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What is sound studies?

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WHAT IS SOUND STUDIES?

Mark Grimshaw-Aagaard

Introduction

I consider myself a sound studies researcher and yet I do not consider myself a sound studies researcher. To explain this paradox: the object of study in my research is sound and yet I do not fit easily within the sound studies bracket as defined in numerous descriptions of sound studies as a research field and as an academic pathway. Still, in my professional life, I find myself regularly labelled as someone who “does sound studies,” whose work should be viewed through the distorting prism of sound studies. Categories and definitions, descriptive or normative, and in any field but, perhaps, particularly so in the humanities, do matter because they are useful tools for politicians and administrators and analysts and reviewers to, among other uses, formulate policies and decisions of inclusion and exclusion. This essay, therefore, is part rumination on what precisely sound studies is, part discussion of what sound is, and, ultimately, part suggestion that sound studies could be redefined to include what, if one holds to nominative determinism, should be the core object of study.

What is sound studies?

In this section, I survey attempts to define sound studies as a field of academic study and discourse. As with many relatively new fields of study, it can be difficult to accurately pin down when the term started to be used, when the field began to aggregate, and some future academic archaeologist will, no doubt, be able to trace the genesis of the field, as the foci of inquiries from diverse disciplines began to coalesce into a recognizably distinct body of work, much further into the past than I would care to. What interests me here are the attempts to define the field that have been provided since the start of the century, that point in time I would cautiously define as marking the beginning of sound studies proper.

Michael Bull and Les Back, in the introduction to *The Auditory Culture Reader* (2003), implicitly acknowledge that the field of sound studies has yet to be defined in their hope that the chapters of the anthology should “provide an integrated picture of what sound studies should look like” (Bull & Back 2003, 3). A further indication of this acknowledgement is that the editors at least twice use scare quotes in the introduction *viz.* “‘sound’ studies” (Bull & Back 2003, 3–4). What is demonstrated in the anthology is that, whatever “sound studies” should look like, it is *not* the study of sound *per se*. The field is better described as *auditory culture*, as stated in the anthology’s

title, in that the contributions range from listening through to studies of sound's use and function in culture and society. Throughout, that sound is a sound wave is an assumption not questioned.

In 2004, Trevor Pinch and Karin Bijsterveld provided what is, to the best of my knowledge, the first succinct definition of sound studies in the journal *Social Studies in Science*: "Sound Studies is an emerging interdisciplinary area that studies the material production and consumption of music, sound, noise, and silence, and how these have changed throughout history and within different societies" (Pinch & Bijsterveld 2004, 636). What is particularly telling here is the mission statement of the journal: to encourage "submissions of original research on science, technology, and medicine. The journal is multidisciplinary, publishing work from a range of fields including: political science, sociology, economics, history, philosophy, psychology social anthropology, legal and educational disciplines."¹ It should be noted that, until 1975, *Social Studies in Science* was titled *Science Studies*. The definition that Pinch and Bijsterveld provide, then, is a justification for the relationship of music, sound, noise, and silence, and the study of their production and consumption, to the broader field of science and technology studies and, therefore, to the remit of the journal. The authors also wish to demonstrate how the methods and methodologies of science and technology studies can be of use to sound studies: "What S&TS can contribute is a focus on the materiality of sound, its embeddedness not only in history, society, and culture, but also in science and technology and its machines and ways of knowing and interacting" (Pinch & Bijsterveld 2004, 636).

In 2012, the field had matured enough to warrant the publication of two substantial anthologies whose titles explicitly state this maturation of the field. *The Oxford Handbook of Sound Studies* (Pinch & Bijsterveld 2012) adheres, in the main, to the science and technology studies track and this should come as no surprise as the editors are the two authors behind the article in *Social Studies in Science* mentioned above. In describing the process of transduction as turning "sound into something accessible to other senses" (Pinch & Bijsterveld 2012, 4), they state that: "[N]ow that technologies of transduction are everywhere, we would like to foreground their appropriation and consequences in science, society, and culture as important topics for study" (Pinch & Bijsterveld 2012, 4). Sound studies, thus, deals with "technologies for storing, manipulating, and transferring sound and music ... and new ways of measuring, conceptualizing, and controlling sound" (Pinch & Bijsterveld 2012, 5). Following on from this technological bent, sound studies also investigates interaction with sound and the role of technology in aiding or enhancing that interaction (for example stethoscopes and hearing aids/prostheses). The field is interdisciplinary and the editors list a number of contributing disciplines and other fields: acoustic ecology; sound and soundscape design; anthropology of the senses; history of everyday life; environmental history; cultural geography; urban studies; auditory culture; art studies; musicology; ethnomusicology; literary studies; science & technology studies; cultural history; anthropology of medicine and the body; media studies; film studies; and game studies (Pinch & Bijsterveld 2012, 6–7).

