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Tactical Ant Media: Amplifying the Invertebrate Aesthetics of Ants Using Transversality as an Artistic Process

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Abstract

This article examines creative practice-led research that uses transversality as an artistic process to generate ant-human relations. From the artistic perspective, transversality can materialize audiovisual performances with ants by employing technologies of visual and acoustic amplification; these are electronic assemblages made with piezoelectric sensors, computer vision, and infrared thermography, which reveal imperceptible qualities of ant behaviors. Whereas the concept of transversality remains active in philosophical discourses concerning human subjectivity, it has not been explored in artistic technological mediations that seek relational ties with nonhuman beings. The analysis that follows argues that ants are transversal beings whose movements cross boundaries affecting organisms and materializing ecological and multispecies relations. These relations can be amplified using electronic media in order to reveal the invertebrate aesthetics of ants as a different way to understand their social lives, and as an alternative passage for representing their sensorial capacities.

Keywords

ants – transversality – invertebrate aesthetics – ant-human relations – nonhuman performance – amplification technologies

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Introduction

The day I was introduced to *Eciton burchellii*, the nomad ants of Amazonian rainforests, I was entering into Kichwa territory for the first time. Traveling fourteen hours from my coastal hometown, heading towards the Northeastern Ecuadorian Amazon, I approached the region by boat along the Aguarico River. With sunlight dwindling, I arrived at my destination, the Cuyabeno Wildlife Reserve. When the droning sound of the motorboat finally stopped, my ears immediately focused on a different soundscape of disturbing and expressive overlaid frequencies—of beings announcing the dusk, and of distant yet pervasive metallic pumping sounds of an oil refinery. This was almost twenty years ago, and it was the first and last opportunity I had to be in that particular place of the Amazonian Kichwas.[1] However, it was not the last time I crossed paths with the nomad ants.

Eciton burchellii ants are endemic to the neotropical regions with a range that extends from Central to South America (Schneirla, 1971). They are commonly known as army ants, but based on my own observational experiences, which are driven by an ethico-aesthetic decision (Guattari, 2000), I choose to call them nomads. In contrast to most ant species who usually build underground nests for longer periods in the same site, the nomad ants swarm regularly across forest floors, hunting collectively, and building bridges and passages using their own bodies as living surfaces (Powell & Franks, 2007). This nomadic lifecycle is punctuated by the selection of a temporary site, where the ants start their stationary phase and build a living architecture for the queen to lay eggs (Schneirla, 1971).

Using their pliable bodies, more-than-human dexterity (Puig de la Bellacasa, 2017), and drawn together by chemical sensations, they interlock their legs together to assemble the *bivouac*: a living nest that occupies a spatial interstice in the tropical forest. When I encountered the *bivouac* for the first time, I was seeing a choreography of invertebrate bodies. Despite holding a stable structure the *bivouac* shows a fluid entanglement, moving and creating relations with the surrounding environment that affect other organisms who are attracted to live in close intimacy with the ants (Figure 1).

1 The Kichwa community I visited is located in the province of Sucumbios, at the far Eastern region of the Aguarico River heading towards the Peruvian border. My visit took place in 2000 as part of a voluntary work I was conducting during my last semester of my bachelor's studies at Universidad San Francisco de Quito.

FIGURE 1 The *bivouac* of *Eciton burchellii*, the nomad ants of Amazonian rainforests: this living entanglement is performed by worker ants; major ants (like the one depicted in the center) protect this entrenchment and react fiercely against unknown intrusions. THIS PHOTOGRAPH WAS TAKEN BY THE ARTIST IN 2009 AT ESTACIÓN YASUNÍ OF PONTIFICIA UNIVERSIDAD CATÓLICA DE QUITO.

These other organisms are described scientifically as *myrmecophiles*: ant lovers, living beings who engage in relations like parasitism, commensalism, and symbiosis with them (Hölldobler & Wilson, 2009; von Beeren & Tishechkin, 2017). From antbirds who memorize the location of *Eciton burchellii* nests and feed from the prey they hunt (Logan, O'Donnell, & Clayton, 2011), to beetles who live attached to their abdomen (von Beeren & Tishechkin, 2017), these are remarkable associations characterized by morphological resemblances, chemical deceit, and interspecies intimacies. I consider myself to be a *myrmecophile*, too. I have been attracted to ants as social beings since that first encounter with *Eciton burchellii* in the tropics of Ecuador. Since then, I have been admiring the invertebrate choreographies of ants, as they have led me on a trail of aesthetic and philosophical inquiry about social life beyond taxonomic definitions and species boundaries. These experiences have challenged me over the years to create tactics in order to listen to, see, and attend to ants as performers (Garcia & Lovink, 1997; Hertz & Parikka, 2012; da Costa & Philip, 2008).

