Building a Voice

Sonics Series

Atau Tanaka, editor

Sonic Agency: Sound and Emergent Forms of Resistance, Brandon LaBelle

Meta Gesture Music: Embodied Interaction, New Instruments and Sonic Experience, Various Artists (CD and online)

Inflamed Invisible: Collected Writings on Art and Sound, 1976–2018, David Toop

Teklife / Ghettoville / Eski: The Sonic Ecologies of Black Music in the Early 21st Century, Dhanveer Singh Brar

Dissonant Waves: Ernst Schoen and Experimental Sound in the Twentieth Century, Sam Dolbear and Esther Leslie

Take This Hammer: Work, Song, Crisis, Paul Rekret

Ruins and Resilience: The Longevity of Experimental Film, Karel Doing

The England No One Cares About: Lyrics from Suburbia, George Musgrave

Goldsmiths Press's Sonics series considers sound as media and as material – as physical phenomenon, social vector, or source of musical affect. The series maps the diversity of thinking across the sonic landscape, from sound studies to musical performance, from sound art to the sociology of music, from historical soundscapes to digital musicology. Its publications encompass books and extensions to traditional formats that might include audio, digital, online and interactive formats. We seek to publish leading figures as well as emerging voices, by commission or by proposal.

Building a Voice

Sound, Surface, Skin

Zeynep Bulut

Goldsmiths
Press

First published in 2025 by Goldsmiths Press

Goldsmiths, University of London, New Cross
London SE14 6NW

Printed and bound by Short Run Press Limited, UK
Distribution by the MIT Press
Cambridge, Massachusetts, USA and London, England

A CIP record for this book is available from the British Library

ISBN 978-1-913380-88-5 (hbk)
ISBN 978-1-915983-00-8 (ebk)

www.gold.ac.uk/goldsmiths-press

Goldsmiths
UNIVERSITY OF LONDON

Typeset by Newgen Publishing UK

Contents

List of Figures

Introduction

Building a Voice as Skin

What is a voice, and how does it come into being? This book deals with these questions within the context of experimental music practices, sound and media art. By building a voice, I refer to the concrete process of making a voice that evolves, through varied sounds, senses, bodies and technologies. In other words, I consider distributed forms and instances of voice, which underlie the making of a voice, instead of giving a voice to something or someone, or being given a voice. But how do we make a voice? This question is important, because it materializes voice as emergent, exploratory and shared, without being limited to a single body – be it human or nonhuman – or the discursive classifications of verbal language. I argue that the voice, once it is constructed, functions not merely as a mode of communication or a sound that conjures the fantasy of an autonomous self, but also as a sort of permeable skin.

The pairing of voice and skin allows us to reconsider what a skin is, and what it does. By "skin" I do not simply refer to the cover or envelope of a body. I discuss skin as a shared surface, a multisensory interface that behaves both as a boundary and as a web of connection across various bodies and environments. The ramifications of "building a voice as skin" are multiple and entangled. The idea of building a voice resists the urge to classify any voice as given or to take any voice for granted. It also encourages a rethinking of the ethical grounding of voicing, of the ways in which one can speak for oneself, as well as the ways in which one can acknowledge that the hearing of another is only partial.

Building a voice is a process that is both individual and collective, a process that is almost always under construction. Some of the thinking

behind this process comes from my earlier essay, "On Building a Voice", which responded to the artist Lisa Skuret's site-specific live installation and performance, *A Call From the Library* (2014), developed in collaboration with sound artist Seth Ayyaz. Taking place in the Rose Lipman Building, a former library and community centre in the regeneration area of Hackney in London, the installation raised questions about unnoticed and unrecognised places, sounds and stories with live vocal, sonic and performative acts. Engaging with Skuret's live writing and Ayyaz's live and interactive sound system, vocalists Guy Harries and Kay Grant sang with the surfaces and materials of the building as they moved in the space. Likewise, the audience was invited to move around the building as they engaged with the performance. The site, the context and the acts involved in this performance contributed to my conception of building a voice as opposed to giving a voice, and to my ongoing interrogation of how voice-making is a distributed, mobile, shared process, and how such interventions in voice-making suggest limits to what we can know as well as helping us endure not knowing and uncertainty.[1]

I began developing ideas about the distribution of speaking and singing voices into visual, sonic and performative acts, the making of a voice as an individual and anonymous process, and the uncertainty of such voices and voice-making during my doctoral studies at the University of California, San Diego (2005–2011) and then my postdoctoral research residency at the ICI Berlin Institute for Cultural Inquiry (2011–2013).[2] At the heart of these ideas, I look at voice and skin both literally and metaphorically. Theorizing voice as skin,[3] I was inspired by two things: the aesthetic use of the non-linguistic voice in contemporary art and experimental music, and French psychoanalyst Didier Anzieu's notion of skin-ego.[4] The aesthetic use of the non-linguistic voice entails the breakdown of verbal language, the probe of atomic units of language such as phonemes and vocal noises, the acoustic and electronic amplification of bodily sounds, as well as neologisms and made-up languages. This aesthetics does not simply deconstruct any given meaning or order of meaning-making but also incites valuable questions about the malleable, contingent, physical, and social and political conditions of voice-making. That is, it underlines the plasticity of voice, speech and language. In so doing, it also leads to an

expanded conception of voice, one that is distributed across varied forms and appearances.

Imagine this expanded voice as a surface, constituted by micro bodies, sounds and senses. Can this voice behave like a skin? Reformulating Freudian ego as skin, an interface between self and the external world, Anzieu examines a formation of various sensory envelopes among which the sound envelope is primary. The sound envelope comprises a mixture of internal and external sounds. It is, Anzieu suggests, the very first "skin"[5] of the baby that mediates the inside and outside worlds. In previous work, I have explored this conception of skin together with the aesthetics of the non-linguistic voice. I have initially reflected on the mother's voice as the primary tactile envelope, a medium of preverbal and bodily sounds which interacts with and evolves in relation to external sounds. The non-linguistic vocal explorations in avant-garde and experimental music practices employ and amplify pre- and pro-verbal, bodily and environmental sounds. Looking at this aesthetics through the lens of Anzieu's sonorous envelope, I then considered whether amalgamation of such sounds might come to function like skin, like a multisensory interface, a point of contact and difference, to reiterate literary scholar Claudia Benthien's account of skin.[6] This furthered the inquiry into the idea of voice as skin, that is, how a voice might function as a shared skin without meaning to, and how such a shared skin might articulate the voice both as individual and as anonymous.

I have been building a voice for over ten years. Writing this book in different continents and surroundings, I embodied and mobilized various voices, and contemplated the distribution of voices across multiple borders. Together, the three parts of the book – Plastic, Electric and Haptic – tell the story of the emergence, embodiment and mediation of the voice as skin. This story draws from and contributes to various threads of thought, spanning music, sound and voice studies; philosophy and environmental humanities; affect studies and new materialisms; psychoanalysis and neuropsychology; and media and communication studies. Prior to introducing the individual parts of the book, I wish to note where my investigation of voice sits in the current scholarship, and how the conception of voice as skin contributes to the discourse.

Voice and skin

In this project, I engage with the burgeoning interdisciplinary discourse on voice and vocality, and in particular on the ways embodied experiences and materialities of sound and listening participate in the constitution of one's voice.[7] Looking at the examples of non-linguistic and non-verbal voices in music and in sound and media art, I consider everyday voices both within, before and beyond the human body and language. I explore voice as a dynamic phenomenon shared by both humans and nonhumans in relation to varied physical and cultural environments. I am not alone in this endeavour.[8]

Philosophical, anthropological and literary inquiries have considered the implications of both linguistic and non-linguistic voices for the formation of self and for sense-making. Some of these inquiries emphasize the co-constitutive phenomena of the body and sound,[9] and revisit the order and mediums of language, speech and vocal expressions.[10] Other inquiries point to the corporeal, non-verbal and sonic effects of voice,[11] and treat the cultural practices and technologies of voicing and listening as interwoven.[12]

Different modalities of speech and non-verbal voice are also scrutinized in psychoanalysis with respect to therapeutic contexts. Freud suggests non-verbal vocalizations as a portal to the unconscious.[13] Lacan, on the other hand, qualifies voice as "a missing object", an object of desire that both the physical experience of sound and the metaphysical operation of language may generate.[14] What makes voice a phenomenon that cannot be entirely grasped? This is a recurring question in my inquiry, as it is for many of those who examine the materialities of voice using different disciplinary methods.

Voice science investigates the physiological, psychological, cognitive and social parameters of voice production and perception.[15] Music studies, as well as other disciplines within the humanities, deal with the musical, sonic and cultural entailments of vocality and extended voices.[16] Theatre and performance studies explore the multimedia manifestations of voice in live and recorded performance, and in literary representations.[17] Sound, media and communication studies point to the aural, visual, tactile and haptic tools of recording, disseminating, transmitting

and performing voices in aesthetic and cultural as well as in medical and scientific contexts.[18] Some of these readings also reflect on the expressive mediums of skin and refer to Anzieu's notion of skin-ego and sonorous envelope.[19] Further, critical inquiry into the racialized representations of sound, voice and listening, and the associations between skin colour and vocal timbre, prompt thinking about the connections between voice and one's literal skin in forming subjectivities.[20]

Similarly, the representations of skin in literature, painting, photography, film and body art raise critical questions about how racial, ethnic, gender and class differences manifest and are produced on the surface of the skin. Such studies present skin as an embodied site of historical and cultural inscription, endurance and memory for both (re)generation of and resistance to bodies.[21] In so doing, they encourage thinking about skin in relation to identity formation and transformation. One could find a discussion about language, speech and expression in these studies of skin, but they do not render the voice's literal and metaphorical imbrication with skin explicit.

Histories of vibrotactile communication technologies, on the other hand, point directly to a material relation between voice and skin. As historians Mara Mills and David Parisi show, the vibrotactile technologies developed for deaf and blind people such as the hearing glove and signing gloves employ skin as a medium of linguistic transmission and verbal exchange.[22] In these accounts, skin is literally treated as a medium for verbal voicing. Further, the body is configured in extended forms.

Given the vast array of virtual and augmented bodies and life forms that have been devised in recent aesthetic, cultural, environmental and medical contexts, the possibilities are expanding for imagining the extended voices to match them. Digital media practices present skin as wearable, changeable and transformable.[23] In these discussions, sound is included as part of the multisensory body. Cultural histories of senses, and music and media studies underscore the tactile experience of sound,[24] but there remains a need to explore the symbiotic relationship between voice and skin. With this book, I intend to expand on this discourse by adumbrating the many ways in which voice and (literal) skin are connected, while at the same time imagining voice *as* skin and discussing the applications and implications of such an imagined reality.

The idea of voice-as-skin is not only important for offering new insights about intersubjectivity, about how to be and to live with other humans and nonhumans; it also helps clarify the dynamics of our current times when, during the first global pandemic in a century, physical mobility was limited, contactless operations increased, with what had previously been everyday human interactions now often co-performed with automated voices and kinetic gestures, at a time when touching threatened human health and humans kept in touch with each other via voices and spoke in person through the physical barrier of a mask. In the midst of an increasingly unstable climate and the possibility, even the likelihood, of further global health crises, we face the urgency of taking notice of the non-verbal behaviours of nonhumans. And as we navigate these strange and challenging times, we must reflect more on the notions of empathy and becoming other, which require a discussion of both intimacy and distance. Needless to say, voice and skin are both aspects of bodily vulnerability where the limits and appropriateness of these qualities have to be negotiated.

With all of this in mind, I approach the idea of voice-as-skin in both literal and metaphorical terms. Part 1, *Plastic*, discusses the co-emergence of voice and environment, while walking through or taking place in particular sites and voicing between humans and nonhumans. I read the voicings in the examples of this section – a multimedia walk devised as a creative response to climate change, and experimental music pieces which encourage listeners to attend closely to environmental sounds – as evocations of skin, as a surface shared by various bodies and senses, and a common ground that behaves both as a boundary and as a web of connection.

Part 2, Electric, examines the embodiment of voice as a network of internal and external sounds. The examples of Part 2 – sound walks that amplify electromagnetic signals in cities, and experiences of voice-hearing and auditory verbal hallucinations – point to the interaction between speech and environmental sounds in forming such a network. Here skin is the imagined realism of voice, leading to the split – or the need for a split – between a sense of "this is my voice" and the contradictory sense of "this is not my voice." To further concretize this reality, Part 2 also addresses an AI technology, "voice-skins"[25] – synthetic and customized voices for those who want to change their voices or "wear" a different skin, if you will.

Part 3, *Haptic*, probes the mediation of voice as skin. I look at the suggestions of tactile speech in biosensing musical systems and interactive media art together with the histories and practices of tactile speech in media and communication technologies. In this section, I discuss voice as skin in more literal terms, while drawing from the conception of skin as a medium of either linguistic exchange and verbal transmission, or stimulation and exploration. Searching skin as a medium of exploration, rather than a medium of linguistic exchange, makes us think about voice as uncertain. That uncertain voice, I argue, is necessary and more suggestive for enduring states of not knowing and revisiting conventional notions of understanding and communication. Two key terms – plasticity and non-dialogue – form themes that connect the book's three parts.[26]

Plasticity of voice

Back in 2006, I wrote a performance piece for voice, plastic sandwich bags and electronics, titled *dialogues between multiple soul mates*.[27] I sang melodic fragments and phonemes into the plastic bags, and zipped and threw the bags away one by one. Throughout this activity, I was intrigued by several questions. For instance, to what extent and in what ways might the sounds of my voice interact with the sounds of the plastic bags? Breathing and singing into the bags, what emotive states would be released or contained or might be recycled? And what could be transformed at the end? I observed a few things. First, the sounds of my voice changed both with the vocal acts and with the sonic texture of the bags. Second, the form and sounds of the bags also changed with the vocal acts. And yet, neither the sounds or form of my voice nor the sounds or form of the plastic bags were completely transformed. Thus began my reflections on the plasticity of voice.

Plasticity means malleability. Plastic, as a material, as with skin, can be re-formed and deformed without completely breaking or disappearing. It can also be explosive – take plastic balloons, for instance – but the material properties of plastic rather make us think of endurance and resistance, adaptation and transformation. To consider the plasticity of voice is to reflect on its capacity to take on these characteristics, as well as for storing and recycling both personal and collective elements. To put

it another way, like skin, the physical and cultural configuration of voice both changes with and also resists the physical and cultural changes in a given environment.

The malleability of human skin is indeed different from the malleability of human vocal cords. Vocal cords may not regenerate themselves in the same way that skin does. With the plasticity of voice, however, I do not necessarily point to the regenerative capacity of the vocal cords. I am interested in exploring voice in expanded terms – a voice that is not simply limited to vocal cords, the human body or mediums for verbal language. The voice and the plasticity of voice that I examine recall the plasticity of a skin, of a surface that can both change and resist change when touching and being touched. With this idea in mind, imagine the processes involved in stretching, deforming, re-forming and re-sounding – instances of a voice in direct relation to a particular physical and cultural environment.

I refer to these instances as voicing. Voicing is not simply a verbal or vocal utterance.[28] It can also be a non-verbal gesture, a sonic or performative act, a non-vocal or a non-aural expression. It can be shared by humans and nonhumans. It can manifest as an amplified moment of silence, a cacophony, an unexpected or unknown encounter, an interruption or a pause. It allows for noticing events that are seemingly far-fetched, unheard or dismissed. Voicing prompts *a* voice, rather than *the* voice, one that is emergent, depersonalized and distributed, without a presupposed name or object of intention. In so doing, voicing articulates the plasticity of voice.

My reading of plasticity draws inspiration from philosopher Catherine Malabou's notion of plasticity. Informed by Hegel's *Phenomenology of Spirit* and Freud's writings on war, trauma and death,[29] Malabou considers plasticity as both transformation and resistance against transformation, which "reveals the indestructible".[30] She writes:

> Plasticity must be understood as a form's ability to be deformed without dissolving and thereby to persist throughout its various mutations, to resist modification, and to be always liable to emerge anew in its initial state. It is precisely the series of transformations that can always "be annulled" so that this "unique form" can reappear. Precisely and paradoxically, plasticity characterises both the lability and the permanence of this form.[31]

Looking at severe brain injuries and cases of trauma, Malabou explores a "destructive plasticity",[32] and asks whether there can be "an identity without a precedent",[33] or whether one can consider a point of no return and hence a complete metamorphosis. Morphological plasticity[34] seems to imply a similar metamorphosis: things may appear in different forms. Different forms do not necessarily mean a completely new form, but entail the possibility of a new form.

If a form is "changeable" and "annullable" for another, as Malabou argues, then what remains to be transformed, what reoccurs or reappears both as an impossibility and as a possibility of a new form? And what resists "transformation" in the first place? The ambiguous states of plasticity reside in the contradictions inherent in the notion of permanence – temporality and sustainability – itself, given that everything is subject to change or decay over time, no matter how permanent it might appear. How does one identify the primary and the final state? If there are myriad mutations, can one trace a definite beginning or end?

Malabou addresses these questions by referring to Freud's text, *Beyond the Pleasure Principle*.[35] In it, Freud discusses the life drive as the capacity for both change and continuity, and the death drive as the incapacity for adaptation.[36] With life and death drive, Freud pursues "the very first, the most original moment".[37] The very first moment may also imply the very last phase, which both precedes and goes beyond life, which is "pre and post-temporal".[38] The quest for whether a new form can be built from scratch or whether a form can be completely destroyed and transformed remains as a paradox. Plasticity, Malabou contends, entails and further triggers the paradox relating to permanence.

The question of permanence, I suggest, sits at the heart of voicing. Acts of voicing – especially non-verbal expressions and gestures – encourage us to imagine the manifestations of things in different forms, the possible transformation of one thing into another, as well as the temporality of "pre and post" and the quest for a new form, be it a new mode of expression, a new mode of communication, a new voice. The questions that I have raised above – what remains to be transformed, what reoccurs or reappears both as an impossibility and as the possibility of a new form, and what resists "transformation" in the first place – are very much at play in the act of voicing. Voicing almost always "interrupts and begins".[39]

Perhaps one can also imagine my proposition in the context of storytelling. Voicing, however, never settles on a narrative. Acts of voicing do not necessarily "tell us something".[40] They do not lead to a sense of continuity (and narrativity) or instrumentalize discontinuity (and tension) to arrive at a continuity across their disparate component parts. Acts of voicing do not dissolve bodies into one of these ends either. They rather interrupt, evoke, incite, trigger. What is unique about voicing is then its instantaneous and ambiguous affect, both changeable and resistant modes of presence, and hence the plasticity and provocation of a new form that interrupts, evoking the paradox of permanence. Such voicing prompts us with a distributed mode of interaction, which I discuss as non-dialogue.

Non-dialogue

Non-dialogue is a distributed mode of interaction, a non-dyadic currency. The suggestion is of non-dialogue as a way of looking into the given notions of communication, to question the hastily concluded discourses and practices of connectivity. We all experience moments of no response, no return, no pay-off. Non-dialogue heightens such moments as moments of both interruption and inspiration, moments through which one can hear with another and make a shift in being with one another. One can perhaps imagine non-dialogue as a case of insular solidarity. The significance of this mode of communication is to help us reconsider the notion of intersubjectivity – as well as the entanglement of intimacy and distance, contact and difference, containment and extension – which this book puts at the heart of what I mean by voice–skin.

Both voice and skin behave in a non-dialogic way. Voice is felt through the whole body. It triggers and is being triggered at different times and in different spaces. It provokes interactions with various bodies, as will be elaborated in this section and in the book as a whole. Skin accommodates and mediates a diffuse sensation. Despite the likelihood of being local to an area of skin on the body, as literary scholar Elizabeth Harvey puts it, "the history of touch is shaped by the anomaly of its corporeal distribution, of simultaneously being everywhere and nowhere".[41] Harvey also reminds us of Merleau-Ponty's account of touch as "double sensation", that "to touch

is also to be touched".[42] Similarly, acts of voicing, in any form, assume the presence of other bodies and voices.

I want to question the implications of this simultaneous modality – touching and being touched, voicing and being heard. Does this simultaneity suggest an even exchange, a mutuality? Do we always get heard or hear a response when we voice something? If to touch is already to be touched, what does it mean to feel touched? Asking these questions, my intention is to point to presumptions we may have about mutuality and reciprocity. Needless to say, a lot of things in life are uneven and disproportionate, both systemically and individually. Take, for instance, underrepresented histories of women thinkers and composers, under-appreciated labor in the workplace, overrated figures in popular culture, as well as unrequited love. Who gets to decide both what counts and who counts? There is no straight formula to what counts and what connects. To connect is not simply to connect with a particular someone or something but also to participate in a network of social and cultural practices. Likewise, to touch one is to touch many. Voicing is not simply voicing something *to* a presumed audience but also voicing *with* various others. In other words, touching and voicing, as well as the touch of voice, operate in a distributed, non-dialogic way.

In *Speaking into the Air,* literary theorist and media scholar John Durham Peters contests the "dialogic" mode of communication. Peters explores the value of "non-dialogic forms of communication" in association with dissemination:

> Distortions of dialogue make it possible to communicate across culture, across space and time, with the dead, the distant, and the alien… The strenuous standard of dialogue, especially if it means reciprocal speech acts between live communicators who are present to each other in some way, can stigmatise a great deal of the things we do with words. Much of culture is not dyadic, mutual, or interactive… The lament over the end of conversation and the call for refreshed dialogue alike miss the virtues inherent in nonreciprocal forms of action and culture…[43]

Central to Peters's discussion is how "writing, recording, broadcasting"[44] go beyond reciprocal forms of communication, in particular Socrates's dialogic form, leading to many meanings and a "deviation from norm".[45] The dissemination of meanings, their mutated manifestations and forms

in everyday life, are already linked to the contested zone of plasticity and permanence, which is not bounded by the need for verbal exchange. Similarly, one can consider philosopher Emmanuel Levinas's notion of ethics. Levinas emphasizes the role of "non-reciprocal" calls and responses in constituting "a shared affect and responsibility". For Levinas, we respond to one another at a "pre and pro-verbal" state in everyday life. That is, we can feel responsible for one another, without knowing or saying, without being reduced to the theoretical logos or intentions of language.[46]

Non-dialogue that the voicing evokes, or non-dialogic voicing, borrows from these accounts. However, in addition to dissemination and a shared affective state, non-dialogic voicing also scrutinizes feedback processes across bodies of all kinds. It does so not simply through mutation of forms and meanings but precisely by means of the interruptive characteristic of voicing, that is, the pause of voicing for how to make sense, as well as an allowance made for how to be and feel with another. This exploration can happen at a pre and pro-verbal state, as distributed across bodies of different kinds.

Media artist and writer Norie Neumark draws attention to the affective capacity of "mirror voicing" in this process. However, Neumark highlights the mimicking of vocal gestures or sounds. In this paradigm, voicing, or mirror voicing, almost always happens in one's throat. I am wondering whether we can also explore voicing released from vocal cords. Non-dialogic voicing allows us to do so.

Let us imagine a few ordinary examples of non-dialogic voicing: singing a melody to a plant, spelling a word following the rhythm of traffic lights, smiling with a bird sound, sustaining a vowel sound or walking in synch with construction noise. These examples encourage an awareness of environmental and concrete sounds through cross-sensory modalities. They employ both vocal and non-vocal acts. The examples do not necessarily generate or imply reciprocal responses. They align us with the temporalities and forms of other beings. Consider, for instance, how a plant may respond to one's singing. Perhaps in a few weeks by blossoming. Perhaps simply by dying. What may construction noise say? Perhaps a not-yet revealed regeneration policy, a spatial reconfiguration or an alert for a detour. What may be the points of connection and disconnection we can feel from various sounds and bodies, from different signals and signs?

Non-dialogic voicing attunes us to these questions. In relation to these questions, I turn to new materialist ontologies. In particular, Jane Bennett's notion of "thing-power" is useful for the questions raised above. The notion of "thing-power"[47] underscores the shared network of human and nonhuman forces, and the need for understanding the agency of nonhuman forces in bringing about political transformation. Inspired by Thoreau's notion of the Wild – which asserts that "things are irreducible to human subjectivity"[48] – and Deleuze and Guattari's notion of assemblage, Bennett explains "thing-power" as both "a property of assemblage" and "a relational effect, a function of several things operating at the same time or in conjunction with one another".[49] Thing-power, she continues, has the capacity to "shift or vibrate between different states of being, to go from trash/inanimate/resting to treasure/animate/alert".[50] Accordingly, everything matters and has life.[51] The ecological implication of "thing-power materialism" is thus clear: things co-emerge, co-exist and co-operate within a relational network.[52] And the warning is also clear: human-centric life entails the danger of human-centric consumption, that is, the danger of careless and irresponsible engagement with the ecology at large. Thoreau's notion of the Wild comes to the surface even more strongly in this warning.[53]

Human encounters with things are in part mediated by pre-existing human conceptions and experiences. What then makes things irreducible to human subjectivity? What makes things in part unknowable? And aligned with this unknowability, what further underlines the ecological consideration, the need for acknowledging the shared ecology of humans and nonhumans?[54] Non-dialogic voicing reinforces these questions. Consider the cross-sensory and distributed modes of interactions that non-dialogic voicing may incite between humans and nonhumans. These interactions do not resolve into a single expression or type of exchange. They rather allow us to imagine many possible expressions in different forms with a conflicting sense of time and space: now and then, here and there. We can say that mutating forms of expression and their lack of resolution into a single body, voice, time or space are part of what make things unknowable.

Bennett has a similar response, which is primarily informed by Adorno's notion of "non-identity", that is, "the persistent lack of fit between

concept and thing".[55] Non-identity enables us to accept the impossibility of a full understanding or "reconciliation" between "concepts and things", "self and other" and "nature and culture".[56] Being the bearer of the unknowable and irreconcilable, and assuring the irreducible aspects of things, non-identity seems to be a necessary challenge to the human-centric consumption of ecology. Bennett's "thing-power materialism" underlines this negativity and furthers my inquiry into non-dialogic voicing. However, "thing-power materialism" also tends to operate with a logic of connection. The activity of "bodying",[57] or the process of performing a body, presumes an idea of connection. Can one consider it a given to move towards connectivity and merging? And if so, where is the boundary that renders the act of connecting possible in the first place?

Non-dialogic voicing does not necessarily operate according to a logic of connection or reciprocal exchange. It rather underscores both an integration and a disintegration of bodies. Imagine the kinds of disconnect or difference may be heard in such voicing. Social markers? Discursive differences? Sensory differences? We can trace and be reminded of all of these differences. However, we can also ask what difference non-dialogic voicing may suggest not for relocating these discursive differences but precisely for unsettling the idea of whose agency is at stake, what speaks with whom, and what counts after all. This promises a shift from the human-centric understanding of voice and language.

As sociologist Vicky Kirby indicates, studies in new materialisms, including major volumes in the field, such as *Material Feminism* (2008), *New Materialisms: Ontology, Agency and Politics* (2010) and *New Materialism: Interviews & Cartographies* (2012), all criticize "the obsession with discourse and language" which "hijacked our ability to engage reality".[58] And yet, these studies also tend to identify the capacity of matter within the bounds of language, human cognition and subjectivity. For instance, as Karen Barad writes, "matter feels, converses, suffers, desires, yearns and remembers…".[59] Kirby points at the reference to human subjectivity in this phrase and asks whether we can imagine a materiality, one that is more striking and unexpected:

> Can we work with a sense of "materiality" that is more surprising?… One way into this question is via the canonical work of anthropologist, Mary Douglas. In *Purity and Danger* she argues that all human societies are preoccupied with 'chasing

dirt' (2001:2)... According to Douglas, every society will monitor its boundaries, margins and sites of ambiguity in the hope of reproducing the existential values that make it work... Douglas's notion of "matter out of place" helps us to appreciate the antics of critique and the inevitable turf wars between new materialism, "old" materialism, the linguistic turn, the affective turn, the pragmatic turn and so on... My focus is on the confusions and paradoxes that leave us wondering; ambiguities that can't be resolved and made proper; riddles that defy and complicate our dearest convictions about the natural order of things and what it means to be human. My assumption is that matter and its cognates are morphologically plastic and that these transubstantiations are myriad, appearing as words, as plants and objects, as blood and belief.[60]

In light of Kirby's encouragement of a more "surprising materiality", which may manifest itself as "morphologically plastic", let us reconsider the experience of singing with plastic bags. Without being limited to a context where we assemble a meaning in relation to a plastic bag or without anthropomorphizing it, how can a plastic bag "say something" that we haven't considered or projected yet?

The non-dialogic voicing discussed in the cases in this book imply the question. The cases demonstrate how acts of non-dialogic voicing make an errant, ambiguous and plastic voice, which is both individual and anonymous, participating in the distributed networks that exist among humans and nonhumans. If non-dialogic voicing is both cause and effect of a voice that is versatile and resistant to disappearance, if it manifests and amplifies both connects and disconnects as moments of insular solidarity, what kind of a skin would such a voice suggest? Such a voice, I argue, makes us think of skin in the form of a shared surface, rendering one accountable for another.

Plastic, Electric, Haptic

The three parts of the book, Plastic, Electric and Haptic, engage with the processes of building a voice as skin. Part 1, Plastic, looks at three cases in three chapters. Chapter 1 examines the multimedia walk, *The Waste Land*. In 2012, the UK's New Economics Foundation asked the map-magazine *Curiocity* to organize a walk for the Festival of Transition, which was a series of events devised to respond to global challenges such as climate crisis. One of the co-editors of the magazine, writer and literary walker

Henry Eliot guided a multimedia walk using T.S. Eliot's landmark poem, *The Waste Land.* As Henry Eliot described it, participants on the walk read fragments from the poem as they walked through areas of decay, abandonment and regeneration. Sites included East London Cemetery, Abbey Mills Pumping Station and the Greenway path. I consider this multimedia walk together with singing explorations and listening meditations in experimental music, particularly, with John Cage's *Song Books* (1970) and Pauline Oliveros's *Environmental Dialogue* (1975/1996).

Chapter 2 concentrates on Cage's *Song Books.* Based on Henry David Thoreau's *Journals*, *Song Books* is a collection of 90 songs, including voice, electronics and theatre. The first three solos use solo voice, the map of Concord and Thoreau's facial portrait as a map, along with fragments from the *Journals*. The score asks the participant to apply the indicated directions on the map of Concord to a physical environment, draw a melodic line based on the directions, and sing the melody to, through and with varied bodies and sounds. In this process, fragments from the text are distributed in the environment, and voicing becomes a navigation tool. Indicating the fragments of the text in different typos, shapes and distances, the score requires the performer to pay attention to the magnitude, duration and spread of a word, phoneme and letter in an environment.

Pursuing a similar aesthetic pathway, Chapter 3 looks at Pauline Oliveros's listening meditation *Environmental Dialogue*. The piece instructs participants to attentively observe breathing, listen to the concrete sounds in a physical environment and respond to these sounds by reinforcing a pitch vocally or mentally. Participant responses do not have to be in the form of an explicitly vocal, aural or verbal reinforcement. Attending to these sounds, one may come across an expression or affect that hasn't been projected, considered or known before.

In different contexts, all three chapters draw attention to varied, distributed acts of voicing between human and nonhuman bodies that emerge in different forms and intensities. The acts do not lead to a necessary or presumed form of exchange. They do not operate or come to surface with a necessary object of intention either. Rather they highlight moments of non-dialogue. The chapters demonstrate how non-dialogic voicing sheds light on the plasticity of voice, and how plasticity of voice

allows us to understand voice not as given or fixed but as emerging with environment, functioning like a shared surface, like skin.

Part 2, Electric, furthers the distributed appearances of voice, focusing on two cases: an inquiry about listening to electromagnetic signals in cities, and experiences of voice-hearing in clinical and creative contexts. Chapter 4 looks at Christina Kubisch's *Electrical Walks* (2004–). Kubisch conceives her electrical walks to map and interact with the electromagnetic fields in cities, some of which take in shopping malls, security doors, ATMs and subways. The kinetic wireless headphones that she has developed pick up electromagnetic vibrations and turn them into audible sounds. Provided with the headphones and a map, participants wander around the electromagnetic fields. I suggest that *Electrical Walks* not only facilitates hearing the infrastructure and the invisible connections of the city as music as well as a trigger for environmental awareness, but also creates a network of speech while mobilizing the participants to hear various kinds of feedback between speech and non-speech (environmental) sounds. In so doing, I argue that the walks contribute to making and embodying inner and external voices in the midst of urban noises.

Chapter 5 first addresses AVATAR Therapy, a relatively new treatment for auditory verbal hallucinations, designed and developed by the Institute of Psychology, Psychiatry and Neuroscience at King's College London in collaboration with the Speech and Phonetic Centre at University College London, and the University of Manchester. Based on a special software program and drawing on voice hearers' descriptions, AVATAR Therapy provides a catalogue of virtual faces and voices. Voice hearers choose their avatar faces and match them with a voice. The face helps to contain the voice, reassuring the voice hearer by making it a visible external entity. The avatar voice is essentially the therapist's voice; yet as computerized and modified, it is still heard as a stranger's voice, which first persecutes then gradually approves of the voice hearers.

Discussing the implications of AVATAR Therapy, the chapter draws on the AI technology, "voice-skins, the computerised voices to modulate identities and characters for social or creative purposes",[61] and a series of creative platforms that feature AVATAR Therapy or experiences of voice-hearing. *This is a Voice* (2016), the Wellcome Trust exhibition curated by Bárbara Rodríguez Muñoz, includes video documentation of AVATAR

Therapy, alongside works by Joan La Barbara, Meredith Monk, Matthew Herbert, Anna Barham, Aura Satz and Mikhail Karikis, as well as "speech devices", "medical illustrations" and "ethnographic objects" associated with the human voice.[62] The other creative projects that I discuss in this chapter, *The Isle is Full of Noises* by Victoria Hume and *Listening to Voices* by Pedro Rebelo, are devised as part of the research networks *Hearing the Voice* and *Listening to Voices: Creative Disruptions with the Hearing Voices Network*, respectively.[63] Both projects feature voice hearers' experiences and their responses to voice-hearing.

Looking at these cases together, my intention is twofold: to reflect first on the embodiment of voice as a network of many voices, triggering the split between "this is my voice" and "this is not my voice", and then on the impact of embodied voice on empathy, on creating a shared reality and skin. Chapter 6 discusses the role of an embodied network of many voices in generating a shared skin. Situating therapeutic procedures within creative interventions, the suggestion is not to use the latter as a rehabilitation strategy for the former but to consider how clinical and creative experiences can be on the same spectrum, highlighting everyday experiences in a new light.

Part 3 suggests the network of many voices as a form of tactile speech. The chapters in this section explore the possibilities of tactile speech within the context of biosensing musical interfaces and participatory artworks. Tactile speech in media and communication technologies, such as the hearing glove, vibrotactile glove, electrotactile speech processors, and smart gloves that translate sign language into automated or vocalized speech (and vice versa), treat skin as a reliable medium for signification and transmission of verbal language. These technologies attempt to make sound and voice visible, indexical and accountable for communication. However, the experience of sound and voice can also lead to misinformation, miscommunication, mishearing and recalculation. While employing similar computational technologies, biosensing musical interfaces and participatory artworks point at experiential, context-sensitive deviations and errancies of both skin and voice. These artistic experiments articulate skin as a dynamic medium of expression and stimulation, rather than signification. Tactile speech, I suggest, may also inform and be informed by these errancies.[64]

Chapter 7 explores cases of tactile speech, looking at biosensing musical interfaces such as the BioMuse (invented by Knapp and Lusted in 1988), which translates neural and electrical signals of the body into digital data and sound, and the Xth sense (in development by Donnarumma since 2010), which converts biophysical signals into sounds. The chapter first portrays the early foundations of biosensing music technologies and gesture-based interaction in electronic music. It then discusses the performances of artists and scholars Atau Tanaka and Marco Donnarumma. With these technologies Tanaka and Donnarumma contest the limits of the human body and the musical instrument, raising critical questions about embodiment within the context of human and machine interaction. Looking at the use of biosensing musical interfaces and performances, I further explore the embodiment of sound and discuss how these performances articulate the body as a medium of tactile speech.

Investigating how bodily signals and sounds may speak, I address histories of electrotactile communication and vibrotactile signification, as well as the role of composers of experimental music in developing speech-synthesis technologies. I examine biosensing musical interfaces together with tactile speech devices in communication technologies (i.e. the hearing glove and signing gloves developed for deaf and hard-of-hearing people) and the tools of "corporeal knowing"[65] in digital health regimes (i.e., mobile gadgets measuring bodily signals, blood pressure, heart rate). Both communication and digital health regimes have a functional and indexical approach to bodily vibrations and signals. They translate vibrations and signals into measurable and verbal signs. Biosensing musical interfaces, however, are interactive, kinetic and touch-driven devices that generate haptic effects. Converting bodily signals into sounds, they mark the embodiment of sound as mediation. They articulate visceral sounds as abstract. I consider this mediation in the form of a surface-membrane, which both surrounds and transmits sensory information. Such information highlights environmental, contingent and contextual variants, without settling into a given semantic or verbal sign. The information from the signals and sounds manifests as manifold echoes, like the non-dialogue of a distributed voice.

Chapter 8 discusses *Vocal Vibrations* (2014), an interactive installation devised by the Opera of the Future Group at the MIT Media Lab. Led

by composer Tod Machover, *Vocal Vibrations* is a series of multimedia experiences using singing voice and immersive music to explore the physical, emotional and cognitive capacities of the human body and voice as well as the impact of the vibrations of the singing voice on wellbeing. The group has developed the Oral Resonance Ball (ORB), which converts the singing voice into tactile vibrations. Discussing the use of the ORB and the activity of singing and listening in two different exhibition spaces (Chapel and Cocoon), I examine the references to visible and tactile speech in *Vocal Vibrations*. I explore the implications of the externalization of voice as ORB and vibrations, the capacity of the voice as vibrations for weaving a shared skin, and the immunity of the vibrations to fixities, as well as to habitual or presumed certainties.

Chapter 9 discusses distributed speech as a form of tactile speech, looking at media artist Rafael Lozano-Hemmer's participatory artworks, *Voice Tunnel* (2013) and *Atmospheric Memory* (2019). Exhibited in the Park Avenue Tunnel in New York, *Voice Tunnel* uses 300 theatre spotlights and 150 loudspeakers. Participants speak to an intercom located in the middle of the tunnel, which records voices. The recordings include fragments of singing and speaking, as well as vocal gestures such as shouting. Played as a loop, each new recording mobilizes the previous one and activates the lights. The traces of the voices mingle in an order, in synch with the lights, appearing and disappearing, and moving in proportion to one another. The traces create a memory lane of voices, as Lozano-Hemmer suggests. I argue that this process, or what I call communal and participatory voice-making, is a manifestation of distributed speech.

Like *Voice Tunnel*, *Atmospheric Memory* distributes speech, translating live-fed voices into various physical appearances and disappearances. With a series of interactive installations, *Atmospheric Memory* echoes scientist and computer pioneer Charles Babbage's question: can we imagine the air that we share as a "vast library of voices"? Probing this question, the installations concretize the voices in the air as light, water waves and vapour, three-dimensional sculptures, as well as sonic and physical actions. The tactility of such distributed speech is twofold. First, the installations convert speaking voices and breath into tangible forms, as well as playing with words and letters of words in tangible forms.

Second, manifesting voice in varied appearances and disappearances, the installations articulate the touch of the voice, be it a momentary touch of another's voice, or voice as warmth of light or evaporating air and water, as both proximate and distant. The touch of the voice in *Voice Tunnel* and *Atmospheric Memory* is precarious, performing the uncertainty of who, when, where and what is speaking as well as what is being said and heard. Such tactile speech, I argue, is a non-dialogue, a distributed mode of interaction, underscoring the issues of response and responsibility between humans and nonhumans.

Taken together, the examples that I discuss in the book lead us to an expanded conception of voice and skin. They urge us to hear voice and skin as partial and distributed, built as a multisensory interface within and in contact with a physical environment, without being limited to human body or mediums for verbal language. Thinking of voice as skin, and skin as voice, we experience and embrace the body, self and speech as emergent, errant, exploratory and shared. In effect, we can revisit the ways in which we situate human and nonhuman bodies, consider the agency and passivity of human and nonhuman expressions, and acknowledge the making of a voice that we do not know, as well as a voice that capacitates the states of not knowing, especially in times of uncertainty, precarity and temporal engagements.

Notes

1 See Zeynep Bulut, "On Building a Voice," 2015. https://lisaskuret.com/on-building-a-voice-dr-zeynep-bulut-on-a-call-from-the-library/ See also the documentation of the installation, *A Call From the Library*, and the larger context of the installation, Skuret's ongoing project, *Communal Materials; Or, Evolution Isn't Fast Enough* via the following links: https://lisaskuret.com/a-call-from-the-library/; https://lisaskuret.com/evolution-isnt-fast-enough/ Last accessed on 1 April 2024. I presented a version of this essay at Embodied Sound: Symposium and Performance, curated by Guy Harries and supported by the Centre for Performing Arts Development, University of East London on 13 May 2015. My thanks to Guy Harries for inviting me to the symposium, and to Lisa Skuret for inviting me to write about *A Call From the Library*.

2 Relating to the ideas on the distribution and uncertainty of voice and language, see my essay, "Anonymous voice, sound, indifference," in *Einstein on the Beach: Opera beyond Drama*, eds. Jelena Novak and John Richardson (London: Ashgate, 2019), 174–93. This essay was largely developed during the second year of my postdoctoral fellowship at the ICI Berlin. I presented versions of this essay at various conferences, including "Resonances: Music, Affect and the City," organized by the Max Planck Institute for

Human Development in collaboration with Harvard University's Sawyer Seminar "Hearing Modernity," Max Planck Institute for Human Development, Berlin, 7–8 November 2013; "Einstein on the Beach: Opera after Drama," organized by Sander van Maas and Jelena Novak, University of Amsterdam, Amsterdam, 5–6 January 2013; "Concepts of Emotion in Contemporary Music," organized by Lydia Rilling, as part of the Rainy Days, Contemporary Music Festival, Philharmonie Luxembourg, 6–19 November 2017. My thanks to my colleagues and fellow researchers at the ICI Berlin for their contributions to the conceptual thread of this essay, to David Kishik and Daniel Colucciello Barber with whom I discussed *Einstein on the Beach*, to Luis-Manuel Garcia-Mispireta and Peter McMurray for organizing and inviting me to the conference "Resonances: Music, Affect and the City," to Sander Van Maas and Jelena Novak for convening the conference on *Einstein on the Beach*, to Lydia Rilling for inviting me to Rainy Days Festival, and to John Richardson and Jelena Novak for inviting me to contribute to the volume, *Einstein on the Beach: Opera beyond Drama*.

3 Zeynep Bulut, "La Voix-Peau: Understanding the Physical, Phenomenal and Imaginary Limits of the Human Voice Through Contemporary Music," (Ph.D. diss., University of California, San Diego, 2011). My thanks to George Lewis for our conversation and for his guidance about the title of my dissertation and the wording of skin-voice, considering Anzieu's notion of skin-ego and my proposal of voice as skin. See also Zeynep Bulut, "Planes, Walls, and Bits of Sound: Healing a voice," special issue on voice, eds. J. Martin Daughtry and Clara Latham. *Music and Politics*, X.2 (Summer, 2016). DOI: https://doi.org/10.3998/mp.9460447.0010.205

4 Didier Anzieu, *The Skin Ego*, trans. Chris Turner (Connecticut, New Haven: Yale University Press, 1989).

5 Ibid.

6 See Claudia Benthien, *Skin: On the Cultural Border of Self and the World,* trans. Thomas Dunlop (New York: Columbia University Press, 2002).

7 My discussion on the embodiment of the voice is informed by examples in experimental music and media art. The notion of (dis)embodied voice has also been considered by scholars of opera, melodrama and film. Scholars in these fields discuss live or recorded voice as an invisible and fantasised projection of the body (Silverman 1988, Chion 1999), a musical and discursive matter that questions the limits of aesthetic convention, narrative and character (Abbate 1996, Poizat 1992, Smart 2004, Kramer and Bernhart 2014), or a critical medium that contests cultural and gender identity (Dunn and Jones 1997, Weidman 2021). Carolyn Abbate, *Unsung Voices: Opera and the Musical Narrative in the Nineteenth Century* (Princeton: Princeton University Press, 1996); Lawrence Kramer and Walter Bernhart (eds.), *On Voice* (Amsterdam, New York: Rodopi, 2014); Michel Poizat, *The Angel's Cry: Beyond the Pleasure Principle in Opera*, trans. Arthur Denner (Ithaca: Cornell University Press, 1992); Kaja Silverman, *The Acoustic Mirror. The Female Voice in Psychoanalysis and Cinema* (Bloomington and Indianapolis: Indiana University Press, 1988); Michel Chion, *The Voice in Cinema*, trans. Claudia Gorbman (New York: Columbia University Press, 1999); Mary Ann Smart, *Mimomania: Music and Gesture in Nineteenth-Century Opera* (California, Berkeley: University of California Press, 2004); Lesley Dunn and Nancy Jones (eds.), *Embodied Voices: Representing Female Vocality in Western Culture* (Durham, NC: Duke University Press, 1997); Amanda Weidman, *Brought to Life by the Voice: Playback Singing and Cultural Politics in South India* (California, Berkeley: University of California Press, 2021).