Jonathan Sterne, in *The Sound Studies Reader* (2012), defines sound studies thus:

Sound *studies* is a name for the interdisciplinary ferment in the human sciences that takes sound as its analytical point of departure or arrival. By analyzing both sonic practices and the discourses and institutions that describe them, it redescribes what sound does in the human world, and what humans do in the sonic world.

(Sterne 2012, 2)

He goes on to state that:

Sound studies' challenge is to think across sounds, to consider sonic phenomena in relationship to one another – *as types of sonic phenomena rather than as things-in-themselves* –

whether they be music, voices, listening, media, buildings, performances, or another other [sic] path into sonic life.

(Sterne 2012, 3)

Importantly for Sterne, “[n]ot all scholarship about or with sound is ‘sound studies,’” and “[s]ound studies has an essential ‘critical’ element” (Sterne 2012, 4–5); sound studies, therefore, is not itself production of sound or any form of sound practice. As with Pinch and Bijsterveld, Sterne provides a long list of academic professions and disciplines feeding off and into sound studies:

[H]istorians, philosophers, musicologists, anthropologists, literary critics, art historians, geographers ... media studies, disability studies, cinema studies, cultural studies, gender studies, science and technology studies, postcolonial studies, communication studies, queer studies, American studies and on and on.

(Sterne 2012, 3)

If the definitions provided above, along with the explanatory argumentation and justification, have anything in common it is that they avoid sound itself as the object of study. This is somewhat surprising given the inclusion and prioritization of that very word in the term *sound studies*. One would assume, confronted with a newly defined field of academic inquiry termed sound studies, that the object of study in the field is sound. Yet, it is not. As Sterne states: “Sound studies ... takes sound as its analytical point of departure or arrival.” Yet, for “one of the field’s central concepts” (Sterne 2012, 7), sound is notable by its absence.

This omission of the study of sound itself from sound studies is, in fact, noted and lamented by Sterne when he briefly queries what sound is: “Does sound refer to a phenomenon out in the world which ears then pick up? Does it refer to a human phenomenon that only exists in relation to the physical world? Or is it something else? The answer to the question has tremendous implications for both the objects and methods of sound studies” (Sterne 2012, 7). Reading the chapters in the anthologies listed above, one must assume that most if not all of those who “do sound studies” hold to the view that sound is a vibration (within the auditory range) that travels through a medium, as does Sterne in his introduction (despite having asked the questions above). The study of *sound* is therefore the province of acousticians and not of sound studies and this view is borne out by the dearth of analysis of sound (as opposed to analysis of the use and effects of sound artefacts through history and in society and culture that are hallmarks of the writings of sound studies scholars). Sterne himself acknowledges an unease with the term sound studies by suggesting that it might be better called “‘auditory culture’ to reflect the degree to which sound is a sensory problem” (see Bull & Back above) and because one path into sound studies “assumes the physicality of sound and then considers its cultural valence” (Sterne 2012, 7).

While I disagree that “sound is a sensory problem” (as I make clear below), I do agree with Sterne that the question of what sound is “has tremendous implications for both the objects and methods of sound studies.” Although I do not suggest that sound studies concerns itself only with the metaphysical and the abstract, in many ways my stance on sound studies echoes that of Claudia Abbate’s (2004) views on musicology: “[why is] the academic discourse devoted to music ... comfortable with the metaphysical and abstract and uninterested in the systems that bring music into ephemeral phenomenal being” (Abbate 2004, 513). There is plenty of debate outside sound studies as to what sound *is* and so I use the following section to survey a number of extant definitions of sound – not only the acoustic definitions (yes, there are at least two of

them) – with a view to finding a definition that can provide the core object of study and so provide a sound foundation to sound studies.