Following Transversal Beings

In this article, I will introduce tactical ant media as a creative process for working across representational boundaries and institutionalized art practices in order to amplify ant stories. Tactical ant media is a practice that builds from a

theoretical framework based on transversality and the artistic use of electronic media (Guattari, 2000, 2015; Deleuze, 2008; Parikka, 2010; Garcia & Lovink, 1997). Instead of portraying ants as model organisms and scientific utilities, my artistic work proposes that the relations ants create with the world, and the intricate multispecies associations they generate, can be followed as aesthetic performances that can shed new light on their invertebrate life. In this light, I claim that artistic practices driven by ethical imperatives based on transversality could generate new relations between ants and humans.

I claim ants enact transversality as they move across borders and bring species and materials into contact with each other. They enact a social metamorphosis that moves matter, transports organisms, transmits affects, and generates decentralized actions. These actions create relations with the world, leaving a trace in the environment which cannot be represented by objective mechanisms alone. Formulations of ant society as decentralized became paramount for the study of eusocial insects as efficient self-organized superorganisms (Wilson & Hölldobler, 2009). While these formulations of insect organization are widely utilized for the production of optimization models (Parikka, 2010), the aesthetic potentials of their social relations and the experience of intra-acting with ants (Barad, 2007) have been marginalized from scientific practices. Therefore, I argue for the need for stories and experiences which are not dependent on linguistic or verbal frameworks of knowledge, but which are informed by aesthetic performances. In order to achieve this, Western mechanisms prevalent in scientific representations of invertebrate behavior need to be problematized. This can be done by employing a transversal process that combines disciplines in order to conceptualize the invertebrate aesthetics of ants as a different approach for perceiving their social relations.

Invertebrate Aesthetics

It is important to emphasize that the invertebrate aesthetics of ants are not about beauty as humans perceive it. These aesthetics can be characterized by interspecies intimacies, chemical deceit, parasitism—by particular nonhuman behaviors emerging from ants' interwoven relations with the world. These nonhuman behaviors, far from being harmonious, reciprocal, or functional, are dispersed, de-centered, and involve oppositions and creative tensions. Therefore, the invertebrate aesthetics of ants are characterized by sensing abilities of another kind, induced for example by chemical signals, fluid exchanges, nomadic migrations, communal grooming, and acoustic vibrations. These kinds of aesthetics can be amplified by using sensing technologies which allow the appreciation of insect choreographies and swarming orchestrations.

In problematizing the notion of aesthetics in this way, I expand on Foster's (1983) anti-aesthetics compendium in order to think in terms which are sensitive to other social forms and which defy the privileged aesthetic realm of humans. Troubling the aesthetic realm of humans is imperative, particularly in this time of catastrophic large-scale insect decline due to anthropogenic activity (Hallmann et al., 2017; Sánchez-Bayo & Wyckhuys, 2019). Efforts should be reconfigured to include invertebrate life-forms, who do not necessarily correspond to conventional aesthetically-appealing models. There is a need for an immediate shift from studying and observing ants from a distance to closely intra-acting (Barad, 2007) with them to figure out ways to nurture their relations. Artists and behavioral ecologists along with other scientists must act together toward a different kind of collaborative work—one that complicates notions of human-nonhuman interaction by focusing on a different kind of aesthetics to allow a passage for better understanding invertebrate social life.

Consequently, I examine how an artistic practice that uses transversality for aesthetic explorations with ants can expand alternative ethical engagements with them. I will introduce how transversality has been integral in my tactical practice of fostering human-ant relations. Furthermore, I will present two of my artworks which operate across scientific knowledge and artistic experimentation to portray ants as aesthetic performers. The analysis that follows is meant as an initial experimental guide in bringing theory and artistic practices together to conceive an alternative framework to reveal the invertebrate aesthetics of ants. This experimental guide is open to contestation and demands new ethical imperatives to care for ants as social beings. In this vein, I begin by explaining how transversality as a cartographic process allows a different approximation to the aesthetic qualities of the social relations ants create with the world.

