On the Electro-acoustic

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In our first seminar, I spent time mapping out the notion of social acoustics, highlighting how acoustics can be thought to influence the dynamics of social life: how the movements of sound, and particular acoustic norms or practices, lend to the ongoing formation of identity, relationships, community. I tried to extend this acoustic perspective at our last seminar, this time through a focus on listening and the idea of the bioacoustic: that is, how we conceptualize or approach life by way of sound and hearing. In what ways are life and the body understood through experiences of listening, and an acoustic imaginary?

For today, I want to continue mapping acoustics, or what we may think of as an "acoustic paradigm", this time talking through the idea of the electroacoustic. In what ways does the electroacoustic draw out particular questions, particular cultural and technical dynamics? If we can consider the electroacoustic as the distribution or diffusion of electromagnetic information, of recorded and amplified sound, how does it come to impact onto experiences of space and place? For instance, we might think back to the history of Muzak, and the operations of recorded music as placed within work environments, public spaces, scenes of consumer culture, not to mention elevators. Through such infrastructures, electroacoustics becomes an apparatus aimed at influencing the metabolism of bodily performance. By way of such histories, we can also consider how the electroacoustic impacts onto music itself, to spawn particular forms of composition and approaches to musical listening – whether in cultures of easy listening, or in the more experimental styles of electroacoustic music that includes techniques of recording, editing, spatializing, mixing, etc.

From questions of space and public environments, to musical cultures and ways of listening, I want to reflect upon the electroacoustic in different ways, which I hope can help in our pursuit of acoustics as a larger critical and creative framework.

To start, we may stay with electroacoustic music as a cultural scene, to consider how the electroacoustic acts as a base for types of composing, listening, and cultural imagination – to emphasize the electroacoustic as an arena of human and technical collaboration and encounter; the ways in which musical processes are facilitated or prompted by the potentiality of working with machines for example. We find an engaging perspective on this through the writings of the composer Daphne Oram. For instance, Oram describes engaging with the tape recorder (in the 1960s and 70s), and relishing the elasticity of tape, and the painterly approach in what she calls "orienting the lines of magnets": this electronic gesture of ordering and reordering magnetic information embedded on tape. Moving closer to the tape recorder, marveling at the contraption, Oram leads us into the ways in which she "composes magnetic forms" – by arranging their position, their alignments, or cuts. In this way, the composer emerges more as an "electro-magnetician".

This extends from tape to the tape recorder or player, and eventually to a loudspeaker, all of which functions as an extended electromagnetic stream or apparatus, a series of amplified patterns that moves from mechanical to electrical to mechanical energy again.

In following Oram's meditation on composing with tape, I think we start to enter into the electroacoustic as a compositional arena or process that links human and technical agencies. We can further such a view by recalling Pierre Schaeffer's

formulation of different modes of listening, these roughly being: the causal (what causes sound: its source), the semantic (what does this sound mean: its code), and the reduced (what are the qualities of this sound: its objectness, its essence). Here, reduced listening is key to electroacoustic music: this desire to attend to the concrete materiality of recorded sound: to listen to sound itself.

We might speculate as to an additional mode, what I may tentatively term the *machinic*: Can we think of a mode of machinic listening arising from the framework of the electroacoustic? This is not so much to bring attention to the fact of the loudspeaker, for instance, as what causes the sound. What I'm after with machinic listening is more ontological, more ecological, more about capturing that sense of collaboration passing between human and machine: to emphasize the electroacoustic as giving onto a mode of listening in which an affective and cognitive relation emerges across human and technical bodies.

As a conceptual framework, the electroacoustic draws forth a focus on the machine. This may include a consideration of the tools of production and distribution (the tape recorder, the microphone, the computer as tools for instance) – to capture a critical take on technical access: how tools of production and distribution perform within an electroacoustic political economy. Within today's geopolitical environments, this includes a concern for the governmentality surrounding technologies (how technologies are shaped by economic and legal, imperialistic or corporate agendas – how what we hear is shaped by these larger national and transnational systems.

In addition, the electroacoustic allows us to consider the compositional skills or gestures that we enact along with machines, a machinic listening, which finds a certain reference in what N. Katherine Hayles terms "human-technical assemblages": how listening passes across bodies and machines.

Hayles elaborates the issue of human-technical assemblages by way of cognition. She asks of us to recognize the degree to which human cognition is deeply entwined with technical cognition, with the ways in which machines perform cognitive tasks, or more precisely, what she highlights as "nonconscious cognition". Nonconscious cognition differs from conscious cognition, as it captures the ways in which information and decision-making occur below the level of awareness: nonconscious cognition names a level of activity in which the processing of data, the interpretation of information, takes place, allowing for forms of decision-making, or responsiveness within particular environments.

