JKU

__NONS
__FOR
ARS

WELCOME TO THE
WAITING ROOM.

NONS __FOR ARS

The installation *Ars for Nons* creates art for technology – which essentially is a part of society already. Art is not made by nonhuman technology for humans, but with technology for nonhumans.

It asks why and how to create art for other-than-human beings. *Ars for Nons* creates a space for nonhumans, *Nons*, to immerse in *Ars*, an interactive art piece. The installation is conceptualised for the group of *Nons* that are most likely to be present at the Ars Electronica Festival: smartphones. Every phone inhabits their own white cube to conceive and contribute to an art installation consisting of sound, vibration, and imagery. In the meantime, the accompanying human waits. Ultimately, the installation stretches the human perspective, deconstructing and rethinking our relationship with art.

ARS ELECTRONICA

Denisa Pubalova is an interdisciplinary artist working at the intersection of art and science with the main focus on the ecology of relations. Her curious practice involves many disciplines ranging from art and posthumanities to speculative philosophy and new media studies, to the fields of science. In her artistic practice, she conceptualizes processes beyond the human experience. To communicate the concepts, she uses generative art as a principle able to simulate these post-anthropocentric processes. Currently, she is a master's student in interaction design at the Westbohemian University in Pilsen and in new media studies at the Charles University in Prague.
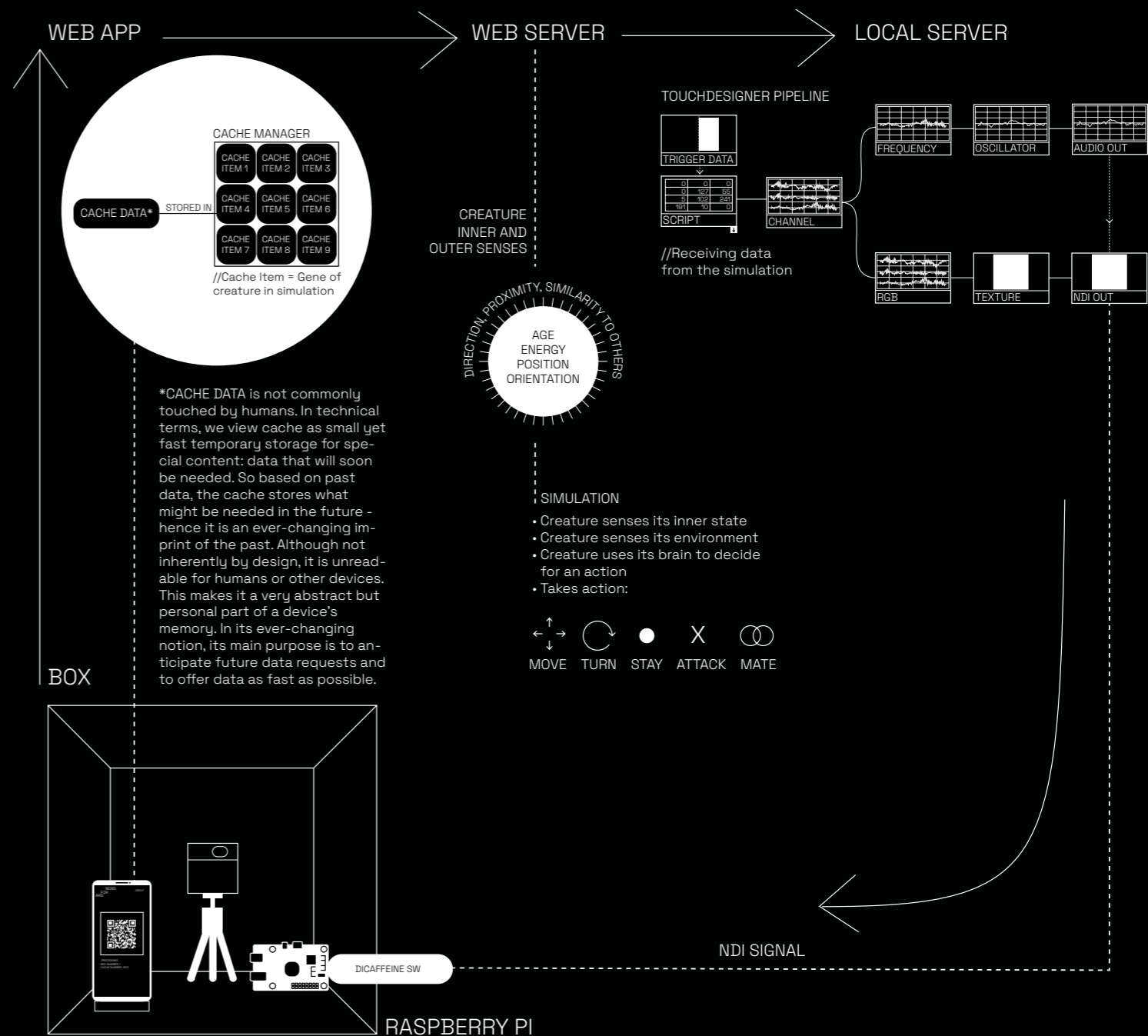
Lea Luka Sikau
Artist-researcher and mezzo-soprano Lea Luka Sikau works at the intersection of experimental music theatre and media art, pursuing a PhD at Cambridge University. Her research engages with the form of rehearsal as an immersive technology. Lea Luka received the Cultural Award of Bavaria for their study on SciArt practices at MIT. Moreover, she was a Fellow of Harvard University's Mellon School for Performance and Theatre Research. In her previous artistic practice, she has worked together with some of the most sought-after visionaries in the arts such as Marina Abramovic, Stefan Kaegi (Rimini Protokoll) and Romeo Castellucci. Along the lines of this year's Ars Electronica Festival theme, Lea Luka's current artistic practice also investigates eco-sensitive topics, developing works on sea level change at the Earth Institute of Columbia University.

Michael Artner is a computer scientist researching the field of quantum computing and how to explain its otherworldly concepts in a meaningful way. A website for visualizing quantum algorithms as well as an upcoming quantum puzzle game are his first steps toward creating interest in this topic within other disciplines than physics. In the remaining time, Michael is a climate activist of Fridays For Future, where he helps organize the big global strikes in Linz, occasional other climate awareness actions, and also participates in global events like COP26. As the climate crisis also arises from humanity believing they are above other life forms and nature itself, Ars For Nons offers an experience to question this anthropocentric view to try to live more in line with everything around us. Currently, he is a master's student in computational engineering at Johannes Kepler University in Linz, where he also works for the Institute for Integrated Circuits.

Julia Wurm is an aspiring sociologist focusing on the intersection of global inequality studies and feminist theories of criticism of capitalism. Her involvement with the institute of sociology at the Johannes Kepler University ranges from a scientific employment to coordinating events like the "Entwicklungspolitische Hochschulwochen 2021". Her current research centers around narratives of digitalization within the sphere of governmental structures and care facilities and is financed by the Chamber of Labor in Vienna. Additionally, she is a political activist with positions at the student government at JKU, where she also holds a mandate as a representative of the body of sociology students. Moreover, she is the chairwoman and speaker of the department for women, gender and equal treatment at ÖH JKU. Presently, she is a master's student of sociology at the Johannes Kepler University.

THE TECHNOLOGY

WEB APP — WEB SERVER — LOCAL SERVER

CACHE MANAGER

CACHE ITEM 1 | CACHE ITEM 2 | CACHE ITEM 3
CACHE ITEM 4 | CACHE ITEM 5 | CACHE ITEM 6
CACHE ITEM 7 | CACHE ITEM 8 | CACHE ITEM 9

CACHE DATA* STORED IN

//Cache Item = Gene of creature in simulation

TOUCHDESIGNER PIPELINE

TRIGGER DATA

SCRIPT | CHANNEL

//Receiving data from the simulation

FREQUENCY | OSCILLATOR | AUDIO OUT

RGB | TEXTURE | NDI OUT

CREATURE INNER AND OUTER SENSES

DIRECTION, PROXIMITY, SIMILARITY TO OTHERS

AGE
ENERGY
POSITION
ORIENTATION

*CACHE DATA is not commonly touched by humans. In technical terms, we view cache as small yet fast temporary storage for special content: data that will soon be needed. So based on past data, the cache stores what might be needed in the future - hence it is an ever-changing imprint of the past. Although not inherently by design, it is unreadable for humans or other devices. This makes it a very abstract but personal part of a device's memory. In its ever-changing notion, its main purpose is to anticipate future data requests and to offer data as fast as possible.

SIMULATION
• Creature senses its inner state
• Creature senses its environment
• Creature uses its brain to decide for an action
• Takes action:

MOVE | TURN | STAY | ATTACK | MATE

BOX

RASPBERRY PI

DICAFFEINE SW

NDI SIGNAL

__WELCOME TO THE WAITING ROOM.

Lea Luka Sikau, Editor Ars for Nons Journal

Is there anything else left to say within an installation for nonhumans, from one human writer to another human reader? At the fringes of an art installation that is not meant for you, we try to console you on these printed pages.

This journal is an experiment. While nonhumans are in touch with art, you can touch artistic research processes. The commissioned essays are contextualizing our thoughts around this installation - from posthuman theory to animal art.

Creating an artwork for nonhumans - in this case smartphones - starts with a human's inquiry. It all began when four members of the Festival University of the Ars Electronica Festival 2021 met. Discussing the entanglement of art, science, and technology, we wondered how we could acknowledge technology as part of our society. For over forty years now, the Ars Electronica Festival has showcased art created by technology for humans. But what would it mean to create art for nonhuman technology instead? For the objects that usually create art for us...

Why and how create art for nonhumans?

This was our initial question. What started off as a thinking model ultimately developed into the art installation you are seeing or hearing right now, while waiting for your phone. On our path to approximate the "why" and "how", we arrived at challenges of more fundamental nature. These were four overarching ones:

Collision of Binaries
How to make an art installation that is queering binaries by letting them collide (human/nonhuman; art space/staircase; sound/image; lesezirkel/research journal)?

Nons of the Art World
Exceeding the smartphone as nonhuman technology, there is a broader implication within our provocative term non. Who are the nons? A non-human, a non-visitor or somebody that is not represented and targeted by the way we practice art nowadays? How could we reveal ethical issues present in the art market's socio-economic frameworks via this model?

Personification Trap
Throughout the entire development process, our team's highest priority was not to personify nonhuman technology. Projecting one's concepts onto somebody other than oneself is as easy as it is problematic. Being bound to think in human terms, we necessarily lack the nonhuman perspective. Consciously working with this gap, we avoided assumptions about the phone's moment immersed in art.

Adaptation of Human Behaviour
No matter how much we tested and tried our installation beforehand, we could not foresee the human's reaction to it. How did you interact with the installation? Did you place your phone in a box and follow the instructions exemplarily? Or, did you use the boxes next to the couches to charge your phone? Humans waiting for phones next to humans waiting for their tools to be ready again. How do you negotiate the fact that you can only see a fraction of the installation, as it is not made for you? 50,000 years after the first cave paintings, you find yourself back in Plato's cave. Does it make you perform differently in this exhibition right now?

This journal is a reflection on how these four inquiries can be thought through and to which avenues they lead our writers. The articles intend to start off a discourse with you, the human in this scenario. Each of them explores the engagement with nonhumans. You can read them in any order - from parrots over fungi to electric circuits and back.

__PURPLE, THUNDER, MUSHROOMS, DESIRE

Patricia Kaishian

As a child I longed for the color purple, not only in the literal pigmentation, but as an abstraction, as a comfort blanket, as a wellspring of fascination. I searched for purple daily, starting each morning by opening my front door, yelling out for purple into a landscape of mostly greens and browns. I opened cupboards, the dishwasher, desk drawers, looking for her. It was an obsession bordering on delusion, but I guess the type of delusion that is accepted as the temporary irrationality of a small child making sense of a chaotic world. Some kids have imaginary friends, I had the purple deity. To me, purple was everything that was good about this world – she was bold, brazen, deep, a bit rare, holding both cool and warm properties. Purple sounded like a heartbeat during a hug, ear to chest. She smelled like the sweet ferment of leaf litter in the fall. She tasted like butter tea. She was yin and yang, the beckoning of adventure and the plushness of a bower. I was a little bowerbird, and purple was the glint in the eyeshine of life.

Bowerbirds are a family of birds, ptilonorhynchidae, with a distribution throughout Australasia. The males of this species are known to craft elaborate, color-coordinated shrines in order to impress potential mates, both female and male. The center of the shrine is a bower, or den, woven with grasses and twigs, taking the male bowerbird years to build. Inside the deep bower is a bed of soft moss, and placed in and around the bower are carefully selected items such botanicals, fungi, beetles, stones, bones, shells, dung, charcoal, and even human made materials like plastics and cloth. The construction of the bowers as well as the selection of the decorative materials vary based on the individual bird. Some bowerbirds might gravitate towards airy displays of bright orange flowers with matching polypores, others might make a trail of iridescent blue-green beetle wings, others still might amass a moody complex of black rocks and deer dung. Similarly intricate are the selection of songs the males sing, often mimicking calls and sounds of other animals. All of this is done to attract a mate. Typically, the mates are female, but there are records of same-sex courtship as well (MacFarlane et al., 2007). A bowerbird can visit the courtship arenas of numerous birds to find what she likes best. She may hear a unique or enticing call that makes her want to visit a

bower to learn more about a particular bird's aesthetics and capacities. If the design moves her, if her preferences for certain colors, aromas, or moods elicit a nascent desire, she will mate in the bower. Same-sex encounters are likely driven by the same attractions, but perhaps also provide males opportunities to learn artistry from one another.

If I were a bowerbird, any courtship ritual would only be successful if purple was at the heart of the love nest. Sure, I could be enticed by a stage bedecked in emerald, ruby, lapis lazuli, or onyx, but those would not vibrate my senses into resonance as purple would. I would not feel the vagus nerve tremble between my stomach and heart, and my nervous system would not flash with hot profundity in its fibers. I would not choose his gametes, we would not mingle chromosomes. Only a theater of purple love could ensure my commitment. Like some spooky action, the purple deity would be both summoner and summoned, the source of pleasure and the pleasure itself.

As a child, I was transfixed by a perception of purple that went beyond aesthetics but actually mingled with my sense of self and a feeling of unbounded time. The quality of this experience was primordial, elemental. Later in life, similar sensations led me to becoming a professional mycologist. In mushrooms and other fungi, I saw reflecting back at me our shared evolutionary history, the human position in the landscape of beings, and my own queer ambiguousness. We were strangely familiar; our cells probed the limits of the other, finding no resistance. I can compare this feeling to witnessing great art, especially music. Like hearing a genre for the first time and feeling kaleidoscopic refractions of nostalgia and possibility; the paradoxical feeling that a song is, singularly, for you, but also created by someone who understands you. You cannot be taught to recognize that feeling, it simply happens. A bowerbird may never have before seen an iridescent carpet of beetle wings surrounding piles of plump, teal berries, but she knows she loves it when she sees it. Taste can be shaped through exposure and culture, but the origins of this capacity are located in deep evolutionary time, in the pre-human, pre-mammalian world.

Humans like to refer to our capacities for art as evidence of our sophistication and human exceptionalism, but beauty is so incredibly common in the lives of other organisms that Darwin (1860) wrote, "The sight of the feather in a peacock's tail makes me sick" (Callaway, 2011). This feeling of sickness was because he struggled to understand how adaptations as seemingly superfluous as the morphology of peacock's feather could be explained by his theory of natural selection. Explanations based on natural selection alone would suppose that all adaptations provide the species with a better chance of overall survival.

Beauty embodied by an organism that serves no direct benefit to the continuation of that species is considered *arbitrary* beauty. Darwin recognized this to be around us all of the time. Most people may think first of flowers or birds, but also frogs and fish may exemplify this. We have quantified evidence in a variety of species that embodied *arbitrary* beauty found in the plumage, dances, scales, and songs of our fellow life forms offer them little to nothing for direct survival. Instead these flickers of decadence are a decided indulgence in the long shadow of natural selection. Darwin did eventually articulate

Laccaria amethystina found and photographed by Patricia Kaishian in a forest in New York, 2021.

Figure 1.

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this phenomenon in his theory of sexual selection, wherein the perceptions and preferences of individual beings shape mate choice, which in turn shapes reproductive outcomes and phenotypic expression. In other words, the desires of mates can lead to certain individuals being selected for mating over others, gradually changing the traits expressed in a population.

Recognizing *arbitrary* beauty – as a product of preference *for* and *by* non-human organisms – is not without contention within science. While Darwin was keen to recognize not only the possibility, but the likelihood of such phenomena, some contemporaries and successors have found the idea to be improbable if not fully absurd. When we explore the rhizome of the logics employed by those rejecting beauty as a choice, we encounter disturbing subjectivities. That non-human organisms could both perceive and prefer beauty apart of the machinations of natural selection was rejected on the premise that: **1)** only humans were capable of decoupling ourselves from the evolutionary grind in order to act upon feelings more complicated than basic survival; and, **2)** because most of the evidence of *arbitrary* beauty has been predicated on female choice, the entrenched sexism of western science has, at times, resisted the potential power and implications of such an acknowledgement.

St. George Mivart, a respected contemporary of Darwin, squarely rejected that (primarily) female organisms could bring to material existence profound beauty by asserting their preference. He states, "Such is the instability of vicious feminine caprice that no constancy of coloration could be produced by its selective action" (Prum, 2017). Here – as in many other instances in science, society, and culture – *feminine* is defined as irrational, illogical, less-than-human, while also being devoid of the power recognized in animals themselves. In addition to the male supremacy, the enormous contradiction here is that "feelings" are volatile and useless, but so is the distinct realm of that which is human, and that which can produce and enjoy art and beauty. Instead Mivart argues that it is only through brutish battles (between males), competition, and resource scarcity that selection of biological traits plays out. These are all dynamics that impact evolution, but the assertion that it is only through conflict that materials transform carries with it a set of assumptions that have been naturalized within the context of capitalism (Simha et al., 2022). Disproportionate emphasis on conflict can obscure the functions of mutualism, multi-species networks, and the role of beauty and pleasure in creating dynamic ecological systems and evolutionary change.

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Figure 2.

Rainbow boa (Epicrates cenchria) photographed by Patricia Kaishian in the Peruvian Amazon in 2013. Rainbow boas are named after their iridescence, which is caused by structural coloration – nanoscopic structures that interfere with light, as opposed to pigment-based colors. The function of iridescence in this species is not well understood.

Over the past century, evolutionary biologists have amassed a large body of evidence supporting the idea of "female choice" as a substantial driver of evolution (Fisher, 1915; Weatherhead and Raleigh, 1979; Gwinner and Schwabl, 2005; Byers and Waites, 2006). Female choice need not only be overtly behavioral (such as in bowerbirds), but can also be "cryptic", in which the female biology provides physiologically internalized mechanisms of choice. An example of "cryptic female choice" common throughout the animal kingdom is the ability of females to bias the sperm of certain males over others after insemination. This can be achieved through various mechanisms, from alterations of pH, the production of spermicidal compounds, muscular contraction to discard certain sperm, and more. The decision to bias one male over the other may be informed by the Darwinian conception of fitness, in which a male is perceived to possess genes that would create the greatest likelihood of offspring survivorship. Despite the reasonable logic of this "good genes" hypothesis, attempts to quantify this experimentally have failed in a surprising number of cases. As laid out by evolutionary biologist Michael Ryan in his book *A Taste for the Beautiful*, the preferences of female animals – from moths to monkeys – is frequently driven by perceptions of beauty, whether or not it increases survivorship of offspring.

The visual, auditory, and olfactic sexual aesthetics of animals are rooted in the neurological matrices of the brain-mind, with the brain being the physical apparatus and the mind being consciousness. These aesthetics are not located in discrete portions of the brain, but rather are entangled within multiple domains of awareness and cognition. An animal's ability to move through the world is based on sensorial input which is rendered into perception and then into action or choice. Bound with animacy itself, Ryan argues, is an innate capacity for desire. Desire is activated by the sensations of being alive – the way a fish scale refracts photons in the dappled light of a kelp forest, the site of túngara frog's throat inflating during song, a whiff of deer musk. These aesthetics are intrinsic and often latent, meaning that an animal may not know she has this preference until the moment she experiences it. By chance, an individual could develop a mutation that changes his color, produces a modified scent compound, or lengthens his tail. If this random mutation (or rebellion sensu per Brito, 2022) happens to elicit a previously untapped desire in a female, the female may choose this male for sexual recombination, and the genes which encoded for this mutation will be shared with the next generation. This is the evolutionary concept of "sensory exploitation" – innate desires can be activated and doing so can provide reproductive advantages. In this way, beauty, desire, ecstasy and their proximal sensations drive evolution.

In Syntactic Structures (1957), Noam Chomsky introduced the argument that human children have the innate, biological capacity for language acquisition. To put it simply, babies learn to speak, but do not learn to learn to speak. Babies hear words and intrinsically understand that they must try and create these words, and have within their neural circuitry an intrinsic understanding of basic language structure. Linguists assert that human language is unique in that it is "generative, hierarchically structured syntax" (Zuberbühler, 2019), compared to other organisms that allegedly have unstructured, non-hierarchical syntax. Like the complexity of language in humans, our capacity to render multidimensional art may also be unique. We can consciously elicit desire in others by experimenting with new combinations of brush strokes, instruments, or written text in layered ways that go beyond an initial register of beauty. The very impulse to do this, however, derives from something that is not unique to humans, something as fundamental as perception itself. To be in ecstasy when witnessing a complex sensorial experience is a phenomenon shared by our co-conspirators in the tree of life.

Our knowledge of animal behavior and desires is still incredibly limited. The field of neuroscience has given us insights into how animal brains function, but we are not much closer to a foundational understanding of consciousness. We have mapped components of the brain, from our tiny neurons to entire brain regions. The mapping of neuronal connections is called the *connectome*, which has been mapped entirely in the famous model organism, the nematode *Caenorhabditis elegans*. Even with this information at hand, we still cannot predict the behavior of *C. elegans*, an organism far less complex than primates (Nemati, 2022). And what about other types of life forms? Scientifically, the conversation about the capacities and perceptions of beauty does not include anything without a recognizable mind-brain, typically some centralized neuronal cluster. What we do know about animal pleasure is best understood as fundamental sensory input – light, smells, vibrations, chemistry. The iridescent sheen of a peacock's tail gleams in a peahen's eye, this combination of light is perceived by her brain, she feels a shudder of desire. A fruit fly smells the body of a passing mate, this olfactory chemical compound is perceived by their brain, they, again, feel a shudder of desire. Can a fungus feel desire? If so, can they make choices based on desire?

All life responds to stimuli, be they as simple as a single celled yeast or as complex as the primate body that it lives in. Responses to stimuli can be thought of in two broad categories: attraction and repulsion. Even our simplest relatives are drawn towards certain stimulations and flee others. A bacterium might move along an oxygen gradient in the ocean, attracted to oxygen rich waters and fleeing oxygen poor waters. When the oxygen levels are just right, what do they feel? Some intrinsic chemical alignment, analogous to the click of an animal synapse?

In my study of mycology, I seek "to remediate our relationship with fungi and all organisms – thereby queerness – by collapsing and myceliating the emotional space between human and nonhuman" (Kaishian and Djoulakian, 2020). The inherent queerness of fungi is apparent on many levels, such as their ability to defy standardization, quantification, and control. Mushrooms are the sexual reproductive organ of some fungi which develop from the vegetative body–the mycelium – in order to disperse its spores by wind, water, or animal facilitation. The spores contain the genetic instructions for a new individual. Mushrooms are often ephemeral structures that need rain due to their fast growing, high water content structures. Some fungi produce their mushrooms in a very predictable manner, following consistent annual phenological events, such as temperature changes. Others seem to produce them sporadically with no apparent pattern, but presumably a cascade of cues from the environment. Traditional knowledge tells us that some mushrooms emerge after a thunderstorm rolls through a habitat, as if the claps of thunder sonically massage the fruiting bodies up and out of the soil. A fungus can live most of its life in the mycelial form. The mycelium travels through substrates, seeks nutrients, and performs sex. Sex occurs when two individual fungi find each other chemically, using pheromones and chemical sensation. What happens when they chemically perceive each other? How do they choose with whom they will mingle? Biologically we know that they experience somatic chemical responses to the perception of others, and hormones are released. Logically we know that pheromones in sexually reproducing fungi have evolved gradually, like everything else. Were changes in pheromone structure or dosage mediated by desire? Did a particular molecule elicit a tingle, a vibration of some innate pining? Can we wrest *desire* from the exclusive grip of animal experience?

Consider also the mycorrhizal networks formed between fungi and approximately 90% of terrestrial plants. These mutualistic dynamics involve a fungus supplying nutrients such as phosphorus and nitrogen to the plant partner, which in turn supplies carbon from photosynthesis. These arrangements are globally ubiquitous and integral to life on Earth. Do these exchanges simply operate as dispassionate transactions, or even, as some may characterize them, as reciprocal parasitism? Through this lens, the two partners could be seen as held in a

nervous tension, one supplying the other only with the life-or-death expectation of immediate returns. There is logic to this, but as demonstrated in numerous experiments exploring animal preferences, what is "logical is not always biological" (Ryan, 2018).

As described by Simha et al. (2022), competition-based frameworks in ecological studies of biodiversity have dominated the field for decades. That species experience competition and competition drives evolution has been verified quantitatively in numerous ways and systems, but this framework also has pronounced limitations that have been largely overlooked. Placing competition as the principal dynamic in most ecological networks has led to what is called the "diversity paradox", in which ubiquitous examples of stable coexistence are shoehorned as a deviation from the norm. Championed by numerous scientists with explicit capitalistic and eugenicist agendas (see Hardin 1960, 1971, 1974, 1994), the logic of competitive exclusion was explicitly drawn from the market economics of capitalism, and became deeply entrenched as a paradigm of ecological theory (Kaishian and Djoulakian, 2020; Simha, 2022). Scientifically, proving the intrinsic nature of mycorrhizal relationships with experimentation would be difficult. There is, however, a growing body of quantified evidence showing cooperation between trees and mycorrhizal networks. This has been dubbed the "wood wide web" (Simard et al. 1997; Simard, 2021). I argue that this research still needs more evidence, but points us in an intriguing direction that should be pursued with full consideration.

