SONIC

LISTENING TO

NON-HUMAN

LIFE

URBANISM

edited by
&beyond collective
for Theatrum Mundi

PREFACE

The Sonic Urbanism publications began as a series of conversations in late 2018 as Theatrum Mundi was developing their nascent conference series, titled Crafting A Sonic Urbanism. Already keen followers of Theatrum Mundi's work, the &beyond collective were invited to conceive a way of sharing the conference presentations that was an accessible, inviting and affordable alternative to orthodox academic publishing.

Three years later, in 2021, this is now a trilogy that can be read, held and heard as a unified body of work. Where the handsome turquoise-bound *Sonic Urbanism*, the first volume, laid out the intellectual framework of the series, as well as the design and editorial approaches, the subsequent two volumes have dug deeper into vital contemporary themes in sound and cities: the hot pink second volume reverberated with politicised human voices and, as you will discover, this sharp mustard edition buzzes with non-human noises: those of pigeons and parakeets, power stations and pipes.

The thematic development, expounded in Theatrum Mundi director John Bingham-Hall's conclusion to this volume, was mirrored by an evolution in the format of the Sonic Urbanism trilogy. The first, a simple print edition, was followed by a progression into digital and print for the second edition, allowing for voices and other sounds from cities worldwide to be heard by readers through audio essays and compositions published alongside the texts on the Theatrum Mundi website. In this edition, we are excited to go one step further with a collection of instructional scores

– guided listening activities for readers – composed by the Listening With collective and spread across the book. The scores, which can be found at the conclusion of each text, invite readers to engage in a variety of embodied deep listening practices.

It is our hope that this multi-faceted approach to publishing, reading and listening has reflected the intellectual curiosity of Theatrum Mundi and the exceptional contributors they have gathered for the Sonic Urbanism conferences over the last three years. Through this period, it has been a real pleasure to engage in an open-minded and supportive collaboration with Theatrum Mundi. Their openness to experimentation in the translation/transcription of sonic space into digital and printed space has made our journey through the sounds of the city together an amazing learning experience that has opened our minds, eyes and ears as we hope it will yours. ●

&beyond collective
Athens, Berlin, Porto and London, 2021

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COMMUNITIES OF ELECTRO- MAGNETIC RESISTANCE

More-than-human responses to the wireless world

Lodged at the core of both our smart devices and the multi-trillion dollar wellness industry, crystals occupy a surprisingly prominent space in contemporary culture. In this text, Matt Parker attunes to the frequencies of these enigmatic minerals.

The first law of thermodynamics states that energy can neither be created nor destroyed; it can only be transferred or changed from one form to another.[1] Energy is transferred in the natural environment as vibration. My research has for some time been concerned with the vibrations of the global media network technology and infrastructure. Inspired by methods of listening with/in human culture and listening to our non-human kin, my work questions how we might find tools to better understand the energetic conditions of our time. In what ways are the vibrations of these technologies transferred from one form to another and who or what responds to them?

My initial response to these questions was to listen in and around the environments of media infrastructures. I would listen as my footsteps crunched through the snow around the perimeters of giant Icelandic cryptocurrency mines, or as I strolled past fibre optic telecom cabinets in Rome. I would attempt to attune to the hums of wireless radio masts in rural Ireland and the drips of water inside a high-frequency trading data centre in Slough.[2] During these visits I would also listen to the people who worked in and around these spaces: their stories, testimonials and the histories of such technologies. I also began to listen to the voices and stories of people that lived on the perimeters of such spaces who were

1   Max Born, *Natural Philosophy of Cause and Chance* (Abingdon: Oxford University Press, 1949).

2   Matt Parker, "The People's Cloud", The People's Cloud, 2017–2020, online, accessible at *thepeoplescloud.org* (Last accessed 09.05.21).