8 See Norie Neumark, *Voicetracks: Attuning to Voice in Media and the Arts* (Cambridge, MA: The MIT Press, 2017); Dominic Pettman, *Sonic Intimacy: Voice, Species, Technics (or, How To Listen to the World)* (Stanford: Stanford University Press, 2017). Concerning physical, cultural, sonic, and social interactions between voice and environment, as well as issues relating to atmosphere, climate change, and precarious vocality, breath and breathlessness, J. Martin Daughtry and I co-convened a one-day workshop, entitled Voice and Environment, at the ICI Berlin Institute for Cultural Inquiry, with the support of ICI Berlin, Queen's University Belfast, and New York University on 18 March 2019. I presented an earlier version of Chapter 1 of Part 1 during this workshop. My thanks to our colleagues at the ICI Berlin for hosting this event, and to J. Martin Daughtry, Naomi Waltham-Smith, Jessica Feldman, Oriana Walker and Andreas Borregaard for their generous contributions to the workshop at the ICI Berlin. I also wish to thank colleagues who participated in an earlier seminar on voice and environment, which took place at NYU.

9 Roland Barthes, "The Grain of Voice," *Image, Music, Text,* trans. Stephen Heath (London: HarperCollins, 1977); Don Ihde, *Listening and Voice: Phenomenologies of Sound* (Albany: State University of New York Press, 2007).

10 Jacques Derrida, *Speech and phenomena, and other essays on Husserl's theory of signs*, trans. David B. Allison (Evanston: Northwestern University Press, 1973); Walter Ong, *Orality and Literacy:The Technologizing of the Word* (New York: Routledge, 2002, 2nd Edition); Adriana Cavarero, *For More Than One Voice: Towards a Philosophy of Vocal Expression,* trans. Paul A. Kottman (Stanford: Stanford University Press, 2005); Steven Feld, Aaron A. Fox, Thomas Porcello, and David Samuels, "Vocal Anthropology: From the Music of Language to the Language of Song," *A Companion to Linguistic Anthropology*, ed. A. Duranti (Malden, MA: Blackwell, 2004), 321–45.

11 Emma Dillon, *The Sense of Sound: Musical Meaning in France, 1260–1330* (Oxford, New York: Oxford University Press, 2012); Brandon LaBelle, *Lexicon of the Mouth: Poetics and Politics of Voice and the Oral Imaginary* (New York: Bloomsbury Academics, 2014); Steven Connor, *Beyond Words: Sobs, Hums, Stutters and Other Vocalisations* (London: Reaktion Books, 2014); Shane Butler, *The Ancient Phonograph* (New York: Zone Books, 2015).

12 Don Ihde, *Listening and Voice: Phenomenologies of Sound* (Albany: State University of New York Press, 2007); Steven Connor, *Dumbstruck: A Cultural History of Ventriloquism* (Oxford and New York: Oxford University Press, 2000) and *Beyond Words: Sobs, Hums, Stutters and Vocalizations* (London: Reaktion Books, 2014); Steven Feld, *Sound and Sentiment: Birds, Weeping, Poetics, and Song in Kaluli Expression* (Philadelphia: University of Pennsylvania Press, 1982); Ana María Ochoa Gautier, *Aurality: Listening & Knowledge in Nineteenth-Century Colombia* (Durham, NC: Duke University Press, 2014).

13 On the use of voice in the talking cure, see Sigmund Freud and Josef Breuer, *Studies in Hysteria* (London: Penguin, 1990). See also Alice Lagaay, "Between Sound and Silence: Voice in the History of Psychoanalysis," *E-pisteme*, 1 (2008), 53–62; Clara Hunter Latham, "The Limits of Hearing: Historical and Contemporary Perspectives on Vocal Materiality and Expression," special issue on voice, eds. J. Martin Daughtry and Clara Latham. *Music and Politics*, X.2 (Summer, 2016). DOI: https://doi.org/10.3998/mp.9460447.0010.201

14 See Mladen Dolar, *A Voice and Nothing More* (Cambridge, MA: MIT Press, 2006); Lagaay, "Between Sound and Silence: Voice in the History of Psychoanalysis," 2008; Jacques Lacan,

Écrits: a selection, trans. Alan Sheridan (London: Routledge, 2001); Slavoj Žižek and Renata Salcel (eds.), *Gaze and Voice as Love Objects* (Durham: Duke University Press, 1996).

15 See Jody Kreiman and Diana Sidtis, *Foundations of Voice Studies: An Interdisciplinary Approach to Voice Production and Perception* (Malden, MA: Blackwell, 2011); Sascha Fruhholz and Pascal Belin, *The Oxford Handbook of Voice Perception* (Oxford: Oxford University Press, 2019).

16 Some recent highlights include Martha Feldman (Convener), "Colloquy: Why Voice Now?" *Journal of the American Musicological Society*, Vol. 68, Number 3, 2015, 653–85; Gary Tomlinson, *A Million Years of Music: The Emergence of Human Modernity* (New York: Zone Books, The MIT Press, 2015); Nina Sun Eidsheim, *Sensing Sound: Singing and Listening as Vibrational Practice* (Durham, NC: Duke University Press, 2015); Nina Sun Eidsheim and Katherine Meizel (eds.), *The Oxford Handbook of Voice Studies* (New York: Oxford University Press, 2019); Chris Tonelli, *Voices Found: Free Jazz and Singing* (London, New York: Routledge, 2020); Martha Feldman and Judith Zeitlin (eds.), *The Voice and Something More* (Chicago, IL: University of Chicago Press, 2019). See also Matthew Rahaim, *Musicking Bodies: Gesture and Voice in Hindustani Music* (Middletown, CT: Wesleyan University Press, 2012), and Katherine Meizel, *Multivocality: An Ethnography of Singing on the Borders of Identity* (Oxford: Oxford University Press, 2020).

17 Konstantinos Thomaidis and Ben Macpherson (eds.), *Voice Studies: Critical Approaches to Process, Performance and Experience* (New York: Routledge, 2015); Zeynep Bulut, "Singing and a song: The intimate difference in Susan Philipsz's *Lowlands*," *Gestures of Music Theatre: The Performativity of Song and Dance,* eds. Millie Taylor and Dominic Symonds (Oxford: Oxford University Press, January 2014), 179–90; "Theorizing Voice in Performance: György Ligeti's *Aventures*," *Perspectives of New Music*. Volume 48, No. 1, Winter 2010, 44–65.

18 Jacob Smith, *Vocal Tracks: Performance and Sound Media* (California, Berkeley: University of California Press, 2008); Norie Neumark, Ross Gibson and Theo van Leeuwen (eds.), *VOICE: Vocal Aesthetics in Digital Arts and Media* (Cambridge, MA: MIT Press, 2010); Frances Dyson, *The Tone of Our Times: Sound, Sense, Economy, and Ecology* (Cambridge, MA: MIT Press, 2014); Allen Weiss, *Breathless: Sound Recording, Disembodiment, and the Transformation of Lyrical Nostalgia* (Middletown, CT: Wesleyan University Press, 2002); Aura Satz and Jon Wood (eds.), *Articulate Objects: Voice, Sculpture, Performance* (Bern: Peter Lang, 2009); Miriama Young, *Singing the Body Electric: The Human Voice and Sound Technology* (Farnham: Ashgate, 2015); *Jonathan Sterne, The Audible Past: Cultural Origins of Sound Reproduction* (Durham, NC: Duke University Press, 2003); Mara Mills, "Media and Prosthesis: the Vocoder, the Artificial Larynx, and the History of Signal Processing," *qui parle* 21,1 (Fall/Winter 2012): 107–49; Zeynep Bulut, "*Last Breath*, Sensing Life," *The Oxford Handbook of Sound Art,* eds. Jane Grant, John Matthias, and David Prior (Oxford, New York: Oxford University Press, 2021), 367–85.

19 In addition to the noted writings by Connor, LaBelle and Pettman, philosopher and theatre scholar Petra Maria Meyer also refers to Anzieu's notion of skin-ego. Annette Stahmer (ed.), *Parole #2: Phonetic Skin/Phone-tische Haut* (Cologne: Salon Verlag, 2012); Petra Maria Meyer, "Mit Haut und Hören/Listen to Your Skin," in *Parole #2: Phonetic Skin/Phone-tische Haut*, 7–15.

20 Nina Sun Eidsheim, *The Race of Sound: Listening, Timbre, and Vocality in African American Music* (Durham, NC: Duke University Press, 2019); Jennifer Lynn Stoever, *The Sonic Color Line: Race and the Cultural Politics of Listening* (New York: NYU Press, 2016).

21 Laura U. Marks, *The Skin of the Film: Intercultural Cinema, Embodiment, and the Senses* (Durham, NC: Duke University Press, 2000), *Touch* (Minnesota, MI: University of Minnesota Press, 2002); Claudia Benthien, *Skin: On the Cultural Border of Self and the World,* trans. Thomas Dunlop (New York: Columbia University Press, 2002); Sara Ahmed and Jackie Stacey (eds.), *Thinking Through the Skin* (New York: Routledge, 2001); Steven Connor, *The Book of Skin* (London: Reaktion Books, 2003); see also Erin Manning's discussion of skin as a multi-sensory surface in her book *Always More Than One: Individuation's Dance.* Erin Manning, *Always More Than One: Individuation's Dance* (Durham, NC: Duke University Press, 2013).

22 Mara Mills, "Media and Prosthesis: the Vocoder, the Artificial Larynx, and the History of Signal Processing," 2012; David Parisi, *Archaeologies of Touch: Interfacing with Haptics from Electricity to Computing* (Minneapolis, MI: University of Minnesota Press, 2018); see also Mara Mills and Xiaochang Li, "Vocal Features: From Voice Identification to Speech Recognition by Machine," *Technology and Culture*, Volume 60, Number 2 Supplement, April 2019, S129–S160.

23 Mary Flanagan and Austin Booth (eds.), *Re:skin* (Cambridge, MA: The MIT Press, 2009).

24 Some highlights include Constance Classen, *The Deepest Sense: A Cultural History of Touch* (Illinois, IN: University of Illinois Press, 2012); Constance Classen (ed.), *The Book of Touch* (London: Berg Publishers, 2005); David Howes (ed.), *Empire of the Senses: The Sensual Culture Reader* (London: Berg Publishers, 2004); Caroline A. Jones (ed.), *Sensorium: Embodied Experience, Technology, And Contemporary Art* (Cambridge, MA: The MIT Press, 2006); Mark Paterson, *The Senses of Touch: Haptics, Affects and Technologies* (London: Berg Publishers, 2007).

25 See the description of voice-skin and Modulate's VoiceWear system via the following link: https://www.modulate.ai/blog/voicewear-individual-identity Last accessed on 19 July 2023.

26 My sincere thanks to J.Martin Daughtry for his generous editorial contribution to the Introduction.

27 *Dialogues between multiple soul-mates* is a performance piece for voice, plastic bags and electronics. I developed this piece in collaboration with visual artist Veronika Bauer, and first performed it in 2007 at UCSD. The performance was included in my multimedia performance, produced in collaboration with William Brent, Joachim Gossmann, Chris Tonelli and Linda Sundstrom, and sponsored by the California Institute for Telecommunications and Information Technology, and the Center for Research in Computing in the Arts. In 2016, I had the opportunity to rework and perform the piece with the EXAUDI Vocal Ensemble in the Chapel of King's College London, as part of the conference, "False Alarm: Aurality, Errancy, and Voice," which I initiated and organized at King's College London. A collaborative conference, False Alarm was supported by the Faculty of Arts and Humanities and Department of Music at King's College London and the Department of Media and Computing (MetaGesture Music project) at Goldsmiths, University of London. In 2021, Vocal Constructivists reworked and performed the piece. My thanks to Atau Tanaka for his kind contributions for convening the concert as part of the conference, False Alarm, and to Jane Alden for inviting me to the festival, Vocal Constructivists.

28 Within the context of voice and sound studies, one can consider Brandon LaBelle's discussion of non-verbal vocalizations as performative acts that generate conversation, connection and resistance; Nina Sun Eidsheim's notion of singing and listening as vibrational practice, Norie Neumark's examination of the affect of non-verbal and nonhuman

voice, and Dominic Pettmann's exploration of an expanded notion of voice informed by both human and nonhuman sounds.

29 Malabou's notion of plasticity is informed by Hegel's *Phenomenology of Spirit* and Freud's writings on war, trauma and death. Hegel understands plasticity not as a tension between "form and matter," but as an intra-relation between "form and itself," which generates the possibility of metamorphoses or transformation, as Malabou contends. Freud's writings on war, trauma and death deal particularly with the transformation of mental states, and qualify "the psychic formations, especially the initial psychic form," as "imperishable." See Noëlle Vahanian's interview, "A Conversation With Catherine Malabou." *JCRT* 9.1 (2008), 4; Malabou's reference to Freud's essay "Thoughts for the Times on War and Death," and "Identity Without Precedent," *The New Wounded: From Neurosis to Brain Damage*, trans. Steven Miller (New York: Fordham University Press, 2012), 58. See also Freud's essay in *The Standard Edition of the Complete Psychological Works of Sigmund Freud*, ed. and trans. James Strachey (London: Hogarth Press, 1950), 14:285.

30 Malabou, "Identity Without Precedent," *The New Wounded: From Neurosis to Brain Damage*, 59.

31 Ibid., 58.

32 Catherine Malabou, *Ontology of the Accident: An Essay on Destructive Plasticity*, trans. Carolyn Shread (Cambridge, UK and Malden, MA: Polity Press, 2012). See also, Stacey Smith's review in Society and Space. http://societyandspace.org/2013/05/27/ontology-of-the-accident-an-essay-on-destructive-plasticity-by-catherine-malabou-reviewed-by-stacey-smith/ Last accessed on 26 October 2017.

33 Malabou, "Identity Without Precedent," *The New Wounded: From Neurosis to Brain Damage*, 57.

34 Sociologist Vicky Kirby uses the term morphological plasticity and further explains it. I refer to Kirby's account in more detail on page 12. Vicky Kirby, "Matter out of Place: 'New Materialism in Review," *What If Culture Was Not Nature All Along*, ed. Vicky Kirby (Edinburgh: Edinburgh University Press, 2017), 8.

35 Sigmund Freud, *Beyond the Pleasure Principle,* trans. C.J.M. Hubback (London, Vienna: International Psycho-Analytical, 1922).

36 I include Malabou's discussion of *Beyond the Pleasure Principle* and plasticity in my essay, "*Last Breath*, Sensing Life," in *The Oxford Handbook of Sound Art,* eds. Jane Grant, John Matthias, and David Prior (Oxford, New York: Oxford University Press, 2021), 367–85. See also "Planes, Walls, and Bits of Sound: Healing a Voice," special issue on voice, eds. J. Martin Daughtry and Clara Latham. *Music and Politics*, X.2 (Summer, 2016).

37 Catherine Malabou, "Plasticity and Elasticity in Freud's *Beyond the Pleasure Principle*," *Diacritics* 37 (Winter 2007), 78.

38 Ibid., 78–9.

39 I would like to express my gratitude and sincere thanks to my dear friend, Claudia Peppel for gifting me with the Voice Card, a real time written text on voice by a story teller that we encountered in Southbank, London. There it says: "a voice interrupts and begins".

40 Norie Neumark refers to Tim Ingold's reading of inanimate or organic matter and joins him in suggesting that matter tells us something. My account of voicing tends to contest the mode of "telling something". We can of course interpret the expression of matter in the form of a telling, but to make a shift from attributing meaning to exploring a new mode of communication, I explore modes of saying something. Neumark, *Voicetracks*, 17.

41 Here Harvey refers to haptic sensors and poet Phineas Fletcher's seventeenth-century allegory of the body *The Purple Island*. Elizabeth D. Harvey, "The Portal of Touch," *The American Historical Review*, Vol. 116, No. 2, April 2011, 386.
42 Ibid., 387.
43 John Durham Peters, *Speaking into the Air* (Chicago: University of Chicago Press, 1999, 2001), 34.
44 Ibid.
45 Ibid., 33–63.
46 See Emmanuel Levinas, *Totality and Infinity: An Essay on Exteriority*, trans. Alphonso Lingis. (Pittsburgh, PA: Duquesne University, 1969); Emmanuel Levinas. *Otherwise Than Being, or, Beyond Essence*, trans. Alphonso Lingis (Pittsburgh, PA: Duquesne University, 1999); Bettina Bergo, "Emmanuel Levinas," The Stanford Encyclopaedia of Philosophy (Fall 2017 Edition), Edward N. Zalta (ed.) URL: https://plato.stanford.edu/archives/fall2017/entries/levinas/
47 Jane Bennett, "The Force of Things: Steps toward an Ecology of Matter," *Political Theory*, Vol. 32, No. 3 (Jun., 2004), 347–72.
48 Ibid., 348.
49 Ibid., 354.
50 Ibid.
51 Bennett writes: "all matter has life". Ibid., 353.
52 With an emphasis on the "relational network between humans and nonhumans," Bennett underlines the correspondence between thing-power materialism and ecological thinking. Ibid., 354, 365.
53 Things have the power to move and shift situations, without being reduced to human subjectivity. Bennett furthers this proposition in referring to Bruno Latour's conception of "actant," that is, that "all material bodies perform actions and produce effects". Ibid., 354–6.
54 Relating to the role of environment and environmental sounds in music and community making, and to the interactions between humans and nonhumans, I also wish to note Dylan Robinson's recent book, *Hungry Listening*, and Kate Galloway's recent article "Introduction: Music, Sound, and the Aurality of the Environment in the Anthropocene". Dylan Robinson, *Hungry Listening: Resonant Theory for Indigenous Sound Studies* (Minneapolis, MI: University of Minnesota, 2020); Kate Galloway, "Introduction: Music, Sound, and the Aurality of the Environment in the Anthropocene," *Yale Journal of Music & Religion*: Vol. 5: No. 2, Article 2, 2019. DOI: https://doi.org/10.17132/2377-231X.1180
55 See Bennett's reference to Adorno's negative dialectics and historical materialism. Ibid., 357, 361–2.
56 Bennett highlights the significance of negative dialectics in the conception of "thing-power materialism". Ibid., 361–2, 364.
57 In *Always More than One: Individuation's Dance*, philosopher Erin Manning also questions the "limits" and "surfacing" of skin. Drawing on Daniel Stern's notion of "emergent" self and Gilbert Simondon's theory of individuation, Manning examines the dynamic modes of intra-actions and interactions of the self, and suggests bodying as process, as an activity of doing and becoming. Hence, body is not a given, but it emerges and becomes in the act, "in movement," as Manning puts it. This idea is discussed in an early article, "Always More than One: The Collectivity of Life," where Manning explores affect as collective. Here one should also note Brian Massumi's notion of affect. Erin Manning,

Always More Than One: Individuation's Dance (Durham, NC: Duke University Press, 2013), 1–10, and "Always More than One: The Collectivity of Life," *Body & Society* Vol.16 No.1, 117–27. See also Brian Massumi, *Parables for the Virtual* (Durham, NC: Duke University Press, 2002); Brian Massumi (ed.), *The Politics of Affect* (Malden, MA: Polity Press, 2015); and Brian Massumi and Erin Manning, *Thought in the Act: Passages in the Ecology of Experience* (Minneapolis, MI: University of Minnesota Press, 2014).

58 Vicky Kirby, "Matter out of Place: 'New' Materialism in Review," *What If Culture Was Not Nature All Along*, ed. Vicky Kirby (Edinburgh: Edinburgh University Press, 2017), 8. See also *Material Feminisms*, eds. Stacy Alaimo and Susan Hekman (Bloomington, IN: Indiana University Press, 2008), *New Materialisms: Ontology, Agency and Politics*, eds. Diana Coole and Samantha Frost (Durham, NC: Duke University Press, 2010), and *New Materialism: Interviews & Cartographies*, eds. Iris van der Tuin & Rick Dolphijn (London, Michigan: Open Humanities Press, 2012). See also Mary Douglas, *Purity and Danger: An Analysis of Concepts of Pollution and Taboo* (London, New York: Routledge, 2002).

59 To further this point, Kirby rightfully asks: "How could matter be subjective? How could it remember, and by implication cognise? Is the unapologetic anthropomorphism in Barad's intervention a glaring mistake?" Kirby, "Matter out of Place: 'New' Materialism in Review," 3, 10.

60 Here Kirby also underlines Barad's notion of "intra-action". Ibid., 14, 15, 16.

61 See https://www.modulate.ai/blog/voicewear-individual-identity; https://www.voicemod.net Last accessed on 19 July 2023.

62 See the detailed description of the exhibition via the following links: https://wellcomecollection.org/exhibitions/W31tHikAACgAP5gi; https://wellcomecollection.org/pages/Wuw0uiIAACZd3SPY Last accessed on 1 September 2024.

63 Hearing the Voice is an interdisciplinary research project at Durham University led by Charles Fernyhough and Angela Wood and supported by the Wellcome Trust. *The Isle is Full of Noises* "is a sound and animation installation" commissioned by Hearing the Voice network for Hearing the Voices Exhibition. The installation is convened by Victoria Hume in collaboration with Shannan Taylor, Judy Christian and Tamsyn Adams. See https://hearingvoicesdu.org/the-isle-is-full-of-noises/; https://hearingvoicesdu.org/the-isle-is-full-of-noises/

Listening to Voices: Creative Disruptions with the Hearing Voices Network is led by Gail McConnell, Jo Collinson Scott, and Debbie Maxwell. *Listening to Voices* is a binaural sound piece is devised by composer and sound artist Pedro Rebelo, and exhibited as part of the research network, Listening to Voices. See http://www.listeningtovoices.org.uk

64 The study on tactile speech was devised during my visit to the research group, "Epistemes of Modern Acoustics," led by Prof. Dr. Viktoria Tkaczyk at the Max Planck Institute for the History of Science in 2018. My sincere thanks to Prof. Tkaczyk and to the research group for their support of this study.

65 In his essay "Beyond the Cyborg: Performance, attunement and autonomous computation," Donnarumma refers to Julian Henriques's notion of "corporeal knowing". See Julian Henriques. *Sonic Bodies: Reggae Sound Systems, Performance Techniques, and Ways of Knowing* (London: Continuum, 2011). Marco Donnarumma, "Beyond the Cyborg: Performance, attunement and autonomous computation," 2017, 3.

Part 1

Plastic

Emergence of Voice as Skin

1

Recycling and Transition: *The Waste Land*

Written in London not long after the end of the First World War, T.S. Eliot's landmark poem *The Waste Land* can be considered a literal and figurative enactment of personal, imperial, social, urban and ecological collapse, as well as cyclical regeneration. In five sections, The Burial of the Dead, A Game of Chess, The Fire Sermon, Death by Water and What the Thunder Said, there is a cycle of death and regeneration. The waste in *The Waste Land* is literal, urban and political. So is recycling. Utopia and dystopia, apocalypse and political upheaval, psychic and spatial ruins and renewals

Figure 1.1 Henry Eliot, *The Waste Land*, 2012.

Photograph: Georgina Gould.

run side by side. Eliot's reference to the River Thames evinces the proximity between ruin and renewal. The Thames is where discarded objects meet, get lost and are cleaned. As Denise Donoghue writes, despite all the collapses, T.S. Eliot attempts to "keep a life between the lines".[1] How does one keep a life between the lines? What is being wasted, discarded and recycled after all? We are reminded of these questions throughout the poem. In this context, literary and urban studies scholars discuss the poem as an alternative cartography and ecocritique of London.

Henry Eliot's multimedia walk contributes to this discussion. Commissioned by the UK's New Economics Foundation, the walk was devised as a creative response to climate change and the financial crisis. Accordingly, and based on the guiding themes of waste, transition and cyclical regeneration implied in the five sections of the poem, Eliot's group walked from East London along the Northern Outfall Sewer to the Olympic Stadium, down the River Lea to Trinity Buoy Wharf and the Millennium Dome, and then through the Docklands developments between Canary Wharf and London Bridge. The group stopped at these sites and read relevant sections from the poem. Both the poem and the walk deal with the plasticity and non-dialogue of voicing. The context of the walk – climate crisis – and related themes of waste, recycling and regeneration speak directly to the concept of plasticity. The poem provides the foundation for plasticity not simply through its title and themes, but also through its emphasis on what changes and what resists change, on cycles of life and death, on the ambivalent beginnings and ends of life and death, on the pre- and post-temporal. Consider the non-dialogue in the poem and the walk – the distributed mode of interaction as well as the mobility of voices facilitated by voicing in different sensory registers – as both cause and effect of such plasticity. The next section addresses the poem and the walk together. Let me begin with voicing.

Voicing a non-dialogue, an insular solidarity

As literary scholar Michael Levenson argues, "voice can be form disturbing or breaking".[2] Indeed, this idea is central to T.S. Eliot's poetry. In his essay "The Three Voices of Poetry", Eliot introduces multiple personas. "The first voice is that 'of the poet talking to himself – or to nobody'; the

second is 'the poet addressing an audience, whether large or small"; and the third "is the voice of the poet when he attempts to create a dramatic character speaking in verse".[3] As the initial working title of the poem, "He Do the Police in Different Voices", suggests, different voices are mobilized and amplified in the poem. Like his contemporaries Gertrude Stein and James Joyce, T.S. Eliot employs voicing as a creative tool to criticize the totality of language.

In addition to performative utterances, things also speak in the poem. As Levenson conveys, "the most propulsive voicing in *The Waste Land* is not human voicing at all, but the 'inviolable voice' of Philomel, crying as the nightingale".[4] None of these gestures build up to a stable voice or subjectivity. They are rather distributed, mingling with city noises, cancelling or overlapping one another.[5] Characters are not distinctly established either.[6] In this voice and cityscape, there is a failure of dialogue. As Levenson argues, what we have in *The Waste Land* is a "disbelief in the reciprocity of voices".[7] Levenson exemplifies the lack of response and dialogue drawing attention to the end of The Burial of the Dead: "There I saw one I knew, and stopped him, crying: 'Stetson!"[8] The second section, A Game of Chess, Levenson contends, demonstrates a similar disconnect between the listener and the speaker while repeating: 'nothing…Nothing…nothing.'[9]

I asked Henry Eliot about what his group experienced while reciting fragments from the text in certain places. For instance, how did the group perform a section from the Burial of the Dead in the East London Cemetery? Did they experience a failure of dialogue? Was there an intention to build a dialogue in the first place? What might be the effect of multidirectional and site-specific reading? "Different participants read different sections," Eliot said.[10] As he describes in an article in the Guardian,[11] the East London Cemetery is a loud zone, where the funeral service from the Book of Common Prayer service, a key source for the poem, has been performed for more than a century, and yet its rose garden is a "quiet spot where serried roses grow from cremation ashes".[12] Reading a section from the Burial of the Dead out loud, the group brought the text back to life.

The voicing here is verbal, but it does not simply operate within the bounds of language. It recycles the dead land while materializing an embodied interaction between the site and the readers. The quietness of the rose garden may also lead to an awareness of otherwise unnoticed

sounds in the area. Similarly, interacting with these sounds, one may notice the sonic and spatial contours of the reciting voice. In the process, the readers' voices are mobilized and depersonalized, generating a sense, perhaps a new voice, that is both individual and communal. Through this voice, there is a contact between the site and the readers, and yet, as this voice gets mobilized and distributed without a necessary call and response, the disconnect between the lines still remains.

Alternative mapping

Can the disconnect between the lines and the voices lead to an alternative mapping of the city? Informed by philosophies of walking, psychogeography, situationism, and sensory and sound-walk practices, Henry Eliot's walk was directly related to this question. Walking, as a punctual, situated, and transitory act, critiques governmental totality and unfolds the derivations and unexpected contours. Hence, walking is also a deviation from the totality of language. Artist Karen O'Rourke's recent book, *Walking and Mapping: Artists As Cartographers*, demonstrates important cases of such a critique.[13] Some highlights include situationists' reclaiming of the streets – "choosing their own landmarks and naming them" – activities of the Judson Dance Theatre, Janet Cardiff's audio tours, "artists' labyrinths" where "walking meets mapping through wayfaring and way finding" and experiments for "collaborative mapping".[14] Likewise, soundwalk artist and researcher Andra McCartney underlines how sound-walk practices[15] point at mobile configurations of walking, listening and recording and thus reveal the "ignored" or "unheard" aspects of a place.[16]

Eliot's walk does not engage with field recording but it does encourage a form of situated listening, where, as they move from one place to another and as they recite the text with one another, participants listen to both connects and disconnects between the lines. Voicing here emerges with the activity of listening and walking. This activity holds a potential for alternative mapping, and perhaps for a collaborative reordering of a place.[17] One motivation behind T.S. Eliot's reordering of the cityscape, as literary scholar Spencer Morrison notes, was Stravinsky's *The Rite of Spring*. Writing the poem, Eliot was inspired by the *Rite*'s rhythmic texture, as well

as the musical transformations of "the scream of the motor horn, the rattle of machinery, the grind of wheels, the beating of iron and steel, the roar of the underground railway…".[18]

Morrison qualifies Eliot's description of Stravinsky's music as an alternative to the city maps and travel guides which Eliot encountered when he first moved to London.[19] In a similar way, one could look at the acts of voicing in Henry Eliot's walk as an alternative to the city map. Those acts of voicing could include verbal recitations, moments of reflection, an amplified encounter with silence – both personal and collective – or an interruption by unidentified concrete sounds. These acts may come to the surface with the simultaneous activity of walking and listening, as well as during the stopovers at certain sites. What makes these acts expressive, what qualifies them as voicing, is their interruptive, partial and fragmented quality. Like the non-responsive voices and the disconnects between the lines in the poem, such acts generate a non-dialogue across varied bodies and matters. That is, the acts of voicing may not lead to an immediate response or grow into a necessary exchange. Rather than suggesting presupposed symbolic connections, they may encourage a different mode of connectivity: listening and reading both in solitude and with one another, be it another human or a nonhuman. Moreover, participants are inspired to be aware of the distributed presence and generation of possible invisible responses. They reiterate and underline the critical quest of the poem: what is there to reorder?

The reordering is implied at the end of the poem, where the speaker asks, "Shall I at least set my lands in order?" This question, as Morrison posits, "announces the possibility of a future spatial order that repairs the present's fragmentation, with the phrase 'set… in order' enunciating an impulse not just cartographic but governmental".[20] The question also shows how spatial ruin and renewal is endlessly cyclical, enacting a conception of waste that is not simply temporal but also out of time, as well as of recycling that is pre- and post-temporal, plastic. The landscape of *The Waste Land* is unreal, as its decay and abandonment run side by side with renewal and reconstruction, both states indicative of the generative forces of mass capitalism. From the poem:

> "Sweet Thames, run softly, till I end my song…
> The river bears no empty bottles, sandwich papers

> Silk handkerchiefs, cardboard boxes, cigarette ends
> Or other testimony of summer nights" (176–9)
>
> "The river sweats/Oil and tar" (266–7).
>
> …
>
> "What is the city over the mountains/Cracks and reforms and bursts in the violet air" (371–2)
>
> …
>
> Falling towers
> Jerusalem Athens Alexandria
> Vienna London
> Unreal (373–6)
> …
>
> I sat upon the shore
> Fishing, with the arid plain behind me
> Shall I at least set my lands in order?
> London Bridge is falling down falling down falling down…
> *Le Prince d'Aquitaine à la tour abolie*
> These fragments I have shored against my ruins (423–30)

How do the excerpts above indicate waste? As ruins, dirt, garbage or decay? One may find the implications of all in the poem, as associated with time and place, and with the order of things.

In *Waste: A Philosophy of Things*, literary scholar William Viney portrays varied conceptions of waste in philosophy, anthropology, biomedicine and waste management. Waste is described in these fields as, "a specific sense of time measured by and related to the encounters with objects, narrative as means and consequences for discarding objects, use and potential value of objects, dirt according to notions of disorder, abjection and disgust, matter out of time and place".[21] The waste in *The Waste Land* echoes Jacques Derrida's and Mary Douglas's reading of waste.[22] That is, the cycle of ruin and renewal suggests waste as "matter out of time and place". The walk takes us through this aspect, but it is also geared towards recycling. Voicing in the poem performs the common ground between ruin and renewal. This is not to say that voicing turns each ruin into a renewal. With every breath and every attempt to connect with another, voicing channels the attempt to renew on the one hand,

Figure 1.2 Henry Eliot, *The Waste Land*, 2012.

Photograph: Georgina Gould.

and, on the other, leads to the awareness that nothing can be entirely wasted or recycled. In Eliot's walk, this suspension (and plasticity) of voicing is loudly present.

Walking from the Northern Outfall Sewer, passing "graffiti and broken images"[23] on the Greenway path, Henry Eliot's group arrived at Abbey Mills Pumping Station, where London's waste empties into the Thames. As Eliot puts it, "it's only on the edges and in the cracks, between a sewage pipe and a cemetery for instance, that urban developers give up and abandon control".[24] The River Thames, the use of water, holds another of the keys to the poem. The title, *The Waste Land*, draws on the Arthurian legend of the Fisher King,[25] who was once wounded and whose kingdom failed due to his illness. The Fisher King was only able to sit by the river and fish, while the quest to find the Holy Grail was undertaken so as to restore his health and the kingdom's health.[26] By taking the walkers to the Thames, Eliot's walk makes a similar gesture towards restoring environmental and economic health. However, in the poem, as literary scholar Gabrielle McIntire explains, the Fisher King cannot be recovered, as he is fishing in an industrial zone next to a gasholder, a dull canal fish.

Figure 1.3 Henry Eliot, *The Waste Land*, 2012.

Photograph: Georgina Gould.

After passing Bow Creek Nature Reserve, the group recited The Fire Sermon, and moved to Trinity Buoy Wharf. This spot was the site of the launch and subsequent disaster that overcame HMS *Albion*, "where around 200 people were killed and injured after a powerful wave engulfed the slipway of the ship".[27] The area, Eliot explains, was later transformed into an artists' commune, where positive transformation could take place. Also, while in the area, in London's only lighthouse, the group listened to Jem Finer's *Longplayer*, a computerized chiming of Tibetan singing bowls designed to play out over a period of a thousand years. The questions of permanence, cyclical regeneration and temporality come to mind more clearly in the context of this epic work.

Next, the group walked to Canary Wharf, in Henry Eliot's words, "a science fiction landscape with waterways, treelines and train tracks at multiple levels, where the group stopped by a sculpture of a fragmented centaur and heard the song of the Thames Daughters, connecting nothing with nothing through broken fingernails".[28] "Connecting nothing with nothing", as Eliot beautifully puts it, reinforces how acts of voicing in the walk constituted and performed the non-dialogue between the wasted and the recycled, the distributed appearances of the pre- and the post-temporal.

Voicing creates and channels the urge for alternative mapping, for both de- and reordering a place.

An ecocritique

Reordering a place through voicing may have critical and creative implications. Eliot's walk engages with these implications, given its response to climate change and the financial crisis. Henry Eliot's interest in *The Waste Land* does not seem coincidental within the context of the walk. Literary scholars underline how the poetry of *The Waste Land* can respond to environmental crisis and encourage finding creative and critical solutions. McIntire, for instance, suggests that we can consider *The Waste Land* as an ecocritique.[29]

Since the late twentieth century, ecocriticism has been a vivid discourse both in environmental humanities and in literary studies. In the *New Poetics of Climate Change*,[30] Matthew Griffiths provides a historical account, as related to modernism. He argues that first-wave ecocritics are interested in "romantic nature poetry" that treats nature as "pastoral or metaphysical" or in "realist prose" which tends to analyze the "physical processes and causes" of nature. Modernist poetry, in this conception, is positioned either "as opposed to nature" or as "not green enough", that is, not attending to "biodiversity, problems of pollution, care for bioregional conservation" or an "earth-focused activism that goes beyond human-centred interests".[31] Griffiths, however, asserts modernist poetry as an alternative reading of climate change, a way to understand the "entanglement between nature and culture" as well as the trajectory of nonhuman agency and forces.[32] What does this alternative reading entail? A critique of anthropocentrism, a reflection on the conceptions of nature,[33] or both? And how can modernist poetry respond to climate change? The ambiguous, fragmented and (dis)integrated language of *The Waste Land*, Griffiths suggests, better equips us for understanding and facing the unpredictability of climate change.[34] The proximity that Griffiths sees between ecological consideration and fragmented language resides in a network of singular events and their uncertain consequences.[35] What performs this fragmentation? What draws attention to the singularity and uncertainty of both language and environment? Both in the poem and in the walk, singular and uncertain aspects of language are disclosed through

the mobilized, displaced and distributed acts of voicing. What I wish to highlight, and what in Griffiths's reading comes forward,[36] is how a voice emerges through the acts of voicing, be it in the form of a vocal utterance, a non-vocal gesture, or a physical movement. This is not a voice that necessarily speaks with a given language, but a voice that can go beyond and exist before human consciousness.

The voicing in the walk further crystallizes what is not perfectly knowable or predictable. It puts the body, environment, and language, as well as the intentional object of voice, into question. It highlights varied modes of interaction across bodies of all kinds, including connection, disconnection, change and resistance to change.[37] For some, understanding the language of *The Waste Land* as ecocritique may seem more indirect, while for others the poem is perhaps even more direct in its response to "waste", climate change, and environmental, political and individual upheaval and, ultimately, collapse. Eliot's walk materializes ecocritique through voicing. It employs voicing as a tangible medium for both building and grasping the shared network and a parity of worth across different kinds of bodies. Consider how the walk dealt with nonhumans in the poem, such as the river. How did the Thames speak to the walkers?

The water of the Thames is a discursive body and an ambiguous matter both in the poem and in the walk. Empty bottles, cigarettes, sandwich bags, as well as the water level of the river bring to mind urban infrastructure, pollution, climate change and the difficult existence of myriad life forms. Material ecocriticism examines water, in particular "the ocean as a porous body, a congealing of agencies and representations, of capital flows, life forms, 'quasi [-]objects' and of geopolitical forces, such as migration fluxes, or environmental phenomena, such as pollution and climate change".[38] But, as Griffiths reminds us, water in the poem also "exhibits its own agency, running as an image through the poem and resisting any fixity that our perception attempts to impose on it".[39] Take these lines extracted from a passage in What the Thunder Said, the last part of the poem:

> If there were water we should stop and drink…
> If there were only water amongst the rock…
> If there were water
> And no rock…
> If there were the sound of water only… (335–52)

Figure 1.4 Henry Eliot, *The Waste Land,* 2012.

Photograph: Georgina Gould.

The walk provided a sensorily changing presence of water, its "resistance against any fixity" in the walk manifested as an expression, as voicing. In addition, such voicing, especially the sound of water, is associated with recycling and renewal. We see this association in the next stop along the walk, ironically in the reading of Death By Water.

The walkers stopped by the Isle of Dogs and listened to Henry Eliot's reading of Death by Water, looking at the river and a collection of discarded objects. There was an attempt both to discard a failing urban landscape and desolate environment[40] and to restore it by means of voicing, as implied in the sound of water. The walkers read relevant fragments from the poem. Reading out loud at a particular site, they also listened to the concrete sounds of that site. Knowingly or unknowingly, inspired by these sounds, the walkers adjusted their vocalizations and read not simply in an environment but also with that environment. The intonation, contour, force and dynamics of each vocalization also interacted with the shape, contour and density of concrete sounds, with the smell of the river, with the visual shape, colour and texture of the discarded objects, with a leftover or swallow that the objects might evoke.

Acts of voicing are multisensory. They are informed by the various sonic, visual, tactile and haptic behaviours of the walkers and the environment. The walkers' reading may have appeared primarily verbal and vocalized; but, in effect, their mobilized and multisensory acts evoke a sense of voice that is not limited to sounds produced by the vocal cords, or those of the human body or verbal language. If the expression of river is implied in the voicing, if this expression is associated with embracement and a sense of renewal, I wonder to what extent we can consider voicing a medium for recycling and renewing.

Voicing as a cycle of recycling

Recycling means reusing previous materials or converting wasted materials into reusable ones. What may we recycle by voicing? To resolve our problems, we usually talk, either with ourselves or with others. Consider Freud's talking cure. Freud treats talking, in particular non-verbal sounds and their expressive amplitude, as a release of the unconscious, as a way

Figure 1.5 Henry Eliot, *The Waste Land*, 2012.

Photograph: Georgina Gould.

to recognize what has been repressed and then to restore it to conscious awareness so that it ceases to control our behaviour. By voicing, we accomplish both these tasks, reordering our internal narrative and displacing whatever the issue is. Re-cycling, and questions of temporality and sustainability, are integral to acts of voicing in everyday life.

Both T.S. Eliot and Henry Eliot employ voicing as an aesthetic medium of recycling. The poem amplifies a desolate wasteland through non-responsive voices, and yet it also recycles a sense of life and continuity by means of non-dialogic voicing. The walk more directly applied to this second use. Reciting the poem in particular sites, the walkers participated in an activity of reconfiguring the voices both in the poem and in the corresponding places. The poem and the walk together suggest recycling as an everyday mode of thought and activity.

Anthropologists Catherine Alexander and Joshua Reno inform us about how we have come to recycling as an everyday mode of thought. Their historical analysis first addresses the contemporary work of recycling, the "economic thrift and environmental care".[41] The contemporary work of recycling, as they posit, is related to the injustices that the economies of recycling produce, that is, "how recycling is carried, where materials go to be revalued and reinserted into mainstream material flows, and the traces that are left behind: localized concentrations of toxic wastes, lingering, uncanny memories or imaginaries of previous material incarnations, and the harm done to the bodies of labourers who carry out this work which is often dangerous and unprotected".[42] In general terms, one can read two implications in this literature. The first is to produce less "waste" in the first place, aligned with the critique of abundance and redundancy. The second is, by means of better public policies and more responsible waste management, to transform waste into energy and goods for sustainable futures. However, these two implications, both in historical and in contemporary terms, paint a more entangled picture.[43]

In the wake of the contemporary economy of recycling, let me briefly note the invention of public and private waste and consider recycling historically. In the seventeenth century, potassium nitrate was extracted

from the "collection of urine-soaked earth from privies for gunpowder".[44] In the mid-eighteenth century, fire ashes were used for building brick houses, and the divide between industrial and domestic waste was enhanced by the newly created role of "sanitation engineers", which led to "professionalism and technological expertise on urban waste", as well as to "a divide between local communities and disposal investments".[45] As Alexander and Reno point out, this divide could be understood as the early background of the late twentieth-century environmental justice movements.[46] The mid-twentieth century, however, was the period of "political, moral and economic crisis", when recycling was urged on households due to scarcity.[47]

What has happened since then? Alexander and Reno give us a striking answer: We habituated recycling as a mode of everyday thought and activity. Referring to the interwar years, early avant-garde movements such as Dadaism, Cubism and Surrealism, modernist literature, cinematic montage, Walter Benjamin's Arcades Project and the inventions of modern disciplines such as archaeology, psychoanalysis and anthropology, underline how we tend to reconfigure "social and material relations" at the heart of breaks, disconnects, uncertainty, multiplicity and struggle.[48] Similarly, principles of physics and chemistry are based on reconfiguration, conversion and transformation of energy and matter. Alexander and Reno's analysis suggests that, except for the intervention of economics which attempts to monitor and plan material exchanges, in this order of physical, chemical, literal, social and imaginative recycling there is no sense of growth but only reordering.[49]

What is at play in *The Waste Land*? Both the poem and the walk demonstrate voicing as an active force of reordering. The voicing in the poem gets distributed by means of a fragmented and uncertain language. It demands a de- and reordering of "the who of speaking",[50] of a possible meaning, or a possible translation into everyday life. The voicing in the walk gets mobilized, displaced and re-formed by means of walking and stopping, listening and reciting alone and with others. The cross-sensory modalities that occur in the process generate a physical, emotive and mental shift together, underlining not simply "the who of speaking" but also what speaks. They facilitate noticing non-verbal and non-linguistic

currencies, the "ordinary affects" in Lauren Berlant and Katie Stewart's terms,[51] as expression, as acts of speech.

Through different processes, both the poem and the walk deal with how matters – be they matters of language, matters of governance and control, or matters of environment – change and resist change through voicing. In so doing, they lead to imagining matters both as timely and untimely, as plastic, as pre- and post-temporal. The reordering, as well as the resistance against a settled order, then reconfigures personal and collective imagination. Sociologist Dimitris Papadopoulos considers such engagement with matters as an "activism of matter".[52] In his book, *Experimental Practice*, he explores a materialism, one that is "not about a politics of history but a politics of matter", that "comes to an activist engagement with matter itself".[53] Creative interventions like Eliot's walk seem to be aligned with this exploration. The walk was not a protest making a direct statement about climate change. It was commissioned as an activity for the general public, as a creative response to climate change and broken finance, as open to being affected by the "activism of matter" in Papadopoulos's words.

