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Sound as Synthesis: technological listening and intra-faces of sound

Erik Nyström
City, University of London
Erik.Nystrom@city.ac.uk

Abstract

This paper suggests that despite the acousmatic ethos that it does not matter how a sound was made established electroacoustic theory and aesthetics are largely linked to a composition method that concentrates on acoustic sound sources and transformations, and thus framed by a specific technological model. Correspondingly, the idiom is less ready to make sense of sounds that do not have a real or suggested acoustic profile or spatiality, such as sounds generated by non-standard synthesis and generative algorithms. With the help of Karen Barad's concept of intra-action, this paper substitutes the idea of source with the principle of synthesis. In doing this, technological listening – a mode defined by Denis Smalley indicating that technology is heard at the expense of music – is reframed. The view that technology is a means to an end is challenged through a speculative listening tactic that scans *intra-faces,* where sound is not conceptualised as a physical event, but rather as a synthesis among the technologies of audio, acoustic events, and human cognition. Further, *technomorphology* is suggested as a term and tool for expanding our morphological vocabulary with the non-physical or posthuman profiles of technological artefacts.

1. Introduction

Although there is no intrinsic reason why technology and listener should be at odds with one another, they often seem to inhabit mutually exclusive perspectives in theory on electroacoustic and computer music. Theory which is centred on listening diagnosis of sound, such as acousmatic theory, seeks to focus on *the end* rather than *the means*: in other words, the *music* rather than the *technology* with which it was created. Though it has been successful in doing this, there is a large body of music which does not seem as readily appreciated from this perspective. This includes music that prides itself on being electronic or computational, coming from traditions historically parallel to acousmatic music including the Cologne school, or composers such as Iannis Xenakis, Gottfried Michael Koenig and Herbert Brün; or indeed other music which might be termed 'post-acousmatic' (Adkins et. al. 2016). Much of this music has an aesthetic that is anchored in production technology, where sound synthesis and generative systems take precedence over gestural agency or acoustic causality and spatiality. Jonty Harrison has made a distinction between 'architectonic' approaches to sound and space – where an emphasis is placed on technical or conceptual underlying structures – in contrast with acousmatic music, which is based on an 'organic' approach (Harrison 1999). It is often argued that different models of listening and analysis are required depending on the type of music in question (Young, 2016). One approach is to analyse or even reconstruct the computer program with which a work was created – such a method is described by Kerry Hagan as 'poietic/genetic' (Hagan 2012) in reference to Peter Hoffman's reconstruction of Xenakis' *Gendy3* (Hoffmann 2000). Although that makes sense, such approaches can have the unintentional side effect of supporting the idea that music which is more readily understood from an acousmatic point of view has a somehow more universal, natural, and less conceptual discourse, based on a composition method that need not be explained. But this view depends on listening being conditioned to ignore technology, turning it into a rather normative activity, despite all the literature that wants to suggest otherwise. I am unsatisfied with the duality between technology and sound and believe that the othering of technology is a mistake. I draw on a post-humanist view on mind, nature and technology to open our listening to a wider scope of materiality and spatiality in sound. Robert Seaback has done related work in this area, identifying 'anacoustic modes' as 'an expression of the materiality of information', following the writing of N Katherine Hayles (1999). I'm going to address Denis Smalley's concept of 'technological listening' and reframe it on basis of theory borrowed from Karen Barad, but this comes at the cost of weakening what I call the 'acousmatic interface'. I believe technological listening – like many other terms and concepts coming from Smalley's writing – is a rich idea that can be developed further. I want to argue that it can be a fruitful part of musical experience, not preventing, but enhancing, the understanding of morphology and appreciation of music.

2. Technological listening and source-bonding

> Technological listening occurs when a listener 'perceives' the technology or technique behind the music rather than the music itself, perhaps to such an extent that true musical meaning is blocked. Many methods and devices easily impose their own spectromorphological character and clichés on the music. Ideally the technology should be transparent, or at least the music needs to be composed in such a way that the qualities of its invention override any tendency to listen primarily in a technological manner. (Smalley 1997: 109)

