

Book reviews

**Douglas Kahn. *Earth Sound Earth Signal: Energies and Earth Magnitude in the Arts*. Berkeley: University of California Press, 2013. ISBN:978-0-52025-755-9
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When Douglas Kahn's first book, *Noise, Water, Meat: A History of Sound in the Arts*, was published it entered a very different intellectual landscape from the one we inhabit today. In the late 1990s, there was no 'sound studies' to speak of. Outside of the music disciplines, the cultural study of sound was scattered across various outposts in communications studies and media theory, art history, literature, urban planning and design, philosophy and more. During this time, it was customary for a monograph on sound to begin with some form of treatise against occularcentricism: the cultural and scholarly bias for objecthood, vision, the image, and concepts of 'the gaze' as objects of study. An inherited notion of sound as the 'forgotten' object in our cultural environment, and hearing the forgotten sense, seemed to fasten itself to sound, bestowing upon it the status of the perennial underdog – the 'always emerging, never emerged' (Hilmes 2005: 249). But the recent boom in scholarly attention to sound means that it can no longer complain of (nor exploit) its own neglect. Sound studies is now a thriving interdisciplinary field, as witnessed by the yearly onslaught of new monographs and anthologies, the slew of high-profile international conferences, the new journals and special editions in established journals, and the initiation of large interdisciplinary research centres devoted to the study of sound and sonic cultures. An outcome of sound studies' ongoing disciplinisation is the possibly reluctant emergence of a 'canon' of significant works, within which *Noise, Water, Meat* is now firmly installed. Ostensibly a history of sound in the arts, the book has come to assume a position alongside the likes of Jonathan Sterne's *The Audible Past* (2003) and Emily Thompson's *The Soundscape of Modernity* (2004) as a field-defining history of modern aurality; a counternarrative to textual and image-based histories of modernity.

It is a sideways acknowledgement of the current fervour for sound in the humanities that in Kahn's second monograph, *Earth Sound Earth Signal: Earth Magnitudes in the Arts*, he shifts emphasis somewhat, focusing on an even more neglected energy: electromagnetism. Offering the first cultural history of the electromagnetic spectrum, seismic events and their varied entanglements in military and

scientific research, artistic and quotidian practices,¹ it has an altogether more intricate task before it than *Noise, Water, Meat* did due to the simple fact that so little is really understood about these energies outside of their associated specialist fields. As Kahn writes, 'nature *sounds* are familiar, while nature *signals* are not' (9). 'Electromagnetism had nothing less than the historical misfortune among forces of nature to be disclosed at the moment of its industrialization' (13). Engaging with the art-science explorations of such figures as Thomas Watson, David Thomas Thoreau, Alvin Lucier and Joyce Hinterburg therefore entails a great deal of technical exposition, and, in some cases, the coinage of new terms (see chapters on the 'aelectrosonic' and 'transperception'). In the hands of a lesser writer this back and forth approach could easily become formulaic, particularly to an audience with a better understanding of the concepts involved, but one of the great achievements of the book is Kahn's ability to recover his subject's enchantment with 'lived electromagnetism' and then essentially follow their path of discovery through the historical record. Chiming with current humanities interests in material and immateriality, sensory history, distributed creativity and the politics of art-science research, *Earth Sound Earth Signal* is a lively and fascinating media arts history that should find a wide cross-disciplinary audience.

The book is separated into twenty short episodes, each of which takes a different feature of environmental energy – natural radio, earthquakes, electroreception and so on – and examines its cultural take-up by artists, philosophers, inventors, poets, scientists and the wider populace during modernity. Beginning in the late nineteenth century with Thomas Watson and the genesis of radio, it moves through the material engagements with electromagnetism of Alvin Lucier, John Cage and Pauline Oliveros, ending with Joyce Hinterburg's handmade electronics. The narrative is not tethered to chronology, however; Kahn frequently retraces his subjects' steps back through modernity. And whilst a strong case is made throughout the book for taking 'vibrant matter and the political ecology of things' seriously, to take a cue from Jane Bennett (2009), it remains a resolutely human-centred project in methodology, with several of the later chapters actually taking the form of short monographs on a particular artist.

¹An exception is Henderson (2005).

