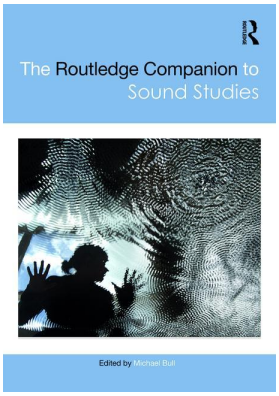

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Sound as Theory 1863–2014: from Hermann Von Helmholtz to SalomÉ Voegelin

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SOUND AS THEORY 1863–2014: FROM HERMANN VON HELMHOLTZ TO SALOMÉ VOEGELIN

Holger Schulze

Sound can be looked at. Yes, you just read this sentence: *Sound can be looked at*. Yet, what can be seen of sound are mainly translations of the pressure waves – out of which any sound actually consists – into scores, diagrams, into sonograms. One sees the effects these pressure waves can take onto other objects, fluids, gases, onto elastic materials, onto the connected limbs of mechanical or electromechanical artifacts. As indirect as they are, these effects of sounds provide the contemporary forms of *Anschauung*, of *theoria* on sound in the early 21st century. Sound *is* vision these days as sound production, sound analysis, and sound technology are effectively operated mainly via the somewhat strange detour of visual displays. Should there be a natural order of the senses? A vast army of thinkers does affirm this assumption. They actually form the canonical literature of Western philosophy and theory, surely not only starting with Aristotle, Jean-Jacques Rousseau, Immanuel Kant and definitely not ending with Ferdinand de Saussure. These *logocentrists* did assume, implied or explicated in their writings, that a natural order of the senses does exist. According to this logocentric sensory anthropology the higher senses are situated closer to the visual perception of arguments and mathematical equations – and lower senses hence closer to seldomly reflected passions, affects, to momentary, idiosyncratic, and entangling impulses, to lust or to longing. More recently though a series of – as I like to call them – *audiopietists* (Schulze 2007) emerged like R. Murray Schafer, like Walter J. Ong or like Joachim-Ernst Berendt who argue as well for a natural order of the senses – though simply reversed: the higher senses are, for them, closer to individual affects and to intimacy, to passions, and to corporeal sensibilities – the lower senses though closer to the supposedly dry and alienating operations of writing and reading, measuring, and calculating. As a countermovement, this reversal of a normative sensory order is quite understandable, at times it could even be considered a kind of subversive or trickster move. Yet, the main fallacy of claiming a stable order of the senses regardless of historical and cultural transformations is truly not corrected by just claiming a different order as stable. Moreover, such audiopietists are not seldomly connecting their mission to anti-modernism and anti-urbanism, to an elitist disregard for popular and everyday cultures, even to technophobia and Luddism. Effectively, the mission of audiopietism is to promote the *audiovisual litany* that Jonathan Sterne did deconstruct so strikingly once and for all (Sterne 2012a: 8).

Thinking about sound is inextricably relying on thinking about the senses. It relies on notions about the plasticity, the mingledness, and the idiosyncrasies shaping sensory and sonic

experiences. Theoretical approaches to sound therefore can take very different shapes and forms – outside the well-known approaches to *theoria*, sticking to a traditional logocentrist or an anti-traditional audiopietist order of the senses. Such efforts to theorize sound underwent various transformations and experiments in the last 150 years: one can observe timid retractions of once experimental ambitions and submissions to hegemonial research paradigms as well as renewed revolutionary ambitions to finally eliminate institutional and methodological restrictions. These efforts took place to foster the progress in researching sounds as well as in operating with sounds, all in order to expand the research field and its research methods. The history of *sound as theory* is thus explored in this chapter as a transdisciplinary and unfinished research project. A project that in itself generated the vivid and largely heterogeneous research field which now bears the name of *sound studies*. In its research culture fundamentally contradicting approaches and methods, positions on the role of the arts, of design, of scientific research, of empirical methods, and of new hermeneutic, post-hermeneutic, new digital or post-digital approaches coexist and complement each other. This very multitude of conflicting approaches and competing methods actually constitutes a proper research field: in contrast to an esoteric school, in which all disciples mainly affirm and elaborate on the genius of one early sage, his holy words, and a selection of holy scriptures. Dissent is how research operates and progresses.