Smalley's explanation of technological listening is based on the observation that techniques and technologies do not help us understand acousmatic sound in the same way that knowledge of acoustic sound-making is linked to instrumental and vocal music. A key aspect here is that technological listening is encouraged by music that is not using technology in a transparent or inventive manner. At the time when the above was written, the technologies available were limited compared to the present, imposing stricter constraints and challenges, and in this perspective, the understanding of music and the technology as two different entities appears reasonable. But what is left if we ignore technology in our listening experience? The non-technological diagnosis of morphology, motion, gesture, texture, space etc, inevitably gravitates towards a framing of sound as real or fictional acoustic events occurring prior to technological mediation. Regardless of how a sound is made, it is interpreted through imaginative *source-bonding* (Smalley 1997), which is the process whereby a listener attributes plausible causes to a sound heard acousmatically. Smalley's view that source-bonding is an inevitable element in listening is coherent with ecological psychology and it is also a central principle in acousmatic music, which frequently bases its discourse on ambiguities, transformations and allusions pertaining to the abstraction, or synthetic imitation, of acoustic sound sources. However, technological listening is also a form of source-bonding, which may locate an electroacoustic sound event in, for instance, a loudspeaker, a signal, an audio software, and so on. Such source-bonding is also a natural element in ecological psychology, which may help us distinguish, for instance, between recorded music and the technology of reproduction. Regardless of what Smalley intended, I suspect that technological listening has become associated with a hierarchical distinction of musical value, where 'nature' is accepted as a genuine origin of sound, but technology less so. Sound is understood as *a physical event, occurring prior to technological mediation*: the event is understood as something plausibly captured by a microphone, not the motion of a microphone diaphragm, an alternating current, a DSP algorithm, a pulse code modulation, or the motion of a loudspeaker driver.

Although spectromorphological and acousmatic thinking clearly aims to be agnostic to composition methods its physical ontology of sound is based on a certain research methodology and composition strategy, namely Pierre Schaeffer's model of transforming sound that has been captured in recording. Adrian Moore explains this well, writing that, 'acousmatic composition begins with source material that is processed and reflected upon' (Moore 2016: 4) and 'If composition begins with sound, we need to record that sound' (ibid.: 5). This encourages a 'before and after' way of thinking, where the electroacoustically sculpted sound is always compared against an original recording. But surely this only matters to composers: the audience doesn't know about the before and after! That is often true at the level of individual sounds, but 'source-transformation play' is also a common and classic concept of form and discourse in EA music, which cements this principle idiomatically. In this view, technological listening is considered problematic because, like in a magician's spectacle, if the technology is revealed, then the transformation has not been successful: the audience can discern the trick. Even if the real pre-transformation sound source has no relevance to the work, it becomes apparent in technological listening because we can hear the technological process as an added 'impure' source, separate from the real or fictional source of 'the sound': stages of production are revealed. Problematic instances of technological listening, then, are simply problematic instances of source-bonding: if a source appears to be somehow irrelevant in the context, we may not want to hear it. My reimagination of technological listening does not suggest a mode in which listeners are seeking exact truths about techniques and tools used in composition. Rather, it is predicated on a view of technology as symbiotic with sound and listening, including technology of listening and listening technology.

3. The acousmatic interface

The notion of the Pythagorean veil is a metaphor for the listening interface of acousmatic music. For listeners, loudspeakers provide a functional interface for decoding composed space and sound. As we have seen, acousmatic sound is not purported to originate in the technology: it is delivered by the technology. The principles of acousmatic diffusion, multichannel spatial panning, and ambisonics all tend to service this encode-decode view of composition and performance: our aim is to project a ready object, a composition, before the audience as truthfully as possible. A composition itself contains several such interfaces located wherever technology has been used to produce a transformation. The technology occludes, obscures or transforms the source, but the principle of source is still there in the sense that the sound remains an event or object we cannot see, plausibly 'out there' in a world behind the veil. The acousmatic interface is also present in the listener, who faces a sound object and imagines its plausible origins, out there, beyond the veil. What is important about the acousmatic interface, whether it is a listener's imagination, an array of loudspeakers or a DAW, is that it is largely external to the music. But how on earth could one say that the listening imagination is external to acousmatic music? In acousmatic music it is surely absolutely central! Yes, it is central, but it is also a conditioned mode of imagination, which is encouraged to decode sounds and their relationships as if there were in a world beyond the curtain of technology. The listener is in an ‘interactive relationship’ with sound (Smalley, 1996): the sound and the listener are as two agents in interaction, separated by the veil. The acousmatic interface obviously accounts well for music that has been composed according to this view. However, it appears rigid and not entirely compatible with music that to a larger extent anchors source, materiality and spatiality in the audio technology and the listener (e.g in cognitive paradoxes or auditory distortion products), rather than in an imagined world beyond. As Brian Kane has written, acousmatic experience depends not on a ‘division between two sensory registers’ but on epistemological degrees of certainty and uncertainty (Kane 2014: 224). Loosening up the interface, in both theory and practice, can allow listeners an ecologically more versatile engagement with music.