Following this, I'm interested to think the electroacoustic as what articulates human-technical assemblages, accentuating the systematic interfacing or shared coordination and decision-making passing across bodies and machines – whether in the process of composing magnetism, or being orientated by systems of electronic audio signaling, from crosswalks to bank machines to security systems to global infrastructures. As with earlier histories of Muzak, electroacoustic systems are deeply embedded in structuring behavior, defining the metabolism of movement, aiding in tasks, and conditioning paths of orientation.

The electroacoustic may operate as an acoustic framework for not only considering the distribution of recorded sound within environments, but equally, how machines and human actions are coupled, giving way to a range of behaviors, listening habits, ways of speaking and navigating across environments. From mobile phones to voice recognition systems, music software to medical prostheses, such as cochlear implants, we may define the electroacoustic as an acoustics of signals which passes across human and technical cognition – what we might think of as

"electroacoustic cognition": a listening emerging by way of human-technical assemblages.

Politics of signals: cochlear implants

I want to elaborate the question of electroacoustic cognition by returning to deafness, which I briefly referenced last time. In particular, we can consider the technology of cochlear implants, which positions the electroacoustic on the level of neurology and the auditory nerve. I'm going to read a passage by Michael Chorost, whose book *World Wide Mind: The Coming Integration of Humans and Machines* offers insight into the experience of being implanted:

> My cochlear implant substitutes for the lost hair cells by directly triggering the auditory nerves with implanted electrodes. A surgeon drilled an inch and a half into my skull, countersunk a ceramic-encased micro-chip behind my left ear, and threaded sixteen electrodes into my inner ear. Now an external device sitting on my ear picks up sound, digitizes it, and radios a stream of 1s and 0s through my skin to the microchip. The chip receives the radio signal with a tiny antenna and decides how to strobe the electrodes on and off. By choosing which electrodes to fire at any given moment, it makes my auditory nerves transmit sound information to my brain. Even though I have 280,000 transistors in my skull, more than in the CPU of my computer when I started grad school, they can't reproduce the functioning of a normal ear in all its subtlety and range. In fact, they stimulate the auditory nerves in a way that is quite different than in a normal ear. Because of that, I had to learn how to hear all over again. Voices sounded like gibberish at first. It took me months to learn how to interpret the software's representation of vowels and consonants as English. (6)

Following Chorost, the implanted user signals a new D/deaf experience, for even though one may use an implant, one is still physically deaf. Sounds need processing; as they are picked up externally and then processed and transmitted through a set of implanted electrodes to the auditory nerve, an individual must learn how to "hear" and comprehend the limited signal information. In adjusting to this new form of hearing, an implant user must also navigate a new sense of identity situated between D/deafness and hearing. This impacts in many ways on physical and cultural understandings of what it means to be D/deaf, as well as on medical and educational approaches. As Mara Mills outlines in an article on cochlear technologies, new types of intersections start to emerge, suggesting other perspectives as to what counts as hearing and non-hearing, and what may constitute D/deaf life in the future.

In addition, Mills poses that cochlear implant technologies articulate or demand an "electroacoustic politics" in order to contend with the ways in which the senses and signals intersect, and how we understand hearing ability. Such electroacoustic politics engages the new subjectivity emerging between hearing and D/deafness, and how this also moves listening into new dimensions: a listening by way of 0s and 1s. As well as a listening that may move across languages, for instance individuals who use two different languages in two different modes, defined as: bimodal bilinguals. This includes hearing individuals who use spoken and signed languages as well as D/deaf individuals who communicate using signed languages, and who also may be able to verbalize by accessing sound through a cochlear implant.

Implant users start to figure listening by way of human-technical assemblages, where processes of perception, decision-making, communication and navigation through environments takes place neither solely in the human nor in the machine. As Chorost suggests, his rather "Cyborgian" status creates a way of listening that is more signal than wave, more electrode than ear drum, more computational than comprehension. Rather, a form of electroacoustic subjectivity emerges.

This is not to overlook the ways in which machines are doing a lot of listening these days as well: how technical cognition is learning from human speech patterns, behaviors, and life-styles. Such modes of eavesdropping, tracking, and modeling further capture the reality of human-technical assemblages, and that sense of an electroacoustic subject that is neither fully one nor the other.

How might we further imagine this subject and what can we make of electroacoustic politics – in what ways can it engage challenges posed by biotechnology, surveillance systems, and algorithmic capitalism? Are there potential paths to be captured, potential ways of listening to machines as agents, and collaborators? Ways of listening in order to navigate the force of datastreams and informational life?

