invertebrates and engaging with them in artistic practices means breaking away from that imagined template of vertebrate interactions. Ants are enfolded into contingent relations emerging from non-hierarchical encounters with beings and things, as Kirksey notes: “ants are constantly moving among different beings and are open to possible becomings [...] anxious to escape from fleeting encounters with humans into the cosmos, into the unknown beyond anthropocentric

worlds” (2013: 175). Engaging with ants in artistic practices thus means placing ourselves in their position and own footing; imagining invertebrate sensorial capacities and chemical pathways, which allow them to make sense of the world, as different yet inevitably entangled with the worlds humans construct. Ants continuously act concealed from human attention on the places and territories which we inhabit and culturally affect. Therefore, the way we ought to imagine invertebrate worlds has to be radicalised. Human imagination has to be inverted in order to carefully and respectfully understand invertebrates.

Ants have been validated as meaningful social model organisms from the privileged point of view of Eurocentric and Anglo-American societies. The muddy and messy ground in which ants live, which is necessary to make sense of their ecological agencies as a medium shared with Amazonian cultures, is turned white and made sterile when ants are abstracted as social models for the optimisation of problems that exist according to privileged societies, imagined by privileged minds.

It is important to note, nonetheless, that young generations of scientists from minority cultures of the world are emerging. Progressively, they are changing the scientific gaze on species, or so it seems, by involving idiosyncrasies of place and native practices in the study of ecological behaviours. In this regard, a plethora of academic discussions has begun taking place, e.g., in Twitter: the recent pledge led by Corrie Moreau at the 2022 IUSI conference, the largest annual world meeting of ant experts, to not forget diversity, equity, and inclusion in ant studies (Cook 2022); or ecology and behaviour funded programs like the one in the University of Bristol Biological Sciences that sponsors working with Brazilian communities and native bees (Grüter 2021). The interest and funding for making scientific practices more inclusive of other worldviews seem to be increasing. However, the frictionless speed of publications and academic exchanges circulating in social media are predominantly in English, thus remaining closed and inaccessible for indigenous languages. So it is not only how we promote inclusion and employ technological tools, or how we acknowledge inspirations, that makes for respecting peoples’ views to ascribe and convey meaning to lifeforms. The hegemony of Eurocentric and Anglo-American methods and technologies for knowledge production remains a systematic problem of language. The publications of novel scientific results and analyses depend on the systematic use of the English language. This form of communication and understanding of the lifeworlds of other beings closes in on itself, dismissing indigenous values that are rather non-verbal, performative, and based on community experience and orality.

Verbal languages need to invert and give way to more performative languages. Performative languages, especially those corporeally enacted with tact and in community, are essential to understand the interrelations between different beings and their shared spheres of knowledge. My artworks try to honour this by concentrating on the performative languages of the Sarayaku culture. This was the overarching basis for using inverting as a creative figure and direction to tactically put my media assemblage to work with *tiam*, *taki*, and *awana* to describe ant performances. And while the exegesis you are reading is written in English, my commitment to the people is to return to perform the artistic results in Sarayaku by means of workshops and presentations with a translated written version in Kichwa. The values of my work with *tamya añanku* remain to be decided by the Sarayaku people.

I recognise that the experimental methodology of inversion I put together to perform with ants is not free of critical issues. I examine now the issues around how my practice activated transversality, aesthesis, and tactical media, including the four inverting operations of my methodology, in relation to *tiam*, *taki*, and *awana*.

Inverting Transversality

Enacting transversal fieldwork in Amazonian rainforests with the impetus of inverting perspectives comes with its risks and responsibilities. Artistic practices such as mine require ethical and aesthetic repositionings to account for knowledge extractivism, cultural appropriation, and the deepening of colonial wounds (Gómez-Barris 2017: 42). Attention must be given to the fact that transversality, as a mode of cutting through systems, produces a disruptive effect of prevalent human structured relations. As an alternative mode of ‘thinking and doing’ which tries to overcome hierarchies and strict boundaries in the study and understanding of invertebrate social beings, transversality also initiates collateral processes of destabilisation. Put in other terms, transversal operations, used without a conduit for leading purpose and direction of decolonial work, bear the risk of disrupting existing fabrics of relations which are not meant to be torn apart.

Taking into account the destabilising potentials transversality can induce, it was necessary to focalise operations of amplification, interference, syncopation, and convolution, with tactical media,

as critical apparatus, and aesthesis, as principle. Aesthesis became a tactic for inverting aesthetics, just as my mediations co-opting sensors and computer programs became tactical to displace scientific paradigms and picture army ants as rain messengers and territorial weavers with sociopolitical subjectivities entwined in their performances. Together with aesthesis and tactical media, sensible awareness and critical operations were exercised to try to meet artistic compromises. By these means, I inverted dominant knowledge models working on that knowledge gap, which science has a hard time dealing with: studying the ecological behaviour of a species within indigenous territories by attempting to place critical thinking and media tools at the service of local knowledges and common histories.

But a careful exercise of attention is constantly required to avoid the overuse and misuse of creative technologic operations that might displace—by means of the language in which they are programmed—active community practices and grounded interactions. In an attempt to enforce a different paradigm in the study of ants, by exploiting transversality as a creative tool for deterritorialising army ants from their scientific encapsulations, my workarounds with electronic media were extremely complicated. It remains to be seen in my return to Sarayaku, how showing these experiments in situ to the younger people will play out. Considering all this, my transversal methods were not neutral. The combined utilisation of amplification, interference, syncopation, and convolution, was explicitly biased by my Sarayaku experience. My art practice adopted *tiam*, *taki*, and *awana* as performative concepts to instruct my operation of electronic media and produce specific artistic results.