What is sound?

It is neither my intention here to list all extant definitions of sound nor to expand in great detail upon those I do present; I and others have done this elsewhere (for example Pasnau 1999; Casati & Dokic 2005/2010; Nudds & O’Callaghan 2009; Grimshaw & Garner 2015; Grimshaw 2015). I use this section, then, to discuss the standard western definitions of sound (that is, those in the field of acoustics and having general currency) to question the fundamental assumption within sound studies that sound is thus defined and need not be discussed further, to discuss some other relevant definitions of sound, and to briefly present a definition of sound that I believe has more relevance and use to sound studies than that tacitly assumed.

I mentioned above that there are in fact two definitions of sound (possibly three depending on one’s interpretation of the wording) to be found in the acoustics standards. The first is the familiar one that the 10th edition of *The Concise Oxford Dictionary* defines as “vibrations which travel through the air or another medium and are sensed by the ear.” Both this definition and the second definition are more fully stated in American National Standards Institute (ANSI) documentation: sound is either “(a) Oscillation in pressure, stress, particle displacement, particle velocity etc., propagated in a medium with internal forces (for example elastic or viscous) or the superposition of such propagated oscillation” or “(b) Auditory sensation evoked by the oscillation described in (a).”² However, even acousticians doubt the correctness of these definitions: when I asked an acoustics colleague to clarify the wording, clarification came there none, but rather a denial of the validity of the definitions: “[the] definition [is] out of scope for most of the purposes I know [the definition] is only operational for some purposes [...] It is therefore necessary to use domain-specific definitions.”³ One wonders if even an acoustician is willing to dispute the standard acoustic definitions of sound (including one that underpins the popular and apparent scientific consensus of what sound is), and to such a strong degree, should not sound studies scholars also reconsider their basic assumptions as to what sound is and turn their attentions to this subject?

I have my own views regarding the standard definitions. For example, the ANSI definitions have the following footnote: “Not all sounds evoke an auditory sensation, for example ultrasound and infrasound. Not all auditory sensations are evoked by sound, for example tinnitus.” With some simple word substitution from the definitions, one can arrive at the curiously pataphysical statements that a) not all sounds evoke a sound and b) not all sounds are evoked by sound. If one does indeed accept that not all sounds evoke an auditory sensation, then one must assume that either dogs do not hear a sound but respond to something else when a high-pitched dog whistle is used or that what they hear cannot be defined as sound simply because we humans are unable to sense such doggy sounds. Further incoherence can be found in numerous examples of downright sloppy use of the term sound in numerous articles and textbooks on physics and acoustics where, for example, sounds arrive at the ear and are then transported (as sound) to the brain or that the brain translates vibrations in a medium into sound (for these and other examples see for example Pasnau 1999; Grimshaw 2015).

One other objection I would like to raise to the standard definitions of sound is that they neither explain various auditory phenomena nor do they support the phenomenology of our everyday hearing. One famous anomaly is the McGurk Effect in which an audio recording taken from a video recording of someone’s mouth articulating the syllable “baa” is superimposed

on a video of the same mouth articulating the syllable “faa.” When a subject is played the first video the syllable “baa” is heard as expected. But, when played the second video, the subject hears “faa.” How is it possible to hear two different sounds while sensing the same sound wave (sound), to have different auditory sensations evoked by the same oscillations (or to have different sounds evoked by the same sound if one takes the pataphysical approach)? Either what we hear is not sound or, if what we hear is indeed sound, then sound is neither of the ANSI definitions.

Phenomenologically speaking, the location of the sound we hear can be quite variable in that, depending on context and other factors, we experience sound as either being dynamic, and thus in accordance with the notion of sound as a moving waveform in a medium (the sound is coming from the left loudspeaker – it can be dynamic too in another sense such as panning the sound from the left to the right loudspeaker), or being static (I hear the sound of her voice over there). Equally, we also quite naturally equate sound sources with sounds in our everyday language. Gaver (1993) provides a good example: a researcher running a hearing experiment plays an audio recording and asks a subject to describe what has been heard; the subject responds “a single-engine propeller plane flying past”; the researcher, frustrated, asks the question again stressing this time that the subject must not interpret the sound; the subject still responds “I hear a plane”; irritated, the researcher retorts “you didn’t hear an airplane, you heard a quasi-harmonic tone lasting approximately 3 seconds with smooth variations in the fundamental frequency and the overall amplitude”; “no I didn’t, I heard a plane” the subject insists (Gaver 1993, 286–287). Human experience resists scientific objectification and therefore, if one wishes to study sound as the object of our hearing (and thus its use and effect in technology, culture, and society), one must define sound as something other and more than the standard definitions. In my view, acousticians do not study sound; rather, they study acoustic waves and these are the objects of an auditory sensation that is only a part of what results in the sound that we hear.