Matt Parker

apprehensive towards the technological phantasmagoria obscured within. People who felt that they had become marginalised or threatened by the arrival of a data centre facility across the road, or in the forest nearby. Their stories affirmed how, while we rarely think about the source of a social media post or financial transaction beyond that of the influencer who made it or the phone used to log in, there is nonetheless a site – specific and situated – where groups felt marginalised by expanding digital infrastructures, the drive for more data, the consolidation of more content, the consumption of more energy and the proliferation of signals and wireless masts.[3] These liminal spaces foster "densely enmeshed human-non-human relations" that the media ecologist Rahul Mukherjee describes as "environmental publics".[4] Between 2015 and 2017, I spent time walking in the forest of Athenry in Ireland, a contested site for a proposed hyperscale data centre complex, where I encountered such a public. It included not only the humans I walked alongside but rare species of plants, bat populations and bee populations as well. Each was at risk, and each held a stake in the environmental controversy that had begun to form around the site.

The relationship between technological infrastructure and non-human ecologies traverses the margins between science, culture and what I refer to as "communities of electromagnetic resistance". These communities are environmental publics, engaged in collectively rethinking what the urban, suburban and rural landscapes of the future might be. A community is a group of bodies with a common interest at stake. They do not necessarily have to agree. Communities of electromagnetic

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3   See: Matt Parker, "An Apple a day: Listening to data centre site selection through a sonospheric investigation", *Culture Machine*, 18 (2019): p.1–15.

4   Rahul Mukherjee, *Radiant infrastructures: Media, environment, and cultures of uncertainty* (Durham: Duke University Press, 2020), p.16.

websites across the world began to claim that there were links between the launch of the 5G network testbed in Wuhan and Covid-19. Some social media users shouted about the new wireless antennae and aerial infrastructures. For many, this sounded like a product of paranoia and conspiracy theory. However, unlike the majority of conspiracy theory generated online, it resonated and echoed across mainstream media, amplified by the voices of A-list celebrities.

By March 2020, as lockdown measures spread, prominent celebrity users of social media including Amanda Holden, Woody Harrelson, John Cusack and M.I.A. began to vocalise claims linking Covid-19 with the newly launched 5G mobile technology. As the conversation swirled around social media, some individuals took the issue into the physical domain by setting fire to a series of telecom masts in the Birmingham and Liverpool areas of the UK. There were also a number of reported assaults on telecom engineers.[8] Celebrities and their followers alike dive deep into desirable echoes, resonating harmoniously. Anything out of alignment comes from a "hater". If an alternative argument doesn't conform to their view, it is dismissed as "fake-believe".

Communities of electromagnetic resistance such as the members of anti-5G groups form social countermeasures to the electromagnetic saturation of our environment created by wireless technologies. They raise concern about the intensification of hertzian space within the more-than-human urban environment. Their aerialness becomes amplified through the very same technological infrastructure they aim to resist.

The resonances between technological, domestic and non-human habitats are deeply entangled in a wireless electromagnetic mesh.

Minerals

In addition to technology, Simondon's philosophy considered the nature of existence. This philosophy is based upon what he called the process of individuation. At its simplest, the process of individuation can be understood as the formation of a crystal. Given the optimum set of conditions – concentration of material, temperature and pressure – a crystal structure can grow rapidly. This optimal manifestation or realisation of being, occurs, Simondon says, through transduction.[9] Transduction is the transfer of information through a material medium. It applies to many processes: from the growth of an embryo, through the learning of a concept, to the spread of memes through a society. Transduction is the basis for all signal-to-reception protocols. Listening is a process of transduction. In audio, we take pressure variations in the air and transduce this into electrical signals, through a microphone, a sensor, an ear, a crystal.

Crystals are essential components in the history of listening and transmission technologies. In the 1880s, Pierre Curie and his brother Paul-Jacques made a series of detailed studies into how some

8   Jim Waterson and Alex Hern, "At least 20 UK phone masts vandalised over false 5G coronavirus claims", *The Guardian*, April 6, 2020, online, accessible at *theguardian.com/technology/2020/apr/06/at-least-20-uk-phone-masts-vandalised-over-false-5g-coronavirus-claims* (Last accessed 09.05.21).