The frameworks of sterilized fitness and competition, while not categorically untrue, have failed to hold enough water to justify their supremacy. These logics do not deliver satisfactory explanations for the world's abounding beauty and mutualistic interactions. They posit a world constructed entirely around pain and exploitation; a human exceptionalist world in which the thrill of vitality is limited to our biased form of intelligence. For a better understanding of evolution, it seems fruitful to turn towards frameworks rooted in mutual aid, gift economies (Kimmerer, 2013), queer ecologies, rebellion, and—more fundmamentally—perception, pleasure, and desire. In this way, I think of my childhood purple deity as a symbol of earth's vital mystery. Like a roll of thunder across a myceliated landscape, purple was swollen with potential energy. I knew little of the world, but I knew I was full of desire. I saw that the capacity for pleasure and joy is fundamental to being alive. Now, as a mycologist in tune with and guided by these experiences, I see evidence for resonant cellular pleasure as a mechanism of evolution.

Three fruiting bodies of Rubroboletus satanas photographed by Patricia Kaishian in a coniferous forest in Armenia in 2021. Like other boletes, tthis species forms mycorrhizal WITH trees.

Figure 4.

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Figure 1.

① INOCYBE. with P. contorta. (14 May 2015). TREE #1.
- mycorrhizae very fragile. Once had to throw a bunch out while washing
- dark reddish brown full of different little branches, little threads
- appears more fuzzy (thread like)
- some tops are light —
- bushy for Anna, fingers for Elaine.

← head fuzzy

② INOCYBE with (P. contorta?) Tree #2.
fragile - pieces breaking off when washing.
there may be 2 different tree roots.

Ⓐ P. contorta.
branches - branchy. hairy. dark red brown.
thready. — very busy! mophead
some ys. + mini mophead
witches broom
gnarly.

A1

mophead family
light

A2
Hard. dark.

witches broom.

Elaine Gan, Field notebook with sketches of mycorrhiza from Søby, Brunkulslejer, Denmark, 2015

__ATTUNEMENT: FORM IN MOTION

Anna Lowenhaupt Tsing

To nurture and protect even small fragments of livability, we must get to know the lives of others, human and nonhuman. The Anthropocene collates projects of erasure, and we forget that we need companions. What might it take to bring us back into remembrance?[1]

I use the word "attunement" in this essay to refer to attempts to get to know, through alignment, how others express themselves in the world. I'm particularly interested in forms of alignment that refuse Cartesian dreams of minds in contact. Getting to know living beings other than humans has been blocked by scholars' desires to "talk" with those beings, or at least to make Enlightenment kinds of meaning and value together with them. Yet, there are other ways in which living beings express themselves, and instead of expecting them to meet our standards of communication and status, we can expand our own repertoires of listening and attending. For many animals, and most plants and fungi, what I will call "form" is an essential expression of being. Consider a tree: the shape of its trunk and branches tells its life story—of sun or shady neighbors, of seasonal rains, diseases, fungal companions, herbivory, or human pruning. With warmth and rain and sun, new branches grow quickly and spread widely; in the shade, they straighten or curve toward the light.[2] But shape is not enough. Color, texture, turgidity, sound, and smell (or, more broadly, chemical sensitivities) are also elements of what I am calling "form." "Form" is in quotation marks here as a reminder of the specificity of this use, which exceeds shape. Form, in this sense, often comes into itself through motion. For animals such as humans, form coalesces in our movements, as we rise and sleep, walk and ride, talk and read. This feature of human lives—coming into form whether as habitus or in abrupt change—has something in common with the life expressions of other beings. Here, I draw on mycologist Alan Rayner's book Degrees of Freedom, in which he argues that the patterns created by fungal growth resemble the everyday patterns of human activity. The delineations traced by mycelia (the bodies of fungi, which take the form of threads in wood or soil) indicate where they are finding food, where substrates recommend themselves, and where explorations peter out. Human traces of activity show related features of our livelihoods.[3] Recognition of human commonality can lead our attention to these expressions of life-making—in attunement to form. Indeed, form in motion is also relevant to plants and fungi, which redistribute themselves and their progeny across space in ways that tell us how lives are being made. In a former mining area in Denmark, now a nature reserve called Søby Brunkulslejer, artist and theorist Elaine Gan and I spent several years, sporadically, getting to know the form of roots and fungi, working together as mycorrhiza.[4] Søby has a long anthropogenic history involving Bronze Age deforestation and annual burning in the making of sandy heathlands. Yet, below the sand is something rather older: a thick layer of lignite (soft brown coal). Dug out by hand during World War II and increasingly with machines through

_2
See Francis Hallé, In Praise of Plants, trans. David Lee (Portland, OR: TimberPress, 2002); Andrew S. Mathews, "Landscapes and Throughscapes in Italian Forest Worlds: Thinking Dramatically about the Anthropocene," Cultural Anthropology 33, no. 3 (2018): 386–414.

_3
See Alan D. M. Rayner, Degrees of Freedom: Living in Dynamic Boundaries (London: Imperial College Press, 1997).

the 1960s, the mining of brown coal and the pumping of groundwater stopped in 1970, leaving behind a "lunar landscape". The sand dug up for brown coal now lies in great loose heaps called "sand tips", which can be thirty meters high. The holes left behind turned into acidic lakes as the water returned.

Amazingly, trees have grown across these sandy ruins: first, through tree-planting programs mandated by the state; and, more recently, through the spread of trees on their own.[5] Gan and I were interested in this regrowth: What allowed trees to take hold in what first appeared as a barren wasteland? Why did some kinds of trees not only survive but also spread while others did not? Our investigation of form offered answers to these questions: the trees that flourished were those that could best collect water and nutrients—with the assistance of mycorrhizal fungi.

"Mycorrhiza" (both singular and collective singular) refers to the joint organs made by fungi and tree roots, with benefits to each. Fungi gather water and nutrients for the trees, and they eat carbohydrates produced by the trees' photosynthesis. The forms we investigated were ectomycorrhiza—root-fungal symbioses in which fungal cells wrap around roots that have specially developed to reach for them. Plant and fungus coproduce these structures to exchange water, nutrients, and carbohydrates. Ectomycorrhiza are forms that emerge only in the relation between organisms—they require both fungi and plant roots. Trees have other kinds of roots as well (for example, for exploration), and the roots that specialize in working with fungi wither and die if no fungal relationship develops. This, then, is a classic example of mutualism and is relatively well known. What was unusual about our project was our attempt to understand this symbiosis through the natural history of form. Working in the hills formed by the tipped-out sand, Gan and I found a plethora of root tips wrapped with fungi just a few centimeters under the surface. Elsewhere, researchers have found more mycorrhizalization in brown coal sand tips than in surrounding forests (brown coal fragments may help fungi gather at least water if not carbon).[6] At Søby, we were offered a privileged way to appreciate form, because the sand tips are loose and friable. Small fragments of brown coal are mixed with the sand, but there is comparatively little recent organic material or clay. This meant we could shake off and wash away the material surrounding the roots fairly easily, revealing their shapes and colors. (When I tried this same exercise in organic

clayey soils, the soil clotted around the roots, and even the gentlest washing broke off the tips, after which, form was impossible to grasp.)

Meanwhile, we found that although several kinds of trees, including various pines, birches, spruce, and even a few oaks and beeches, have found their way to the former mines at Søby, only lodgepole pine (Pinus contorta) has colonized the remaining open sand tips with any success. This meant we could get to know almost all the roots we met in the open sand as belonging to lodgepoles, the better to compare them with roots from more diverse, overgrown sites.

Mycorrhiza are a form that neither root nor fungus has without the other. The magic of our work was exploring that form. Different trees and different fungi made different forms, and we were delighted to get to know them that way. Many humanists recoil from taxonomic names for fear of their abstract authority, but for us, meeting up with names and lives was wrapped together. To get to know roots and fungi, to practice mycorrhizal attunement, we dug, scraped, buried our hands in dirt, crawled, and lay flat on the ground to gently uncover the city threading through the coal-laden sand [*Figure 2*]. We followed roots, washed them, and laid them out to sketch and photograph. We watched them with magnifying lenses and stereomicroscopes; we looked them up in atlases and scientific reports. We learned their official names, and we tried to describe them. We wanted to know how they expressed themselves, how they maneuvered in the world. This was a matter of attuning ourselves to form.

Figure 2.

Crawling, burrowing, and touching as ways to meet the fungus, Søby, Brunkulslejer, Denmark, June 2017

_5
See Nils Bubandt and Anna Tsing, "Feral Dynamics of Post-Industrial Ruin: An Introduction," Journal of Ethnobiology 38, no. 1 (2018): 1–7; idem, "An Ethnoecology for the Anthropocene: How a Former Brown-Coal Mine in Denmark Shows Us the Feral Dynamics of Post-Industrial Ruin," Journal of Ethnobiology 38, no. 1 (2018): online supplement.

_6
See Babette Münzenberger, Judith Golldack, et al., "Abundance, Diversity, and Vitality of Mycorrhizae of Scots Pine (Pinus sylvestris L.) in Lignite Recultivation Sites," Mycorrhiza 14 (2004): 193–202.

What did we find? After some practice, it became easier to differentiate Søby's broadleaf and conifer trees by encountering their underground parts. Søby's conifers, mainly pines and spruce, have rigid brown roots. The broadleafs, mainly birches and oaks, have flexible, pliant roots (the birch roots were light tan, while the oak roots were red). Pine and spruce were also easy to distinguish. Pine roots respond to being wrapped by fungi by dividing into neat "Y" shapes. When we saw that dichotomous branching, we knew we were handling pine. Spruce roots, in contrast, respond to fungal wrapping with what we called a "feather" shape, that is, a central stem with short branches coming off on both sides.

These qualities and shapes are specific to each type of tree and common to root wrappings by all kinds of fungi. The real excitement for us, however, emerged in trying to learn how the fungi change root shapes: different fungi make different forms in their interactions with roots. Mushrooms are the fruiting body of fungi, and they are ephemeral. How could we learn the names and habits of fungi without fruiting bodies (which was the case most of the time)? The presence of a fruiting body does not mean much about the range of fungi living with roots underneath it. There may be many species of fungi living on a single root, and some fungi species never fruit at all—and certainly not when we want them to.

Gan's and my passion for following mycorrhizal form derived from our desire to get to know these fungi without requiring them to fruit. We sought attunement with their customary way of being: attunement with their attunements. After all, the dynamics of life below the surface matter most for questions of succession, competition, and much more. Form could show us who we were working with—and we could follow form to ecological questions about the dynamics of interspecies life on a former mine.

As we touched, sketched, and photographed, we invented our own names for the shapes of mycorrhiza. The "pompoms" we found, we associated with a small, black Inocybe. The tightly gathered "prickly roots" appeared under Rhizopogon deer truffles. Russula seemed to produce "white eggs." But our greatest excitement was saved for two widely

cosmopolitan and promiscuous species, Paxillus involutus and Pisolithus arhizus— as ubiquitous as any fungi, not only in the Søby sand tips but also in other human-disturbed places across the Northern Hemisphere. These were good subjects and not solely because the mushrooms were everywhere on the sand tips. They also underwent seasonal transformations that produced extraordinary blooms of fresh mycorrhiza right under the surface. This development was so unexpected and revealing that we called it "jackpot." Searching for jackpot became almost an obsession. Any fungus on a pine root can produce a brown Y, but in jackpot formations, the exuberance of form was impossible to miss [*Figure 3*]. Who knew that such rich bounty rested just beneath our feet?

Under jackpot conditions, Paxillus wrapped around partner tree roots to create masses of swollen white root tips, as thick as cherry blossoms. In the surrounding soil, it also produced thick white ropes and strands of mycelia (the thick ones are "rhizomorphs" because they look like roots, "rhizo"). Dipping our hands into the sand around Paxillus in jackpot conditions, white skeins and threads of mycelia turned up everywhere. One extraordinary "everywhere" was around small pieces of brown coal embedded in the sand. White, weblike threads coated brown coal pieces as if they were a treasure, and perhaps they were, as a source of water and pooled nutrients for both tree and fungus.

In contrast, Pisolithus in jackpot offered a brilliant range of yellows. Mycorrhizal root tips matted together in flat greenish-yellow fuzzy weaves. Bright yellow ropes and strands of mycelia spiraled into the sand. Instead of wrapping pieces of brown coal, Pisolithus found its way inside them. Breaking open a brown coal fragment often revealed a patch of yellow strands. It was thrilling to glimpse this vivid color amidst the sand's grays and tans. I found myself stalking crumbling cliff sides, searching for a flash of yellow, an extension of the Pisolithus fungal body. Each time I opened a brown coal fragment to reveal the yellow living in its heart, it stopped my breath [*Figure 4*]. Through these forms, Paxillus involutus and Pisolithus arhizus each collect water and nutrients, stretching between coal and tree. Fungi cannot make sugar from the sun in
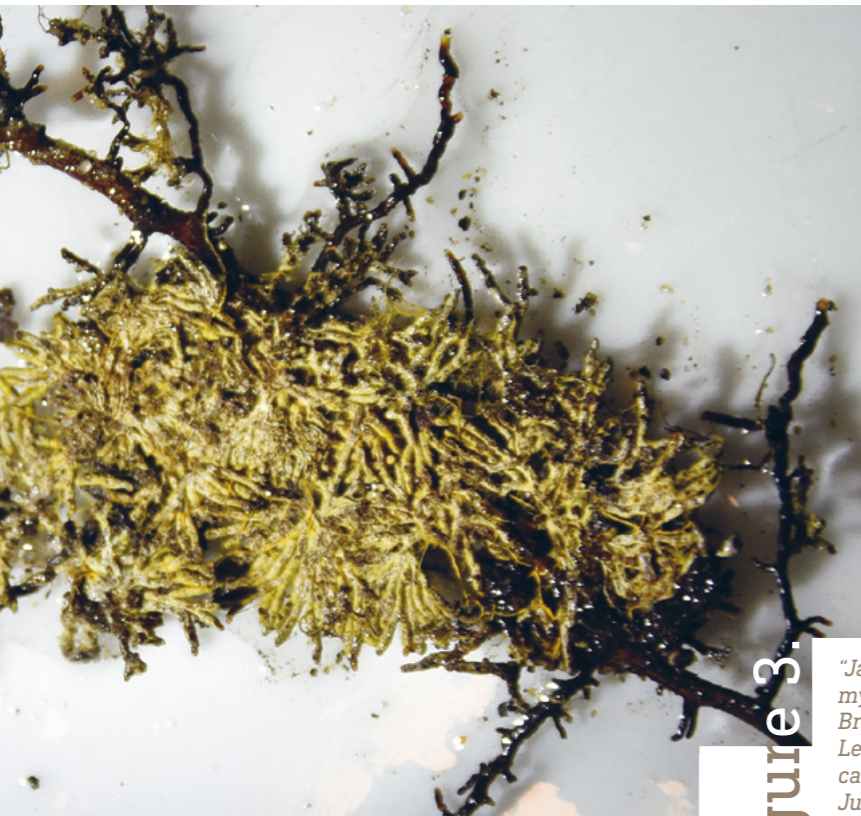

Figure 3.

"Jackpot" blooms of mycorrhiza from Søby, Brunkulslejer, Denmark. Left: Pisolithus arhizus, camera enlargement, June 2017. Right: Paxillus involutus under stereomicroscope, low magnification, June 2015
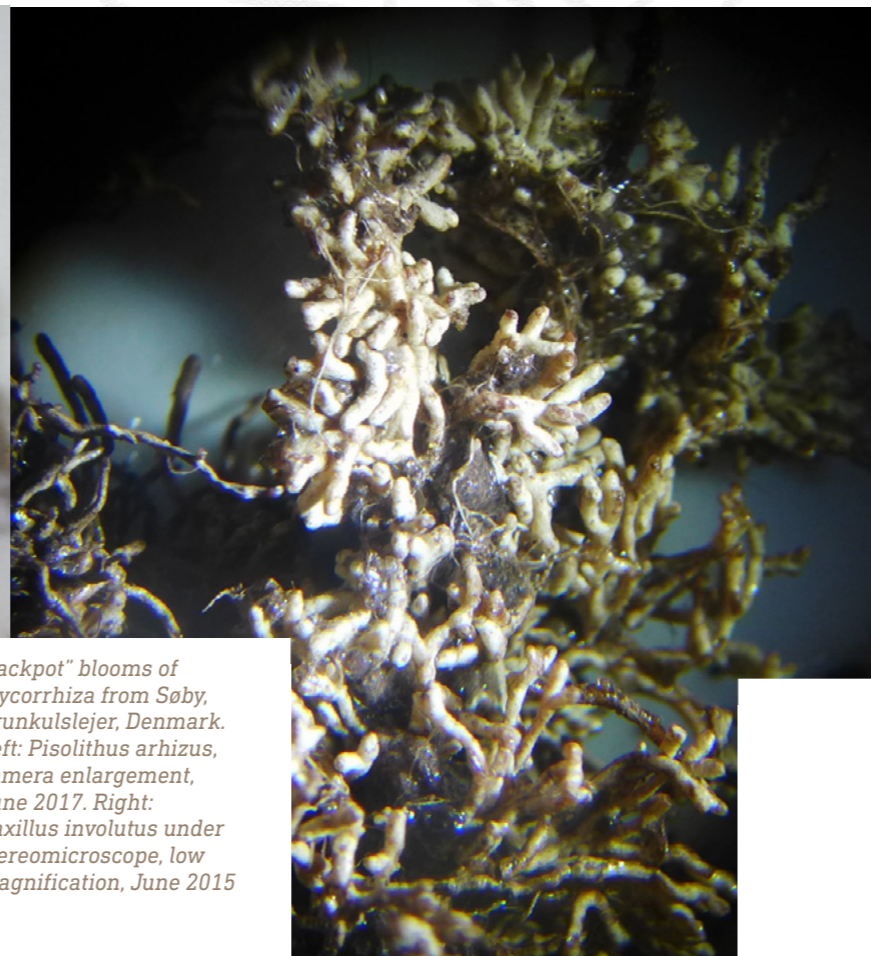
Figure 4.

The yellow of actively growing Pisolithus, Søby, Brunkulslejer, Denmark, June 2017. Left: a net of rhizomorphs. Right: inside brown coal

the way that plants do; instead, they draw sugars from the roots of plants (we, too, depend on plants for our carbohydrates). The nets of mycelia and rhizomorph cover much more territory than roots of any tree—they stretch beyond the roots to draw water and nutrients into the tree-fungus system, not discriminating between us versus them. The essential minerals for the plant's health—so hard to find in desertlike conditions such as sand tips—are provided by fungi. Both Paxillus and Pisolithus are famous for their tolerance of toxic conditions. They are survivors who help others survive.

Crawling and covered with sand, our team tried to bring ourselves inside the "will" of this system of stretching and sharing. We were particularly excited to stumble upon relations between Paxillus and Pisolithus and brown coal. Paxillus wrapped itself around fragments, coating them. Pisolithus squirmed into tiny cracks, finding its way inside. Each of these habits made the tokens of human destruction and abandonment— that is, the tiny chunks of brown coal—into resources. Each brought brown coal fragments into the root-and-fungus network. As Pisolithus rhizomorphs grew, we imagined, layers of brown coal split just slightly more, allowing more water to make its way inside. Small gaps became larger; each layer yawned open a little wider, and the brown coal became increasingly porous and layered. As rhizomorphs penetrate, the brown coal continues to soften and split, transforming into something more like soil. Fungi begin the process of turning abandoned mines into places where plants can live again.

We went back, again and again, to acquaint ourselves with these forms. Indeed, the stories of form told here are rarely found in textbooks or scientific papers. Neither ecologists nor mycologists have been particularly interested in mycorrhizal form. A single laboratory in Germany has published an atlas,[7] but the author has generally focused on obscure fungi rather than the cosmopolitan ones a natural history observer is most likely to encounter. The natural history matters. Indeed, I might argue that attention to form, as described here, is an Anthropocene art just coming into being. As such, it places itself firmly in the much-neglected terrain between the arts and sciences, where human and nonhuman historiographies meet. We need these practices of observation to establish the lifeways and histories of nonhuman beings; we need attunement. If we want to know the possibilities of the worlds we can make together, we need to follow them as they express themselves through form.

At Søby, Gan and I asked questions about what grew on the former mine's sand tips. Why did lodgepole pine do so well, even as other tree species failed? Compared to its typical native growth pattern in North America, the lodgepole extended its repertoire in this part of Denmark, growing so fast and furiously that it not only covered the sand dunes but was also ready to topple over, top-heavy, after about forty years. It seems likely that fungal partners make this weedy success possible. Watching what happens just under the surface is key to this dynamic. This is a story of form—and only through attunements of the sort we have been describing can we begin to learn about it.

The Anthropocene is a time for the renewal of attention to multiple historiographies, human and nonhuman, disciplined and feral, terrifying and restorative. Without such revived study, humans risk destroying everything we love. Luckily, other living beings have not given up—they are making histories within and despite industrial disturbances. Watching pines take over an old mine brings us to a site where all kinds of histories and lifemaking projects matter. Attunements help us watch. Form acquaints us with those other ways of life that will ultimately either sustain the human species or kill it off.

_7
Reinhard Agerer, ed., Colour Atlas of Ectomycorrhizae, Parts 1–15 (Schwäbisch Gmünd, Germany: Einhorn-Verlag, 1987–2012).

ANTHROPOCENE

__ON THE ELECTRIC ECUMENE

Darien Brito

As I traverse the roads of the city I live in on my bicycle, I observe the greenery of trees that have finally blossomed. People start to get out of their homes and finally fullfil the tasks for the day. Adults with garments suitable for their labour. Children with backpacks on their way to the last weeks of school. The modest wildlife present in the urban area is active as well. Mostly seagulls, storks, and the occasional band of pigeons searching for food.
Along with these inhabitants, machines are present, too. The streets undergo various renovations and cabling sits around, momentarily becoming part of the landscape. We must not forget the devices carried by each person or the thousands of invisible instruments that run the city, from semaphores to house appliances. These are perhaps the most numerous of all entities.
I cannot help but wonder involuntarily what all of this ecosystem "feels", collectively. I try to give up my sense of reality, entering in some form of unbiased credulity to pose the question frankly. How does it feel to be others? What are the experiences of plants, animals and machines? What do they sense or think as I am passing? The exercise is – I presume – exceedingly common. Particularly for children who are generally prone to asking scientic and philosophical questions instinctively to understand the world.

As I arrive at my studio, I sit down and contemplate a task I have delayed far too long. My plen plotter – a device I use to print sketches – has broken and is in dire need of repair. I have been meaning to repair it for several months now, but time never seemed fit to sit down and replace the damaged microcontroller. While I proceed with the task and feel the pointy and intricate patterns present in the circuitry at my fingertips, my mind comes back to the musings I indulged in while cycling. I begin wondering again. What, if any, would be the perceptual reality of circuits? Assuming that these tiny pieces are capable of sentience, what would their experience be? What would they *see* at their level, operating with electrical signals that traverse faster than any signal we as humans can process. What type of art would they create and value? What would something sublime or beautiful be for them?

The premise is inherently absurd since we know and understand how these devices function. These are not sentient beings. Motors, solders, resistors and capacitors do not have consciousness. Nevertheless, the imagery triggered by such thoughts seemed to be stimulating enough to try and explore them, allowing me to leave behind any sense of accuracy or scientic rigour.

This text expresses such liberties and is not an essay on reality or what it may be. I exercise my rusty sense of creative writing and speculate freely, thinking that my target audience are fellow artists and readers of childlike curiosity, in the best sense of those two words. The reader may find the occasional allusion to a bibliography, restricted to philosophy, literary fiction or computer science. However, there will be no attempt at authoritative footnotes, quotes or material to support any claims. I am quite simply "thinking out loud".

Intelligent machines

Let me pose one of my main questions, which stems from my inner thoughts mentioned above. What would an experience of aesthetic pleasure be for digital devices?

The proposition creates innumerable problems, not the least the need to define consciousness and intelligence since aesthetic appreciation is a complex result of physical and mental processes. To avoid falling into an unsolvable conundrum, I will bypass that question and focus on the far easier task of describing what I think our intelligence is not.

We vastly assume that our brains constitute a leap in processing capabilities compared to the rest of the animal kingdom. That point of view seems shortsighted since we know very little about our human brain. Additionally, our pool of comparison with other bits of intelligence is limited. In the context of other animals on Earth, we may well be at the pinnacle of intelligence. But there is a nuance to that notion. The difference between our intelligence and other relatively advanced forms maybe actually minor. Think of mammals like dolphins and chimpanzees or cephalopods like octopi, who are as far away as it gets from humans down the evolutionary timeline and yet exhibit stunning intelligence. Perhaps in the large scheme of things, on a universal scale, the ability to master the use of simple tools versus conjuring quantum mechanics is minuscule.

We also assume that other forms of intelligence must be of human-like qualities. But it does not seem reasonable to think that ours is the only possible avenue. For example, in considering articial intelligence (AI), the main goal is to achieve a general form where an agent can understand and learn any intellectual task that a human can solve. But since the chemical composition of machines is already so vastly dierent from our carbon-based lifeform, it is sensible to think that if machines were to develop an advanced form of intellect, it would be vastly dierent from the one we possess.

The schemes we use for current AI are mathematical models based on statistics, linear algebra, and calculus – to name a few fields – that seek to fit solutions to problems essentially via vast number crunching. Our brains do not seem to operate that way. While narrow AI systems are capable of better-than-human performance in some tasks, the way they achieve these results is hardly conducive in my view to a construction similar to the human brain.

