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Spatial Audio

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Beneath our Feet; Imagining an Illuminated Geologic Soundscape

The soundscape of the earth, a heartbeat so slow and deep in time it cannot be heard and often never felt. Our local soundscapes keep our senses too busy to consider the waves propagating through the materials on which we stand. "The physical world is talking to us all the time, but mostly, the sounds are largely inaudible to our ears. There's this huge wilderness of sound inside the earth and on the surface of the earth, and we're just not paying attention to it." (Ecotone) These sound systems each having their own patterns, tempos and rhythms are characterized by their mechanisms and energy production and consumption. In terms of a busy city; the bustling pedestrian, industrial drone, and local traffic keep a listener aware that they are a part of the system and the workings of it. It has a rhythm defined through cause and effect that we attach ourselves to but often do not take notice of. From the standpoint of an inactive participant (one not actively adding to the soundscape) this noise could begin to be compared to the push and pull of the sea. In a similar way, the sound of the earth exists, "the lull of waves crashing against the shore; the ticking murmur of a glacier slowly conveying ice and rock to sea; the gossip of wind as it moves to canyons and trees. Acoustic ecologists call these sounds 'geophony', which they distinguish from those sounds made by

animals and those made by us.” (Ecotone) These sounds create a musical score linking us with our sense of place, and our ability to identify with it. Leaving the sounds we cannot hear, the geologic, the earthly, unnoticed but forever droning on.

Our bodies, equipped with extraordinary abilities to sense the world around us are often in a state of perceptual distraction. Constantly hyper stimulated, we begin to lose our ability to access sensory material presenting itself in our daily lives. There is also the situation where our perception of space is quite acute but what is attempting to be perceived extends our bodies’ capable perceptual field. Specifically the function of “human hearing, which relies on the ability of the ear and the neural system to sense and process variations in sound pressure. Accordingly, the act of hearing has both subconscious and conscious effects.” (Human Perception of Sound, zone.ni.com) Our evaluation of the soundscape our present body is within, is dependent on not only our mind’s ability to focus, but also the capacities of our physical bodies. When parsing out sounds in one’s space it can become so complex that details fall to the wayside, and sounds existing outside of our ears frequency range are deemed non-existent except to those searching for them (and in many cases cannot be found without the use of tools). Although, despite the ears having a max capacity, “they are capable of discerning layers totally unknown to the eyes...Our ears can register from 360 degrees around us. Above and below us, too.” (Ecotone) This is what is interesting when thinking about a core sound, a sound rooted in material, and the information sound can discern about space that the eyes cannot.

Waves are constantly travelling through solids created by vibrations. At most moments they are not considered to be tactile but rather produce audible sound. When the frequencies of these waves drop low enough they vibrate in such a way that they are, “transmitted directly to the human body by contact, rather than by sound waves through the ears. For example, when you stand on a train platform you can feel the train approaching as well as hearing it.” (Tactile Sound, Wikipedia.com)

In a similar way, we cannot hear the earth but rather understand it through its materiality and effect. Acting as a transducer, which transmits its vibrational energy through objects occupying it, it creates new audible layers of vibrational space.

Artist and researcher, Mark Bain experimented with this notion of a space void until activated. This piece, Live Room, consists of “a space devoid of physical objects, therefore composed of virtual objects, which haptically interface with the audience. By interacting with the cycling waveforms, the occupant was again occupied, infested with frequencies, modulated by vibrational energy and imparted with the volumetric sensibilities inherent within the body. The audience therefore was the activated object, the sculptural form, traversing the site and feeling the liveliness of themselves, others and space within.” (Low End Theory) The ground beneath our feet can act with Bain’s ‘empty’ architecture in the sense that waves of energy are already set into motion and will not be activated for our recognition until captured in a body, an object or a tool.

“Sound is unique in that it always originates from a dynamic event that transforms mechanical energy into a propagating sound wave, which then broadcasts the existence of the event over a wide area. Sound is the transport

mechanism by which we are able to sense remote events. Periodic vibrations and sudden impacts produce sound, but we experience the event, not the sound as being separate from the event.” (Blessner and Salter, *Spaces Speak are You Listening*) In part to our vibrational earth, geologists and scientists consider how these sounds are produced and what notable events can be linked to sounds we consider to be ‘of the earth’. At moments they become musical definitions such as, “ words like tempo and rhythm to describe both erosion and sedimentation. They settled on the term harmonic tremors to describe the pipe-organ-like effect created by pressurized magma shooting through the tubes of a volcano.” (Ecotone) Or the consideration of the most pronounced earth sound, the earthquake whose vibrations act “ like messengers dispatched from a source near the earths surface to travel far inward towards its center and return to the surface with news about the interior.” (*The Earth Beneath Us*) The activation of objects on the earth surface in the form of tremors, amounts as the result of this interaction, while acting as a cause to the alteration of a place’s soundscape in the form of a forceful call to attention. These moments are few and far between and only through destruction do they become illustrated.