In my inverted use of transversality, amplification and interference represented essential operations. Amplification and interference were enacted in every creative process: filming with macro-lenses, recording substrate-borne ant sounds with piezoelectric sensors, registering ants crossing laser beams, electroacoustic synthesis or visual algorithms to transform photographs and sounds of ants; even in olfactory synthesis, the geosmin scent was created by interference, by breaking down the molecular structures of organic soil samples to then apply chemical processes that amplify certain odours. Convolution and syncopation, on the other hand, were specifically channelled with *tiam* and *taki*. Convolution and syncopation allowed me to produce artistic results aligned with more grounded underpinnings of life. Convolution was specifically aligned with *tiam* to operate on ant performances characterised by turns. By thinking with and operating convolution, I visualise rain ants turning into a woven fabric in motion. Syncopation was specifically aligned with *taki* to

operate on ant rhythms, and the rhythms of rain as both being forces of displacement. *Taki* guided my use of syncopation to compose an acoustic fabric of sound waves crossing each other.

Tiam and *taki* were made transversal with convolution and syncopation. These operations were specifically repurposed to emphasise that against expected norms of order, and models of organisation and reproductivity imposed since colonial times, indeterminacies, improvisations, and anomalies, can lead nevertheless to the formation of resilient fabrics holding ecological, sociopolitical, and cultural relations in place. Guided by *tiam* and *taki*, I operated convolution and syncopation to demonstrate the spectrum of rhythmic motions of rain ants is a better alternative to nomadism. This spectrum shows that the rhythms of rain ants as an invertebrate community are not necessarily harmonic, nor do they faithfully follow biological cycles, but are variable with an oscillatory character that depends on the cross-species territorial relations with which they co-exist. In my multi-sensory installation, this is visually and acoustically emphasised. Visually this spectrum was produced with the operation of convolution, that is, machine algorithms for motion tracking and image transfer. In my exhibition, these results are shown in photographic prints and the visualisation of the *Tiam Movements* installation. Acoustically, this spectrum is generated with syncopations. Ant sounds recorded in the field with piezoelectric amplifiers were syncopated using the laser interference data of ants crossing beams. By playing with granular algorithms in Max Msp using self-organising maps, and live coding programs via Sonic Pi that use the laser interference data, I created the acoustic fabric of rain ants, giving emphasis to the oscillating sound waves that emerge from their rhythmic motions scratching the forest floors.

Inverting Tactical Media

Scientific methods and technologies for artistic production ought to be subverted to other uses indeed, not in the sense of free-to-use applications that are already available on the Internet, but rather to be shared in complicit interaction with communities across the Amazon. This kind of work is necessary so that people living in the Amazon can understand them and amplify the sovereign knowledge 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:

6). Tensions arising from indigenous implementations of technologies are already part of the Sarayaku's fabric of interrelations. The involvement of younger Sarayakus in learning to use media and acquire equipment poses a risk of replacing time and routines usually dedicated to fieldwork in *chakras*, the essential performances for taking care of the land and its vital relations. Tactical media in my work seeks a form of reinforcement of cultural resistance in Sarayaku's sociopolitical and globally connected activism, but the outcomes of this are open to contestation.

It is key to keep in mind that tactical media for political purposes and to document sovereign cultural practices using mobile phones and social media are contingent on capital infrastructures and the economic circulation of commodities. Moreover, tactical media that rely on the communication infrastructures of capital globalism run the risk of becoming antagonistic to traditional Amazonian practices. There is also the problem of the afterlife of technical apparatus, recycling, upcycling, and learning to repair or discard circuits and gadgets properly without environmental harm. Technologies can create addictions, displacements, and dependencies. Programming and coding with computers bear a language problem. The deployment of sensor technologies to monitor species behaviours, even in favour of *Kawsak Sacha* and *Sumak Allpa*, are time-consuming and depends on electrical re-charging—a complicated affair in Amazonian rainforests that is entwined with the use of batteries, solar panels, or even fuel combustion to generate electricity. The promotion of a practice like mine that tactically repurposes media and electronics needs to be conducted with careful tact and attention. The deployment of technology needs to always acknowledge the culturally grounded values and ecological fabrics in which species interactions take place.

In this regard, the Sarayaku concept of *tiam* demanded me to question the creative purposes of technological improvisations and tactical media. *Tiam* compelled me to continuously turn operations upside down to convolute functions and align them to situated understandings. In a creative practice outlined by *tiam*, there is always the possibility of return, of assessing paths that can lead to previous or better ethically-situated practices — to go back if necessary to the roots of knowledge. The roots of knowledge about army ants reside in science. The roots of knowledge about *tamya añanku* are placed in Sarayaku. In my transversal practice using tactical mediations, these knowledges cross each other. Thus, artistic practices like mine, which rewire machine algorithms and western-based media and theories to sense nonhuman worlds, need to be woven

with earthly entanglements, to remain attentive to how inventive approaches can be carried out ethically and fairly in favour of local ecologies and cultures.