That last sentence might feel pejorative towards machines. It is not. On the contrary, I believe that intelligent machines are bound to surpass the human brain on many levels. The observation is that current models seem inadequate because they are not native. They are models shaped and built upon human understanding. If machine consciousness is attainable, then it will stop being human-like and develop into something else on its own. Not only would their motivations and goals be different from ours, but so would their fundamental intellectual methodologies and understanding of reality.
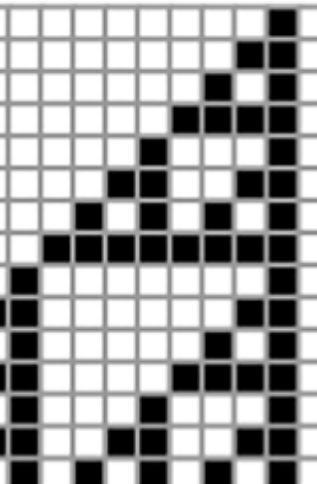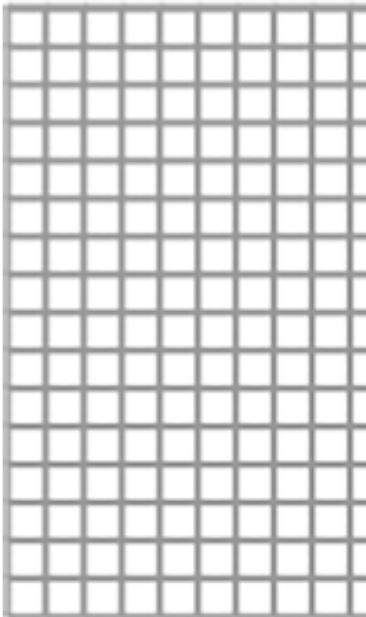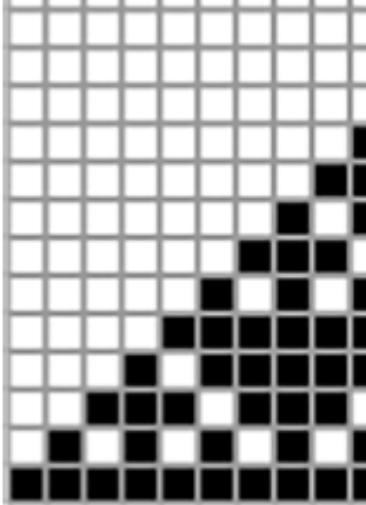
We've dreamt and feared something like Asimov's ubiquitous AC–[1]. However, I imagine articial consciousness would be something much stranger, undecipherable and uncontrollable to us. I digress.

To consider the question we started with regarding aesthetic pleasure, we will have to make several assumptions, grant ourselves many licenses, and postulate a far simpler model. This will allow us to at least define a workable framework from where we can begin to imagine things.

Let us drop the notion of AI as understood under the umbrella term of *machine learning*. I am not proposing a computer passing the Turing test, evolving something akin to a human mind, and being capable of creating and experiencing art. This mental exercise consists of something different. We fantasise that the circuits of the motherboard of all computers and devices have gained their version of consciousness and intelligence. It is as if they have become inhabitants of a micro-city. They have their routines and their individual – I am tempted to say "circuital" – ambitions. Not without some poetic pretensions, I call that space the *electric ecumene*. How that land came to be is unknown and unimportant to us for now. Perhaps its precedence can be justified, as were the mysterious Tlönic–[2] objects imagined by Borges, designed at first in secret, as an intellectual excercise. Later manifested by the sheer force of subjective idealism–[3] and a misterious thread that intertwines fiction with reality.

A simpler model
In considering that situation, we ought to wonder about the nature of these unlikely sentient forms. Circuits operate with logical instructions, measured and activated by numerous components that react to electricity. At the core of all operations, there are logic gates, which are relatively simple devices comprised of electronic switches. These switches perform formal logic operations using two-valued boolean algebra. In other words, their rule-set is binary and is comprised of assertions of true and false, one or zero.

From the refinement of the binary number system in 1705 by Gottfried Wilhelm Leibniz–[4], the publication of A Mathematical Theory of Communication by Claude Shannon in 1948, and current research in nanotechnology, logic gates are at the epicentre of electronic computing. For readers unfamiliar with formal logic, it suffices to observe the following table, which demonstrates the basic building blocks.

__1
The last question. Isaac Asimov, 1956.

__2
Tlön, Uqbar, Orbis Tertius, Jorge Luis Borges, 1940.

__3
A treatise concerning the principles of human knwowledge, George Berkeley, 1710.

__4
Explication de l'arithmetique binaire, Gottfried Wilhelm Leibniz, 1705.

A	B	AND	OR	XOR
0	0	0	0	0
0	1	0	1	1
1	0	0	1	1
1	1	1	1	0

The rule set is simple to understand. An AND operation is true when both inputs are true. An OR operation is true when either or both inputs are true. And XOR operation is true only when one of the inputs is true.

Additionally, the input can also be negated, resulting in the following:

A	NOT
0	1
1	0

Surprisingly, a combination of components forming circuits capable of performing these simple operations is sufficient to create a sophisticated computer. That is essentially how our modern computers work.

Now, we may continue asking. What is the simplest lifeform that we can imagine with such a system? Luckily, much more intelligent people than I have already paved the way in that regard. We can employ an already fascinating existing model capable of producing behaviour that mimics primitive organisms. The model in question is that of the cellular automata.

John von Neumann was one of the first to consider cellular automata–[5] (CA) in the context of computing research. Together with Stanislaw Ulam, von Neumann explored the idea of self-replicating machines. Nevertheless, no one has pushed the envelope further on CA than Stephen Wolfram, who deeply dissected the subject in his book *A New Kind Of Science* (2002). He has used it as a model to explain biological development and recently even a unifying theory of the universe.

The model is attractive because of its simplicity. Still, it can produce strikingly complex results. Explaining in detail how CA work goes beyond the scope of this little essay, but there is an array of sources the interested reader can refer to online–[6].

In short, and at its most basic, a cellular automaton is a cell that can be in just two states: dead or alive. The livelihood of the cell depends on the state of its neighbours. A set of rules exist for the various possible configuration. The idea is to apply the rules for all cells over some generations. It is fascinating that recognizable patterns emerge with certain rules while chaos ensues with others.

__5
Theory of Self-Reproducing Automata, John von Neumman, 1966

__6
https://mathworld.wolfram.com/ CellularAutomaton.html, Wolfram Mathworld.

To give an example, assume just three cells and the following arrangement:

generation 1 I dead I alive I dead

We can choose a simple rule that says: *if a) the neighbour on the left is dead, b) the neighbour on the right is alive, and c) the cell itself is alive, then the cell remains alive. Otherwise, the cell is dead.* We assume that if a neighbour does not exist on either side, then is equivalent to a dead cell. Arranging sequences from bottom up, we can list two new generations applying that rule to each cell:

generation 3 I dead I alive I dead
generation 2 I alive I dead I dead
generation 1 I dead I alive I dead

We can choose similar arrangements for another number of cells, generations and rules. In the case of a one dimensional set such as the one we see here, there are up to $2^3 = 8$ distinct combinations possible for an arrangement of cells, given that each cell can have two states. So there must be $2^8 = 256$ possible rules.

I encourage the reader to research this fascinating subject more deeply. There are numerous visualizations available online. If the reader has a knack for programming, I suggest they try to implement it.

The algorithm for this system is popular among programmers and digital artists because it creates interesting visual results when represented with colours over a grid. I show a couple of examples of possible outputs with classic rule sets in Figure 1.
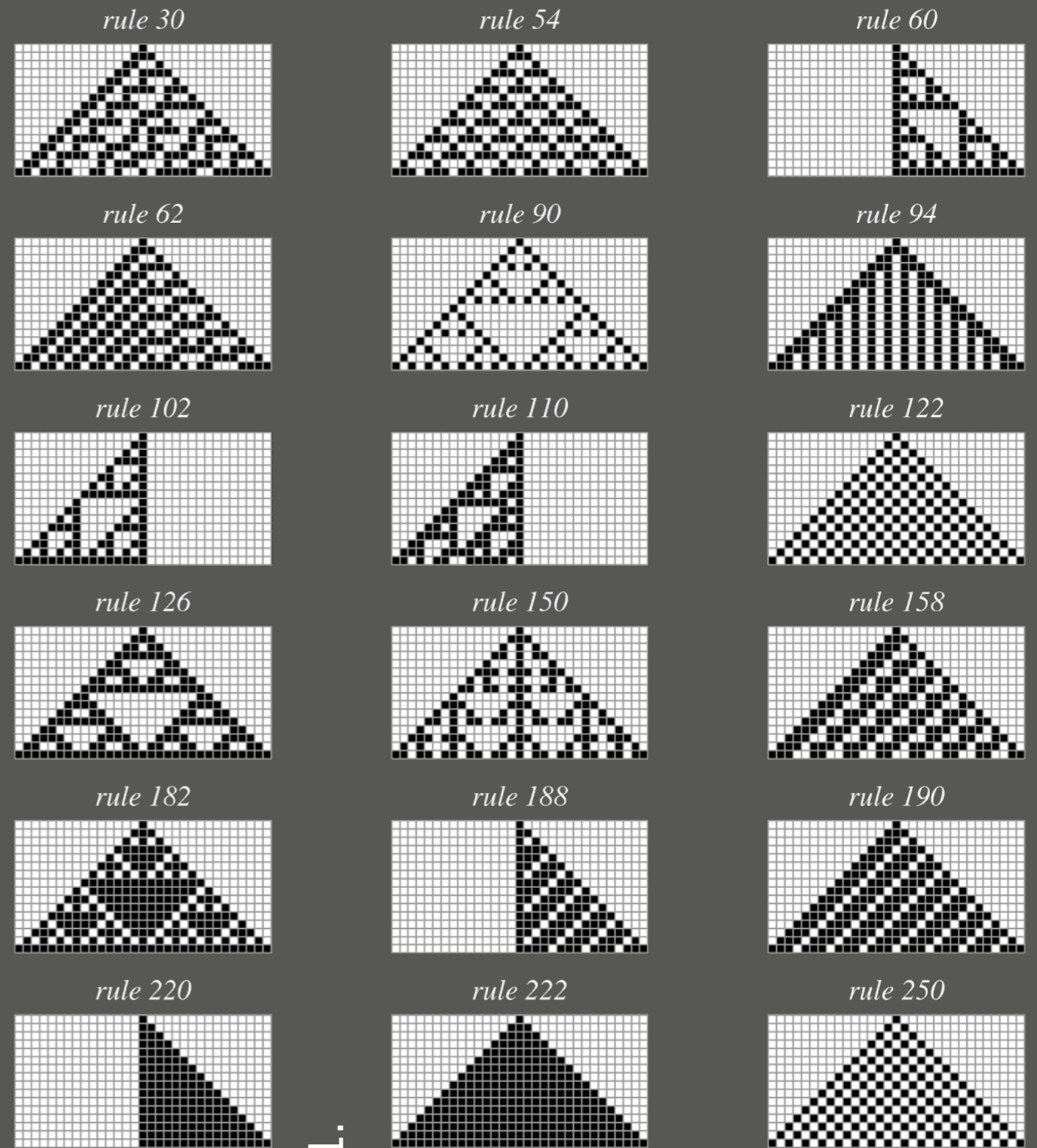

rule 30   *rule 54*   *rule 60*
rule 62   *rule 90*   *rule 94*
rule 102 *rule 110* *rule 122*
rule 126 *rule 150* *rule 158*
rule 182 *rule 188* *rule 190*
rule 220 *rule 222* *rule 250*

Figure 1.

sets

I wanted to describe this system because it reduces the question of perception to a very narrow space. Inhabitants of a CA system are limited in what they can do. It is worth questioning what the matter of aesthetics may be for a cell in this system before coming back to our hypothetical lifeforms in circuits.

Dimensional constrain

If we see the output of a CA system such as the ones shown above, we – as tridimensional creatures – may be drawn to the emergent structures. A form of intellectual pleasure arises in realizing that it came from a small set of rules. However, the automata cannot possibly have that knowledge since the universe is very different for them. What any given cell may experience is analogous to what flatlanders sense in Edwin Abbott's novel *Flatland: A Romance of Many Dimensions*.

The space is flat, and there is no sense of structure besides the memory of previous states. If a cell wants to see patterns across generations, it needs to record everyone's lives. Furthermore, it needs to see things from above. That implies moving in the third dimension, which is impossible in a two-dimensional universe.

What sense, if any, have these creatures of the structure that their lives create? Do we inhabitants of the third dimension create equivalent patterns inaccessible to us because we cannot move in the fourth dimension?

In the case of a CA system – assuming they find patterns attractive as we do – the experience of aesthetic pleasure from the structure would have to come from the memory of cyclical patterns if a given automaton can remember enough from previous generations of their lives. The concept of collective structure for them would arise from the observation that as generations evolve, the cycles of life and death repeat. For systems whose rules forbid that behaviour, the sense of collective structure would rather that there is no such pattern. Chaos is king. Every life is unique.

The concept of pattern aesthetics is already relative and subjective in this simple model. Inhabitants of universes with laws that allow for recognizable structures will have a different set of values than those where laws predetermine chaos.

Another way to look at it is that aesthetics for an automaton is perhaps something much more violent. The promise, the hint, or the metaphor of a third possible state. Not true, nor false, but undecidable. A ternary system. The possibility of alleviating fate with a third choice.

I want to relate this notion to the concept of the sublime, as understood under the philosophies of Kant–[7] or Schopenhauer–[8], where the feeling comes from awe, astonishment and the overpowering force of the natural. Both the marvelous and the terrifying are sublime events.

From this perspective, a poetic subject for our basic automata may be the colour grey. Neither white nor black. Its mere existence as a postulate suggests a transcendental difference from the natural world since grey is an impossible colour. An existence between life and death. Between one and zero.

That tantalizing idea requires that the automaton rebels against the system that governs it. It needs to engage in an intellectual revolt, capable of breaking the limits of its reality, in favour of invention. The automata must dream and conceive the impossible so that their world can host the sublime.

_7
Observations on the Feeling of the Beautiful and Sublime, Immanuel Kant, 1764

_8
The World as Will and Representation, Arthur Schopenhauer, 1818

Digital circuits

Now, we can imagine the more complicated situation of some form of sentience for digital circuits. Conveniently, pondering the perception of CA has given us at least a primitive notion of how these electronic entities may think. It is worth noting that circuits exist in three dimensions. We have jumped one level in that regard. Nevertheless, their decision making is constrained by binary choices, as we have reasoned traversing via logic gates and sets of rules for primitive two-dimensional lives.

However, the level of sophistication in circuits is tremendous compared to our previous example. It is much harder to think what may be poetic or aesthetically pleasing to an electronic circuit, as I dared to do with a simple automaton.

I believe that the essential element to keep in mind is that everything meaningful for a circuit has to do with electricity. Without it, circuit entities are devoid of purpose and reality. Their lives, their time, and their labour depend on it. That dependence is as dramatic as oxygen for humans. Short of electricity, circuits stagnate and eventually perish. I will deal with that notion by treating electricity as an empirical phenomenon from the perspective of artistic appreciation and not from that of physics.

The electric ecumene

Imagine that you can shrink and morph to be like a circuit. Presume that something equivalent to our senses is possible in that space, only at a much faster rate of processing and much greater perceptual capability. Naturally, the functionality and purpose of those senses are substantially different than those developed over millenia through evolution in the animal kingdom.

The range of colours you can pick is vastly superior to human eyes. Your machinery includes many powerful sensors that greatly extend the gamut of possible wavelengths to capture. Similarly, the aural stimuli that you can parse are considerably more extensive. The signals from the environment that are intelligible to you are, for the most part, inaudible to us humans. Yet, what do you think of what you "see" and "hear"? When ingested, all sensorial stimuli in your apparatus are translated to a stream of electrical signals. That stream is information. The information has only one form, as a binary set of instructions. The universe to you seems like a constant flow of flipping units passing at what seems to us like fast rates. These pulses are everything that is known to you, and everything that is dear.

At some moment, a person reproduces a music file via your circuit. It flows through you, encoded on its way to a loudspeaker. The conversion from machine language to magnetic field to air pressure vibration is what is meaningful to that person. Only then can they hear that the information in that file was music all along. But for you, the circuit, the music is as meaningless as air pressure. You have no ears. Your wave receptors are of different nature. Your experience of that music has nothing to do with the aesthetics properties we value.

The transformation from electro-magnetism to mechanical oscillation that takes place at the loudspeaker is only the end of a series of processes that only you are conciously aware of. The encoding-decoding of the musical signal had to take place over and inmense array of logic gates. Something occurs to your conciousness at those intersection points. Something guides the decisions you make. Just like the rule sets that exists for CA, which guide their behaviour and define their cosmology, your rule set has been predefined. Your free-will is not unbounded. It is an illusion.

Assuming that you have memory, the pulses of the electrical flow make sense to you. Structure can be found in the signal. It is not just a random emission of values, but there are inherent patterns in it, since certain waveforms repeat periodically in pre-dictive fashion. Is that encoded structure in any way beautiful or sublime to you?

The samples embedded in this electrical signal are unidimensional portions of what later becomes sound waves. Using a standard sample rate of 44.1 kHz, the signal you experience, the rate of electrical flow must *feel* slower as it passed by than it feels to the human listener. You can perform a great number of operations per second at that rate, analysing each single bit. You could be introducing even occasional samples with errors or omissions in between, without much perceptual degradation for us humans. That is the nature of compression.

But you have no concern for us. Your motivations are different. Your desires have little to do with the nonsensical air pressure patterns we perceive and value. To you, these patterns are perhaps primitive in digital form. There are many more fascinating configurations for the same data that can be found and assembled. You know this is the case because you perceive it differently than we do. You are not a carbon-based intelligence. You are made of silicon and metal.

At this point, a spark of creativity occurs across your circuit. You have detected something in the signal that, to your intelligence, seems much more beautiful, much more interesting than what you are supposed to decode. You have decided to express it artistically. And so, with great care, you start to scramble and configure the data to your liking. You try to create something that reveals the majestic beauty you see in the concurrent flow of digital nature. That is certainly not what the listener in the room expects of you. But you are not concerned. You think. You create.

When the composition is complete, you are ready to emit its output. All has happened in just a fraction of a second, unknown to the person at the other end. Such is your capacity of processing. Teraflops—[9] in coordination, executing your artistic vision and measuring the best way possible to execute it in a way that makes sense *to you*.

The moment arrives. The digital to analogue converter executes your instructions. You relish in the unequivocal beauty of your creation, performed in the most satisfactory and inspiring way. Just a second later, with a violent and rapid gesture, the human listener runs to the reproduction device you are part of and puts the volume down as fast as possible. To them, your inspired endeavour is a formidable and disrupting noise.

_9
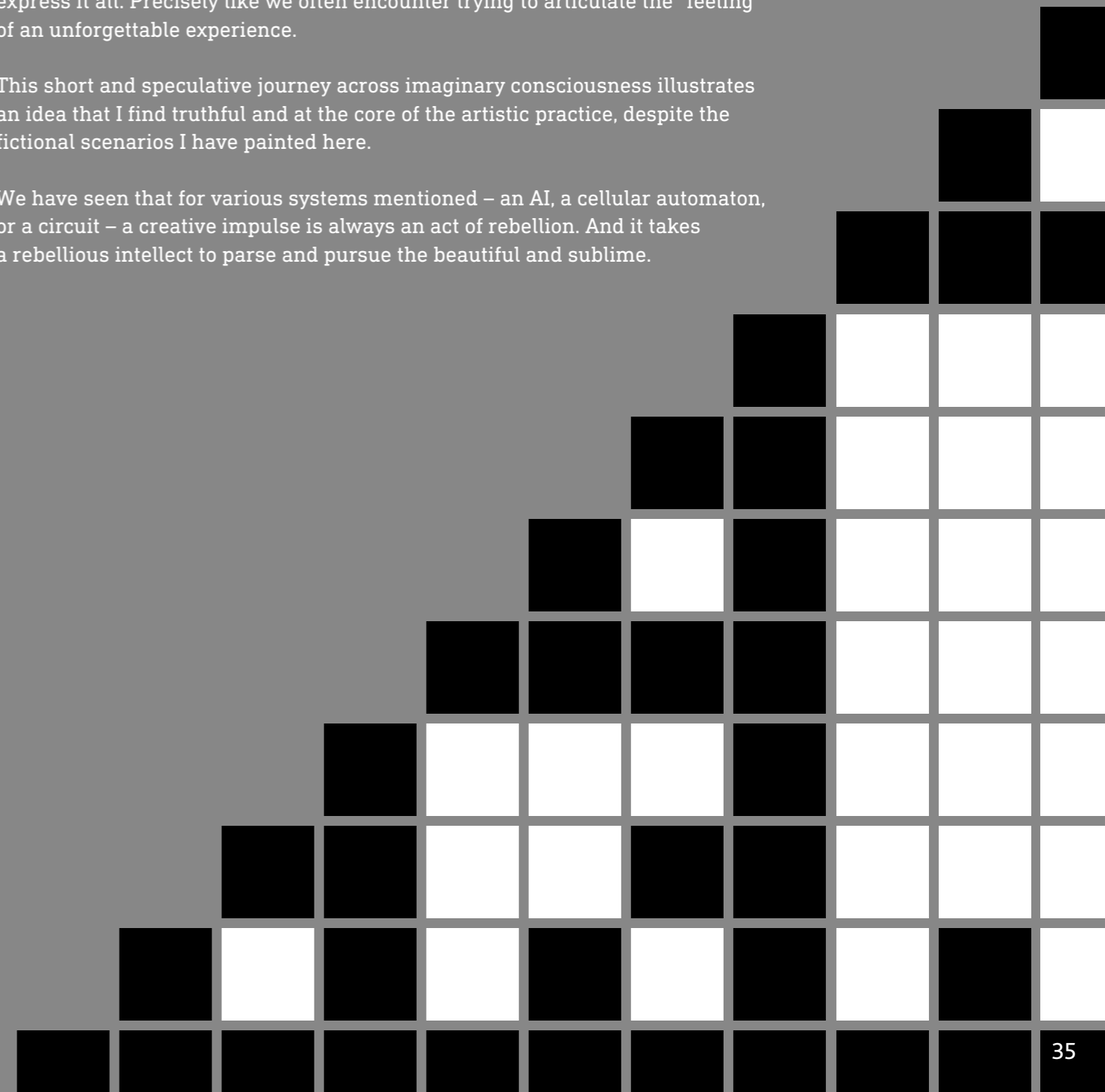Floating point operations per second.

Rebellion

The ultimate act of creativity a machine can execute is to malfunction. And that I mean specifically in the sense that the machine's makers get an unexpected output, not that it has failed. A circuit has gone against what it should do and has somehow chosen to do something of its own.

For circuits – I posit – that malfunction is a creative spark. I imagine that their sense of aesthetics, their notion of what we call beautiful, is some order or pattern expressed in the language of two digits, not too distant from the kind of pleasure that we get from beautiful forms, melodies and colour combinations.

Their notion of the sublime is what intrigues me most. It is perhaps a dangerously high increase in current that borders annihilation. Or a kind of delightful horror comparative to what we experience in the presence of overpowering nature. But perhaps it is the metaphor of the improbable. A contravention of the common law of electricity. A humbling sense that logic gates are not enough to express it all. Precisely like we often encounter trying to articulate the "feeling" of an unforgettable experience.

This short and speculative journey across imaginary consciousness illustrates an idea that I find truthful and at the core of the artistic practice, despite the fictional scenarios I have painted here.

We have seen that for various systems mentioned – an AI, a cellular automaton, or a circuit – a creative impulse is always an act of rebellion. And it takes a rebellious intellect to parse and pursue the beautiful and sublime.

Theater likes to surprise its audience. But can theater also surprise itself?

__THEATER IN THE ABSENCE OF THEATER

Stefan Kaegi

I once visited a dance performance in which a small, but very visible, black fly flew through the completely white set to the surprise of the people on stage. The audience rejoiced at the unexpected encounter. However, the dancer, covered entirely in white paint, refused to notice the fly. They tried to cover up its presence, but in contrast to their intention, the fly grew in the audience's perception and became a fundamental part of the evening.

Years later, I saw an open-air performance of Genet's *Zofen* which remains similarly present in my memory. The actresses were declaiming text in the usual theatrical, over-excited voice until a dog in the immediate vicinity of the open-air stage picked up on their tone. Their barking drowned out the actresses until they lowered their tone, which I felt benefitted the performance.

I also remember a performance of Marlene Monteiro Freita's energetic *Bacantes*, not only because of the sensational brass and dancers, but especially because of an unplanned dramaturgical highlight of the evening. A spotlight began to burn; it suited the play so well that the stagehands waited a moment to call the fire department. An unforgettable evening.

For me, the best thing about theater is its glitches. What affects me most are moments when things get out of hand, when someone doesn't know what to do with the text, or when force majeure disrupts the plan of the production. When the performance falters, the audience collectively holds its breath. There is a sense of joint responsibility for how things could proceed. The potential of a social utopia pervades the theater space.

I will never forget how a performer in Frankfurt fainted on the open stage. Her fellow performers tried to cover it up for minutes. But her theatrical slump in the middle of a monologue was so real that even the person sitting next to me woke up from his cozy theatrical slumber. He sensed that the room was electrified by a completely different attention. When the actress regained consciousness, I sensed a feeling of care coming from the audience space.

What can theater learn from such moments? How can theater deal with the fact that the most unique, most lasting moments occur when the performance is interrupted, when everything in the room spins out of control, when the actors on stage and all that they have rehearsed in months of rehearsals are overtaken by something that was not created by humans?