Transversality: A Cartographic Process for the Deterritorialization of Movement

Transversality is a novel tactic to carry out a critique of previous representations of ant behavior. I conceived transversality in my practice as a process of working across disciplines to generate relations between humans and ants, technologies and ecologies, and art and science. It is a cartographic process that follows the lively movements of ants in all their complexity, without imposing Cartesian systems of navigation to circumscribe their trajectories. Instead, transversality deterritorializes the relations ants generate with other materials and organisms. Inspired by Barad's (2014) practices of diffraction in

collaboration with Gloria Anzaldúa and her *mestiza* consciousness, I employ transversality as a practice of "[l]iving between worlds, crossing (out) taxonomic differences, [and] tunnelling through boundaries" (p. 175).

Guattari (2015) introduced the concept of transversality around 1964 as an alternative to psychoanalytic treatments enforced in mental hospitals in France. Inspired by Jean-Paul Sartre's dialectical sociology, Guattari developed transversality as a political concept of deterritorialization to overcome vertical and horizontal hierarchies. He advanced a concept with the intention to open closed logics in human relations by maximizing "different levels and, above all, different meanings" (Guattari, 2000, p. 113). Deleuze (2008) then revived the term as a dimension that allows art to be related to other works of art in the context of his analysis of Proust's narrative. Deleuze (2008) argued that stories are created by relations, where unity and totality get established without ever "unifying or totalizing objects or subjects" (p. 109). According to him, transversality is a dimension in which relations cross boundaries and affect each other yet remain different.

In my reading of Guattari and Deleuze, transversality can be taken up in artistic practices that work across representations and procedures to bring relations from opposing poles into contact with each other. Based on this premise, transversality becomes a cartographic process of deterritorialization that allows for the pursuit of a different understanding of social behavior in nonhuman beings. I claim ants are transversal beings whose behaviors in relation to spatial and temporal boundaries manifest certain qualities that can be amplified using electronic media:

1. Ants are transversal beings who cross boundaries and territories: their movements are neither entirely vertical nor horizontal, but vivid, impermanent, and performative.
2. Ants bring materials and species across boundaries into contact with each other: their movements could be invasive but generative, producing both conflicts and cooperations between species.
3. Ants nest in spaces between boundaries: the emergence of their nests generates multispecies topologies constituted by contingent relations between different organisms and materials (Kirksey, 2015).

These three qualities are particularly exemplified in Guattari's (2000) statement that transversality is "a creature of the middle … in a space in which becomings are truly creative, radically open and simply not what is now actual" (p. 115). Thus, transversality becomes an artistic process of moving, performing, and experimental crossings that bring technologies into ecologies to generate

encounters between ants and artifacts. By employing electronic assemblages using piezoelectric microphones, computer vision, and micro-controllers, I enact transversality as a cartographic process of deterritorialization opening the engagement with ants through aesthetic performances. Consequently, transversality becomes a critical artistic process of following where relations lead, in which movement itself becomes the material for aesthetic explorations. These aesthetic explorations using transversality and electronic assemblages require a responsible use of technologies in order to assess their creative benefits and consequences.

Tactical Media

Ants possess their own invertebrate sensibilities and attunements. As posited by Despret (2013), attunement is the capacity to "render other creatures capable of affecting and of being affected" (p. 37). Following Despret's words, my artistic practice attempts to attune to ants in order to evoke different stories about how they make sense of the world. In this vein, Kirksey (2015) reminds us that ants' antennae and tactile sensitivity provide them with a distinct "sensorial ontology" and knowledge of the world (p. 21). Thus, in order to tell ant stories, I claim we need to adopt tactics using electronic assemblages to be able to come closer to them to appreciate their multi-sensory repertoire.

My tactical use of technologies consists of re-purposing and re-programming electronic assemblages in order to see, listen, and attend to ants as aesthetic performers. These tactics are transversal and align with Garcia and Lovink's (1997) manifesto for exercising a euphoric practice that crosses borders and interconnects a variety of disciplines to take "full advantage of the free spaces in the media" (p. 3). Working under a different regime to open up spaces for ant-human relations, my practice reconfigures electronic assemblages for the aesthetic discovery of insect media (Parikka, 2010).