With this in mind, my tactical mediation with *tamya añanku* performed a deterritorialisation of data away from technoscientific quantifications, affording creative reinterpretations and materialisations aligned to different ontological boundaries. This allowed me to reposition my electronic and algorithmic mediations as decolonial exercises that enhance indigenous territorial values and perspectives. Inverting became a decolonial practice for placing my creative work on the grounds of a situated knowledge that has struggled but now is on the rise to be recognised as integral of a pluriversal view, in which multiple worlds co-exist in tension with each other. I claim, in this pluriversal view, aesthetics is a concept for sensorial reevaluations that plays a major role in reshaping perceptions of, and relations with, invertebrate beings.



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⁷⁹ Shed cocoons on the territoriality from underneath mark the return to massive mobilisations and signal new beginnings: ants are born.

Inverted aesthesis

In my previous artistic practice, I claimed I created techno-ecologies by focusing on the invertebrate aesthetics of ants (Kuai Shen 2019). Now, after my experience in Sarayaku, I have learned differently. Without cultural sustenance, that claim only exacerbates the gap between resistant knowledges and the exclusive powerful minority producing, distributing, and controlling technological infrastructures to create comfort zones and privileged aesthetic experiences. I understand that the sensory worlding capacities of *tamya añanku* to weave themselves with the territory cannot be rendered meaningful only through a transversal practice that tactically mediates technological tools. The rain ants of Sarayaku have taught me that tactical media in artistic production must be focalised on earthly entanglements from a decolonial and inverted position. Transversality and tactical media need to be channelled towards challenging hegemonic technocracies, and any aesthetic regime defining sensorial experiences.

I claim that aesthesis, when supported by a resistant and different cultural set of knowledges that oppose prevalent life models originated through colonial histories, offers an alternative passage to evaluate ant performativity besides aesthetic conventions. Employing aesthesis, I inverted the aesthetic impetus infused in my previous practice. I employed aesthesis in my practice-led research with rain ants to tactically guide an inverted transversality which aligns with *tiam*, *taki*, and *awana* to mediate the *kawsay* of rain ants as threads and sound waves interacting with the living matter of *Kawsak Sacha* and *Sumak Allpa*. Situated on this territoriality from underneath, and inspired by Sarayaku's community-weaving practices, I propose ants have their own aesthesis. I propose inverted aesthesis at the end of my exegesis to accentuate my appreciation of ant abilities and sensibilities for weaving worlds.

Inverted aesthesis grants me a situated awareness conditioned by an altered regime of sensorial experience. I work with inverted aesthesis to open to other forms for making sense of ant worlds, always in pursuit to adapt to the sensible regime of the actual cultural time and place in which invertebrate interactions are performed. While aesthetics is arguably a predominantly visual set of principles regulating human experiences, now more than ever on screen, inverted aesthesis opens to a different engagement with the worlding capacities of invertebrate communities as comprised by tactile, vibratory, corporeal, metabolic, and olfactory sensations. Inverted aesthesis looks with excitement into the dirty, messy, and fluid business of invertebrate beings. Inverted aesthesis

celebrates invertebrate and inverted bodies, heightening the perception and assessment of their different qualities and sensorial abilities. For example, a signature of ants' social communication is trophallaxis, in my view a form of inverted aesthesis. Trophallaxis is the exchange of fluids mouth-to-mouth in ants, literally vomiting in each other's mouths, or via imbibing and licking anal secretions (LeBoeuf 2017), which has been deemed as the proof of true sociality: "a mutual trophic relation between the mother insect and her larval brood has expanded with the growth of the colony like an ever-widening vortex till it involves, first, all the adults as well as the brood and therefore the entire colony" (Wheeler 1918). Thinking with inverted aesthesis, trophallaxis becomes the circulatory transmission of fluids between members of invertebrate communities, which flow amongst earth beings and turn into messengers as they turn with the rhythms of rain.

By invoking inverted aesthesis in my work with rain ants I deterritorialise the aesthetic production of media installations from underlying Eurocentric concepts. While I claim this, I also acknowledge that inverted aesthesis subverts, poaches, and makes use of scientific facts to remix a different understanding of the sensorial world of ants. While this prompts ambivalence, it is precisely by convoluting scientific means that tactical media inserts itself into a decolonial work capable to enact "temporary reversals in the flow of power" (Garcia and Loving 1997; da Costa and Philips 2008). At the same time, my inverted methods make creative use of a wealth of scientific verities and thus could expand disciplinary boundaries and gain credibility if presented in discussions with scientists (see *Appendix D*).

There is much more to explore and contest ahead, as I have barely touched the surface of possibilities with inverted aesthesis. Inverted aesthesis could be developed as a concept beyond aesthetics and sciences for reconfiguring the multiple ways invertebrate bodies can be valued, particularly in relation to mutation and metamorphosis, which I did not fully engage with in the present work. Or for reshaping our awareness of endangered invertebrates in need of more attention amidst anthropogenic disasters. And even deeper underneath, considering the vast invertebrate world of the oceans, beings whose inverted performances underwater require a paradigmatic human shift of sensorial understanding. The chemical connection between water and invertebrates is worth further and deeper research.