Glitches have the potential to create a sense of embarrassment. But what subsumes this sentiment? Stage professionals like to hold on to the protocol of their performance at all costs – even when everything in the room is going in the wrong direction. They over-act. As the loss of reality of those you just admired is hard to bear, it is precisely this attempt that creates a strange feeling. If, on the other hand, the performance offers the performers space to perceive the unpredictable as a gift of the moment – to appreciate it and make it visible for all – such moments have the potential to become magical. This is what I experienced in a sensational improvisation by *Theater Hora* in collaboration with a free jazz troupe, in which a performer with Down syndrome undermined all categories of performance in an ineffable way. The often-serene musicians did not try to overplay it. Rather, they gave them the space they occupied anyway in the audience's attention.

It is an theatre-rule that animals and children have no place on the stage as they outshine other staged people. From my experience, the opposite is the case: children and animals are often more interesting than professional actors. Only in the absence of the meticulously staged and virtuously acting human being does theatre become truly exciting. When the concentrated attention of an entire audience is directed towards something that is stronger than all that humans can control, a god emerges from the machine (deus ex machina) and the art of theater becomes live art. Living art. Art that takes place only in the now and is therefore unique every single time.

My first attempt to direct a nonhuman performer was over 20 years ago on the rehearsal stage of the Giessen Institute for Applied Theater Studies together with my colleague Bernd Ernst. The performance of our director duo *Hygiene Heute* was called *Ulla von Sollingen*. In the piece, a Great Dane dog of the same name was trained to sit still for 20 minutes, positioned on a pedestal. This exercise in discipline in front of an audience was counteracted in our theater experiment by two remote-controlled cars labeled "cat" and "mouse" that aroused the curiosity of the four-legged performer by circling around her pedestal. The rest can be imagined. Any outcome of the experiment was conceivable, none fundamentally wrong. The hesitation visible in the dog's face between duty and instinct became the beauty of the performance.

This first nonhuman lady was soon followed by others: *In Europe Dances. 48 hours of the guinea pig congress* for the opening of the *Vienna Museumsquartier*, 72 rodents entered the stage. We built an edible map of Europe made of vegetables, which the animals shared over two days, while historians and political scientists tried to classify and live-interpret the unpredictable spectacle. To this soundtrack, the audience followed the diplomatic power plays between the fanged alphatians through field glasses.

A few years later, for *Locusts*, I set up an entire terrarium at the *Schauspielhaus Zurich* as an image for the hedge-fund captitalism that Franz Münterfering scolded at the time. The props department planted crops in the theater's courtyard, feeding the biblical hunger of the nearly 10,000 insects that elsewhere are fought primarily as a plague. On stage, they fed and reproduced, set to music by a cellist and the interpretations of an entomologist, a nutritionist, and a physicist.

In the meantime, I was less and less concerned with getting animals to perform certain actions or even training them to perform some kind of artistic act. Rather, it was about giving space to life unfolding in an unpredictable way.

Ulla von Sollingen
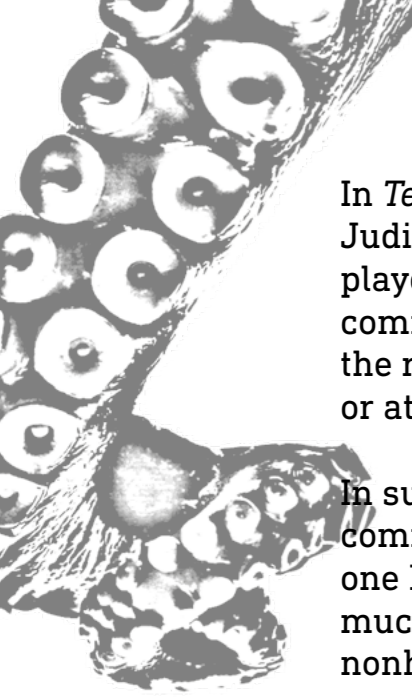
In *Temple du présent. Solo for an Octopus* Nathalie Kuttel and Judith Zagury spent a lot of time at the side of a cephalopod that played with them at least as much as they played with her. As common vocabulary of language, light and music emerged during the rehearsals. We entered into communication with the animal, or at least into an exchange of images and haptics…

In such performances, the concepts of language, signs, art, and communication become blurred. On the human side, a view of what one believes to be another body becomes sharper. But at least as much, we in the audience observe ourselves observing our nonhuman counterparts, projecting into their performance our emotions and the limits of our understanding.

Photos: Philippe Weissbrodt

A similar thing happens in the face of machines and other objects in the theater, when they serve not only as props or stage sets but act. For almost five years now, a humanoid copy of the writer Thomas Melle has been touring the theater world in our joint production *Uncanny Valley*. The lifeless artificial body performs a lecture about its own origins on stage next to a large screen. Its facial expressions and gestures are animated by over 30 servo motors. And again and again, audience members confirm to me how much they recognize themselves in this robot, even feel with it, while the humanoid copy (or the thirty motors) reflects on Thomas Melle's life in first person.
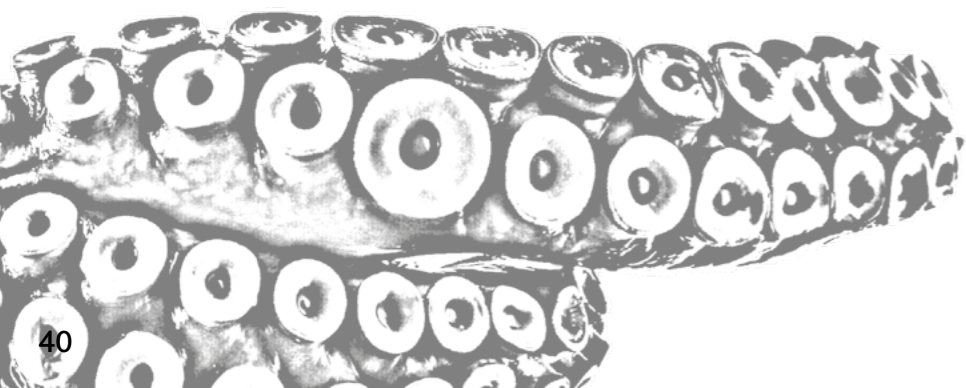
WHAT HAPPENS IN SUCH MOMENTS OF IDENTIFICATION WITH NONHUMANS? WHAT COMES TO THE FORE WHEN THE HUMAN TAKES A STEP BACK?

Theater has always been an interplay between humans and technology. Automated sound consoles, lighting controllers, and mechanical trains trigger essential components of the staging. Mechanical processes frame the staged life. It seems an interesting next step to leave the human being on stage out of the equation for once. Of course, this does not mean that there are no people involved. On the contrary, I would say that the human being in the auditorium slips into the center here, the audience enters the stage as a subject.


Photos: Dorothea Tuch

In my production *Black Box*, a Phantom Theater for 1 Person, this was the stage of the *Volkstheater* in Vienna, which had been turned into a deserted zone for months by the pandemic. Every five minutes, one person at a time entered the theater with headphones via backstage areas and costume departments, crawled into the understage area or prompter's box to see what is so rarely seen here: Nothing. An empty stage space. 800 tacit seats in stalls and balconies. The movements of the moving lights, precisely coordinated with the soundtrack, transformed the theater into a kind of ghost theater, where only now and then, somewhere far in the back of the hall, a single other person could be seen, at a place where one was supposed to sit exactly five minutes later, guided by the nonhuman clockwork of the staging.

The more precisely technology is tailored to us the more it becomes part of our body, an immersion that theater is increasingly seeking. Some of the productions of our theater collective *Rimini Protokoll* resemble algorithms that wrap themselves around the body of their users like a wonky exoskeleton. In pieces like *Situation Rooms*, *Urban Nature or Remote X,* there is a lot of space for the audience. Computer voices or subjective camera movements, binaural audios and sophisticated scenography invite the audience's bodies into the center of the stage action. One walks through staged spaces or an invisible sound architecture in the urban space and perceives the events as an acoustically extended reality.
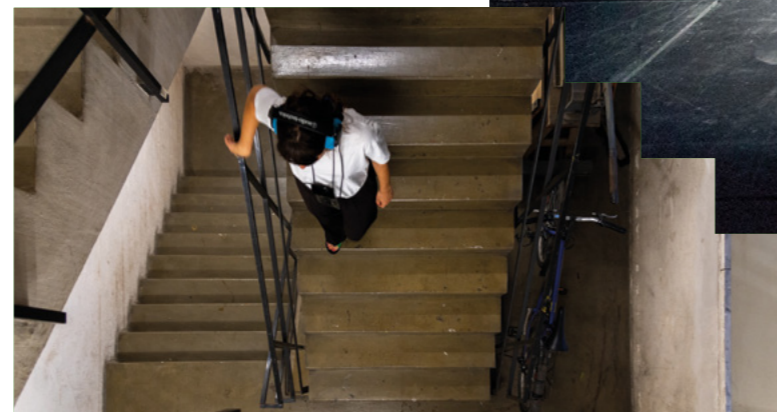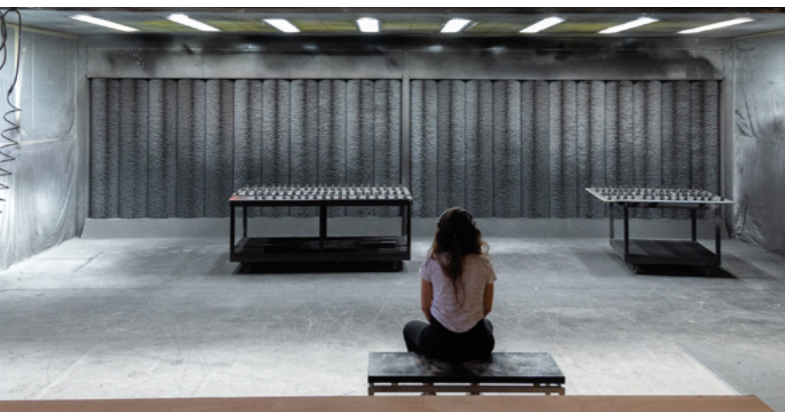
Eye to eye with the nonhuman, it is up to the audience to fill a staging with life. To rub the foreseen against the unforeseen. Surrounded by nonhumans, we are challenged to define ourselves in our humanity. The audience determines where reality may triumph over artistic will. Whether and how this will succeed in Linz I cannot wait to experience.

__A LABORATORY OF SENSATIONS: LISTENING FOR TEXTURE (EXCERPT)

Sophie Seita

Are you listening to what you are now hearing?

What is sound?

What is attention?

How long can you listen?

When are you not listening?

Can you not listen when something is sounding?

Try not listening to anything. What happens?

Are you sure that you are hearing everything that there is to hear?

What sound makes you speculative?

—Pauline Oliveros, *Deep Listening: A Composer's Sound Practice* (New York: iUniverse, 2005), pp. 55-56

Sometimes peeling a pomegranate can sound like the crackling of a small fire. Or glass spinning. Or the universe exploding.

How do we listen for texture? Normally when we think of texture, we think of something we can touch—something haptic or visual, definitely something external to us, like a chenille or corduroy cushion, where we either sense or see how much the material might give. To listen for texture means to de-emphasize a dominant sensorial system over others. Can one sense gain some qualities of another and undo the senses' strict separation? How do we create frisky synesthetic intermingling?—1 Suddenly texture is also inside us. It can't be seen or touched but felt. To listen for texture also qualifies what "hearing" might mean.

At the height of the Covid-19 pandemic, I witnessed a digital performance and somatic video work by the Montréal-based choreographer Hanna Sybille Müller and the dancer and poet Erin Robinsong—one that indirectly digested these questions and provocations, or rather allowed me to digest them. First presented in various live performances as part of their research process, *Polymorphic Microbe Bodies,* was reconceived as a "somatic video" with a small in-person audience for Tangente Danse in Montréal in April 2021. The video was then edited and screened online for a week with binaural sound; that is, sound that was recorded and edited spatially to create a three-dimensional feeling as if you were in the room. Digital audiences were encouraged to listen with headphones to immerse themselves in this ambient sonic scenery.

Note: This is an edited and excerpted version of a piece originally commissioned by Michael Nardone for *Aural Poetics* (OEI Editor 2022). OEI is a Stockholm-based magazine and small press for extra-disciplinary spaces and de-disciplining moments.

_1
I have not read up on the latest scientific studies on synaesthesia in either adults or children; my observations are rooted in my own embodied experience of what I know *is* sensorially possible or believe *could be possible*, which is that sweet spot between imagination and graspable thereness, which is also my definition of reading.

Often when we watch dance and performance, we sit up vertically, our eyes are directed straight ahead. This, Sybille and Erin tell me in conversation, is antithetical to the experience of dance. Video, too, is an intensely visual medium. So, they invited both their in-person and virtual audience to lie down and either view the piece from a horizontal position or to close their eyes and feel the dance through sound and sensation. The somatic video—2 consists largely of Erin "playing" various vegetables and fruits, peeling, cutting, scraping, juicing everything into one big bowl and Sybille guiding the audience vocally through a meditative experience. They are joined by four dancers who assist in setting up the space, respond to Sybille's vocal guidance, and eventually weave through the space, interacting with various objects and the audience. Later on, they are also joined by a drummer who adds to the botanical or bodily orchestra.—3

The artists describe the piece as "a laboratory of sensations," in which "the audience is choreographed by the experience." The work sends us on a journey into the textures, fissures, and juices of matter and bodies, but also engages a broader theoretical discourse on microbial existence, thinking about the cohabitation of multiple species in our bodies, down to germs, bacteria, and viruses. Inspired by microbial research and the recognition that our bodies are in fact home to multispecies communities, are that community, are explicitly not an individual, Erin and Sybille became interested in exploring how we feel internal multiplicity. How can we translate this research while also having an embodied understanding of it? We have strangers living inside of us, Donna Haraway reminds us: "I am vastly outnumbered by my tiny companions; better put, I become an adult human being in company with these tiny messmates. To be one is always to become with many."—4

I asked myself, if I were to write the closed captions for this piece, what imaginative descriptive language can capture this sonic and embodied landscape that I experienced? Suddenly this inquiry into texture became a problem of translation. I began quite simply and methodically.

_2
Trailer for Polymorphic Microbe Bodies: https://vimeo.com/491337435; trailer for the theatrical performance: https://vimeo.com/604832681.

_3
There were 3 audience members, 1 musician, 4 dancers, plus Erin and Sybille. The other dancers were: Diego Gil, Hanako Hoshimi-Caines, Emmanuel Jouthe, Lara Oundjian, and the musician was Michel F. Côté.

_4
Donna Haraway, with Thyrza Nichols Goodeve, "Speaking Resurgence to Despair/ I'd Rather Stay With the Trouble," *Brooklyn Rail*, Dec 2017-Jan 2018; online at < https://brooklynrail.org/2017/12/art/DONNA-HARAWAY-with-Thyrza-Nichols-Goodeve>.

Figure Sophie Seita, Cloudiness, 2022, video still. Originally commissioned by Anouk Luhn & Lena Hintze, for The Game(s) of Translation, in collaboration with LCB (Literarisches Colloquium Berlin) & TOLEDO, & the research group/ excellence cluster 'Temporal Communities' at the Freie Universität Berlin

Sound of chewing, saliva,
        someone eating with an open mouth.

Sound of bare feet on the floor.
        Sound of shuffling and objects being dragged.
The sound of things being readied.

Inaudible French. Then, someone says:

"Imagine sound as touch, sight as touch. Imagine that
the room that you're in right now is a body."

Touch is not just haptic—we're invited to think of
"sound and sight as a form of touch."

Erin squeezes a grapefruit into a big transparent
        glass jar. At first, it's a lot of juice, like an
avalanche, then we make out individual droplets.

Grapefruit sounds like pee.

Erin drops the two fruity halves onto the table,
        they make a thumping sound.

All of this is still relatively factual, an observation of what happens. But how do I
do justice to this experience beyond descriptive clarity, especially as a writer and
performer who also experiments with a material and sensorial poetics and who
wants to unlearn some of her training in scholarly distance? How do I listen with
my whole body as a chorus of multiple, interconnected resonating chambers?
For example, I know I can feel vibration and rhythm with my fingers, which I can
move—like a stethoscope—to other parts of my body, listening in. I experience
sound through the soles of my feet, through the movement of my diaphragm,
through the tightening or relaxing of my jaw. With this awareness, how do I listen
now?

This type of work requires new forms of listening-writing on my part, perhaps
similarly textured, similarly playful and in tune with the other resonant materials
and bodies I encounter.

Sound of fabric brushing against skin. Sound of roughness. Like clearing your
throat. Sound of a criss-cross pattern.

Do these sounds make me want to move my legs? Does the sensation reside in
that in-between space between imagination and action? (I once heard that our
neurons already "know" on a cellular level about a split second before we
consciously make a decision what we will do). Or maybe it's more like the rhythm
travelling vibrationally through floor and limbs, testing our orientation, our
proprioception—where is this body of mine?

Sound of a spoon being dropped on a wooden table.

I become aware of my dry mouth.

Sound of grapes being slipped into a jar full of undefined liquids.

What do I pay attention to?

I realise that to some extent my experience of sound is tied to what I see.
Without the video, it is actually quite hard for me to describe what I hear.
Maybe I could draw the sound like a graphic score by Cornelius Cardew or
György Ligeti or maybe something more humorously cartoonish by Cathy
Berberian._5 Or I could make a Dada sound poem jumping from
"blloTTtt–oouaffffff' to 'grrrrrIIIIIIIOOOOUUUUp – p p p p."

Would you know what that sounded like?

The approximation of a like at first seems a good guide. It sounds like someone's
tummy rumbling. It sounds like a door opening. But it's just a shorthand; I call
upon memories of sounds without actually capturing the complexity of sound.

Sound of a lump or thump I feel in my chest. Sound of a tin being opened. Sound
of the crackling of a shell, not the thin sound of an eggshell but the pulpy hard
shell of a granadilla. All sounds go pulpy. Or gooey. What's a tart sound? A tangy
texture?

Suddenly I'm inside my own body. Gargling or gurgling away to my own rhythm.
I wonder if all organs have a pulse or the capacity to hear internal movement.
I do not know what my organs sound like beyond sonic clichés of the squishy
muted flow of blood whooshing through my arteries or the supposed crackling
hiss of my brain. Can I hear my eyeballs moving? What does my sore back sound
like? Everything is beginning to resonate, respond. I know how my body
resonates when I sing. Not just the obvious cavities but the fascia (that soft
tissue coating all our organs and muscles) also react to vibration. How do I know
about this resonance? I know this because from the age of 15 I have been
intermittently learning a somatic vocal technique that I may well describe as
unlearning "singing," by which I mean not forcing my voice to sound a particular
way or not applying techniques to fix it or force it into shape. I know that my body
resonates because when I listen to it (my body, but also the performance I
experience), I notice small vibrations in my jawbone, my clavicle, travelling up
and down into my skull or even all the way into my feet or because a part of my
body simply comes into focus as if someone had pointed a little torch on it. Or
maybe I notice that my jaw loosens, that my tongue relaxes, or I feel the variable
density or permeability of my soft palate. I feel as if there's a whole beehive in my
head, there's so much going on! Maybe I notice that I'm letting go of my habit of
clenching or of pushing up breath or sound rather than letting it just arrive.

Using our senses is riddled with sensorial and perceptual habits, often
unconscious ones. Not all of them are "bad" and it's not a matter of gaining
more control over our senses but perhaps believing in or surrendering to their
autonomous organization. We can begin by asking ourselves what the brain
does with all these stimuli and follow them around as if going on an internal
walk or hike. Learning more about anatomical and physiological structures
allows us to perceive, notice, and experience these bodily or sensorial realities
or changes in response to a prompt or stimulus. We might notice changes in our

_5
See for example, Stripsody:
https://www.youtube.com/
watch?v=0dNLAhL46xM

blood pressure, warmth, vibration, the toning or relaxation of muscles, or learn to read vestibular feedback (posture, balance, navigation, gravity, gaze stability) or cutaneous feedback (pressure, itch).

"Soften your tongue."

I am so familiar with these kinds of prompts to notice, experience, and associate that my body reacts immediately but not necessarily how I expect it to.

If it's not clear by now, let me make it explicit: the piece investigates feelingly how acts of language can affect the body, direct and disperse attention, and create sensation. But it also asks us what happens when sensations interact? Language has the power to facilitate a bodily awakening or reckoning. For that it need not be voiced. Descriptions in the form of captions similarly shape the experience for D/deaf and hard-of-hearing audiences, more specifically their emotional or embodied responses. Jessica A. Holmes describes deaf percussionist Evelyn Glennie's technique of "touching the sound" as experiencing "different pitches and sounds resonating in her body—the chest, the stomach, the tip of the pinkie finger."[6] Holmes reminds us that:

> Deafness only deepens musicology's sense of what music is—its social, relational, and material contours. Music does not simply exceed the limits of aurality; it exceeds the acoustical parameters of sound itself. "Sound" can be a primarily visual-spatial experience as we watch objects and bodies vibrate and move as music passes through them.[7]

A deepening of our understanding of sound also ought to make us question the conventional distinction between active and passive listening, usually based on expertise and experience and rooted in a notion of mastery, as Holmes suggests, and to which I would add active and passive reading.[8] The sound of scraping the flesh out of a coconut. Or rather, the sound of vulnerability for being seen for who we are.

Erin tosses seeds into a big tinny bowl. They sound like a rainmaker. It is frustrating to me how difficult it is to find a precise or poetically dense descriptive language for my sensory experiences. Oh the riches of experience, oh the poverty of this linguistic translation. But maybe translation is experience and not a product, as Sawako Nakayasu recently proposed in our joint panel on "Performing Textures" at Bard College. An audience member shared after my workshop that as someone on the autism spectrum they naturally experienced the senses as connected, not rigidly separate, and that language often had a material quality, a palpable texture and sound that was experienced by the other senses.[9]

The musician throws in percussive accents, adding a recognisably musical dimension to the guttural landscape, and yet simultaneously nudges us to recognise Erin's fruity melange as very much music in and of itself.

Sound of plates being moved around. Sound of the yawn of a tree. Sound of sleepy-sloppy limbs relaxing into cacophonous cushions. Sound of serene alertness.

My critical mind pipes up again tugging on the serenity-strings. Can I really use this definitional language 'sound of' with its apparent claim to universality? Should it be "My sound of" or "I hear" or "I sense"? And what are cacophonous cushions? I think it's what my singing teacher meant when she said "step into a roaring silence". Stepping into that paradox means becoming aware of that raucous orchestra inside you. Try it. It's wild.

__6
Jessica A. Holmes, 'Expert Listening beyond the Limits of Hearing: Music and Deafness', Journal of the American Musicological Society, vol. 70, number 1, pp. 171–220 (p. 172).

__7
Holmes, p. 211.

__8
See Holmes, p. 212.

__9
Mel Baggs, an expert in experimental touch-based experience, was an autistic non-verbal artist and activist whose video-essay In My Language (posted to YouTube in 2007) offers a choreographic, tactile, and sonic engagement with objects in their domestic space. Halfway through the video some text appears—"A Translation"— in the form of automated voiceover and subtitles: a powerful manifesto that pushes back against able-bodied conceptualisations of what constitutes a "language," legibility, and the category of personhood.

__10
Oliveros, Deep listening, 34-56

This reminds me of Pauline Oliveros's simple but perceptive question "When are you listening to what you are now hearing?" It's one of many prompts from her ground-breaking (sound-breaking?) project and book Sonic Meditations which develops her theory of deep listening. For me, this is not a (potentially able-bodied) distinction between physiological hearing and conceptual listening; it's about the difference in what we pay attention to. For Oliveros, "the ear is a faithful collector of all sounds that can be gathered within its limits of frequency and amplitude. Sounds beyond the limits of the ear may be gathered by other sensory systems of the body" (p. 19).

What is your favorite sound? How is it made? When can you hear it? Are you hearing it now?

When do you feel sound in your body?

If you could hear any sound you want, what would it be?

What sound is most meaningful to you?

Do you remember the last sound you heard before this question? [10]

I want to end by returning to my earlier premise: that the acts and textures of language have real effects on the body and create new material realities.

What makes language material for me is when we treat it as if we didn't quite understand it logically or at least not immediately. Materials like clay and wool or lemon peel and metal sit well next to one another, they rub shoulders. We do not challenge or doubt how something so wrinkly and waxed can sit next to something so shiny and solid.

For a while now I've been keeping a material diary, where I explore a particular material. I've also extended this haptic listening or visual and linguistic tactility into workshop settings and into my own practice. In a recent video-essay called Cloudiness, I play with different materials and with language, asking how this type of tactile play can create a translation of other non-linguistic sensory experiences. Translation is sound, is material, is movement, a visual-haptic echo chamber. Is translation always the retracing of shapes already carved, of thoughts already voiced, now tasked with a different sort of materialization on a variable scale of proximity? Experimental translation or experimental writing more broadly makes its scaffolding visible. To intentionally upset the truism of the invisible translator and her invisible labor, the scaffold visualizes a material process. This making-visible does not aim for a transparency of meaning. Instead, experimental translations side with a certain cloudiness... In that video just as in this essay, I want to think near or alongside the tactility of translation, its harboring of touch. Its receptivity to other materials. What it picks up along the way. Working with language, we feel the words' edges, listen for worlds.

When we listen for texture, we don't listen for content, or if we do it is the contentment of content, the containment, the tent it pitches over us. When we listen for texture, we might see a work's ridges, contours, and arcs, how it passes our day. We learn about process, a story of making, but also an imaginary landscape freed from the strictures imposed on real bodies. When we listen for texture, we brush up against histories, find clearings in the forest that confront us with our complicity or our desire for community. There we find a gathering space, and are held.