1863–1954:

Theories of sound

A *theory of sound*, if you intended to invent it anew – how would you start conceptualizing this? With a focus on specific sounds and experiences of hearing maybe? With going out in the field and collecting characteristic sonic experiences in common and not so common situations? Maybe even with travelling all over the globe and looking for the most remote and most unusual sonic experiences in a wide array of cultures and subcultures? Such an approach would be considered rather characteristic for globalized, mediatized, and commodified research in the early 21st century with its focus on material, specific, and empirically recognizable tiny situations – moreover integrating aspects of globalization, mediatization, and individualization. In contrast to such an approach, research on sound in the 19th century did start, unsurprisingly, at a radically different point, focusing on substantially different questions, intending to achieve a different goal. In those times of electrification, of imperial nationalism, and excessive colonialism, at the climax of a bourgeois concept of territorializing all aspects of life, history, space, and existence, the research cultures of those times were as well-tailored to contribute to this process of industrialization, of commodification, and of capitalization.

The audio technology present today, all these amplifiers and compressors, surround sound systems, hearing aids, the mixing desks, the effect tools, the sound processing software suites: in these artifacts the historical sound theory, stemming from the aforementioned 19th-century efforts of European and American science imperialism and their historical framework of epistemology and social as well as economic order is still manifest. *Theories of Sound* from this period did materialize, quantify, and objectify sound in order to support the major process of capitalization and commodification. These theories present themselves to us as the one and only, the exclusive, and the only actually useful and profitable way of storing, transmitting, presenting, and reflecting sounds. Studies by Hermann von Helmholtz, by Harvey Fletcher, or by Leo Beranek can serve thus as appropriate entry points into this historical and impactful specimen of theorizing sound. Their research, covering over one century, colonizes if you will the whole range of corporeal aspects of aural listening: listening *by the ear.* Their research tries and succeeds

in quantifying aural and auditory sensations; it succeeds in materializing the before often immaterialized process of listening; and it *almost* succeeds in establishing a language that speaks about sounds for once not in terms of the unspeakable or the imaginary – but in terms of corporeal sensations, of bodily events.

Hermann von Helmholtz's research is one starting point. His research focused on a materialization of the ear, its functioning, its means and materials for signal transduction from the surrounding and intruding air into the body, into the nerve net, and the brain (for example Helmholtz 1863). The experiments and the models invented and crafted by Helmholtz are impressive still today, for he managed to conceptualize sound as one coherent signal that could be transduced through carriers and channels inside a humanoid body. This alone qualifies as a major theoretical step in the history of any *theory of sound*. With this new, scientific entity and model it actually became possible to describe sound as a material phenomenon – not merely an imaginary or at best supernatural event beyond any comprehension of humanoid mortals. With the physiological and sensorial research by Helmholtz and his disciples such as Wilhelm Wundt and later researchers such as Carl Stumpf or Hermann Ebbinghaus, the sacred areal of the human body and its behaviour concerning sensory perception and auditory phenomenology were joyfully profanized to become a research field of its own. Without Helmholtz's crucial first step no research on perception and on auditory cognition as it is present today would have been possible.

A second crucial step in the history of any theory of sound can be found in the research of Harvey Fletcher (Fletcher 1929). Fletcher, being principal investigator for the *AT&T Bell Telephone Laboratories* in the late 1920s and early 1930s, conducted research on the limitations and the potential of speech recognition. Yet, the status of AT&T as an aspiring monopoly at that time almost necessarily corrupted this research (cf. Sterne 2012b: 43–45). The goal was *not* speech recognition in general, but how to minimize the transmitted quality of sound, and hence to maximize the profits from transmitting sounds: "Where AT&T could once bill for one call, it could now bill for four – with minimal modifications of infrastructure and no price increase" (Sterne 2012b: 45). The capitalization of sound is therefore an inbuilt constituent of any sound research following this approach.