Thinking about the vibrational qualities of our world the practice of cymatics came into view. “First proposed by Hans Jenny in 1965, cymatics is the study of periodic systems in nature. It takes its name from the Greek *ta kymatika*, meaning ‘matters pertaining to waves.’ ...when a signal is passed through a transducer at high enough volume, waveforms begin to take visible shape.” (*Low End Theory*) The direct connection between these cymatic processes and the natural world are visible

in, “various states of matter, acoustic vibrations, ultrasound and hypersonics. Again, the lattice structures of matter in the crystalline state are also periodic. Periodic structure is a salient principle in say. the space lattices of mineralogy. What insights into vibration and periodicity have been gained in the vast range extending from the cosmic systems (rotations, pulsations, turbulences, circulations, plasma oscillations, periodicity of many kinds in both constituent elements and the whole) down to the world of atomic or even nuclear physics (shell model of nucleus; nucleon structure: organization of meson clouds)!” (Hans Jenny, A study of wave phenomena and vibration) These patterns brought to life for our viewing by cymatics are deeply and complexly rooted in the structure of our universe and the way in which matter interacts far out of our field of view and at moments our understanding. Cymatics, is a phenomena brought about by our ever searching minds for ways to understand the systems laying the groundwork for our physicality. These experiments help us unpack sonic objects existing within the realm of matter and they do so with an understanding of time that is not always attainable as visual information.

“The sea was ‘cymatics in its native element,’ but by slowing perception, he argued, we can observe similar dynamics at work in orogeny, or mountain-formation (i.e. deep time rhythms in the geologic sea).” (Low End Theory) Time asserts itself in interesting ways sonically and is greatly attributed to the way we consider the passing of it. The expansion or contraction of an audio composition alludes to different time frame references and can directly affect our bodily understanding of time and space such as, “a ‘sensational feeling that the body softly starts flowing off into space and time synchronously with these sine waves’. It can

induce a swimmingness of temporal perception, as time seems to expand and contract, simultaneously sliding forwards and backwards.” (Low End Theory)

If time is imagined to be a layering of energized matter, the notion of deep geologic time can represent itself sonorously in a similar sense in which we visually reference historical matter. Earthquakes and the movement of tectonic plates have been creating a soundscape all along and we reference topology and rock structure in order to understand this history. “The vibration of complicated bodies can also be rendered visible. The vibrations of structures whose mode of vibration cannot be calculated at all, or only approximately, can in this way be made accessible to experience.” (Hans Jenny, *A study of wave phenomena and vibration*) One can think of a cymatic experience to be an entranceway to imagining an illuminated geologic soundscape.

Beneath our Feet; Imagining an Illuminated Geologic Soundscape took the form of a multi-channel audio installation in which an interactive sculptural cymatics piece was employed to illustrate the composition. The piece had a length of 12 minutes and explored the temporality and vibrational qualities of a geologic world unheard. The selections of sounds used in this piece were contact microphone recordings, pure frequency generations and recordings of pure crystal singing bowls. The only manipulations done to the samples were the process of stretching them in time. During the performance, participants were encouraged to touch the cymatic discs to experience the vibrations first hand in order to make the connection between the vibrations felt through the floor, the sight of the discs and the feeling of the liquid in the discs. When speaking about the piece as a group,

participants mentioned the communal experience the interaction of touch gave them with each other and the piece. Murray Schafer, mentioned in his writings about the soundscape, “touch is the most personal of the senses. Hearing and touch meet where the lower frequencies of audible sound pass over to tactile vibrations (at about 20 hertz). Hearing is a way of touching at a distance and the intimacy of the first sense is fused with sociability when ever people gather together to hear something special.” (Murray Schafer, *The Soundscape: the tuning of the world*) With this piece, I was interested in the idea of a collective space that envelops the participants. Pulling them closer to the world we all very presently exist within by creating a device for expression, for speaking, for the ground beneath all of us.

Our world is in a constant state of ‘ON’ every object speaking until it has exhausted the energy given to it by the earth. “Without activities, there are no soundscapes. When activities change, the soundscape changes.” (Blessner and Salter, *The other half of Soundscape: Aural Architecture*) Activities often considered to be sound making moments can also be thought of as the act of listening. Without this act, soundscapes cannot be heard; one does not need to make sound to hear sound as it is always present. Vibrations transformed into tones, which can only be understood as the voices of matter, which are seemingly inaudible. Jim Cummings, Executive Director of the Acoustic Ecology Institute, “thinks there may be a better distinction, not to separate sounds into those created by breath and those created by touch. It’s the touch sounds, he says - the sound of leaves beneath our feet, of water coursing over rocks, the wind pushing sand-that most define our relationship with place.” (*Ecotone*)

Works Cited

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