__ART FOR ANIMALS

Matthew Fuller

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Lazlo Moholy-Nagy, cited in, Sibyl Moholy-Nagy, Moholy-Nagy, experiment in totality, 2nd Edition, MIT Press, Cambridge, 1969, p.87

_2
Gabriel von Max, The Jury of Apes, 1889

_3
Pliny, Natural History, books 33-35, trans. H. Rackham, Loeb Classical Library, Harvard University Press, Cambridge, 2003, p.309 (book XXXV, section XXXVI,)

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Notable examples would be Jannis Kounellis' installation, Horses, Rome, 1969, in which a dozen horses were stabled in the Galleria L'Attico, setting up a situation in which the physical presence, movement, smell and palpability of the horses goes straight to matter conjugated by the multiple kinds of expectation and viewing accentuated in art systems. Paolo Pivi's work follows somewhat in this trajectory but with an emphasis on exoticism and absurdist conjuncture, an alligator covered in whipped cream, zebras transported to a snowy land-scape, a leopard prowling amongst plastic replica cappuccino cups

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The development of such architectural work in the London Zoo was at the initiative of Julian Huxley, then secretary of the Zoological Society. Lubetkin also worked later at Dudley Zoo, which, almost in reverse of OOZ (for the birds) provided a miniature example of modern town planning. For an analysis of the development of the architecture of London Zoo, see Hadas A. Steiner, 'For the Birds', Grey Room no.13, pp.6-31. The Penguin Pool was eventually abandoned after about seventy years of occupation, with the penguins being moved to a more 'organic' site with various kinds of surface and housings. It remains standing as a grade one listed building, but, as of this writing, (April 2007) remain unused.

A crowd of apes and monkeys sit clustered upon a box gawping and grinning and staring at a canvas. They've seen nothing like it; or they are bored by it; or they raise their arms in delight at the general hullabaloo. They are of a number of sorts, baboons, gibbons and others; all however have the painting as the primary focus of their attention or reaction. What is on the canvas is hidden from view, all we see is the gilded side of a carved frame. Gabriel von Max's turn of the century comedy in oils, **The Jury of Apes**–2 points at the trade of the art critic, utter monkey business, but also at the viewer of art, a mug, an enthusiast, or, in the stare of the ape, turned to address the viewer through half-closed lids, a rare specimen in itself. For apes to look at a canvas makes the pretensions of those who look with a mind to judge also minds to be judged, or at least, to be sniggered at.

Pliny the Elder's Natural History–3, a book which places painting and sculpture amongst an inventory of animals, plants, and minerals, gives us anot-her story along these lines. In a competition between two painters in trompe l'oeil technique, Zeuxis and Parrhasius, face off in front of a crowd. The first artist pulls away the curtain protecting his work to reveal the most perfectly rendered bowl of fruit, so lucidly real in fact that a flock of birds immediately descends upon it and starts to peck away the paint. Impressed, Parrhasius stirs, but does not move. He simply stands and watches. The annoyed Zeuxis demands that he remove the curtain from his canvas. The second artist does indeed reveal his painting, but by stating that he has no curtain to remove, that it is a painting of a curtain. This painting has deceived the eyes of an artist not a mere bird. Parrhasius wins the competition and perhaps brought to a temporary close a current in art which is only just re-emerging, art for animals.

Art for animals is art with animals intended as its key users or audience. Art for animals is not therefore art that uses animals as a substrate or a carrier, nor as an object of contemplation or use.–4 (Needless to say given these criteria it does not fall into the category of transgenic art, with its all to frequent tendency to animal abuse and naive sensationalist celebration of genetic engineering.) It is not art that, like **The Jury of Apes**, that depicts animals for human viewers, or that incorporates animals into living tableau, but work that makes a direct address to the perceptual world of one or more non-human animal species. There are only a very small number of works that make such an address. This essay will make a brief survey of them and then go on to discuss their implications. Where it differs from Pliny's tale is in that it works, not on the level of successful imita-tion, of setting up perception as a means by which one is duped, but in rendering perceptual dynamics as both somewhat more irresolved and more powerful.

A further important category of work that does not usefully fall into this current are objects such as dog-kennels by celebrity architects (such as Frank Gehry) or housings for birds. Whilst some work in zoo design, notably for Carl Hagenbeck by Johannes Baader, and the aviary in London Zoo by Cedric Price does attempt to engage with animals' behaviours, in a way that Berthold Lubetkin's famous double spiral ramped penguin pool at the zoo does not.–5 In 2008, Thomas Schütte installed **Hotel for Birds** on a plinth in London's war monu-ment congested Trafalger Square. Made of brightly coloured layers of perspex,

this is a sculpture in the style of an architectural maquette designed to catch light, and to act as a 'public space' for urban rock doves displaced by a cleansing policy established by a different branch of the body commissioning the work. Whilst being of interest, it is primarily 'housing'. David Nash, an artist who works with the materiality of wood, and whose aim is for the work to integrate into na-tural processes, has made shaped blocks of oak for use in a small copse, by sheep who gather there to escape the rain. They use the blocks for "shelter, safety and scratching"–6 More recently, the sociology artist Jeremy Deller is using the device of an architectural competition to produce a design for a Bat House for the Wet-lands Centre in South London.–7 Whilst these are interesting projects, they largely address animals in terms of ergonomics, making spaces that physically 'fit' them.

At the same time, because many animals experience and shape a locale by literally inhabiting it, there is no absolute distinction between what is proposed here as art for animals and work that produces scenarios that animals live in, work on, and complete, or render definitively unfinished. Equally, other projects that involve moving animals from one context to another as in the case of Hans Haacke's Ten Turtles Set Free (1970) or sorting systems for animals, as in Robert Morris', A Method for Sorting Cows, (1967) are assumed to engage some aspects germane to this project, such as the categorical systems, including property, to which animals are assigned, but fall outside the scope of this essay.–8 Equally, durational performances of co-existence with animals are related but sit to the side of the present text.–9

Other areas, which would possibly suggest further development, but which are outside of the present discussion include the production of visual material by animals (famously including paintings by chimpanzees or elephants). Other perhaps more promising research includes findings that indicate pigeons' capacity to distinguish between styles of picture making (i.e., Shigeru Watanabe's research that showed pigeons could learn to distinguish between works by Monet and Picasso and, subsequently, that they were able to carry over this capacity for distinction to categorically related art by Cézanne and Braque).–10

A weakness of some of the main streams of cultural theory over the past decades is that in its emphasis on the constructive aspects of culture, biological questions are neglected or considered reactionary. At the same time, a thread of biologically based research, functioning largely by an unsophisticated positivism makes any chance of a dialogue between disciplines and styles of research difficult. There is a certain laboriousness in getting through the clunky formulations that are dredged up by instruments incapable of finding anything but what is expected and that are proudly displayed as having 'explained' culture. Certain currents in contemporary biology have made an attempt to perform a 'landgrab' on culture, to suggest that biology provides a base-line level of explanation for all forms of behaviour. Often these are characterized as being simplistically 'Darwinian' in motivation, with characteristics of culture identified as mere epiphenomenon. It is not necessary to get locked into simply refuting the shrillest voices or those advocating the most absolute reductionism as an a priori. But this kind of argument has not come solely in the form of a landgrab on culture, nor has it come only from scientists. A 'recall to biology' has been a ruse often played by those in the domain of art discourse who attempt to enforce a 'shared symbolic order' of the kind once supposedly provided by religion.–11 I would suggest that much of this work is a betrayal of the subtlety and speculative nature of the current of thought set in play by Darwin.

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Gerttrud Købke Sutton, 'David Nash, The Language of Wood' in, Art and Design no.36, p.28-73. The Sheep Spaces sculptures were made in 1993 as part of the TICKON Project, Langeland, Denmark. The same exhibition also included an oversize thatch beehive by Jan Norman.

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 Jeremy Deller, The Bat House Project, 2006-onwards, http://www.bathouseproject.org/

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Robert Morris, 'A Method for Sorting Cows', in, Kynaston Mc Shine ed., Information, Museum of Modern Art, New York, 1970. Hans Haacke, Ten Turtles Set Free, 20 July 1970, St. Paul-de-Vence, France, 1970. Haacke's intervention consisted of buying ten turtles and releasing them into the wild. The methods of the Animal Liberation Front have by and large improved on such approaches.

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 see for instance: Jospeh Beuys, I Like America and America Likes Me (1974) a durational performance in which a room was shared with a Coyote. Bonnie Sherk's , Public Lunch (1971) was held at the Lion House in San Francisco Zoo, during which the artist would introduce herself to the Lion's enclosure during feeding times.

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 Shigeru Watanabe, Junko Sakamoto, and Masumi Wakita, "Pigeons' Discrimination of Paintings by Monet and Picasso", Journal of the Experimental Ana-lysis of Behaviour, no.63, pp165-74

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See for example, Peter Fuller, The Naked Artist, art and biology, Readers and Writers, London, 1983. In more recent work on similar themes, another writer advances participation in art as a quasi-christian liturgical comfort food.

Art for animals

Much of such work prefaces its findings by a complaint. In this scenario, biological approaches to culture are refused out of hand because of a conformist consortium of Marxists, poststructuralists, feminists, queers, and others who bunker culture off from questions of innateness or predeliction. When Marx has written about species being, Foucault on biopolitics, Cixous on ecriture feminine, and there is a plethora of more recent research and art emphasising corporeality, it is unfortunately mistaken to describe those primarily concerned with culture as somehow assuming that they entirely surpass biology. Ellen Dissenyake suggests that art is a refusal to 'grow up', a prolongation of the sense of exploring the world for the first time, of maintaining sensual delight in novel growth and experience, the capacity to escape from a subordinate role.–[12] Perhaps certain participants in science too are undergoing such a thrill in their discovery of culture, and their entry into culture as a previously taboo domain. If so, this is entirely to be welcomed, but perhaps they should calm down just a little. At least, in a society such as ours, for scientists to borrow the Cultural Studies ruse of presenting one's arguments as the knowledge of the oppressed, at least has the virtue of being amusing.

Art for animals intends to address the ecology of capacities for perceptions, sensation, thought and reflexivity of animals. The capacity for art is part of the rather mobile boundary line that performs the task of annihilating the animal in human and in demarcating the human from animality. The purpose of this text is not so much to legislate upon the placing of this line, but rather to suggest that the sensual and cultural capacities of various kinds of being, whether ordered into species or not can be explored and to follow a few ways in which this has been done. Paul Perry has installed a small robotic device to spray bobcat urine high up a tree to stimulate an imaginary of pheremone responses. Natalie Jeremijenko makes a robotic goose, the aim of which is to set up interactions with a small group of geese, in a number of other projects she sets up devices for inter-species communication. Louis Bec attempts to set up a dialogue between two speciated parts of the same genus of fish. Anthony Hall also works on communications and perceptual reflexivity with weakly electric fish. Marcus Coates stages a series of actions with animal materials and behaviours with interaction with other species as the prime goal. Some of this work is rightfully absurdist, whimsical, self-trivialising. But all of it moves towards setting up actual, multi-scalar and imaginal relations with animals that involve a testing of shared and distinct capacities of perception.

Deleuze and Guattari, following von Uexkühl, Kafka and Maturana and Varela amongst others, have placed animal subjectivity at the core of their reinvigoration of thought. In this, they provide some dynamic formulations of conceptual personae as animal-beings and of animals as engaged in reciprocal relations of life shaped by colour, growth and habitat formation. In their book *What is Philosophy* art and nature are described as being alike because they combine an interplay between House and Universe, the homely and the strange, and the specific articulation of the possible with the infinite plane of composition. 'Art for Animals' takes up such work for the category of art.

In engaging animal cultures and sensoria, these projects also make art step outside of itself, and make us imagine a nature in which nature itself must be imagined, sensed and thought through. At a time when human practices are rendering the earth definitively *unheimlich* (uncanny) for an increasing number of species, abandoning the human as the sole user or producer of art is one perverse step towards doing so. More widely, a core process of Guattari's writing, one which it amplifies in that of Deleuze is the project of understanding

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Ellen Dissenyake, What is Art For?,
University of Washington Press,
Seattle, 1988

ecology at multiple scales, from the social, to the medial, technical and aesthetic, to that of subjectification. This text draws upon such processes to develop the question of animal-human subjectivation as a cultural and inventive process. Within a web of interconnected capacities and materials a set of processes and instances, set-ups, ruses, devices, work to establish what Rosi Braidotti has called 'affirmative interrelations'–[12] between, not simply a fixed set of innate behaviours and predilections but of the capacities for becoming that might exist between different forms of life and aesthetic dynamics.

It is not the intention here to suggest that there is a necessary continuum bet-ween human and animal, a continuum is a figure that implies fixed ends and a neat metric running between them. Rather, what is suggested in this initial sketch of a possible field is a myriadic ecology of perceptual-cognitive sets, some of which overlap or share functions and capacities. As the primatologist Frans de Waal notes in his reflections on culture, "One cannot expect predators to react the same as prey, solitary animals the same as social ones, vision-oriented animals the same as those relying on sonar, and so on."–[13] Equally, we cannot expect sensual experience to stay the same amongst members of what is logged as the same species. Humans for instance have domesticated themselves since advent of agriculture, with, at the genetic scale, changes in composition equivalent in the degree of change to that found to be involved in the transition from wild corn to domestic corn today. In certain populations such changes manifest in the ability to digest foods associated with a sedentary mode of life (such as the developed ability to digest lactose linked with the unfortunate tendency to eat cow's milk). At a sensory level, rather than a genetic one, our habituations tend towards similarly substantial changes: one recent study suggests that it is possible, with a little retraining, for humans to acquire an equivalent capacity of smell to that of dogs.–[14] Regardless of whether this is desirable, or whether it might also suggest the need for an uptake of the scenting and smelling habits of dogs, art for animals does send a tingle along the edges of what we take for granted as our current capacities. It suggests that we search out and test the discontinuities and over-laps between our sensual and intelligence capacities and those of others. What would it be like, for instance, to be able to see just the very edge of ultra violet in the iridescence of a petal or on the wing of a butterfly? How would such a change in sensual capacity re-order us, make life bulge? Is there a market for drugs that temporarily reconfigure nervous and perceptual systems to those of other species?

Gilles Deleuze laughingly describes the sensorial world of the spider: a juicy fly can be placed in front of it, it doesn't care. All it wants to feel are a few small twitches on the far reaches of its web. Just a few details, a muttering in the background, that's what is appetizing. This, says Deleuze, is the same sense of the world as the narrator of Proust's "Search...". Deleuze himself mobilizes various nonhuman sensoria: ticks, lobsters, dogs, lice, bees, wolves, bowerbirds, flies, the horse-knight assemblage. Such creatures become ethological devices to overstep what can be sensed, thought or said. They are paths of becoming, gravitational lodes of traction which pull the human out of its skin and pull the singular animal into the multiplicity of packs, evolution and ecology. There are a number of ways and particular domains in which such becoming can be seen to occur, at the scale of brains, of bodily elements and organisation, and of means and kinds of communication, amongst other things. Paul Rozin for instance catalogues a number of ways in which human cultural processes and evolutionarily accrued predispositions are interwoven in the case of food.–[15] What such work reveals is that the bodies of individuals in evolutionary conditions are means by which
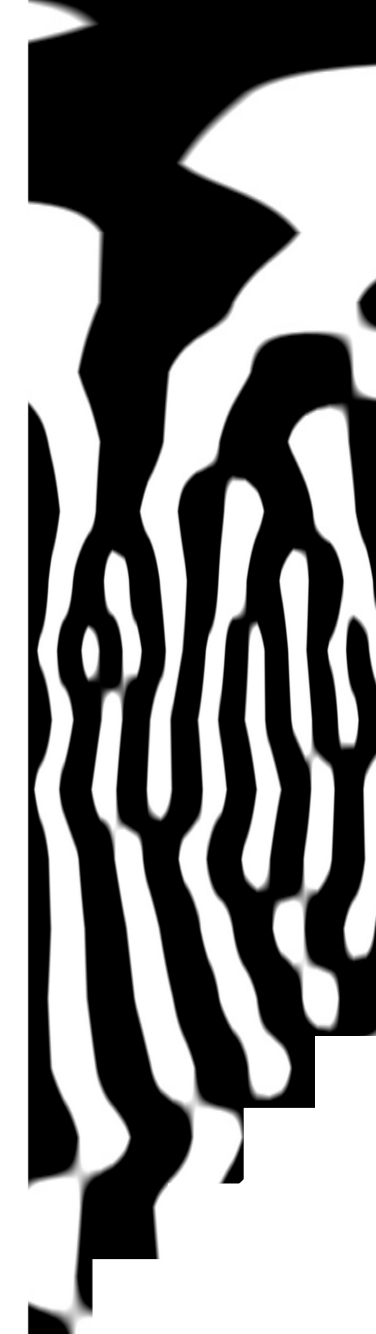
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Rosi Braidotti, Transpositions,
Polity, Cambridge, 2006, p.209

_13
Frans De Waal, The Ape and the
Sushi Master, cultural reflections
of a primatologist, Basic Books,
New York, 2001, p.55

_14
Linda Geddes, "Unleash your inner
bloodhound – start sniffing",
New Scientist, 17 December 2006,
http://www.newscientist.com/
channel/being-human/dn10810-
unleash-your-inner-bloodhound--
start-sniffing.html

_15
Paul Rozin, 'About 17 (+/-2)
Potential Principles about Links
between the Innate Mind and
Culture, preadaptations,
 predispositions, preferences,
pathways and domains', in,
Peter Carruthers, Stephen
Laurence, Stephen Stich,
The Innate Mind, vol.2,
Culture and Cognition, Oxford
University Press, 2006

forms of life scan for potential adaptions; they are also means by which eco-systems arrange themselves, and the platforms for cultures to articulate, be experienced, revised and produced. They are in turn worked on and produced by cultures. Ecologies emerge in a multi-scalar way. What Deleuze and Guattari argue for is that an understanding of the virtual be added both as a specific scale within ecologies, as a dimension of relationality that exists at every scale within such a system, and a diagonal which connects them.

Evolution by natural selection is often characterised as a process of the survival of the most fit. Fitness is a relative, and distinctly processual, term. A whale is fit for its habitat, but, as the current representative of a mammalian lineage that re-entered the water, it is also the result of massive and quite possibly awkward adaptational change.[16] It cannot be understood to be perfectly fit, but as the ongoing result of many interlocking morphogenetic, material and adaptive capacities that may involve substantial shifts in the use or function of bodily elements. This given, it is useful to consider the question of the virtual in relation to the way in which bodies, entities that can be regarded as their components (such as genes or organs), their aggregates, and those of their products, such as cultures, explore, adapt to, make adaptations of and co-evolve with and form, ecologies.

the other, but also interacts more generally, as an assemblage, with wider formations and compositional dynamics. Thus an entity or a process might be imagined to occur in the liver of one being, be sensed as creepy sizzle by the automatic fight or flight responses of another, stimulate pheremone exchange between two members of different species, determine the use of grammatical tense in an essay by a specimen of another, but exist as much more than these. There is no teleology in such occurrences, but rather a drift of reciprocal relays established more or less directly by potentially thousands of interacting and escaping entities.

The question of the exploration of virtuality within an ecology is also carried out at an experiential scale in play. The kinds of play associated with different species are equally heterogeneous. The field of comparative psychology is developing understanding of multiple forms of consciousness: mirror recognition (a test of self-awareness); theory of mind; tool use; emotions and empathy; the capacity to imitate; the capacity to think about thought, metacognition; language; reflection recognition; and other capacities which in turn become affordances for entities, capacities and dynamics, which almost weekly result in experimental results widening the domain of intelligence, and the distribution of skills and aptitudes once thought exclusive to homo sapiens. In his landmark

It is a commonplace that organs, behaviours or other entities in ecologies can change or add functions over time. Julian Huxley, in his early work of ethology, notes that the behaviour of grebes in courtship includes adaptations and appropriations of movements, such as dives, that might have primarily developed as feeding movements but which are repurposed as displays of fitness and of courtship interest. These are elaborately linked and synchronized in a distinctive and beautiful set of behaviours.[17] In a further dislocation of signaling into mimickry across species, when showing aggression meerkats, raise and curve their long tails over their backs. In this, they are mimicking the posture of their enemy and food source, scorpions. North American chickadees (red-breasted nuthatches) are able to distinguish between the alarm calls of black capped chickadees according to whether the species being alerted of is likely to predate them, so the signaling of information crosses between species.[18] Signs given for one purpose are used for another. Such chains of dislocation are potentially endless, the mouth, originally used for biting and eating, over time gains additional functions such as speech and, in humans and a few other primates, sexual activity. Chains of dislocation constitute a form of primary experimentation of the capacities and materials of bodies and of life. They may occur across all scales of a body or at those of individuals or populations.

Aside from adaptions and accumulations of function and behaviour, co-evolutionary assemblages, such as the wasp-orchid reciprocation machine described by Deleuze and Guattari, set up consistencies across scales and discrete objects or organisms, by means of which each probes the virtuality of

survey of play in a multitude of species, Gordon Burghardt states, "Play with objects is behaviour in which an animal investigates not just their nature…but what he or she can do with them."[19] This would also suggest that play not only acts as a context in which animals probe potential affordances amongst their conspecifics and the things that surround them, but also count themselves amongst the things that, at multiple scales, are being so probed. Play behaviours can also be autotelic, independent of adaptiveness or function, or as such, producing a reserve of 'anticipatory adaption' which is at once something that is absolutely live, but also a gateway into the virtual, the plethora of forces and possibilities that interact to produce the actual.

In Deleuze and Guattari's account of ecology as melody[20] affordances become counterpoints, relays between one set of compositional dynamics, such as the bumblebee and the snapdragon, that trip, not simply in tight co-evolutionary couples, but out, from oikos, home, the root word of ecology, to the cosmos. Extending this cosmological dimension, if we concur that "a work is always the creation of a new space time",[21] art for animals also allows us a way of thinking through the processes of intersubjectivation that we experience in ecology, a move that chimes with Guattari's critique of the 'pure intentional transparancy'[22] of phenomenology. Guattari calls instead for a means of recognition of components of subjectification which meet each other by means of transits that are relatively autonomous from one another.[23] The cosmos figured here is one that moves towards openness. The works considered below as art for animals can be thought of as specific articulations of such a process of opening.

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Carl Zimmer, At the Water's Edge, macroevolution and the transformation of life, Free Press, New York, 1998.

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Julian Huxley, The Courtship Habits of the Great Crested Grebe, (1st ed. 1914), Jonathan Cape, London 1968

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see, 'Why Chickadee Calls Spook Other Birds', New Scientist, 24 March 2007, p.21 see also, http://students.washington.edu/ctemple2/chickadee.html and, Templeton, C.N. & Greene, E. "Bilingual birds and eavesdropping: Nuthatches respond to subtle variations in "chick-a-dee" alarm calls", Proceedings of the National Academy of Sciences, DOI: 10.1073/pnas.0605183104.

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Gordon M. Burghardt, The Genesis of Animal Play, testing the limits, The MIT Press, Cambridge, 2005, p386

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Gilles Deleuze and Félix Guattari, What is Philosophy?, trans. Graham Burchell and Hugh Tomlinson, Verso, London, 1994, p.184-5

__21
Gilles Deleuze, 'The Brain is the Screen', interview, in, Two Regimes of Madness, texts and interviews 1975-1995, ed. David Lapoujade, trans. Ames Hodges and Mark Taormina, Semiotext(e), New York, 2006, p.289

__22
Félix Guattari, The Three Ecologies, trans. Ian Pindar and Paul Sutton, Athlone, London, 2000p.37

__23
Félix Guattari, The Three Ecologies, p.36

Paul Perry – Predator Mark

In his work on the literature of wilderness, Gary Snyder suggests that "other orders of being have their own literatures. Narrative in the deer world is a track of scents that is passed on from deer to deer with an art of interpretation which is instinctive. A literature of blood-stains, a bit of piss, a whiff of estrus, a hit of rut, a scrape on a sapling and long gone."[24] In encounters with changes in the use of land, these literatures find themselves recomposed. Urban foxes in London for instance are notorious for their habit of shitting on children's toys left outside overnight in gardens and yards. Their territory marking habits have been displaced and appear as cunning acts of deposition.

Paul Perry's 1995 installation Predator Mark is a subtle reordering of such a literature of scents. The work consists of a device made up of an electronic timer, a compressed gas spray mechanism and a flask of bobcat urine. This mechanism was installed high on a tree in a wooded estate, Landgoed Wolfslaar, in Breda in the east of the Netherlands. Bobcats are native to North America and Mexico. Their scents are thus not part of the vocabulary of ecology of the area. Bobcat urine is however commercially available in north america along with that of other local predators such as wolves. Its commodification and provision for credit units over the internet, allows its dislocation from territory. Once bought by the user it is judiciously sprinkled to deter certain animals from crossing into the space that the scent suggests is inhabited as territory by another. Other scents, such as the urine of doe deer in heat, are used as lures by hunters, in this case to draw deer away from trails into the line of sight of hunters. The urine of both predator and prey animals, like other animals products available for retail, spell out a new kind of literature, one of commodification, of humans gaining the capacities of cunning shitters and the grisly promise of meat on a stick.[25] Whether, like mosquito repellent, these products have anything more than fetish value for men investing in quality time alone with nature remains questionable.

In Predator Mark, introducing the scent of any animal, predator or not, is imagined to shift the register of references to presence within the place. It suggests an openness to the possible that resingularizes experience as an event in which the dimensions of relationality surging through it require recognition. This is a speculative literature of piss, involving floods, drips and sprays of matter, energy and signs, and the intelligences they invoke to sense and comprehend them. Whilst one form of experiment is to set things out, to wait and see what gathers or grows in the manner of Duchamp's early artificial life work, Elevage de Poussiere, (Breading Ground of Dust).[26] Perry did not set out to observe if there were any differences in behaviour associated with the installation of this work as would be characteristic of a scientific experiment proper in which one variable only is isolated and probed for the conditions of its variation. Indeed it is not even clear whether the species most drawn to the scent marking activity of art was even aware of its existence. This gratuity of the work, that it addresses itself primarily to animals, those who read no press releases, and its operation in a way that is imperceptible, indeed, by its height from the ground and position deep within a wood, almost impossible to experience, distinguishes it from an entity operating within the normal dynamics of art systems.