A third and final step then is to be detected in the massive research of Leo J. Beranek on concert hall acoustics and room acoustics in general (Beranek 1954, 2004). Developing military- and network-technology with *Bolt, Beranek and Newman* (BBN), Beranek made serious efforts not only to materialize and to quantify a *theory of sound* but to formalize and to proceduralize the measuring, the evaluating, and hence the design or redesign of concert hall venues. His research thus follows quite consistently Jonathan Sterne's descriptions of modern sound discourses: discourses that engage in the materializing, the commodifying, the processing, and the applying of sound as data. Subsequent acoustic theories of the present are relying thoroughly on exactly these theories and their epistemological as well as ideological framework. The history of auditory cognition, of room acoustics and of the acoustics in telecomunications studies is not thinkable without these studies. And yet, if one relies *solely* on these approaches the description of sonic experiences remains strangely hollow, empty, and insufficient. Their authors would then probably be claiming: This is exactly the intention. In the framework of logocentric research and its imperialist, territorializing urge in the 19th and early 20th century, the colonization of the white areas on the map of knowldge is the main goal. Yet, the map of the mind, of affect, and of experience was hardly imaginable at that time. The whole sphere of individual and idiosyncratic experiences around and with sound was necessarily excluded from research. Research on sound had to neglect and ignore any individual assimilation and idiosyncratic affectation by the sonic. Only if it could be considered a sufficiently general effect of sound, preferably with physical and

quantifiable results, then it could be researched. The life of sensibilites was taken out of sound research. This is the exact point where a *theory on sound* seemed to come in handy.

1977–1994:

Theories on sound

Only a few decades ago – quite recently in the *longue durées* of cultural history – sound became an analytical object that could be researched by cultural theory. The first prominent theories on sound emerged in the 1970s – supposedly in the aftermath of the first soundscape movement following the writings and compositions by R. Murray Schafer on the one side (Schafer 1977, 1967) and on the other side following the massive distribution of commodified devices for sound recording and sound reproduction into all areas of everyday life. Still impactful and strongly contested is the long reflection by Jacques Attali on the economy of music he titled *Bruits* or *Noise* in 1977, written just before Punk broke. The prognostic qualities of this book are still unmatched, especially concerning the dynamics of the music industry and various institutional dispositives of containing violence, aggression, and resistance in the form of harmonizing organizations. Attali's essay marks an audacious and highly complex effort to analyse Western societies in the course of written history by their *sonic practices* and their *auditory dispositives*: two concepts that the more recent sound studies are founded upon (Sterne 2003; Back & Bull 2003; Schulze 2008; Bijsterveld & Pinch 2011; Papenburg & Schulze 2016). To be perfectly clear, it was *not* Jacques Attali who did actually introduce these two concepts; yet he argues and he thinks in this essay in a way that tacitly takes these two concepts as *implicit* starting points. As in this paragraph:

> Eavesdropping, censorship, recording, and surveillance are weapons of power. The technology of listening in on, ordering, transmitting, and recording noise is at the heart of this apparatus. The symbolism of the Frozen Words, of the Tables of the Law, of recorded noise and eavesdropping – these are the dreams of political scientists and the fantasies of men in power: to listen, to memorize this is the ability to interpret and control history, to manipulate the culture of a people, to channel its violence and hopes. Who among us is free of the feeling that this process, taken to an extreme, is turning the modern State into a gigantic, monopolizing noise emitter, and at the same time, a generalized eavesdropping device. Eavesdropping on what? In order to silence whom?
>
> *(Attali 1985: 7)*

Attali assumes here a so-called "hearing perspective" (Auinger & Odland 2007) to society, to history and technology, to politics, and to cultural developments. He interprets these aspects and strata of culture following audible and auditory effects, through dispositives and practices. Though his main reference for analysis is one from the visual arts: an excerpt from the large painting *The Fight between Carnival and Lent* (1559) by Pieter Bruegel the Elder. Exactly this move is one of his major and quite clever rhetoric tricks. Attali introduces his readers into *sonic thinking* by refering to an example of *visual* thinking they might more easily digest. In accepting this visual yet eminently *artistic* example for once, a reader then can become more inclined to accept other artistic examples as arguments: for instance *sonic* artistic examples. Hence, Attali does not widen an imagined gap between the visual and the sonic as an audiopietist would do, but he bridges the gap by connecting both sides via the artistic approaches, inhabiting both areas

at once. Therefore not an scholarly or even a scientific argument provides a route into more complex reflections of sensory experiences, but artistic practices and aesthetic experiences. This rhetoric figure will evolve over time to a crucial and prolific element in sound studies.