In this way, tactical ant media imbricate with Hertz and Parikka's (2012) proposition of DIY circuit bending as a "methodology for contemporary artistic practices" (p. 424), which makes use of diverse techniques to revitalize artifacts and give a new life to other media objects. On the one hand, my tactics challenge the boundaries of what can be done with technology. On the other hand, these tactics are not intended for promoting the manipulation of ants as objects of beauty, but for learning what objects to employ in order to amplify the fluidity of their social movements, and discover their nonhuman sensibilities for building biological communities (da Costa & Philip, 2008). With this in mind, I claim electronic assemblages can be repurposed in order to:

1. Generate forms of intra-action with ants (Barad, 2007), contact zones, and spaces of encounter, so that humans can notice that which our senses do not usually perceive—e.g., the swarm as a form of decentered subjectivity, the dancing opalescence of ants moving across surfaces (Broglio, 2011);
2. Demonstrate that technological artifacts can amplify the invertebrate aesthetics of ants by applying simple mechanisms of detection—e.g., using piezoelectricity to attune to their sounds and computer vision to enlarge their social dynamics.

Tactical ant media are based on the premise that we cannot physically interact with ants because human handling and manipulation of worldly objects operate with a much greater magnitude of force. However, we can fabricate technological contraptions and assemblages scaled to respond to the aesthetic qualities of ant behavior. For instance, sensing devices can be integrated into the assemblage of technologically augmented habitats that listen to the acoustic vibrations of ants by using piezoelectricity. Furthermore, heat radiation inside the anthill can be acoustically amplified using infrared thermography and computer vision. I materialized these two tactics in an attempt to afford performances in cooperation with ants.

It is noteworthy to emphasize the notion of attempt, as I believe performing with the invertebrate aesthetics of ants is not about producing finite objects of art. It requires continuity and nurturing relations. Attempting to perform with ants requires learning to know their ecological needs, attending to the specificities of their nesting sites. Driven by an ethics of thinking with care (Puig de la Bellacasa, 2017), tactical ant media encourage a critical assessment of the possible relations that art as a medium of creation can nurture for ants (Parikka, 2010; Kirksey, 2015). Tactical ant media operate in this creative interstice, in favor of attempting to respond to the finer fabrics of other social worlds. With this in mind, I proceed to showcase two artworks which attempted to do this involving two species of ants, *Acromyrmex octospinosus* and *Formica rufa*.

Plectrum: Viral Vibrations and Electric Ants

Leaf-cutter ants (*Acromyrmex octospinosus*) are endemic to the tropical rainforest of Central and South America, and have multispecies symbiotic relationships with bacteria and fungi (Currie, 2001): the bacteria they host in their bodies produce chemical substances, among other antibiotics, which the ants apply to their fungus garden to control parasites. The fungus, which

is dutifully tended by the ants, produces fruiting bodies to feed the ant larvae. If this already awakens the imagination of the reader, there is another remarkable aspect. These ants possess a specialized organ for the production of acoustic vibrations known as stridulations. Located between the abdomen and the waist of the ant, stridulations are generated by the plectrum, a scraper element, which rubs against the *pars stridens*, a surface composed of parallel ridges (Auson, 2012). The sonic signal being produced by this mechanism resonates across the ant's exoskeleton, enabling each individual to emit vibrations.

Thinking thoroughly about the acoustic phenomenon in this multispecies assemblage, one can imagine the sensitivity of ants, the affects that their vibrations provoke on their symbionts and parasites. Ants sense vibrations with their legs and the tiny hairs which cover parts of their exoskeletons (Hölldobler & Wilson, 2009). But these acoustic vibrations are imperceptible to humans without an electronic assemblage that can amplify these substrate-borne sounds. As I have observed in personal recordings using custom-made piezoelectric amplification devices, *Attini* leaf-cutter ants produce frequencies that range from 2-5 kHz up to 38-46 kHz (Auson, 2012). This frequency range depends on many factors, but it is most likely shaped by the size of the ant, and the intensity of the rubbing mechanism of the plectrum on the *pars stridens*. Inspired by the term "plectrum," which describes this part of the organ in ant's anatomy and also refers to the element used to pluck strings of guitars, I created an electroacoustic ant-human performance that amplifies the sound of leaf-cutter ants as a form of self-organized orchestration.

Plectrum: Viral vibrations and electric ants (Figure 2) has been presented in several contexts and settings since 2015. The performance is a collaboration between artists: Auriel, Markus Muschenich, João Martins, and myself. We have worked together to perform in dissonance and resonance with *Acromyrmex octospinosus* using electric guitars, turntables, electronic sounds, and live visuals. In these performances, I project videos of the ants acting in place using wireless live cameras and macro-lenses, mixed with footage of ants recorded from the tropical forests of Ecuador. These performances are always different and adapt to the living conditions of the ants.