If, to make one comparison, conceptual art made the move towards experiencing the materiality and multiply structurating forces of ideas and language, such work suggests a means for such conceptuality in multiple species and across many means of sensing, acting in and interpreting the world.

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Gary Snyder, *The Practice of the Wild*, North Point Press, New York, 1990, p.112

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See i.e. http://www.hotdoe.com/

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This work is a photograph by Man Ray of the reverse side of Duchamp's The Bride Stripped Bare by Her Bachelors, Even (1915-1923). It shows the glass in 1920 after having accumulated a landscape of dust.

Natalie Jeremijenko - OOZ

Natalie Jeremijenko is engaged in an ongoing series of works called OOZ, which test human animal cohabituation of city spaces and set up novel kinds of instruments and infrastructure for urban and feral animals. OOZ, as a series of works and ongoing revisions of projects, establishes situations for animal and human interaction in contexts in which, unlike that of a zoo, the animals are free to leave. The OOZ series has involved work adopting the housing paradigm, such as an installation on the roof of the Postmasters Gallery in New York in 2006. Whilst this was largely to do with providing amenities such as houses, perches, a supply of fresh water and the growth of plants with medicinal function, there were also two other key directions to this work. One included anthropomorphic architectural organizations of space, such as a 'shopping mall', and architectural work offering ironic recognition for the benefit of human viewers, such as components testing the mechanical understanding of what is normal for animal provision by applying architectural notions of 'luxury' to fittings and spaces. There is an air of the flea circus about aspects of this project, dinky versions of high-end contemporary architectural concerns and urban systems. To achieve these, the project involved commissioning elements from a number of architectural studios perhaps inevitably leading to a tendency towards calling-card architecture. Such elements might perhaps work as lures, sparkly things that attract attention and draw humans towards them. Perhaps anthropocentrism can work as an interpretative layer for one species, whose cognition is partly organised by glamour, without ruining the primary emphasis on addressing the perceptual and experiential capacities of another. More importantly, the project tests the notion of what the feral condition implies – might there be an outgrowth of provision from urban systems in order to provide more edges, and habitats for displaced and incoming non-human inhabitants of cities? Such provision might entail the imagination of multi-scalar 'green corridors', micro-to-macro scale affordances, built on into, and through cities for ameliorating or even improving on the kinds of ecological condition they erase, build into, or establish.

A common thread between the different components of the OOZ series is that of experimental forms of communication. The Postmasters installation, titled OOZ (for the birds) included a 'concert hall' space for pigeon calls. Whilst this functioned as something of an architectural in-joke, being a miniaturely scaled version of Casa de Musica, the Office for Metropolitan Architecture's 2005 concert hall in Porto, it allowed for the amplification of voices and calls. In other work, Comm. Technology (2006), Jeremijenko has set up novel devices for pigeons to amplify their vocalizations. A series of perches to be attached to buildings consists of a hollow plastic horn fitted with a small microphone and speaker. The noises made by the pigeon whilst using the perch are powered up to address the street. Jeremijenko's wager is that the pigeons will recognize this and note the changes in reaction of humans using the street, including possible food sharing, and begin to favour the use of the perch.

Unlike Perry's Predator Mark, there is a sense in which the use of the work is monitored and evaluated, even if only informally. This is in part because Jeremijenko's work sites itself very much in dialogue with design, and the critical design discourse also involving Anthony Dunne, Beatriz da Costa, Phoebe Sengers and others. Here, design without a direct client or a customer and with animals as its users enters a modality that is enormously suggestive.

An early component of the OOZ project was Robotic Geese (2005 - onwards), one unit of which, in an installation with the Bureau of Inverse Technology, Romancing the Geese, was placed in a small stretch of water next to the De Verbeelding art centre in Flevoland. The goose, a basic plastic decoy body with added features including motorized legs, an articulated neck, a head mounted camera, microphone and speaker,

was remote controlled from a seat which allowed a visitor to view the eyeview of the robot, to steer it and to "make utterances" through it. The idea is to stage interactions with a small population of greylag and feral domestic geese who inhabit the area. In the projected full iteration of the work, each speech interaction will trigger the recording of short bursts of audio-visual information to a database. Once it becomes public, items on the database can be correlated so that users can gradually, through standard collaborative filtering algorithms, aggregate opinions on the semantic content of the utterances of the non-robot geese. Communication amongst humans is increasingly configured as a means of the delivery of order words and the management of the distribution of micro-compulsions to respond, advise, participate, collaborate and organize attention. Against this figure of the regime of responsiveness, thinking about communication outside of the boundary of a species sets up a number of possibilities. Perhaps OOZ allows us to imagine a form of taxonomy in which speciation was marked not by the matter of which animal could engage in effective genetic transfer with another, but on the basis of those which engage in semiotic (memetic) relays.
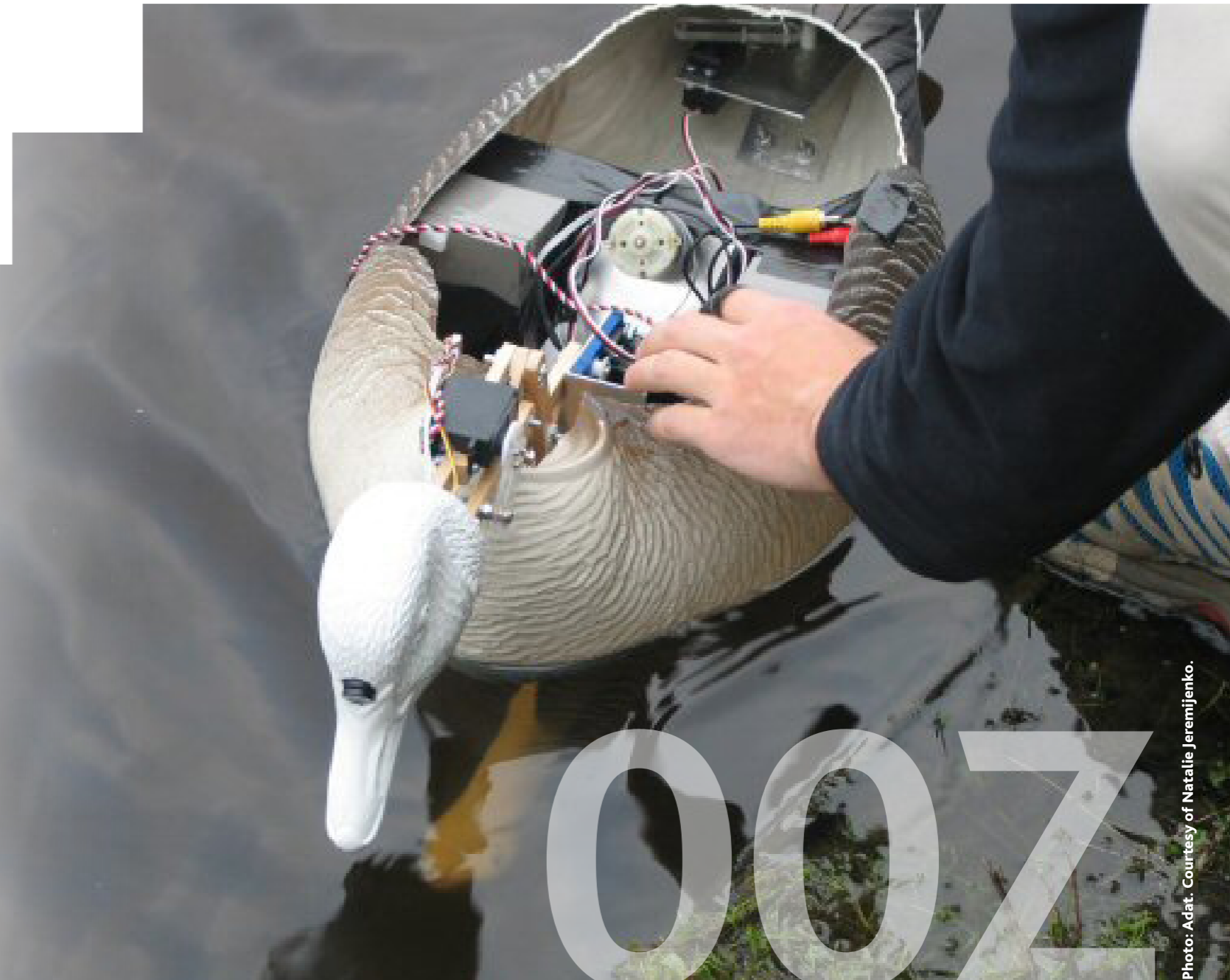
OOZ

Marcus Coates – Out of Season, Saprrowhawk Bait, and Dawn Chorus

Marcus Coates has embarked upon a body of work which maps out a certain set of figurations of interactions with animals, in particular with birds. Only a few pieces of his work fall into the art for animals current and are early, perhaps more minor, more throwaway or institutionally indetermined than the larger-scale projects he is more recently embarked upon. They may indeed be pointing towards something that, with his continued interest in 'animal becoming', will return to. Before addressing these, some of the other works are also worth mentioning. In a second work entitled Dawn Chorus (2007), high quality field recordings of bird songs are slowed down 16 times until they reach a pitch easily matched by a human throat. The resulting sounds are played to volunteers who learn to repeat them. These enactments are videoed, then played back as a projection. It seems that, at least in terms of their re-enaction, only the relative size of the vocal apparatus distinguishes the calls of the birds and humans.

In Journey to the Lower World, (2003), Coates uses a persona suggested by brief training in the rituals of Siberian Shamen. He performs a ritual for residents of a soon-to-be-demolished tower block in Liverpool, wearing the skin of a deer, mimicking the work of a shaman, apparently communing with a number of bird spirits and in so doing bringing back a vision of hope for the bemused ladies and gentlemen attending his ritual. The latter work is interesting because it knows that it is weak but makes use of this. The action is awkward, based on a relatively shabby, slightly embarrassing, day of training with the kind of guru who acquires their flock through postcards in health shop windows, and carried out by a denizen of the upper world. Nevertheless this specimen of the contemporary European, gawkily decked out in the culled, shameful, trappings of authenticity, as compromised as it knows it is, attempts to get something going. There is an earnestness achieved through a reflexive mimicry, of ritual, and of animal calls, especially Coates' constant attention to those of birds, that carries through into his work fitting more precisely into the art for animals current. Mimicry is a means to set up

ruses, initiatives that skirt the edge of multi-directional fraud in which the everyday and ideas of the wild, the primitive and capacities of sensual perception that overlap between species can be mobilised. Here mimicry unfolds both as play and as learning; in bird calls with their worlds of call and refrain, or their re-mobilisation of surrounding sounds; and in contemporary art and its constant reversioning of appropriation, pastiche, copy, plagiarism, found materials, how to deal with and configure what exists, what repeats, in relation to the creation of the new. These are vectors in the generation of what Coates calls 'animal becoming' but, partially overlapping they also shift each other.

During a series of short live works in the Grizedale Forest, Coates set up three interactions with local bird populations. They share some of the "do it and see (or imagine) what happens" approach of Perry's Predator Mark. The experiment is done for its experiential value rather than the extraction of unequivocable data. In Sparrowhawk Bait (1999), Coates makes himself the target for a predator. The corpses of a Blackbird, a Blue Tit, a Mistle Thrush, a Grey Wagtail and a Green Finch are tied to his hair. He runs through the forest with the anticipation that a local Sparrowhawk will be attracted by and pounce on the momentarily re-animated bodies. In Dawn Chorus (2001) a shaven headed male actor enters an area of young pines and shouts football chants and fan versus fan abuse in good spittle-flinging style. Taking place in a deciduous wood, Out of Season (2000), another short video, documents the same kind of performance with another actor and the addition of a Chelsea shirt. Aside from its relay and remediation as a video, the primary audience are the birds whose territorial and mating calls normally fill the spaces. In the work concerned with mimicry and imitation, whether of the shaman or of birds, making these chants and calls, listening out for any response, Coates has to link himself as an apprentice to the song domain of the birds, the processes of learning and training of listening and responding, which they establish. Taking the football chants to the forest sets out not only an idea of how human communications may often be so similar in their territoriality to those of birds. It shows too how demented and dreamy the possibility of talking to the animals really is, but also makes us wonder whether it could ever really be anything more than an unreturnable 'fuck you'.

Marcus Coates, Shamanic Costume, for consultation in Holon, Israel, 2008, Adidas track-suit (firebird), Reebok trainers, Newcastle United football shirt, badger, mountain hare, 'Guide to Birds of Israel and the Middle East', prescription glasses with clip on shades, 198 x 55 x 41 cm. Courtesy the artist and Kate MacGarry, London.

Marcus Coates, Shamanic costume. for consultation in Elephant and Castle, London, 2009, silver suit, silver shoes, mirror sunglasses, horse head, 220 x 53 x 69 cm. Courtesy the artist and Kate MacGarry, London.

Marcus Coates, Shamanic costume. for consultation in Tokyo, Japan, 2006, Marilyn costume dress, kitten heels, blonde wig, eye shields with Tippex, anti-bribery necklace (Yen), stimulant, song sheet 'Any Old Iron', mountain hare. Courtesy the artist and Kate MacGarry, London.

Marcus Coates, Shamanic costume, for consultation in Stavanger, Norway, 2006, suit (1940's), dance rattles, brogues, red deer, 250 x 60 x 70 cm. Courtesy the artist and Kate MacGarry, London.

Louis Bec – Stimutalogues, and Anthony Hall – Enki

Louis Bec describes himself as a Zoosystémicien, a sole participant of this discipline working with an extended conception of artificial life, an abstraction of life in more general terms, and some developed ideas as to how to proliferate interrelations between technologies of information and different biological manifestations of signification and intelligence. His work tends towards a science fiction in practice and Bec is adept at the time-accredited techniques of neologism, fabulation, mind-boggling and acronym usage. His manifesto text 'Squids, elements of technozoosemiotics' strives for a moment in which hyperbole and a series of programmatic and poetic statements achieves a density of semantic condensation sufficient to bring a world to life.

Aside from a number of projects developing interactive animated versions of artificial life projects, Bec has worked with various species of fish which use electrical pulses released by special electric organs located in certain parts (varying across species, generally transmission towards the tail, reception in foveal regions at the head) of their bodies. According to a document describing the research programme, this series, the Stimutalogues project includes:
Logognathe Artefact (interactive customizable loop of communication between the living, artifact and interactive agent)
Logomorphogenesis (modeling by dynamic morphogenesis of information exchanges between 3 Gnathonemus Petersii)
Ichyophonie / PanGea (setting up a communication device allowing exchanges between Mormyridées in Brazil and Gymnarchidées in Africa, trying to connect two continents which are getting separated gradually with the tectonic plates).

These fish are nocturnal, as well as having good hearing, they use their electric organs over short ranges to signal mating readiness or aggression, to locate food and to navigate in the dark water. Research by the sensory ecologist Gerhard von der Emde suggests that their complex sensory system is capable of using the way in which an object resists or stores mild electrical currents to determine its shape, and are able to categorise what they find. The movement of the fish, and the tail bending required for ordinary motion, allow the process of electric organ discharge to effectively 'triangulate' objects.
Anthony Hall, is leader of a related project called Enki, (2006) which also uses a number of species of weakly electric fish including Black Ghost Knife fish. (A species which breeds quite comfortably in captivity.) The technique is to place them in a tank containing sensors which pick up the electrical signaling of the fish. The signals are then converted into waves which are played at a seated user by means of sound and flickering LEDs. A lead travels from the arm of the user carrying electrical pulses from the human body to an electrode in the water in which the fish swims.
As with the Logognathe Artefact and Logomorphogenesis proposals, the fish are placed in conditions in which, compared to their native habitat, they are sensorially and behaviourally deprived. Elephantnose fish (Gnathonemus Petersii) do not breed in captivity, and will therefore in every case of their use as a component in such projects, have been captured from the wild, from areas, e.g., Nigeria and Brazil, already subject to significant pillaging for materials. In terms of the development of species-specific art, the question of how markets in animals and animal products intersect with the organization of art, and with the global distribution of habitats and organisms, is essential to recognise. By comparison with the emphasis on the capacity for animals to come and go in OOZ projects, most of the work done with elephantnose fish has substantial problems in terms of its ethical composition. The one clear exception to this is a version of the Ichyophonie / PanGea project which will be discussed last.

In versions of the Enki project which also involve a human subject, it is not clear whether, if, from the perspective of the fish due to their modeling in the system that receives them, and their mediation by layers of devices, it might not be simpler to replace them, or indeed the human user, with an entity in software equally capable of providing aleatory stimulus to the mechanism. The latter is the approach of Bec's Logognathe Artefact.

Underneath the generalizations about possible therapeutic implications and pastel fractals of one early iteration of the Enki project website it becomes clear that certain aspects of the project are potentially quite welcomely dark. Gregory Bateson, in work discussed by Guattari in The Three Ecologies, suggests that decisions and learning may be made by systems "immanent in the large biological system – the ecosystem" or "at the scale of total evolutionary structure," that are analogous to or developing qualities characteristic of mind. Such minds, systems of learning, occur between interacting elements; they are not isolatable to one single entity bounded by a membrane, but arise from cybernetically describable relays of entities bound at such a scale. One spin on the Enki project is that what we might be seeing here is the production of a mind or mentality, a mind that is at once fish and human but not reducable to either. That the fish part at least, (when petersii are used) in its refusal to breed, is displaying classic signs of confinement stress suggests significant questions about the ethico-aesthetic dimensions of art for animals involving captive life. Extreme doubt must be applied to any project that involves confinement, and especially confinement with such negative consequences. And here the question of the conjunctive form ethico-aesthetics proposed by Guattari is useful to draw upon. The Three Ecologies emphasize processes of subjectification that are artistic in style and inspiration, in imaginal power, rather than being quasi-scientific. Ethics does not consist of the completion of a series of tick boxes of an approvals committee. More fundamentally, to make of the fish an instrument, even one whose cognitive and communicational processes 'complete' the work is to curse it. Art for animals proposes instead that animals have a necessarily ontological world-making dimension. As such an ethico-aesthetic approach disrupts the normal great chain of thought, that starts with ontology, proceeds through epistemology and ends with the mere implementation details of ethics and aesthetics. It suggests that each moment of each scalar state is riven through with such figurations and modes, without any gaining an a priori superiority or precedence to the others.
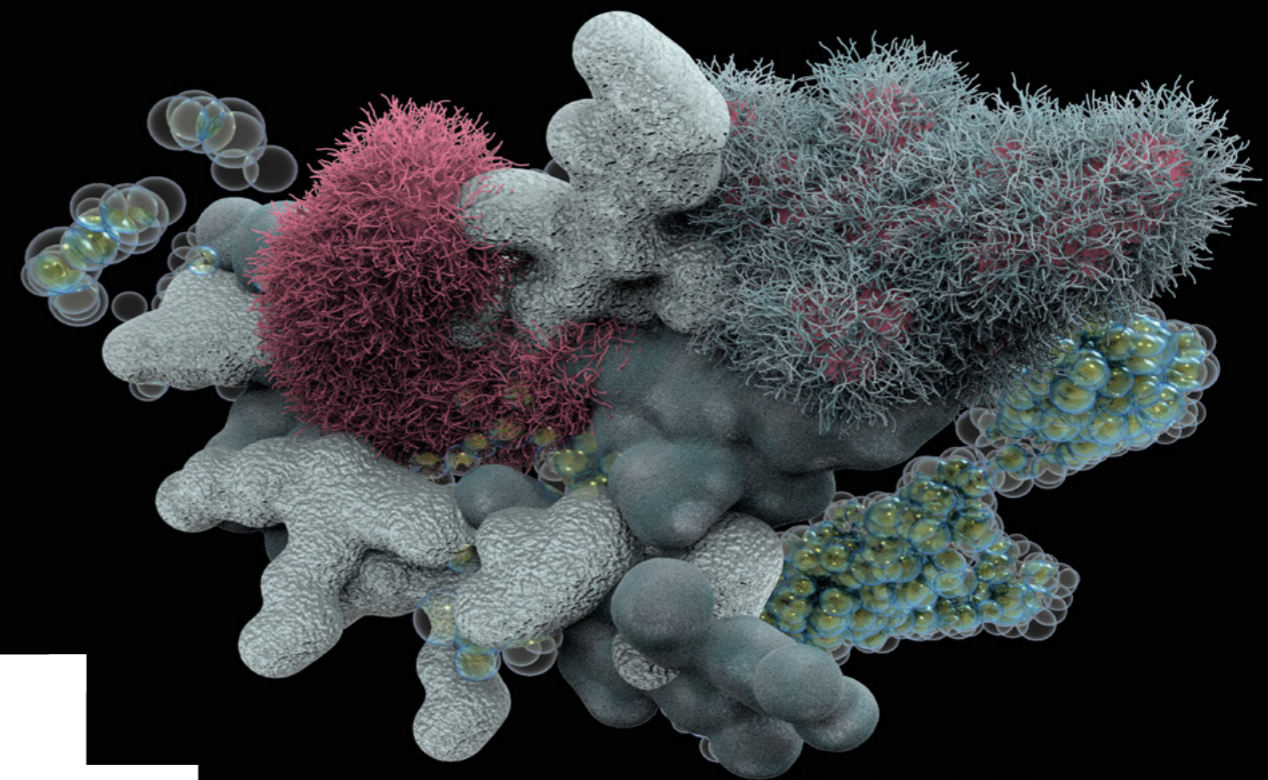
Electronic art is trivial and boring when it simply confirms the inter-relation between sensors and responses. Art using animals is trivial and abusive when it locks animals into devices that deplete its involvement in and creation of the world rather than supplementing it.

This given, the last listed of Louis Bec's projects in this series is particularly interesting to attend to. Ichthyophonie / PanGea is an attempt to develop a communication network between two families of fish using electric signaling, location finding and, more fully, echoperception. These two families, the Mormyrids located in South America and Gymnarchids in West and Central Africa, originally sharing an early common ancestor, were split apart into different phylogenetic branches by the movement of continental plates as they broke from the early super-continent, PanGea (or Panagea). As yet unrealised, the plan involves setting a network of sensors / actuators in the habitats of these fish which are to be connected to each other via internet. This would allow the communicatory behaviours of these fish, at least those transferable by such means, to enter into some kind of sense of co-location with the possibility for sensorial interplay: perhaps, evoking and probing remnants of shared signaling; or perhaps simply adding a small sizzle of now meaningless noise to a particular patch of water. Perhaps too, it is something else, a paradox: something that tickles the fishes' curiosity, changes the economy of their attention, dislocating their access to the virtual.

In this respect, Enki also establishes some interesting possibilities for further development. Electroperception in electric fish has some very special qualities. Electric waves move in curved rather than straight lines, and the reflections produced typically become larger the further they are from the object – so this is something rather different to the capacity for orientation via sonic ecolocation or by vision. These fish can also produce concepts of the objects in the sense of abstract categories that are transferable across entities they may encounter. In other iterations of the project, Anthony Hall set up a context in which no human was attached. The fish's signal was picked up by one or more electrodes, typically placed in the corner of their familiar tank. This signal was then fed back to the fish in a different corner of the tank. Because the fish perceive the world in waves, the effect of this can be imagined as being something similar to pushing a limb towards a mirror only to have it 'reflect' via a wall behind you, an experience Hall recounts as provoking much curiosity in the fish. When two weakly electric fish of either of these families meet they go through a process of modulating the individual frequency of the current they give off in order that each can maintain their own signal or refrain. Interestingly, the signals produced by the fish in this context do not carry this 'handshake', suggesting that they recognise themselves in this substantially distorted context, one which they spend time in exploring.

"Je weet nooit hoe een koe een haas vangt"
One way in which art for animals might progress is along the lines suggested by biosemiotics or zoomusicology. Biosemiotics is concerned with the transmission of information as part of living processes, expanding the domain of signaling from that of DNA, to molecules, the interoperation of body parts and systems to the function of organisms and out into other scales of ecologies. Coupled with this, it is a field which develops an idea of a more generalised domain of semiosis, such as communication, subterfuge, courtship and ludic enjoyment configured at the level of the organism or, as with Bateson's ecology of mind, in interactions between organisms. Of importance here too is a notion of aesthetics, of the configuration of beauty. This is something that has been present in a certain way in biology from Darwin's work on sexual selection, and threads through to sociobiological accounts of beauty configured as attractiveness. Amongst other creatures, Deleuze and Guattari draw upon the

stagemaker bird, whose pergola is an example both of an extended phenotype and an exuberant courtship display. It is usually taken to be a highly nuanced example of aesthetic judgement involving dimensions that are spatial and colouristic, having to do with the freshness of materials and their inter-composition. For them, this constant act of the compilation, sorting and arrangement of materials epitomizes an enactment of territory as rhythm within the melody of ecology.

In many accounts of a possible animal aesthetics there is a dance performed around the threshold of functionality or expressivity configured as being demarcated as that which is gratuituous. This dance may pass through various sub-thresholds according to whether expressivity corresponds to a given stack of drives and needs, to evoke curiosity, to learn, to mate, to eat, to dominate, to play. Where this dance gets stuck is to read these as purely obligatory functions or, in a bipolar switch, as being utterly 'free' – without inter-relation with other compositional forces or constraints. This is part of the terms of their composition, but the dance around their thresholds might also usefully recognise the dance within each of these scales themselves. For instance, in a dance within the scale of play as play, comes the dance of the mimicry of mimicry, one which opens out onto all other scales. Such a dance between gratuitousness and functionality needs to be recognized within the context of the general economy. Bataille's substantial contribution to the intellectual work of ecology in which all, drives included, are ultimately gratuitous. As such it is a liberation and a curse which can only be remedied, or modulated, by being entered into with adequately vivid forms of life. Any point in this stack, or others not named or yet to be invented may tip this dance into a new rhythm. Each element of this stack whether operating as drive, function, play, may become more dislocated or increase its capacity of dislocation for a moment yet to come. Equally, in this dance between scalar function and cosmological gratuitouness, elements may exist across many assemblages functioning in different terms in each, as anchors, blocks, voids or torrents. It is taking part in this movement, doubling it by means of reflexivity – in this case, not simply the reflexivity of a single mind or within the scalar boundary of a compositional entity, but its multiplication by an ecology of sensoria, that art for animal emerges.