The Waste Land as a response to climate change and broken finance

The acts of voicing in Eliot's walk lead to an active engagement with different kinds of matter, to a reconfiguration of personal and social imagination. What may be the impact of such engagement and imagination on climate change and broken finance? Recall the context of the walk, as part of the Festival of Transition convened by The UK's New Economics Foundation (NEF). Regarding climate change, NEF has a different stand from the majority of think-tanks and NGOs.

Most conservative think-tanks treat climate variability (regional variations), feedback processes and climate change as a rhetorical question, that is, one that doesn't need an answer. Naomi Klein's well-known book, *This Changes Everything: Capitalism v.s the Climate*,[54] for instance, portrays the status of intervention by NGOs and think-tanks, the web of governmental procedures and capitalism, and capitalism's denial of climate change. Klein discusses the Heartland Institute's Conference on Climate Change (2011), sponsored by the Heritage Foundation, a conservative

US think-tank, the Cato Institute, another US-based think-tank which advocates individual liberty, free markets and "peace", and the Ayn Rand Institute.[55] The general attitude towards climate change in this conference, she notes, is to treat the scientific data simply as a rhetorical question and deny global warming.[56] Klein further investigates this ideological divide by referring to Yale's Cultural Cognition Project. She writes:

> People with a strong 'egalitarian' and 'communitarian' worldview (marked by an inclination toward collective action and social justice, concern about inequality, and suspicion of corporate power) overwhelmingly accept the scientific consensus on climate change. Conversely, those with a strong 'hierarchical' and 'individualistic' worldview (marked by opposition to government assistance for the poor and minorities, strong support for industry, and a belief that we all pretty much get what we deserve) overwhelmingly reject the scientific consensus.[57]

Presenting itself as a people's think-tank and committed to regeneration projects to cope with poverty, inequality, climate change and the financial crisis, NEF abjures the trajectory that denies climate change for the sake of capitalism and the status quo. The Festival of Transition was devised to encourage social awareness and a sense of social solidarity so as to deal with global challenges in creative ways. How does Eliot's walk facilitate this? By means of walking, listening, site-specific readings and cross-sensory voicing, transitions from one place to another, and a distributed speech or non-dialogue. With these activities, one can reflect on possible ways to cope with global challenges. Non-dialogic voicing here becomes a significant tool.

Let me reiterate some of the related questions. What does it mean to speak to the Thames or to a dull fish, for instance? Do the Thames or the fish respond? If so, when and how? How may such speech, which may manifest itself in the form of a vocalization, non-aural sound, physical movement or non-vocal gesture, bond the walkers with one another, as well as with other familiar places or with strangers?

We may think that the walkers speak and bond through the fragments from the poem. However, neither the fragmented language of the poem nor the constituents of the corresponding sites – such as the bodies and matters that the walkers come across in these sites – speaks with a given language or voice. The sites become articulate with histories, and yet they are also sensory fields of contingencies, which may unsettle our presumptions

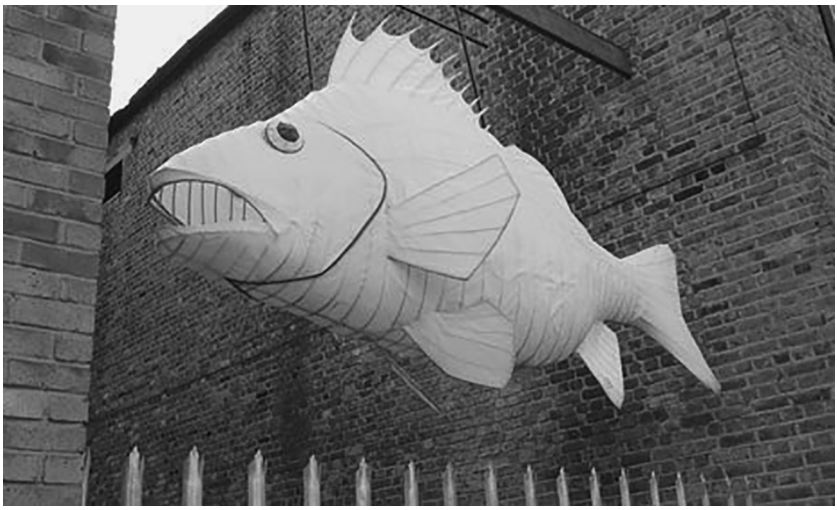

Figure 1.6 Henry Eliot, *The Waste Land*, 2012.

Photograph: Georgina Gould.

and habituated knowledge about them. Acts of voicing in the walk provoke an embodied and mobilized practice of encountering what is habituated, discarded, abandoned and regenerated both as site and as experience. They prompt an engagement with the connects and the disconnects across people, places and language, as well as across humans and nonhumans. They evoke and enact a sense of voice, one that is depersonalized, distributed and poetic. Such a voice may speak in different forms, be they vocal and non-vocal, aural and non-aural, or linguistic and non-linguistic. But the voice is shared. It works like a common ground, a shared surface or skin that both connects and disconnects, that both extends and limits.

Given the precariousness of these neoliberal times, this shared voice and skin is important. To bear with uncertainties and resist the unfair grounds of material and social configurations, we need the imaginative provocations of voice as skin. To further this idea, I turn to media theorist Franco "Bifo" Berardi's text, *The Uprising: On Poetry and Finance*. Drawing parallels between money and language – in terms of their symbolic weight, exchange value and conventions – Bifo suggests voice and poetry, as "strategies for reactivation",[58] as a way to regain social empowerment,

Figure 1.7 Henry Eliot, *The Waste Land*, 2012.

Photograph: Georgina Gould.

imagination and solidarity. As he writes, "poetry is the language of non-exchangeability, the return of the infinite hermeneutics, and the return of the sensuous body of language. I'm talking about poetry here as an excess of language, a hidden resource which enables us to shift from one paradigm to another."[59]

Both the poem and the walk make a paradigm shift. The walk crystallizes this shift more tangibly. The ending of Eliot's tour performs the shift, highlighting an example of non-dialogic voicing. Passing the Monument, another zone of transition and rebuilding, the walkers stopped on Lombard Street by the old Lloyds Bank, where T.S. Eliot worked on foreign accounts, and shout out: "We gathered in Change Alley, the Lloyds beehive symbol way above us. We shouted "DA!" The thunder bouncing off the bank: "DA!"…"[60] DA was addressed to the air, to the commons, the common surface that the voices perform together.

Notes

1 Denise Donoghue, *Words Alone: The Poet T.S. Eliot* (New Haven, CT: Yale University Press, 2002), 1–26, 26–58, 110–38.

2 Michael Levenson, "Form, Voice, and the Avant-Garde," *The Cambridge Companion to The Waste Land*, ed. Gabrielle McIntire (Cambridge: Cambridge University Press, 2015), 87.
3 T.S. Eliot, "The Three Voices of Poetry," *On Poetry and Poets* (New York: Noonday Press, Farrar Straus &Giroux, 1957). The essay is quoted in Levenson's article. Ibid., 96.
4 Levenson, "Form, Voice, and the Avant-Garde," 91. See lines 99–101 in the poem. T.S. Eliot, *The Waste Land* (New York: Horace Liveright, 1922).
5 Levenson, "Form, Voice and the Avant-Garde," 93.
6 Here Levenson refers to Eliot's own explanation: 'Just as the one-eyed merchant, seller of currants, melts into the Phoenician Sailor, and the latter is not wholly distinct from Ferdinand Prince of Naples, so all the women are one woman, and the two sexes meet in Tiresias.' See the reference in Levenson's article. Ibid., 90.
7 Ibid., 122–6, 94.
8 See line 69 in the poem. Ibid.
9 See line 120 in the poem. Ibid.
10 Zeynep Bulut, "Interview with Henry Eliot," London, 2017.
11 Henry Eliot, "T.S. Eliot's The Waste Land 2012 – A Multimedia Walk," *Guardian* article, 30 July 2012. https://www.theguardian.com/books/2012/jul/30/eliot-waste-land-multimedia-walk Last accessed on 5 July 2017.
12 Ibid.
13 Karen O'Rourke, *Walking and Mapping: Artists as Cartographers* (Cambridge, MA.: The MIT Press, 2016).
14 Ibid., xix–xx.
15 Some of these sound walks include "shadow walks, electrical walks, blind walks, audio walks, tourist walks, and listening walks". See Andra McCartney, "Soundwalking: Creating Moving Environmental Sound Narratives," *The Oxford Handbook of Mobile Music Studies* Volume 2, eds. Sumanth Gopinath and Jason Stanyek (Oxford, New York: Oxford University Press, 2014), 214–15. See also Cathy Lane and Angus Carlyle (eds.), *In the Field: The Art of Field Recording* (London: Uniform Books, 2011).
16 Ibid.
17 Literary scholar Spencer Morrison argues that the poem itself casts attention to alternative mapping, one that is drawn by people's "personal orderings of city space, not by government administrators". Spencer Morrison, "Geographies of Space: Mapping and Reading the Cityscape," *The Cambridge Companion to The Waste Land*, ed, Gabrielle McIntire (Cambridge: Cambridge University Press, 2015), 24.
18 Here Morrison quotes T.S. Eliot. Ibid.
19 Ibid.
20 Ibid.
21 William Viney, *Waste: A Philosophy of Things* (London, New York: Bloomsbury, 2014), 2, 3, 4, 5, 9, 18–19, 25.
22 Ibid.
23 Henry Eliot, "T.S. Eliot's The Waste Land 2012 – A Multimedia Walk," 2012.
24 Ibid.
25 Ibid.
26 Ibid.
27 Ibid.
28 Ibid.

29 Gabrielle McIntire, "*The Waste Land* as Ecocritique," *The Cambridge Companion to The Waste Land*, ed. Gabrielle McIntire (Cambridge: Cambridge University Press, 2015), 178–94.
30 Matthew Griffiths, *The New Poetics of Climate Change: Modernist Aesthetics for a Warming World* (London, New York: Bloomsbury Academic, 2017). See also *Oxford Handbook of Ecocriticism*, ed. Greg Gerrard (Oxford, New York: Oxford University Press, 2014).
31 Here Griffiths refer to Joshua Schuster's *The Ecology of Modernism* and Anne Raine's chapter in *The Oxford Handbook of Ecocriticism*. See Joshua Schuster, *The Ecology of Modernism: American Environments and Avant-Garde Poetics* (Alabama: University of Alabama Press, 2015), 3–7. Anna Raine, "Ecocriticism and Modernism," *The Oxford Handbook of Ecocriticism*, ed. Greg Gerrard (Oxford, New York: Oxford University Press, 2014), 99. See also Timothy Morton's chapter "Deconstruction and/as Ecology" in the same volume, which aligns deconstructionism with ecocriticism. Griffiths, *The New Poetics of Climate Change: Modernist Aesthetics for a Warming World*, 7–11.
32 Ibid., 10.
33 Griffiths quotes Kate Soper's *What is Nature: Culture, Politics and the Non-Human* (Hoboken, New Jersey: John Wiley & Sons Publishing, 1995). Griffiths also refers to Lawrence Buell's *The Environmental Imagination*, which discusses Thoreau's *Walden*. Buell sheds light on the problem of anthropocentrism and the need for decentring the human. However, Griffiths considers a sense of "selfhood" in Thoreau's *Walden*, which he describes as a non-fiction, an autobiographical diary. As will be discussed in the solos of Cage's *Song Books*, I consider Thoreau's *Walden* as a collection of sketches and notes, which highlights not a sense of "selfhood," but rather a reflection on bodies of all kinds, suggesting also fiction. See Lawrence Buell, *The Environmental Imagination: Thoreau, Nature Writing, and the Formation of American Culture* (Cambridge, MA: Belknap Press, Harvard University Press, 1995).
34 Here Griffiths indicates Timothy Morton's and Bruno Latour's emphasis on human and nonhuman agency. Griffiths, *The New Poetics of Climate Change: Modernist Aesthetics for a Warming World*, 14, 18. See also Bruno Latour, *Politics of Nature: How to Bring the Sciences into Democracy*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 2004).
35 Drawing on Bruno Latour's actor network theory, Griffiths sheds light on how the poem reinforces a network of singular events. Griffiths, *The New Poetics of Climate Change: Modernist Aesthetics for a Warming World*, 44.
36 Griffiths refers to Joshua Schuster again, and underlines how the quest for "making it new" is related to the affinity between modernist language and ecological consideration. See Schuster, *The Ecology of Modernism*, 153–4; Griffiths, *The New Poetics of Climate Change: Modernist Aesthetics for a Warming World*, 29.
37 Griffiths's analysis well echoes some of these points. Ibid., 42, 43, 45.
38 Griffiths quotes Serenella Iovino and Serpil Opperman. See Serenella Iovino and Serpil Oppermann. "Theorizing Material Ecocriticism: A Diptych". *Interdisciplinary Studies in Literature and the Environment* 19, no. 3: 448–75. Iovino and Opperman, "Theorizing Material Ecocriticism," 457. Griffiths, *The New Poetics of Climate Change: Modernist Aesthetics for a Warming World*, 47.
39 See also Gabrielle McIntire's discussion on the water. McIntire argues that water has a central agency in the poem. Ibid., 48.
40 Gabrielle McIntire also suggests this point.

41 Catherine Alexander and Joshua Reno, "Introduction," *Economies of Recycling: The Global Transformations of Materials, Values, and Social Relations* (Chicago, IL: University of Chicago Press, 2012), 3.

42 Ibid. See also Matthew Gandy, *Recycling and the Politics of Urban Waste* (London, New York: Routledge, 1994), Marc Jay Rogoff, *Solid Waste Recycling and Processing* (Norwich, NY: William Andrew Publishers, 2013), as well as *Waste-Site Stories: The Recycling of Memory*, eds. Brian Neville and Johanne Villeneuve (Albany, NY: State University of New York Press, 2002), and Peter Thorsheim, *Waste into Weapons: Recycling in Britain During the Second World War* (Cambridge: Cambridge University Press, 2015). The volume edited by Alexander and Reno, and Thorsheim's historical study, for instance show how recycling may come with a cost while generating inequality in labour as well as destruction of other resources. New material flows across the world – for instance, as Alexander and Reno note, "newly emerging economies such as the BRIC countries (Brazil, Russia, India, China), are in need of infrastructural materials and key destinations for metal scrap, and the Middle East becomes a zone for the collection of scrap lead to new systemic problems of poverty, inequality, and danger". Alexander and Reno, "Introduction," *Economies of Recycling*, 4.

43 The aestheticized forms of waste and recycling, as *Waste-Site Stories* addresses and as we see in Eliot's walk, further explore the grounds of both implications.

44 Ibid., 6.

45 Ibid., 7.

46 Ibid., 7.

47 Ibid., 8.

48 Ibid., 8, 9.

49 Ibid., 10, 12, 15.

50 Adriana Cavarero's famous book, *For More than One Voice*, investigates this question loudly. Elsewhere, I also reiterated this question. See Adriana Cavarero. *For more than one voice: toward a philosophy of vocal expression*. Trans. Paul A. Kottman. Stanford, Calif.: Stanford University Press, 2005. Zeynep Bulut. "Silence and Speech in Lecture on Nothing and Phonophonie," *Voice Matters*, eds. Nina Sun Eidsheim and Annette Schlichter, *Postmodern Culture* 24.3 (May 2014).

51 Katie Stewart, *Ordinary Affects* (Durham, NC: Duke University Press, 2007); Lauren Berlant and Katie Stewart, *The Hundreds* (Durham, NC: Duke University Press, 2018).

52 Dimitris Papadopoulos, "Introduction," *Experimental Practice: Technoscience, Alterontologies and More-Than-Social Movements* (Durham, London: Duke University Press, 2018), 8.

53 Ibid.

54 Naomi Klein, *This Changes Everything: Capitalism vs. the Climate* (New York: Simon & Schuster, 2014).

55 Naomi Klein quotes Bell. Ibid., 38. See also Larry Bell, *Climate of Corruption: Politics & Power Behind the Global Warming Hoax* (Austin, Texas: Greenleaf Book Group, 2011).

56 Klein, *This Changes Everything*, 32. For instance one of the speakers, Larry Bell, in his book *Climate of Corruption*, paints climate change as a discursive phenomenon which "has little to do with the state of the environment and much to do with shackling capitalism and transforming the American way of life in the interests of global wealth redistribution". Klein quotes Bell. Ibid., 33.

57 Ibid., 36.
58 Franco "Bifo" Berardi, *The Uprising: On Poetry and Finance,* semiotext(e) intervention series 14 (Cambridge, MA: The MIT Press, 2012), 20.
59 Ibid., back cover.
60 Henry Eliot, "T.S. Eliot's *The Waste Land* 2012 – A Multimedia Walk," 2012.

2

Voicing through *Song Books*

Like *The Waste Land*, John Cage's *Song Books*[1] employs non-dialogic voicing. A collection of 90 songs, including voice, electronics and theatre, the first three solos use solo voice, excerpts from Henry David Thoreau's *Journal,* the map of Concord, Mass. and Thoreau's facial portrait as a map. Performers are instructed to apply directions indicated on the map of Concord to a physical environment, draw a melodic line based on the directions, and sing the melody through and with the environment. The non-dialogic voicing underscores the plasticity of voice in two ways. First, it shows how a voice both changes with and resists the changes to an environment. Second, it reveals how a voice both appears and disappears in distributed and multisensory forms, and thus blurs the sense of a definite beginning or ending, drawing attention to the pre- and post-temporal. The aesthetic probes of the solos, such as the commitment to process and force of life, engender these ideas.

An introduction to *Song Books*

Cage reads music within everyday scenes. He employs, what he calls, "relevant and experimental action". By relevant and experimental action, the implication is "intentional purposelessness", that is, someone's attentive response to their immediate environment, allowing them the chance to change direction. Cage's idea of intentional purposelessness does not mean that there are not choices. There is still a choice and a commitment; however, the commitment is to let something happen in its own way. Cage's notion of sound and silence prompt and mediate such commitment.

Composer and music theorist Christopher Shultis notes that, for Cage, "non-intention had become a new, nondualistic realization of what silence really was".[2] That is, there is no complete silence; silence is also sound, a pause or interruption through which sounds can be heard even louder. Sound is everywhere, and "there are only intended and unintended sounds".[3] One can understand both the presence and the operation of sound and silence as non-dualistic. Attuning oneself to sounds and silences in an environment, one can also observe the manifestations of intention and non-intention as non-dualistic.[4] *Song Books* can be considered an exploration of this kind. Including 90 songs, *Song Books* is divided into four categories: "song, song using electronics, theatre, and theatre using electronics".[5] In the general directions, Cage describes the performance instructions as such:

> The solos may be used by one or more singers. Any number of solos in any order and any superimposition may be used. Superimposition is sometimes possible, since some are not 'songs,' but are directives for theatrical activity (which, on the other hand, may include voice production). A given solo may recur in a given performance. Specific directions when necessary precede each solo. When such directions have already been given, they are not repeated, but reference is simply made to them…Given two or more singers, each should make an independent program, not fitted or related in a predetermined way to anyone else's program. Any resultant silence in a program is not to be feared. Simply perform as you had decided to, before you knew what would happen…Wireless throat microphones permit the amplification and transformation of vocal sounds. Contact microphones amplify non-vocal sounds, e.g. activities on a table or typewriter, etc.[6]

As described above, the solos can be performed in varied ways and contexts, which, in effect, forces the performer to make choices and commit to them. The context could be devised in the form of a staged performance or an ordinary meditation in everyday life. Written for Simone Rist and Cathy Berberian, and performed together with Cage, the very first performance of *Song Books* was staged at the Theatre de la Ville in Paris on 26 October 1970.[7] More recently, Joan LaBarbara, Jessye Norman and Meredith Monk performed a staged version of *Song Books* as part of the American Mavericks Festival 2012. Beyond these staged performances, the premise of *Song Books*, I suggest, is a meditation in everyday life.

Performing the solos in everyday life, one could note various aspects: the duration of each act, activity of focused listening and voicing in front of and with others, the use (in Cage's description) of "empty words", the singularity of each act, and the simultaneity of multiple acts. I wish to highlight all of these aspects, since they induce the act of voicing as plastic, prompting a non-dialogic mode of interaction. Such voicing is engaged not simply with the transactional aspects of language but also with ordinary apprehensions that manifest beyond the bounds of language.

For each solo, choices change along with the physical environment that the performer experiences. Electronics and tape recordings here function to mark this physical environment, to amplify the performer's awareness of her vocal sounds or any other non-vocal sounds, and to make the physicality of any interaction between vocal and non-vocal sounds audible. With such awareness, the whole sonorous activity becomes the very structure of the solos. In this structure, the treatment of words also needs attention. "Each solo is either relevant or irrelevant to the subject: 'We connect Satie with Thoreau' ",[8] writes Cage.

French composer Erik Satie and American transcendentalist Henry David Thoreau were both influential figures in the solos' aesthetic genesis. Cage was inspired by the tranquillity and "(in)difference" of Satie's sound atmosphere,[9] and by the "forthrightness, fluidity and openness"[10] of Thoreau's *Journal*. Cage reflects on Thoreau's *Journal* not as a personal diary. On the contrary, he reads the *Journal* as a common text of common words. Thoreau's use of language, and especially his word choices, Cage contends, encourages a depersonalized account of experience, where one can hear other things – be they human or nonhuman, organic or inorganic, animate or inanimate – that is, where one can hear the "environment" speak.[11] It would not be far-fetched to suggest that, with such exploration, both Cage and Thoreau imply a shift from human-centric voice and speech. They encourage thinking about the emergence of a voice and singing, which is not limited to vocal cords, the human body or verbal expression. Moreover, they both scrutinize the primacy of "self-expression", and encourage considering "self-modulation"[12] at the heart of one's interaction with environment. This idea is integral to Cage's chance operations and technique of indeterminacy.

William Brooks's *Choice and Change* and Janetta Petkus's Ph.D. research *The Songs of John Cage* shed light on the notion of indeterminacy in the context of addressing Cage's compositional techniques. Brooks and Petkus observe that, similar to his earlier works, Cage used the *I Ching*, an ancient collection of Chinese commentaries systematized by a set of 64 hexagrams[13] and chance operations, as a compositional method in the *Song Books*. Using similar compositional methods, Brooks argues, makes the solos efficient and consistent, symmetrical and asymmetrical at the same time.[14] Cage decided on the division of genres based on the outcomes of the hexagram he drew:

> To make a decision it is first necessary to determine the number of options. The numbers from 1 to 64 are then partitioned into equal segments, and a hexagram is obtained; the number of the hexagram determines the outcome. For example, there are four genres in the Song Books, so the partitioning could be 1–16 (song), 17–32 (theater), 33–48 (song using electronics), and 49–64 (theater using electronics).[15]

The equal partitioning brings symmetry between the pieces. Variations and repetitions of the solos can be considered at the expense of this symmetry. For instance *Solo 4* is a variation of *Solo 3*. In addition to the variations, Cage encourages superimpositions. In *John Cage's Theatre Pieces*, William Fetterman explains these superimpositions: "The solos may be performed a cappella, in combination with other *Song Books* solos, or with *Concert for Piano and Orchestra* and *Rozart Mix*."[16] Performance decisions and superimpositions then seem to approximate the mathematical symmetry, breeding asymmetry. Brooks mentions mathematical approximations as the source of this asymmetry, yet, as the performance choices change and overlap with other choices, the symmetry between the pieces becomes more asymmetrical.

The first performance of the solos shows this asymmetry.[17] To describe this performance, Fetterman refers to two reviews and documentation:

> Martine Cadieu mentions Simone Rist performing gymnastics, Cathy Berberian changing costume every few minutes and cooking spaghetti using contact microphones, and John Cage playing a tape machine with a recorded excerpt from Satie's *Parade*…Antoine Golea mentions Simone Rist on a trapeze, Cathy Berberian preparing a salad, and John Cage manipulating objects while seated

at a table…Eleanor Hakim writes that "the auditorium was shaped…like half of a broad amphitheatre cut into three vertical sections by aisles, and sloping upwards from the stage on a steep incline. Cubicle-like balconies ranged along both sidewalls provided for the placement of additional tape recorders and instrumentalists. Other musicians were spotted throughout the audience, sitting on the steps of the sloping aisles…"[18]

The reviews and documentation reinforce the nature of the solos as theatre pieces. Cage was not interested in creating theatrical situations in which the audience witnesses dramatic encounters, yet he was interested in performing and amplifying scenes from everyday life. In so doing, he suggested blurring the boundary between music and theatre, sound and action, life and art. What is essentially staged in *Song Books* is a series of focused and multiple activities, a series of asymmetrical echoes in everyday life.

Approximation of duration and endurance

The aesthetics in the solos can be traced to Cage's interdisciplinary and multimedia collaborations at Black Mountain College and also his earlier works. Take, for instance, *Water Walk* (1959). Written for television performance, *Water Walk* comprises a variety of materials, such as "water pitcher, iron pipe, a goose call, a bottle of wine, an electric mixer, a whistle, a sprinkling can, ice cubes, two cymbals, a mechanical fish, a quail call, a rubber duck, a tape recorder, a vase of roses, a seltzer siphon, five radios, a bathtub and a grand piano".[19] The first performance was premiered in Milan "for the Italian TV quiz 'Lascia O Raddoppia', using Fontana Mix as the composing means".[20] In 1960, Cage appeared with *Water Walk* on the American game show *I've Got a Secret*. The nature of these TV shows extends Cage's commitment to chance operations. In addition to their relevance to everyday knowledge and mundane enactments, the thematic context of these shows – game, secret, quiz – also echoes Cage's investment in process and "unintended consequences", employing everyday sounds, objects and situations. The organizing principle in *Water Walk* is timing.

Using a stopwatch, Cage plays each "instrument" one by one in a particular order. However, none of the timings is intended to be accurate, as noted in the score. Or perhaps, one could say, the more accurate the

timing is intended to be, the more approximate it becomes both for the performer and for the audience. Such approximation, especially when considered in the midst of multiple enactments, crystallizes the urge for reflecting on duration and endurance, reminding us of the plasticity of our perceptions. Walking through multiple acts, how does one precisely figure the beginning or the end of an act?

In his conversation with Charles, Cage mentions how much he wanted to eliminate the temporal limits of the performances: "I myself explained to Cathy Berberian that I very much liked a situation in which art disappears and becomes immersed in what we call life… We shall each perform in a different way… When the audience is entering the hall, I shall already be playing…"[21] Accordingly, Cage attempted indeterminate beginnings and endings for each performance. The question of time, and early on rhythm, seemed to be always at stake for Cage. His studies with Schoenberg pointed him towards harmony, and yet, as Shultis observes, "silence" and its embodiment as many sounds prompted Cage to break away from harmony and reflect on duration.[22] The shift from harmony to the performative approximation of duration and endurance is both relevant to and suggestive of the notion of plasticity, the "pre- and post-temporal", that is, the "ambiguous" identity that resists being settled. As seen in *Song Books* and *Water Walk*, the simultaneity of multiple acts underlines an approximation of duration.

Solos 3, 4, 5

Solos *3*, *4* and *5* are particularly based on Thoreau's *Journal*. Throughout his lifetime, Thoreau lived in the Concord, Massachusetts and wrote in his journal to record almost every impression and connection that he observed about nature, technology and society. Given his interest in environmental sounds and listening, Thoreau's observations could be seen as one of the earliest critical studies of sound, as Jeff Todd Titon argues. According to Titon, Thoreau suggests a "relational epistemology of sound", which enables the "co-presence" of human and nonhuman beings and perhaps an effective way to deal with today's environmental crisis.[23] Similarly, Sherman Paul portrays how Thoreau's diaries of sound entail a conversation between his voice and other environmental sounds in *Walden Pond*.[24] How does one speak with environmental sounds, for instance, with the sounds

of thunder, river, wind or a hawk? And how might the sounds of this conversation amount to a voice?

One possible answer, as mentioned earlier, is Norie Neumark's suggestion of "mimetic responses",[25] the pre- and non-verbal modalities between voice and other sounds. Such responses, Neumark posits, give rise to "affect" and "interconnections"[26] across varied bodies and species. We can also note theorists Steven Connor and Brandon LaBelle's emphasis on the performative acts of voice before and beyond verbal language, and musicologist Gary Tomlinson's observations on the palaeolithic foundations of "voicescapes" and the "protolinguistic" function of song and music.[27]

Although these suggestions reflect on the socialities and affective capacity of non-linguistic and non-verbal voice across bodies and species, they tend to locate voice in the vocal tracts.[28] The suggestion of voicing as a constituent and function of skin is rather different: to consider voice an embodied sound, be it aural or non-aural, that is released from vocal cords. Thoreau's conversation with environmental sounds may not be reflected or happening in his throat. Within the activity of listening, a voice may also emerge in the form of non-vocal and/or non-aural gestures or movements.[29] Does such voice have a name or a body? Is it identifiable? To what extent can one consider this voice personal? And to what extent can such a voice resist the personal? Cage's solos trigger these questions.

Thoreau's *Journal* opens with the map of Concord. Using the same opening, Cage gives the following instructions in *Solo 3*:

> Using the map of Concord given, go from Fair Haven Hill (H7) down the river by boat and then inland to the house beyond Blood's (B8). Turn the map so that the path you take suggests a melodic line (reads up and down from left to right). The relation of this line to voice range is free and this relation may be varied. The tempo is free. Change electronics at intersections and/or when mode of travel changes. Use any of the following words by Henry David Thoreau as text. The different typefaces may be interpreted as changes in intensity, quality, dynamics. This solo may be accompanied by a tape recording of hawk sounds.[30]

Solo 4 is a variation of *Solo 3*. Cage instructs the performer to use the same directions, yet apply them to different words. Keeping the ecology of *Song Books* in mind as discussed earlier, how could one interpret the instructions and the path suggested in the instructions? Supplementary transparencies of the score demonstrate the map distinctively. Yet, the possibilities

for voicing the map may be varied, making the performer responsible for following a performance choice. Cage offers words to activate the processes of voicing.

In both solos, Cage underlines the space left between the words. The performer is encouraged to use this space for applying the map to the words. The way Cage treats language and typography is important here. The words are transformed into circular forms on a horizontal line. Some of the letters are written in small characters, some others are capitalized; some of the words are highlighted, some others are almost invisible. Even though they are laid out on a horizontal line, the words are also punctuated, evoking an expression in different sizes and forms. Cage delineates this exploration as "the impossibility of language".[31] Instead of discursive codes, he amplifies letters and syllables and deals with the words as sensory sources.

This emphasizes "relevant experimental action". The performer has to process words according to the sensory ecology of context, move through the various sensory interpenetrations and feel the space by means of simultaneous events that occur. The process underlines the phases of making a choice, rather than the ultimate choices themselves.

In his conversation with William Duckworth, Cage mentions that, "If something doesn't have any life in it, and is nothing but a set of relationships that are so forceful that the things that are being related cannot be heard apart from the relationship, then what you have is an intellectual situation, that has no, I will say, physicality."[32] As opposed to the intellectual enforcement to connect and order sounds, application of the path to the sentence in *Solo 4* helps us discover the physicality of language, that is, not simply the order but also the disorder and unknown contours of a shared environment and acoustics. The process of the performance, as well as the spatial distribution of melodic lines, point toward the modes of voicing with, through an environment.

Solo 5 expands on this idea by using a more intimate map – a portrait:

> A song in eight parts: Wander over the portrait of Thoreau given, turning it so that the path taken suggests a melodic line (reads up and down from left to right). The relation of this line to voice range is free and may be varied. Each part has the number of time units given; establish length of time unit by determining how fast part 2 (which has two units) can be performed. Change electronics when moving, for instance, from hair to eyes…[33]

With this instruction *Solo 5* highlights the performer's body. Cage situates the physicality of language at the heart of Thoreau's face before his words, urging us to write a melody that would lead to a relevant bodily movement.

Mapping on the portrait, one could develop a physical and melodic movement. However one could also develop this movement by walking, gesturing, or touching the portrait. In this context, the modality of singing is not limited to a vocal or verbal expression. The instructions rather demand a spatially distributed act, an embodied interaction with environment. The invocation of voice is here explicitly multisensory. Rather than a vocal expression inciting a multisensory embodiment of environment, the suggestion is to explore how one finds a voice through an engagement with environment employing varied sensory registers. With this invocation, the solos further crystallize voicing as a series of multi- and cross-sensory acts, including non-vocal and non-aural acts, both informing and informed by a particular physical environment. A "solo voice" emerges with the modalities of this voicing: a non-habituated and momentary expression that does not necessarily become a sign, a non-dialogic performance that does not operate with a logic of call and response, and a distributed presence that can manifest itself both as singular and as multiple. These modalities do not necessarily lead to an integration of sounds or bodies. In effect, the solo voice here is not fixed in time or space. It can appear pre- and post-temporally, bringing back the issue of plasticity and sustainability. It does not have a fixed name or central figure. The solo voice is rather exploratory and depersonalized, both individual and communal. The voice may speak with an expression which is not considered, expected or has ever been known before. As much as it informs and is informed by its environment, such a voice, as media theorist Dominic Pettman posits, "arrives intimately".[34]

The "sonic intimacy" that Pettman theorizes refers to literary theorist Leo Bersani's notion of impersonal intimacy. Impersonal intimacy, as suggested in conversation with psychoanalyst and essayist Adam Phillips, attempts to make a detour from psychoanalysis's pursuit of symbolic connectivity between seemingly disconnected behaviours or patterns.[35] Bersani and Phillips highlight the significance of disconnect and difference in forming intimacy. They note the potential danger of resolving disconnect and difference into an intellectually and personally enforced

connection. Instead of such enforced connection, intimacy, Bersani and Phillips argue, can emerge with depersonalization, with the acknowledgement and projection of the unknown and undefinable aspects. Acts of voicing prompt and manifest such depersonalization, while performing the unknown, unexpected and unidentifiable. Cage's understanding of commitment further illuminates this idea. Cage considers commitment an engagement with the process, as well as an acknowledgement of unrelated fragments as they are.

On commitment and the *Nothing-in-between*

Song Books is an investigation of commitment. In the midst of simultaneous activities, the performer needs to stay focused and perform their task with precision and without distraction. And yet, they need to engage with the performance environment. Staying focused refers to being attuned to the relevant environment, and, accordingly, finding relevant actions. The act is both physically and phenomenally an inclusive – "experimental" action – which is "intentionally purposeless",[36] as Cage posits. How can one both stay focused to the act and attentive to the environment that surrounds it? In *A Year From Monday*, Cage proposes a few ideas:

> The question is not: How much are you going to get out of it? Nor is it How much are you going to put into it? But rather How immediately are you going to say Yes to no matter what unpredictability, even when what happens seems to have no relation to what one thought was one's commitment?[37]
>
> I have a friend whose actions resemble overwhelming inspirations. Constantly changing in her course, she nevertheless does fully whatever it is she is doing, so that I would say she is committed. She would like, however, she told me, not to have two of everything, but just one, so that she could be utterly concentrated. When she told me this I was surprised, because I thought she was committed in the first place, and I myself feel more committed the more diverse and multiplied my interests and actions become.[38]
>
> We are not committed to this or that… We are committed to the Nothing-in-between – whether we know it or not…[39]

The remarks above manifest different means and capacities of commitment: commitment as constant change, as focused act, as decision-making without hesitation or preoccupation, regardless of the incalculable risks.

These observations illuminate the ways in which someone becomes more attentive to their environment the more focused they are in their action. More strikingly, the very last remark – commitment neither as departure nor as destination, but as the Nothing-in-between – reiterates the aesthetics of the *Solos*.

Cage's *Solos* allow the exploring of a space in which diverse and multiple acts co-exist but may not join up together. Recall the acts and modalities of voicing in the solos suggested above. Mapping the portrait of Thoreau and drawing from this a melodic and physical movement, for instance, enable both a concentrated activity and an awareness of other activities that surround and inform this concentrated act. This process, the nothing-in-between in Cage's words, is potentially ecological and woven by voicing. It draws attention to the acknowledgement of the uncertain and contingent variables of environment, amounting to an understanding of the force of life itself. I will further the notion of life itself in the next chapter. Here let me address the difference between new materialist readings of "nothingness" and Cage's notion of Nothing-in-between.

New materialist readings understand and pronounce "nothingness" as a "matter of infinite possibilities, the generative force of life, ontological indeterminacy and intra-relation."[40] Despite its recognition of the indeterminate aspects of interaction across bodies and species of all kind, these readings bring the idea of generative transformation to the fore. The Nothing-in-between is not necessarily invested in transformation or connectivity as ends or means. It rather points at the processes of acknowledging different modes of engagement. In the instructions for the *Solos*, performers are also allowed to consider the events as unrelated and singular, without a necessary transformation. In effect, the impossible is not always implied as a condition of possibility in the solos.

One door closes. Another opens. Perhaps yes, but not necessarily or not always. In any case, these two doors do not have to be related. They can lead in different directions. What do we do with this idea? What may be the ethical value of facing the impossible as it is? The value is that we can perhaps reflect on the tendency toward recycling as a mode of thought and way of life, as Alexander and Reno remind us, as well as toward "chasing dirt", to quote Douglas and Kirby again. In so doing, we can also question the need for continuity and narrativity. This awareness and acceptance of

disintegration, which I argue that non-dialogic voicing provides, allows us to bear with discontinuities and uncertainties, and form a new mode of expression and a new presence, a new voice, which may communicate but may not settle into a dominant or imposed mode of communication or relation. Such a voice can form a common ground, which accommodates modes of both connect and disconnect without turning them into one another's cause or consequence, and which, in effect, functions like "boundary and surface".[41]

Notes

1 This section – in particular, the introduction and the analysis of Solos 3, 4 and 5 – is based on the chapter on Cage's *Song Books* in my Ph.D. dissertation. Zeynep Bulut, "La Voix-Peau: Understanding the Physical, Phenomenal and Imaginary Limits of the Human Voice Through Contemporary Music," Ph.D. diss., University of California at San Diego, 2011, 312–26.

2 Christopher Shultis, "Silencing the Sounded Self: John Cage and the Intentionality of Nonintention," *The Musical Quarterly*, Vol. 79, No. 2 (Summer, 1995), 317.

3 Shultis refers to Cage's visit to Harvard University and the experience of hearing his bodily sounds in an anechoic chamber. Ibid.

4 Indeed, Cage points at the entanglement of intention and non-intention, drawing on the multiplicity of acts that occur in an environment. How can one know when an act precisely begins or ends? Shultis explores this question with respect to indeterminacy as a compositional technique. Ibid., 322–3.

5 John Cage, *Song Books* (New York: Henmar Press, 1970), 1.

6 Ibid.

7 See William Fetterman, "*Song Books*: General Performances and Specific Solos," *John Cage's Theatre Pieces* (Amsterdam: Harwood Academic Publishers, 1996), 151.

8 Ibid.

9 In his conversation with Daniel Charles, Cage mentions how much he admires the "tranquil continuity" of Satie's music: "His music reflects exactly my theory of aesthetics. There are none of the bursts of energy or climaxes we usually associate with Beethoven." Daniel Charles, *For the Birds: John Cage* (London: Marion Boyars Publishers, 1981), 184, 185.

10 In a previous conversation with Charles, Cage explains how, as a thinker and writer, Thoreau engaged nature and language without any preoccupation. In his *Journal*, Thoreau welcomed nature, experimented with inventing technological tools, and expressed his impressions in words with a similar degree of liberation, as Charles posits. Charles, *For the Birds: John Cage*, 112, 113.

11 Shultis, "Silencing the Sounded Self: John Cage and the Intentionality of Nonintention," 336–7.

12 As Shultis posits: " 'having nothing to say' was the reason that allowed Cage to continue composing. It was through Gita Sarabhai, an Indian musician who was studying Western

music with Cage, that he learned the traditional reason for making a piece of music in India: 'to quiet the mind thus making it susceptible to divine influences.' According to Cage, this led music away from self-expression and toward self-alteration through the influence of our natural environment…'Having nothing to say' allows that environment the opportunity to speak." Ibid., 316.

13 Janetta Petkus, *The Songs of John Cage (1931–1970)*, Ph.D. Dissertation (Connecticut: University of Connecticut, 1986), 153.

14 William Brooks, "Choice and Change in Cage's Recent Music," *A John Cage Reader: In Celebration of His 70th Birthday*, eds. Peter Gena and Jonathan Brent (New York: C.F. Peters Corp., 1982), 87, 99.

15 Ibid.

16 William Fetterman, "*Song Books*: General Performances and Specific Solos," *John Cage's Theatre Pieces* (Amsterdam: Harwood Academic Publishers, 1996), 149.

17 Ibid., 151.

18 Fetterman here quotes Eleanor Hakim's paper, which was unpublished and housed in the John Cage Archive at Northwestern University. Hakim 1979, 5–6; Fetterman, *John Cage's Theatre Pieces*, 151.

19 See johncage.org. See also http://www.johncage.org/blog/paolini-cage-eds-editlp.pdf; http://johncage.org/pp/John-Cage-Work-Detail.cfm?work_ID=242; http://www.openculture.com/2014/12/john-cage-performs-water-walk-on-us-game-show-ive-got-a-secret-1960.html Last accessed on 18 February 2018.

20 http://johncage.org/pp/John-Cage-Work-Detail.cfm?work_ID=242 Last accessed on 18 February 2018.

21 Charles, *Birds*, 119.

22 Shultis, "Silencing the Sounded Self: John Cage and the Intentionality of Nonintention," 313, 314, 315, 316.

23 Jeff Todd Titon, "Thoreau's Ear," *Sound Studies: An Interdisciplinary Journal*, Volume 1, 2015, 144.

24 Sherman Paul, "The Wise Silence: Sound as the Agency of Correspondence in Thoreau," *The New England Quarterly*, Vol. 22, No. 4 (Dec., 1949), 511–27.

25 Regarding mimetic responses, Neumark refers to Vinciane Despret and William James, as well as John Dewey's pragmatism, "knowing with doing" and Anna Gibbs's notion of mimesis effect, as "the transmission of affect and affective spectatorship". Neumark, *Voicetracks*, 5–6.

26 Ibid., 13.

27 Tomlinson writes: "The Acheulean taskscape 1,000,000 years ago was more than a soundscape, reverberating with the varied noises of hominin activity and industry. It was also a voicescape, in which lungs, larynx, and vocal tract helped to negotiate environmental affordances and social entrainments both general and specific. Its synchronies, indeed all its social interactions, must have resounded with calls, cries, growls, purrs, whimpers, grunts, hoots, and more." Gary Tomlinson, *A Million Years of Music: The Emergence of Human Modernity* (Brooklyn, NY: Zone Books, MIT Press, 2015), 89.

28 Neumark writes: "As I jumped with joy, my lungs open and I sing out. When I recoil with fear, I hold back my breath and swallow my voice. And as sadness weighs down my heart, my limbs turn to lead and my voice constricts in my throat." Neumark, *Voicetracks*, 4.

29 Nina Sun Eidsheim's notion of singing as vibrational practice draws our attention to non-aural manifestations of voice as well. Eidsheim theorizes voice as a medium that both encapsulates and triggers multi-sensory sensations. See Eidsheim, *Sensing Sound: Singing and Listening As Vibrational Practice*, 2015.
30 John Cage, *Song Books* (New York: Henmar Press, 1970), 2.
31 Charles, *Birds*, 113.
32 William Duckworth, *Talking Music: Conversations with John Cage, Philip Glass, Laurie Anderson, and Five Generations of American Experimental Composers* (New York: Schirmer Books, 1995), 9.
33 John Cage, *Song Books*, 12.
34 See Dominic Pettman, *Sonic Intimacy: Voices, Species, Techniques* (Stanford, CA: Stanford University Press, 2017), 83.
35 Bersani contests Freud's theory of narcissism and Phillips draws on Winnicott's idea of play. Adam Phillips and Leo Bersani, *Intimacies* (Chicago, IL: University of Chicago Press, 2008). See also Salley Vickers's Review of *Intimacies* in the *Financial Times*. Salley Vickers, review of *Intimacies*, *Financial Times*, https://www.ft.com/content/35c8f8c0-6a59-11dd-83e8-0000779fd18c Last accessed on 23 February 2018.
36 Fetterman quotes Cage in his discussion about Cage's 0'00". Fetterman, *John Cage's Theatre Pieces*, 86.
37 John Cage, *A Year from Monday: Lectures and Writings* (London: Marion Boyars Publishers, 1985), 13.
38 Ibid., 115–16.
39 Ibid., 119.
40 Here I refer to sociologist Peta Hinton's analysis of the positive and generative accounts of new materialisms. In light of Braidotti's account, Hinton "wants to ask what happens when we account for death as politically and ethically constitutive…". The suggestion after all is to underline that "the generative possibilities of life itself may already be found in and with death or nothing…as life's own 'dynamic interiority,'to use Vicki Kirby's terms." Peta Hinton, "A Sociality of Death: Towards a New Materialist Politics and Ethics of Life Itself," *What if Culture was Nature all Along?*, ed. Vicki Kirby (Edinburgh: Edinburgh University Press, 2017), 234–5, 225–6.
41 Mary Flanagan and Austin Booth, "Introduction," *Re-skin*, 3.