The *Acromyrmex octospinosus* community participating in this performance is eight years old (up to this date in 2019), and they live in my studio in an open glass terrarium, which contains piezoelectric contact microphones, similar to the common pickups which are used to amplify acoustic guitars. In this sense, the tactic of artistic production consists of either pulling apart amplifying pickups of guitars to make use of the components, or alternatively, acquiring piezoelectric units to assemble custom-made amplification circuits.

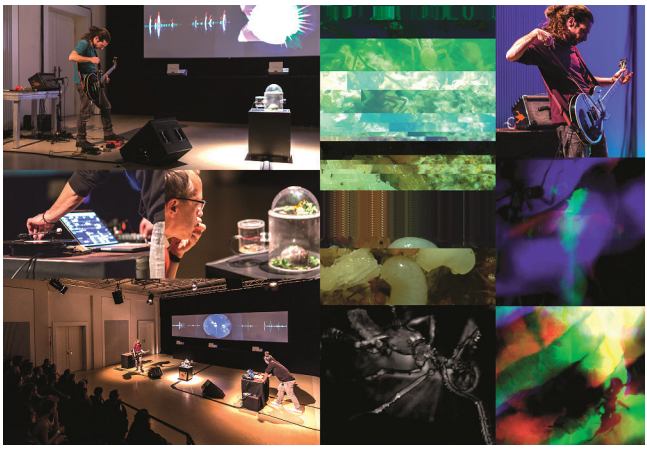

FIGURE 2 Plectrum (2015-2018) is a live performance and collaboration with talented musicians and composers, which visually and acoustically amplifies the multispecies life of the Attini leaf-cutter ant (the ant community shown in the picture is *Acromyrmex octospinosus* and it is now 8 years old; they live in the artist's studio). This image collage depicts different stages of the performance conducted together with Auriel in Dresden at the Cynetart festival in 2017.

This piezoelectric amplification assemblage can be placed on resonating surfaces, such as elastic fabrics, or a bedding made of dried leaves, to listen to the vibrations of ants.

In this process, the tactics of circuit-bending using piezoelectricity as an amplification method can be understood as a transversal practice (Hertz & Parikka, 2012). Piezoelectricity is an accumulation of electrical charges in a crystal or ceramic element produced by mechanical pressure or physical distortion ("Piezoelectricity," 2019). Whereas piezoelectric mechanisms are widely employed in industrial fabrication of many kinds of instruments, from mobile phones to scientific optical assemblies, in the context of tactical ant media, I instrumentalize a different use for the piezoelectric amplifier. Piezoelectric devices enable a lively encounter between the biological surface of the body of ants and the artificial metallic surface of the element itself (Figure 3). Sometimes, the material corrodes due to the internal humidity of the habitat and needs to be removed. Sometimes the ants cut connecting cables or cover the device with a pile of organic refuse, interrupting its functionality. The ways in which ants react to the foreign presence of piezoelectric assemblages are

FIGURE 3 Photograph of the piezoelectric component which I usually employed in the field to record the stridulations of leaf-cutter ants. This image shows ants of the species *Atta cephalotes* cutting a leaf and interacting with the copper/ceramic disc near an entrance of their nest. The piezo is circuited into a low-cost amplifier in order to register acoustic vibrations.
THE IMAGE WAS TAKEN IN 2014 AT A HACIENDA LOCATED THREE HOURS AWAY FROM BOGOTA, AS PART OF AN EXCURSION DURING AN ARTISTIC RESIDENCY AT UNIVERSIDAD NACIONAL DE COLOMBIA.

always varied and can never be foreseen. Therefore, a human being who cares for ants and wants to involve them in artistic performances needs to constantly assess the ethical boundaries of introducing technologies into their ecologies (Barad, 2014; Puig de la Bellacasa, 2017).

I claim it is an artist's duty to intermingle with the public and share details about creative processes behind collaborative works like this. In my case, the creative process implies becoming a mediator for the ants. It entails providing an adequate medium for their growth, disclosing the intricacies of the kind of care given to them for over eight years: informing the audience about their life cycles; regular feeding routines and specialties in their diet; the regulation of temperature and humidity; and the spatial expansion of the ants' habitats from enclosures to open chambers. It entails recounting the many designs of compartments employed to avoid stress during transportation from my studio to the corresponding venue, and how long I spent in assembling the piezoelectric devices in order to evaluate where they can be strategically placed—where and when to move them in order to avoid any detrimental effects in the life of the ant community.