But what about actual sonic examples? Examples of *sonic* experience and *corporeal* sound events? Again, wouldn't these provide the obvious empirical material for any *theory on sound*? You might have guessed already: not so much for the early history of sound theory. Of all, it was a philosopher of science and technology who dared to focus largely on an actual phenomenology of sounds: the phenomenology of *Listening and Voice* (1976). A work that is still one of the most inspiring and thought-provoking concerning the voice and its sounding – and yet largely underrated in the field of sound studies. Ihde takes his readers onto a journey of various phenomena in experiencing sound "doing a phenomenological investigation" (Ihde 2007: xix) of *radical empiricism* (James 1912) in order to incorporate the *auditory dimension* into phenomenology. Hence, he presents in his book an "anthropological-archaeological-historical set of variations" (Ihde 2007: 263). His descriptions of everyday listening situations, of listening habits and individual reflections on listening and sounding provide an immensely inspiring introduction into the actual academic *practice* of phenomenological and anthropological writing about sounding and listening. Any research in sound studies intending to work about actual sonic experiences and specific listening situations and sound practices can start with this seminal volume by Ihde.

Yet, tracking the actual effects and affects of sonic experiences: what could be the result of such a study? Klaus Theweleit explored this in various studies since the 1970s, not always focused solely on sound – but consistently analysing corporeal, personal, social, and cultural effects of intensified sensory and sonic experiences and the individual tricks and detours on how to deal with those, for instance in one of his major works, *Buch der Könige. Volume 2x & 2y: Orpheus am Machtpol – Recording Angels' Mysteries* (1994). For Theweleit the impact of sound is corporeal – and as such it is personal, intimate, social, and global at the same time. The body experiences and it records sounds, in every cell and nerve being worn out or anticipating specific sonic experiences:

> The muscular system is a registry of auditory pleasures (and horrors). Tones have a physical precipitation. [...] certain parts of the cell structure of my body have changed after they recorded certain musics. I react differently then; differently not only to certain musics; also differently to certain people and different to states of reality in general, with which I have to deal with.[1]
>
> *(Theweleit 2007: 30; transl.: HS)*

Here the hearing perspective is in full effect: the corporeal resonance on sonic experience is the main perspective Theweleit assumes here. This approach channels already the approach of *sonic materialism* (Kim-Cohen 2009; Cox 2011; Schrimshaw 2013; Schulze 2016) which should become a major thread in sound studies years after. Yet, could there be another, an even more materialist, even more sensorially thought relation between sound and theory? A relation that actually would have been unthinkable in the research dispositives of the 19th and most of the 20th century? Not a small number of researchers at that time (and obviously still today) included in their personal, ostensibly *non-professional* (yet highly instructive) practice the knowledge of musicians, of singers, of composers, arrangers, of dedicated listeners, and sound aficionados; though at this time it would have seemed a rather weird if not lunatic concept to do research on sound and to present its results via the means of actual sound practices: *sound on theory*.

1967–2005:

Sound on theory

Researchers of sound are guided, and all too often imprisoned, by the epistemological frameworks and the institutional restraints that make research possible in a given cultural environment and a historical era. Hence research publications represent and reproduce foremost the historical idiosyncrasies and cultural inhibitions from where they originated. There are, though, selected efforts by researchers to break out of these prisons and to expand or even exchange the main epistemological concepts and the arsenal of recognized research methods. In the field of sound most of the researchers discussed in this chapter actually contributed to this transformation: a few of them are not even researchers in a traditional sense – or they would not have been given access to research environments due to their gender, their race, their social status, or their erratic sensibilities and idiosyncratic heuristics. Stunningly enough this was also true for researchers who decidedly refused to publish their research results in academic writing, presenting a verbal argument, supported by visualizations or diagrammatic representations. As these researchers published mainly *sound pieces*, *soundwalks*, *sound installations*, or *concepts for sound performances*, they would have had a hard time entering the globalized institution of research in the sciences or humanities. This was true for the core period of establishing modern European and North-American research cultures in the 19th and early 20th century. In this period the modern, territorializing desire of establishing national research cultures lead to a neglect, all too often even to a malevolent, condescending disrespect for all methods not exclusively adhering to acknowledged models of proof and presentation in academia. This disrespect towards artistic approaches, though, represents apparently a repressed desire.