I recognise inverted aesthesis could help frame a sensorial study about the impact of rain and water worlds in the lives of ants as invertebrates. In this vein, I did discuss the hydrophilic condition of

ants evading water contact in Chapter Three (*Chemical Darkness*, page 97, and *Rain Syncopations*, page 100). Rain and water drops are evoked in my work *Taki Rhythms*, as I assembled a mechanism that raises and lowers threads, reading the data of laser interferences created by ants in the field to make water drops trigger sonic factors (page 137). While in *Tiam Movements*, I mixed geosmin in water to create a fluid medium for dispersing the smell of wet earth, and mediated ant vibrations to create impermanent water-weaving patterns (page 115). Yet, I ponder there could be more poignant creative imbrications with water transpiring as fluid, ever-present, shape-shifting, and dispersible medium, which myriad invertebrates depend on while myriad other terrestrial invertebrates evade.

I assert inverted aesthesis could encompass more work with molecular processes, too. For instance, I fell short of artistically engaging with the invisible and gaseous nature of ant pheromones, an idea I keep in mind for future projects. Biosemiotics and semiochemicals in social insects are exciting research topics that blur boundaries, which, especially in molecular genetic studies of mutations, are encapsulated in laboratory examinations requiring a great deal of investment and equipment. Opening that black box of molecular practices perhaps will reveal issues linked to other hegemonic conundrums and colonial legacies. I acknowledge the interrelation between rain ants as invertebrate performers and rainwater as *antagonist* offers more opportunities in the realm of chemistry that I have not explored in this practice-led research.

Acknowledging ants' performances inspired by an idiom of turns, rhythms, and weavings centred around indigenous concepts of community defies scientific logics and aesthetic framings. Hence, inverted aesthesis stands against terms derived from monarchic, imperial perspectives that describe army ants as colonies alternating between nomadic and statory phases—the former inevitably points to the State as central unit of control and administration, the latter, derives from the military use of being stationary. Inverted aesthesis returns the rights of naming significant others to the cultures and territories in which they co-exist, according to local forms of perception. Inverted aesthesis stands against the creation of arbitrary identities and the omission of indigenous understandings. It has to be considered that other indigenous nations have respective names assigned to their local army ants, which if dwindling in value, need to be brought back into light.⁸⁰ Inverted aesthesis demands more attention to forms of ascribing meaning to and performing with ants, and the invertebrate

⁸⁰ For example, Henry Walter Bates' expedition across the Amazon of Brazil during 1863, which yielded the renowned "The Naturalist on the River Amazonas," already revealed a local name of army ants, *Tauoca*, given by an indigenous community he did not properly identify (Bates 1963: 760). Considered as an anecdotal account of his travels and memoirs, *Tauoca* was not given importance by a taxonomic classification system which was at that time already established (Kronauer 2020: 33).

communities they compose. Inverted aesthesis asks us to reconsider the performative capacities of invertebrate life in general from inverted perspectives, grounded on territorial relations and cultural resistance.

Epilogue

This exegesis accompanies the multi-sensory installation [*The Rain Ants of Sarayaku*](#). As rain messengers in the Sarayaku world, *tamya añanku* are interwoven with the meteorological forces of rain, the peoples' biocentric perspectives, their community-weaving practices and sociopolitical activism. With the guidance of *tiam*, *taki*, and *awana*, and localised in a culture of territorial relations, this invertebrate performance is presented as a form of worlding with *Kawsak Sacha* and *Sumak Allpa*. This multi-sensory installation is my tribute to Sarayaku and the fabrics woven by rain ants.

My practice-led research concludes that the scientific study of ants must expand the logics of investigation by acknowledging and actively involving Amazonian local practices and knowledges previously obscured by colonial perspectives. Using my methodology of inversion, I situated myself in Sarayaku, with and against the Eurocentric and Anglo-American education and perspectives that I initially brought along. I have challenged and broken away from the biological sciences which have created an image of ants in military disguise, a representation which has not been questioned by any artist until now. And while the disciplinary rigour of current scientific practices with invertebrates might not be flexible enough to allow for the inclusion of weaving as a worlding ability, I argue that developments during the last decade demonstrate cross-fertilising possibilities are expanding. In light of debates about diversity, equity, and inclusion in western scientific systems of knowledge, it is imperative to remember that it is not only about bridging art and science. It is of uttermost importance to overcome visual and language primacies and turn transdisciplinarity into multidisciplinary, in which multiple optics, senses, apparatuses, and cultures can rightfully and respectfully take part in the creation of more ethically inclusive, and fluid, knowledges.

Until the time comes to show the results of this practice-led research in Sarayaku, I recognise that my artistic production required a careful channelling of creative operations to avoid becoming an

extractive practice that benefits from indigenous knowledges just for rendering an alternative vision of an ant world I have been admiring for decades. I claim aesthesis and tactical media allowed me to focus my transversal operations with technology towards a decolonial work, towards critical repositioning my intentions and changing my artistic impetus. Yet, entangled transversals ahead are calling me to prove the contribution of my work.

I claim inversion as a transversal and decolonial methodology to study ants has its complications. Compromising aesthetics by inverting the order of values, and ways of ascribing meanings, suited my decolonial aims, as I tried to exert opposition to conventional perceptual norms. However, this created complex conceptualisations about ants, burdening the design of an easily accessible installation that can successfully convey novel, but radically different identities based on cultural values and languages of an indigenous minority. Simply put, art under aesthetic rhetorics is a tool that facilitates the public outreach of scientific studies. Within the privileged circle of European and Anglo-American organisations with the power to decide future regulations and inscribe global policies for mitigating ecological catastrophes, aesthetic depictions of invertebrate life can better function to communicate scientific knowledge, that is, conveying the urgency to change industrial practices and capitalist habits. In this sense, aesthetic practices become a convenient utility for creating artistic renditions of invertebrates, and these images, videos and sound compositions turn into a digestible product in the pursuit of a good cause.