Kahn's first task in considering the aesthetic properties of energetic fields is to prise electromagnetism away from its modern life inside telephone lines, radio sets, power sockets and so on, and consider it as a natural resource. To find the deconstruction of a nature/culture binary in a book such as this may be small surprise; many writers in literary, media and ecocriticism fields are abandoning the notion of a 'great outdoors' that precedes human intervention altogether, a shift that is reflected in the new geo-temporal category of the 'anthropocene' and the recognition that human activity has changed the earth's geology. Kahn does not go this far, however. Instead, his main theoretical move is to try to think the nature *in* media, an approach that, as becomes clear over the course of the book, is motivated by the histories he wants to rethink, principal among them being the history of electronic music.² His counterintuitive proposal for a 'natural' media should then be seen as a corrective to the prevailing tendency to classify music practices according to whether their production relies upon the 'technological' energy of electricity, or the 'natural' energy of Newtonian mechanics. This may not be a new insight (and this is one of the things Kahn illuminates), but this book must contain one of the most sophisticated and historically grounded critiques of these positions to date. I expect many contemporary music technologists will welcome it.

Chapter 1 captures a wonderful, brief moment in the early history of telecommunications. Between the first experiences of the telephone and the industrialisation of electromagnetism soon after, which would smother all non-vocal sound under the 60Hz hum of electrical light, Thomas Watson was able to hear the sounds of natural radio over the telephone: 'one of the most common sounds was a snap, followed by a grating sound that lasted two or three seconds before it faded into silence, and another was like the chirping of a bird' (28). Kahn's retroactive interpretation, aided by mid-twentieth-century research in atmospheric science, is that Watson in fact heard a 'swishy whistler' – a very low frequency (VLF) electromagnetic wave caused by the energy from a lightning strike travelling across the earth's magnetic field, and converted into audio by a transducer (the telephone). The sensory history that is recovered here, peripheral to the grand narrative of the telephone's development, and also to the life of its inventor, Alexander Graham Bell, is one of the great highlights of the book. 'Watson heard radio before it was invented', Kahn repeats, perhaps so the history is not lost again. When Watson is brought to the centre stage of telecommunications history, he becomes an

²Kahn uses the term 'electronic music' to refer to music created via electroacoustic means, and I follow his designation in this review. It should be noted that his terminology is not entirely conventional throughout the book; see for example his references to 'audiotape music' to describe early Lucier pieces.

icon in the book for the amateur absorption in the sonic world of radio atmospherics that would take hold in the twentieth-century avant-garde.

Walter Benjamin famously said that media did not merely enhance our perceptions, they transformed them. Writing about the camera, he declared that 'the enlargement of a snapshot does not simply render more precise what in any case was visible, though unclear: it reveals entirely new structural formations of the subject ... a different nature opens itself up to the camera than opens to the naked eye' (1969: 435). It's a statement that shadows Kahn's second chapter, 'microphonic imaginations', as he uncovers the gulf between the material world of new sounds opened up by the invention of the carbon microphone, and the wild and fanciful sonic imaginary it set in motion. The book as a whole delights in sonic description and onomatopoeia, but it is in these early chapters that it is most prolific. Projecting the close-up world of cellular and microscopic biology onto the new structural formations of the amplified auditory world, D. E. Hughes and James Clerk Maxwell declared that 'the mere breath of the fly is heard almost like the trumpeting of an elephant'; and further, 'a fly's scream, especially at the moment of death, is easily audible' (36). Through these early impressions, Kahn portrays a fascinating process of remediation at work in the early modern era, as the existing media ecology shaped, and was reshaped by, the experiences of the new technology of the microphone.

Once electromagnetism is established as a natural resource, and the aesthetic experience of lived electromagnetism a descendant of the Aeolian, we head into the world of US experimentalism and the work of Alvin Lucier, John Cage, Pauline Oliveros and Gordon Mumma. The section on Lucier's work with electromagnetism is the most substantial – covering three chapters, Kahn's own apprenticeship under the composer comes across strongly in the detailed study of the social and scientific background of *Music for Solo Performer* and *Whistlers*. Particularly interesting is the portrayal of the physicist Edmond Dewan's involvement in his work. Dewan, working on the electromagnetic spectrum of brainwaves, introduced Lucier to the brainwave amplifier used in *Music For Solo Performer* after having tried for some time to interest other composers in writing a piece for it. Not only that, Dewan also alerted him to a practical demonstration of room acoustics by Amar Bose that was to become the basis of *I Am Sitting in a Room*, as well as the research on ionospheric radio that would inform the later withdrawn *Whistlers*. The story behind the latter is particularly compelling. Lucier's early performances of the piece used filtered recordings selected from the popular 1953 LP *Out of This World*, and he later released a recording of the performance on LP. Though Kahn does not pursue this line too