As most of the traditional *theories of sound* emerged out of highly idiosyncratic sensibilities and inclinations of their leading researchers, these sensibilities and desires had to be hidden and camouflaged in their academic publications. This repressed desire finally returned even more impactful in the form of *Artistic Research* or *Aesthetic Research*. These forms of expanded research confront academic institutions in the sciences and the humanities with a substantial methodological and existential critique. Starting out with the avant gardes of the 20th century, artistic research has transformed in recent decades from an essayistic provocation to a very much more respected, and in some cases even institutionalized, area of research. Hildegard Westerkamp proposed for instance a quite impactful, and radically individualistic and corporeal approach to research in her prolific concept of *Soundwalk* (1974):

> Start by listening to the sounds of your body while moving. They are closest to you and establish the first dialogue between you and the environment. If you can hear even the quietest of these sounds you are moving through an environment which is scaled on human proportions. In other words, with your voice or your footsteps for instance, you are "talking" to your environment which then in turn responds by giving your sounds a specific acoustic quality.
>
> *(Westerkamp 1974)*

Effectively, Westerkamp transforms the relation of a researcher to her research subject – and thus the role of the researcher is completely reconceptualized. The researcher is not anymore an anonymous entity, exhaustively erudite, omniscient, and calmly evaluating various hypotheses and models in objective deliberation. This fiction of objectivity which researchers learn to indulge in very early in their education, this imaginary is lightheartedly rejected. Westerkamp

assumes in contrary a researcher who is an empirical person of a certain gender and race, age and social status, physical stature and idiosyncratic corporeal abilities as well as cultural inhibitions: an approach that later was expanded to a proper ethnographical research method in the *Sensory Memory Walk* (Järviluoma & Vikman 2013) and effectively inspired manifold research into the corporeal ubiquity of sound (Henriques 2011; Kassabian 2013). This epistemic quality of an irreducible constellation made of corporeal, affective, and conceptual idiosyncrasies has become a major mark in the artistic theories, the *Künstlertheorien* (cf. Lehnerer 1994) of two other highly influential sound artists: Maryanne Amacher and Pauline Oliveros. Maryanne Amacher operated in her workgroups *City-Links* (1967–88) as well as in *Intelligent Life* (1981–2009) directly in the physical material of a given location: the walls and the floors, the cables and the furnitures, people lingering and working there, appliances, machines, and computers connected to the electrical grid. Her soundworks are indeed physiologically and auditorily extremist explorations of what sounding and listening are capable of in our cultures:

> When played at the right sound level, which is quite high and exciting, tones in this music will cause your ears to act as neurophonic instruments that emit sounds that will seem to be issuing directly from your head. […] Produced interaurally, these virtual sounds and melodic patterns origiante in ears and neuroanatomy, not in your loudspeakers.
>
> *(Amacher 1999: booklet)*

You, the listener, become the location of sound reproduction and hence the field of artistic fieldwork. A parallel endeavour motivated the artist, composer, sonic thinker, and performer, Pauline Oliveros. In her work she moved more and more to a kind of sound piece that can be regarded as meditating exercises in which a listener *is* the actual performer: A researcher's listening habit and her or his idiosyncrasies here also consitute the actual research field (Oliveros 2005). In contrast to more widely known artists and sonic thinkers like Max Neuhaus, Alvin Lucier, and John Cage, all of these researchers managed to actually leave traditional ties in institutional frameworks behind. They expanded their soundworks into artistic operations consisting of *Sound On Theory.* Following this major step of incorporating artistic practices into sound research, an even more daring move into the unknown of theory had become possible: *Sound* could now even be considered *as theory* itself.

1998–2014:

Sound as theory

"You are not censors but sensors, not aesthetes but kinaesthetes. You are sensationalists. You are the newest mutants incubated in wombspeakers". (Eshun 1998: 1)

With *More Brilliant Than the Sun* by Kodwo Eshun, published in 1998, a whole different period of writing and publishing sound theory has begun: "Far from needing theory's help, music today is already more conceptual than at any point this century, pregnant with thought-probes waiting to be activated, switched on, misused" (Eshun 1998: 003).

Whereas for over one century any writing about music or sound that dared to indulge in sensory subtleties and complex affects while experiencing or creating sound events was doomed to be defamed as unscientific and merely lyrical, some more chauvinist researchers even cursed it as being *uneducated*, *confused* and *effeminate*. This quite scary repression of sentiment and sensibility in theories about sound now finally seems to have vanished, step by step.

> There is no distance with volume, you're swallowed up by sound. There's no room, you can't be ironic if you're being swallowed by volume, and volume is overwhelming you. It's impossible to stay ironic, so postmodernism, all the implications of that go out of the window, simultaneous with Benjamin and all the modernist arguments, all those go out of the window as well. So not only is it the literary that's useless, all of the traditional theory is pointless. All that works is the sonic plus the machine that you're building. So you can bring back any of those particular things if you like, but it better work. And the way you can test it out is to actually play it. (Eshun 1998: 188f.)