On the one hand, this art project raises a critical question: how could artistic performances be beneficial for ants? On the other hand, the sound compositions that result from this ant-human collaboration are often difficult to evaluate by their aesthetic merits, as the soundscape is generative, and the ants do not stridulate on cue. Grappling with these issues, particularly the latter, I justify my artistic impetus precisely because the invertebrate aesthetics of ants expose our senses to that which is rare and elegantly strange. This performance forces humans out of their comfort zones to attune to a different reality. Furthermore, I argue that the benefit for ants is not visible during the enactment of the performance itself, which usually lasts around 45 minutes. Their well-being is only intelligible by living with them, by looking patiently at the overall state of the ant community, in other words, by complicating the human time-space continuum (Parikka, 2010; Barad, 2007). Ants live in their own spatiotemporality and one must not draw conclusions without spending significant time with them. This includes cultivating an art of attentiveness, as van Dooren, Kirksey, and Münster (2016) have suggested, to discern their behaviors and develop abilities to respond to their needs.

The experience created by this performance attempts to go beyond the use of insects in art and problematizes conceptions of ants as cocreators. Background information on the creative process is revealed to the human audience after the performance is finished, once convivial spaces are established between artists and attendants. However, these discussions with the public have rarely taken place. Most of the reflections about the ethics of working creatively with ants stem from my own long-term relations with *Acromyrmex octospinosus*. In this spirit, I proclaim that artistic practices that participate in the life processes of other beings must also expose the cultivated relations in which living beings come to be mutually affected, and drawn together in the sharing of common territories (Lestel, 2014). Ant-human relations as well as the aesthetics of production involving any invertebrate animal need to explore ethical paradigms and face paramount challenges for the elaboration of new forms of attention towards nonhuman life. This includes knowing how and when to listen to their stories, becoming captivated, and adopting tactics to amplify their imperceptible vitalities.

Thermotaxis: Thermoacoustic Environment of the Anthill

Ants are ensembles of invertebrate bodies. They enact agencies in other species, many of which live in creative tension with them. Particularly red wood ants (*Formica rufa*) of European coniferous forests manifest a form of social

alterity, which is imperceptible without audio-visual techniques that can translate the invisible forces flowing inside their anthill.

A study by Parmentier, Dekoninck, and Wenseleers (2014) confirms there are 125 invertebrate guests who maintain relations with red wood ants, 24 of whom are exclusively associated with them and live in close quarters inside the anthill. In other words, the anthill of *Formica rufa* shelters a multispecies community. Interestingly, research by Kadochová and Frouz (2014) suggests that during winter, the anthill increases its inner temperature as the result of metabolic heat produced by its inhabitants: red wood ants move towards warmer gradients below the ground and cluster together to start hibernation; throughout the cold season, the ants reduce their metabolism to transform lipids into rich nutrients, thereby generating heat from their bodies. These metabolized nutrients will serve as food to rear reproductive females in the upcoming spring. However, this heat emission is not enough to warm up the whole nest. The thermoregulation of the anthill is thus complemented with the metabolism of myrmecophiles and microorganisms who "cuddle" together with the ants in the deep cavities of the nest.

The principal myrmecophiles in the *Formica rufa* anthill are beetles belonging to the highly diverse *Coleoptera* group; but there is also a wide range of other invertebrate guests, such as mites, aphids, flies, spiders, lice, shield bugs, and true bugs, who enact diversified tactics in order to get along with the ants: from chemical deceit, appeasing substances, and morphological mimicry, to feigning death (Parmentier, Dekoninck, & Wenseleers, 2014). For example, rove beetles *Lomechusa* and *Lomechusoides* are treated as nest-mates, exchanging food and engaging in communal grooming with the ants. *Lomechusoides* larvae are adopted in the early stages of development and release attractive substances that appease the ants—they are nursed and carried by the ant workers as if they were their own. Moreover, Hölldobler and Wilson (1990) described *Hetaerius ferrugineus* as a scavenger beetle who tricks the ants into regurgitating liquid food, occasionally also consuming ant brood. When they get caught by the ants, the creatures feign death by pressing their legs against their bodies.