forcefully, it raises questions as to what is left over when the two elements that the artist's ego is most invested in, concept and material, both come from elsewhere. His focus on Dewan's involvement, not to mention Thomas Watson's earlier 'aesthetic engagement' with spherics, serves to problematise easy distinctions between artists, scientists, technical assistants and 'sidekicks', and in this it echoes recent work by Benjamin Piekut (2011) amongst others. It is no surprise to learn that Lucier redid the piece as *Spherics* in 1981, travelling to the mountains of Colorado with recording equipment and antennas in order to capture the sounds for himself. But even here there is an implicit question mark over the difference between Lucier's 'interested' listening to natural radio and the 'disinterested' listening of Watson that opens the book.

Although the book is interdisciplinary in scope, with works by Robert Barry and Semiconductor discussed alongside the more tried-and-true path of US experimentalism, electronic music discourse provides the general frame for Kahn's argument. Through his historical examples, Kahn elaborates a theory and aesthetics of electronic music that he deems to be marginal in the context of its major history. Each of his subjects uses electromagnetism, or seismic waves, as a living energetic material, and in this he perceives a stark contrast to the visions of control embedded within, say, the American genealogy of computer music represented by Max Mathews, or the skeumorphic design of early electronic instruments, which tried to replicate the aesthetic and expressive affordances of existing musical instruments. This comes across most forcefully in the chapter 'For More New Signals', where Kahn advances the idea that Cagean 'sonic plenitude' (the title of the chapter is a play on Cage's 'For More New Sounds') actually became a plenitude of astro/bio/geo/physical signals, not intrinsically aligned to, nor delimited by, the concept of sound.

This new, expanded notion of sonic plenitude is welcome, but Kahn becomes too ideological in defining it, rigidly distinguishing between the truth-to-materials approach he approves of, and the capture, construct and control methods he does not. For instance, when outlining the range of possible categories of sonic plenitude he comes to sound synthesis, writing: 'the generation of new sounds promised to bolster sonic plenitude, seemingly preventing it from being exhausted; however, sound synthesis was used mainly to imitate existing musical sounds, could only aspire to generating the world of other sounds, and proved not to be as fecund as originally imagined' (126). Given the depth of the first half of this book, it is disappointing to come across so superficial an analysis as this. Iannis Xenakis, hardly a marginal figure in twentieth-century modernism, is just one of a number of authors whose sound synthesis ideas opposed the imitation of musical sounds.

More than this, the model he constructed was actually conceived as a critique of the 'simplistic' sonorities of radio atmospherics too, something Kahn would be interested in (Xenakis 1992: 243). Such 'nonstandard' approaches are so widespread today that the sound-synthesis critique reads weakly. Later he comes to Max Mathews: 'his concern for both experimental and emulative approaches ran into contradictory idealizations of sonic plenitude and strict control' (129). It is another oversimplification, insensitive to the way Mathews' position on the possibilities of sound synthesis developed over his career. Mathews' project would be better condensed into a search for 'beautiful sounds', which leads on to the hearing psychology and brain science he was invested in. Of course this opens up questions and concerns, some of which coincide with ideas about control, but without actually engaging with his work all we get is caricature. Mathews deserves a more nuanced treatment than the one he receives in these pages.

Had Kahn given sound synthesis a bit more time, he would have uncovered more accord than disagreement with the works he acclaims. For instance, the aesthetics of granular and particle synthesis were in part informed by radio astronomy, the genre of 'microsound' an extension of the molecular imagination opened up by the microphone. Whilst there is much discussion of whistlers and their influence on the twentieth-century avant garde, I was surprised to see no mention of pulsars, the rotating neutron stars that emit a periodic beam of electromagnetic radiation in the range of 0.24–642Hz, and that Jocelyn Bell first observed in the data from her radio telescope. On whistlers, Kahn proposes that they embody the 'holy trinity of avant-garde musical aesthetics: noise, silence, glissando' (80). That's fine, but doesn't the pulsar also embody avant-garde musical aesthetics, in its traversal of the rhythm tone threshold that indirectly anticipates Stockhausen's *Kontakte*, David Tudor's *Pulsers*, Curtis Roads' *Pulsar Synthesis* program and so on? Some investigation of alternative routes in sound synthesis would have given more substance to the argument for a 'signal plenitude'.