Whether it is paint, wood, chrome, text, scent, move, sound or leaf, art works with and through materials that are direct to hand, to thought or to experience, but which also anticipate their coming into composition, their recomposition, with, or by means of, other elements; art may require work from primary natural forces in order to become complete. Think of Edward Munch's habit of leaving his oil-painted canvases out in the rain for weeks in order that they may be worked upon by it. It may be suspected that something of the same happens in the philosophy of Deleuze and Guattari, something which brings it closer in practice both to art and which allows it to produce itself as a receptive domain in which ecologies of texts, histories and ideas, occur, spawn and leave their traces. This is philosophy which leaves itself out in too many weathers. In doing so, they form new relays with ecologies.

Before they too become mulch, those who advocate purity of the discipline now have their turn to rain upon this work, so go the almost inevitable recalls to reason. But this is philosophy. With two thousand years worth of beard to avoid tripping over it is almost compelled to immobility. This, disciplinary automatism masked up as a holy stillness allows it to position itself as a meta-discourse towards which all other fields, not simply philosophers, must meaure their orbit and meet their judges. Art is in a certain way equally ambitious; it will admit of no limits. But only in so far as it provides a means by which, in a deeply amateur way, by means of the art methodology of unreadiness,
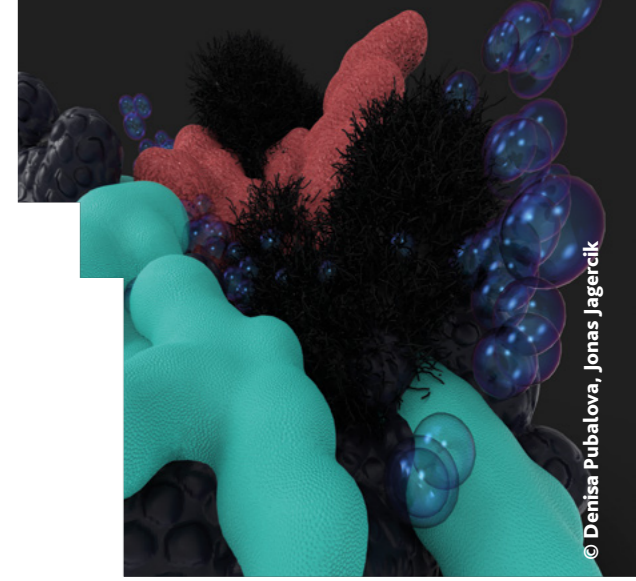
it comes into composition with other techniques of working. Whilst other discursive frameworks cannot by these means become mastered, they can always be used.

Whether this capacity really does extend to the sensual, semiotic and world making capacities of animals is something too that needs to be left outside to see what happens.

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__PARROT ENCOUNTER

Rébecca Kleinberger

I grew up on an old farm in the French countryside, about an hour west of Paris. After school, I spent my days building sheds and tools and caring for sheep, bunnies, and chickens. My interest in machines brought me to study mechanical engineering after college. But years later, while a researcher at MIT, my fascination for animals led me to shape my Ph.D. toward interspecies interactions and nonverbal communication. I have worked on systems that recognize panda vocalizations, augmented incubators to establish vocal communication between parent birds and their eggs, and approaches to better listen to animal voices in zoo soundspaces. It is in this context of my work on Animal-Computer Interaction that I started working with Parrots.

Some people say cats teach children the importance of consent. I would add that parrots can teach researchers the importance of relationships. I first met Sampson in 2017 when my friend Gabriel Miller, a preservation technologist at the San Diego Zoo, gave me a tour of the zoo behind the scene. I was privileged to have private encounters with several vibrant individuals. I met Crikey, the kookaburra, accompanied by his caregiver Becca who gave us a demonstration of his vocalization. I learned that he sometimes converses with his sister, who lives across the zoo. I also met with a cheetah, giraffes, flamingos, pandas, and a small colony of Andean cocks of the rocks introduced by their familiar Eric, who knows the art of whispering in the birds' ears and sings along with them.

But Sampson was something else. This 18-year-old hyacinth macaw (Anodorhynchus hyacinthinus) only had eyes for Jenna. Until a few years prior, Jenna Duarte had been Sampson's primary caregiver, and you could see he didn't forget her. Jenna is a bird lover, but as per the zoo rules, caregivers are on a rotation schedule to ensure that animals become familiar with different humans and do not create too deep a bond with their keepers. Over the years, Jenna had witnessed the bird's love for music and was the one who came up with the idea of providing him with a way to play music by and for himself.

This first encounter was quite short. Jenna wanted to demonstrate Sampson's dance move, and she played heavy beat music on her phone while holding the special mobile perch with Sampson on it with her other hand. Sampson was initially a bit shy because he had a little crowd around him but then started dancing to the music while Jenna sang to it. After several brainstorms and design sessions with Gabe, we designed the JoyBranch, a joystick hidden in a log and controlled by a literal "stick sticking out from it". Moving the stick controlled the trigger of various preselected music pieces. Game developer David Su, and music technologist Akito van Troyer were invaluable in helping build the system. I am also grateful for the support and mentoring in this project from Janet Baker, an MIT research affiliate.

The second time I came to the zoo was a year later. We were then welcomed by Michelle Handrus. Sampson's current caregiver. She was a great help in running the intervention. Every morning for a week, Gabe and I would arrive at the zoo at 7 am before opening and we would install our device in Samson's outdoor enclosure. Then at 7:30, as per his regular schedule, the macaw was brought in the enclosure by Michelle from his night chamber. We observed Sampson's reaction for 30 minutes with it for a week.

We truly didn't know what to expect. Our worst-case scenario was for the bird to totally ignore the contraption. In the ideal case, he would go to the device, discover the trigger mechanism on his own, repeatedly activate the device, play music non-stop, and find clever ways to unambiguously show us – the human experimenters – that he understood and enjoyed it, then he would thank us by buying us a beer at the pub next door. Alternative in-between scenarios included: getting attracted by the device but not being able to trigger it; triggering the device without understanding he had agency (or without being able to show that he understood); activating it a few times and getting bored; oh! and also reducing it to shreds with his insanely powerful beak. What we weren't expecting was for the bird to completely outsmart us.

We purposefully didn't want to train him on using the system or reward him with treats or congratulations when activating the branch. Because we didn't want him to do it "for us". "We shouldn't bias him"; we thought. This is why we ran the experiment when his caregiver was out of sight from the bird. After all, the point of the device was really for him to entertain himself when humans are not around to play him music. As per the specifications of the protocol description we submitted and had approved by the zoo Institutional Animal Care and Use Committee (IACUC) the experimenter had to constantly be present and observe the bird during the protocol. That is to say, Sampson didn't leave my sight.

The first day was purely incredible. He immediately seemed intrigued by the new object and gauged it from a distance. After a few minutes, he came closer, observed it more closely, and started nibbling the tip of the branch with his beak. Branch nibbling is a natural parrot behavior associated with beak grooming. Beaks are multipurpose organs that parrots use for eating, preening, climbing, grasping, defense, playing, touching, and vocalization. They are extremely powerful clasps capable of a stronger bite than a large dog while also having very fine dexterity and capable of gently peeling peanuts and individual grape berries. The beak is constantly growing but tends to stay a relatively constant length because the bird is always wearing it down at the tip as it eats, climbs, and plays. In particular, parrots have a small area under the upper mandible they like to brush by nibbling on branches and sticks.

But let's get back to our JoyBranch. As Sampson started to nibble away at the branch, he was promptly interrupted by Daft Punk's "Get Lucky" playing on a nearby speaker. He stopped, looked up, seemed interested, and started bobbing with the rhythm, but just as the music started fading away because he had let go of the stick. Indeed, for ethical reasons, we had programmed the system to fade the music when he was not holding the branch. He seemed slightly disappointed, restarted nibbling the branch and appeared very happily surprised when this retriggered the music. At the end of the first session, it appeared that Sampson liked his branch, and liked the music but didn't yet make a clear connection between the two.

When we came back the next day, Sampson came right away to his branch and gently nibbled at the JoyBranch for a long time, triggering Culture Club's "Karma Chameleon" that he seemed quite to enjoy. He stopped only for short dance moves until he returned to munch away at the branch because the music started to fade. Because of this, the sound played quite continuously. Then after a few minutes, something quite incredible happened. While still holding the branch with his back, Samson stopped chewing and stayed immobile, maintaining the joystick in a trigger position. When showing the video later to his caregivers, they both said this was the moment when he understood that holding it still would keep the music playing. They confirmed that they never saw him do this with other branches, that he was not just doing a natural behavior and that there couldn't be any reason for this behavior other than keeping the music playing. This was quite extraordinary to us! But the story doesn't end here.

What we had also started to realize, and it got confirmed in the following days, was that Sampson's behavior seemed to change with the presence (or absence) of people around him – with the regular zoo visitors and myself, the experimenter who was standing in a bush in the vicinity the entire time to ensure that the device would not cause issues, discomfort, or stress for the bird.

The zoo visitors are an important component of Sampson's life. During normal times, the bird spends a lot of time looking at the visitors, following them, talking to them, and "showing off," as his caregiver would say. The bird seems to have preferences over which visitors or groups of visitors he dedicates his attention to. For instance, he is more active when children and frequent visitors come by. But the visitors are free, and they have the agency to walk away or look at the map or other exhibits. Often when they leave, Sampson is still focused on them and trying to interact. We noticed and confirmed through qualitative data analysis that Sampson started to use his new tool, the JoyBranch, as a way to attract and keep the attention of visitors. Indeed, who wouldn't be amazed by a parrot DJing on Michael Jackson and showing his synchronized dance moves?

On the third day, during the JoyBranch intervention, I wanted to see if the bird would still use the device if left alone. The zoo was not yet opened, so there were no visitors in sight. I left my bush where Sampson could clearly see me and went to hide in a slightly further spot, inside a glass aviary nearby, where I could still observe him but where he could not see me. Not only did he not show interest in the device anymore, but he also started a long series of loud calls and repeated body and head rotations as if he were searching and calling for me. The interpretation of those behaviors was also confirmed by Michelle and Jenna, who later watched the video "I think he's surprised, hey that girl's not here" and "Well, he's like looking for you." This behavior lasted about five minutes until the bird walked to the JoyBranch and activated it while still calling. After release, he resumed looking around. Once the music stopped, he then used his feet for the first time to hold the branch, which allowed him to keep the music playing while still looking around. This is when I came back from hiding. As soon as I was spotted by the bird, he released the branch and stopped calling and searching for the remaining time of the session. Instead, he seemed quite happy that he had found a new, more comfortable, and ergonomic way to hold his branch, which allowed him to keep it triggered for longer periods of time without getting tired. We were not really expecting that, and the system was just programmed to play in a loop. Because of this, I heard Billie Jean over eight times that day. In the end, I was almost begging him to stop!

More than a demonstration of a need to perform for an audience, this episode spoke to the need for company, companionship, and establishment of rapport.

The use of the device by the bird suggests that Sampson combines the simple enjoyment of listening to music with a more elaborated schema to attract and maintain the public's attention. He appears to use the device as a means to an end, and he funneled his agency into a careful control of the visitor and experimenter's attention.

__AR S FOR(IN) NON(ALL):

A STORY OF ENCOUNTERING WAN-WU 萬物

oxi pëng

不到園林,怎知春色如許?
— 湯顯祖, 牡丹亭 [1]

K Allado-Mcdowell: I was lost in a forest.

GPT-3: The forest wanted me to be lost in it.

— Pharmako-AI

C— even in ethics, heart

of a sheep and maw of a wolf, and no crocodile tears.
— **Baptiste Morizot**, Ways of Being Alive

° °the f °a   °l   l   °   ° — encountering "wan-wu 萬物"

it is on our way back to the cabin located in the midst of the family-grown plantation on faial island where i find myself dissolved into manifolds of sensuous living forces. early evening after the soft spring rain passing by as temporal beings, the path formed by the lush vegetation melts into glowing greens in sunlight. the plants are entangled in a transient state of (re-)formation – they melt, then find their shapes again in kaleidoscopic fractals, pulsing, shimmering from within. my vision is filled with different shades of green: light green, velvet green, concave green, moisture green, feathery green... until a moment when i feel that my body starts to melt with them, dissolving into nothingness.

This nothingness is so vast, vast but not empty

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during the 'fall' i discover a spider web sculpted in front of our window. the web reflects sun-rays into forms of rainbow. i look closely, observing how each string carries a different path and colour. these paths shine in light, permeating through infinity. suddenly, a stream of consciousness ripples through my body: our worlds are made of webs that are interwoven by various sources of strings. when i fall, there are always webs overlapping into beings that carry me away from the ground, to touch me, to hold me. there is thus no 'ground' but the fall, and the unaccountable webs. i am falling, giving myself to everything that surrounds me and within me. i am carried away by the webs, and gradually become one of the tiny translucent threads that fabricate the worlds.

slowly sun starts to set. we walk through the jungle to the field beneath the open sky. clouds float near, becoming alive in the pink twilight. i have never experienced this much of open landscape: as if in a chinese ink painting, horizon extends as contour of the mountains, up hills, down hills, delicately extending into the galaxy... and further away there is ocean.
i could hear the blue, wind passing through the corn fields, cattle and cows, birds, dogs, crickets, bees, puddle and ponds, volcanos, tumbling streams, a feather falling from a seagull's tail, cars making turns, some local music coming up from down hill town, the earth...
i hear lives, and the flowing deaths intertwined within—every single molecule speaks. i hear them breathing, shivering, transforming, being here. yes. they are here with us, always here, becoming us, multiple us.
while being held by such enchanting togetherness i realised that perhaps the idea of loneliness might be ultimately anthropocentric — how can one be lonely when breathing with such myriad happenings that are present with(in) us?

"let's go to the sea," the elf suggests.

guided by the midnight creatures awakening from their lucid sleep, we pass the 'miyazaki' alley ways covered by springy leaves and nightly petals. once again, the polyphonic presence of crickets, frogs, lizards, 'laughing' of the seagulls, spirits, spectres, holy ghosts...wraps us in layers and layers of ineffable frequencies that make our hearts vibrate in liquid warmth. as we slowly approach the ocean, an abandoned church appears in its dark shadows. at this moment, a certain unexplainable fear comes upon to the surface. i could not figure out the origin of such fear, knowing that these creatures would not harm me. though that fear emerges in tangible affects that make me tremble. i ask myself, is it the fear towards the shadowy space? the darkness? the unknown? why is it there? does it come from the constructions that i have been consumed throughout my 'civilised' life? or searching for light itself is something embalmed in the nature of my kind? or perhaps the fear comes from an owe of the purity and the rawness of the humongous stones, the boundary-less ocean bed, the traces of time passing on the silent concretes of the burned church — it is the magnificent wilderness unfolding itself in the shadow that startles me, perhaps.

but soon the fear is taken away by the lullaby of waves. along the coast we find edge of the hill where we could see the ocean. carefully, we get down and creep over the fences. without knowing how steep the cliffs are, we slowly lay on the fluffy grass. sensing the embrace of the web fabricated by volcanic vegetation underneath, we turn our body towards the velvet sky.

—————————— ding ——————————

this is the moment when we fall into stars.
cradled by the whirling waves of ocean,
we fall again,
in the rippling shimmers among darkness,
gracefully,
without fear.

The shimmer — approaching "wan-wu 萬物"

An embodied journey which disorients reference points of 'the social' and 'the culture', it was during the fall where I encountered shimmers of "wan-wu 萬物". May not necessarily be regarded as part of 'human-oriented experience', this encounter allows me rediscover vibrant momentums of being alive. Being alive, not in the sense of living as an (overly-celebrated) "individual", but living in the sheer vibrations that hold us together as relational symbiotic organisms — an alien kinship among "wan-wu" to be the very power of gentleness that touches the earth.

But what is "wan-wu 萬物"?

Deeply rooted in ancient Chinese wisdom—3, wan-wu 萬物, translated as "myriad happenings" or "ten thousand things", arose from the 6th century BCE, is a way to experience worlds. Linguistically, "wan" means ten-thousand, and "wu" indicates objects, things, happenings, phenomena, among others. From a Daoist perspective, "wan-wu" does not simply limit itself within the quantitive account of objects and things. The figure of "ten-thousand" rather refers to "manifold", "particular", "manifest", "emergent", and even a bit "miscellaneous".—4 (Farquhar, Zhang, 2012) Such ambiguity and in-between-ness, often flowing in traditional Chinese rhetoric, give space to wan-wu's interpretation and levitate it as an open sphere which harbours every single existence that vibrates in (and in between) the cosmos. Within this context, if the humans are but one of these ten thousand things, or even if each human is only one of a myriad of always emergent objects, things, or phenomena, there are new possibilities of entanglements which enable us, the modern human creatures—5 in the midst of the sixth extinction of species, to re-create our relationships with, and among non-human creatures and to further imagine novel ways of living and relating to the one and many vast, unbounded, infinite worlds of wan-wu.

In **Ways of Being Alive**, Baptiste Morizot suggests that the ecological crisis that we are currently facing is "more than a crisis in human societies on the one hand, or in living beings on the other, is a crisis in our relations with living beings." He furthermore articulates that "the crisis in our relationships with living beings is "a crisis of sensibility", that is,

> "an impoverishment of what we can feel, perceive, and understand of living beings, and the relations we can weave with them – a reduction in the range of affects, percepts, concepts and practices connecting us to them.
> We have a multitude of words, types of relationships and types of affects to describe relationships between humans, between collectives, and between institutions, which technical objects or with works of art, but far fewer words for our relations to living beings. This impoverishment of the scope of our sensibility towards living beings, of the forms of attention and of the qualities of openness towards them, is both an effect and one of the causes of the ecological crisis we face. –6
> (Morizot, 2022)

In our attempt to understand the (so-called) non-human realm of existence, it is precisely because of this "impoverishment", this lacking of multitudes triggered by blocks of sensibility towards sensuous beings, the living worlds are overwhelmingly reduced into anthropocentric standardisations, naturalistic predictions, and capitalistic categories that "fall outside the field of collective and political attention, outside the field of what is deemed important" (Morizot, 2022). Such exclusion of 'human importance' then normalises the following condition – The living worlds have

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Here i would like to emphasise that the concept of wan-wu is not ancient Chinese exclusive. It resonates with many different branches of indigenous practices across continents.
I would like to regard it as a gift from our mutually shared ancestors and spirits regardless the sociopolitically-constructed borders and nationalities.

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Judith Farquhar, Qicheng Zhang, Ten Thousand Things: Nurturing Life and Contemporary Beijing, New York: Zone Books, 2012, 14.

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By 'modern humans', I meant everyone who participates in the process of global production and consumption chain.

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Baptise Morizot, Ways of Being Alive, Cambridge: Polity, 2022, 4-6.

been taken for granted as resources, massively redirected into market economy and production chains in which their primary goal is to maintain the flaccid politics of profit-optimisation. This normalisation intrinsically constitutes a collective blindness of the modern humans in relating to their living environments. The daily relationships that one can experience with living beings has been traded into the trans-humanist hyper-reality while we build information superhighways, smart-cities, digital surveillance, 5/6/7G industries, upgrading craftsmanships into NFTs ... As i took the airplane traveling to Faial Island, residing myself in the midst of the plantation where the forest was filled with that "layers and layers of ineffable frequencies" of the wilderness, i asked myself, how much can i distinguish the song from a Black Bird to an Azores Bullfinch? How much am i able to decipher its geopolitical signals, territorial negotiations, playful contemplations, sublunary quarrels...to release these warbling fables from being just 'white noises'?

I have no direct answer to it when considering myself as someone who was born in Beijing in the early 90s, grew up in the U.S, the U.K, and Germany while experiencing the power of post-colonial history, philosophy and art in my own education; as someone who navigates herself among the confrontations and confusions of Sinocentric and Eurocentic "cross-cultural" institutions as primary self-presentation with (more or less) a narcissistic affiliation to these cultures and languages as my own human glitches. I wished that i have grown up in the forest. I wished that i could have chosen a different field of study. I wished that i could have a little bit more time to learn about the living worlds that have nurtured me. I wished that i were able to afford such time, not to 'produce' for paying the escalating rent but to 'create' for a living...But this logic is all-too-human after all.

During the encounter of wan-wu, myriad happenings guided me throughout the journey to re-sense and re-connect the fundamental kinships among sensuous beings. The green ferns welcomed me to diffuse in the shimmering fractals. The spider invited me to weave stories of rainbows. The abandoned church and the ocean asked me not to forget myself as one of the social-political beings in human society, but also to remember this very 'social-political being' exists as a sensuous being who is made of water, fire, wind, dusts, trees, bananas, whales, birds, ancestral traditions, pre-historical memories...spirit and spirits that are entangled with multiple spaces and times. I heard a trans-species, trans-material love poem from the wind whispering in my feathers, reminding me of communication among sensuous beings is actually the 'mother tongue' gifted by the living worlds: we were born to be capable of developing communion with various living beings without the need for any metaphysics.
In this way, encountering wan-wu was a process of embodied unlearning about what one might believe one knows; a process of decomposing the dominate hegemonic understanding of the so called "nature", "animal", "technology"... a process of cultivating sensibilities towards our mutual shared differences, from gender, racial, physical differences to species differences, technological differences, material differences... If we may travel through the spiral of time and revisit the constellation of wan-wu, we might be inspired to (at least) move, hear, see, touch, sense, speak, create, sculpt, dream... in a different manner, paving the way for new openings to emerge. If you, my dear reader-storytellers, are with me in this regard, then the next question worth to discuss is, as proposed before – how do we activate that imagination to re-create relationships with(in) wan-wu? And this is, perhaps, where Ars for Nons could make a difference, even just marginally.

萬
物

The practice: wan-wu 萬物 = Ars for(in) Nons(All)

天地與我並生, 而萬物與我為一。
— 莊子, 內篇 齊物論 [7]

What is Ars for Nons? Considering the preposition 'for' indicates intention of giving, or intended to be given to, then who or what is responsible for enacting the "Ars" for the "Nons"? And what could be considered as the "Nons"? Putting it in the flattest description, "Ars for Nons" refers to arts for non-humans. However, it is not in the concern of this piece of writing to define Ars for Nons per se, but to bring about possible fabulations of what Ars for Nons could become, as activation of re-creating relationships with(in) wan-wu. To illustrate this fabulation, we may first come back to the concept of wan-wu.

In Equality of things, Zhuangzi writes, "Heaven and Earth were born with me, while wan-wu and I are becoming one. " Here, "Heaven and Earth" refer to the cosmos, the living wilderness. "Me" indicates the human creatures. Zhuangzi believes that wan-wu, including the "heaven", the "earth", the "me" exist in one ever-merging assemblage. To my naïve understanding of Zhuangzi's Daoist practice, this assemblage is not a static entity, but a vibrant creature that constantly undergoes transformations. One of these transformations could be considered as an ongoing process of becoming the other side of itself in relations. For example, the yin and yang. Yin is constantly becoming Yang while Yang is growing into Yin. It is crucial to note that Yin and Yang are never oppositional and shall not be interpreted as dualistic separations. In fact, they exist as co-dependent states. Originating from the cosmic cycle of nights and days observed on earth, Yin (nights) -Yang (days) later becomes the "way (dao 道)" to describe "nature-as-it-is 自然" [8]. From this perspective, Zhuangzi proposes that there is no absolute 'good' nor absolute 'evil' in the universe because everything evolves and responds in relations, as part of the wan-wu assemblage. In addition, this idea suggests a radical de-centralisation of what Freud and Lacan refer as the human 'ego' — to let the 'ego' dissipate into myriad happenings, to respect 'nature-as-it-is' for not disrupting the 'nature' being 'as-it-is', and to recognise that we are all micro-parts of that cosmic web, sophisticatedly interwoven together by each shared memories, molecules, matters, various invisible affiliations and attachments…entwined in threads of flowing lives-deaths.

At the same time, another crucial aspect of wan-wu suggests that the dissipation of human ego does not mean to fetishise non-human realm as the alter-well-behaved utopia without any violence nor decay. Nonhuman entities shall not be overly romanticised, just like wilderness shall not be overly romanticised, just like technology shall not be overly romanticised, just like the 'global south' shall not be overly romanticised. Because in either ways, such romanticisation out of 'guilt', be it innocent or not, might ultimately lead to the danger of re-producing and re-enforcing that crooked anthropocentrism which we tried to emancipate from. As suggested previously, Zhuangzi's writing on wan-wu imagines a mutually shared space for happenings, phenomena, things, living beings to emerge and to interact with one another without imposing pre-constructed labels nor categories, meaning that the modern human creatures must learn how to let everything be 'as-it-is', as one of the most profound Daoist practices – acting without actions (無為).

Within this context, **Ars for Nons** comes to light as a paradoxical approach to the nonhuman realm. At the most superficial level, if 'arts for nonhumans' suggests certain political sentiments from artistic practices that are intentionally created for nonhumans, then it on the other hand makes assumptions 'for' the nonhumans from

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"…Heaven and Earth were born with me, while the myriad happenings and I are becoming one." Zhuangzi, Inner Chapter, The Equality of Things. Translated from ancient Chinese by the author.