9   Gilbert Simondon, *Individuation in Light of Notions of Form and Information: Volume II: Supplemental Texts,* trans. Taylor Adkins, Supplement edition (Minneapolis: University of Minnesota Press, 2020) in: Steven Shaviro, "Simondon on individuation", The Pinocchio Theory, 2006, online, accessible at *shaviro.com/Blog/?p=471* (Last accessed 09.05.21).

crystals exhibited a piezoelectric effect, where a voltage was generated when pressure was applied to a crystal.[10] One of the earliest types of radio receiver, the crystal set, designed initially as a wireless fuse by Jagadish Chandra Bose between 1894 and 1895, used a galena crystal to rectify an alternating current signal and extract audio without the need of an additional power supply – pure crystal power.[11] During the early 20th century, the physicist Paul Langevin developed what is now known as sonar technology.[12] Sonar detects the presence of objects underwater by transmitting and receiving ultrasonic "pings" or echoes. Initial sonar devices made use of the piezoelectric effect of Rochelle salt crystals. Rochelle salt, a piezoelectric crystal that can be grown using simple baking materials – bicarbonate of soda and cream of tartar – has been used to make sonars, loudspeakers, microphones and other sensor devices. Crystals have powerful properties that have made them critical agents within many advanced digital technologies.

Crystals form the foundation for the 4.9 trillion USD global wireless communication industry market. Simultaneously, the 4.5 trillion USD global wellness industry is increasingly expanding its engagement into crystals and minerals. Sellers and practitioners of "crystal healing" describe deep metaphysical properties of crystals. Writer Ingrid Burrington has produced a chart outlining both the technological and metaphysical properties of significant crystal minerals present within smartphone and wireless technologies. For example, quartz, a piezoelectric crystal, is the fundamental mineral for the production of computer microprocessors (silicon), and also

> absorbs, stores, releases, unblocks energy, enhances psychic abilities, blocks out distraction, and harbours 'Universal Life Force'.[13]

Quartz is frequently used by wellness practitioners exploring the restorative and healing powers of sound through sound baths. A practitioner will agitate a tuned crystal bowl in order to generate a resonant, immersive sonic experience for themselves and their customers. Sound baths are an increasingly popular method for meditation amongst those communities of electromagnetic resistance who are exploring methods of digital detoxification.[14] Thus, somewhat paradoxically, minerals including quartz form the geological foundations of technological communication infrastructure yet are also considered to be powerful agents of insulation from that same infrastructure.

Whilst piezoelectric crystals can unblock or release energy, other materials are thought to act as insulators and shields. The mineral shungite, for example, is claimed to be an effective shield against electromagnetic waves. As a result, shungite is being used to line the walls of health spas, people's homes, pockets, pendants, and even beehives, as part of the growing digital detoxification industry.[15]

Electromagnetic radiation will inevitably increase in the urban environment of the future. Regardless of their efficacy, crystals and minerals will probably continue to be considered not

10   Walter Guyton Cady, *Piezoelectricity: Volume One: An Introduction to the Theory and Applications of Electromechanical Phenomena in Crystals*, (Mineola: Dover Publications Inc., 1946), p.4.

11   Alfred Balk, *The Rise of Radio, from Marconi Through the Golden Age* (Jefferson: McFarland & Company, 2005).

12   Cady, *Piezoelectricity*.

13   Ingrid Burrington, "Everything Has a Resonant Frequency: On Crystals, Networks, and Crystal Networks" (Seminar, Radical Networks, Prime Produce, NY, October 18, 2019), *radicalnetworks.*

org/archives/2019/participants/ingrid-burrington (Last accessed 09.05.21).

14   For example, the website for London-based wellness centre Crystal Sound Lounge, whose corporate clients have included Chanel and BNP Paribas, states how "[i]n an increasingly connected world, a soundbath is the perfect 1hr digital detox". Crystal Sound Lounge, 2021. crystalsoundlounge.com (Last accessed 01.10.21).

15   Regina Martino, *Shungite: Protection, Healing and Detoxification*. Translated by Jack Cain (Rochester: Healing Arts Press, 2014).

How are communities of electromagnetic resistance voiced, enacted, enraged and engaged through technical platforms?

only a source of energy activation, but also of insulation and resistance by those seeking silence from the digital noise and echo chambers of the everyday.