Artistic portraits of insects related to invasive species, habitat destruction, and pollution are potent vehicles to create awareness about “human-induced environmental distress” affecting earthly, symbiotic relations (Klein and Brosius 2022). This has been assessed by Klein and Brosius, who surveyed seventy-three artworks since 1983 dedicated to emphasising, through a diversity of artistic techniques, the role insects play in an age of environmental turmoil (2022). But the artists selected for their analysis do not question colonial implications or include indigenous heritages. The utility of aesthetic practices under the domain of ‘art and science’ remain limited to promoting an Occidental awareness that does not attend to nor empower indigenous knowledges and their relations to nature.

Art must be created with others, for others. Art must favour other cultures. There is a vast emptiness if art follows science without including indigenous knowledges. There is a vast emptiness if art follows aesthetic sensations and experiences without daring to work on alternative imaginaries that

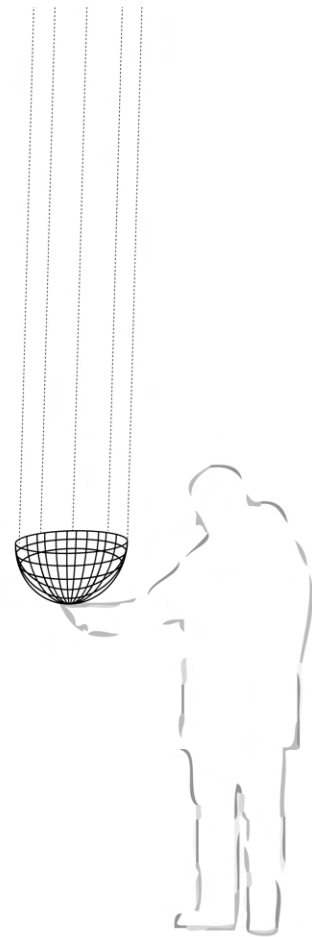
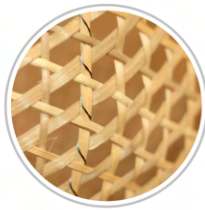
include the sensorial world of the significant others around us. Inversion as methodology and decolonial practice attempted to prove that a simple reversing action, of thinking from the perspective of the other to channel opposite values and views, can create the necessary awareness to ethically challenge dominant anthropocentric world orders and models of life. The act of inverting perspectives is a tactic of creative resistance, and of uttermost importance, in a planet still being ruled by a hierarchical accumulation of power and privilege bearing colonial legacies unaccounted for.

Until the time comes to share my methods in Sarayaku, I look down, humbly admiring the turns, rhythms, and woven worlds being brought into life by ants, worlds in which perceptions and significations invert. Then, I look up to the resistant fabrics of indigenous people who weave territorial relations with them and the earth beings of rainforest worlds.

Schematic of *Awana Fabric*



interwoven
conductive
threads in
basket material
—
'ashanga' baskets
are woven by hand using
'tiamshi', a liana
growing from trees
in Sarayaku.



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Glossary

This glossary is organised into two sections. The first one lists Kichwa terms, while the second section explains scientific terms. Combined, these keywords sustain the arguments in the exegesis of my artistic practice. The Kichwa people of Sarayaku have specific terms which do not appear in the unified Kichwa dictionary, which is being scholarly promoted to standardise the language across the major Quechua/Kichwa communities of Bolivia, Peru, and Ecuador. Like other Kichwa and Quechua cultures in the Amazon and Andes, many words live through oral transmission only. Kichwa is a language in which pronunciation and cadence play a major role over written forms. Thus, written words can have orthographic variations and should not be taken as misspellings, e.g., words written with c instead of k, or u in place of w.

Kichwa terms

Tamya añanku

Kichwa name for *Eciton burchellii*, the ants of the rain. Tamya is the Kichwa word for rain. Añanku means ants.

Taki

In Kichwa, taki means rhythm, but it also translates as music or song. In Sarayaku, taki refers to the chant a Yachak intonates during ayahuasca ceremonies. A Yachak is a wise elder—what in the West is referred to as a shaman. Taki can be a musicalisation performed with instruments as well as acoustic expressions performed by animals or spirits of the forest.

Tiam

In Sarayaku, tiam means radical turn. It refers to motions of turning around, but also symbolises returning to the roots or place of original thoughts. Tiam is invoked when one needs to look at things from a different angle in order to change perspectives.

Kawsay

Kawsay means life in Kichwa. In Ecuadorian anthropology, kawsay has been translated as the vitality of life forms or 'lifeforces', taken from Uzendoski experience with the Naporuna Kichwa

(2008). In Sarayaku, the term kawsay refers to the visible and unseen agencies and energies that are present in constant fluctuations.

Kawsak Sacha

The living forest: from kawsay, life, and sachá, forest. The concept of Kawsak Sacha in Sarayaku acknowledges the forest is alive due to the multiplicity of mutual and antagonistic relations between beings and lifeforces (in conversation with Dionisio, 2019). Kawsak Sacha has been proposed by Sarayaku as an alternative ecological, political, and social model to promote their knowledge, sovereignty, and territorial rights.