With Eshun's effort to establish a writing of *sonic fictions*, of highly idiosyncratic and often erratic, yet thoroughly convincing and plausible narrations and constructions around sonic artifacts of any kind, it became clear that this form of writing actually has to be regarded as the core of any writing, researching and theorizing around sound: To unravel the sensory and imaginary impact of a specific specimen of organized sounds – in a characteristic and culturally as well as historically contextualized situation (Schulze 2013). Sound *is* theory and sound *as* theory is written in *sonic fictions.*

"The African drumchoir complexifies the beat into distributed Polyrhythmachines, webbed networks of poly⋆counter⋆contra⋆cross⋆staggered rhythms that function like the dispersed architecture of artificial life by generating emergent consciousness". (Eshun 1998: 5)

With this concept Eshun convincingly exchanged the whole framework for any future or past theory *of* or *on* sound: Any effort of crafting such a theory now must be read as just one specimen of academic writing styles. The epistemic model of sonic fiction is a performatively radical constructivist one: It assumes that all verbal, diagrammatic or algorithmic representations of sonic experiences are highly idiosyncratic edifices fuelled by the imagination of a group of researchers, their projections, memories, obsessions, and fears. Most of these – probably also in this and all other chapters of this volume – do rather schematically reflect their highly personal, historical, and cultural limitations of constructing an epistemic reality. Therefore the physicalist models of Hermann von Helmholtz represent foremost his avoidance of speaking about affects and immersion; in a similar and very personal way as the musical performances and recordings by Sun Ra and his ensembles represent among others his afrofuturist perspective onto the creation of sound, life and interaction; in a way close to the works by Pauline Oliveros that represent a way of being affected by sound and by intense sensory experiences in a meditating situation. In the framework of sonic fiction all of these cultural artifacts belong obviously to quite different social meshworks with differing goals, different regulations for articulation as well as different categories for evaluating artifacts. Yet all of these examples share an ambition to embody a certain historically and culturally quite specific and idiosyncratic *hearing perspective* (Auinger & Odland 2007).

This concept of the *hearing perspective* and the artistic research around it is the logical consequence of proposing *Sound As Theory*. The works by Sam Auingeer and Bruce Odland represent this artistic approach to theory at its best. Since the early 1990s they work on a series of installations, performances, and sound art pieces that explore what they and many other sound artists call *sonic thinking* (Herzogenrath 2017; Schulze 2017b) or *sonic epistemologies* (Cobussen, Meelberg & Schulze 2013). This approach, supported by many other sound artists and sonic thinkers such as Brandon LaBelle (LaBelle 2006, 2010) or David Toop (Toop 2010), Kaffe Matthews or Ulrike Sowodniok (Sowodniok 2013, 2016), Jeremy Woodruff or Salomé Voegelin (Voegelin 2010a, 2010b, 2014), starts with the assumption that research on sound needs to be conceptualized, performed, and presented foremost in the realm of the sonic, the audible, the sensible itself – and not in translations into neighbouring realms of alphanumeric codes, logocentric

hermeneutics or refined abstractions crafted from philosophical concepts. The sonic experience and an approach of radical empiricism to it is the first material, the first empirical ground to work in *Sound As Theory*. The main research goal for sonic thinking is hence:

> to make sense of the sound environment we live in by listening with attention, hearing, exploring, and attempting to understand the cultural waveform as a language. […] These sounds are often shut out of our mental picture of a space as *noise*. By listening to and studying these noises, they become useful sound sources.
>
> *(Auinger & Odland 2007)*

Sound is in this area of research not anymore interpreted as representing something external to it – as it was in the earlier specimen of *theory of sound* and *theory on sound*. Sound is the material in which research is operating and in which the results of this research are presented. These results are not – as in the approach of *sound on theory* – easily repressed as being *only art/only music*. But the findings of these sound artists and sound researchers, these sonic thinkers are being acknowledged as the research they are, starting with authors such as Seth Kim-Cohen or Christofer Cox who affirm their relevance, their impact and their groundbreaking character. Especially in the writings by Salomé Voegelin the interweaving of sensory fictions, sonic performativity and acoustic knowledge has reached an impressive apex:

> at an open window sounds my simultaneity with my environment. Singing birds, humming traffic, the clanking of scaffolding being taken down and the spinning of the washing machine sound simultaneous with my hands tapping the keyboard and the movements of my cotton jumper. I experience an equivalence of inside and out that engages me in the environment. I write about it through taking part in it: from my equivalence into the environment.
>
> By contrast when I go to the British library with all its air tight, windowless quietness, I hear painfully only myself, cut off from my surroundings, pursuing scholarly research that does not link me to the sound world out there, I write with a closed off self-referentiality.
>
> Sitting at my window the relationship of myself writing is with a world out there and my inhabiting of that world, and it is as that inhabiting self that I write about the sound of that world.
>
> *(Voegelin 2011)*

What in the writings by Hermann von Helmholtz needed still to be neglected and psychologically separated into a less meaningful, profane and too materialist part of the researcher's actual everyday life, can be found reintegrated in Voegelin's writings. Research on sound is happening *in* sound. The repressed forms of knowledge and epistemic, the sensory and the material, the visceral, and the dynamically plastic can be included in reseach (Schulze 2017a). Sound theories can be listened to. Sound theories are sounding.

Note

1 "[D]ie Muskulatur ist eine Registratur auditiver Lüste (und Schrecken). Die Töne haben ihren körperlichen Niederschlag. […] bestimmte Teile der Zellstruktur meines Körpers haben sich verändert nach der Aufnahme bestimmter Musiken. Ich reagiere anders; nicht nur anders auf bestimmte Musiken; auch anders auf bestimmte Leute und anders auf die Zustände des Wirklichen überhaupt, mit denen ich zu tun habe" (Theweleit 2007: 30).

References

Amacher, M. (1999). *Sound Characters (Making The Third Ear)*. New York, NY: Tzadik Records.

Attali, J. (1985). *Noise: The Political Economy of Music*. Minneapolis. MN: University of Minnesota.

"Auinger, S. & Odland, B. (2007). "Hearing Perspective (Think with Your Ears)." In C. Seiffarth, C. & M. Sturm (Eds.), *Sam Auinger Katalog*. Wien: Folio Verlag.

Back, L. & Bull, M. (Eds.) (2003). *The Auditory Culture Reader*. Oxford: Berg Publishers.

Beranek, L. (1954). *Acoustics*. New York, NY: McGraw Hill.

Beranek, L. (2004). *Concert Halls and Opera Houses: Music, Acoustics, and Architecture*. New York, NY: Springer Publishing.

Bijsterveld, K. & Pinch, T. (2011). *The Oxford Handbook of Sound Studies*. New York, NY: Oxford University Press.

Cobussen, M, Meelberg, V. & Schulze, H. (2013). "Towards New Sonic Epistemologies." *Journal of Sonic Studies* 3, Vol. 4.

Cox, C. (2011). "Beyond Representation and Signification: Toward a Sonic Materialism." *Journal of Visual Culture* 10, *No.* 2, 145–161.

Eshun, K. (1998). *More Brilliant Than the Sun. Adventures in Sonic Fiction*. London: Quartet Books.

Fletcher, H. (1929). *Speech and Hearing. With an Introduction by H.D. Arnold*. New York, NY: D. Van Nostrand Company, Incorporated.

Helmholtz, H. (1863). *Die Lehre von den Tonempfindungen als Physiologische Grundlage für die Theorie der Musik*. Braunschweig: Friedrich Vieweg und Sohn.

Henriques, J. (2011). *Sonic Bodies. Reggae Sound Systems. Performance Techniques, and Ways of Knowing*. New York, NY: Bloomsbury.

Herzogenrath, B. (Ed.) (2017). *Sound Thinking – Vol. 4 of the book series Thinking Media*. New York, NY: Bloomsbury Publishing.

Ihde, D. (1976/2007). *Listening and the Voice: Phenomenologies of Sound*. New York, NY: State University of New York.

James, W. (1912). *Essays in Radical Empiricism*. New York, NY: Longman Green and Co.

Järviluoma, H. & Vikman, N. (2013). "On Soundscape Methods and Audiovisual Sensibility." In: *The Oxford Handbook of New Audiovisual Aesthetics*. Edited by John Richardson, Claudia Gorbman & Carol Vernallis. Oxford: Oxford University Press, 645–658.

Kassabian, A. (2013). *Ubiquitous Listening: Affect, Attention, and Distributed Subjectivity*. Berkley, CA: University of California Press.

Kim-Cohen, S. (2009). *In the Blink of an Ear: Toward a Non-Cochlear Sonic Art*. New York, NY: Bloomsbury Publishing.