Critters

Tetragonula is a genus of stingless bees found across Oceania. A team of scientists recently determined that the structure of their hives followed the same principles as the growth of crystals.[16] Science aims to reduce principles that govern the formation of systems to mathematical problems. Crystal growth and hive growth are both understood by the same algorithm. Information – the data of mathematics – often seems independent of matter, because it operates through transduction, the continual transfer of patterns both within a given medium, and from one medium to another. Transduction is never independent of its material medium though, in the way that we sometimes imagine "information" to be. The medium has a powerful influence on what is possible in transduction. Minerals found in technologies, human, non-human and inorganic bodies influence what is possible. They influence and shape the way things send and receive signals; minerals influence aerialness.

Studies on the aerialness of honey bees have shown they rely on small electromagnetic fields to aid orientation.[17] Some beekeepers are coating their hives with shungite paste as a sealant to protect the colony from electromagnetic waves

and bees are known to respond well to it. Honey bees themselves produce a resinous substance called propolis by mixing saliva and beeswax with exudate gathered from tree buds, sap flows, or other botanical sources. It is used as a sealant for unwanted openings in their hives. Research has demonstrated that propolis is produced as a detoxifying agent or primer of detoxification pathways, which can increase bee longevity via antioxidant-related pathways.[18] If honey bees are drawn to electromagnetic-field-shielding materials and are producing propolis as a detoxifying substance, could they be creating organic shields in an attempt to reduce the hertzian space within their home?

Listening, as a process of attentiveness, calls for us to be sensitive to the actions and signals of others. We can learn about the relationships between technology and the environment by listening not only to human interactions but also non-human critters who modulate their behaviour to the shifting hertzian space. During the mid-20th century, ospreys were on the verge of extinction across Europe and the US. Their resurgence coincided with increased nesting atop of cell towers. As the young are raised on these towers, they seek out the towers in later life.[19] Between 2018 and 2020, Microsoft experimented with siting a data centre facility underwater. Located on the seafloor off Scotland's Orkney Islands, the heat generated by this technological infrastructure has transformed the surrounding undersea habitat by encouraging the growth of algae, barnacles

16   Silvana Cardoso et al., "The Bee Tetragonula Builds its Comb like a Crystal", *Journal of The Royal Society Interface*, 17, no. 168 (2020).

17   Daniela Lupi et al., "Effects of Pesticides and Electromagnetic Fields on Honeybees: A Field Study Using Biomarkers", *International Journal of Environmental Research*, 14, no. 1 (2020), pp.107–22.

18   Michael Simone-Finstrom et al., "Propolis Counteracts Some Threats to Honey Bee Health", *Insects* 8, no. 2 (2017), pp.1–20.

19   Russell Adams, "How to Solve Osprey Nesting on Cell Towers", AGL (Above Ground Level) (blog), January 14, 2020, *aglmediagroup.com/how-to-solve-osprey-nesting-on-cell-towers* (Last accessed 09.05.21).

20   John Roach, "Microsoft Finds Underwater Datacenters are Reliable, Practical and Use Energy Sustainably", Innovation Stories, September 4, 2020, online, accessible at *news.microsoft.com/innovation-stories/project-natick-underwater-datacenter* (Last accessed 09.05.21).

21   Lionel Carter et al., *Submarine Cables and the Oceans: Connecting the World*, (Cambridge: UNEP World Conservation Monitoring Centre, 2009), p.58.

and sea anemones.[20] The electromagnetic fields from a suspended cable "strumming" in currents deep undersea reportedly led to shark attacks on data cables.[21]

The resonances between technological, domestic, and non-human habitats are deeply entangled in a wireless electromagnetic mesh. Whether alarmed or allured by the changing conditions created by digital infrastructure and their hertzian vibrations, these critters demonstrate how our changing technological environment will have a profound impact, not only on humans, but also on non-humans in unintended ways.●

An exercise in aerialness

1.   Locate a site of electromagnetic intensity: anything from a mobile phone mast or cash machine to a data centre or cryptocurrency mine.

2.   Become attuned to the site through whole body listening – not to the electromagnetic frequencies themselves, but rather to the ways in which human and non-human entities converge around them.

3.   Pause. Come to an awareness of your body as an interface between this abstract space of electromagnetism and other bodies, plants and materials. It's ok to engage your imagination here.

4.   You are now acting as an aerial. Consider how you might cultivate this new-found connectivity towards a sense of solidarity with human and non-human others.