Sumak Allpa

Sumak is the Kichwa word for beautiful and goodness. Allpa means land or soil. In Sarayaku, Sumak Allpa is translated as “tierra sin mal,” the land without evil (Dionisio 2019). Sumak Allpa is thus considered a vital component of the Kawsak Sacha cosmology.

Pacha

The Kichwa concept of spatiotemporality, or spacetime, is known as pacha. Pacha refers to earthly moments from the experience of being in place in relation to the cosmos. For many Kichwa and Quechua cultures across the Andes and Amazon, space and time cannot be separated. Pacha in the recent unified Kichwa dictionary means “everything that exists anywhere” (Kinti-Moss and Masaquiza Chango 2018: 110).

Pachakuti

Cosmological concept for various Kichwa and Quechua nations across the Andes and Amazon which is understood as the turning around of established powers or inversion of order. As part of ancestral practices and beliefs for certain communities, pachakuti, also written pachakutiy or pachakutik, means a change in the sun; in a political context it signals the beginning of new cycle, the turning of the world upside down. It is defined in the unified Kichwa dictionary as “a drastic and far-reaching change in government” (Kinti-Moss and Masaquiza Chango 2018: 110). In Ecuador, the most recognised active political party representing the indigenous nations is called Pachakutik: *Movimiento de Unidad Plurinacional Pachakutik – Nuevo País* (Plurinational Unity Movement – New Country).

Chakra

Itinerant and rotational technique for farming forest gardens. A chakra is a rainforest parcel under temporary care of a family. Each family in Sarayaku carries sustainable cultivations in different forest farms combining selected species of tubers, fruits, and vegetables accordingly to avoid complete degradation or permanent damage of the soil. Once soil sustenance reaches a threshold limit, remaining saplings, roots, and seeds are taken and implanted into a new chakra somewhere else. The previous land is left to recover before it can be intervened again by another family.

Minga

Community labour based on physical cooperation. Minga functions as an alternative to the remuneration of work. In Sarayaku, a minga is invoked whenever people require help for building a house, cleaning the paths between forest communities, pruning chakras from overgrowing weeds. In exchange, collaborators are invited to food and drinks after work.

Awana

In Kichwa, awana means to weave. In Sarayaku, people call weaving to the technique of using hands to make and give shape to earthenware and baskets. Women collect particular forest clay to weave pots and vessels for drinking aswa. Men combine a diversity of forest materials to weave baskets (ashanga) and net-bags (shigra) for carrying fruits from the chakra.

Aswana

The fermentation technique for producing *aswa*, 'fermented alcoholic drink' made with the buccal bacteria of women. Aswana comprises the process of preparing and chewing the tuber *manihot esculenta*, yuca, to transform it into a fermented drink (*chicha* is the popularised Spanish word; *aswa* in Kichwa).

Piwano

Traditional flute handcrafted from wild bamboo. The wind music of the piwano sets the tone in chants and songs during community celebrations.

Wasi

Hut or house in the Kichwa language of Sarayaku.

Scientific terms

Bivouac

A temporary living shelter woven with the bodies of rain ants whose dimensional forms depend on the spatial intricacies of the nesting location. Originally, the term comes from the German military use of the word *Beiwacht*, which means taking turns in watching a camping site (Bradford 2017).

Myrmecophiles

Organisms attracted to live with ants, maintaining a variety of persistent associations with them which are not necessarily beneficial for the latter. The term derives from the Greek words *myrmex* (ant) and the suffix *philia* (love). For example, I encountered myrmecophiles in Sarayaku like antbirds, which follow raids to feed from fleeing insects. In the great majority, the myrmecophiles of rain ants are however invertebrates. Myrmecophiles of rain ants most likely to be encountered are:

- 1) rove beetles, or staphylinids, genera *Vatesus*, *Ecitophya*, *Ecitomorpha*, and *Tetradonia*
- 2) beetles, genera *Cephaloplectus* and *Euxenister*
- 3) mites, genus *Circocylliba*
- 4) bristletails, genus *Trichatelura*
- 5) flies, genera *Calodexia* and *Stylogaster*

Tarsus

The last segment of an insect leg. Two claws are located at the end of an ant's tarsus, which are known as tarsal claws.

Pheromone

Chemical compound secreted from different body glands which elicits a distinctive behavioural response in insect individuals.

Army ant syndrome

The three characteristic traits according to Western science that define army ants behaviour (Schneirla 1971; Gotwald 1982; Holdobler and Wilson 1990; Kronauer 2020): mass raiding or collective hunting, nomadism or frequent relocation of the nest, and colony fission or reproduction by splitting a colony in two.

Appendix A

Sacha Ukupacha exhibition in Quito, Ecuador, 2019. I was invited to create an artwork as part of a group exhibition that derived from a week research in Cuyabeno Reserve, in the northern Amazonian province of Orellana. This location is over 2000 Km away from Sarayaku. My son came along with me and was my special assistant. The artwork I exhibited was a photograph of the rain ants of Sarayaku, as I did not find any army ants there. The installation was composed of that photograph, a two channel sound composition, and my first experiment with decoction/diffusion of a scent made with water, roots, leaves, and soil sampled from the Cuyabeno. The scent was encased behind the photo and was triggered when a person was standing in front.