3

Commons of Humans and Nonhumans: *Environmental Dialogue*

A deep listening

Environmental Dialogue, a prime example of composer Pauline Oliveros's practice of deep listening, forms a non-dialogic voice in the activity of listening within the physical environment. In so doing, the piece also underscores the plasticity of voice, pointing to how a voice both changes with and resists an environment, and how it never fully settles in one single form, time or place.

Deep listening is a series of meditations conceived for listening to, with and through an environment, attentively and voluntarily. According to Oliveros, deep indicates "complexity and beyond the habitual understanding".[1] Coupled with listening, deep listening refers to an "expansion of the habitual perception of sound" an engagement with the complexity and multiplicity of sound. That is "an expansion of the space/time continuum".[2] Deep-listening practices generate this awareness by means of focused activities. The activities involved in the practice, developed in collaboration with Oliveros's creative and life partner, artist and healer IONE, along with movement artist and educator Heloise Gold, may include breath exercises, vocalizing, and body and energy work, similar to meditation. They encourage understanding listening as a slow and interactive process.

Within the context of *Environmental Dialogue*, I wish to underline listening as process. *Environmental Dialogue*, and other related deep-listening pieces, such as *Collective Environmental Composition* (1975) and *Earth: Sensing/Listening/Sounding* (1992), engage with focused, attentive, exploratory ways of listening. They develop a process in which one can

notice the sounds of a physical environment. Oliveros's instruction is as follows:

> Each person finds a place to be, either near to or distant from the others, either indoors or out-of-doors. The meditation begins by each person observing his or her own breathing. As each person becomes aware of the field of sounds from the environment, each person individually and gradually begins to reinforce the pitch of any one of the sound sources that has attracted their attention. The sound source is reinforced vocally, mentally or with an instrument. If one loses touch with the sound source, then wait quietly for another. Reinforce means to strengthen or to sustain by merging one's own pitch with the sound source. If the pitch of the sound source is out of vocal or instrumental range, then it is to be reinforced mentally.[3]

Consider the demands and possible implications of this meditation: situated presence, both placement and displacement of a sound and a body, attention towards the modes of interaction among varied sound sources and bodies, as well as the acknowledgement of no vocal response. Central to these demands and possible consequences, there is a recognition of human and nonhuman bodies, a reassembling of the placements of animate and inanimate matters in an environment, and perhaps a reconfiguration of the environment itself.

Imagine that you are performing *Environmental Dialogue* in your immediate physical environment with a group of people. Following the instruction, you first observe your breathing and then allow yourself to be drawn to any sound in your environment. This sound may be an animal sound, wind or traffic noise, another person's breathing, or a sound associated with an everyday item such as a computer or a phone. You listen to the sound attentively, and may respond to it or not. In any case, this activity would encourage hearing the similarities and differences between various bodies in your surroundings. Regardless of a vocal or instrumental articulation of a pitch, there would be a mental reinforcement in the process. In addition, you would be reminded of the order of concrete bodies and sounds as related to your body and voice. This experience may inform us about how humans and nonhumans co-exist and can be similarly situated. Let me offer two recent performances as examples.

The first performance took place at the School of Electronic Music in Venice in 2015, as part of a workshop and seminar, and was joined by

Pauline Oliveros.[4] The performance included a large group of performers and instruments – such as duduk/clarinet, piano, piccolo, electric guitar, electroacoustic hacking, trumpet, percussion and drums, double bass, Yamaha AN200, harp, toy piano, viola, electronics, laptop, Alesis Micron – located in different parts of the performance space. The video documentation of the performance demonstrates the spatial layout of the performers, as well as the placement of each individual performer in the space. It is possible to trace each performer's individual sounds. However, the sonic interaction among the performers and the instruments is not audibly traceable. Sounds, just like the performers, are spatially distributed in the performance space. They appear both individual and atmospheric, whilst feeding into and being fed by the acoustics of the performance space. This setting confuses the possible transactions across the performers and sounds, as well as across human and nonhuman bodies, or how we order them, at the very least. What is the dialogue of *Environmental Dialogue* then? If there is no direct exchange or call or response, if the evocation is a reordering of a space where signals and sounds are shared among humans and nonhumans, is not the expression that one finds through the meditation of *Environmental Dialogue* non-dialogic?

The second performance is by the International Contemporary Ensemble (ICE). ICE staged *Environmental Dialogue* with a smaller group of performers and instruments (guitar, saxophone, piano, voice and cello) in the Chopin Theatre in Chicago in 2016.[5] The first performance created the urge to engage the very process of making an acoustic space, of configuring a physical environment through distributed interactions, a non-dialogue. The performance by ICE articulated the musical and physical spacings between and across sounds. Performers slowly made a sound. At times, they remained silent. In a similar fashion, they made relatively quiet sounds. Again, there was no necessary call and response. Focusing on a particular sound in the space – be it a performer's sound or another sound occurring in the concert space – gave rise to more than one response. Sound is already a multitude of vibrations. The spacing between the sounds prompted listeners to notice such a multitude, as well as to question to what factors they attributed those sounds – be they physical, spatial, symbolic or discursive. One can understand this moment as an interruption, both as an extended engagement with the surroundings in which this

interruption takes place and as an intensive disengagement from those surroundings. Similar to *The Waste Land* and *Song Books*, such interruption or (dis)engagement manifests itself as an expression, a voicing.

The non-dialogue of *Environmental Dialogue* may generate an environmental and ethical awareness which can be sustainable. The activities blur ideas of agency and passivity, allow slowness and going backward or forward, and facilitate a spatial reconfiguration, without a necessary investment in connecting the lines, bodies and movements of sound. Performing *Environmental Dialogue*, we do not give a voice to something or someone. We are not given a voice either. We rather explore a sound, and by reinforcing its pitch vocally or mentally, we make a voice. The dialogue here is not necessarily dialogic or linguistically exchangeable. It rather reveals and heightens the multitude and the distribution of voicing. Environmental and ethical awareness arises from awareness of one's surrounding engendered through this multitude of voicings. Echoing Rosi Braidotti's notion of "active ethical citizenship",[6] this awareness promotes a sense of the parity of worth of humans and nonhumans.

In the documentation of the performance in Venice, Oliveros – like scholars including Emily Thompson, Steven Feld, Georgina Born, Jonathan Sterne, David W. Samuels, to name a few[7] – discusses soundscape and listening as a political construct, as related to networks of actors, institutions, technologies, and material things and forces. Oliveros's idea of listening further expands on the analysis of sound as the means or ends of a material network and culture.[8] With her deep-listening meditations, Oliveros also explores the unexpected manifestations and effects of sound. Elsewhere, I wrote, "The idea of differentials, the distributed multiplicity and anonymity, is already embedded in the phenomenology of sound."[9] That is, "The way we design and differentiate a sound as audible or inaudible is discursive and socially engineered, but the embodiment of sound – as well as its disembodiment – may still contest our discursive attributions for it."[10] What do we expect to reveal and exchange by means of listening then? The question of listening is not simply methodically or historically informed by acquired skills and techniques. It also critically and creatively interferes with conventions and thresholds of hearing. As Brandon LaBelle writes:

to listen is to also confront the voluptuous richness of ambiguity. In this regard, 'feedback' is a continual process that teeters on the line to becoming noise or to tapering into silence — it rises and falls in intensity according to the near and the far of audible events, building spaces of intimacy and distraction, togetherness and dislocation.[11]

Listening, we do not simply sharpen a potential comprehension. We also exchange ambiguous signs and signals, and ponder ideas of intimacy and distance. We ask questions or we may be reminded of both familiar or more far-fetched associations that the sounds invoke. The voluptuous ambiguity here can be considered an atmosphere, what Salome Voegelin calls, "a sonic possible world", which allows us to access the "invisible mobility below the surface of a visual world…", challenging "…its certain position, not to show a better place but to reveal what this world is made of, to question its singular actuality".[12] The ambiguity entails the impossibility of settling a sound in one single body, or the irreconcilable tension of sound felt between the bodies. Such disintegration, as LaBelle contends, enables us to "recognize the political".[13] LaBelle explains this point by referring to Steven Connor's account of an "auditory ontology"[14] and political theorist Chantal Mouffe's suggestion, that "the ability to think politically today might be found not in a presumed notion of resolve, in consensus, but in recognition of the political as a process that always involves or requires the tensions of confrontation, the prolongation of an uncertain language…".[15]

Mouffe's argument is useful in unpacking the premise of non-dialogic voicing in *Environmental Dialogue*, as well as in *The Waste Land* and *Song Books*. All three cases invoke questions of how one forms a voice in the act of listening with the environment, and how the environment can sound and speak. The uncertain language of voicing, its ambiguous and brief interventions, invites us to recognize the distribution of voices, and the fragmentation of words and sounds, across varied bodies, and thus demands a multisensory engagement with the physical and cultural environment. This engagement is not necessarily reciprocal and does not lead to a sense of depth that presumes a given essence to be revealed.

Take the instructions of *Environmental Dialogue* again. Participants place themselves near or far from others, either indoors or outdoors. Observing breathing, they become aware of the sounds of the environment that they engage with. Next, they catch a sound near or far and

interact with it by reinforcing its pitch mentally or vocally. And yet, the result does not have to be vocal or aural. The act of voicing is not limited to vocal cords or the human body, and participants are allowed to interact with the sounds whilst remaining silent. There is no enforced connection or dialogue between the sounds. The process of voicing is not bounded with a form of call and response. Here, the environmental dialogue is both focused and distributed. And deep listening does not presume or suggest a given essence in sound. Oliveros's deep listening is indeed what geographers Anja Kanngieser, Michael Gallagher and Jonathan Prior call "expanded listening",[16] which points at "the varied ways in which bodies of all kinds – human and more-than-human – respond to sound".[17] *Environmental Dialogue* encourages such a mode of expanded listening, while moving from a "human-centred listening" to a possibly post-human exploration of sound, body and acoustic space.

Posthuman, nonhuman, and life itself

Philosopher Rosi Braidotti considers the posthuman our current condition. Given our technologically mediated bodies, new genetic configurations and physical and social extensions of life, Braidotti suggests that humans are already interacting with the posthuman/nonhuman/inhuman. She employs these terms – posthuman/nonhuman/inhuman – synonymously, referring to literary scholar Katherine Hayles's notion of the posthuman, a process informed by patterning, distributed cognition and the loss of the body of information.

Human and nonhuman, "we are all in this together but we are not one", Braidotti says.[18] Similarly, political theorists Diana Coole and Samantha Frost draw attention to the inevitable interaction between socioeconomic and environmental predicaments and biological and physical processes.[19] Take, for instance, genetic mutations, narratives of illnesses and anxiety, climate change and financial markets that can become anxious, upset and depressed.[20] These interactions underline the concept of the "politics of life itself", as Braidotti puts it. No doubt, one needs to acknowledge the notion of "life itself" in the context of capitalism and its discourse of growth, innovation and financial benefit. Braidotti acknowledges and articulates this context;[21] however, she advocates the notion of "politics of

life itself" to shift from anthropocentrism and move towards "active ethical citizenship".[22] She suggests this notion as a way to investigate the possibility of "broadening the sense of community".[23] Life is a combination of "zoe/anima" and "bios/discourse".[24] She writes:

> Life is experienced as inhuman because it is all too human, obscene because it lives on mindlessly. Are we not baffled by this scandal, this wonder, this *zoē*, that is to say, by an idea of life that exuberantly exceeds bios and supremely ignores logos?… Classical philosophy is resolutely on the side of a dialogue with the biological. Nomadic subjectivity is, in contrast, in love with *zoē*. It's about the posthuman as becoming animal, becoming other, becoming insect – trespassing all metaphysical boundaries. Ultimately, it leads to becoming imperceptible and fading – death being just another time sequence.[25]

As Braidotti contends, the tension between anima and discourse, as well as the processes of becoming another, lead to a "nomadic subjectivity" that "depersonalizes" the self and suggests an "ethics of relation".[26] Nomadic subjectivity recognizes "the knowledge that life produces", which understands life and knowledge as "dynamic and integrated".[27]

Human and nonhuman, to what extent may we know, quantify and control life? If life is information that can be fully quantified and measured, and in effect, fully controlled, why does it strike us that certain artefacts which deviate from the norm are unintended, unexpected or precarious? The idea of the "politics of life itself" draws attention to the unintended deviations, to the precarious, possibly as both inspiration and interruption. It articulates the need for noticing and living with the contingent and complex variables of life, body and environment. In so doing, it equips us not with escapism or denial but with an acknowledgement of uncertainty. I am interested in this shift. I suggest that *Environmental Dialogue* both triggers and capacitates such an acknowledgement. It encourages us to critically engage with sensory variables in an environment. It allows us to make a voice through the cross-sensory evocations and manifestations of environmental sounds, which we may have not considered before.

Participating in environmental sounds

The instructions of *Environmental Dialogue* reflect on the processes of performing and listening to environmental sounds. The two performances

mentioned earlier treat both environment and environmental sounds as unfixed. Anthropologist Tim Ingold examines environment in a similar way. Like Oliveros, Ingold discusses environment not as a given, self-contained or fixed entity but as a "fluid space".[28] Ingold follows a genealogy of ideas on varied conceptions of environment and the ways in which both humans and nonhumans interact with it. Among these ideas, James J. Gibson's theory of affordance and Deleuze and Guattari's conception of "becoming" are important to note, as *Environmental Dialogue* both relates and contributes to them. Let me mention a few related highlights in these theories.

As is widely known, Gibson makes a specific term, "affordance", which suggests that the capacity of a body for perception interactively and dynamically emerges in relation to its environment.[29] Accordingly, both environment and human and nonhuman beings are informing one another's constitution and contingent. One can follow Deleuze and Guattari's notion of "lines of becoming", perhaps in the light of the contingent variables of life, be they sensory, structural or semiotic. The lines of becoming, which are relevant to both humans and nonhumans, prompt a flow but not necessarily a consistent connection, as Deleuze and Guattari posit.[30] Following this genealogy, Ingold suggests a "meshwork", the term he borrows from Henri Lefebvre, which indicates the commonalities "between the way in which the movements and rhythms of human and nonhuman activity is registered in live space, but only if we think of writing not as a verbal composition but as a tissue of lines – not as text, but as texture".[31] The lines transport information, as they move and act. This is where Ingold ends with a notion of "environment as fluid space".[32]

Environmental Dialogue, and the noted performances, treat both the forming of environment and the engagement with environmental sounds as fluid. Such fluidity should not be confused with a constant flow of sounds or a composition. The fluidity of *Environmental Dialogue* echoes the flow of lines that move but do not necessarily amount to a cohesive connection, or "the tissues of lines not as text, but as texture",[33] in Ingold's words. The meditation inherent to the piece amplifies sonic differences and similarities across varied bodies, as well as moments of silence, which may be loud and uncomfortable for participants. Mental or vocal reinforcement of a sound encourages participants to focus on the processes of listening and voicing, more than the sounds that one hears or vocalizes.

The interaction between the listener and what is being listened to, or between the vocalizer and what is being vocalized, is non-dialogic. There is no central listener, speaker or respondent in this activity, just as there is no predetermined form of attention towards a predetermined object. Participants in the meditation are rather encouraged to explore the sonic, acoustic, visual and spatial features of a physical space, and to listen to the space with others. To pick a sound and listen to it attentively here means being drawn to any sound that takes place in that particular space. To make a voice in the act of listening, or to recalibrate voicing with listening, as anthropologist Steven Feld suggests,[34] is then to reinforce a voice, mentally and/or vocally, which may speak not simply in words but also in affective gestures.

Through deep listening, one may notice how bodies that listen may be varied in kind, interacting with one another in manifold directions and intensities. This experience leads us to contest our presumptions about environmental objects and sounds. Furthermore, it obliges us to recognize the parity of worth among different human and nonhuman bodies, as well as questioning and unsettling the habituated ways and means by which we usually listen. In that respect, one can see deep listening as akin to what writer and scholar Dylan Robinson identifies as decolonial listening. In his discussion of Indigenous ontologies of sounds, listening and languages, Robinson exemplifies Indigenous songs as "living document and embodied history",[35] and underlines the significance of "attending to affect alongside normative listening habits and biases", which in effect, "allows us to imagine (or audiate) otherwise…to develop strategies for different transformative politics of listening".[36] He writes:

> What is listening as a responsibility in documenting our histories? Reorienting our ears toward Indigenous ontologies of song requires us to return to the place that musicologist Susan McClary found herself nearly thirty years ago. In 1991 McClary, advancing new models for feminist music analysis, noted in considering the intersections of gender, sexuality and music, we might reach a point of production un-knowing, where we are 'no longer sure of what MUSIC is' (McClary 1991, 19). Decolonizing musical practice involves becoming no longer sure what LISTENING is.[37]

Indeed, without being limited to conceptions of music or listening, both McClary and Robinson highlight "unknowing" as a critical, creative and

productive tool and setting for revisiting how we name and assume, value and count, feel and know, and co-exist and co-operate with others. In short, they encourage us to think about the ethics of being and becoming, as well as the cohabitation of human and nonhuman bodies, and to recognize their parity of worth. Can we propose that the making of a voice in *Environmental Dialogue* generates a common ground among human and nonhuman bodies? And how does *Environmental Dialogue* posit this question in relation to other sound works that also employ and explore environmental sounds?[38] With respect to these questions, I look at works by John Luther Adams, Peter Cusack and sound art collective Q+A. In these examples, one observes the translation of environmental data and imaginaries into sound, the recycling of spaces, and cases of building environments through sound and, more strikingly, through the notion of "sonic commons".

Sonic rebuilding and imaginaries

Composer John Luther Adams's sound and light installation *The Place Where You Go to Listen* (2009) is based on Naalagiagvik, "the Iñupiaq name for a place on Alaska's Arctic coast".[39] Adams takes inspiration from the legend associated with Naalagiagvik, which tells the story of a woman, who "can understand the languages of the birds and hear the unseen voices all around her sitting quietly in this place".[40] Exhibited in the Museum of the North at the University of Alaska Fairbanks, the installation invites the audience to sit quietly in an empty room and listen to the extreme cycles of earth and sky. Adams presents the installation as "an ecosystem of sound and light", which listens and translates natural events – rhythms of daylight and darkness, phases of the moon, and the seismic vibrations of the earth – into sound in real time.[41] He uses sonification, which, in this context, refers to generating sound by mapping the data of natural events.[42] In so doing, he encourages the audience to "tune with"[43] the sounds of "far field"[44] landscapes. What one experiences can be considered a mediated abstraction of unfamiliar sounds, suggesting both a physical sensation and an imaginary of the virtual. As Andrea Polli and Jane D. Marsching explain, the "remote and technologically mediated"[45] experience of "far field" landscapes, such as the moon and the poles, bring a "planetary

imaginary"[46] within reach. In effect, the "human presence in the Poles", and the real-time experience of the "virtual presence"[47] of far-off landscapes inspire a new environmental awareness, new behaviour and new knowledge, too. The setting of Adams's installation contributes to this line of thinking and evokes a sense of environmental awareness.

A different mode of sonic and spatial imaginary, sound artist Peter Cusack's *Sounds from Dangerous Places* (2012) draws attention to environmental damage and regeneration. Cusack presents his project as "sonic journalism", which he considers the "aural equivalent of photojournalism".[48] *Sounds from Dangerous Places* documents location recordings, songs and poems from "areas of major environmental/ecological damage" and "nuclear sites or the edges of military zones", including the "Chernobyl exclusion zone, Caspian oil fields in Azerbaijan, and nuclear, military and greenhouse gas sites in the UK".[49] The project recollects an abandoned place and rejuvenates a cultural narrative through sound.[50]

Likewise, initiators of the sound art collective Q+A, Bruce Odland and Sam Auinger, have been rebuilding cultural imaginaries through sound. *Harmonic Bridge*[51] has been on site in North Adams since 1998, "generating harmony from roadway noise".[52] The installation was commissioned by Joseph C. Thompson, the director of Mass MoCA, prior to the opening of the museum, to "activate the town of North Adams".[53] The implication of "harmony" here seems to be a given connectivity of all sounds. Odland and Auinger treat sound as a way to access and recycle the past, as well as to bridge the past to the present as integral, imagined and amplified. Q+A's site-specific works, *Symphony of Resonances* and *Requiem for Fossil Fuels*, follow this idea. Exhibited as part of the Documenta 14 film festival in Thessaloniki, *Symphony of Resonances* responds to Russian Futurist Arseny Avraamov's site-specific work from 1922, "Symphony of Sirens", which comprises "factory sirens, machine guns, aircraft flyovers, and a chorus of 1000 workers and soldiers".[54] Also an "orchestra of city resonances",[55] *Requiem for fossil fuels* works with the acoustics of the Rotunda of Galerius in Thessaloniki. In both works, there is an emphasis on sonic rebuilding by means of resonance.

Resonance, ethnomusicologist Veit Erlmann posits, does not always refer to harmony or harmonizing.[56] Resonance rather manifests itself as acoustic tension,[57] unfolding a multitude of partial sounds that do

not necessarily become one. All three examples – Adams, Cusack and Q+A – explore resonance informed by acoustic or/and cultural tension. Adams's ecosystem of sound and light invokes a mode of physical tuning with earth and sky by means of an extended imaginary of sounds, by means of the virtual. Cusack's sonic journalism retrieves and regenerates a cultural narrative through field sounds, songs and voices from an abandoned and environmentally damaged zone. Q+A attempts in one piece to activate a contemporary urban site and in another an ancient building by restoring and acoustically projecting site-specific sounds. Despite their different contexts and applications, the examples encourage us to look into the "sonic commons", which is described as the medium of the unheard and ignored, as well as what needs to be heard and restored.

Sonic commons

Bruce Odland coined the term "sonic commons" to underscore the sounds that are unnoticed, unheard, ignored or left out. As he puts it, sonic commons indicate "the shared acoustical space that we ignore, mainly filled with unintentional sounds".[58] Indeed, what Odland articulates with this notion is a "negative space of sound between built environments".[59] To further explore what sonic commons may imply, I look to Michael Hardt and Antonio Negri's description of the "common" in their well-known book *Commonwealth*:

> By the "common" we mean, first of all, the common wealth of the material world—the air, the water, the fruits of the soil, and all nature's bounty—which in classic European political texts is often claimed to be the inheritance of humanity as a whole, to be shared together. We consider the common also and more significantly those results of social production that are necessary for social interaction and further production, such as knowledges, languages, codes, information, affects, and so forth. This notion of the common does not position humanity separate from nature, as either its exploiter or its custodian, but focuses rather on the practices of interaction, care, and cohabitation in a common world, promoting the beneficial and limiting the detrimental forms of the common. In the era of globalization, issues of the maintenance, production, and distribution of the common in both these senses and in both ecological and socioeconomic frameworks become increasingly central.[60]

Following this description of the common, we can consider sounds – both as shared vibration and as a matter of distribution and circulation that is supported by open access and participation[61] – as common. The underpinning idea of the common is the negation of property. "The political project of instituting the common", Hardt and Negri posit, is "neither private nor public, neither capitalist nor socialist".[62]

In his talk "On the Right to the Common", Hardt explains this idea further. As he puts it, the common is twofold: the common as an "object of struggle" and the common as a "form of organisation", both of which require "open access and participation, collective decision making and self governance".[63] Exploring systems of "self-governance", the suggestion is to "make the political process itself common" and "reorient the democratic process".[64] In this paradigm, public goods seem to be both included in and excluded from the common. What counts as public is a necessary question, if the common is intended to re-orient a collective decision-making process. How the public is governed cannot be perfectly detached from institutional mechanisms, be they the state or the market. Responding to this conflict between the public and the common, Hardt says, "…in many struggles that orient towards the common, there often has to be a dual comeback. One that is both with the public and against the private, and against the public for the common".[65]

Hardt differentiates the "ecological" from the "immaterial" commons, arguing that they operate on two different logics. The former functions on the logic of "scarcity and limitation" with the reminder that "there is only one planet".[66] The latter (for instance codes, languages, images, sounds that are shared and circulated via open access) employs the logic of "abundance, accumulation, and reproducibility".[67] I argue that the sound works mentioned here reinforce both logics.

Sonification of global environmental data or data-based abstraction of "far fields", for instance, indirectly responds to the ecological commons, in its attempt to demonstrate the physical limits of Planet Earth, as well as the availability of ecological resources. However, it also attempts to expand on the planetary imagination, both in the physical and the virtual experience of Planet Earth and its beyond. Sonic representation of a particular place, sounding a possible future while resounding a past, and remaking an orchestra of city sounds all employ the logic of recycling, that is, the

logic of generating a good out of limitation and scarcity. And yet, despite their different emphases, they all evoke the idea of an accumulation as well as the reproducibility – or re-cycling – of sound and place. Recycling already invokes the states of scarcity, accumulation and reproducibility. One can consider recycling at the intersection of the ecological and immaterial commons.

Non-dialogic voicing, a common ground

In relation to the sound works noted above, *Environmental Dialogue* offers a different account of ecological and immaterial commons. It does not follow the logic of recycling at the heart of scarcity or reproducibility. The instructions do not necessarily employ a recollection, recomposition or abstraction of sounds. The activity rather facilitates an expanded and distributed listening. The mode of voicing emerging with this mode of listening does not necessarily depart from a pre-determined call or arrive at a predestined response. It is an ordinary practice, a focused and concrete process. The distributed listening and voicing prompts an attunement to the unheard, ignored and unintentional sounds, to the processes of making a voice with the physical and cultural environment. If the sonic commons emerge from a negative space between these environments, through which unintentional and unnoticed sounds can be heard, *Environmental Dialogue* generates such a commons.

One of Oliveros's earlier works, *The Poetics of Environmental Sound,* consolidates this point. *The Poetics of Environmental Sound* includes a listening exercise and excerpts from around 150 responses to this exercise. Conceived at UCSD as a part of the course, The Nature of Music, the exercise encourages students to "develop musical perception through group improvisation, graphic notation and tape composition". Below are a few responses from students:

I also noticed that my disposition was also affected by the type of sounds I heard…

One of the dryers is providing an undercurrent of 'La Cucaracha' or something similarly Spanish…: Chick Chicka Chick…The Chicka is joined by a more dynamic washer in the rinsing cycle, slowly going Swish Swash…

It all sounded very rhythmical… After this I began to notice groups of sounds at a time. A door slammed and then a turn-stile clicked, at almost the same time another door closed…

The climax came when the roar of a motorcycle was met with a very unexpected bang of an object dropped in a nearby room. My nerves jumped as I settled back to the rustling leaves.[68]

The responses above highlight the observations on amplitude, pitch and sonority, rhythmic occurrences, grouping and mingling of varied sounds, including musical and environmental sounds. More strikingly, however, they manifest the sounds that have not been necessarily noticed or considered before. The commons here refers to thinking with unnoticed sounds, as well as with unnoticed events, both singular and multiple.

The performances of *Environmental Dialogue* mentioned here draw attention to a similar process of making and noticing the commons. The voicing emerging through the performances inspires and informs an environmental or ecological process, where human and nonhuman sounds can be similarly situated, listening can be performed without a necessary dialogue, slowness can be experienced as an implicit critique of mundane capitalism, and where social and material relations can be configured, without being framed simply in the modes of limitation, accumulation or reproducibility. Voicing through *Environmental Dialogue* materializes and furthers Braidotti's notion of "active ethical citizenship", that is, the invocation of parity of worth across humans and nonhumans, without turning them into one another's means or end.

The Waste Land and *Song Books* correspond to this voicing in Oliveros's meditations. Recall the non-reciprocal voices in *The Waste Land* and their distributed interaction with the environment by means of walking. Throughout the walk, the site-specific recitation and voicing is mobilized between and across humans and nonhumans, often without an explicit response. The experience is non-dialogic. It flattens the distance between ruins and renewals. In a way, the non-dialogic voicing in the walk invokes waste and recycling as entangled, that is, nothing is entirely wasted and nothing can be entirely recycled or resolved. What remains, what resists transformation, is after all not out of movement but rather displaced, projected elsewhere. The solos in *Song Books* sharpen this awareness further, while facilitating a (dis)integration of sounds, bodies and spaces. They demand singular acts of voicing in the midst of multiple situations. They reinforce an ecological interaction, which underlines the process, the commitment to the focused acts and their distribution in an environment.

In effect, the non-dialogic voicing in *The Waste Land, Song Books* and *Environmental Dialogue* leads to a voice that emerges within the varied and contingent forces of life itself. Hence the non-dialogic voicing contests the temporality and sustainability of the intentional object, the body and the meaning of voice. Both changing with and resisting the changing environment, such voicing manifests and generates the plasticity of voice. Consider this voice depersonalized, unsettled and unsettling, and yet resilient and engaged with its surroundings. As the cases in Part 1 have suggested, this voice can function as a common ground, a surface that can articulate the connections in distance and the disconnects in proximity, a surface which functions like a sensible skin.

Notes

1 Pauline Oliveros, *Deep Listening: A Composer's Sound Practice* (Lincoln, NE: iUniverse, Deep Listening Publications, 2005), xxiii.
2 Ibid.
3 Ibid., 35.
4 See the video documentation of the performance at the School of Electronic Music in Venice: https://vimeo.com/126476362 Last accessed on 26 February 2018.
5 See the documentation of the performance of Oliveros's *Environmental Dialogue* by ICE (International Contemporary Ensemble) at the Chopin Theatre, Chicago, 6 December 2016. https://digitice.org/digitice/detail/pauline-oliveros-environmental-dialogue#.WpdDemVy7ak Last accessed on 1 March 2018.
6 Rosi Braidotti, "The Politics of 'Life itself,' and New Ways of Dying," *New Materialisms: Ontology, Agency, and Politics*, eds. Diana Coole and Samantha Frost (Durham, NC: Duke University Press, 2010), 203–204.
7 See Emily Thompson, *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900–1933* (Cambridge, MA: The MIT Press, 2004); Steven Feld, *Sound and Sentiment: Birds, Weeping, Poetics, and Song in Kaluli Expression* (Durham, NC: Duke University Press, 2012); R. Murray Schafer, *Soundscape: Our Sonic Environment and the Tuning of the World* (New York: Alfred Knopf, 1977, 1994); Jonathan Sterne, "Soundscape, Landscape, Escape," *Soundscapes of the Urban Past: Staged Sound as Mediated Cultural Heritage*, ed. Karin Bijsterveld (Bielefeld: Transcript, Verlag, 2013), 181–95; *Music, Sound and Space: Transformations of Public and Private Experience*, ed. Georgina Born (Cambridge: Cambridge University Press, 2013); David W. Samuels, Louise Meintjes, Ana Maria Ochoa, Thomas Porcello, "Soundscapes: Toward a Sounded Anthropology," *Annual Review of Anthropology*, 2010, 39:1, 329–45.
8 The scholarship engaged in this question examines sound as a material and sensory medium, as well as a medium for historical, cultural, semiotic, phenomenal knowledge production (Feld & Basso 1996; Erlmann, 2010; Sterne 2003; Schulze and Papenburg 2016; Henriques 2011; Nancy 2007; Szendy 2008; Kane 2014; Back and Bull 2003). There

are manifold threads related to this consideration. Take, for instance, exploration of sound within the contexts of life sciences, scientific knowledge and and sonification (Helmreich 2015; Pinch and Bijsterveldt 2011; Supper 2016), signal processing and engineering (Mills 2012), vibrational ontology (Trower 2012; Eidsheim 2015, Henriques 2011), affect, sonic violence and reparation (Goodman 2012; Thompson & Biddle 2013; Daughtry 2015; Cusack 2008; Schwarz 2012), mobility and urban cartography (Stanyek and Gopinath 2014; Bull 2007), and space and urban environment (Born 2013; Peterson 2012; Ouzounian 2013; Ouzounian, Lappin, O'Grady 2018; Thibaud 2011; Revill 2016).

9 Bulut, "Cage and Care," *Dirty Ear Report #1*, 31.

10 Ibid.

11 Brandon LaBelle, *Acoustic Territories: Sound Culture and Everyday Culture* (London, New York: Bloomsbury, 2010), 200.

12 Salome Voegelin, *Sonic Possible Worlds: Hearing the Continuum of Sound* (London, New York: Bloomsbury, 2014), 3.

13 LaBelle, *Acoustic Territories*, 82.

14 Ibid., xxi.

15 Ibid., 82.

16 Anja Kanngieser, Michael Gallagher, and Jonathan Prior, "Listening geographies: Landscape, affect and geotechnologies," *Progress in Human Geography*, 2017, Vol. 41(5), 618–37. http://dx.doi.org/10.1177/0309132516652952

17 Kanngieser, Gallagher and Prior suggest this term to move from "human-centred listening" to an expansive mode of listening in geography whereby we can reflect on "geospatial practices – mapping landscapes, charting animal populations, understanding social configurations, investigating technologies of warfare and governance, monitoring earthquakes". Ibid., 618, 632.

18 See Rosi Braidotti's lecture, "Posthuman, All Too Human," Tanner Lectures on Human Values, Yale University, 1–2 March 2017. https://www.youtube.com/watch?v=LNIYOKfRQks; https://www.youtube.com/watch?v=OjxelMWLGCo Last accessed on 5 July 2017.

19 Diana Coole and Samantha Frost, "Introducing the New Materialisms," *New Materialisms: Ontology, Agency, and Politics*, eds. Diana Coole and Samantha Frost (Durham, NC: Duke University Press, 2010).

20 Ibid., 16.

21 Rosi Braidotti, "The Politics of 'Life itself', and New Ways of Dying," *New Materialisms: Ontology, Agency, and Politics*, eds. Diana Coole and Samantha Frost (Durham, NC: Duke University Press, 2010), 204, 206.

22 Ibid., 203–4.

23 Ibid., 206.

24 Ibid., 206, 208.

25 Ibid., 208.

26 Ibid., 210. It is worth noting the difference of "nomadic subjectivity" from the major discourses of biopolitics. Biopolitics, as largely discussed by Foucault and Agamben, refers to the government of the biological – such as the bios of the human body including its capacity, life, extension of life, birth, reproducibility, death etc. – by the procedures and operations of institutional power. For Foucault, there is no potential resistance of the anima against the discourse, or vice versa. Despite the influence of George Cangulheim

on Foucault – Canguilhem's account of knowledge "as a form of life," that is, "the knowledge that life produces" – the notion of the "politics of life itself" does not come across as a possibility in Foucault's view.

27 See Catherine Malabou and Carolyn Shread, "One Life Only: Biological Resistance, Political Resistance," *Critical Inquiry* 42, no. 3 (Spring 2016): 429–38. https://doi.org/10.1086/685601; *The Government of Life: Foucault, Biopolitics, and Neoliberalism*, eds. Vanessa Lemm and Miguel Vatter (New York: Fordham University Press, 2014); Nicolaer Morar, book review of V. Lemm & M. Vatter (eds.), *The Government of Life: Foucault, Biopolitics, and Neoliberalism*, *Notre Dame Philosophical Reviews*, Spring 2015, https://ndpr.nd.edu/news/the-government-of-life-foucault-biopolitics-and-neoliberalism Last accessed on 23 February 2018; Agostino Di Scipio, "The Politics of Sound and the Biopolitics of Music: Weaving together sound-making, irreducible listening, and the physical and cultural environment," *Organised Sound*, Volume 20, Issue 3 (Aesthetic Radicalism, Future and Past), December 2015, 278–89. https://doi.org/10.1017/S1355771815000205

28 Tim Ingold, *Being Alive: Essays on Movement, Knowledge, and Description* (London, New York: Routledge, 2011), 78, 79.

29 James J. Gibson, "The Theory of Affordances," *The Ecological Approach to Visual Perception* (New Jersey, London: Lawrence Erlbaum Associates, 1986), 127–47.

30 Ingold, *Being Alive: Essays on Movement, Knowledge, and Description,* 14–16, 78, 79. See also Ingold's reference to Deleuze and Guattari's *A Thousand Plateaus.* Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi (Minnesota, MI: University of Minnesota Press, 1987).

31 As Ingold explains, this meshwork is also informed by sociologist Bruno Latour's actor-network theory, "acteur reseau," a spider's web that transports information but does not necessarily connect points or functions like a communication network. Ibid., 84.

32 Ingold's line of thinking can also be considered in relation to studies in perception, ecology and music. In *Ways of Listening*, for instance, musicologist Eric Clarke discusses perception aligned with action and adaptation, forming a "self-tuning process" which demands the perceiving organism's "active and exploratory engagement with its environment." See Eric Clarke, *Ways of Listening: An Ecological Approach to the Perception of Musical Meaning* (Oxford: Oxford University Press, 2011), 19.

33 Ingold, *Being Alive: Essays on Movement, Knowledge, and Description*, 84.

34 Steven Feld, "A Rainforest Acoustemology," in *Sound Worlds*, edited by Patricia Kruth and Henry Stobart (Cambridge: Cambridge University Press, 2000), 173–200 and *Sound and Sentiment: Bird, Weeping, Poetics and Song in Kaluli Expression,* 1982, 1990.

35 Dylan Robinson, *Hungry Listening: Resonant Theory for Indigenous Sound Studies* (Minneapolis, MN: University of Minnesota Press, 2020), 45.

36 Ibid., 38.

37 Ibid., 47. See also Susan McClary, *Feminine Endings: Music, Gender, and Sexuality* (Minneapolis, MN: University of Minnesota Press, 1991).

38 As Jonathan Gilmurray outlines in *Environmental Sound Artists in Their Own Words*, the exploration of environmental sounds goes back to the Neolithic era, where humans sonically engaged with resonant spaces and rocks, and includes Tuva throat singing, rainforest songs of the Kaluli people, the water drumming of the Baraka pygmies, as well as representations of nature and bird sounds or urban noises in Western music history such

as in Beethoven's *Pastoral Symphony*, Messiaen's *Awakening of the Birds* and Edgard Varèse's *Ameriques*. Jonathan Gilmurray, "Introduction," *Environmental Sound Artists in Their Own Words,* eds. Frederick Bianci and V.J. Manzo (Oxford: Oxford University Press, 2016), xix–3. Writings on acoustic ecology, ecomusicology and ethnomusicology encourage environmental awareness and activism, socially responsible engagement and community, new conceptions and aesthetic practices, new reflections on culture and nature and on localities and global challenges, as well as re-configurations of past and future. See *Current Directions in Ecomusicology: Music, Culture, Nature*, eds. Aaron S. Allen and Kevin Dawe (London, New York: Routledge, 2015); Mark Pedelty, *Ecomusicology: Rock, Folk, and the Environment* (Temple, FL: Temple University Press, 2011), *A Song to Save the Salish Sea: Musical Performance as Environmental Activism* (Indiana, IL: Indiana University Press, 2016); *Art of Immersive Soundscapes*, eds. Pauline Margaret Minevich and Ellen Waterman (Regina, SK: University of Regina Press, 2013); Hildegard Westerkamp, "Linking Soundscape Composition and Acoustic Ecology," *Organised Sound*, Volume 7, Number 1, 2002, 51–6; Barry Truax, *Handbook for Acoustic Ecology* (Vancouver, BC: World Soundscape Project, 1978); Kay Kaufman Shelemay, *Soundscapes: Exploring Music in a Changing World* (New York, W.W. Norton, 2001). See also The Hearing Landscape Critically network, an interdisciplinary and international research initiative led by musicologist Daniel Grimley at the University of Oxford. https://hearinglandscapecritically.net. I had the opportunity to participate in one of the conferences and workshops of the network; my sincere thanks to my colleagues involved in the network for their kind invitation, and to Daniel Grimley, Jonathan Hicks and Michael Uy for their generous contributions to my thinking on the topic.

39 For John Luther Adams's essay on *The Place Where You Go to Listen*, and further description, see http://johnlutheradams.net/the-place-where-you-go-to-listen-essay/; https://www.uaf.edu/museum/exhibits/galleries/the-place-where-you-go-to/ Last accessed on 1 March 2018. See also John Luther Adams, *The Place Where You Go to Listen*. Wesleyan, CT: Wesleyan University Press, 2009. Oliveros's *Echoes from the Moon* and notion of "sonosphere" may also be considered in a similar realm. See also Douglas Kahn's *Earth Sound Earth Signal: Energies and Earth Magnitude in the Arts* (Berkeley, Los Angeles: University of California Press, 2013).

40 John Luther Adams, *The Place Where You Go to Listen*, 110–40.

41 Ibid.

42 Ibid.

43 Ibid.

44 *Far Field: Digital Culture, Climate Change, and the Poles*, eds. Andrea Polli and Jane D. Marching (Chicago, IL: University of Chicago Press, 2012).

45 Andrea Polli and Jane D. Marching, "Introduction," *Far Field*, 14.

46 Ibid., 11.

47 Ibid., 9.

48 See Cusack's project website: http://sounds-from-dangerous-places.org/index.html Last accessed on 23 October 2017.

49 Ibid.

50 Ibid. Sound artist Jacob Kirkegaard's *4 Rooms* has a similar context. Kirkegaard describes *4 Rooms* as a "sonic portrait of four abandoned rooms inside the 'Zone of Exclusion' in Chernobyl, Ukraine". Inspired by Alvin Lucier's landmark piece, *I Am Sitting in a Room*,

Kirkegaard recorded the sound of each room, played back the recording into the room, and re-recorded the playback. He repeated this process until, as he describes, "each room slowly unfolded its own unique drone of various resonant frequencies". That is, re-sounding the four rooms generated a voice of its own. See Jacob Kirkegaard's description: http://fonik.dk/works/4rooms.html Last accessed on 23 October 2017.

51 See the description of *Harmonic Bridge*. http://www.resoundings.org Last accessed on 25 February 2018. See also the description of the exhibition at Tate Modern, as well as the artist statement. http://www.tate.org.uk/whats-on/tate-modern/exhibition/bill-fontana-harmonic-bridgehttp://www.tate.org.uk/whats-on/tate-modern/exhibition/bill-fontana-harmonic-bridge/bill-fontana-harmonic-bridge-artists Last accessed on 25 February 2018.

52 See http://bruceodland.net/2017/07/07/harmonic-bridge-oa-1998-present/ Last accessed on 24 February 2018.

53 Ibid.

54 See http://bruceodland.net/2017/07/01/symphony-of-resonances/ Last accessed on 24 February 2018.

55 Seehttp://bruceodland.net/2017/09/27/oas-requiem-fossil-fuels-thessaloniki-documenta-14/ Last accessed on 24 February 2018.

56 See Veit Erlmann, *Reason and Resonance: A History of Modern Aurality* (New York: Zone Books, The MIT Press, 2010).

57 In relation to this idea, I wish to acknowledge the symposium, titled, Resonant Bodies: Landscapes of Acoustic Tension, which I co-convened with Claudia Peppel and Brandon LaBelle at the ICI Berlin in 2013. The symposium was funded by and realised in cooperation with the Volkswagen Foundation.

58 Bruce Odland's thoughts about the sonic commons, Goethe Institut Boston, published on 18 March 2015. https://www.youtube.com/watch?v=KvjeSAsEeMw Last accessed on 26 October 2017. See also the volume *Tales of Sonic Displacements*. My thanks to Ellen Flugge for bringing Q+A and *Tales of Sonic Displacements* to my attention. *Tales of Sonic Displacements: SoCCoS: A Sound-based Artist Residency Network*, eds. Julia Eckhardt & Luis Costa (Visea, Portugal: Tipografia Beira Alta, Q-02, DISK Berlin, Hai Art, Binaural/Nodar & CCA Ujazdowski Castle, 2016).

59 Ibid.

60 Antonio Negri and Michael Hardt, *Commonwealth* (Cambridge, MA: Harvard University Press, 2009), viii.

61 See Hardt's talk "On the Right to the Common," delivered at the Chicago Center for Contemporary Theory. Michael Hardt, "On the Right to the Common," introduced by Lauren Berlant. Chicago Centre for Contemporary Theory, University of Chicago, 16 October 2012. https://www.youtube.com/watch?v=lc4EuIng1_k Last accessed on 27 February 2018.

62 Negri and Hardt, *Commonwealth*, ix.

63 See Hardt's talk.

64 Ibid.

65 Ibid.

66 Ibid.

67 Ibid.

68 Pauline Oliveros, *Software for People: Collected Writings (1963–80)* (Baltimore, MD: Smith Publications,1984), 32–4.

Part 2

Electric

Embodiment of Voice as Skin

4

A Network of Speech: *Electrical Walks*

Cities are sonically vibrant. They both bridge and move people apart with identifiable and unidentifiable noises, depending on the socioeconomic and cultural circumstances in which they occur. Since the early twentieth century, composers and artists have dealt with urban soundscapes. The early and post-war avant-garde responded to industrial sounds by literally, artfully and musically depicting and/or transforming them. Experimental, interactive and participatory practices such as the sound walks and multimedia experiences have employed public spaces and concrete sounds for musical, aesthetic and social acts.