In the western world there have, of course, been definitions of sound that pre-date those of modern acoustics. That early proponent of atomism, Democritus (active in the 5th and 4th centuries BC), suggested that sound was a stream of particles emitted by a thing and, interestingly, the basis for this idea has found a new lease of life in quantum physics with the concept of the phonon (Gabor 1947) and this leads to the interesting notion that sound has mass and can therefore be deflected by gravity (Unnikrishnan 2005) – perhaps the long lists of disciplines and fields contributing to sound studies given above should also include quantum physics. However, there are also several definitions of sound that attempt, philosophically or phenomenologically, to describe sound in ways that account for our everyday experience of hearing (particularly the question of our experience of the location of sound).

Among the more recent definitions, in appealing to the veridicality of our perception, Pasnau (1999) is among those claiming that sound is the property of an “object that ‘makes’ them ... objects *have* sounds” (Pasnau 1999, 316) because “we do not hear sounds as being in the air; we hear them as being at the place where they are generated” (Pasnau 1999, 311). Others (following Aristotle’s claim in *De Anima* that “sound is a particular movement in air” [quoted in O’Callaghan 2009, 27]), argue that sound is an event and that this event causes periodic motion in the medium (O’Callaghan 2009, 37) and that “[s]ounds are events that take place near their sources, not in the intervening space” (O’Callaghan 2009, 48). Yet others describe sound as both object and event. For Scruton (2009), sounds are secondary objects and pure events; sound is “an object of attention” (Scruton 2009, 50) that, in being such a secondary object, does not undergo change (for example when broadcast or recorded), and is a pure event because it does not happen to anything – there is thus “a virtual causality in sound that has nothing to do with

the process whereby sounds are produced” (Scruton 2009, 64). In failing to demonstrate “a causal mechanism linking our neurological processes with the supposed subjective effect – the world of our perception” (Riddoch 2012, 14), the standard acoustic definition of sound does not account for the “worldly phenomena” that are sounds. Riddoch instead proposes two categories of sound: cochlear sound (those sounds involving sound waves); and non-cochlear sound (sounds produced by cross-modal effects such as synaesthesia, infrasonic sounds, and auditory imagination).

The question *where is sound?* is a fascinating one to ponder not least because it forms the basis for several of the definitions presented above. If we can answer the question satisfactorily, then presumably one has taken the first step towards defining sound. Nevertheless, while the question is a good one and should be asked, I believe asking it first places too much emphasis on the necessity of sound waves to sound (that is, sound as not defined according to acoustic definitions). Find the source of the sound wave and there will be found sound, and so all of the above definitions (with the exception of Riddoch’s non-cochlear sound) presume a causal connection from sound to sound wave. Yet, we are quite capable of experiencing sound (frequently so) as being at or issuing from somewhere other than the sound wave source as evidence from, for example, the cinema (*viz.* synchresis [Chion 1994]) and the ventriloquist’s dummy (for example Warren, Welch, & McCarthy 1981) demonstrates all too clearly. There are other problems with the definitions discussed above. For instance, Scruton bases his definition on studies of music perception (a rather singular mode of sonic expression) and insists that humans alone are able to perceive order in sound (for evidence to the contrary, see for example Patel, Iversen, Bregman, & Shulz 2009)⁴ while O’Callaghan, in defining sound as an event bringing “a medium into *periodic* motion” (2009, 37 italics mine), ignores that vast majority of sound waves that arise from a medium in *inharmonic* motion.