4. Intra-faces of sound

> I introduce the term "intra-action" in recognition of [agents’] ontological inseparability, in contrast to the usual "interaction", which relies on a metaphysics of individualism (in particular, the prior existence of separately determinate entities). (Barad 2007: 128)

Karen Barad (2007) makes a distinction between *interaction* and *intra-action*. Agents in *interaction* are pre-existing and predefined, but in an intra-action, the agents are not external to one another. The agents are brought into existence by what Barad calls an ‘agential cut’: it is the action of defining where an exchange of forces takes place which creates the agents. For Barad, agents are phenomena rather stable entities and ‘"phenomena" are the ontological inseparability of objects and apparatuses’ (Barad 2007: 128). The technology of observation cannot be separated from what is being observed. This is obvious for audio practitioners: e.g. a sound is not independent of its monitoring. But does the music seek to subdue or explore this reality? Does it internalise the expanding ecology of sound that has been defined by technology, including anything from auto-tuned voices to non-standard synthesis algorithms?

The neologism ‘intra-face’ can replace the acoustic origin myth with a continuous synthesis which takes the form of a potentially infinite chain of transductions, where every layer may be seen as a cause or effect. If we accept that any event is potentially stimulated by another preceding it, the concept of origin becomes irrelevant. A sound branches out into any listener, who becomes part of it, their bodily organs and mental faculties producing their own manifestations of the transduction chain. Understood this way, a listening human is not less technological than a loudspeaker. In the process of perceiving and cognising sound, a listener exposes certain agential forces through different intra-faces. This may include source-bonding, bodily affects, morphological diagnoses, and more, but we are not reducing or deducing, but *synthesising* sound. As Eric Clarke observes,

> When perception proceeds in an unproblematic way, we are usually unaware of the sensory aspect of the stimulus information, and are only attuned to the events that are specified by stimulus structure. But when that relationship is problematic, the stimulus structure itself can become more evident. (Clarke 2005: 32)

The moment a listener encounters uncertainty of the spatiotemporal reality of sound, the integrity of their mind is challenged as the technology of hearing and auditory cognition becomes exposed. Jean-Claude Risset wrote about his endless Shepard tone glissando that "such oddities reflect the mechanisms of pitch perception." (Risset 1985: 125). It is as if the human listener is broken down into modules which operate in a synthesis network where any sound phenomenon is located at an intra-face in a particular synthetic register. Technology is not a veil which hides a sound from vision, it is simply the mechanism present in all sound transductions. In this view, sound void of acoustic materiality or spatiality stimulates rather than impoverishes the speculative synthesis of listening (Nyström 2018).

5. Technomorphology

> Matter organized technomorphologically is not passive; the tendency does not simply derive from an organizing force - the human – it does not belong to a forming intention that would precede the frequentation of matter, and it does not come under the sway of some willful mastery: the tendency operates, down through time, by selecting forms in a relation of the human living being to the matter it organizes and by which it organizes itself, where none of the terms of the relation hold the secret of the other. (Stiegler 1998: 49)

Our musical ecology of sound is not natural or human any more than it is technological. We have seen a manifestation of this in popular idioms, where artists have normalised the post-human voice by using autotune, not as the correctional tool it was built to be, but as a creative agent in its own right; likewise, computer music has developed an ecology of phenomena coming out of algorithms used in the spirit of "[composing] a composition that teaches [us] the next aesthetics." (Brün 1985: 6). David Tudor created a technological biosphere where nature is not behind a curtain, but in electronic circuits and listener. Composers such as Stine Janvin, Markus Schmickler, Maryanne Amacher, Jean-Claude Risset and others have in various ways made the mechanisms of auditory scene analysis and hearing part of our sonic and spatial ecology. These sounds are not captured or located 'out there', but they are collectively synthesised by intra-actions among listeners, artists and technologies. Moreover, these are all phenomena that are linked to the mechanism of making and hearing sound, and in many cases also specific tools which have provided us not only with clichés, but also contributed to our morphological typology. Thus, a morphological archetype is not really an archetype, but a *technomorphology*, a phenomenon continually resynthesised by culture and technology over time. The technomorphological perspective incorporates any distinct artefacts that are generated by technology into our morphological vocabulary, including sound shapes that do not correspond with physical cause and effect. This acknowledges that the areas of electronic, electroacoustic, and computer music are no longer dependent on an audience that is primed on instrumental and vocal sounds in music, but also that human and nature are not isolated from technology.

6. Conclusion

Intra-faces of sound and technomorphology outline a future direction for electroacoustic music studies, and can be developed as a theoretical framework that expands across a more inclusive palette of sound available to composers. Such a framework recognises that theory received through research and education becomes embedded in composition practice *and* that we must be open to the idea that our fundamental knowledge and understanding of sound and aesthetics is linked to technology. Technological listening, in this view, becomes a process of engaging with mechanisms of synthesis – physical, digital, auditory – by scanning through different intra-faces of sound. We replace the ontological principle of source with the onto-epistemological concept of speculative synthesis, where the ‘nature’ and ‘source’ of sound is the product of technologies running through mind, digital information, circuitry, and physical events.

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