Composer and sound artist Christina Kubisch's *Electrical Walks* (2004–) explores the human body and urban environment as mediums for both musical and social composition. Kubisch points to the human body as a medium of sound and music making, as well as to the "city in the form of a concert".[1] I argue that *Electrical Walks* doesn't simply allow us to hear the infrastructure of the city and the invisible connections it sustains, but also creates a network of speech while mobilizing the participants to hear the feedback loops between speech and environmental sounds. In so doing, the walks contribute to an understanding of the making of internal and external voices in the midst of urban noises.

Electrical walks

Since 2004, Kubisch has been devising what she calls "electrical walks". A constant work in progress, *Electrical Walks* has taken place in various cities across the globe. At the time of writing this amounts to several

Figure 4.1 Christina Kubisch, *Electrical Walks*, Bremen, 2005.

dozen walks in Europe, North America and Southeast Asia. For each walk, Kubisch studies the electromagnetic fields in the city, which in some cases include shopping malls, security doors, ATMs and subways, often behaving as "in-transit" zones. She draws a map of the fields, and invites participants to explore them using a pair of wireless headphones that she has designed. The headphones have built-in sensor coils to pick up electromagnetic vibrations. Incorporating a speaker system, the headphones turn the vibrations into audible sounds. of which some are "musical",[2] Kubisch notes.

Provided with headphones and the map, walking through underground and in-transit zones, participants are encouraged to wander around musical and electrical signals. They extend their bodies and ears to the spots indicated on the map. As they move, they hear loud beats, syncopated rhythmic patterns, almost pitched sounds, sometimes white noise and sometimes nothing in particular. Indeed, it is not possible to tell exactly what each participant hears, as the bodily gestures of the

participants also determine the ways in which the sounds become audible and change their volume, texture, shape and rhythm. Kubisch's recordings demonstrate the sonic and musical palette of the walks. However, the frequency and amplitude levels of these palettes vary, depending on the urban design of each city and site, on what Kubisch calls "electromagnetic anthropology".[3] Despite the differences, the sounds appear "ubiquitous", as Kubisch writes:

> …The palette of these noises, their timbre and volume vary from site to site and from country to country. They have one thing in common: they are ubiquitous, even where one would not expect them. Light systems, wireless communication systems, radar systems, anti-theft security devices, surveillance cameras, cell phones, computers, streetcar cables, antennae, navigation systems, automated teller machines, wireless internet, neon advertising, public transportation networks, etc. create electrical fields that are as if hidden under cloaks of invisibility, but of incredible presence. The sounds are much more musical than one could expect. There are complex layers of high and low frequencies, loops of rhythmic sequences, groups of tiny signals, long drones and many things which change constantly and are hard to describe. Some sounds are much alike all over the world. Others are specific for a city or country and cannot be found anywhere else.[4]

Exploring the cityscapes through such sonic and musical palettes offers a different understanding of what we consider invisible and inaudible in the context of our daily encounters. We interact with the electromagnetic zones and communication technologies but do not think about how they sound and speak. Indeed, taking the walk and hearing the electromagnetic sounds may change the ways we think about and engage with the city. Attending to these sounds is both laborious and playful. It involves imagining a network of invisible speech among humans and nonhumans on a city-wide scale. The walks show, in Kubisch's words, how "nothing looks the way it sounds, and nothing sounds the way it looks".[5]

Christoph Cox asks Kubisch whether she suggests her electrical walks as a way to "call attention to the environmental and psychological implications of this electromagnetic web in which we live".[6] Kubisch's answer suggests both a "fascination" with the sounds of the electromagnetic fields and a warning to the listener to be aware of the increasing number of such fields. "I'm more interested in having people recognize what's around them by doing it themselves… I am worried about how these fields around

Figures 4.2–4.3 Christina Kubisch, *Electrical Walks*, New York, 2019.

us are increasing",[7] she responds. Thinking beyond the parameters of the walks, she also considers her ongoing interest in the relation between nature and technology. She exemplifies her experience of natural electricity during a thunderstorm using her headphones:

> This summer I put on my headphones during a very strong thunderstorm. There was no electricity, because all the power had gone out. But, when I recorded, I got the sounds of natural electricity, which was wonderful. The recording is so strange: very low, but very clear (Track 10). At two points, you hear voices. You can't understand the words, but you can tell that they are voices.[8]

An urban network speaks

Cities are topological structures, networks of both infra- and superstructures. The interaction across these structures emerges with the tension between distance and proximity, settlement and movement, flow and stop, connect and disconnect, containment and extension, and inclusion and exclusion. What makes a city a zone of co-habituation is perhaps this tension and its confrontational energy. As Henri Lefebvre posits, the specificity of a city "depends on relations of immediacy, of direct relations between persons and groups…and is situated at an interface, half-way between what is called the near order (relations of individuals in groups of variable size), and that far order, that of society, regulated by large and powerful institutions…".[9]

In this matrix of near and far orders, as Lefebvre posits, one never gets a full picture of a city, but rather walks through its matrix. Walking generates an embodied practice of mapping. It allows us physically and mentally to connect the points of extension, expansion and transition between near and far. It turns the city dweller into a "potential wanderer, a stranger who comes today and stays tomorrow",[10] in Georg Simmel's words. The stranger stays tomorrow but does not belong to a place, as Simmel explains. *Electrical Walks*, I suggest, creates the urge for participants to become a potential wanderer, a stranger of that kind. This urge derives both from the experience of the electromagnetic sites as transitional sites and from the amplified experience of electromagnetic vibrations as transient sounds.

Sound is a spatiotemporal phenomenon. It is fleeting. But, if what we hear is not a familiar or usual sound, the temporal appearance and

disappearance of sound may become more heightened. Depending on one's physical movement, electromagnetic sounds appear or disappear. Participants are invited to notice both the appearance and the disappearance of electromagnetic sounds rather than the information that they may carry. In this process, the physical environment becomes a negative space. Whilst not consciously picking up or hearing the electromagnetic sounds, other sounds that one passes by can become more audible. The disappearance of electromagnetic sounds thus leads to an attunement to the other sounds in the environment. Listening to environmental sounds, one is invited to explore the process of sensing the environment. In such an act, the headphones do not simply function as extended or augmented ears, which isolate and provide an inner escape; they also become navigators to amplify the acoustic environment of the electromagnetic sites.

Most of these sites, such as the shopping malls, security doors, transportation areas and wireless communication spots, are transitional. They are "non-places",[11] in sociologist Marc Augé's terms, that is, they do not evoke a sense of belonging or behave as a place. Non-places highlight the tensions embedded in the formation of cities as well as in the control of identities. Take, for instance, ATMs. Not simply a cashpoint or a point of money exchange, ATMs are also points of surveillance. Or consider shopping malls. One can understand shopping malls as spaces of compression, self-contained entities in which almost everything is included. Yet, as designed to seduce us into consumption and aspire to personal expansion through what we consume, a shopping mall could also be considered as a point of extension.

Within these sites, further to an economy of image and movement, there is an economy of sound. In *Acoustic Territories*, Brandon LaBelle mentions muzak and the role of music and sound in creating the ambience of shopping malls. LaBelle's discussion rather draws attention to the "sonic figure of feedback".[12] By economy of sound, I want to address LaBelle's suggestion of considering feedback in spaces of compression, extension and transition. Along with the musical moments, what could be the affective labour of being attuned to the noises of feedback? In an urban context, bodies of noise may include industrial noises, construction noises, automobiles and traffic, as well as the noises of wireless telecommunication devices such as radio and telephones.

Urban planners map such noises by graphically showing the sound levels associated with the corresponding areas. A noise map can also be devised to classify and demonstrate certain sound data, such as traffic and industrial noises, as modelled in particular areas of a city without referring to measurement of sound levels.[13] In both cases, noise maps are directly related to identifying noise pollution. Another way to map sound data is sound-mapping. Compared to noise maps, sound maps, especially the ones that are initiated by sound artists and researchers, do not necessarily classify sound levels. They rather examine the social organisation of sounds, as well as the role of sound in social organisation. They point to how we can creatively reconfigure a place through sound-mapping. Some recent highlights include the Favourite Sounds Project; Berlin Sonic Place, London Street Noises, the Belfast Sound Map, Recomposing the City, SONCITIES, and CRiSAP's sound-mapping and scoring projects.[14]

A good number of these projects comprise an online map that points to specified places and the field recordings that correspond to these places. Clicking the map and listening to the corresponding sounds can be considered an act of spatial reimagination. Another reconfiguration of urban environments is score-writing, which is linked to the notion of "spatial urbanism" from the mid-twentieth century. Spatial urbanism, LaBelle explains, "diffuses the built across a greater set of spatial and social coordinates that find support in the material and imaginary force of transmission".[15]

Discussions relating to noise levels or noise pollution are not excluded from these explorations. Quite the contrary, such interventions may scrutinize discursive and methodical categorization of noise. Sound maps, for instance, prompt us to revisit the social and historical framing of what counts as noise. Sound-walking and sound-mapping, as scholars, artists and practitioners remind us – Westerkamp, McCartney, Katrinem, Polli, Ouzounian and Flügge, to name a few – are not simply aesthetic but also political acts. Situationists and psychogeographers have already examined how walking, as an embodied and situated practice, reorders both the physical and the social environs. Sound-walking is no different. The use of field-recording technologies and choices of audition is an opportunity to review thresholds of hearing that may go unnoticed

and ways of listening that have become habituated, as well as to underline how the simultaneity of listening and walking can both fold and unfold a physical space.

Looking at *Electrical Walks*, I consider these critical genealogies and creative interventions. But I primarily investigate how buzzes, hisses or crackles of electromagnetic noises might speak, and how such noises can feed into hearing one's voice and the making of both an internal and external voice. Let me begin with the first question. Kubisch suggests the human body as a medium – a musical instrument – for actualizing electromagnetic noises without a necessary content or form of communication, and for recognizing and reconfiguring particular ecologies of vibration in an urban situation. To reiterate, some of the sounds recorded in the walks include "high and low frequencies, loops of rhythmic sequences, groups of tiny signals, long drones" and signals and frequencies that "change constantly and are hard to describe".[16] Imagine how you might experience one of these walks. As you walk and/or stop with others, you interact with various human and nonhuman bodies in the process of hearing electromagnetic sounds. Throughout, each participant in the area – be it human or nonhuman – including yourself, may operate as a body of noise, transmitting, echoing and moving with other bodies. In effect, bodies of noise speak in feedback. But what might they say? Does this speech transmit a necessary semantic content? Within the context of *Electrical Walks*, I approach this question in relation to the use of noise in telecommunication technologies.

Clicks and cracks of communication: telephone listening and speech

The feedback prompted by *Electrical Walks* leads to imagining the city in the form of a communication system. The system speaks through acts of both connect and disconnect. That is, the system speaks not simply through the co-operation of individual bodies but also through their failure of co-operation. The configuration of noise in telecommunication technologies is a relevant example of this point. Media scholar Jussi Parikka portrays the role of noise in digital communication models and culture.[17] Referring to Shannon-Weaver's mathematical model of communication, which includes "sender, receiver, channel, as well as noise",[18] he underlines

Figure 4.4 Christina Kubisch, *Electrical Walks*, London, 2005.

how noise has been regulated as part of transmitting an intended message. He writes:

> Even though noise is seen as coming from the outside and invading the mediating powers of a communicative act, it still is diagrammed in the same image, as an integral part of the system... Measurability of communication was achieved only through this move toward a-signification and the statistics of uncertainty that corresponded with information. In other words, in this particular model a totally predictable message included no information at all, whereas uncertainty equaled increased information…Looking for noise from even atmospheric conditions such as the sun or the weather became a top priority in electrical engineering. As the people at Bell Labs soon noticed, noise was everywhere.[19]

Drawing on this model, Parikka aligns noise with the "redundancy and uncertainty" of signals, which were considered functional as "characteristics of communication".[20] The science of cybernetics treated noise as a "temporary arrangement in a system" as well as "a message" itself to be

"mapped, controlled and constrained".[21] The control of noise, however, was subject to the "unstable forces of the physical world".[22] The concern about false alarms or "transmitting false intelligence" thus came to the surface, which echoed the prior concerns about the security of wireless transmission via radio as well as "the danger of *parasitizing*, of using telegraph networks for unsolicited goals",[23] as seen in nineteenth and early twentieth-century telecommunication technologies.

Let us pause for a moment: How could one ensure the delivery of a message in the way it was intended? Despite the increased security and performance of network systems, a degree of loss in translation is integral to any communication, to the extent that the "intentionality" of the sender's message or receiver's response may become irrelevant. In a way, the network itself speaks as well as the sender and the receiver. And the way the network speaks, its moments and points of connect and disconnect, is spooky. We may not always know who or what is really speaking. As Parikka comments, "it was as if the networks started to hallucinate for us, and hallucinations became automated program functions".[24] Telecommunication and recording technologies have generated a ghostly interaction across the bodies. This interaction has also pointed to the failures of network speech itself – to its hisses, buzzes, clicks, cracks and gaps as part of the communication.

During *Electrical Walks*, when electromagnetic signals become audible, participants hear the hisses, hums, buzzes, clicks and cracks of the network system. These noises are not necessarily instrumental or functional to the purpose of delivering or receiving a message. They can be loud and encompassing, but they can also be experienced simply as signals that draw attention to other bodies at the site. In effect, participants do not simply train their ears to electromagnetic sounds, but rather explore the network of speech of various bodies, be it visual, sonic, discursive or movement-based. The headphones can be imagined here as augmented ears, but the intimacy that they generate can be more akin to the intimacy of telephone speakers. Nevertheless, I want to differentiate these two different types of aural intimacy: the intimacy of telephone speakers versus the intimacy of headphone listening, as possibly experienced in audio stories or personalized music playlists.

When you listen to a piece of music or a personalized audio playlist with your headphones in daily activity, there is a degree of personal world

making, "a regulation of your mood"[25] based on the type of music you listen to. There is also a heightened embodiment of those you are listening to in isolation, stimulated by the experience of sounds inside your head. Listening to an audio story with headphones, you may be taken by the voice of the storyteller, by background sounds or by music included in the story, each with the power to help create a world. Such a world is not static. The headphone listening physically and mentally moves us. The experience can also be literally mobile, if one is listening on the move.

Imagine, for instance, sound artist Janet Cardiff's audio walks. Cardiff instructs participants to walk through particular sites, as they listen to the specific soundtracks that she has devised. The soundtracks include Cardiff's narrating voice and the concrete sounds that she has pre-recorded at these sites. Taking the walk, participants can embody Cardiff's soundtrack as personal and intimate on the one hand, and reconfigure the spaces that they walk through in a different order on the other. In effect, whilst walking and listening, participants distribute Cardiff's story in space and mobilize the perception of the space also through hearing Cardiff's soundtrack.

Such an act is an example of world-making and world-sharing, a case of making up a story connecting different times and spaces. *Electrical Walks* also employs walking and listening, but it does not necessarily lead to world-making. In this context, the intimacy of headphone listening stems from enabling us to hear inaudible and somewhat strange sounds as audible, hearing a distant body as if close by, like one may experience in telephone listening. Interruption and disruption are part of this listening. So are intrigue and awe. At times, it is possible to come across and pick up voices and speech from afar, as Kubisch mentions. It is also possible to confuse words and word-like speech sounds in the midst of network speech, again, like in telephone listening or speech. In his book, *Earth Sound Earth Signal: Energies and Earth Magnitudes in the Arts*, Douglas Kahn examines telephone listening as the first medium where "radio was heard", and the telephone as both "a scientific instrument to investigate environmental energy" and "an aesthetic device used to experience the sounds of nature."[26]

> The telephone listening sessions of Thomas Watson were a conjunction of wireless reception prior to wirelessness, engagements with an electromagnetic cosmos prior to scientific investigation, a noisy aesthetics of sound before the avant-garde, and electrical sound before electronic music.[27]

Similarly, the network speech – including sonic cracks, breaks or gaps – of *Electrical Walks* may be understood as "a noisy aesthetics of sound", in Kahn's words. Considering the network speech as such also reveals the city as a speaking body.

City as a speaking body

Sociologist Saskia Sassen suggests that cities "talk back" and "have speech".[28] With this suggestion, Sassen points to the "speech acts of the city"[29] performed by people, institutions and various urban spaces. In relation to these acts, she underlines the notion of "urban capability", which she defines as "an analytic borderland – neither simply urban space nor simply people",[30] but "their combination under specific conditions, in thick settings, confronting particular potentials and particular assaults that can generate speech".[31] To exemplify what she means, she sketches a mundane traffic scene in a busy city:

> A car, built for speed, exits the highway and enters the city. It hits a traffic jam, composed not just of cars but of people bustling around. Suddenly, this car is crippled. Built for speed, the mobility of the car is arrested. The city has spoken.[32]

As depicted in this scene, city speech underlines the "resistances and enhanced potentials" that emerge with the "interactive deployment of people, firms, infrastructures, buildings, projects and imaginaries".[33] City speech, Sassen writes, "is a capability to alter, to shape, to provoke, to invite, all following a logic that aims at enhancing or protecting the city's complexity and its incompleteness",[34] as well as the city's "possibility of making".[35] In other words, the point of city speech is not legibility, but its potential, action and force for configuring and adjusting to various modes of being and living in an incomplete fashion. The sensory experience of being in a city plays into this configuration.

The sensory fabric of urban environments, sociologist and urban planner Jean-Paul Thibaud posits, is interwoven with "social practices".[36] The sensory fabric gets crystallized with what Thibaud considers as ambience, an involvement of "the lived experience as well as the built environment of the place".[37] Ambience, Thibaud continues, is being "tuned, modulated, and framed".[38] We tune into an ambience, experiencing a "close affinity

between impressions and expressions, between what is felt and what is produced".[39] We "modulate" the ambience and the experience of ambience in alignment with the "affordances" of environment.[40] And finally, we frame the ambience through "social practice" as well as the "ecology of relations in public".[41]

These modalities inform both the formation of the sensory experience in an urban space and the transformation of an urban space through sensory experience. They also help articulate how sensory experience contributes to the making of city speech. City speech can be punctual, visible and performative. But considering its nature as an inherently incomplete process, we can also imagine city speech as a broader and invisible patchwork of expressions wanting be heard and recognized, as well as to retain their anonymity. *Electrical Walks* amplifies the sonic constituents of such a patchwork of expression. The walks facilitate a kinetic conversation with transitional sites that we pass or stop at, raising our awareness of the inaudible infrastructural sounds and drawing attention to how we act – how we "tune" or "modulate" our bodies – in these encounters. Wearing the headphones and performing a kinetic act, we may become visible to others. However, that does not make the interaction itself visible.

We interact with ATMs, security doors, phone booths, airport lounges, but we do not necessarily think about this interaction. Let me now crystallize the next question that I am asking: How do the sonic constituents of cities feed into internal and external voice making? In other words, how do the sonic constituents remain embodied, informing not simply one's aural perception of environmental sounds but also their voicing and speech? And how does one's speech become, in part, another's speech?

Speak up: hearing speech in noises

If you stopped by an ATM to withdraw cash and check your balance, you would simply follow the guidelines on the screen and possibly would not pay attention to the audio signals coming from the machine, unless the ATM was not working or your card was stuck inside it. If, on the other hand, you were attending one of the *Electrical Walks,* you would not simply stand in front of an ATM machine but move around it to hear the range of electromagnetic sounds emanating from it. You would lean away from or towards

Figure 4.5 Christina Kubisch, *Electrical Walks*, Birmingham, 2006.

from the machine, perhaps even touching the screen. As you moved, there might be flows and interruptions in the flows of sounds. These interactions would lead to a multimodal conversation between you, the ATM and the place where the ATM was sited. As you heard the electromagnetic sounds of the ATM, you might also imagine that the machine was speaking via the babble of electromagnetic sounds. How would you make up speech out of these non-speech sounds?

Recent studies in cognitive neuroscience, neuropsychology and speech identification demonstrate that humans tend to pick up speech sounds and make up words through non-speech sounds, even more so in noisy urban environments. Cognitive neuroscientist Sophie Scott argues that "human speech perception is complex and multi-stable; in the brain of a listener, no one acoustic cue determines the intelligibility of speech".[42] What constitutes the "intelligibility" of speech is already a debatable issue, suggesting the articulation of both the emotive and the semantic content of what is said as well as the physical and cultural context in which the

speech is heard. Neither transmission nor communication of speech is straightforward. Scott underlines the role of "auditory representation" in understanding speech. As she puts it, we understand speech not by following the "sequences of abstract phonemic categories" but by paying attention to the auditory information, which includes "acoustic and emotive" as well as "phonemic" features.[43] Perceiving "the auditory form of language",[44] Scott explains, we have a functional approach. There is a "contingent utility" and "flexibility" in the auditory perception of speech, she notes. This raises the question of how we hear.

Examining histories of speech audiometry and telecommunication technologies, historian and media scholar Mara Mills makes a similar point. However, reflecting on the contingency and utility of speech perception, she demonstrates a different story. In it, speech sounds are not triggered or shaped by environmental noises, but they are used as quantifiable measures that are divorced from environmental noises to "test hearing".[45] Mills's historical analysis shows several research tracks that "test hearing with speech".[46]

In the nineteenth century, "physicians and deaf educators such as Jean Marc Gaspard Itard developed their own speech hearing tests, often based on the distance at which particular words could be heard".[47] At the turn of the twentieth century, the phonograph, along with the voice, was used as a tool to test "useful hearing" in clinical contexts.[48] However, speech, Mills argues, "only seemed suitable for rough tests of hearing loss, not for testing the hearing of speech itself".[49] That is, speech is hard to measure, as it comprises a variety of contingent information such as the acoustic, vocal, and linguistic components of an utterance. Accordingly, the "test" for measuring the "range of speech sounds in a language…and a person's hearing loss…required the quantification of frequency content, loudness, and the nebulous factor of familiarity".[50] The quantification methods were also adopted and furthered in telecommunication technologies. As Mills explains, Bell Telephone Laboratories developed "quality testing", based on "phonetically balanced words and sentences".[51] Phonetically balanced words use phonemes that occur at similar frequencies in a conversational language. Bell Labs used "articulation tests" to investigate the "clarity" of "carbon telephone transmitters".[52]

Looking at these separate research tracks in relation with one another, Mills demonstrates how the clinical, pedagogical, technological and industrial contexts of measuring hearing via speech (and vice versa) constituted the notions of "useful" and "normal" hearing that we carry around with us in everyday life. The idea and practice of speech intelligibility are undoubtedly informed by such contexts. The "quality testing", Mills argues, "shares an epistemology with the origins of medical screening: establishing limits on variability, eliminating sources of extreme variance, and either 'junking' or rehabilitating those objects or people who fall outside the limits".[53] Indeed, "micro-measurement" of hearing and speech only reassured the "uncertainty" and contingency of "communication" and "articulation."[54] Yet it also generated "classifications" of what constituted "normal hearing and speech".[55]

Both historical and cognitive accounts address the uncertainty and flexibility of speech intelligibility, but they draw different conclusions about the impact of environmental noises on speech intelligibility. Mills's historical account demonstrates how certain educational, industrial and clinical contexts treated environmental noises as redundant variables that should be filtered so as to create a standardized efficiency or utility. The usefulness of cognitive and empirical approaches, however, underlines the active use of environmental noises and contexts for adapting to various auditory orders and vocal delivery of sounds and for speech intelligibility. In this paradigm, environmental noises are considered useful.

Scientists and engineers Marchegiani, Fafoutis and Abbaspour show that speech intelligibility and comprehension is more "successful" in "urban sound environments that are characterised by the presence of severe noise", and in "acoustic scenes where the ability to identify the speech is highly reduced".[56] Their study further assesses the impact of the "masking effect" – that is, informational masking, "the noise that perceptually interferes with the speech signal as part of the cognitive process", or energetic masking, "the noise that physically interferes with the speech signal in the acoustic setting" – and "target speech" on speech intelligibility and comprehension.[57]

Focusing on "traffic, construction work and car engine noise", the study "performs listening experiments".[58] The experiments combine the

noises with short stories for twenty individual participants who fall into the category of "normal hearing" and speak conversational English as a native or second language. Participants are asked to "randomly spot words from the stories and interpret the content".[59] Word-spotting prioritizes the "contextual weight"[60] of words. However, there is a preparatory procedure for the listening experiments. The authors introduce the participants to the stories in advance, combined with particular noises, so as to familiarize the participants with the overarching context, namely, "to emulate a natural environment", and "to avoid any surprise effect".[61] To measure word-spotting, the authors "apply image processing techniques to visual representations of the tempo-spectral content of the acoustic signals".[62] The results of the experiments demonstrate that word identification can be challenging "under excessive noise", but comprehension of content is not negatively affected by the environmental noises.[63]

Electrical Walks corresponds to the cognitive, historical and perceptual approaches of speech intelligibility in an intriguing way. Kubisch's headphones are kinetic instruments that can pick up speech sounds near and far, whilst the listening body interacts with transitory signals and environmental noises. The walks impact the cognitive, ecological and cultural perception of electromagnetic signals and environmental noises, and encourage participants to hear speech sounds in noises. But there is more to how *Electrical Walks* may interfere with speech sounds and hearing voice, especially with respect to the "variability", "flexibility" and "contingency" of hearing and speech intelligibility.

Environmental noises are a crowd of sounds. We can identify and group certain urban noises such as traffic or construction-work noises, as seen in the study noted above. Furthermore, we get familiar with the order of sounds that we hear in a particular physical and cultural environment, including the density of human voices and speech. However, none of this excludes the "surprise effect" of the variables of a sonic experience. Hearing electromagnetic signals, I suggest, falls precisely into the category of "surprise effect" that quantitative protocols of speech perception may fail to pick up. Here we can think about the surprise effect both in literal and in metaphorical terms. Literally, we walk through electromagnetic signals everyday. However, we are not familiar with how electromagnetic signals sound. We experience what Kahn calls, "lived

electromagnetism", that is, we are surrounded by electromagnetism, but we do not understand it well.[64]

It's electric: a poetic speech

The speech that electromagnetic signals evoke is possibly alien speech, a kind of poetic speech, one that does not follow a canonic language. Alien speech is not always a coded speech, unless we wish to translate it into a common language that we use. And poetic speech is not necessarily a dialogue. What poetry evokes is ambiguity, the uncertainty of meaning, which calls for movement, movement from a given position, from a given way of thinking, doing, saying and being. The uncertainty of electromagnetic signals may incite such a movement in our minds.

The signals that Kubisch's headphones amplify do not signify a specific meaning. These signals inform and incite the cognitive and cultural perception of environmental noise. They also feed into hearing non-speech sounds possibly as speech sounds. They trigger moments of mishearing and false alarm. The signals do not speak at us. They perform a non-dialogue. That is, we have a non-reciprocal but distributed interaction with them. Douglas Kahn reminds us of telecommunication technologies and "energetic environments" that participate in such a non-dialogue. He writes:

> The sphere of telecommunications technologies of telegraphy, telephony, and wireless resonated with energetic environments and received signals from terrestrial and extraterrestrial sources. Thus, receiving radio may mean that someone is listening but not always that anyone is sending.[65]

Electrical Walks performs a non-dialogue of this kind. Somewhere, someone is receiving signals. But they do not respond. Somewhere, somebody is sending signals. But they do not hear. There is a web of manifold bodies, matters and "energies", as Kahn notes. The walks then facilitate hearing this web of non-dialogic interactions and embodying the very enigma of communication. The walkers, the headphones, passages, in-transit sites are all active participants in amplifying and orchestrating such communication, beneath and beyond the bounds of any given language.

In her text on *Electrical Walks*, Rahma Khazam considers Christina Kubisch a sonic geologist.[66] This attribution is indeed telling, as electromagnetic signals and frequencies are embedded in the physical infrastructure of an environment. What Kubisch does is to map these frequencies, make them audible and embodied. In the process, the temporal engagements and encounters with such frequencies articulate the gradations, the infra qualities of both sound and space, and the ecologies that they collectively generate. The city is evoked as a concert of infrasounds, and the human body becomes a musical instrument that resonates with the city. But, as I have suggested, this process also leads to the imagination of both internal and external speech, that is, the kinetic and multisensory act of making a voice that speaks an unknown or a not-yet-known language.

Electricity gives way to poetic speech. The feel of *it's electric* can be translated as a state of thrill, of unknowing as well as decentring and forgetting yourself. This state provides the opportunity to pause, to question without presuppositions what is happening now, or to put it more directly, to notice and to question the presuppositions in the first place. The poetic speech of *Electrical Walks* leads to false alarms between voices and noises, between human and nonhuman bodies. This is not to suggest that the effect of this speech is a transgression of boundaries, a constant fluidity or a complete transformation. Electric or poetic speech, on the contrary, is a reminder of the existing boundaries and a medium to be affected otherwise.[67] Such speech creates the condition for critically reflecting on what constitutes these boundaries.

In *The Tone of Our Times*, Frances Dyson discusses poetic speech as noisy speech.[68] She writes: "Noisy and poetic speech, like the wind, like air itself, is open to mutation and resists fixation to a speaker, an object, an 'a.'"[69] This is what is at play in the speech that *Electrical Walks* offers: a resistance against the fixation upon a given voice or body. Or in Dyson's words, "a voice that is not a voice".[70] I have argued in this chapter that hearing electromagnetic signals through urban noises leads to hearing speech sounds, confusing the discursive limits and knowledge by which we understand the human voice and human language, similarly to sound poetry. "A voice that is not a voice" prompts us to review different ways of embodying voice. It makes a call for hearing the affective connections, the poetic and "noisy speech" common to humans and nonhumans, communicating at a

level beneath and beyond any given form of language and meaning. The call is also an opportunity to reconsider how we apply the labels, "this is my voice" and "this is not my voice". It is a reminder of the many voices that one carries, speaks with and through, often in a non-dialogic, distributed way.

Notes

1 Matteo Milani, "Walking in the City with Christina Kubisch," *Digimag*, issue 45, Sound, June 2009. http://digicult.it/digimag/issue-045/walking-in-the-city-with-christina-kubisch/ Last accessed on 4 August 2023.
2 Christoph Cox and Christina Kubisch, "Invisible Cities: An Interview with Christina Kubisch," *The song of the machines, Cabinet*, issue 21, Electricity, Spring 2006, 93–96. https://www.cabinetmagazine.org/issues/21/cox_kubisch.php
3 Milani, "Walking in the City with Christina Kubisch," 2009. http://digicult.it/digimag/issue-045/walking-in-the-city-with-christina-kubisch/
4 See Kubisch's description on her website. https://christinakubisch.de/electrical-walks Last accessed on 13 March 2023.
5 Ibid.
6 Cox and Kubisch, "Invisible Cities: An Interview with Christina Kubisch," 2006. https://www.cabinetmagazine.org/issues/21/cox_kubisch.php
7 Ibid.
8 Ibid., 94–5.
9 Henri Lefebvre, *Writings on Cities*, trans. Eleonore Kofman and Elizabeth Leas (Oxford: Blackwell Publishers, 1996), 100–01.
10 Georg Simmel, *The Sociology of Georg Simmel*, ed. and trans., and with an intro., by Kurt H. Wolff (Glencoe, Ill: Free Press, 1950),402.
11 Marc Augé, *Non-Places: An Introduction to Supermodernity* (New York: Verso Books, 2009).
12 Brandon LaBelle, *Acoustic Territories: Sound Culture and Everyday Life* (New York, London: Continuum, 2010), 168.
13 Regarding the acoustic and social constitution of noise levels in cities, see, for instance, Emily Thompson's well-known book, *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900–1933* (Cambridge, MA: The MIT Press, 2002).
14 For Peter Cusack's Favourite Sounds Project, see https://favouritesounds.org/about.php Berlin Sonic Places is a related project, also devised by Peter Cusack in collaboration with artists and researchers. In it, Cusack explores various soundscapes in Berlin with residents of Berlin, and in relation to other capital cities in Europe (https://www.crisap.org/research/projects/berlin-sonic-places-brief-guide/). London Street Noises is a research project initiated by acoustic ecology scholar John Levack Drever. The project takes its cue from a "1928 Columbia Gramophone recording, titled London Street Noise" (https://londonstreetnoises.co.uk/about/). Devised by composer and sound artists Pedro Rebelo,

Rui Chaves, Matilde Meireless and Aoghus McEvoy, the Belfast Sound Map is a project that engages with urban communities, soundscapes and everyday sounds in Belfast (http://www.belfastsoundmap.org/); Recomposing the City is a collaborative research project founded by scholars Sarah Lappin and Gascia Ouzounian. It draws attention to how sound and sound art may reconfigure our interaction with urban environments. The project also includes "score writing workshops," which probe the relation between "scoring and performing an urban space" (http://www.recomposingthecity.org/). SONCITIES is the acronym for the research project, Sonorous Cities: Towards a Sonic Urbanism, led by Gascia Ouzounian. The project examines urban ways of living and design through a critical inquiry of urban sounds (https://www.soncities.org/about). CRiSAP, the Creative Research into Sound Arts Practice, is a research centre at the University of Arts London. The research centre aims to investigate sound as an artistic practice (https://www.crisap.org/).

15 LaBelle, *Acoustic Territories*, 212.

16 See Kubisch's description of *Electrical Walks* on her website: https://christinakubisch.de/electrical-walks Last accessed on 13 March 2023.

17 Jussi Parikka, "Mapping Noise, Techniques and Tactics of Irregularities, Interception, and Disturbance," *Media Archaeology: Approaches, Applications, and Implications*, ed. Erkki Huhtamo, and Jussi Parikka (Berkeley, CA: University of California Press, 2011), 258.

18 Ibid.

19 Ibid., 259.

20 Ibid., 260.

21 Ibid., 261, 263.

22 Ibid., 263.

23 Ibid., 264–265, 266, 267.

24 Ibid., p. 270.

25 Music sociologist Tia DeNora gives a thorough account of how music regulates moods and becomes a "technology of the self" in her famous book, *Music in Everyday Life*. Tia De Nora, *Music in Everyday Life* (Cambridge: Cambridge University Press, 2000).

26 Douglas Kahn, *Earth Sound Earth Signal: Energies and Earth Magnitudes in the Arts* (Berkeley, CA: University of California Press, 2013), 1

27 Ibid., 4.

28 Saskia Sassen, "Does the City Have Speech?" *Public Culture* (2013) 25 (2 70): 209–21. https://doi.org/10.1215/08992363-2020557, 209.

29 Ibid., 210.

30 With this description, Sassen refers to Chapter 8 of her book *Territory, Authority, Rights: From Medieval to Global Assemblages*. See Saskia Sassen, *Territory, Authority, Rights: From Medieval to Global Assemblages*, 2nd edition (Princeton, New Jersey: Princeton University Press, 2008).

31 Sassen, "Does the City Have Speech?," 210.

32 Ibid.

33 Ibid., 211.

34 Ibid., 214.

35 Ibid., 209.

36 Jean-Paul Thibaud, "The three dynamics of urban ambiances," in *Sites of Sound: Of Architecture and the Ear*, Vol. 2, edited by Brandon LaBelle & Claudia Martinho (Berlin, LA: Errant Bodies, 2011), 43.
37 Ibid.
38 Jean-Paul Thibaud, "A Sonic Paradigm of Urban Ambiances," *Journal of Sonic Studies*. Issue 1. https://www.researchcatalogue.net/view/220589/220590.
39 Thibaud, "The three dynamics of urban ambiances," 43.
40 Ibid.
41 Ibid.
42 Sophie, S.K. Scott, "From speech and talkers to the social world: The neural processing of human spoken language," *Science*, 366 (6461), 2019, 58. doi:10.1126/science.aax0288.
43 Ibid.
44 Ibid.
45 Mara Mills, "Testing Hearing with Speech," *Testing Hearing: The Making of Modern Aurality*, eds. Viktoria Tkacyzk, Mara Mills and Alexandra Hui (Oxford, New York: Oxford University Press, 2020), 23–48.
46 Ibid.
47 Ibid., 28.
48 Ibid., 24.
49 Ibid., 37.
50 Ibid.
51 As Mills writes, "In 1922, researchers at the Western Electric (WE) and American Telephone and Telegraph (AT&T) branches of the Bell System produced an electronic audiometer, along with "area of sensation" charts that portrayed average curves of maximum and minimum audibility – based on tests with a few dozen subjects – for a series of tones selected from the piano scale". Ibid., 25, 27.
52 Ibid., 27.
53 Ibid.
54 Ibid., 43.
55 Ibid.
56 Marchegiani, L., Fafoutis, X., Abbaspour, S. "Speech Identification and Comprehension in the Urban Soundscape." *Environments*, 2018, 5, 56. https://doi.org/10.3390/environments5050056
57 Ibid., 2, 1.
58 Ibid., 3, 10.
59 Ibid., 2.
60 Ibid., 2.
61 Ibid., 4.
62 Ibid., 2.
63 Ibid.
64 Douglas Kahn, *Earth Sound Earth Signal*, 9.
65 Ibid., 1.
66 Rahma Khazam, "From Relational Aesthetics to the Lightning Field: Christina Kubisch's Electrical Walks," in *Wellenfang* by Christina Kubisch (Bonn: Fotografen und Skulpturenmuseum Glaskasten Marl, 2010), 39–54.
67 See the reference to Vicky Kirby in Part 1.

68 Frances Dyson, *The Tone of Our Times: Sound, Sense, Economy and Ecology* (Cambridge, MA: The MIT Press, 2014), 105.

69 Ibid., 96.

70 Dyson uses this phrase in her discussion on the sound poetry of poet and sound and performance artist Amanda Stewart. Stewart fragments words into phonemes and manipulates the vocalization of the phonemes with electronics. She creates "noisy speech," which confuses the limits of the human voice and evokes "a voice that is not a voice." Ibid., 98.

5

Speaking with Avatars

We all talk with ourselves, silently or out loud.[1] When you talk with yourself, internally or externally, how do you know that it is your voice that speaks? Where does your voice begin or end, mentally and physically? During the Covid-19 pandemic, some people who isolated themselves on their own noted that they began to talk with various things at home, be that a plant, a pet, an armchair or a TV set. Some people responded to this phenomenon with jokes: "If they don't answer, then you are fine." How do we draw the line between sanity and insanity, especially in a world which is constantly in crisis?

Indeed, this kind of self-talk has always been an important part of our mental landscape. As Brandon LaBelle writes, self-talk and inner voice are "always linked to the concrete world outside", and "hum along".[2] In other words, humans speak with nonhumans not simply via words but also via vibration and movement. Knowingly or unknowingly, we regulate and mobilize multiple bodies, which we speak with and which speak through us in different sensory forms. We have a non-dialogue, a distributed interaction with these bodies and voices. We recalibrate the hearing of a voice in the act of listening with others, including both humans and nonhumans.[3] In this chapter, I examine the non-dialogue and the recalibration of hearing voices, with respect to the experiences of voice-hearing in clinical and creative contexts. This analysis points to how the imagined realism of voice functions like skin.

I will address AVATAR therapy (created by Julian Leff in 2008), a specific procedure that "uses virtual reality technology to create a virtual embodiment of the voice-hearing experience, enabling the person to visualize their persecutory voice and engage in real-time face-to-face dialogue".[4]

Looking at experiences of voice-hearing and AVATAR therapy, I investigate the embodiment of voice as a network of many voices, the split between "my voice" and "not my voice", and the role of non-verbal interactions and noises in constituting a sense of voice and skin. I probe clinical and nonclinical experiences, and therapeutic procedures and creative interventions together. The suggestion is not to use creative interventions as a means of rehabilitation in clinical cases but to see how clinical and creative experiences can be observed on the same spectrum, highlighting everyday experiences. These proximities have already been explored, such as in AVATAR therapy's feature in the Wellcome Trust exhibition *This is a Voice*, curated by Bárbara Rodríguez Muñoz in 2016.

This is *not* my voice: embodiment of voice as a network of many voices

Let me begin by expanding on Frances Dyson's phrases, "a voice that is not a voice", a voice "that is taken to the extreme, an exercise in self-annihilation".[5] As discussed in the previous chapter, poetic, electric speech gives a way to such a voice. Poetic speech generates a non-dialogue, a distributed conversation, as well as a potential false alarm, mixing up nonhuman sounds and human voices, confusing ideas of who and what speaks, in effect, aligning human and nonhuman bodies. How might this alignment interrupt the moments of "this is my voice" and "this is not my voice"?

AVATAR therapy makes us think about this question, whilst dealing with cases where a voice is taken to the extreme, to a point of "self-annihilation" in Dyson's words. In common language, the word avatar may refer to an incarnated person or idea or a fictional and computerized figure. Avatar therapy engages with both meanings of the word. Researchers at King's College London, University College London and the University of Manchester developed this procedure for people with severe schizophrenia and auditory verbal hallucinations often deriving from traumatic and abusive experiences. The therapy is based on a special software program which allows the voice-hearers to "create an avatar of the entity, human or non-human, which they believe is persecuting them".[6] The program provides a catalogue of voices and faces, among which the voice-hearers choose their avatar face and match it with a voice. The catalogue represents faces and voices based on the descriptions of the voice-hearers:

The approach uses computer technology developed by the Speech, Hearing and Phonetics Department at University College London which enables each participant to create a visual representation of the entity (human or non-human) that they believe is talking to them. Additional software is used to transform the voice of the therapist to match closely the pitch and tone of the voice the patient reports hearing, the two processes finally being combined to produce a computer simulation (a virtual agent or 'avatar') through which the therapist can interact with the participant.[7]

The face helps to contain the voice, turning it into a reassuring external entity. The avatar voice is essentially the therapist's voice, but computerized it sounds like a stranger's voice. Participants are informed about the way the program works; however, throughout the sessions, they tend to perceive the avatar voice as the therapist's voice.

The avatar pretends to be a stranger, one that harshly criticizes voice-hearers with an authoritative tone and thus becomes the persecutor, which causes the hallucinations in the first place. For participants engaged in AVATAR therapy, the voices appear with concrete names and figures and as commanding actors. The idea of the therapy is to develop a dialogue between the persecutor and the voice-hearers, and gradually to change the persecutory voice into an approving and friendly one for the participant. This process aims at first externalizing and controlling the persecutory voice, and then transforms it into one that is supportive. However, the procedure introduces a "trialogue",[8] that is, the computerized voice, the voice-hearer's voice and the therapist's voice. The faces of virtual avatars reassure the participant that the voices are external beings, putting up a necessary boundary between them and the voices as a crucial part of their potential for recovery.

The results show that "several individuals' voices cease completely after a few sessions of the therapy".[9] Auditory verbal hallucinations, as described by psychiatrists, mean "hearing a voice or other sound in the absence of an external stimulus".[10] Voice-hearers designate these voices in a myriad number of ways:

…"resonant voices," "organ voices," "voices of conscience," "voices which do not speak with words," "false voices," "abortive voices," an "inner feeling in the soul," an "inward voice in the thoughts," something "between hearing and foreboding," "the brain talk[ing]," "voices in the whole body," "murmurings and natural

spirit-voices," "underground voices from the air," "telephone gossip," "good voices," and "whispering voices from the whole of mankind."[11]

Such descriptions already underline different forms and manifestations of voice, including various points of contact between speech and non-speech sounds, acoustic and mental noises, and the threshold between the sense of voice and not voice. AVATAR therapy deals with these experiences by giving voice-hearers the opportunity to externalize the voice that they hear, as attached to a computerized face and software agent. The end goal of both clinical and non-clinical experiences of voice-hearing is befriending voices or "voice-like" experiences.

Researchers observe that AVATAR therapy achieves "a sense of voice presence", that is, a virtual simulation that provides a sense of reality and of "being there".[12] In its gradual transition from persecutory to supportive, the avatar voice attempts to reinforce the voice-hearer's sense that "this is not my voice". This process undoubtedly helps to restore a functional sense of self, or at least reduces the heightened paranoia that stems from a loss of self. It gives the voice a skin, one that primarily acts as a boundary but ultimately also as a point of connection.

Voice skins

One could consider the artificial voices of AVATAR therapy as similar to the notion of "voice skins", as applied to digital technologies. Take, for instance, AI technology start-up Modulate, and "the real time voice changing software" Voicemod. Both generate computerized voices for people who want to modulate their identities for "social" or "creative" uses.[13] The founders of Modulate underline that the goal is not to create a false representation. The suggestion is rather to create "voice-wear", to find the best fit for your "chosen character with a different age, gender, or body type", "that match inhuman characters like orcs and robots".[14] Modulate employs this technology for online gaming and "player identities".[15] It promises a voice "that sounds authentic"[16] within this context, and it also intends to offer a certain agency in the making of voice and skin.

Voice skin is a synthetic construction, not so distant from the "virtual simulation of avatar voices" designed for therapeutic procedures.