LaBelle, B. (2006): *Background Noise. Perspectives on Sound Art*. New York, NY: Bloomsbury Publishing.

LaBelle, B. (2010). *Acoustic Territories. Sound Culture and Everyday Life*. New York, NY: Continuum.

Lehnerer, T. (1994). *Methode der Kunst*. Würzburg: Königshausen & Neumann.

Oliveros, P. (2005). *Deep Listening: A Composer's Sound Practice*. New York, NY: iUniverse, Inc.

Papenburg, J.G. & Schulze, H. (Eds.) (2016). *Sound as Popular Culture. A Research Companion*. Cambridge, MA: The MIT Press.

Schafer, R. (1967). *Ear Cleaning. Notes for an Experimental Music Course*. Toronto/Canada: Berandol Music Limited.

Schafer, R. (1977). *The Soundscape. Our Sonic Environment and the Tuning of the World*. New York, NY: Knopf.

Schrimshaw, W. (2013). "Non-cochlear sound: On affect and exteriority." In: *Sound, Music, Affect. Theorizing Sonic Experience*. Edited by Ian Biddle & Marie Thompson. New York, NY: Bloomsbury Publishing, 27–44,

Schulze, H. (2007). "Die Audiopietisten. Eine Polemik," *Kultur und Gespenster* 2 (2007), H. 3: "Dokumentarismus – die Inszenierung des Authentischen." Hamburg: Textem Verlag, 122–129.

Schulze, H. (Ed.) (2008). *Sound Studies: Traditionen – Methoden – Desiderate. Eine Einführung*. Bielefeld: transcript Verlag (Sound Studies Series Volume 1).

Schulze, H. (2013). "Adventures in Sonic Fiction. A Heuristic for Sound Studies." *Journal of Sonic Studies* 3, Vol. 4.

Schulze, H. (2016). "Der Klang und die Sinne. Gegenstände und Methoden eines sonischen Materialismus." In: *Materialität. Herausforderungen für die Sozial- und Kulturwissenschaften*. Edited by Herbert Kalthoff, Torsten Cress & Tobias Röhl, München: Wilhelm Fink Verlag, 413–434.

Schulze, H. (2017a). *The Sonic Persona. An Anthropology of Sound*. New York, NY: Bloomsbury Publishers.

Schulze, H. (2017b). "How To Think Sonically? On the Generativity of the Flesh." In: *Sonic Thinking: A Media Philosophicaal Approach*. Edited by Bernd Herzogenrath – Vol. 4 of the book series *Thinking Media*. New York, NY: Bloomsbury Publishing.

Sowodniok, U. (2013). *Stimmklang und Freiheit. Zur auditiven Wissenschaft des Körpers*. Bielefeld: Transcript Verlag.

Sowodniok, U. (2016). "Voce in libertà." *The Senses & Society* 11, no. 1.

Sterne, J. (2003). *The Audible Past: The Cultural Origins of Sound Reproduction*. Durham & London: Duke University Press.

Sterne, J. (2012a). *The Sound Studies Reader*. London: Routledge.

Sterne, J. (2012b). *MP3 – The Meaning of a Format*. Durham & London: Duke University Press.

Theweleit, K. (2007). *Übertragung. Gegenübertragung. Dritter Körper. Zur Gehirnveränderung durch die Medien. Internationale Flusser Lecture*. Köln: Verlag der Buchhandlung Walther König.

Toop, D. (2010). *Night Leaves Breathing*. RTE Radio Ireland 27 October 2010.

Voegelin, S. (2010a). *Listening to Noise and Silence. Towards a philosophy of Sound Art*. New York, NY: Continuum.

Voegelin, S. (2010b). *Sound Words: A Blog about Sound and Words*. New York, NY: Tumblr. soundwords.tumblr.com

Voegelin, S. (2011). *Writing. June* 10, 2011, 10:16 pm. http://soundwords.tumblr.com/post/6395471901/writing

Voegelin, S. (2014). *Sonic Possible Worlds. Hearing the Continuum of Sound*. New York, NY: Bloomsbury Publishing.

Westerkamp, H. (1974). "Soundwalking," *Sound Heritage* III, No. 4 (also in: *Autumn Leaves, Sound and the Environment in Artistic Practice*, Ed. Angus Carlyle, Double Entendre, Paris, 2007, 49).