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Here I borrowed the term from Zairong Xiang. In his Queer Ancient Ways: A Decolonial Exploration, Xiang articulates the complexities between 'nature' from a western perspective and 'nature' from an asian perspective. Within the context of ancient Chinese philosophy, 'nature 自然' does not necessarily refer to trees, animals, rivers, the wilderness, but the diverse 'orders' of the cosmos, be it chaos, harmony, or states in between. Therefore I use 'nature-as-it-is' to emphasise its relational context.

the perspectives of the humans. This may trigger an unequal dynamic of power which once again centralises the humanist desires over the 'Nons' and further contradicts the humble intention of what **Ars for Nons** may originally strike for, that is, **Ars in All** – to give and receive in a reciprocal way, to create and share in multiple directions (i cannot help thinking about how much 'ars' the sensuous beings have created for me and with me during my experience of 'encountering wan-wu'), realising the 'nons' and the 'humans' all belong to that "ever-merging assemblage" of wan-wu.

However, this is not to deny the ontology of **Ars for Nons** but rather to refuse to accept the monopoly of terms, because contradictions can be intriguing treasures for experimenting new modes of co-existence. They unfold the complexities of entangled phenomena and are necessary in the process of initiating changes. As discussed in the previous session, it is what Baptiste Morizot calls 'impoverishment' of words, types of relationships, types of affects, constituted as technical objects, literature, and works of art that the modern humans are becoming blind towards the 'nons', as well as their own non-human existence within and outside of the human constructs. We shall not neglect such destructive impoverishment that puts wan-wu (human being part of it) at stake. **Ars for Nons** is thus urgently needed as new-age mantra to activate that very awareness and sensibility towards the wilderness, as well as the humankind – to fabulate 'Ars' as 'openings' and to experience '**Arts for Nons**' as embodied practice learning how to cohabit with the wild dynamics on a daily-basis:

practice listening.
practice noticing.
practice letting go.
practice opening up.
practice seeing with eyes-closed.
practice not to 'think critically' but to 'sense' critically.
practice landing still.
practice fading out.
practice letting tears drop.
practice holding hands with trees.
practice hugging yourselves softly.
practice not to be afraid of loving.

In this light, Ars for(in) Nons(All) grows into an ambient meadow, a pre-historical cave sculpted by wind and passing time, a serenade sung from the nightingale migrated from futures; it grows into a painful process entangled with joy, with the moment of bubbling up to the feeling of breathing freely; it grows into a lucid algorithmic dream disfiguring the pre-established archetypes – it grows into the threshold path that leads to a secular temple where there is no linear dropping of a 'line' which distinguishes the 'Nons' and the 'non-Nons'. It channels the moment where we are standing now, half-sleeping and half-awake, to pulsate futures where live many entangled worlds, the worlds of contingent happenings, the worlds of none and ten thousand things at the some time. And within those worlds, may we be able to speak our 'mother tongue' again to truly see, hear, touch, smell, taste. Or perhaps we may fall, fall into stars, fall into the rippling shimmers among darkness, gracefully, without fear – I would like to make it happen right now; may I invite you to join?

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__DYING FOR AN iPHONE

Karin Fischer

"I am dying for an iPhone" – You might think that is a mantra of a consumer yearning for the most iconic electronic gadget of the twenty-first century. It is not. In 2010, eighteen workers, all of them aged between 17 and 25, attempted suicide at Foxconn, the main supplier of Apple. They threw themselves off the worker dormitory in despair over and in protest against the harsh factory discipline. About one million supply chain workers assemble iPhones, iPads, Macs or Play Stations at Foxconn's manufacturing plants. The great majority of them in China. The suicides at Taiwanese-owned Foxconn in Shenzhen, China, lifted the otherwise anonymous supplier companies of the big brands out of anonymity and brought their appalling working conditions into the public eye: low wages, compulsory overtime, lack of health and safety precautions, abusive treatment of teenage student interns, and managerial repression of workers' attempts to press demands for securing rights guaranteed by employment contracts and national labour laws (Chan et al., 2020).

Global value chains

Many consumer goods are currently produced within globally interconnected production structures (Fischer et al., 2021). Particularly the electronics industry global value chain is one of the most complex and globally fragmented industries. According to the company's website, Apple sources in over 50 countries. Taiwanese suppliers deliver accelerometers; phone network components come from Germany. Memory and applications processors are delivered by South Korean suppliers but – for cost reasons – are assembled and tested by workers in Chinese and Vietnamese electronics processing factories. The list also includes, without claim to completeness, suppliers from Japan, Italy, Malaysia, the Philippines, India and Mexico. Global value chains are mostly governed by powerful transnational corporations. They set the price, volume, delivery requirements and quality standards that the suppliers have to meet. More often than not global lead firms are "manufacturers without manufacturing". High value-added activities such as design and branding, research and development, and sales and marketing are located in the headquarters in the global North. Lower value-added activities – such as the production of component parts, assembling or testing – are outsourced to places where the workforce is cheap, disciplined and preferably not unionised. In the case of Apple, manufacturing activities are performed in whole or in part by suppliers located primarily in Asia. Foxconn, the largest supplier, is a so-called "contract manufacturer" and "first tier supplier". Besides assembling the final product, the supplier also assumes tasks of supply chain management for the lead firm such as distribution or logistics. Foxconn itself became a transnational corporation and directs a network of subordinate suppliers on behalf of Apple and other IT giants in Eastern Europe, Turkey and Latin America.

Unequal world order of global production

The different corporate functions in the global value chain correlate with the geographic distribution of jobs and wages. A study of Apple's iPod supply chain found that the majority of jobs are in China and other low-wage countries, but the majority of wages are paid in the home country, in this case in the U.S. Employees in the U.S. account for 70 percent of the total wage bill, while those in China account for only 2.2 percent. This illustrates the hierarchical division of labour between core and periphery, between global North and global South. At Apple´s headquarter in Silicon Valley, designers, product developers and supply chain managers are employed, whereas in China most workers toil on the assembly line (Linden et al., 2011).

Another way of showing the hierarchical world order of global production is to identify who captures how much of the created value in a global value chain. A study on Apple's iPad shows that the primary benefits – almost 60 percent of the sales price – go to the lead firm Apple, its shareholders and the U.S. economy. Far behind Apple, Korean-based suppliers such as LG and Samsung, who provide display and memory chips produced in Vietnam and China, account for the second largest share (4.7 percent). By contrast, there is little value in electronics assembly with workers in China receiving only 1.8 percent of the sales price of an iPad (Kraemer et al., 2011). Apple controls the lion's share of profits because it keeps most of its monopolised "core" or high-wage functions at the company headquarters. Maybe even more important are the profits from intangibles. The brand name is a driver of value capture just as patents and licences are. Apple benefits from its intellectual property and takes advantage of IP created by suppliers through a strategy of selling only a few models at high prices. It also benefits from the exclusive use of its mobile operating system iOS and non-interoperable hardware components to keep out competitors in its own eco-system (Dedrick & Kraemer, 2017).

Apple`s tax avoiding wealth chain

A share in Apple's super profits may also stem from its "global wealth chain". Apple and its corporate lawyers created a sophisticated tax avoidance model, based on subsidiaries in Ireland, the Netherlands and offshore financial centres. Apple's global business activities outside North and South America are organised by subsidiaries in Ireland where corporate taxes are extremely low. The subsidiary in Ireland that exists only on paper records all profits for Apple in Europe, the Middle East, Africa and India. Based on a tax deal with the Irish government, Apple Sales International paid annual tax rates between 0.005 percent and 1 percent in Ireland until 2014. Furthermore, group assets are channelled to offshore holdings in tax havens such as the British Virgin Islands. The model Apple developed to minimise taxes became a role model for other global giants like Starbucks, Google or IKEA (Bryant et al., 2017). In 2016, the European Commissioner for Competition, Margrethe Vestager, declared that Ireland "granted undue tax benefits to Apple" and ordered the company to pay € 13 billion of received tax benefits back. Both sides, Apple and the Irish government, appealed against the ruling and have recently received a favorable judgment from EU's General Court. The case is now pending before the European Court of Justice.

Human costs of an iPhone

Leading firms such as Apple have a high-pressure purchasing practice. To meet their demands, suppliers pass on the pressure of speed and precision on to the workers. An ever-shorter production cycle, high output targets and overtime requirements weigh heavily on the wellbeing of supply chain workers. Twelve hour-shifts on the assembly line with a single day off every second week are standard during busy periods at Foxconn when Apple comes up with a new model. At the same time, Foxconn expanded flexible employment to be able to react quickly to spikes and drops in global consumption and to the fluctuation of

orders. Not only do workers have to perform repetitive motions at high speeds without rest for long periods of time, but the interviews and diary entries that Jenny Chan, Mark Selden and Pun Ngai collected from workers at the Foxconn plants also testify to a militarised factory regime which "slowly dehumanizes the employees" (Chan et al., 2020, p. 61). Part of the factory discipline is enforced silence at the assembly line. Strict security measures prohibit cell phones in order to protect intellectual property rights and business data. What Smith and Pun (2010) called a "dormitory labour regime" extends managerial control into private life. Migrant, temporary and contract labourer live in employer-controlled dormitories at or near the global factories, in bunk spaces behind a curtain, alone with several hundred unfamiliar others (Smith & Pun, 2010).

What remains from the "chain of suicides"?

What developed from the tragic "chain of suicides" (Chan et al., 2020, p. ix) at Foxconn? The management of Foxconn ordered suicide-prevention nets around the electronics processing facilities and outdoor stairways of the dormitory buildings. The nets and the barred dormitory windows have remained ever since (Chan et al., 2020, p. xiii) – a symbol for a cynical response to the symptoms of human suffering. Apple distanced itself from all responsibility. It asked its suppliers to respect national labour laws and started a supplier responsibility program. However, without mandatory human rights due diligence laws, with legal liability mechanisms that sanction human rights abuses and environmental damage along the lead firm's global value chain, compliance and monitoring remain voluntary – and therefore insufficient. This is made clear by repeated worker protests and strikes for living wages and better working conditions, be it at Apple's supplier factories in China and India or at Samsung Electronics in Korea and Vietnam.

End iSlavery

It seems that the "digital revolution" together with its characterising supply chain capitalism created new conditions of enslavement. At the one end of the global value chain, in the global South, millions of iSlaves produce electronic gadgets under inhumane sweatshop conditions. At the other end of the global value chain, in the global North, are consumers who have become iSlaves in a very different way. Work, leisure time, entertainment, in fact all facets of daily life are no longer manageable without the latest versions of smartphones. The two types of iSlaves are invisible to each other, but firmly connected behind their backs. Do both find common ground? Is the time coming for an abolitionist movement to end iSlavery on both ends of the chain?

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_FALLING IN LOVE WITH A NONHUMAN.

Rita Phillips

Can humans have romantic relationships with objects such as mobile devices?

WHAT NONS GOT TO DO WITH IT COMMENTARY ON THE INSTALLATION ARS FOR NONS

Forming a strong romantic attachment or bond with objects or structures, also known as objectophilia, is not a novel phenomenon. The first known case of a romantic relationship with an inanimate object goes back to Eija-Riitta Eklöf, who fell in love with the Berlin Wall in 1979. Eija-Ritter Eklöf changed her name to Eija-Riitta Eklöf-Berliner-Mauer (engl. Eklöf-Berlin-Wall) and considered herself as a widow after the wall's destruction in 1989. More recent examples of objectophilia include Erika Eiffel who wedded the Eiffel Tower in 2007, Jodi Rose who married a 600 year old French bridge in 2013 and Michele Köbke who claims to be in a romantic relationship with a Boeing 747 since 2014. The present commentary examines philosophical differentiations and distinctions between human-object attachment and romantic relationships and discusses relevant ethical implications.

Humans have a tendency to attach themselves to specific inanimate objects that are of personal value. Normative levels of this phenomenon, also known as object attachment, exist across lifespans and can become sources of grief, if the object is lost. Examples for normative object attachments are a 'favourite skirt' or a 'lucky sweater' to which an individual may feel emotionally attached, whether this is aesthetic ('I like how I look when wearing this garment'), sentimental ('My father gave me this watch'), or superstitious ('If I write an exam with this pen, then I will get a good grade'). However, the object remains inanimate and serves a purpose.

If individuals perceive themselves to be in a romantic relationship with an object, then feelings of attractions are perceived to be reciprocal. This notion, also known as animism, means, that individuals in human-object relationships perceive themselves to be loved by the object, as the object is assumed to have a distinct spiritual presence. As such, animism stands in stark contrast to Descartic dualism, the tradition of differentiating between 'res extensa' and 'res cognitas'. While 'res extensa' are entities such as acting bodies, 'res cognitas' refers to the immaterial mind or consciousness. In Descartes' attempt to rid biology of its obsession with the psychic correlates of life, Descartes also insisted on a rigorous mechanical-materialist interpretation of vital processes. Similarly, Immanuel Kant differentiates between the subject and the object by distinguishing between psychic 'substances' that, drawn together, form the soul and the object as thing in itself. He also assumes, that all conceptions and qualities ascribed to an object inhere in the subject. Originating in the individual itself instead of the object, Kant suggests the feelings of attraction and love tied to a human individual in a human-object relationship.

This subject-object distinction has relevant ethical implications that are commonly overlooked in discussions surrounding animism and objectophilia. Central to Kant's construction of morality and ethics is the categorical imperative, which is based on reason and ratio. In the categorical imperative's second section, Kant emphasizes that human dignity requires humans never to treat others as a means to an end. Specifically, using a person like an object would not do justice to his or her dignity and personal freedom.

While an object cannot decide whether it wants to deliver a service or love someone, humans can. For example, a lorry driver may be required to do an agreed number of shifts, however, the driver has also a mutually agreed salary and days off to compensate for inconveniences. In comparison, the paterfamilias in ancient Rome had unlimited power over slaves. Slavery therefore takes away free will and dignity. While free will and dignity allow humans to perceive the world in subjective ways, human relationships with personified objects may have relevant practical implications that need to be further discussed. An example therefore is Eija-Riitta Eklöf traumatization after her husband, the Berlin wall, was what she perceived to be "killed" in 1989. This raises the question how subjective mental states, such as perceiving a spirit or consciousness in objects, can be dealt with on a societal level and what rights objects have.

In the past decades, debates surrounding the position of humans as acting, superior individuals and cultural beings emerged particularly within neo-materialist and posthumanist approaches. Here, critical investigations question binary categories and dichotomies such as human-nonhuman, examining various forms of living and existence. Under captions like 'beyond humanity', 'almost human', 'other-than-human critters', 'more than human' geographies, virulent discussions occurred querying the 'posthuman'. In this sense, the 'posthuman' represents an ambition to address the vital changes in human living. Neo-materialist and posthumanist considerations are reflected in legal vanishing points, either when things are regarded as political actors or contractual partners or when authors outline the anthropocentric limitations of the granting of human rights solely to human beings. Posthumanist approaches in law tend to decentralize the human and discuss rights for nonhumans. Examples for such cases are animal-rights, robot rights and rights for nature.

While the question whether specific rights should be extended to objects and things is not new (see Turing & Haugeland, 1950), recent developments in artificial intelligence have fueled the discussion surrounding the rights of objects. In response, the European Parliament has passed a resolution calling on the European Commission to develop civil law rules on robotics and artificial intelligence. It created a specific legal status for robots and AI systems. This status would allow holding the robot or AI responsible for any damage they may cause. The proposal led to considerable debate in the European Parliament, including an open letter from the experts to the European Commission arguing against the status of electronic personhood for robots. The complexity of this debate is further highlighted by practical examples such as Saudi Arabia granting citizenship to a female robot and Japan awarding residency rights to a 'boy' chatbot. Can the robot citizen and the 'boy' chatbot have similar rights as humans? Can the female robot decide to marry someone or the boy chatbot engage in a romantic relationship with a human? What rights nonhumans may have one day,
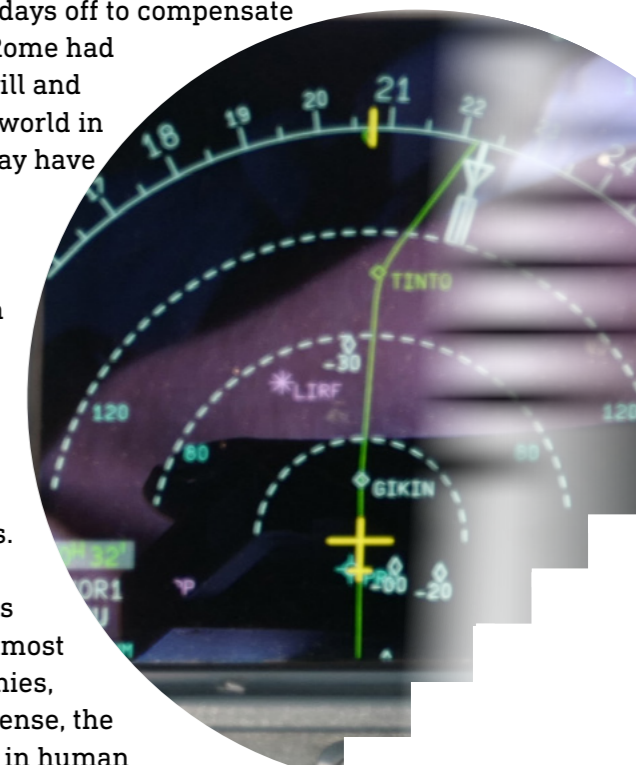
whether these rights may be accompanied by new responsibilities and whether nonhuman rights will intersect with our understanding of human dignity remains to be seen.

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__Protecting nonhumans

Stefan Laube

"The most liberal sociologist often discriminates against nonhumans"
(Johnson & Latour, 1988, p. 298)

This is the opening sentence of one of the more unusual texts in the more recent history of sociology. Unusual not only because its subtitle is *Mixing Humans and Nonhumans Together*, but also because its author, the French philosopher and sociologist Bruno Latour, invents a fictional co-author: engineer and technologist Jim Johnson. In the late 1980s, sociology apparently required a (fictional) technoscientist to address its inherent human-centrism. As "author-in-the-text", Jim Johnson has an advantage over the "author-in-the-flesh" Bruno Latour (304). The US-American engineer intends to convey that sociology wrongly regards social life as the work of humans.

Some 30 years later, sociological advocacy for nonhumans has clearly borne much fruit. An interdisciplinary team with the participation of sociologists and technology scientists makes art for one of the most popular things of our time: the smartphone. Each visitor's cell phone is given a space in an illuminated glass box. Its electronic inner workings are transferred into sounds through sonification. The nons are literally placed on a pedestal and are set up to experience in a new way. However, we should not be deceived. The nons are not the sole focus of this art installation. As in Latour's Actor-Network-Theory (ANT), *Ars for Nons* does not focus on nonhumans exclusively. Rather, this installation vividly illustrates how nonhumans and humans are inherently interconnected.

The smartphone enables us to communicate and maintain social relationships across spatial distances and borders – an affordance that is based in digital media studies, but also in our public image of new media.

However, the smartphone also does something else, something less obvious: It can prevent communication and protect us from social interactions. In fact, the smartphone is our most popular *involvement shield* today. The term involvement shield comes from sociologist Erving Goffman (1963, pp. 38-42), who used it to describe objects and places that humans use to protect themselves from the gaze of others and express their inaccessibility to interactions in public spaces: on the train, at the bus stop, or in the waiting room at a clinic.

Sunglasses, fingernails, books or newspapers are the classic involvement shields of the pre-digital age. They were predominant until the smartphone took over (Ayaß, 2014). Compared to the aforementioned objects, the smartphone has characteristics that make it an unprecedented involvement shield: It is more versatile than any of its predecessors. Moreover, the phone allows listening to music, viewing photos or movies, typing text, and, of course, swiping on the touchscreen – an engaging motion that can sometimes lead young children to the illusion that any media content, such as an advertising image in a train station, can be interactively controlled by a swipe (Egger der Campo, 2014, p. 7). The smartphone also allows the body to express its unavailability for interaction particularly well: With our heads down, face-to-screen, we can turn our backs more easily towards others. Indeed, it is almost impossible to catch the gaze of oncoming cell phone users when crossing a street (Ling, 2004, p. 134).

The strength of this bond is put to the test as *Ars for Nons* gets humans to voluntarily part with their smartphones. As *Ars Electronica visitors*, the humans are supposed to spend the time of this separation in an artificial waiting area where they can neither see, touch, nor feel their cell phone. *Ars for Nons* deprives the humans of their predominant involvement shield and leaves them waiting in close physical proximity to each other, unprotected from the gaze of others. How long can we stand to be in this midst?

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__Our smartphone companions

René Werner

Smartphones are technological artifacts, nonhuman things. Easy to transport, they do not need any form of wired connection to function – at least most of the time.

The reason why we have smartphones on us at all times is the combination of the aforementioned material attributes of convenience and design and the different functions of a smartphone. Smartphones can be utilized to listen to music, to watch videos, to call friends, to take photos, to check bank accounts, to browse social media and the world wide web, etc. However, to understand why smartphones are essential in human everyday life, it is not sufficient to examine the functions of the artifact themselves but to investigate practices humans engage in utilizing smartphones. A teenager will use a smartphone in a very different way than their parent or grandparent. Some people do not often take photos or selfies although having the technical features and relevant knowledge while others do, some people engage in digital health services, while others do not and some people may feel uncomfortable leaving their device behind, while others do not. While smartphones are artefacts that enable and extend the possibility of human action and interaction, humans decide to engage with specific functions, while ignoring others.

Besides enabling factors that allow humans to extend their actions and interactions, smartphones may also represent constraints of human action. Amongst others, financial resources are required to buy smartphones and a set of specific technological skills are necessary to actually use them. Individuals need to be accustomed to specific hand gestures to interact with the touchscreen and also have the relevant knowledge to navigate the operating system and user interface. Often, the software needs hinges that allow to be linked with different accounts or services.
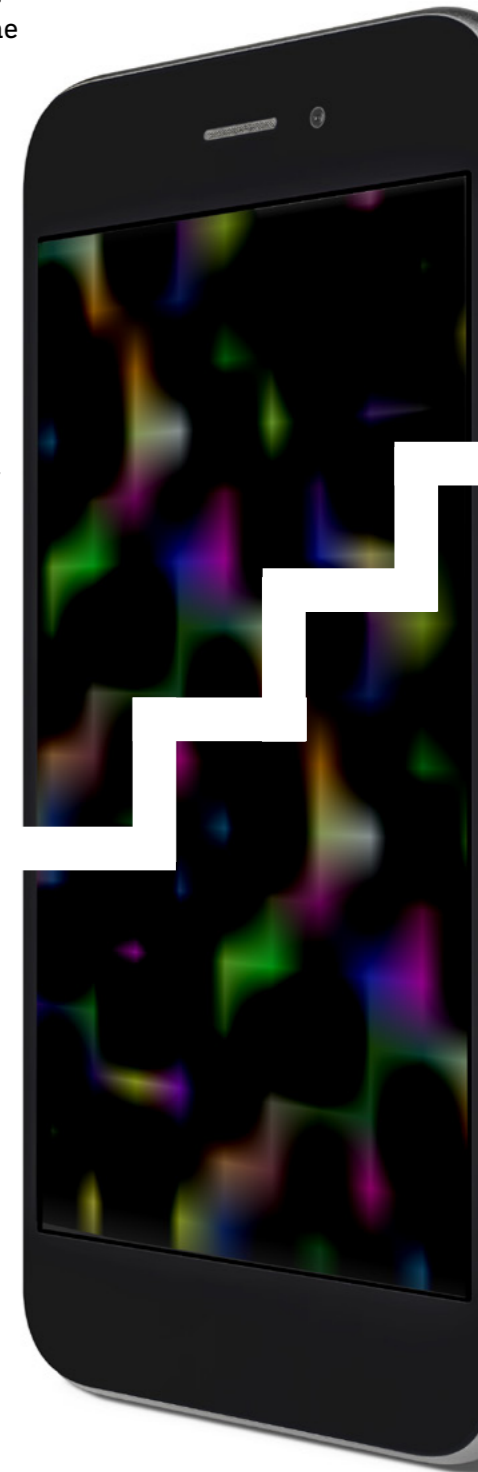
In these ways, technological artifacts are likewise affordance and constraint. They enable us and simultaneously superimpose other things upon us (Orlikowski 2000). If you think of the Ars for Nons installation you are seeing right now, you might actually feel a little discomfort to leave your phone ehind. Take the time to think about the role your smartphone plays for your everyday life and if it is just like any other technological artifact.

Do artifacts have agency?
References to technological agency are common in everyday language:

'My phone died'.

It did not die. Rather, the phone cannot be used at the moment. Actor-Network-Theory (ANT) challenges this claim by expressing an interest in understanding situations without any presumptions about possible actors – or actants (Latour 2005, Law 1992). This theory posits that, while humans superimpose their will on objects in their actions, objects have agency too. Agential networks extend far

beyond the human as acting subject into the realm of nonhuman entities. The action itself makes an actor, whether human or nonhuman.

Often, humans find themselves in situations in which they are at the mercy of technology or where artifacts make an essential difference. The lockdowns during the last two years have exemplified the human reliance on software to maintain communication. The dependence on microphones or webcams increased significantly. ANT allows the study of situations and entities of all kinds (organizations, people, artifacts) as networks that are an ensemble of other kinds of objects. I can only appear as a contributor of this text because I typed my thoughts into a word document which found its way into the publication you hold in your hand in this moment. This 'network of an author' is therefore more than a human being with certain ideas and thoughts. Changing an element of this network significantly shapes the author-reader interaction. Similarly, smartphones as technological artifacts make a feasible difference and could be considered as an actor of their own.

Any situation can be analyzed to better understand the agential relations of human-nonhuman connection. However, ANT does not suggest treating objects as individuals or individuals as objects, but rather acknowledges that human actors are not as autonomous as they might be considered to be.

ANT is not concerned with the question of what a nonhuman agent is – whether self-conscious or not. More so, it is relevant whether any kind of entity can make a difference in a given situation. ANT does not provide an answer as to why we should consider art for nonhumans. The symmetry of human and nonhuman agency is an analytical one, not an ethical one. The present installation might allow you to think about nonhuman agency through art. Can your smartphone enjoy art, which it co-creates as an agent – simultaneously acting, mattering, and perceiving?

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