However, the "Modulate's VoiceWear service" proposes to provide a "true voice and new identity" by employing "a nuanced control over emotion and prosody while effectively trying on a new set of vocal cords."[17] The premise is to enable exploration and "expression" of "different aspects of voice and identity" in online interactions.[18] Similarly, Voicemod encourages the participant to "decide how you want to be heard".[19]

Both Modulate and Voicemod articulate the voice as malleable matter, a technology of identity. Creators at Modulate take into consideration, for instance, trans gamers who may want to wear voices that they feel better suit their identities.[20] Likewise, gamers whose voices are classified with particular social markers, be they of gender, class, race or ethnicity, express interest in devising new voices for their player identities.[21] When you change your voice, do you become a new person? What does it take to become another? A new body? A new voice? I have echoed these questions in Part 1, drawing on the plasticity of voice as it interacts with environment – on how bodily representations and the sounds of voice change with an environment as well as resisting such change. Here, I ask these questions to underline how synthetic and avatar voices perform skin as an imagined realism of voice. Such a realism, I argue, crystallizes the experience of voice-hearing and the embodiment of voice as a network of many voices.

Voice-hearing

Thinking about the avatar voices of AVATAR therapy together with the synthetic voice skins prompts us to question notions of "voice hearing" in expanded terms. Voice-hearing, research psychologists Charles Fernyhough and Eleanor Longden explain, is not limited to cases of schizophrenia. As Fernyhough writes, "Voice-hearing is associated with a whole host of other psychiatric diagnoses, including epilepsy, substance abuse, post-traumatic disorder, Parkinson's disease and eating disorders."[22] Longden conceptualizes voice-hearing not as a "psychotic" but as a "dissociative phenomenon".[23] Cultural theorist Lisa Blackman suggests voice-hearing as a "technique of self-production".[24] Understanding voice-hearing in these terms, Blackman argues, "allows voice-hearers to

enact their voices as spirit-entities, abuse-entities, ecological-entities and trauma entities, for example, rather than as discrete disease-processes".[25]

Historically, voice-hearing has been understood as a spiritual power, as a neurotically charged or creatively embodied act, a medium of expression, as well as a technology of both voicing and sounding. Scholar Simon McCarthy-Jones brilliantly portrays these histories.[26] As he explains, in ancient Mesopotamia and Egypt, ghostly voices are considered a sign of bad luck. Auditory verbal hallucinations manifest themselves when there is "anything that could not be dealt with on the basis of habit, any conflict between work and fatigue, between attack and flight, any choice between whom to obey or what to do, anything that required any decision at all".[27] In ancient Greece and Rome, voice-hearing was associated with illness, delirium or fever, which distort the "appearances of things, sounds, and so on".[28] For Christian thinkers, both externally located – bodily – and internally located – imagined – voices relate to evil spirits, but a voice without words was considered divine.[29]

In early modern times, the rise of the court and the emergence of urban life in the sixteenth century, as McCarthy-Jones puts it, led to the autonomous individual and the notion of an inner self, which encouraged voice-hearers to attribute their own meaning to the voices heard.[30] In the seventeenth century, Locke's empiricism suggested "disorders of perception (such as hearing voices)" as "prominent signs of madness", which was then associated with "animality."[31] The empirical and rational approach towards hearing voices, McCarthy-Jones explains, "led to the seventeenth and eighteenth centuries gradually moving from a view of madness being associated with animality…to being associated with unreason".[32] The medicalization of hearing voices along with the secularized notion of the "autonomous self" created the dispute between the religious and the medical authorities, as well as the disputes among the religious authorities themselves.[33]

In the eighteenth century, the medical approach reduced the possible "cultural meanings" associated with hearing voices to a medical category, and hearing voices was examined with respect to "the nerves of the brain".[34] The nineteenth century, as McCarthy-Jones explains, demonstrated various debates about the treatment for hearing voices, including both the "physical" and the "moral" causes, as well as "moral treatment."[35] Contrary

to abstract ideas, Esquirol investigated the specific connections between the experiences of "brain changes" and hearing voices.[36] He examined the experiences of hearing voices alongside "seeing visions and similar experiences in other sensory modalities," and prompted the concept of "hallucination" as a comprehensive term that encompasses these experiences.[37] In the early twentieth century, following the footsteps of the birth of psychiatry and neurology, Eugene Bleuler coined the term, schizophrenia.[38]

The invention of the term schizophrenia underscores the experience of a split not simply in voice-hearing but also in verbal language. Psychoanalysis has dealt with the split in verbal language in different ways. For Lacan, verbal language, as well as the non-verbal, is associated with lack, desire, the missing object, causing a sense of incompleteness for the self. Freud, on the other hand, treats non-verbal vocal expressions as a positive symptom to restore the self. His talking cure imagines – almost presumes – a voice, which functions as a portal to the unconscious.[39] The British school of psychoanalysis – in particular D. W. Winnicott and Wilfred Bion – suggests the idea of "I" and "language" as connected to one another, whilst conceptualizing the "play" between self and objects as a "relational self".[40]

In none of these accounts are "I" and language the same or one. Voice can be considered an active site, a technology which performs both the split and the contact between the experience of the self and of language. It contains felt thoughts of a sensory experience, but gives way to inspiration – in its literal sense, to breathing in – and unreckoned sensation. It extends a feel and yet gives a form to the feel as it mediates word or word-like sounds. The question is how an embodied sound becomes or manifests itself as a voice. It is worthwhile considering the limits of knowing when a voice is heard as voice and which voice is speaking. These questions cannot be analyzed without examining the social context in which a voice is heard and qualified as a particular voice. This specificity reinforces an understanding of the emergence of voice in the act of performance.[41]

The questions concerning which voice is real and which imagined, and what speaks and who speaks, are thus aligned. In contrast to the discourse of psychosis, cultural approaches to voice hearing, such as Blackman's approach, encourage us to examine various experiences of voice-hearing in everyday life. Fernyhough and psychologist Angela Woods further this approach, whilst examining varied experiences of voice

in both clinical and non-clinical settings, intending to develop "systematic empirical research on the phenomenology of auditory hallucinations".[42] Their research explores the phenomenon as a common issue which is also experienced by individuals who have no psychiatric history. An early study relating to this approach was an online questionnaire presented to individuals whose ages vary between 16 and 84 years. Researchers asked the participants to describe their "voice" and "voice-like" experiences. Out of 153 responses among both psychotic and non-psychotic cases,[43] findings convey several characteristics of voices: "characterful (69%); not characterful (14%); recognized individual (22%); supernatural (16%); simple address (10%); no direct address (10%); commenting voices (12%); conversational voices (37%); commanding voices (5%); abusive and violent voices (35%); positive and helpful voices (30%); spiritual purpose (16%)".[44] What is most striking is how participants narrate the experience of hearing voices or voice-like sounds. The report lists several categories: "auditory, thought-like, mixed auditory or thought-like voices, external, internal, single, multiple, undifferentiated voices, voice as inadequate description".[45] Researchers of the study focus on the first three categories, as well as on the differences between "voices with somatic effects and the experiential complexities of characterful voices".[46] These categorizations portray a wide spectrum of voices, which manifest themselves in vocal, non-vocal, aural, non-aural and sonorous forms. Looking at various forms of voice within the context of both clinical and non-clinical experiences of voice-hearing brings to mind a common practice: self-talk.

Self-talk

There is a constant work of conversation, whether or not we engage with it. And conversation is not simply talking at or with someone externally. It is also a case of inner speech, a form of self-talk, hearing yourself in relation to others. Inner speech, Fernyhough writes, has been examined by a variety of disciplines for a long time:

> Philosophers have struggled…[with] how the mind can represent knowledge… Psychologists have set their participants reasoning tasks and asked them to speak their thought processes out loud for close analysis. Neuroscientists have tracked inner speech by recording electrical signals from the articulatory muscles of people who are thinking silently, or by stimulating parts of the brain and seeing how

language processes are affected. Writers.... have filled their novels and poems with verbal thinking, and their depictions of streams of consciousness.[47]

Internal self-talk, just like external talk, can be "self-regulating" and "self-motivating".[48] Fernyhough reminds us how self-talk – especially when performed in second- or third-person references as shown in psychologist Ethan Kross's research – can generate a necessary and useful distancing from the self. In other words, self-talk can ironically facilitate a useful decentring of the self.[49] Decentring the self is crucial for developing an awareness of others. It can also be a coping strategy, a tool for engaging with the external world and becoming more present in it, as well as for the possibility of creating another world.

The notion of "private speech" is a striking example of such a self-talk. Psychologist Jean Piaget, Fernyhough explains, understands private speech as "ego-centric", a kind of speech that does not intend to communicate a message to anyone. Self-talk in this paradigm does not trigger or enact any behaviour, but only complements the already existing act.[50] Another psychologist Lev Vygotsky, as Fernyhough notes, considers that private speech as a trigger that does play a role in forming an act. Vygotsky observes children talking with themselves out loud when they face some obstacle to their activity.[51] In this account, self-talk is not complementary but rather "functional" and "creative", so as to "change the course of [an] activity".[52]

These observations apply to adults as well. Drawing on Descriptive Experience Survey, Fernyhough's analysis points to how adults "compress"[53] meaning in inner speech and converse in various voices. Inner speech takes different forms in research findings: "dialogic, condensed (abbreviated), other people (hearing other people's voices), and evaluative (judging yourself)".[54] Among these forms, Fernyhough underlines "dialogic inner speech" as a form of creative thinking.[55] Likewise, one can find forms of creative self-talk in contemporary music. Take, for example, multimedia artist, composer and vocalist Pamela Z's live performance series, *Voci*. In it, Z samples vocal phrases and manipulates them with various other sounds using mixed media and gesture-based MIDI devices. She creates a conversation across different sounds, bodies and voices, whilst externalizing a stream of thought and movement

through them. As composer and performer Mary Mainsbridge writes, with these technologies, Z "heightens or obscures the character of the voice" and "explores the various roles of the singing and the speaking voice in communication and character signification".[56] Similarly, composer and vocalist Cathy Berberian's performance piece *Stripsody* portrays interaction among a variety of voices. In a theatrical way, Berberian characterizes singing in different musical genres varying from opera to pop music, and mimics animal sounds and the voices of comic figures of the 1960s. Both *Voci* and *Stripsody* are solo vocal acts. However, they manifest the creative processing and staging of many voices, continuously and discontinuously.

The staged interaction between these voices suggests a case of creative self-talk and inner speech. Drawing on these examples, I argue that inner speech is not necessarily dialogic. It is rather non-dialogic, pointing to the distribution of various voices to various bodies. Such a process mobilizes not simply the sense of my voice and not my voice, but also of voice or not voice, that is, the sense of where we locate a voice and how we make it present. The mobilization of a sense of voice significantly underlines the role of non-verbal interactions and the affinities between human and non-human sounds in making a voice, as well as the affective registers of sense making itself.

Is this a voice?

Recall the setting of AVATAR therapy. A face-to-face conversation, featuring three voices: a computerized voice, a therapist's voice and a voice-hearer's voice. In her work on the power of talk in a digital age, social scientist and psychologist Sherry Turkle stresses the need for face-to-face conversations. She starts her book with Henry David Thoreau's three chairs metaphor in *Walden*: "I have three chairs in my house; one for solitude, two for friendship, three for society."[57] The setting that Turkle depicts is similar to the "trialogue" of AVATAR therapy. Rather than writing, where we may have relatively more control over the delivery of the content, Turkle advocates for live conversation.

Conversation has its own demands for extension and derivation, as well as deviation and improvisation. Conversation is not simply

a dyadic situation. It facilitates being with one another in expanded terms. Likewise, face-to-face interaction draws attention not simply to facial and bodily gestures, but also to multiple time and space aspects of the interaction. What might be the work of avatar voices in expanding a conversation? In the context of AVATAR therapy, affective derivation of the avatar voices is based on verbatim speech and on the tone of voice, which is digitally manipulated in real time. Part-live, part-computerized, the avatar voices also bring to mind our interactions with digital assistants.

Most digital assistants talk but do not necessarily offer conversation. They are trained to respond to particular accents and verbal and linguistic patterns on the basis of a defined database of sounds, words and phrases. Machine speech is an artificial speech constructed out of both speech and non-speech sounds. This aspect is, as explained earlier, integral to human speech perception as well. Electronic voice phenomenon – hearing speech sounds and fragments in wireless transmissions and background noises, almost like a ghostly conversation – is a good example.

Electronic voice phenomenon (EVP) was first identified in the 1950s, when Friedrich Jürgenson claimed that he heard voices on the recordings of birdsongs. Early sound recording technologies – in particular telephone and radio, as scholars Sterne, Weiss, Kahn and Blackman discuss – have an impact on the idea of communicating with the spirits. But, we may also experience this phenomenon with different intensities in everyday life, amid the false resemblances between human and nonhuman sounds. Such resemblances are mobilized by the acoustic ecologies in which we participate.

Joe Banks's study on the topic, *Rorschach Audio*, examines electronic voice phenomenon as a case of "creative mishearing".[58] He refers to writer Shawn Carlson's account of psychologist Diana Deutsch's experiments. The experiments are as follows:

> Deutsch records the sound of a person speaking two neutral words, and creates a sequence in which the voice samples are reproduced in alternating stereo channels. Played back over stereo loudspeakers at 'dizzying' speeds, fast enough that the sounds remain recognizable as voices while scrambling their semantic context, the sequence produces what Carlson described as 'a pattern that sounds like language, but the words are not quite recognizable.'[59]

What is interesting here is Carlson's hearing of sound patterns as if they were language. Banks notes Swiss psychiatrist Hermann Rorschach's inkblot test, and the notion of auditory projection. To reinforce the idea of "mishearing" or "projection" he underlines how "most EVP techniques require not the removal, but the addition of noise to the basic input to improve the success of recordings".[60] Creative mishearing does not necessarily give us answers or confirm the accuracy of our first guesses about the bodies of sound but rather makes us ask questions about them: What are we hearing? Where is this sound coming from? Who is speaking? Is anyone there? Is this a voice?

This is a Voice, the exhibition curated by Bárbara Rodríguez Muñoz at the Wellcome Trust in 2016, echoes these questions. The exhibition featured video of the AVATAR therapy alongside works by composers and artists Joan La Barbara, Meredith Monk, Matthew Herbert, Anna Barham, Aura Satz and Mikhail Karikis. The works were also displayed next to "speech devices", "medical illustrations" and "ethnographic objects" associated with the human voice.[61] The suggestion of this curation was to reflect on different manifestations and ambivalent senses of the voice, especially with respect to the voice's "non-linguistic and non-verbal" capacities.

The exhibition explored voice in five sections: (1) "voice as original instrument" presented "pre-verbal sounds, the human larynx, as well as recordings of lullabies, and soundscapes that reveal ritualistic polyphonic singing"; (2) "melodic contours" emphasized the non-verbal, non-linguistic, gestural, tonal, rhythmic, textural and emotive aspects of the voice; (3) "strains of the human voice" pointed to the vocal production of sounds, as well as the tension between the voice and the body; (4) "egophony" focused on vocal identification and classification; and (5) "the unlocated voice" dealt with disembodied voices.[62] AVATAR therapy was exhibited in the last section, "the unlocated voice", along with "mythological sirens", Samuel Beckett's play *Not I*, and portrayals of "speech disorders, and historic attempts to humanise prosthetic, robotic voices".[63]

Drawing on the order of display, I want to explore the points of contact across the so-called clinical, everyday and creative voices, and to further consider the placement of AVATAR therapy in this web of voices. The idea of an "unlocated voice" is resonant with the therapy on the one hand, and conflicting with it on the other, as the therapy aims to externalize the

voices heard, precisely to cope with the disturbing experience of the disembodied voices.

Auditory verbal hallucinations are described as mental constructs, but voice-hearing is an embodied phenomenon, stemming from the traumas stored in and speaking through one's body. Avatar voices play a pivotal role in giving a body and a face to the disembodied and unlocated voices. Within the context of the exhibition, the video of AVATAR therapy can be considered like a bridge across the virtual, imagined, and real voices, as well as across the soundings of the voices – be they verbal or non-verbal.

With this bridging, the voice appears in a plural sense. The sense of voice, as well as its production, is shifted. The voice is not simply produced in the larynx or heard inside someone's head. One could embody the contours, shapes, intensities and densities of the voice in the listening body. One could probe various bodies of voice, through "affective or telepathic transfers",[64] as Lisa Blackman frames it. The task then is not to settle but to constantly ask whether "this is a voice". This questioning informs our relationship to self-talk. Again, self-talk is a non-dialogue. On the one hand, it reinforces a sense of self and other, on the other, it displaces the speaking voices of others to a marginal position in our consciousness. In so doing, it highlights the embodiment of the voice itself as a network of many voices.

Notes

1 See Charles Fernyhough, *The Voices Within: The History and Science of How We Talk to Ourselves* (London: Wellcome Collection, 2016); Ethan Kross, *Chatter: The Voice in Our Head and How to Harness It* (London: Vermilion, 2021).

2 Brandon LaBelle, "Inner Voice, Self-Talk," *The Lexicon of the Mouth: Poetics and Politics of Voice and the Oral Imaginary* (New York, London: Bloomsbury Academic, 2014, 2022), 89.

3 Relating to the recalibration of voice in the act of hearing, see Steven Feld, "A Rainforest Acoustemology," in *Sound Worlds,* 2000, and artist Aura Satz's project *Preemptive Listening*. https://www.iamanagram.com/PreemptiveListening.php Last accessed on 30 July 2021. See also Aura Satz, *Listen, Recalibrate* (New York: Friedman Gallery, 2018).

4 Mar Rus-Calafell, Thomas Ward et al., "The Role of Sense of Voice Presence and Anxiety Reduction in AVATAR Therapy," *J. Clin. Med* (2020), 9(9), 2748, https://doi.org/10.3390/jcm9092748; Tom K. J. Craig, Mar Rus-Calafell, Thomas Ward, Julian P. Leff, Mark Huckvale, Elizabeth Howarth, Richard Emsley, Philippa A. Garety, "AVATAR therapy for auditory verbal hallucinations in people with psychosis: a single-blind, randomised controlled trial," *Lancet Psychiatry* (2018), 5, 31–40, http://dx.doi.org/10.1016/S2215-0366(17)30427-3

5 Dyson, *The Tone of Our Times*, 105.

6 Julian Leff, Geoffrey Williams, Mark Huckvale, Maurice Arbuthnot & Alex P. Leff, "Avatar therapy for persecutory auditory hallucinations: What is it and how does it work?" *Psychosis* (2014), 6:2, 166. DOI: 10.1080/17522439.2013.773457.
7 Tom K.J. Craig, Mar Rus-Calafell, Thomas Ward, Miriam Fornells-Ambrojo, Paul McCrone, Richard Emsley and Philippa Garety, "The effects of an Audio Visual Assisted Therapy Aid for Refractory auditory hallucinations (AVATAR therapy): study protocol for a randomised controlled trial," *Trials* (2015) 16:349, 3.
8 See Rus-Calafell et al., "The Role of Sense of Voice Presence and Anxiety Reduction in AVATAR Therapy," 2020, 2748.
9 Ibid.
10 A. Woods, N. Jones, M. Bernini, F. Callard, B. Alderson-Day, Badcock, V. Bell, C. Cook, T. Csordas, C. Humpston, J. Krueger, F. Larøi, S. McCarthy-Jones, P. Moseley, H. Powell, A. Raballo, D. Smailes and C. Fernyhough, "Interdisciplinary approaches to the phenomenology of auditory verbal hallucinations," *Schizophrenia Bulletin* (2014) 40(4): S246-S254. See page S246.
11 Ibid.
12 Rus-Calafell et al., "The Role of Sense of Voice Presence and Anxiety Reduction in AVATAR Therapy," 2020, 1–2.
13 See https://www.voicemod.net Last accessed on 13 March 2023. In relation to the descriptions of voice wear technologies by Modulate, see "VoiceWear and Individual Identity," 17 March 2021. https://www.modulate.ai/blog/voicewear-individual-identity Last Accessed on 31 August 2024.
14 See Mark Nolan, "Voice Chat Moderation is More Than Mere Transcription," 16 November 2020. https://www.modulate.ai/blog/voice-moderation-is-more-than-mere-transcription Last Accessed 1 September 2024. Also see, "VoiceWear and Individual Identity," 17 March 2021. https://www.modulate.ai/blog/voicewear-individual-identity Last Accessed on 31 August 2024.
15 See "VoiceWear and Individual Identity," 17 March 2021. https://www.modulate.ai/blog/voicewear-individual-identity Last Accessed on 31 August 2024.
16 Ibid.
17 Ibid.
18 See "Unlocking the Power of Voice," 11 March 2020. https://www.modulate.ai/blog/unlocking-the-power-of-voice Last Accessed on 31 August 2024.
19 See https://www.voicemod.net Last accessed on 13 March 2023.
20 See "VoiceWear and Individual Identity," 17 March 2021. https://www.modulate.ai/blog/voicewear-individual-identity Last Accessed on 31 August 2024.
21 Ibid.
22 Fernyhough, *The Voices Within*, 129.
23 Eleanor Longden, "Dissociation, Trauma, and the Role of Lived Experience: Toward a New Conceptualization of Voice Hearing," *Psychological Bulletin* © 2011 American Psychological Association, 2012, Vol. 138, No. 1, 28–76.
24 Lisa Blackman, "Embodying Affect: Voice-hearing, Telepathy, Suggestion and Modelling the Non-conscious," *Body & Society*, 2010, Vol. 16(1), 164. DOI: 10.1177/1357034X09354356. See also Lisa Blackman. *Hearing Voices: Embodiment and Experience* (London: Free Association Books, 2001).

25 Ibid., see also Lisa Blackman, "Psychiatric Cultures and Bodies of Resistance," *Body & Society*, 2007, 13(2): 1–24.
26 Simon McCarthy-Jones, *Hearing Voices: The Histories, Causes and Meanings of Auditory Verbal Hallucinations* (Cambridge: Cambridge University Press, 2012).
27 See Julian Janes, *The Origins of Consciousness in the Breakdown of the Bicameral Mind* (Boston: Houghton Mifflin, 2000), 93. McCarthy quotes Jaynes. Ibid., 14.
28 McCarthy Jones, *Hearing Voices*, 18.
29 Ibid., 34–7.
30 Ibid., 38, 58.
31 Ibid., 47, 48.
32 Ibid., 48.
33 Ibid., 48. 52.
34 McCarthy-Jones, 55.
35 Ibid., 60.
36 Ibid., 61.
37 Ibid.
38 Ibid., 70, 71, 72, 73.
39 The references and ideas here are based on my Ph.D. dissertation and previous articles. See Zeynep Bulut, "La Voix-Peau: Understanding the Physical, Phenomenal and Imaginary Limits of the Human Voice Through Contemporary Music," Ph.D. diss., University of California at San Diego, 2011, 336–58; "Planes, Walls, and Bits of Sound: Healing a Voice," special issue on voice, eds. J. Martin Daughtry and Clara Latham, *Music and Politics*, X.2 (Summer, 2016). http://dx.doi.org/ 10.3998/mp.9460447.0010.205. Also, see Latham's chapter, "The Limits of Hearing: Historical and Contemporary Perspectives on Vocal Materiality and Expression," in the same issue, and Alice Lagaay, "Between Sound and Silence: Voice in the History of Psychoanalysis," *E-pisteme*, 1 (2008), 53–62.
40 See Donald Winnicott, *Playing and Reality* (New York: Basic Books, 1971); Bulut, "La Voix-Peau," 346–58; W.R. Bion, "Language and the schizophrenic," *New directions in psycho-analysis: the significance of infant conflict in the pattern of adult behaviour*. eds. Melanie Klein, Paula Heimann and R.E. Money-Kyrle, with a preface by Ernest Jones (New York: Basic Books, 1957). Also, see Bulut, "La Voix-Peau," 336–46.
41 See Zeynep Bulut, "Theorizing Voice in Performance: György Ligeti's *Aventures*," *Perspectives of New Music*, Volume 48, No. 1, Winter 2010, 44–65.
42 A. Woods, N. Jones, B. Alderson-Day, F. Callard C. Fernyhough, "Experiences of hearing voices: Analysis of a novel phenomenological survey," *Lancet Psychiatry* (2015) 2(4): 323–31. See page 323. See also Angela Woods (2013), "The Voice-Hearer," *Journal of Mental Health*, 22:3, 263–70, DOI: 10.3109/09638237.2013.799267
43 Distribution of demographics include schizoaffective disorder (16%), bipolar disorder (14%), no diagnosis (18%). Ibid., 324–5.
44 Ibid., 326.
45 Ibid.
46 Ibid., 328, 329.
47 Fernyhough, *The Voices Within*, 13.
48 Fernyhough's examples include tennis or cricket players talking with themselves out loud. Ibid., 40, 41.

49 Ibid., 45. See also Ethan Kross's book, *Chatter: The Voice in Our Head and How to Harness It*, 2021.
50 Ibid., 48.
51 Ibid., 49.
52 Ibid., 49.
53 Ibid., 62, 63.
54 Ibid., 64. We also use different pronouns of inner speech, as we talk with ourselves: "I, You, They," 65.
55 Ibid., 76, 100–01.
56 Mary Mainsbridge, *Body As Instrument: Performing with Gestural Electronic Systems in Live Electronic Music* (New York, London: Bloomsbury Academic, 2022), 76.
57 See Sherry Turkle, *Reclaiming Conversation: The Power of Talk in a Digital Age* (New York: Penguin Press, 2015).
58 Joe Banks, *Rorschach Audio: Art & Illusion for Sound* (London: Strange Attractor Press, 2012), vi.
59 Ibid., 29–30. On related topics, see also Diana Deutsch, *Musical Illusions and Phantom Words: How Music and Speech Unlock Mysteries of the Brain* (Oxford, New York: Oxford University Press, 2019).
60 Banks, *Rorschach Audio*, 31, 39.
61 See the detailed description of the exhibition via https://wellcomecollection.org/exhibitions/W31tHikAACgAP5gi; https://wellcomecollection.org/pages/Wuw0uiIAACZd3SPY Last Accessed on 1 September 2024.
62 Ibid.
63 Ibid.
64 Blackman, "Embodying Affect: Voice-hearing, Telepathy, Suggestion and Modelling the Non-conscious," 165.

6

Sharing a Skin

One important implication of understanding self-talk as an embodied network of many voices is empathy. Empathy is evoked, especially in a time of global pandemic, when we isolate in solidarity, or at the very least, when we need to configure the idea of isolation as such. We assume that it is viable for humans to put themselves in another person's shoes or, even more to be another. Humans have cognitive and social capacity for compassion, mutual exchange, altruism and cooperation. But putting yourself in another's position, let alone being another, may be more complicated than we think. Scholars of psychology, neuroscience, literary and political theory propose different accounts of empathy. I contend that the broadly conceived notions of empathy lead to the ethical problem of giving a voice to someone.

Instead of giving a voice or speaking for another, how can we empower others to speak for themselves, as Toni Morrison said? Instead of presuming that we can be another in actual, virtual or augmented terms, how can we acknowledge the limitations that we face in being another as well as in being with another? When you are supposedly another or becoming another, with whose voice are you speaking?

I raise these questions in the context of voice-hearing. Experiences of voice-hearing encourage us to consider the impact of embodied voice on empathy, as well as the embodiment of voice as a network of many voices, a sounding board acting like a skin. Alongside therapeutic procedures like AVATAR therapy, the interdisciplinary research networks Hearing the Voice[1] and Listening to Voices: Creative Disruptions with the Hearing Voices Network[2] engage with the experiences of voice-hearers in collaborative and creative ways, employing sound composition, collaborative writing and interactive media.

Both networks introduce manifold contexts and degrees of voice-hearing not as pathology but as varied experiences. With this intention, the research networks facilitate interactions among scholars, creatives and voice-hearers. In this chapter, I will discuss two creative works, *The Isle is Full of Noises*, commissioned by Hearing the Voice Network for the exhibition Hearing Voices, and *Listening to Voices*, composed as part of the Listening to Voices Network. As associated researchers of Listening to Voices write, we need to explore "why and how we silence voices in ourselves or others and how we might help increase understanding about the experience of hearing voices".[3] I will consider these questions by exploring the impact of embodied voice on empathy, on sharing a reality, sharing a skin.

The Isle is Full of Noises

"Fragmental accumulation…you can't describe the experience…" So begins *The Isle is Full of Noises*, "a sound and animation installation that explores what it is like to hear voices".[4] Devised by composer and arts and health researcher Victoria Hume in collaboration with Shannan Taylor, Judy Christian and Tamsyn Adams, the installation was "largely based on a workshop held in summer 2016 in Durham with people who hear voices".[5]

Hume suggests the installation as an outlet for "unreal experiences" that "result from involuntary creativity", which, in effect, "tell us about ourselves and the world".[6] For eighteen minutes and twenty seconds, this animation video portrays audio clips and drawings from the workshop, ambient sounds, original music and artwork.[7] Throughout, the video releases a stream of superimposed voices, images and sounds. The audio includes workshop participants' descriptions of voice-hearing. The original music, which is mainly Hume's songs featuring guitar and voice, use lines from these descriptions. The songs either accompany the images and the participants' vocal descriptions and utterances, or act as chapter markers between different themes. In both cases, the songs mingle with the speaking voices.

Excerpts from the descriptions and the songs include: "…when I'm tired… spinning reveries…confusion of the noise with voice…the phrases tend to be repeated as well…why is this voice telling me that?…sometimes

I hear things that I don't even know what they mean…".[8] Percussive background sounds and pointillistic visuals accompany these phrases. The visuals look like a star constellation when not directly associated with the words or with the corresponding image. At times, words are also fragmented. They can be confused, as this phrase shows: "power…or it could be flower…".[9] At the core of such "fragmental accumulation", to reiterate one of the participants' expressions, there is a cross and multisensory embodiment of the voice. Voices appear and speak through the internal organs. "…It gets more and more frightening…and then this voice stopped coming in…it was coming from my stomach…" says one of the participants.[10]

It is possible to group these phrases into themes: fragmentation in and out of language and body, self-worth, and the role of music in connecting or mobilizing voices and bodies. Despite their differences, these themes interact with one another. Severe degrees of fragmentation lead to the appearance of voices, which can be both harsh and friendly, reinforcing the sense of a loss of a boundary to the self. Self-worth thus becomes a "commentary", more than a currency, as echoed in this remark: "I have a constant commentary, if people are thinking how stupid and horrible I am…night-time voices…but during the day they are good…they told me that I'm a good person…".[11]

The lyrics of the song, "it is all suspension…all suspension",[12] and the accompanying drawing in the video, a circle containing blue water, are telling. The water flows in a circle. With repetitive guitar arpeggios, which are louder than the vocals, the song continues: "…doesn't matter how we build our bonds to face the day…".[13] The songs glue the voices, not to delete or merge them but to amplify their distribution to both appearing and disappearing bodies, be they bodies of sound, words or images. Music comes to the surface as an important topic in the mix of such appearances and disappearances.

Just after a brief section where we see marching people and hear a marching band,[14] the video introduces some of the participant commentaries on music:

music connects people…so many different voices…your mind…changes when you're depressed and the happy thoughts that I associate with those songs then become bad, because when I don't see that person, when I can't speak to that

person…so the only way to do that is to shut down the music, because it has so many connotations……I don't generally listen to music as it makes me cry….[15]

Music moves the bodies of voices and mobilizes emotions. It also disturbs the possibility of externalizing the voices. *The Isle is Full of Noises* externalizes voices. Such an externalization, however, distributes the voice as well as the sense of voice, rather than containing it with a face. Music reinforces this distribution. The distraction noted in the comments above evokes unexpected and transitory associations across the various voices that voice hearers hear and the various bodies that they give to these voices. *The Isle is Full of Noises* mingles and moves "the voices and thoughts" in that fashion.[16] In so doing, it also bridges different experiences of voice-hearing and provides a positive note: "…we are people, and this voice-hearing thing is just a tiny part of that… [laughter]…The End".[17]

Listening to Voices

The binaural sound piece devised by composer and sound artist Pedro Rebelo presents an audio narrative in four parts. Introduction portrays voice-hearers' brief narratives about the experiences of voice-hearing. It begins with a mass of voices, which sounds like a speech bubble. Background voices and concrete sounds accompany the narratives. The sounds "stop" when voice-hearers use the word "stop".[18] They merge into a loud and distorted sonic mark, when the next voice-hearer's introduction begins. The short narratives point to when, how, where and why experiences of voice-hearing have started and/or evolved. The background sounds depict, disrupt, blur and shape the speaking voices. "I would go right back to my childhood…I used to take my voices…bad thoughts…", one of the participants notes.[19] A recurring signal noise interrupts his narrative.[20]

The second section, the Lab, begins after this narrative. Traffic and speech noises envelop the speech fragments: "The voice is…I convinced myself that I'll die at a very young age…as they will finish me off…With me I have central characters…I called the voices visitors…Sometimes… when I'm stressed I hear my name really firm…".[21] The noises such as horn sounds gradually get louder, multiplied and translated into tones.

Along with rhythmic beats, we hear another participant's remark: "I call it inside…"[22] The Lab becomes a conversation across not only many voices but also many sounds. It is not clear which one incites the other. But there is a theatre of characters, a sense of everywhere and nowhere that is triggered by the (dis)embodiment of both voices and sounds. A few participants explain this effect referring to supernatural forces: "…When you're in a room when that's happening, it's like everybody in the room… telepathic…"[23]

The third section, Restaurant, reflects on telepathy in an indirect way, pointing to the possibility of connecting voices via signals. Restaurant employs concrete ambient sounds as well. What we hear in this section is background music and kitchen sounds.[24] The selected narrative fragments address signal noises, which, as one of the participants describes, "act" like a "basis…for a conversation".[25] The phrases get distorted, echoed, delayed, repeated and multiplied in the sound composition. In line with the literal and sonic theme, another participant adds: "You can tell that it is not a vocal voice…it's like…a sort of voice like…[high-pitched whistle]…[monstrous noise echoing]…[monstrous noise and high-pitched whistle]…".[26] In both the Lab and the Restaurant, Rebelo and the participants explore the connections between "voices and the acoustic environment".[27] They not only search the possibility of voice and speech through signals,[28] they also demonstrate how a voice can be embodied through such noises. The last part, "Night", is an improvised investigation of "the role of positive thoughts on voice-hearing".[29]

Empathic hearing of voices

Like *The Isle of Noises*, *Listening to Voices* presents a fragmental narrative ending on positive thoughts and voices. However, *Listening to Voices* also challenges ideas about voice-hearing together with those of empathy and communication, while commenting critically on different intensities of voice-hearing. In addition to the sound composition, the research project includes a companion piece, titled *Listen If You Dare*, which is co-convened by the Hearing Voices Network and related groups from across Scotland, Northern Ireland and Ireland.[30] The companion piece is a collaborative and performative intervention. Collectively written by the researchers and

voice-hearers, the text presents reflections, questions, objections, corrections and provocations from multiple voices. Voice-hearers' interventions are indicated in bold, in between the lines, as part of the text and footnotes. The interventions raise questions about the concepts, terms and actors we assume to be involved in voice-hearing, as well as personal responses:

this companion was co-authored in conjunction with the Hearing Voices Network and related groups from across Scotland, Northern Ireland and Ireland. These are loosely affiliated networks of locally-run self-help **do you use this description 'self-help' to make us more dismissible? Pop-psychology nutters?** groups who believe in addressing voice hearing as a form of common human experience yes! That's it! and aim to find ways of listening to and living with voices. You can explain this as nicely as you want but you'll never fully understand it.[31]

"You'll never fully understand it" is not a prematurely personal response or an impulsively negative shout. It is a critical call to re-examine our habituated conceptions of understanding, empathy and "shared reality". In the section called, "How to cope with voice hearing", a voice-hearer alerts us to this danger of making assumptions:

Whose shared reality? Who's to say any two people experience themselves and their lives in a similar way? All we have are words with which to describe our experience, and the hope that they might resonate with the person who hears them. What a risk it is to speak in the hope that we will be understood.[32]

We do not have only words; but, in part, I wish to echo the statement above. Whose shared reality are we talking about? We all want to be heard and understood. And yet, we do not necessarily or fully understand one another. What we share is a stream of multiple times and spaces. We often have an epiphany at a particular time and place, being reminded of what we thought we had understood before.

During the Covid-19 pandemic, I talked with one of my childhood friends. She told me about the difficulties of home schooling during the pandemic. "I don't expect you to understand me," she said. I was listening to her attentively. And yet, I would not be able to understand her fully or put myself in her shoes. I do not have kids and have been a solo traveller living in multiple continents for over 19 years. We have different life choices and surroundings. But do I need to be exactly in the same physical and mental state to understand her, to share her reality? The point is that

even if I lived the same reality that she described, I might not be able to understand her fully.[33]

We hear one another through our own wounds and then only partially. When we listen to another, we hear the voice that speaks in our mind and body, among many other voices that we carry, knowingly or unknowingly. We can take a leap of faith and suppose that we understand each other. But we may be better off if we accept the limitations and suppose that we may not share the same reality, that we may not know what the other is living or going through. We can then make space for conversation and shift our hearing. My friend did not expect me to understand her. But regardless, she kept talking. I did not expect to understand her, but regardless I kept listening. We may be frustrated with the fact that no one truly understands or hears us, or that someone imagines that they understand us when they don't. There is no full translation or hearing of anything. We can only connect in parts. We can only be a sounding board that both echoes and diffracts.

I consider this sounding board in the form of skin, a surface that does not simply operate with words. We have sensations, affects, feelings and chills that we never put into words. We interact not only through words but also through non-verbal cues and sensations. The sounding board is a cross- and multisensory surface that both connects and differentiates. Such a surface may not always be visible. It may not always show scars, layers, figures but instead a manufactured flawlessness. The surface may rather be an invisible yet felt patchwork of various voices and noises. The sounding board may be a compacted and wavy surface.

Thinking about this surface pauses the fast-forward notions of connectivity as well as the fantasies about complete metamorphoses of the body and self or of becoming another. As discussed in Part 1, readings on post-humanism, affect and virtual reality deal with the possibility of a complete metamorphosis of the body, of a continuous and generative becoming. At the heart of these discussions, there is an examination of empathy across the bodies of all kinds. Empathy is a complex notion. It has different meanings in different contexts and disciplinary conventions.

In a recent volume on the subject, cultural and literary scholar Sigrid Weigel warns us about the diverse and potentially ambiguous implications

of the concept of empathy. Addressing empathy, she writes, "it is by no means clear whether we refer to the same concept, capacity, or attitude".[34] Empathy could refer to "an interdependence of the members of certain species", "a human attitude towards the emotional state of the other" or "a mode of altruism, and intersubjectivity".[35] As a neurobiological term, Weigel explains, empathy is a result of early twentieth-century empirical psychology. In 1908, British psychologist Edward Titchener used the word to translate the German term *Einfühlung*, meaning "feeling in/into".[36] Deriving from nineteenth-century aesthetic theory, "feeling into" indicates "animating" a mental abstraction of a scene or emotive state via "vivid imagination".[37] Contemplation of a painting, a song, a text, or observation of everyday actions and behaviours can be considered triggers for such imaginative acts. Studies on mirror neurons[38] propose related empirical evidence.

Vittorio Gallese, one of the prominent scholars of embodied cognitive science and mirror neurons, suggests that humans can develop "embodied simulation",[39] while observing another's behaviours and emotive responses or contemplating an artwork.[40] Gallese argues that "the discovery of mirror neurons" provides "empirical evidence" for "intercorporeality", that is, "the mutual resonance of intentionally meaningful sensorimotor behaviors".[41] Gallese refers to basic behaviours, but considering the "relational nature"[42] of human actions, he underlines the role of mirror neurons in developing a mode of intersubjectivity.

The impact of mirror neurons on intersubjectivity and empathy, as well as on speech and language perception, is still debated.[43] The question is not simply embodied simulation or animation but whether or how we make sense and use of them for being and living together. Take, for instance, virtual reality experiments. VR researchers and industries create immersive environments in which one can physically, sensorially and mentally experience another's reality.[44] The suggestion of VR is to enable people to embody another's physical, mental and cultural state, and to raise understanding and empathy for others.

The content of VR products, as literary scholar Lisa Nakamura explains, often includes "representations of people who are suffering and/or disadvantaged".[45] Despite the "promise of social connection",[46] and the presentation of "VR identity" as "anti-racist and anti-sexist",[47] these products,

Nakamura argues, create "an artificial empathy machine",[48] which, in effect, perpetuates social marginalization. The issue is that the creators of these contents speak for the marginalized people, whilst prioritizing the so-called "direct sensory experience of the suffering".[49] Nakamura writes: "You cannot trust marginalized people when they speak their own truth or describe their own suffering, but you have to experience it for yourself, through digital representation, to know that it is true."[50] The truth is, one can access and translate another's experience only to a certain extent, and whether or how sensory immersion suffices to change human attitudes and thought patterns, and potentially heals systemic inequalities remains as a question.

The body knows. The body endures. The body repeats and insists. The body both stores and moves. The bodily work, more than words, as Bessel van der Kolk suggests,[51] may help us recover from traumas. Sensory immersion no doubt has a cognitive and affective impact on how we feel, think and choose to be. But the bodily work also articulates the body as a limit. And acknowledgement of limits and limitations is crucial for the notion of empathy, precisely for shifting one's presumptive knowledge and habits and for hearing another perhaps with a less familiar voice. The bodily work prompts us to consider empathy as also being aligned with distance.

Historically, psychoanalysis approaches the notion of empathy at a distance. The word empathy, as psychoanalyst M. Leuzinger-Bohleber explains, "was theoretically tabooed for a long time"[52] in psychoanalysis:

> Although most psychoanalysts agree on the relevance of empathetic communication including "listening with the third ear" (Theodor Reik), that is, the professional perception of and reflections on unconscious information exchanged between analysand and psychoanalyst, the term "empathy" seems to have remained a taboo in psychoanalytical literature for a long time. One of the reasons might have been that many psychoanalysts feared "empathy" could be used in an idealistic and idealized way, thereby harmonizing the existential and often destructive dimension of unconscious wishes, conflicts, and fantasies, and their enactments in the psychoanalytical situation. Psychoanalysts have thus preferred to talk about, for example, transference and countertransference, projection and projective identifications, "rêverie," or holding and containing, in order to characterize unconscious communication in the psychoanalytical situation…[53]

Following this genealogy, in the 1950s and 60s, psychoanalyst Heinz Kohut drew attention to the notion of empathy as "vicarious introspection".[54] In

his talk at the 5th Conference on Self-Psychology at Berkeley, CA (1981), Kohut underlines the possible dangers of using empathy for "vaguely defined support measures",[55] for emotionally manipulating another not simply for "kindness" but also for "hostility".[56] As he posits, one could put themselves in another's shoes for both "therapeutic" and "beneficial" purposes.[57]

Kohut particularly emphasizes how we can revisit empathy for therapeutic purposes, addressing disintegration anxiety, that is, "a complete loss of self and sense".[58] In a case of disintegration anxiety, Kohut argues, it does not suffice to say "I understand you" or "I hear you".[59] Instead, Kohut suggests that an empathic act requires "interpretation", and interpretation is not necessarily an "intellectual construct".[60] Interpretation is a "kinaesthetic"[61] effect. It is reflective of the intrinsically connected neural, mental and physical senses of the self and its environment.

Similarly, I consider empathic hearing of voices. Listening to another, we mimic and incorporate another's voice, and project various other voices.[62] Listening to another, we do not necessarily resolve or merge subjectivities. We rather both attend to and deviate from one another, perhaps in an inevitable and generative way. In the case of voice-hearing, it is possible to observe a degree of disintegration anxiety, a deviation and a level of interpretation. The non-dialogue, the embodied network of many voices, especially as seen in the creative works discussed above, manifests a therapeutic context of empathy. The embodied network of many voices articulates the presence and importance of distance in an empathic connection. It draws attention to the awareness of interpretation, of giving a kinaesthetic account of something rather than a given understanding. Such distance and awareness are ethically crucial.

Performance artist Rose Parekh-Gaihede argues that "empathy and distance are not in opposition to each other and that empathy in a performance can appear as a sudden break".[63] She underlines how narratives may also generate distance, one that is not always "translated" into "recognizable emotions".[64] Referring to Slavoj Žižek and Emmanuel Levinas, Parekh-Gaihede notes the ethical importance of such limitation.[65] For Žižek, narratives cannot be fully understood and translations are destined to "fail".[66] For Levinas, there is a need to "not to possess" the other, as there is always "otherness", the other of the other, which we cannot fully access.[67]

Performance work makes us aware of different degrees and ways of accessing others. The connection a performance provides may be immediate or less than immediate; regardless, this connection is not necessarily given, expected, presumed or translated. Acknowledging a limitation there is in accessing another is part of constituting this connection. Drawing on performance work, Parekh-Gaihade thus asks how we can empathize without "presuming" a given "understanding" or without "imposing" on the other.