Appendix B

Nomadas was a short film exhibited as part of Giada Lusardi's curated exhibition "Fragile Correspondences" in Macas, the capital of Morona-Santiago, in the Ecuadorian Amazon, 2019. *Nomadas* is 8 minutes long and was my first visual experiment combining sounds and motion-detection algorithms on video recordings of rain ants that resulted from my first visit to Sarayaku in May 2019.

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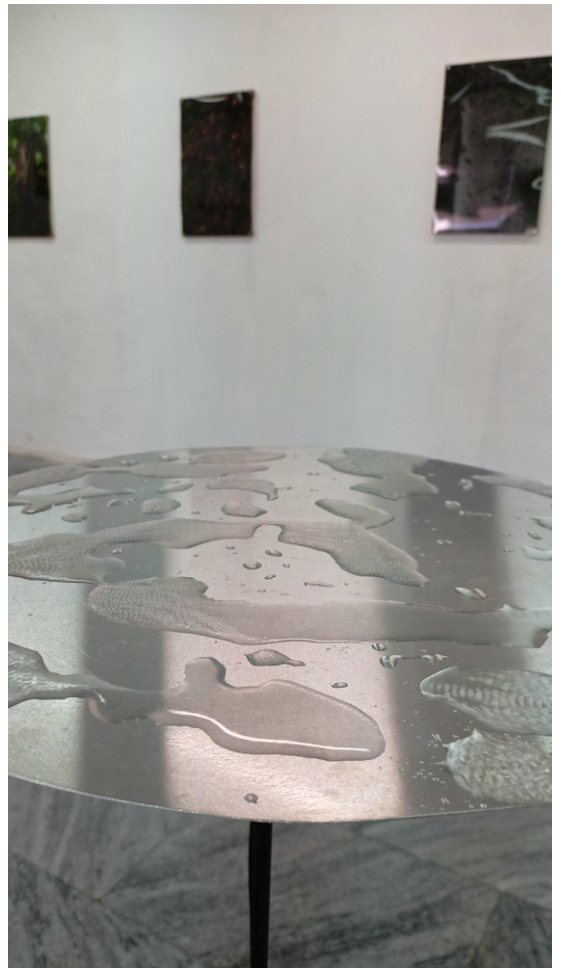




Appendix C

“Hormigas de la lluvia: tejedoras territoriales del Kawsak Sacha” was exhibited from May until June 2022 as part of The 14th Havana Biennial. The curatorial topic for the program where I participated was ‘Decoloniality: roads that do not lead to Rome.’ This exhibition gave me the opportunity to show my ongoing artworks for a Spanish-speaking audience. I also gave a talk about the preliminary results of my research. The installation art consisted of ten photographs printed in metallic paper, a 23-minutes visualisation showing rain ants weaving corporeal passages and processed with convolutional algorithms, my first syncopated sound composition, and a vibrating disc with water infused with the geosmin scent from Sarayaku samples (synthesised at Fraunhofer Institute Potsdam with the collaboration of Dr. Latnikova).







CONFERENCIA

HORMIGAS DE LA LLUVIA: TEJEDORAS TERRITORIALES DEL KAWSAK SACHA

31/3



Kuai Shen
ECUADOR



Appendix D

“*The Crossing*” was exhibited as part of the Brno Art Open Biennial in Czech Republic (June to August 2022). It consisted of three sound sculptures and one visualisation inspired by my research on the rain ants of Sarayaku. The main theme of the biennial in public space was Johann Gregor Mendel’s 200th anniversary. I worked on “*The Crossing*” using the syncopation operation to generate three different soundtracks of rain ants, which are played on three steel monoliths via transducers. The transducers are placed underneath thin aluminium discs printed with SEM images of body parts of rain ants. The images were coated by means of thermal sublimation and were created with convolutional algorithms for style transfer. The visualisation is a 23-minutes long documentation of different laser interferences I conducted in Sarayaku on rain ants. The projection on the small window of the building works only at night, establishing the relation with the nocturnal migrations of rain ants. Additionally, a talk and discussion took place on the 8th of June 2022 at the House of Arts, with the curators, Czech ant scientists, Klara and Pavel Bezděčka, and myself. See it here: https://youtu.be/YZ5fuA_l8zY.

During the discussion and afterwards, I made my claims about addressing ants as communities and not as colonies, building on my work with támara añanku. This eventually led to a lively conversation about a possible future collaboration, and their agreement that naming ants is a practice that should be done in complicity with the history of lands and cultures in which they exist.













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Appendix E

Annexed translation of “Constitución de la República del Ecuador”

Chapter Four Rights of communities, peoples and nationalities, page 41-44

Art 56: The indigenous communities, peoples and nationalities, the Afro-Ecuadorian people, the Montubio people and the communes constitute part of the Ecuadorian State, which is unique and indivisible.