For a book on the musical cosmos, *Earth Sound Earth Signal* contains precious little on Pythagorean mysticism and the occult in music, staying for the most part within the material dimensions of atmospheres, ionospheres, magnetospheres and so on. This is reflected by the fact that there is no mention of La Monte Young, despite his soundworld having been greatly influenced by the Aeolian and the sounds of the step-down transformer. A small departure from scientific rationality comes in the chapter on Pauline Oliveros and her notion of the 'sonosphere'. As Kahn observes, Oliveros is influenced by the physical sciences as well as the various occult engagements with them, so clairvoyance, supersensory experience and

'other realms' are engaged with alongside the material realities studied by the physical sciences. For example, Oliveros thematised New Age writer Gregg Braden's barmy idea that the earth's fundamental frequency was increasing, and that the planet would start spinning in the opposite direction once it reached 13Hz. The sections offer a worthwhile counternarrative to the resolutely terrestrial approaches explored elsewhere, but it is clear that Kahn is rather less comfortable in this company. His comment that 'artists operate under a different license than occult magi, religious authorities, and New Age charlatans' (178) reads rather like an apologia, lacking the critical nouse of the chapters on Cage and Lucier.

That being said, this chapter and the one preceding offer a valuable and interesting pre-history of the form that would become telematic music. Two canonical pieces that utilise very long distances are discussed: Alvin Lucier's *Quasimodo the Great*, which was inspired by the way fin whales are able to transmit signals over very long distances, and Pauline Oliveros' *Echoes from the Moon*, a sound installation which used the moon to reflect and receive radio signals. During these sections, Kahn elaborates his notion of 'transperception', which means 'hearing in a sound the influences of intervening space traversed by a signal or sound' (109). At first I was unconvinced of the need for a new term, since much of what Kahn includes under the umbrella of 'transperception' is already captured by the existing sonic concepts of 'resonance', 'filtration', 'echo' and so on. Outside of an anechoic chamber, all sounds bear the imprint of the spaces and mediums they have traversed, be it air, walls, torsos, ears: in this way, all sounds are 'transperceived'. But in the context of the sound-signal transfer it takes on a different significance. For instance, transperception can include the latency in a network music performance, which tells us how far away a distributed collaborator is in space, whether it be 80ms, 160ms, or whatever. It is by bracketing the mechanical latency of echoes and resonances together with the latency of communications engineering that 'transperception' becomes a potentially fruitful concept, a means to bring nature and media closer together in discussions of networked acoustics, for example.

Earth Sound Earth Signal will be an important new book for scholars in sound and music studies. In its call to consider the electromagnetic spectrum outside the 'tiny patch' that visible light occupies, it feeds into many contemporary intellectual currents. Points of contact can be found with the ecotheorist Timothy Morton's notion of 'hyperobjects', for instance: entities too vast and complex to be considered 'things' (for instance 'global warming'), but whose materiality we urgently need to conceptualise as the planet gets warmer. When Kahn discusses the imperceptible work of Robert Barry, the influence of global warming on

whistler occurrences, or the manifold ways the earth has been put 'in-circuit' with telecommunications technologies, he lends historical support to some of the more speculative work of ecotheory. The early chapters on the birth of telecommunications are the strongest, offering many valuable new ways to think about media. I feel that Kahn is best when he is writing about the past; the temporal distance from his subjects lends a certain muscle to the writing that contemporaneity seems to impede. For example, there is a very funny section on Eduard Hanslick and his morbid philosophy of art and nature, Kahn portraying him as actively wishing death upon plants and animals so that they can be moulded into humanly crafted musical instruments. The later chapters on individual artists are more hit and miss, and can occasionally read rather like exhibition catalogue essays. A tendency to digress, repeat and abruptly change tack emerges over the course of the book, which can leave the reader feeling stranded. But these are minor shortcomings, and a virtue of the chapters' episodic form is that you don't necessarily need to read it from a to b. What I do recommend, however, is reading with good sound examples handy, since so much of the book is spent describing the experience of listening to natural radio and seismic waves. Since University of California Press provides no audio CD or accompanying website, I can recommend the websites Live VLF Natural Radio (<http://abelian.org/vlf>) and Solar Winds Sounds (http://cse.ssl.berkeley.edu/stereo_solarwind/sounds_links.html).

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