The creative interventions devised for the hearing voices networks that I discussed above highlight this ethical position. They show the importance of "maintaining a distance" as a form of "ethical awareness".[68] *The Isle Is Full of Noises* employs songs, visuals and animation not simply as a tool of continuity across the verbal narratives of voice hearers. The songs, visuals and animation condense some of the experiences and comments on the one hand, and mobilize and distribute them on the other. *Listening to Voices* uses concrete and ambient sounds to weave a texture, rather than a body of voices. The audio compositions present verbal narratives and utterances as part of this texture. They point to how experiences of voice-hearing evolve with background noises, silences and sounds. As mentioned in some of the remarks, some sounds and signals function like a surface effect both for the appearance and for the disappearance of a voice. They play a role in embodying the voice in both concrete and abstract forms, in both proximity and distance.

Thinking through the embodied network of many voices, then, alerts us not simply to the connection but also to the disconnects across the voices. The point is not to champion a disconnect. However, the suggestion is to underline how ethically important it is to accept that neither the voices nor what they represent completely merge or become one. Such an acceptance prompts us to practise an empathic hearing of voice. It also encourages us to imagine the network of the voices, the sounding board as surface, like a shared skin.

Shared skin

Consider the shared skin as an extended surface across the bodies. As woven by various bodies, senses and technologies, the surface can be in the form of a patchwork. The patchwork shows the pauses as well as the

moments of connection, which indeed need one another. Connecting, we notice limits, individualities. Almost every relation – and any meaningful sense of togetherness – demands individualities. The terms of these relations may not be even; but the exchange is negotiated, creating a common ground to on which to affect others and be affected by them. Shared skin, as a patchwork of various individuals, is this common ground.

Skin, as argued by scholars such as Marks, Ahmed, Stacey, Connor and Flannagan, is historically and culturally inscribed and marked, worked and reworked, and regenerated and transformed. Skin is an expressive and malleable surface. Take, for instance, various forms of writing on surfaces including human skin, such as body art and tattoos, writings on billboards and graffiti, as well as artists' conceptual use of words on walls and buildings. As Didier Anzieu writes, both the "spoken" and the "written word" can "function as skin".[69] Furthermore, skin may express "the unspeakable"[70] in various forms, manifesting the unconscious in Anzieu's account.

In *Thinking Through the Skin*, Sara Ahmed and Jackie Stacey refer to Donna Haraway: "Why should our bodies end at the skin, or include at best other beings encapsulated by skin?"[71] Ahmed and Stacey recount this question not simply to suggest a generative unfolding of bodies. They also want us to "think through" the physical and conceptual limits of skin, as well as various "forms and folds of living skin".[72]

I have posed the same question for voice, sharing a similar critical account: Where does a voice begin or end? I am not interested in defining the somatic or semantic limits of voice. With this question, what I wish to suggest is that the fluidity and plasticity, anonymity and yet also individuality of voice together lead to an affect. This acts like a shared skin. It performs and helps us consider both voice and skin in the form of an extended surface, rather than a manifestation or envelope of one single body. Ahmed and Stacey call this surface a living skin. I call this surface a living voice.

Electrical Walks and the creative works devised with voice-hearers provide insights about this suggestion. They show that we crystallize a form of skin, whilst embodying voice as a network of many voices and sounds, physically, mentally, imaginatively and emotionally. The process of embodying a voice leads to differentiating my voice from another's voice. But it also leads to mobilizing and remaking my voice with other

voices, sounds and bodies. Thereby, the embodiment of voice generates a shared skin, which may be both visibly and invisibly expressive. In any case, the shared skin circulates the touch of another at a distance, bringing us back to the importance of ethical distance in empathy.

"Contact is tenderness and responsibility,"[73] writes Levinas. Steven Connor reminds us of Levinas's account of touch and ethical relation. The sense of touch for Levinas, Connor argues, also occurs at a distance, and skin, as associated with the sense of touch, is not necessarily "visible, figural or palpable".[74] The ethical for Levinas, Connor posits, is related to this sense of touch and skin. The ethical indicates a point when the "intentional mutates into an unrepresentable singularity", the point where "an other" can be found in "human face and skin".[75]

The point where this ethical happens, where the "mutation of the intentional" falls into the "unrepresentable" and another can be found, is not simply the human skin and face but also, and perhaps more so, the voice. Voice touches and mediates the touch of another near and far. It makes a call, and in doing so makes all parties involved responsible. It weaves a shared surface. This surface may manifest itself in visible, invisible, figural or non-figural forms. The shared surface is after all a living patchwork, which never fully appears or disappears.

What this patchwork makes us think about is also how a living voice mediates and is mediated by various forms and implications of touch. Part 3 pursues the touch of this living voice, of bodily sounds and signals, sung and spoken words, text and light, letters and crystallized breath, water and air. It explores different forms and implications of tactile speech, how different consolidations and distributions of touch speak, how voice is mediated as a shared skin.

Notes

1 See the project description and resources via https://hearingthevoice.org/about-the-project/ Last accessed on 20 June 2022.
2 See http://www.listeningtovoices.org.uk Last accessed on 21 June 2022.
3 See http://www.listeningtovoices.org.uk. Last accessed on 21 lune 2022.
4 See https://hearingvoicesdu.org/the-isle-is-full-of-noises/ Last accessed on 21 June 2022.
5 Ibid. Hume was an "arts manager for the NHS for 15 years and chair of London Arts in Health Forum, and the founding chair for the National Alliance for Arts, Health and

Wellbeing in 2012". She is currently Director of the Culture, Health & Wellbeing Alliance. See https://culturehealthandwellbeing.org.uk/who-we-are/board-and-staff.

6 See https://hearingvoicesdu.org/the-isle-is-full-of-noises/ Last accessed on 21 June 2022.
7 Ibid.
8 Ibid. My transcription.
9 Ibid.
10 See 7:24 in the clip. Ibid.
11 See 9:19 in the clip. Ibid.
12 See 10:08 in the clip. Ibid.
13 Ibid.
14 See 12:07 in the clip. Ibid.
15 See 12:26–12:50 in the clip. Ibid.
16 Relating to the mingling of voices, see the following remark: "…so there is good presence and bad presence…a helpful voice…and these were voices but there were thoughts and voices that were kind of in a mingle that…" See 14:13 in the clip. Ibid.
17 See 18:20 in the clip. Ibid.
18 See the audio documentation of the composition via http://www.listeningtovoices.org.uk. See 2:11 in the clip.
19 See 4:43 in the audio documentation. Ibid.
20 See 4:50–5:00 in the audio documentation. Ibid.
21 See 5:00–6:14 in the audio documentation. Ibid.
22 See 10:52 in the audio documentation. Ibid.
23 See 9:02–9:18; and 9:23–9:29 in the audio documentation. Ibid.
24 See 14:12 in the audio documentation. Ibid.
25 See 17:37–17:48 in the audio documentation. Ibid.
26 See 18:23–18:27; 18:32; 18:27–18:42 in the audio documentation. Ibid.
27 Ibid.
28 On this topic, see also Christoph Cox's text "Requiem for the Siren," in the exhibition catalogue, *Listen, Recalibrate,* by Aura Satz, *Fridman Gallery*, New York, 2018, 10–14.
29 See the audio documentation of the composition via http://www.listeningtovoices.org.uk
30 Find the companion, *Listen If You Dare*, via the following link: www.listeningtovoices.org.uk. Jo Collinson Scott, Gail McConnell, Deborah Maxwell, Time and Space (Glasgow), Elaine Weir, Lindsey Miller, Pete Brown and Brian Hartnett, *Listen If You Dare*, funded by the Arts and Humanities Research Council (grant no. AH/M009181/1) and with institutional support from Queen's University Belfast, University of the West of Scotland and University of Edinburgh, 2015.
31 Ibid., 9.
32 Ibid., 28.
33 My thanks to my dear childhood friend, Ganimet Savcı Şamikoğlu, for this particular conversation.
34 Sigrid Weigel, "The Heterogeneity of Empathy," *Empathy: Epistemic Problems and Cultural-Historical Perspectives of a Cross-Disciplinary Concept*, eds. Vanessa Lux and Sigrid Weigel (London: Palgrave McMillan, 2017), 3.
35 Ibid.

36 Ibid., 4.
37 Ibid.
38 See G. di Pellegrino, L. Fadiga, L. Fogassi, V. Gallese and G. Rizzolatti, "Understanding Motor Events: A Neurophysiological Study," *Experimental Brain Research* (1992) 91, 176–80; V. Gallese, "The 'Shared Manifold' Hypothesis: From Mirror Neurons to Empathy," *Journal of Consciousness Studies* (2001) 8, 33–50. V. Gallese and A. Goldman, "Mirror neurons and the simulation theory of mind reading," *Trends in Cognitive Science* (1998) 2, 493–501.
39 Vittorio Gallese. "Mirror Neurons, Embodied Simulation, and the Neural Basis of Social Identification," *The International Journal of Relational Perspectives*, Volume 19, 2009 – Issue 5, 519–36, published online on 15 October 2009. https://doi.org/10.1080/10481880903231910
40 See David Freedberg, "From Absorption to Judgement: Empathy in Aesthetic Response," *Empathy: Epistemic Problems and Cultural-Historical Perspectives of a Cross-Disciplinary Concept*, 139–81.
41 Vittorio Gallese, "The Empathic Body in Experimental Aesthetics," *Empathy: Epistemic Problems and Cultural-Historical Perspectives of a Cross-Disciplinary Concept*, p. 188.
42 Ibid.
43 See Gregory Hickok's critical account of the theory of mirror neurons in *The Myth of Mirror Neurons: The Real Neuroscience of Communication* (London, New York: W.W. Norton & Company, 2014).
44 See for instance Jeremy Bailenson's book *Experience on Demand: What Virtual Reality Is, How It Works, and What It Can Do* (London, New York: W.W. Norton & Company, 2018).
45 Lisa Nakamura, "Feeling good about feeling bad: virtuous virtual reality and the automation of racial empathy," *Journal of Visual Culture* (2020) Vol 19(1): 47–64. See page 49. DOI 10.1177/1470412920906259
46 Ibid., 49.
47 Ibid., 47.
48 Ibid., 52.
49 Ibid., 53.
50 Ibid.
51 Bessel van der Kolk, *The Body Keeps the Score: Brain, Mind, and Body in the Healing of Trauma* (New York: Viking, Penguin, 2014).
52 Marianne Leuzinger-Bohleber, "Embodied Empathy – Clinical and Developmental Perspectives in Psychoanalysis," *Empathy: Epistemic Problems and Cultural-Historical Perspectives of a Cross-Disciplinary Concept*, 50.
53 Ibid., 51.
54 Ibid., 55.
55 Heinz Kohut, "On Empathy," *International Journal of Psychoanalytic Self Psychology*, 5:2, (1981) (2010), 129.
56 Ibid., 126.
57 Ibid.
58 Ibid., 127.
59 Ibid., 128.
60 Ibid.
61 See the volume, *Kinesthetic Empathy in Creative and Cultural Practices*, eds. Dee Reynolds and Matthew Reason (Bristol, UK; Chicago, IL: Intellect, 2012).

62 Relating to music, merged subjectivity and intersubjectivity, see also Tal-Chen Rabinowitch, Ian Cross and Pamela Bernard's chapter in *Kinesthetic Empathy in Creative and Cultural Practices*. The authors discuss how musical interaction, "movement, emotionality, entrainment and synchronisation of rhythm" generate a merged subjectivity. It is important to note the studies exploring how musical interaction reinforces a shared cognitive and social medium, but here I wish to address the creative works discussed in relation to voice-hearing. These works deal with fragmented narratives and a network of senses.
63 Rose Parekh-Gaihede, "Breaking the Distance: Empathy and Ethical Awareness in Performance," *Kinesthetic Empathy in Creative and Cultural Practices*, eds. Reynolds and Reason, 177.
64 Ibid., 178.
65 Ibid.
66 Parekh-Gaihede quotes Žižek. See Slavoj Žižek, *The Plague of Fantasies* (London & New York: Verso, 2008), 276–277. Parekh-Gaihede, "Breaking the Distance: Empathy and Ethical Awareness in Performance," 178.
67 Parekh-Gaihede quotes Levinas. See *Emmanuel Lévinas, Totalit. et Infini. Essai sur l'Ext.riorit* (Paris: Librairie Générale Française, 2009), 27, 36–37, 235. Parekh-Gaihede, "Breaking the Distance: Empathy and Ethical Awareness in Performance," 178–179.
68 Ibid., 180.
69 See Anzieu, *Skin Ego*, 231. See also Jay Prosser, "Skin Memories," in *Thinking Through the Skin*, 65–6. Prosser quotes Anzieu in his discussion on skin and skin-ego.
70 Ibid., 62.
71 Ahmed and Stacey quote Haraway. See Donna Haraway, *Simians, Cyborgs and Women: The Reinvention of Nature* (London: Free Association Books, 1991), 178. Ahmed and Stacey, *Thinking Through the Skin*, 1.
72 Ibid.
73 Emmanuel Levinas, "Language and Proximity," in *Collected Philosophical Papers*, trans. Alphonso Lingis (Dordrecht: Martinus Nijhoff, 1987), 116. Connor quotes Levinas at length. He also considers the "touch at a distance," drawing on Paul Virilio's analysis of "tactile telepresence at a distance" and the merging of the "real" and the "virtual," that is, everything can touch and affect one another from a distance, and the sense of "presence," "near and far" can be blurred. My argument about voice – that is, how voice makes contact both in proximity and in distance – does not necessarily relate to the merging of the real and the virtual. However, the idea of "skin, shared surface" as an imagined realism of voice echoes the interplay between the real and the virtual. Steven Connor, "Mortification," *Thinking Through the Skin*, 41, 42, 43.
74 Ibid., 42.
75 Ibid., 41, 42.

Part 3

Haptic

Mediation of Voice as Skin

7

Surface-Membrane: *Bio-sensing Musical Interfaces*

What would your body say if it talked with bodily signals and sounds? What might be the implication of the touch of bodily sounds? I will consider these questions drawing on biosensing musical interfaces. These interactive and kinetic systems comprise sensors that detect a performer's physical gestures and bioelectrical signals, as well as hardware and software that amplifies, filters and digitizes the signals and translates them into audio. The interfaces do not simply analyze, control or amplify, they also interactively shape bodily gestures, signals and sounds. The mediation of the signals is both physical and abstract.

Composers, performers and music technologists[1] have examined biosensing musical interfaces in relation to human–computer interaction, digital musical instruments, the expressive capacity of embodied gesture, quantitative and qualitative analysis of emotion, notation, affective computing, as well as algorithmic listening, new forms of interactive and collaborative music making, co-agency of machine and human learning, and music, health and wellbeing. Examples include the BodySynth invented by Chris Van Raalte and later configured with Ed Severinghaus as a wireless tool (1986/1996); the BioMuse, developed by scientists Ben Knapp and Hugh Lusted (1988/1990); the Interactive Brainwave Visual Analyzer, created by Masahiro Kahata (1991); and Xth Sense wearable biophysical technology, developed by artist, scholar and technologist Marco Donnarumma (2010–present). Tracing some of these examples, as well as seminal works such as *Music for Solo Performer* (Alvin Lucier, 1965), *Spacecraft* (Musica Elettronica Viva, 1967) and *Ecology of the Skin* (David Rosenboom, 1970), I examine biosensing musical interfaces differently than the ways in which the composers and performers who use them have discussed.

I explore biosensing musical interfaces together with histories of electrotactile and vibrotactile communication, speech recognition and synthesis, as well as with voice and touch-driven digital interfaces. Historically and conceptually, digital sound systems have evolved with speech recognition and synthesis technologies, as well as with visible speech and forms of tactile speech developed for deaf and blind people. Drawing attention to these histories together, I suggest that biosensing musical interfaces are both touch-driven and voice/speech-driven technologies. I consider the convergences and divergences between recent communication technologies devised for deaf and hard-of-hearing people (such as the signing gloves that translate sign language into text and/or automated speech) and biosensing technologies used for gesture-based interactive performances.

Signing gloves and biosensing musical interfaces demonstrate technical similarities in their foundations. However, they have different contexts, applications, protocols and implications. The former is invested in so-called "efficient and functional" communication, mostly based on verbal and/or auditory measures. The latter does not attempt to transmit or signify a verbal message. It investigates expressivity at the core of intentional variation and control of gesture. What the gesture and the corresponding sound express, or what the bodily signals may say, remains uncertain, interruptive and evocative. I argue that biosensor performances' visceral and yet abstract mediation of bodily sounds creates a voicing, which functions like a surface membrane, both surrounding and transporting bodily signals and sounds. I underline this voicing in line with non-dialogic and distributed voices, which are not limited to linguistic exchange or verbal utterance, and which contest our presumptions about the bodily limits and the dynamics of speech and communication.

Gestural expressivity

Gestural expressivity and intentional control of gesture are key to biosensing musical interfaces. Human–computer interaction (HCI) researchers examine gestural expressivity with respect to embodied music interaction. Music psychology, cognitive science and neuroscience offer a broader paradigm for this term. Researchers Marc Leman, Micheline Lesaffre and Pieter Jan-Maes argue that embodied music interaction encourages

focusing on "dynamic and ecological principles" in music-making and sharing.[2] Relating to these principles, researchers propose that embodied music interaction is restrained "by acoustical structures (both in music and in the radiation of sounds), by cognitive activities (limitations of memory, attention and learning), and by body resonances, biomechanics, and metabolic and energetic restrictions".[3]

In this framework, musical expressiveness and gestural expressivity point to a non-verbal expressivity as well as a verbal expressivity. Musical expressiveness is associated with "expressive intention",[4] suggesting that musical performance can communicate the intended ideas, feelings and emotive content of a musical piece.[5] The "intended" idea of a musical piece, composer or performer is historically and culturally dynamic. The field of embodied music interaction considers related sociological and anthropological aspects of musical performance. Nevertheless, it specifically engages empirically with the cognitive, acoustic, and physical processes of music-making and sharing.

Researchers investigate both the verbal and sensory correlation between the performer and the audience in response to a musical piece. They look at "sensorimotor expressiveness", which is designated through "verbal labels, action–reaction metaphors, cross-modal associations".[6] Gestures, bodily movements, "kinetic parameters", the "energy of musical pieces and performance" and "sensory connotations" are associated with verbal measures to test whether the performer and the audience express a similar affect when asked to write about their experience of a piece of music.[7] The results of such experiments show that the "impressions" of the performer and the audience "generally agreed".[8]

Building on this approach, there are also experiments that employ "action–reaction metaphors and cross-modal associations", without these applying to verbal measures.[9] These experiments refer to sensory scales including tactile, visual, gustatory and haptic areas, based on "interactions with other objects through contact, pressure, and (usually small amounts of) motion".[10] The interactions are instigated by "haptic devices" that "measure a user's fingertip position, pressure, and motion and exert a precisely controlled force vector response to the fingertip";[11] they may also include the use of virtual objects.[12] The experiments using sensory scales may also depart from mechanical concepts such as "friction, elasticity, and

inertia",[13] and measure the dispersion and storage of kinetic energy and potential energy.[14] Applying to sensory scales, the audience is instructed to make direct associations between musical pieces and haptic responses.

Researchers consider these experiments and the use of non-verbal and sensory scales useful, as they prompt a broader framework and can be applied to both musical and non-musical contexts.[15] However, regardless of the use of verbal and non-verbal scales and the differentiation of musical experience from the semiotics of verbal language,[16] all experiments tend to posit "expressive intention" similar to verbal communication. Using verbal and/or non-verbal tools, a performer can communicate a pre-conceived expressive intention for a musical piece, performance or gesture in a sensitive way. The gestural expressivity in biosensing performances does not necessarily imply this suggestion, as such performances are not necessarily invested in communicating an emotive content. They rather concentrate on the intentional control of a physical gesture. In this context, the intention points to physical and mental control of the bodily movements and production of sound in real time. The process includes practice and rehearsal, but the end result still leads to a degree of uncertainty, which does not need to be resolved, translated or presumably communicated. In that regard, biosensing performances offer a medium for collaborative sense-making, without applying to a pre-conceived intention or form of communication.

We may still ask whether the signals and sounds generated with biosensing interfaces form a language for the performer and the audience, when repeated. In *Sonic Writing*, music technologist and theorist Thor Magnusson recounts how the human mind, cultural memory and language emerge and develop with technical artefacts. He emphasizes that musical instruments – like technical artefacts – store and transmit information and conventions, which in turn become memory.[17] In other words, musical instruments contribute to an existing language or to forming or de-forming a new language. Both musical and non-musical inscriptions are part of dynamic and symbolic systems, and musical instruments themselves can be considered, as Magnusson argues, "material, symbolic, and signal inscriptions".[18]

Likewise, biosensing technologies are systems and technical artefacts that evolve with sound and speech synthesis systems. They generate signal

inscriptions and participate in a symbolic system that informs and transforms digital communication tools in everyday life. However, in a performative context, their expression does not form or manifest a symbolic language. As musical instruments, or posing the human body as a musical instrument, their sonic inscription may suggest a historical continuity with twentieth and twenty-first century gesture-based electronic music instruments, but their real-time sourced noise is not continuous. Instead of translating sonic signals into semantic symbols, biosensing musical interfaces make us think of a different question: What happens when signs do not become symbols or form a language, when bodily signals and sounds express something but do not translate anything in particular in a performative context?

Early examples of biosensing music performances

Biosensing technologies in music can be traced back to the experimental music of the 1960s, such as in Alvin Lucier's pioneering work, *Music for Solo Performer* (1965). Developed in collaboration with physicist Edmond Dewon, the piece amplified alpha brainwaves and percussion instruments including cymbals, gong, and drums. Lucier treated alpha brainwaves as rhythms. He used percussion instruments, considering the low-frequency range of the alpha waves. The electrodes attached to Lucier's head captured the EEG signals, which were sent to a brainwave amplifier and then a band-pass filter. The filter divided the signals into multiple channels, each of which was directed to a loudspeaker. Connected to loudspeakers, the percussion instruments were excited by the signals.[19]

Alpha waves are associated with a motionless state of relaxation. Lucier had to maintain a motionless state to be able to produce alpha waves and excite the instruments. The whole idea of *doing nothing or nothing has to happen* resonates with the ethos of experimentalism of the time.[20] Emphasis on the ordinary and the endurance of the ordinary,[21] and the incorporation of everyday objects, sounds, images and places into performance have all together articulated music as process. In addition, this emphasis contested both the performer's and the composer's agency. What followed *Music for Solo Performer*, one could argue, was not directly in tune with the ethos of the ordinary. However, the use of biofeedback

further inspired the idea of real-time and interactive music-making across bodies of all kinds, be they human or nonhuman.

For instance, *Spacecraft* (1967), by Richard Teitelbaum and Musica Elettronica Viva, amplified heartbeats and brainwaves of the performers as real-time musical material and modulated the EEG and ECG signals with a Moog synthesizer. In *Ecology of the Skin* (1970), composer David Rosenboom observed the EEG and ECG signals of both performers and audience. The multimedia art and science collective Experiments in Art and Technology (E.A.T), and Manford Eaton's book *Bio-Music* (1974),[22] expanded on this idea, while making a call for a direct biofeedback between the audience and performers.[23] In 1986, marine biologist and dancer Chris Van Raalte devised the BodySynth, a wearable computing that converts the performer's physical movements and gestures into sound using bioelectrical (EMG) signals. Van Raalte later furthered the BodySynth as a wireless tool in collaboration with engineer Ed Severinghaus (1996). As he explains, the final and wireless version of the device has enabled performers to convert bodily signals that stem from muscle contraction into audible sounds. Composer, performer and media artist Pamela Z and performance artist Laurie Anderson have also used the BodySynth in their performances.

Around the same time, scientists Ben Knapp and Hugh Lusted created the BioMuse device at Stanford University's Centre for Computer Research in Music and Acoustics (CCRMA, 1988). The device was initially designed as a digital signal processor and MIDI interface, which both captured and controlled bioelectrical signals.[24] In the 2000s, Knapp and Lusted generated a portable biosignal unit and biocontrol device, the Wireless Physiological Monitor (2005), which included a micro-controller to filter two channels of biosignals captured from two electrodes (one wet electrode attached to an armband, and one dry electrode attached to the main unit). The most recent development is the BioFlex armband, which comprises non-invasive or surface-contact dry electrodes.

Performing with the BioMuse

BioMuse has been used by a number of performers including composer Atau Tanaka, who works with the bioelectrical signals (EMG), which are produced by muscle contraction. Tanaka emphasizes BioMuse as a biocontrol device, a facility through which to reproduce volitional acts,

leading to an expanded repertory for gesture-based musical interaction. The use of sensor interfaces requires both training and exploration of the body. Performers control and modulate gestures and signals as related to one another. In effect, they articulate the physical body as a tactile surface of signals and gestures. I am interested in how the performer's body may talk in this context. For instance, is it possible to imagine the gestural expressivity, the articulation of bodily signals as a form of voicing, one that is not filtered as verbal utterance? Tanaka encourages this question performing the pieces *Le Loup*, *Lifting* and *Myogram*.

Le Loup is a short piece, described as "sculpting the sound of a growling wolf".[25] Using EMG muscle sensors and wearing a BioFlex armband, Tanaka taps his fingers in the air.

Figures 7.1–7.3 The BioMuse, system cable and 8-way breakout box; the underside of the BioControl WPM unit; Infusion Systems BioFlex EMG sensor.

Source: https://econtact.ca/14_2/tanaka_personalsurvey.html

Figure 7.1–7.3 (*Continued*)

He moves his hands closer and apart, creating a sonic, visual and haptic interaction between them, as well as "holding and manipulating"[26] sounds. The "sculpted" sounds sound sharp, precise and loud, while the performer's body is actively engaged in the process of making sound. *Lifting* is an "ode to the Theremin in 3 frequencies".[27] In this piece, the hand moves are more fluid. For about two minutes, Tanaka generates oscillatory sounds. With pointillistic hand gestures, he then articulates higher frequencies individually and sustains them. In the last section of the piece, Tanaka manipulates the frequencies with forearm and hand moves. He moves one forearm down, facing the ground, and slowly rotates the other arm up and down. In effect, Tanaka builds an invisible but resonant volume that physically grows both with the performer's body and with the performance space.

Myogram further crystallizes the resonance across the performer, the audience and the performance space. Employing two Myo interfaces, a custom software developed by technologist Francisco Bernardo, and in musical collaboration with composer Miguel Ortiz, Tanaka sonifies bioelectrical nerve impulses of muscle contraction in eight channels.[28] He wears a sensor band on each forearm. The sensor band has "multiple electrodes" that "focus on specific muscle groups from flexor to extensor" and "reports on voluntary muscle activity causing wrist rotation and finger movement".[29]

The sensors are "mapped to dual quadraphonic speaker spaces", which allows the "audification" of "stochastic pulses" that "reflect "performer limb activity".[30] The pulses inform filters and resonators, leading to a composition of electronic beats that gradually evolve into a thunder-like volume. The process engages with the performance space and the audience as well as with the performer. *Myogram* is generated by a sound system that manifests co-operative and relational aspects of different kinds of bodies, a "performance ecosystem"[31] in composer Simon Waters's terms.

Tanaka and Donnarumma explain the historical grounding and conceptual implications of such a performance system and idea. They specifically ask whether we can imagine the human body itself as a musical instrument, as well as whether we can consider the human body as "not a fixed entity" but an expanded and extended medium, in the form of a "posthuman" body.[32] Asking these questions, Tanaka and Donnarumma

encapsulate the underlying issues about biosensing interfaces in music: "gesture based embodied music interaction versus disembodied and virtual digital medium, voluntary versus involuntary activity of the human body, and co-adaptation and co-agency of human and machine interaction".[33]

The Hands and the *lady's glove*

Historically, gesture-based interaction in electronic music goes back to the theremin, an electronic musical instrument using two antennas, high-frequency oscillators and electrical circuitry, invented by scientist Leon Theremin in 1920. Playing two antennas with hand gestures towards and away from the circuitry, performers of the theremin generate and control musical tones without physical contact.[34] Similar inventions were later furthered at the Studio for Electro-Instrumental Music (STEIM) in Amsterdam. Michel Waisvisz, composer, music technologist and the artistic director of STEIM (1981–2008), devised the digital musical instrument The Hands (1984, 1990, 2000) in collaboration with engineers and artists.

The Hands are "two data gloves" which allow performers "to create and control elements of a musical performance in real time".[35] Different versions of The Hands were developed using different custom sensor electronics and MIDI devices.[36] The sensors capture performers' movements. As connected to a MIDI controller and devices, they help produce and shape electronic sounds. The idea behind The Hands was to "develop more tactile and immediate ways to approach the creation and manipulation of electronic sounds".[37] On that note, certain musical aspects that Waisvisz explored, such as "scratching and bowing" and "controlling the pitch bend"[38] of electronic sounds, became possible with the use of custom sensors and MIDI devices. The way The Hands sound and look may be somewhat alien. The performer's body is extended with an additional prosthesis, with additional hands that are both wired and contactless. The production of sound is performative, mediated by both human and machine labour. Both the process and the sonic results include an element of the unknown due to this mediation.

Figure 7.4–7.5 Laetitia Sonami, *the lady's glove v.4.*

Credit: Frank Hoekzema.

Here, the use of custom sensors further crystallizes the (dis)embodiment of a digital medium.[39] The hardware environment of The Hands does not directly suggest a disembodied digital medium, as the sensors are connected to the performer's wrists and fingers. The procedure of sound production and control entails a series of conversions of the physical into the virtual, grounded that the hardware environment is also controlled by MIDI devices and the software environment.

In 1991, as a creative response to virtual reality systems, in particular to male-dominated music technology, sound artist and performer Laetitia Sonami designed her signature instrument, the *lady's glove*, in collaboration with Paul DeMarinis.[40] The *lady's glove* was made from "a pair of rubber kitchen gloves", which were later styled using different fabrics and colours. The instrument, Sonami explains, aims to criticize "technology and virtuosity", as well as the idea of control and rationality associated with technology. Suggesting a feminist critique of control, she points to the

unknown and "fluid"[41] element in both the visual appeal and the sound results of the *lady's glove*.

The gloves produce sound using a technology similar to The Hands. The first version of the gloves includes "hall effect transducers glued at the tip of the fingers and a magnet on the right hand".[42] Touching the magnet, the performer generates "varying voltages", which are "fed to a Forth board and converted to MIDI signals".[43] The signals "control various synthesisers and samplers", including speech synthesis, and are manipulated by another glove used by Sonami's collaborator Paul DeMarinis.[44] The next version uses the same sensors but encloses the magnet and the wires in the glove as much as possible. "I wanted to make them look magical," Sonami says.[45] The "magical" look and the "alien sound", or, what one might say, the alien speech of the gloves are enhanced with the addition of "two accelerometers on a right wrist band, some more hall effects, light sensor, extra switches, leds and more recently a miniature mic".[46] The intention is to "allow movement without spatial reference, and most importantly to allow for multiple, simultaneous controls", which make the sounds "embodied", the controls "intuitive", and the performance "fluid", in Sonami's words.[47]

Myogram

Tanaka's use of the BioMuse in *Myogram* reinforces Sonami's critical account of control and emphasis on fluidity of performance. Embodied, gesture-based digital music interfaces draw attention to the co-agency of human and machine. The idea of embodiment that these performances and technologies explore is that bodies are not fixed or unified entities. The fluidity here emphasizes the unknown of the body. The unknown is not a mystified but a material phenomenon. Bodies emerge, evolve and change, as they interact with their environments. This dynamic state makes the bodies in part unknown. Here, performers' bodies integrate with machine parts and a computer, with the performance space and with the audience. Performers develop certain skills to execute physical gestures and neural and/or physical signals, as well as to sculpt electronic sounds, while wearing biosensing interfaces such as the BioMuse.

This learning process employs modes of proprioception, exteroception and interoception.[48] The first mode, proprioception, concerns the spatial orientation, movement and positioning of the body in an environment in relation to other external bodies. In association with proprioception,

exteroception refers to the body's "tactile sensitivity to external objects",[49] and interoception indicates the stimuli produced in the internal organs and the susceptivity towards the movement of the internal organs. Performers generate the embodied contact and boundary effect, or the voicing of muscle contraction if you will, by means of physical exertion. They use either an external physical object – what is called a boundary object, or free gesture.[50]

Parameters include the performer's intended action, the direction and force of the intended action, and the physical resistance or limitation of the surface or object, which can be either externally or internally imposed. If there is no boundary object or external limitation, or in the event of a free gesture, performers apply internal control. Performers work with modes of proprioception and interoception to execute physical gestures and electronic sounds, and the "boundary effect" is realized with "haptic feedback", which is created by "projecting audio of particular frequencies within particular amplitude ranges".[51] The action can be intentionally executed and varied with these parameters.

Tanaka and fellow researchers Baptiste Caramiaux, Marco Donarumma, and Miguel Ortiz consider these parameters within the context of "gesture expressivity and volitional act" – what they term, "gesture power or intensity".[52] Based on their experiments with boundary objects, they show that EMG may allow detecting the gesture power at certain frequencies. However, they also note that biosensors do not capture "movement, position, or the outcome of gestures; and the electromyogram does not suffice to detect gesture at all frequencies or allow making a direct connotation between muscle exertion and hand movements".[53] Due to compound and complex gestures, and "discontinuous, aperiodic and stochastic" signals of the electromyogram, a comprehensive and specialized detection of gestures requires, "signal processing, feature extraction, classification and musical mapping".[54] This process directly relates to speech recognition and synthesis, as will be addressed later in this chapter.

The process also brings back some of the issues raised by researchers of human–computer interaction in music: virtuosity, composition, improvisation, inscription and notation, and control and co-agency of human and machine. The suggestion is that the biosensing interfaces facilitate "co-adaptation" across varied bodies and systems.[55] As Tanaka and Donnarumma posit, *Myogram* creates a collaborative and co-adaptive

Figure 7.6 Atau Tanaka performing with EMG interfaces.

Photograph: Martin Delaney. www.martindelaneyphotography.london

space including the performer, the system, the performance hall and the audience.[56] I argue that this network functions like a surface-membrane.

The sounds of *Myogram* grow from pronounced, irregular noises to a thunder-like atmospheric noise. The amplitude envelops the audience but also leads to a sense of boundary, a sonic wall that is felt both viscerally and figuratively. The co-adaptive system both surrounds and transports the bodily signals and sounds. The authors note that the "wrong" gesture may end up "generating excessive feedback or not exciting the system".[57] Regardless, when the system was properly excited and gestures could be translated into signals, there would not be a right or wrong sound. In such an environment, the sounds are neither particular to one single body nor particularly intended for one single body as a sign. The post-human body is not simply the performer's body. One could imagine the system itself as a hybrid body, enacted by the distributed bodily signals and sounds. Such a system makes us question the process of sense making itself, prior to any given signal or sign that the process may incite.

Xth Sense

Donnarumma's Xth Sense emphasizes sense-making as an augmented and unknown process. The Xth Sense also employs muscle contraction. The armband includes a microphone sensor, which is embedded in a

silicon case so as to avoid the noise that may derive from any direct contact between the microphone sensor and skin. When muscles are contracted, muscle tissues vibrate at certain frequencies and generate sounds, which are called mechanomyogram (MMG). Microphone sensors capture these sounds. Xth Sense amplifies and connects the muscle sounds to an open source software environment for digital audio processing. A surround-sound system including loudspeakers and subwoofers plays back the processed sounds.

The device can be treated as a tool for gesture control and sound synthesis as well as for shaping – or again, as performers say, sculpting – sounds. As Donnarumma posits, unlike biomusic, which is driven by electrical and neural impulses and brainwaves, the features of the Xth Sense allow creating biophysical music.[58] In the case of BioMuse, bioelectrical impulses and signals need to be converted into MIDI data and then into sound feedback. The Xth Sense, on the other hand, employs physiological input and thus directly produces a sound feedback.[59] In effect, both the BioMuse and the Xth Sense augment and extend the body to various other bodies. Furthermore, they articulate the body in process.

"Body is never silent," Donnarumma writes.[60] Referring to philosopher Eugene Thacker's account of biology as technology and information, he characterizes the human body as a "relentless sound technology", whose "muscular tissues, nerves and blood vessels produce sounds that retain a meaningful vocabulary of intimate interactions with the performer's neurological and kinetic behaviour".[61] Xth Sense, Donnarumma continues, provides a relatively transparent mediation, given that it attempts to amplify and communicate muscle sounds directly, without using MIDI devices. It directly manifests that "the raw sonic material originates within the fibres of the body".[62] Biophysical music may offer a relatively less mediated sound production than biomusic. But translation of the "meaningful vocabulary and intimate interactions" across visceral sounds and signals, as Donnarumma suggests, is not a raw process.

Mediation of Xth Sense

Xth Sense includes several media: the performer's body, an armband, a computer, loudspeakers and subwoofers. The performer's muscle sounds are shaped with the armband, mediated through a software environment,

Figure 7.7 Marco Donnarumma, Xth Sense, (2010–present).

and played back via loudspeakers and subwoofers. The way the software environment processes the sounds is collaborative. The software analyzes the sounds captured from the performer's body, controls and changes them algorithmically, and sends them to loudspeakers for playback.[63] The algorithmic change of the software can be described in the form of interference, or what media theorist Alexander Galloway calls, "interface effect", that is, "always a process or a translation".[64]

I want to further what Galloway means by "interface effect", because Galloway's reading of interface helps give us a better understanding of how the software environment of the Xth Sense mediates bodily sounds as a sonic effect, and how this process makes us reflect on sound as mediation. Galloway discusses computers not as "technical media devices" but as "interface effects":

> A computer instantiates a practice not a presence, an effect not an object… Perhaps a useful way to understand the distinction is to differentiate between a language and a calculus. A language works at the level of description and reference… A calculus, on the other hand, operates at the level of computation and

process… With a calculus, one speaks of a system of reasoning, an executable machine that can work through a problem, step by step. The difference between the two, in one aspect, that a calculus implies a method, whereas a language does not. […] The computer takes our execution of the world as the condition of the world's expression. And this is the interface effect again, only in different language: the computer is not an object, or a creator of objects, it is a process or active threshold mediating between two states.[65]

Revisiting the computer in light of the difference between calculus and language, as Galloway suggests, is stimulating.

In the 1980s, Sherry Turkle discussed computers as "evocative objects" that affect the human mind and thus behaviour and language.[66] Turkle argued that computers have changed humans and encouraged the anthropomorphism of machines, whilst humans program them. We can consider calculus as an invisible function behind the anthropomorphism of computers. Calculus and language may be entangled in our daily treatment and mystification of computers, but I join Galloway in his differentiation of calculus as process, and language as a system of description and reference.

Language is a living culture, not simply describing but also executing and expanding the condition and expression of the world. However, language is also a system of reduction. It produces the discrepancy, the "incompatibility",[67] between a physical condition and its symbolic representation, between the bodily experience and its figurative expression. In that regard, the execution of calculus is dissimilar to the performance of language. To reiterate Galloway's point, in the case of calculus, there is a task and solution-oriented procedure. A computer performs assigned tasks and defined procedures. It thus produces a process, an effect.

Likewise, the particular software environment of the Xth Sense mediates Donnarumma's muscle sounds as a process, a sonic effect. However, the sonic effect is not limited to two states, be they visceral or abstract. The computer-generated sounds are sent to the speakers and subwoofers. They are heard and played in the performance space, and Donnarumma's bodily gestures and muscle sounds are affected by the particular performance space as well as by the audience, both physically and socially. In that sense, the mediation that the software facilitates is not a dyadic reciprocity exchanged between the human performer and the machine, but a

distributed mode of interaction across various bodies in the performance space. The process has multiple effects and directions, and no sound is "raw", including Donnarumma's muscle sounds.

The body here is underscored as a network of information and technology, both encapsulating and transmitting its surroundings. This form of music-making situates humans and nonhumans in similar ways. But there is more to this discussion. There are also musical examples, which not only situate humans and nonhumans but also decentralize humans. One of these examples is *Voyager* (1992), a seminal piece devised by composer, performer and music theorist George Lewis.

Voyager

Voyager employs an improvisatory and interactive process that evolves with both human performers and the computer. The computer is programmed to generate an "automatic composition program" analyzing a human performer's act in real time. The program produces both "complex responses" in relation to human performers' acts and "independent responses" generated through its own "internal processes".[68] The computer may not need humans' input, as Lewis notes. The computer can generate both programmed and improvisatory responses, which may be related or unrelated to the human input. Here human and machine are not only similarly situated actors but humans are also decentralized. This is a significant aspect, amid the tendency of human beings to anthropomorphize technology and the nonhuman world.

Composer and music theorist Simon Emmerson in his model for human–computer musical interaction discusses the interaction between humans and nonhumans as an opportunity to "humanize the technology and animate the technological world".[69] He contemplates the modalities of this interaction with a diagram, which he calls, "living experience".[70] In it, he designates two sub-entities located in the larger entity of living experience: "physical presence: action and agency; psychological presence: will, choice, and intention".[71]

If we apply the parameters of psychological presence to *Voyager,* we could ask whether or how a computer could have will, choice or intention in a similar way to a human performer. Or we could simply ask whether a computer *should* have will, choice or intention. Rather than raising a

question like this, Emmerson investigates a live process common to both humans and nonhumans, considering the diagram noted above. This exploration encourages thinking about the "inter-act" between bodies of all kinds. More so, it demonstrates our habitual tendency to anthropomorphize nonhumans by applying human interaction patterns.

Humans are perhaps the only living things on planet Earth that have considerable difficulty with mortality and endings. I wonder whether it is possible for humans to recognize various nonhuman life and death cycles without humanizing them. By not humanizing, I do not mean dehumanizing or championing nonhumans over humans. I rather want to take issue with human exceptionalism. To reiterate Lewis's and Galloway's observations, computers may not need humans. And the universe existed for billions of years before humans came along.

In *Alien Agency*, media artist and scholar Chris Salter asks: "When we encounter the world's vivacity, does it really care about us?"[72] Such a striking question. How and why should the world care about us? And whose world are we talking about? By world, might we mean the universe, a larger system in which multiple worlds exist along with the imagination that can comprehend them? If you have dealt with various kinds of uncertainties, discontinuities and temporary engagements for a long while, you might have got interested in a method of prediction like astrology, like I did. Most astrologers suggest that astrology raises our awareness of possibilities and potentials, as well as the limitations that one needs to grow through, provided that the universe is caring.

In my humble opinion, the universe does not care about anyone in particular. The universe is a teeming multitude whose wisdom is generated and transmitted across an infinite number of bodies. To hear the wisdom, we need to recalibrate our "intention, will and choice" with bodies of all kinds. Human–nonhuman interactions in music and sound performances may provide us with creative tools for both decentring and recalibrating the human notions of will, intentionality and decision-making. Such interactions call upon us to review the dynamics of being together with both other humans and nonhumans, to conceive of the social in new forms.

Sociologist Georgina Born underlines how music forms "new relations and experiences of the social", and makes us "attend them".[73] Born argues

that relational ontology, "one that is concerned with the mutual mediation of the human and the environmental, whether that environment is material or immaterial, organic or inorganic, expressive or technological", tends to dismiss the idea of the social, while treating it as "conceptually abstract and non-specific".[74] Drawing on Latour's actor–network theory, she considers the specific mediation of music as what she calls, "musical assemblage", that is, "a network of relations between heterogenous entities – musical sounds, human and other subjects, practices and performances, discourses and representations, material and immaterial technologies, and spaces and locations".[75] In effect, musical assemblages, Born argues, prompt "an Arendtian conception of the musical public constituted by performance as autonomous, artificial and uncertain, and yet as embedded in pre-existing social relations and institutions".[76] Born analyses *Voyager* as a specific and relevant case, through which we can understand human–nonhuman interaction as a social relation, an example of the musical public both as embedded in the existing social context and as "autonomous, artificial and uncertain".

I refer to Lewis's *Voyager* and Born's analysis, as they reinforce my point about the mediation of the Xth Sense, as well as Donnarumma's account of configuring and performing "hybrid and technologized bodies" using that biophysical musical interface. Like *Voyager,* the computational process of the Xth Sense generates autonomous and unintended results. The control shared between Donnarumma and the computer evokes a social relay. Informed by visceral, artificial and uncertain effects, the social relay here does not amount to a given language for the audience or the performer. The relay possibly remains as a practice, a process, a question mark. In so doing, it also encourages us to hear bodily sounds as an expression that emerges without a necessary object of intention.

Here, intentionality indicates a mode of attention to the process, rather than an attempt to determine the result. As noted earlier, performers using biosensing musical interfaces train themselves to control bodily gesture and sound production. The physiological input feeds data to the software environment about the "force, temporal profile and the intention to execute a gesture".[77] However, the compositional process is open to change. It also explores involuntary and malleable aspects of human–machine interaction.

Figure 7.8–7.9 Marco Donnarumma, *Ominous*, 2014.

Photograph: Ugo Dalla Porta.