Art 57: The following collective rights shall be recognised and guaranteed to indigenous communities, peoples and nationalities, in accordance with this Constitution and with the international human rights covenants and agreements:

1. To freely maintain, develop and strengthen their identity, sense of belonging, ancestral traditions and forms of social organisation.
2. Not be the object of racism and of any form of discrimination based on origin, ethnic or cultural identity.
3. Recognition, reparation and remedying of collectivities affected by racism, xenophobia and related intolerance and discrimination.
4. Preservation of the inalienable, impoundable and indivisible property of their communal lands. These lands are exempt from the payment of fees and taxes.
5. Maintain possession of ancestral lands and territories, and obtain their free adjudication.
6. Participate in the use, benefit, administration and conservation of the renewable natural resources found on their lands.
7. The prior, free and informed consultation, within a reasonable period of time, on plans and programs for prospecting, exploitation and commercialisation of non-renewable resources that are on their lands and that may affect them environmentally or culturally; to participate in the benefits that these projects bring and to receive compensation for the social, cultural and environmental damages caused to them. The consultation to be carried out by the competent authorities shall be obligatory and timely. If the consent of the community consulted is not obtained, the Constitution and the law shall apply.
8. To conserve and promote their management practices of the biodiversity in their natural environment. The State shall establish and execute programs, with the participation of the community, to ensure the conservation and sustainable use of biodiversity.
9. To conserve and promote their own forms of coexistence and social organisation, and of the generation and exercise of authority, in their legally acknowledged ancestral territories and community lands.
10. Create, develop, apply and practice their own or customary law, which may not violate constitutional rights, in particular of women, children and adolescents.
11. Not to be displaced from their ancestral lands.
12. To maintain, protect and develop collective knowledge; their ancestral sciences, technologies and traditional wisdoms; the genetic resources that comprise their biological diversity and agricultural biodiversity; their traditional medicine and traditional medicinal practices, including the right to recuperate, promote and protect ritual and sacred places, as well as plants, animals, minerals and ecosystems within their territories; and their knowledge of the resources and properties of fauna and flora.
13. Maintain, recover, protect, develop and preserve its cultural and historical heritage as an indivisible part of Ecuador's heritage. The State shall provide the resources for this purpose.
14. Develop, strengthen and promote the bilingual intercultural education system, teaching and learning methodologies, that rely on quality criteria in accordance with cultural diversity.

A dignified teaching career will be guaranteed. The administration of this system will be collective and participatory based on community participation and accountability.

15. To build and maintain organisations that represent them, within the framework of respect for pluralism and cultural, political and organisational diversity. The State shall recognise and promote all of their forms of expression and organisation.
16. Allow participation through their representatives in the official bodies determined by law, in the definition of the public policies that concern them, as well as in the design and decision of their priorities in the State's plans and projects.
17. They must be consulted prior to the adoption of any legislative measure that may affect any of their collective rights.
18. To maintain and develop contacts, relations and cooperation with other peoples, in particular those divided by international frontiers.
19. To encourage the wearing of traditional costumes, symbols and emblems that identify them.
20. To restrict military activities in their territories in accordance with the law.
21. The dignity and diversity of their cultures, traditions, histories and aspirations will be reflected in public education and in the media communication; the creation of their own means of communication in their native languages and access to others without discrimination.

The territories of people living in voluntary isolation are irreducible and intangible ancestral possession, and all types of extractive activity within them shall be prohibited. The State shall take measures to guarantee their lives, secure their self-determination and their willingness to remain in isolation, and protect the observance of their rights. Violation of these rights shall constitute an offence of ethnocide, which shall be criminalised by law.

The State shall guarantee the application of these collective rights without any discrimination, in conditions of equality and equity between women and men.

Art 58: In order to strengthen their identity, culture, traditions and rights, the Afro-Ecuadorian people are recognised as having the collective rights established in the Constitution, and are supported by the covenants, agreements, and declarations in international human rights instruments.

Art 59: The collective rights of the Montubio peoples are recognised in order to guarantee their process of integral, sustainable and continuous human development, the policies and strategies for their progress and their forms of associative administration, based on recognition and respect for their culture, identity and own vision, in accordance with the law.

Art 60: The ancestral, indigenous, Afro-Ecuadorian and Montubio peoples may constitute territorial circumscriptions for the preservation of their culture. The law shall regulate its conformation. Communities with collective ownership of land are recognised as having an ancestral form of territorial organisation.

Chapter Seven

Rights of Nature, page 52

Art. 71: Nature or Pacha Mama, where life is reproduced and realised, has the right to be fully respected for its existence, and the maintenance and regeneration of its life cycles, structure, functions and evolutionary processes.

Any person, community, people or nationality may demand from the public authority the fulfilment of these rights of nature. For the application and interpretation of these rights, the principles established in the Constitution shall be complied, as appropriate.

The State shall encourage natural and juridical persons and collectives to protect nature, and will promote respect for all the elements that make up an ecosystem.

Art 72: Nature has the right to be restored. This restoration will be independent of the obligation of the State to compensate individuals and groups that depend on the affected natural systems.

In cases of serious or permanent environmental impact, including those caused by the exploitation of non-renewable natural resources, the State will establish the most effective mechanisms to achieve restoration, and will take appropriate measures to eliminate or mitigate harmful environmental consequences.

Art 73: The State will implement precautionary and restrictive measures for activities that may lead to the extinction of species, the destruction of ecosystems or the permanent alteration of natural cycles.

The introduction of foreign organisms and inorganic materials that could definitively alter the national genetic heritage is prohibited.

Art 74: All individuals, communities, peoples and nationalities have the right to benefit from the environment and from the natural wealth that provides them with Sumak Kawsay, 'the good living.'

Environmental services shall not be appropriated; their production, provision, and utilisation shall be regulated by the State.