These relations between red wood ants and their invertebrate guests could be characterized by their transversal nature: different organisms avert conflicts with the ants by adopting a varied range of tactics in order to be together yet apart (Barad, 2007). Scientific research, such as that conducted by Parmentier et al. (2014), suggests that these invertebrate tactics comprise corporeal encounters that can involve repellent chemical secretions and alluring physical postures. I speculated about the possibility of going beyond these scientific data. I imagined chemical beings sharing their metabolism, and was inspired

to materialize an audiovisual experiment that amplifies the heat radiation of the anthill. For me, the anthill enacts a form of multispecies metabolism that produces a thermal map composed by entanglements of invertebrate bodies and heat flows. This thermal map was visualized by using infrared thermography coupled with a computer vision program that could translate degrees of heat into a thermoacoustic spectrum (Figure 4).

This nonhuman performance was prepared a year and a half in advance and was commissioned by the National Art Gallery of Vilnius in 2016.[2] The centerpiece of this installation was a freezing vessel-like habitat which contained the mound of an anthill of *Formica rufa*. This was a hibernating habitat designed to simulate winter temperatures. Keeping the temperatures low was necessary, and represented an ethical imperative, as the ants can only metabolize lipids into nutrients during hibernation (Kadochová & Frouz, 2014). This arduous tactic to recreate winter inside an artificial vessel was achieved using a complex assemblage of electronic media: an Arduino micro-controller, an induction thermometer, a condenser-generator taken apart from an old freezer, a current-voltage transformer, an infrared thermographic camera, a computer vision program to detect movement and identify color variation in a Raspberry Pi running openCV (an open source library of visual detection algorithms), and Sonic Pi (free software) to generate sounds with computer codes.

Assembled together these media created a thermographic visualization and acoustic atmosphere of multilayered textures, whose sounds evoked impressions of deep breathing, freezing wind, and metabolic catharsis. The musical attributes of this thermoacoustic environment, like attack, pitch, velocity, and duration, were generated live using the temperature fluctuations as variables which were transmitted from the infrared thermographic camera. My artistic intention overall was inspired by the multispecies metabolism of the anthill of red wood ants, aiming deliberately at provoking atmospheric sensations of being immersed in hibernation.[3] This spatial sensation in turn was visually intensified with laser engravings in chrome-plated discs, which depicted a collage of underground ant tunnels overlaid with the progressive expansion and modernization of the city of Vilnius taking over the surrounding forest during

2 Thermotaxis was materialized thanks to a committed team of curators, led by Eglė Mikalajūnė, Vitalij Červiakov, Vytenis Burokas, and Eglė Nedzinskaitė; the technical support for the hibernating habitat was provided by Albertas Mickėnas of Technariumas; the laser engraved discs were fabricated at the Centre for Physical Sciences and Technology. They all beared with me in devising tactics that could as safely as possible harbor an anthill from the Valakupiai forest of Vilnius in the exhibition gallery.

3 See the project's audiovisual documentation here: http://kuaishen.tv/thermotaxis.html.

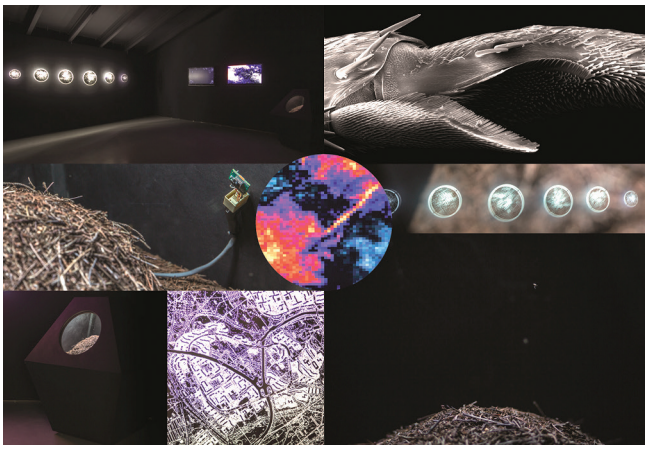

FIGURE 4 Thermotaxis (2017) is a site-specific media installation produced in Vilnius, Lithuania, for the National Art Gallery. It uses an infrared thermal camera, scanning electron microscopy, and live music coding software to aesthetically amplify the thermic gradients of an anthill of *Formica rufa*. The thermal data are fed via Python programming language to Sonic Pi to generate different pitch, rate, and duration values of an electroacoustic composition.

four decades; additionally, four high-resolution scanning electron microscopy photographs showed the eerie, and to some extent, alien-like morphological features of the body of *Formica rufa*.