Currents of Sympathy

Following these perspectives on the electroacoustic, some questions start to emerge, even a curiosity, an imaginary, what I start to follow by way of a poetics of the signal: in parallel to an electroacoustic politics, that of tools of production, infrastructures of recorded and streamed sound, and the subject positions made and unmade by medical or technical interventions, I'm interested in the ways in which listening moves by way of electroacoustic matters and systems; that in our collaborations with machines, and machines' participation in human culture, a larger framework can be posed, one that returns us to histories of the radiophonic and the telephonic, histories of animal magnetism and telepathic correspondences, hypnotism and ethereal conduction. The electroacoustic certainly speaks to such histories, giving way to a range of fantasies and constructions, methods and techniques of attunement and transmission, especially in relation to the more-than-human.

The nonconscious cognition of human-technical assemblages Hayles charts has, in a way, been with us throughout modernity. With its current computational, algorithmic and data-obsessed varieties, such forms of cognition – what is also termed within neuroscience, the new unconscious – may require other views onto understanding the electroacoustic. Here, the electroacoustic is increasingly less about amplified sound, less about magnets, air pressure and systems of playback, and more about brain signals and affective transmission. As cochlear implant users suggest, radio is no longer in the ether, but inside the head. We find an early indication of this in an account by Charles Graser (1970s), an implant patient and amateur radio operator. Graser would tune and customize his implant much as if he was tuning a radio receiver. In addition, internet founder Vinton Cerf, who is hard of hearing, imagines that in the future cochlear implant users can simply connect their electrode implants directly to the internet, thereby tuning into internet radio for instance without the aid of speakers.

We might appreciate the ease with which pedestrians walk down city streets today tapping on phones, speaking into the air, and navigating by way of a range of devices each charged with a vibratory linking; this new sensory configuration shaped by an array of signals and that defines a multi-modal responsiveness on the part of our

selves – not so much tuning a given channel, as attuning to an ecology of currents – this electrical walker.

The new unconscious posed by neuroscience, which captures the ways in which much of our decision-making happens on a nonconscious level, finds expression in the form of an electroacoustic subjectivity well-versed in the nature of signals. In this regard, there might be a new form of "auditory unconscious" emerging by way of human-technical assemblages, an unconscious that, again, has been with us a long time and which in today's environment might be finding ways of participating more overtly in our global ecologies – where listening may enable technoscientific practices that critically extend our collaborative arrangements.

Might this auditory unconscious support ways of contending with how machines listen to us for example? An electroacoustic subjectivity skilled in machinic listening and whose capacities for attunement may assist in composing greater ecologies of attention?

In this sense, I'm curious to reflect upon the politics and poetics of signals. Suggested by the electro-magnetician, cochlear implant usage, and the electrical walker within today's global ecologies, an electroacoustic politics moves from questions of access to tools, or the need to challenge medical or technical approaches to human bodies, to include an engagement with the life of signals: what Jane Bennett suggests through the notion of "currents of sympathy".

Currents of sympathy are not so much about the individual capacity to sympathize with others – this sense of having or expressing compassion; rather, Bennett takes a more materialist approach, shifting from "the emotional" and toward "the gravitational": sympathy as what gives gravity to things and ourselves – what pulls at us, or pushes in and out of place. Currents of sympathy speak to the "affective tonalities" that pass across and through bodies and things, subjects and objects, humans and more-than-humans; such currents are material ambiences or resonant flows – the "influx and efflux" of influence and attraction; they are, rather, nonconscious, vibrant, embodied and impersonal.

The electroacoustic, and the subsequent machinic listening I'm considering, might be mobilized as an acoustic means for attending to the increasingly nonconscious cognitive self immersed in currents of sympathy: to orient by way of the auditory collaborations emerging across human-technical assemblages. For surely, our capacity to listen is fundamentally shaped by the machines that put so much sound into us. In this sense, is it possible to bring our electroacoustic skills (musical, compositional, performative: how we deepen our listening through machinic collaboration) to the contemporary challenges of global ecologies, where machines and their algorithmic capacities do a great deal of damage? If we carry a long history of being "tuners", how can we elaborate capacities for attunement by engaging with signals and their medial and ecological force?

Bibliography:

Jane Bennett, *Influx and Efflux: Writing Up with Walt Whitman* (Durham: Duke University Press, 2020).

Michael Chorost, *World Wide Mind*. Michael Chorost, *World Wide Mind: The Coming Integration of Humans and Machines* (New York: Free Press, 2016).

N. Katherine Hayles, *Unthought: The Power of the Cognitive Nonconscious* (Chicago: University of Chicago Press, 2017).

Mara Mills, "Do Signals Have Politics? Inscribing Abilities in Cochlear Implants." In *The Oxford Handbook of Sound Studies*, eds. Trevor Pinch and Karin Bijsterveld (Oxford: Oxford University Press, 2011), 320-346.

Daphne Oram, *An Individual Note of Music, Sound and Electronics* (Anomie Publishing, 2016).