In the book *Sonic Virtuality* (Grimshaw & Garner 2015), Tom Garner and I proposed another definition of sound: sound is an emergent perception that arises primarily in the auditory cortex and that is formed through spatio-temporal processes in an embodied system. This is a definition that accounts for the many objections Garner and I had to current definitions of sound including being able to account for the human factor in our experience of sound, the imagining of sound, and the localization of sound (the question *where is sound?*).

Regarding the imagination of sound (also known as auditory imagination or aural imagery), Garner and I were keen to have a concept of sound that allowed us to explain the imagination of sounds as sounds in themselves (this mirrors some of Riddoch’s thinking above). There is plenty of evidence from neuroscientific studies to suggest that such sonic imagination plays a large part in our multi-sensory experience of the world whereby the brain, for example, is capable of “filling in the gaps” left by absent sound wave stimuli if the context demands it and so such imagined sound should be a part of any holistic conception of sound (see for example Hoshiyama, Gunji, & Kakigi 2001; Hughes et al. 2001; Kraemer et al. 2005; King 2006). Furthermore, we were interested in the possibility of extracting sound from the brain. That is, neurally decoding the brain wave activity of the emergence of sound as a perception and then using this imagining of sound to create digital audio and, ultimately, to produce sound waves. To do this, one needs a conception of sound as perception and to be able to identify the relevant brain wave activity. While it has yet to be achieved with sound, such neural decoding has achieved success with visual imagery and speech perception and there are plans to attempt it with musical imagery (for example Nishimoto et al. 2011; Pasley et al. 2012; Thompson, Casey, & Torresani 2013) and therefore the possibility to do likewise with sound, for instance, to be able to “think” sound into a Digital Audio Workstation, has important consequences for our future design of technology and our interaction with it.

On the question of localization of sound, rather than first use the answer to that question to drive the formulation of our definition, we used our definition itself as the means to answer the question. This allowed us to account for our experience of synchresis, for example, and so the localization of sound is not a process of *finding* the sound wave source but of *placing* the sound out into the world where it makes *cognitive* sense to locate it. This is a form of cognitive offloading (such a concept being found in theories of Embodied Cognition [see for example Wilson 2002]) and, in addition to using it to explain effects such as synchresis, I have since used this notion of sound localization to explain the role of sound in presence in virtual worlds such as computer games (Walther-Hansen & Grimshaw 2016; Grimshaw 2017).

Sound studies and sound studies

Here is an important link to sound studies: a conception of sound as an emergent perception that, to return to Sterne, could have, if not “tremendous implications,” at least some implication “for both the objects and methods of sound studies” but that also helps to explain how to bring sound in as a core object of study to sound studies while at the same time maintaining some insularity from acoustics and like subjects (that study the physics and sensations of sound waves).

As stated in my introduction, it is not my intention to redefine sound studies but to suggest that it could be redefined should those with a vested interest in sound studies wish to do so. My main contention is that sound studies should hold true to its title and therefore have at its core the study of sound. This does not mean that sound’s relationships to, uses in, effects on, and roles in forming technology, society, and culture should be ignored; far from it as these are important topics. But a conception of sound that is perceptually based has use-value to sound studies because sound as a perception, being formed from bottom-up processes (that is sensation) and/or top-down processes (that is cognition), is formed not only from sound waves (if they are present at all) but also from memory, knowledge, reason, experience of physical spaces, expectation, emotion, mood, imagination, and so on. Studying how that perception is formed, therefore, provides a rich vein of research into society and culture as well as into the individual as a product of society and culture. Finally, a conception of sound as emergent perception allows for a proactive approach to be included in sound studies whereby the development and design of technology is informed by an analysis of knowledge about that perception.

Notes

- 1 <http://sss.sagepub.com/>
- 2 American National Standard, *Acoustical Terminology*. ANSI/ASA S1.1-2013.
- 3 Personal email communication, 1st September 2015.
- 4 And one must draw attention again to the ANSI definitions of sound that are strictly human-centered. Ultrasound (in the ANSI definition, a sound not producing an auditory sensation) is defined as being above the upper human hearing limit (c.20kHz) and so, despite many dogs having perfectly serviceable hearing up to c.45kHz, any pressure wave fitting the primary ANSI definition but that nevertheless lies within the 20–45kHz range does not produce an auditory sensation. Similarly, cats have a hearing range of up to c.80kHz and are often used experimentally to inform about the *human* auditory system. All of this is absurd.

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