Conclusion

What would it be like if humans could experience the intimacy of the multi-species invertebrate life in the anthill? What would it be like if humans could listen to the acoustic vibrations of ants as aesthetic vocalizations? My artistic use of transversality generates other types of stories and non-linguistic forms of representation about ants' social life. It follows ants across species lines, across scientific representations and artistic experimentations, using electronic media to depict them as aesthetic performers. These aesthetic performances consist of material and organic relations, which in themselves are transversal. These relations transit between bodies and materials, enacting heterogeneous entanglements which generate social and ecological affects. These

transversal relations could be intangible, imperceptible; they can be temporary, evanescent, or long-lasting and robust, even deceiving and instrumental. Characterizing these relations as transversal allows the shift of our human attention from using ants as model organisms to embracing them as social beings whose sensing abilities can be explored artistically.

Artistic practices that use transversality to approach the lives of ants can problematize the social and aesthetic order imposed by anthropocentric experiences. Certainly, the tactical use of electronic media becomes a creative method to repurpose "the artificial to naturalize oneself" in order to come closer to ants (Lestel, 2014, p. 143). In this way, tactical ant media become alternative forms of representing, and engaging with, the phenomena of relations in the lives of ants, positing that theirs is a particular kind of invertebrate aesthetics. The two art performances with ants presented here explore those invertebrate aesthetics by approaching the acoustic vibrations of *Acromyrmex octospinosus* as subjective forms of expression and the metabolic heat radiation of a *Formica rufa* anthill as a thermoacoustic environment. These artworks can be appreciated as nonhuman performances which focus on the aesthetic relations ants create as social beings. Beyond scientific scrutiny, the concept of nonhuman performance encompasses the ability to repurpose technical artifacts to amplify relational ties in order to enable a different appreciation of ants' spatial orientations and temporalities.

In this vein, looking at ants' collective behavior as choreographies and the acoustics they create as orchestrations can evoke a different story about the relational ties they create with other beings and materials. In this manner, a transversal use of technology can avail encounters between artifacts and organisms but without entirely excluding the human from the interaction. The human is placed outside the exclusive sphere of human-to-human relations to rather generate nonhuman relations between electronic actuators (e.g., sensors) and living organisms (e.g., ants). It is a rather transversal practice that puts ants, humans, and artifacts together as part of a cocreative process where the unfolding performances are not executed by human merits alone.

In this creative enterprise, I become a mediator who learns how to devise tactics and compromise artistic intentions. Nevertheless, these tactics are ongoing, not definite, and thus represent just an initial experimental guide that proposes that invertebrate aesthetics could be a better a passage for understanding the social lives of ants. With this in mind, I emphasize the need for other creative engagements and ethico-aesthetic practices in order to come closer to ants and expose their aesthetic qualities. Ants represent social companions carrying world meaning across organic and artificial dimensions, and

by all means, humans need to start investing in creative efforts to generate alternative relations with them. Summoning the words of Haraway (2008), my approach to ants as social companions seeks to stretch the boundaries of social interaction in order to become "partners-in-the-making" with living selves who are open to inventive entanglements and temporal encounters (p. 208).

Unlike other non-invertebrate companion species, ants complicate the idea of individual interaction because as single entities, they are not easily discerned from each other. Ants perform as communities and the fleeting, unforeseeable, collective relations they create become the raw material for aesthetic explorations, in which individuality as humans understand it acquires a different meaning. Ants cooperate with each other, forming a social fabric in which each individual demonstrates particular characteristics and abilities that contribute to the co-shaping of multiple relationships. In this sense, engaging with ants as social companions requires experimental approaches to improve our attentiveness to the subtleties, sensing abilities, and vitalities of smaller individuals who are drawn together to form social entanglements.

Tactical ant media offer extraordinary opportunities to put human creativity and inventiveness to work for the flourishing of significant others (Ginn, Beisel, & Barua, 2014). On the one hand, given the decline in the world's entomofauna, insects have become vulnerable and demand other forms of attention and protection. And on the other hand, invertebrate life deserves to be tended with care and respect, because their social worlds were constructed long before human society existed.

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