Ominous, Corpus Nil, Amygdala

Among Donnarumma's works which use the Xth Sense and explore hybrid bodies, *Ominous* is a key piece. *Ominous,* as Donnarumma calls it, is an incarnated sound sculpture. Dedicated to Alberto Giacometti's sculpture *Hands Holding the Void*, the piece reflects on a recurring theme of Giacometti's work, that is, "'a constant irrational search and movement towards an unknown object'".[78] Directly corresponding to the title and the theme, Donnarumma moulds an empty space and attempts to hold sounds in his hands. Here the unknown object, he writes, is "made of malleable sonic matter".[79] This emerges with the physical gestures, in particular with controlled limb movements, which lead to muscle contraction and sounds. The armband captures the muscle sounds, and these are sent directly to the computer and processed by the software environment. The processed audio input is amplified and played back by the subwoofers

Figure 7.10 Marco Donnarumma, *Ominous*, CTM Festival, 2015.

Photograph: Stefanie Kulisch.

and speakers. The interaction between the muscle sounds and the digital sound processing is performative and changeable, which, in effect, produces an "unknown" and unfixed object. How does Donnarumma sculpt the unknown object?

In the audiovisual documentation of *Ominous* (2014)[80] Donnarumma controls, releases, stretches and expands both continuous and discontinuous sounds using his hands and physical gestures. He moulds the sounds in different amplitudes, rhythms, textures and intensities. Again, what one possibly hears can be described as a stream of percussive, pulsating, thunderous sounds. Donnarumma structures this stream into musical episodes, pausing between short sections, and articulating the rhythm, amplitude and dynamics of certain frequencies. Acoustic and digital, all sound-processing and spatialization take place in real-time performance, affected by Donnarumma's physical behaviour.[81] The documentation also includes a few verbal hints that accompany Donnarumma's gestures: "The hands look empty but a deep pulsating sound reveals an object… It's the amplified sound of the flesh, stretching and moving in between skin and viscera… Corporeal sounds enter the sensing circuits of a digital instrument. The natural and the virtual body merge into an unstable object. This is biophysical music…".[82] The video ends with a quote from Victor Hugo: "The flesh is the surface of the unknown."[83]

Taking a cue from the descriptions above, like the BioMuse, Xth sense creates a voicing that behaves as a surface-membrane, both surrounding and transporting bodily sounds. Xth Sense amplifies the visceral sounds in collaboration with a human performer and computer. What is the unknown object here? The sounds of the skin or the augmented human skin? The visceral sounds or the viscera? The sonic and the musical effect of the performance? Or the Xth Sense itself, both literally and metaphorically? Perhaps all of these. The point is that the Xth Sense makes the body and the voicing unknown via both visceral and abstract mediation of bodily sounds, via a collaborative medium for sense-making that is shared by both human and nonhuman bodies. This query brings back the idea of building hybrid bodies and expressions, as seen in Donnarumma's other works, such as the award-winning *Corpus Nil* (2016) and *Amygdala* (2018).

Figure 7.11 Marco Donnarumma, *Corpus Nil*, 2016.

Photograph: ONUK, ZKM Center for Art and Media.

Corpus Nil is a performance that experiments with reconfiguring the human body using an artificially intelligent machine. Algorithms controversially classify human identities. What would happen, Donnarumma asks, if "artificial intelligence could be used to contaminate human bodily experience".[84] When algorithms literally damage a body, what does it "look and move like"?[85] In *Corpus Nil*, Donnarumma turns himself into a "partly human partly machine" figure, "an amorphous cluster of skin, muscles, hardware and software".[86] To clarify, let me note Donnarumma's detailed description of the piece:

> Biophysical sensors attached to the performer's limbs capture bodily electrical voltages and corporeal sounds and feed them to the machine. Thanks to a sophisticated set of algorithms, each nuance of the body's motion sets off a synaesthetic play of sound and light directed by the machine. The biological signals of the body influence the choices of the machine, but cannot control what it will do. In turn, the auditive and visual saturation produced by the machine influences the body's movement, but disrupts its perception and motor skills at the same time… In an unstable feedback loop, the body and the machine pollute each other. The amorphous being on stage slowly evolves into [an] unfamiliar creature. It reconfigures

its parts through a sensuous choreography pushing the limits of muscular tension, [limb] torsion, skin friction and equilibrium. The corporeal sound frequencies are spatialised using a multi-channel sound system surrounding the audience, while bioelectrical flashes of light rhythmically illuminate the space…[87]

With this configuration, Donnarumma wants to make the experience of the "hybrid body" and the unknown object tangible. The tangibly hybrid body or unknown object is not an enclosed or single entity. It is a series of amorphous and interactive states, an affair, an effect. Talking about his creative explorations, Donnarumma articulates his interest in visceral experiences of the unknown, instead of creating metaphors about it. Similarly, here the voicing of bodily signals does not necessarily amount to a symbol or representation but becomes and remains a tangible unknown.

In *Amygdala*, Donnarumma materializes the tangible unknown in a rather different direction. He still contests the same question, that is, how algorithms classify human identities and presume social categorizations. *Corpus Nil* poses this question by building an alien figure that is "contaminated" with algorithms. *Amygdala* points to the seemingly opposite of contamination: purification. *Amygdala* is "an artificially intelligent (AI) robot

Figure 7.12 Marco Donnarumma, *Amygdala*, 2018.

in the form of an uncanny human-like limb hung inside an industrial-grade computer server cabinet", which "uses a knife to manipulate and sculpt a large piece of skin",[88] so as to "learn a ritual of purification known as skin-cutting".[89] The ritual of *Amygdala* draws on the animistic tribal rituals in Papua New Guinea, Africa and Eastern Asia.[90] Donnarumma argues that "rituals of purification" share a similar "politics" to AI technologies, as both tribal rituals and AI technologies control access to social positions and services.[91]

Donnarumma's association of the principles of tribal rituals and the effects of AI technologies may be arguable. Nevertheless, it is insightful to consider AI technologies in the form of a ritual, as an expression of the "repetitive and never ending" aspects of contemporary technocracies.[92] Using adaptive neural networks, a real-time iteration of computing, *Amygdala* "imitates the sensorimotor system of animals".[93] Adaptive neural networks allow the gathering of "sensory information" from the robot and make the robot "adapt to any physical change in its environment".[94] With its changeable bodily features and expressions, like *Corpus Nil*, *Amygdala* concretizes the idea of hybrid body and tangible unknown.

As Donnarumma notes, hybrid bodies, both human and cyborg, are technologized, suggesting "alternative" embodiments that make us consider the embodiment not as essentialized but "adaptive, playful, improvisatory, negotiable", and the expressive capacity of bio-computational processes as "improvisatory and negotiable".[95] The use of Xth Sense and artificially intelligent algorithms reconfigures such alternative embodiments. Xth sense explores dynamic and interactive bodily states and expressions – what Donnarumma considers, "affective agency of the body" – and makes these states and their agency "digitally tangible".[96]

What might such affective agency do to us, especially with respect to our capacity for living with uncertainty? The malleability and uncertainty of bodily sounds, the tangible unknown, I argue, encourages revisiting fast-forward and habitual modes of communication. The "tangible unknown", of communication encourages us to attend to bodily signals and sounds, not as a secondary or complementary form to words or word-like symbols but as a practice of "corporeal knowing",[97] in Donnarumma's words. Corporeal knowing is explored not simply in musical contexts but also at the heart of everyday life, in relation to narratives of well-being.

Corporeal knowing in biomusic and digital health regimes

Corporeal knowing has been read in evocative and creative, and in iterative and diagnostic terms. Musicologist and improviser Deniz Peters asks, "what body, what expression"?[98] Peters suggests that "there is a bodily residue in the sounds we hear", that is, we perceive a body through listening, as informed by the everyday experiences of "touch-sound relations", as well as by the convergences and divergences between "tactile and vocal knowledge".[99] The bodily evocation of sound–touch relations may also have an iterative function and diagnostic implication. Scientific studies show that the human body comprises numerous communication and information circuits. Neural networks and internal organs feed, inform and rewire one another. Bodies constantly talk.[100] But what do they say?

To listen and translate what a body needs and says demands a certain practice. The interaction inside the body can be both dynamic and articulate, but to decode what this interaction expresses requires experiments. Early experiments in psychology and psychophysics deal with decoding this interaction. Biosensing technologies trace the development of specialized research on individual sensory registers with specified protocols. As Jonathan Crary, Jonathan Sterne and David Parisi argue, experimental psychology of the nineteenth century constitutes the quantitative analysis on which the disciplinary and categorical knowledge of individual senses is based.[101]

Media scholar Natasha Dow Schüll examines a current version of this interaction, looking at biosensing and wearable technologies within the context of digital health regimes. Schüll argues that the wearables we use in everyday life, such as the gadgets that quantify and analyze eating, movement and sleeping patterns, promise "self-tracking, self-care, and self-regulation".[102] The wearables turn the human body into a "data-driven body", and generate what Schüll calls, "data for life", demonstrating "short-circuit cultural ideals for individual responsibility and self-regulation".[103] Like tactile speech technologies developed for deaf and hard-of-hearing people, the digital gadgets developed for everyday health regulation show affinity to the technical protocols of wearables in electronic music contexts.

Furthermore, various biosensing musical interfaces, including the Xth Sense, are also used in health and wellbeing contexts, in particular

for physiotherapy and prosthetics.[104] The wearables in musical contexts also lead to a data-driven and quantified body. In his performances, Donnarumma explicitly transforms his body into one that is partially data-driven. Half-human half-machine, the becoming of an alien figure can be understood as an abstraction, a consequence of abstract quantification and atomization. However, such an abstraction is also felt viscerally. In addition, the implication of these performances is not necessarily atomization of senses, self-tracking or self-regulation. The corporeal knowing suggested in the performances points to self-exploration and self-adaptation to others, acknowledging both the autonomy and the co-operation of the human performer and the algorithms, and examining the potential effects of the algorithms.

At the beginning of this chapter, I asked what might one's body say if it talked with bodily signals and sounds. Seemingly, the developers of digital health gadgets ask a similar question. Schüll gives the example of a health and fitness technology promoted by Samsung, which raises the following question: "What if you could ask your body questions and listen to the answers, every minute of every day? You could adjust your habits according to your body's advice. Imagine the insights gained, the mysteries unlocked; it would change your life."[105] In fact, looking at biosensing musical interfaces, the question I pose is the opposite. I explore what may happen when quantified bodily signals and sounds do not amount to a consistent meaning or sign. I ask what happens when such quantities do not lead to a particular diagnosis of any kind.

No matter what we do, we gather pieces of information and experience through our bodies. But we also need to further scrutinize how and in which terms we transcribe what bodies may say. My intention is not to mystify the functioning of the human body or algorithms in that regard, but to encourage us to question how the human body co-exists and co-operates with others, in this particular context with wearable extensions and algorithms. I argue that the corporeal knowing and tactile speech the BioMuse and Xth Sense give rise to is an exploration of that kind. They make us question the limits of connectivity between different bodies. They encourage us to notice the limits of the transmission, accountability and functionality of a message. And they disclose the potential errancy and uncertainty of this message. In short, they create an urgency to reflect on how we make sense of data or a message, rather than how we make use of them.

Electrotactile communication

Early examples of electrotactile communication technologies demonstrate a case of non-linguistic communication, a stimulation via vibration. Building on these technologies, vibrotactile communication technologies such as the signing gloves treat skin as a linguistic voice, as a medium of signification and the translation of verbal messages. While employing similar technical procedures, biosensing musical interfaces such as the BioMuse and Xth Sense, I suggest, contest the very ideas of signification and translation. Comparing electrotactile and vibrotactile technologies together with biosensing musical interfaces underlines how the latter evokes a voicing that extends in multiple directions, which any given language may not be able to adequately translate.

Media scholar David Parisi tells a fascinating history of interfacing with haptics.[106] From eighteenth-century electrical knowledge to twenty-first century haptic media, he explains how the sense of touch is technologized, quantified, and abstracted. The first phase of this history was electrotactile communication. The early inventions of the time – "electrostatic generators, Leyden's jar, the discovery of the electric eel" – focused on electrical knowledge gained outside of the lab.[107] These inventions were demonstrated in public spaces either as an exploratory event where the public was directly involved or as "public entertainment" which generated further "curiosity and amazement".[108] Among these inventions, especially Leyden's jar and the discovery of electric eel hint at the future development of biosensing musical interfaces.

Dutch scientist Pieter van Musschenbroek's Leyden's jar contained high-voltage electricity and enabled empirical investigations about "the sensory behaviour of electricity" such as "tangible shocks" and the impact of electric shocks on the human body and senses.[109] However, while connecting the human body with an electrostatic nonhuman body, the jar also generated a myth about electrification. The shocks were felt but not always visually captured. They were distributed across the human bodies being studied. As Parisi argues, the experiments with the jar depended on a "non-visual mode of witnessing".[110]

Around the same time as the Leyden jar became popular, the Dutch colony of Guiana noted the sensations caused by the electric eel.[111] Those who experienced holding the electric eel and the Leyden jar, among whom the

Englishman Edward Bancroft was the first, reported similarities between the two sensations.[112] In this case, however, the network was facilitated not by an inorganic container of electricity but by an organic body. The "electric shocks of the fish" were not visible or reliable either.[113] This experience turned the sense of touch into an epistemic inquiry. It gave rise to the analysis of the temporality of electric shocks and the approximate quantification of sensations based on tactile experience. However, the standardization of such analysis proved difficult, as fish was an organic and hence changeable body.[114]

Following the discovery of the tactile network of fish and humans, what came next was the research on animal electricity, as well as the combination of artificial and animal electricity. Luigi Galvani claimed that electricity was not unique to the electric eel. Alessandro Volta disproved Galvani's hypothesis about animal electricity, suggesting that the source of electricity in Galvani's experiment was not the frog's legs he had used but the metals that touched the frog's legs. Volta's metallic electricity and invention of batteries led to the development of individual electrodes and the techniques of electrotherapy.[115] The idea of electrotherapy, Parisi explains, was to rejuvenate the energies of the human body. The techniques of electrotherapy associated each individual organ with an individual electrode. Nineteenth-century scientific laboratories individually investigated and quantified tactile sensations with respect to "vibration, weight, intensity, temperature, pain, pressure and movement".[116] In addition to the wonder and the epistemic and therapeutic use of electric shocks, what is striking in this history is, as Parisi insightfully observes, the "non-linguistic" transmission and dissemination of electricity, as well as the transition from non-linguistic dissemination to vibrotactile signification.[117]

Vibrotactile signification

The concentrated study and measurable knowledge of touch generated the possibility of considering skin as a medium for signification. From non-linguistic signals to linguistic signs, from tactile to haptic sensation, which encompasses tactile, kinaesthetic and proprioceptive aspects, touch-driven interfaces have been interwoven with voice, speech and language-driven interfaces. Skin and voice have been treated in related ways as mediums for computing, articulation, translation and stimulation.

Media scholar and historian Mara Mills brilliantly demonstrates this point, analyzing the histories of telecommunication technologies together with the hearing and speech technologies developed for deaf, hard-of-hearing, and blind people. Mills examines Alexander Graham Bell's talking glove for deaf students, which applies visual speech – an alphabet of phonetic symbols initially conceived by Alexander Graham Bell's father, Melville Bell – to a glove. As she argues, mathematician Norbert Wiener's invention of the hearing glove was influenced by Bell's talking glove.[118] Wiener, in collaboration with deaf and blind author and activist Helen Keller, tested the hearing glove in 1949 at MIT. He designed a system in which vibrations of speech could be captured, processed with narrow-band frequency filters and transmitted to each individual finger as electric shocks. This system would require individual training for translation. The experiment did not prove successful. Almost a decade after, in 1956, experimental psychologist Frank Geldard developed another system, which he called, "the tongue of the skin".[119]

Geldard's system was inspired by an earlier development, the "Teletactor, developed for deaf and hard of hearing people in the Robert Gault's Vibro-tactile Research Lab at Bell Labs in 1926".[120] Like the operation of telephones, the Teletactor comprised an apparatus that broke speech sounds into vibrations sent through the reed. The goal was to make the users "feel the vibrations distinctively pressing the pad of thumb".[121] This was another failed attempt. However, Geldard built on this idea and developed a system and a tactile language for deaf and blind people. The system included mechanical, electromechanical and electrical devices. The tactile language was put together through the electrotactile signals of skin and observed and controlled tactile sensations. There were several functions assigned to these machines. Some of them were intended to "transmit speech sounds through the fingers, some others used vibrations to project tactile images, and created arbitrary associations between vibrotactile signals and letters".[122] Expanding on its precedents, Geldard's project employed skin as a multimodal tool of communication. Users were trained to hear, see and speak through the skin. These touch-driven technologies were thus considered voice and speech-driven technologies. More specifically, they were later interwoven with the production and imagination of artificial voice and speech.

Take, for instance, the development of the vocoder. Mills posits that Dudley developed the vocoder (1939) based on lip reading and the artificial larynx so as to capture the necessary content, the "tangible gestures" of speech.[123] The challenge was to transmit speech content to a long-distance location. Thus certain signals were treated as redundant and noise. The vocoder introduced the process of breaking speech input into electrical signals at certain frequencies in defined ranges, encoding them with numbers, decoding these numbers based on corresponding frequency ranges and resynthesizing them as speech output at the receiver's end. Signal processing, Mills explains, was first applied to the vocoder compression.[124] This process was significantly informed by sound synthesis research in experimental music.

Experimental music and speech synthesis

Scholars Douglas Kahn and Hannah Higgins mark the role of experimental music composers, visual artists, poets and literary figures in informing the technologies of digital sound and speech synthesis, early computing and algorithm, and automated speech. As Kahn notes, composer James Tenney, was the first composer fellow working with the engineer John Pierce at Bell Labs, invested in exploring sound synthesis.[125]

Tenney's recommendations to the Bell Labs, Kahn explains, such as the acquisition of noise generator, envelope generator and band pass filter have proved useful in generating tones. However, Tenney was not after the pragmatics of efficient and standardized communication. The creative context allowed him to further explore noise and what was considered to be unnecessary or useless in a telecommunication context.[126] Similarly, in his famous piece, *North American Time Capsule* (1967), Alvin Lucier used the vocoder to decompose speech into signal.

Experimental music composers have probed how one can generate speech out of non-speech sounds, and what it means to consider speech a form of music.[127] Conceptually, such interrogations also led composers to consider the expressive capacity of non-speech sounds. Late twentieth and twenty-first century interactive technologies such as affective computing and embodied gesture expressivity exemplify this conceptual

thread. Technically, this quest both borrowed from and evolved with the foundations of speech recognition and synthesis.

The early beginnings of speech recognition and synthesis were informed by mathematical and probabilistic models such as discrete Markov processes.[128] Between the late 1950s and the 1970s, two models were followed: "symbolic and stochastic". The former was informed by formal linguistics, and the latter referred to the use of Hidden Markov Models, a statistical theory for analyzing nonlinear and unobserved variables. Hidden Markov Models are used for gesture recognition as well as for speech pattern recognition. The stochastic and probabilistic methods have led to more frequent generation and use of algorithms for "parsing syntax and reference, speech tagging, and discourse analysis" in the 1980s and 90s.[129] And since the 2000s, we have been discussing machine learning in relation to this chronology. If we put the technical language aside, what is at stake here is a thread that leads from identifying the smallest units of words to connecting sentences with the most probable order based on pattern extraction, matching and classification.[130]

To do so, there are three main approaches: acoustic and phonetic, pattern recognition, and artificial intelligence. As speech sounds are dynamic in terms of time length and frequency information, acoustic and phonetic approaches prove complicated and not reliable enough. Pattern recognition, however, is treated as a comprehensive method which can be applied to varied forms of data including a sound, a word, a phrase. Artificial intelligence refers to the combination of acoustic–phonetic approach and pattern recognition. It aims to recognize acoustical and spectral features, map the acoustic data into words (or vice versa), combine words in a grammatical sentence, and validate or connect the sentence with its precedent. In short, artificial intelligence performs "acoustical, lexical, syntactic and semantic tasks".[131]

The general protocol of biosensing musical systems works with the basic methods of speech recognition, such as HMM for gesture recognition, as well as feature extraction, mapping and classification. However, the performances demonstrate a non-verbal transmission of bioelectric or biophysical signals. The transmission here attempts not translation but rather stimulation, similar to the thread that Parisi discusses, that is,

the thread from tactile to haptic, from vibrotactile signification to the feel of something.

Signing gloves

Consider the biosensing musical interfaces together with the signing gloves. What are the convergences and divergences between the biosensor performances and the signing gloves? The most obvious convergence is the basic principles of their technical procedures, which trace back the thread from electrotactile communication to vibrotactile signification and principles of speech recognition and synthesis. However, the implications of the biosensing musical interfaces and signing gloves are different.

Signing gloves capture hand gestures and finger motion with sensors, often detect the pace and orientation of movement with gyroscope and accelerometers, send the signal data to a computer, a tablet or a phone using wireless tools, and digitize and translate the data into text. Rather than exploring the control or variation of a physical gesture in pursuit of a creative end, signing gloves aim to classify gestures and convert gestures into text and automated speech. With this procedure in mind, note that the signing gloves are indeed not groundbreaking new technologies, but expanded prostheses and computerized versions of the hearing glove, and to a certain extent, Geldard's research on "the tongue of the skin". Despite their potential benefits, signing gloves – especially the ones which convert gesture data into automated speech – also lead to questions. The main problem is that they are driven by auditory principles and limited hand gestures.

In his *Atlantic* article on sign-language gloves, Michael Erard presents a comprehensive discussion on the signing gloves.[132] As he portrays it, the first signing glove that aimed to foster an interaction between deaf and hearing communities was the "talking glove" developed by James Kramer and Larry Leifer at Stanford University in 1988, following Gary Grimes's invention at Bell Labs in 1983.[133] Since then, there have been a number of student projects and art initiatives on signing gloves. One of these projects was SignAloud Gloves, developed by the University of Washington students Thomas Pryor and Navid Azodi in 2016. SignAloud Gloves recognize the basic gestures of ASL and convert them into text and automated speech.

Awarded the Lemelson-MIT Student Prize, SignAloud Gloves received considerable media attention, but also led to critique from scholars of deaf studies and deaf culture. For instance, as mentioned by Erard, the critique points to how signing gloves reduce the scope of sign language only to hand movements.[134] For all sign languages, facial expressions and bodily movements are as crucial as hand movements. Despite the claim of creating two-way communication, most of the signing gloves seem to perform one-way communication. The critique underlines the need to collaborate with deaf individuals and communities in the process of designing these tools. There may be additional limitations. Translation of sign language into automated speech may discourage hearing communities from learning sign language as well as limiting the modality of communication to auditory principles.

MotionSavvy, a San Fransisco-based tech start-up, addresses some of the points raised above. Initiated and run by a team of deaf technologists, the company developed a sign-language application, called UNI, which

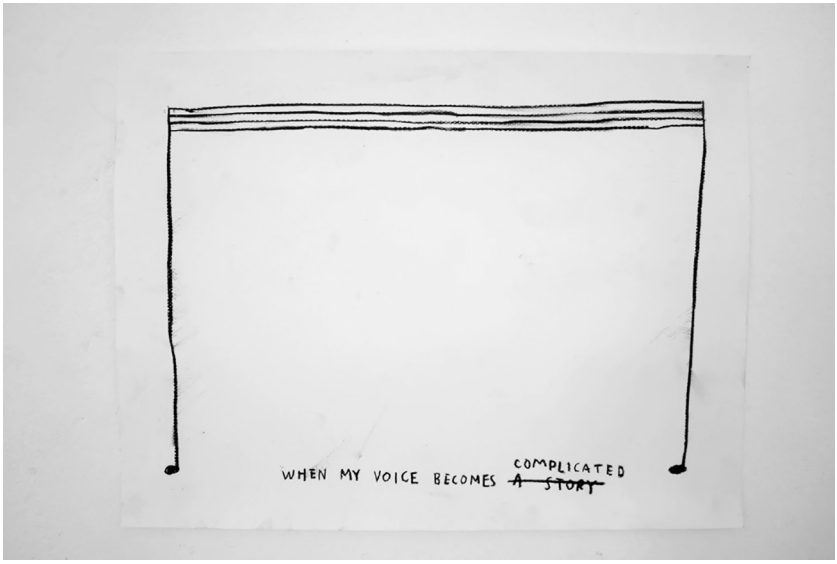

Figure 7.13 Christine Sun Kim, "When My Voice Becomes Complicated".

Source: https://ideas.ted.com/gallery-beautiful-drawings-show-the-music-of-sign-language/. Courtesy of Christine Sun Kim, François Ghebaly Gallery and White Space.

recognizes and converts ASL into text and automated speech. The application also recognizes auditory speech and converts it into text. Founder and CEO of MotionSavvy Ryan Hait-Campbell explains the rationale behind the UNI, referring to "communication barriers"[135] between deaf and hard-of-hearing and hearing communities in everyday life. He mentions the high cost of hiring ASL interpreters, which is simply not affordable or accessible for many people. He considers the UNI "an affordable and accessible option"[136] for resolving the communication barriers. UNI aims to perform a two-way communication converting sign language into speech and speech into text. The developers of the application are very well aware of the difficulties and inequalities that deaf and hard-of-hearing people experience. UNI can be affordable and effective for everyday transactions, but it also perpetuates some of the limitations mentioned above. The application demonstrates only hand gestures, and operates based on an auditory mode of communication.

Social currency or skin?

Deaf since birth, sound artist Christine Sun Kim criticizes the auditory mode of communication. She advocates the wider use of sign languages across both deaf and hard-of-hearing and hearing communities. In her work, talks and interviews, Kim underlines how sound functions like "social currency", a validating and dominant form of transaction like "money, power, and control"[137]. Kim associates certain sounds and volumes as well as ways of speaking and sounding with what she calls "sound etiquettes". Referring to her collaboration with ASL interpreters, she also highlights the idea of social currency in relation to voice, that is, how her voice and identity are represented and heard through another's voice. The experience of "borrowing voices" and the habituated norms and forms of sounding have led Kim to ask how to "claim the ownership of sound" in an auditory world.

Sounds do not have to be embodied in an auditory form. Sounds can be felt on the skin, represented or imagined visually, mentally, discursively. Likewise, Kim's drawings probe conceptions of sound, silence and volume visually and discursively. She also works with infrasounds to heighten the tactile embodiment of sound below the auditory thresholds. Considering

the multimodality, temporal and spatial (dis)appearance, and physical and social contingencies of sounds, the ownership of sound and voice and the ways in which we habituate sounds and get heard are already contested and open to change. Sounds can be instrumentalized and treated as indexical, as a form of social currency. Voices may also appear and act as a personal signature. However, both sound and voice can unsettle the very idea and modalities of social currency as well. In fact, I understand Kim's work as a critique of that kind.

I first met Kim in Berlin. We both participated in artist and scholar Anna Bromley's radio show Lautstrom on Berlin's Reboot FM in 2013.[138] Based on Kim's and my work, Bromley called our conversation "Social Currency or Skin?" In it, we discussed some of the issues mentioned above. Drawing on the use of non-verbal voice in experimental music practices, I have suggested voice as skin, a multisensory interface that both connects and differentiates bodies. Voice as skin, like biosensing musical interfaces, stimulates but does not necessarily articulate or translate a currency, message or identity. Experimental music practices prompt this idea, whilst exploring sound in multiple forms and modalities: sound as movement, as bodily gesture, as idea, as experience.

Kim associates sign language with music. She considers her drawings a case of "visual music" that critiques and transforms the "sound etiquettes". In her recent TED talk, she notes how both sign language and music are "highly inflected and spatial",[139] how their implications can be subtle and hard to translate. As an example, she demonstrates signing, first "falling in love", in international sign language, and then "colonization" and "enlightenment" in ASL. "Notice how all three signs are very similar, they all happen at the head and the chest, but they convey quite different meanings,"[140] she says. In other words, sign language, like music, is performative. An advocate of the wider use of sign language, Kim points to the social currency attached to the "audio-centric" mode of communication. I wish to underline Kim's work relating to this critique. I juxtapose signing gloves with biosensing musical interfaces in terms of their communicative medium and value.

Biosensing musical interfaces operate within auditory worlds but make us question the auditory thresholds and the context-sensitive and performative dynamics of communication. They encourage investigation

of non-verbal modalities of expression, speech and communication without settling into a presumed sign or meaning. In so doing, they contest the very idea of communication, not at the heart of transmission or signification, but at the heart of stimulation and exploration. Developers of signing gloves propose a narrative of efficient and inclusive communication, as well as the generation and distribution of low-cost technologies for many. They perpetuate a notion of linguistic voice. Biosensor performances, on the other hand, prompt us with a different case. Their interfacing leaves us with an uncertainty.

Apart from being a touch-driven and voice and speech-driven technology, biosensing musical interfaces evoke a voice, one that is not reduced to verbal language or limited to vocal cords. The non-verbal expressivity, which can be both visceral and abstract, encourages us to reflect on what we mean by communication and mediation in the first place. This expressivity makes us pause at the threshold of habituated forms of verbal reciprocity. It perhaps strengthens our capacity for listening and for nonsense, as opposed to a sense of pragmatic exchange and growth. The voicing of the performances do not reciprocate a particular code or meaning, but release echoes that go in manifold directions.

Notes

1 Some highlights include Atau Tanaka, Biomuse Trio (Ben Knapp, Eric Lyon, Gascia Ouzounian), Laetitia Sonami, Pamela Z, Miguel Ortiz, Marco Donnarumma, Baptiste Caramiaux, Rebecca Fiebrink, Frédéric Bevilacqua, Pavlos Antoniadis, Tod Machover, Teresa Marrin-Nakra, Rosalind Picard and Jaime Oliver La Rosa.

2 Marc Leman, Micheline Lesaffre and Pieter Jan-Maes (eds.), *The Routledge Companion to Embodied Music Interaction* (London, New York: Routledge, 2017), 2.

3 Ibid.

4 Gabrielsson, A., & Juslin, P.N. (1996). "Emotional expression in music performance: Between the performer's intention and the listener's experience," *Psychology of Music*, 24(1), 68–91.

5 See Giovanni De Poli, Maddalena Murari, Sergio Canazza, Antonio Rodà. "Beyond Emotion: Multi-Sensory Responses to Musical Expression," *The Routledge Companion to Embodied Music Interaction*, eds. Marc Leman, Micheline Lesaffre and Pieter Jan-Maes (London, New York: Routledge, 2017), 78–87.

6 Ibid., 79.

7 Ibid., 80.

8 Ibid.

9 Ibid., 79.

10 Ibid., 81.
11 Ibid.
12 Massie, T.H., and Salisbury, J.K. (1994). "The phantom haptic interface: A device for probing virtual objects," *Proceedings of the ASME Winter Annual Meeting, Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems*, 55(1), 295–300.
13 Ibid.
14 De Poli, G., Mion, L. and Rodà, A. (2009). "Toward an action-based metaphor for gestural interaction with musical contents," *Journal of New Music Research*, 38(3), 295–307.
15 Ibid., 81, 81–2.
16 See Andy McGuiness and Katie Overy, "Music, consciousness, and the brain: music as shared experience of an embodied present," in *Music and Consciousness: Philosophical, Psychological, and Cultural Perspectives*, eds. Eric Clarke and David Clarke (Oxford: Oxford University Press, 2011), 245–63.
17 Here Magnusson refers to musicologist Gary Tomlinson, anthropologist Andre Leroi-Gourhan's *Gesture and Speech* (1993) and media theorist Bernard Stiegler. Thor Magnusson, *Sonic Writing: Technologies of Material, Symbolic, and Signal Inscriptions* (London, New York: Bloomsbury Academic, 2019), 5.
18 Ibid., 6.
19 See the description of *Music for Solo Performer* and Lucier's other works in the film, *No Ideas But In Things*, by Viola Rusche and Hauke Harder. http://www.alvin-lucier-film.com/film.html Last accessed on 13 March 2023.
20 See Christopher Shultis's discussion on "intentional purposelessness" in Cage's aesthetics. Christopher Shultis. "Silencing the Sounded Self: John Cage and the Intentionality of Nonintention," *The Musical Quarterly*, Vol. 79, No. 2 (Summer, 1995), 312–50.
21 See Benjamin Piekut's discussion on how "ordinary" was treated as "extraordinary" in experimental music aesthetics. Benjamin Piekut, *Experimentalism Otherwise* (Berkeley and Los Angeles: University of California Press, 2011).
22 Manford Eaton, *Bio-Music* (Barton, VT: Something Else Press, 1974).
23 See Atau Tanaka and Miguel Ortiz, "Gestural Musical Performance with Physiological Sensors, Focusing on the Electromyogram," *The Routledge Companion to Embodied Music Interaction*, eds. Marc Leman, Micheline Lesaffre and Pieter Jan-Maes (London, New York: Routledge, 2017), 420–21.
24 Atau Tanaka, "The Use of Electromyogram Signals (EMG) in Musical Performance: A Personal Survey of Two Decades of Practice," *eContact! Online Journal for Electroacoustic Practices*, 14.2. https://econtact.ca/14_2/tanaka_personalsurvey.html
25 See Tanaka's description and the video documentations of the piece via the following links: https://www.youtube.com/watch?v=p8CKjmE7zys; https://www.youtube.com/watch?v=G6H1J2k--5I Last accessed on 3 April 2024.
26 Holding and manipulating sounds is an expression that the technologists use. See Atau Tanaka and Marco Donnarumma, "The Body as Musical Instrument," *The Oxford Handbook of Music and the Body*, eds. Youn Kim and Sander L. Gilman (Oxford, New York: Oxford University Press, 2018), 79–96. See also https://www.hz-journal.org/n21/tanaka.html
27 Ibid.
28 See https://www.youtube.com/watch?v=G6H1J2k--5I Last accessed on 11 March 2023.
29 Ibid.

30 Ibid.
31 Simon Waters, "Performance Ecosystems: Ecological Approaches to Musical Interaction," *Electroacoustic Music Studies Network EMS-07 Proceedings*, DeMontfort University, 2007. http://ems-network.org/spip.php?article278
32 Tanaka and Donnarumma, "The Body as Musical Instrument," 83.
33 Ibid., 95.
34 Ibid., 85.
35 Giuseppe Torre, Kristina Andersen and Frank Baldé, "The Hands: The Making of a Digital Musical Instrument," *Computer Music Journal*, Volume 40, Number 2, Summer 2016, 22–34; see page 22.
36 As noted by Torre et al., the sensors used in each glove include "momentary push keys, mercury switchers, ultrasonic receivers, ultrasonic transmitters, clip cardoid microphone, pressure sensors, potentiometer, four character display board". Ibid., 23.
37 Ibid.
38 Ibid., 27–8.
39 Ibid. See also Tanaka's and Donnarumma's article, "The Body as Musical Instrument," 79–96.
40 https://sonami.net/portfolio/items/ladys-glove/ Last accessed on 2 March 2023.
41 Ibid.
42 Ibid.
43 Ibid.
44 Ibid.
45 Ibid.
46 Ibid.
47 Ibid.
48 Tanaka and Donnarumma, "The Body as Musical Instrument," 81.
49 Ibid.
50 Tanaka and Ortiz, "Gestural Musical Performance with Physiological Sensors, Focusing on the Electromyogram," 427.
51 Ibid.
52 Ibid.
53 Ibid., 424–7.
54 Ibid., 423.
55 Tanaka and Donnarumma, "The Body as Musical Instrument," 94.
56 Ibid.
57 Ibid.
58 Marco Donnarumma, "On Biophysical Music," *Guide to Unconventional Computing for Music*, ed. E.R. Miranda (London: Springer, 2017), 63–83. https://doi.org/10.1007/978-3-319-49881-2_3 See also https://marcodonnarumma.com/works/xth-sense/ Last accessed on 13 March 2023.
59 Ibid., 70.
60 Marco Donnarumma, "Xth Sense: recoding visceral embodiment," Conference Paper, CHI'12, May 5–10, 2012, Austin, Texas, USA. ACM 978-1-4503-1016-1/12/05. https://www.researchgate.net/publication/260095896
61 Ibid.
62 See https://marcodonnarumma.com/works/xth-sense/ Last accessed on 13 March 2023.

63 Ibid.
64 Alexander R. Galloway, *The Interface Effect* (Cambridge: Polity Press, 2012), 33.
65 Ibid., 22, 23.
66 Sherry Turkle, *The Second Self: Computers and the Human Spirit* (New York: Simon and Schuster, 1984).
67 Galloway explains this point in detail. See Galloway, *Interface Effect,* vii–viii.
68 George E. Lewis, "Too Many Notes: Computers, Complexity, and Culture in Voyager," *Leonardo Music Journal*, 2000, Vol. 10, Southern Cones: Music Out of Africa and South America (2000), 33. Also, see Georgina Born's discussion of *Voyager* in "Digital Music, Relational Ontologies and Social Forms," *Bodily Expression in Electronic Music: Perspectives on Reclaiming Performativity*, eds. Deniz Peters, Gerhard Eckel and Andreas Dorschel (London, New York: Routledge, 2012), 166–69.
69 Simon Emmerson, "Live Electronic Music or Living Electronic Music?" *Bodily Expression in Electronic Music: Perspectives on Reclaiming Performativity*, eds. Deniz Peters, Gerhard Eckel and Andreas Dorschel (London, New York: Routledge, 2012), 152.
70 Ibid., 153.
71 Ibid.
72 Chris Salter, *Alien Agency: Experimental Encounters with Art in the Making* (Cambridge, MA: The MIT Press, 2015), 4.
73 Georgina Born, "Digital Music, Relational Ontologies and Social Forms," 165.
74 Ibid., 164, 165.
75 Ibid., 172.
76 Ibid., 174.
77 In his text, *On Biophysical Music*, Donnarumma refers to his collaborative research with Atau Tanaka and Baptiste Caramiaux. See page 3 in the author's copy of "On Biophysical Music". See also Caramiaux, B., Donnarumma, M. and Tanaka, A. (2015). "Understanding gesture expressivity through muscle sensing." *ACM Transactions on Computer-Human Interactions*, 21(6), 31.
78 Marco Donnarumma, "Ominous: Playfulness and Emergence in a Performance for Biophysical Music," *Body, Space and Technology Journal*, 14. Brunel University, 2015. See https://marcodonnarumma.com/writings/ominous-playfulness-and-emergence-in-a-performance-for-biophysical-music/ Last accessed on 24 February 2022. Donnarumma notes that this quote is taken from a bulletin of the St. Louis Art Museum (US) in which the author (apparently unknown) rephrases a description allegedly attributed to André Breton. See (Saint Louis Art Museum, 1967: 2).
79 See Donnarumma's description of the piece via the following link: https://marcodonnarumma.com/works/ominous/ Last accessed on 14 March 2023.
80 Ibid.
81 Ibid.
82 Ibid.
83 Ibid.
84 See https://marcodonnarumma.com/works/corpus-nil/ Last accessed on 13 March 2023.
85 Ibid.
86 Ibid.
87 See Donnarumma's description on his website. See also the interview with Donnarumma via the following link: "Corpus Nil": A Performance by Man and Artificial Intelligence,

Ars Electronica Blog | Sep 4, 2017 | by Vanessa Graf. https://marcodonnarumma.com/works/corpus-nil/https://ars.electronica.art/aeblog/en/2017/09/04/corpus-nil/ Last accessed on 12 March 2023.

88 See https://marcodonnarumma.com/works/amygdala/ Last accessed on 11 March 2023.

89 Ibid.

90 Ibid.

91 Ibid.

92 Ibid.

93 Ibid.

94 Ibid.

95 Marco Donnarumma, "Beyond the Cyborg: Performance, attunement and autonomous computation," 2017. See also, *On Biophysical Music*, 2, 3, 4.

96 Marco Donnarumma, "Xth Sense: recoding visceral embodiment," 2012.

97 In his essay "Beyond the Cyborg: Performance, attunement and autonomous computation," Donnarumma refers to Julian Henriques's notion of "corporeal knowing". See Julian Henriques. *Sonic Bodies: Reggae Sound Systems, Performance Techniques, and Ways of Knowing* (London: Continuum, 2011). Marco Donnarumma, "Beyond the Cyborg: Performance, attunement and autonomous computation," 2017, 3.

98 Deniz Peters, "Introduction," *Bodily Expression in Electronic Music: Perspectives on Reclaiming Performativity*, 4.

99 Ibid., 4, 18, 19, 20.

100 During my doctoral studies, I encountered the alternative wellbeing practice BodyTalk and BodyTalk practitioner and trainer Karen Atkins. My subsequent conversation with Atkins informed me about how BodyTalk works, by regulating the interactions – the talk – between bodily organs, based on their frequencies.

101 See David Parisi, *Archaeologies of Touch: Interfacing with Haptics from Electricity to Computing* (Minneapolis: University of Minnesota Press, 2018), 15.

102 Natasha Dow Schüll, "Data for life: Wearable technology and the design of self-care," *BioSocieties*, September 2016, 1. DOI: 10.1057/biosoc.2015.47.

103 Ibid.

104 See, for instance, the website of Xth Sense.

105 Schuïll, "Data for life: Wearable technology and the design of self-care," 10.

106 David Parisi, *Archaeologies of Touch: Interfacing with Haptics from Electricity to Computing*, 2018.

107 Ibid., 48–9.

108 Ibid.

109 Ibid., 53–4.

110 Ibid.

111 Ibid., 58.

112 Ibid., 58–62.

113 See Parisi's discussion on the "invisible shock of the fish" and "fish–human circuit". Ibid., 58–62.

114 Ibid., 64.

115 Parisi addresses Galvani's animal electricity and Volta's metallic electricity, as well as electrotherapy, experimental psychology and "the doctrine of touch" in several chapters. Ibid., 6–7, 47–97.

116 Ibid.
117 Ibid., 47.
118 Mara Mills, "On Disability and Cybernetics: Helen Keller, Norbert Wiener, and the Hearing Glove," *differences* (2011) 22 (2–3): 74–111. https://doi.org/10.1215/10407391-1428852
119 Parisi, *Archeologies of Touch*, 12, 151–213. See also the interview with Parisi in In-Touch. https://in-touch-digital.com/2017/11/14/in-touch-qa-with-david-parisi/
120 Parisi, *Archeologies of Touch*, 12, 151–213.
121 Ibid.
122 Ibid., 7.
123 Mara Mills, "Media and Prosthesis: The Vocoder, the Artificial Larynx, and the History of Signal Processing," 107–49.
124 Ibid., 113–16.
125 Douglas Kahn, "James Tenney at Bell Labs," *Mainframe Experimentalism: Early Computing and the Foundations of the Digital Arts*, eds. Hannah Higgins and Douglas Kahn (Berkeley, Los Angeles: University of California Press, 2012), 131–147.
126 Ibid., 132, 133, 138–41.
127 Both Christoph Cox and Douglas Kahn underscore this point in various writings. See, for instance, Christoph Cox, "The Alien Voice: Alvin Lucier's North American Time Capsule 1967," *Mainframe Experimentalism: Early Computing and the Foundations of the Digital Arts*, eds. Hannah Higgins and Douglas Kahn (Berkeley, CA: University of California Press, 2012), 170–86.
128 Lawrence Rabiner and Biing-Hwang Juang, *Fundamentals of Speech Recognition* (New Jersey: Prentice Hall, 1993), 2.
129 Daniel Jurafsky and James H. Martin, *Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition* (New Jersey: Prentice-Hall, Pearson Higher Education, 2000), 10–18.
130 Ibid., 1–17.
131 Rabiner and Juang, *Fundamentals of Speech Recognition*, 42–56.
132 Micheal Erard, "Why Sign-Language Gloves Don't Help Deaf People," *The Atlantic*, 9 November 2017. https://www.theatlantic.com/technology/archive/2017/11/why-sign-language-gloves-dont-help-deaf-people/545441/ Last accessed on 24 February 2022.
133 Ibid.
134 Ibid.
135 See the interview with Ryan Hait-Campbell, featured by TechCrunch in 2014. https://www.youtube.com/watch?v=Kj51RNZAM9k Last accessed on 13 March 2023.
136 Ibid.
137 Anna Bromley, Lautstrom#36 with Christine Sun Kim and Zeynep Bulut, "Social Currency or Skin? Notions on Voice, Absence and Presence of Sound," 2013. https://soundcloud.com/lautstrom-1/lautstrom-36-with-christine
138 Ibid.
139 See Christine Sun Kim's TED Talk, "The enchanting music of sign language," 19 November 2015. https://www.youtube.com/watch?v=2Euof4PnjDk Last accessed on 24 February 2022.
140 Ibid.

8

Warmth: *Vocal Vibrations*

Vocal Vibrations, an interactive public installation by the Opera of the Future group at the MIT Media Lab, crystallizes multiple echoes of the singing voice. The group, led by composer and technologist Tod Machover, develops a biosensing musical interface which translates a sonic experience into a tactile one. However, unlike the BioMuse and Xth Sense, *Vocal Vibrations* deals with the physical and psychological implications of the human voice. BioMuse and Xth Sense amplify physicalization and abstraction of bodily signals and sounds. They encourage us to consider whether

Figure 8.1 "The Chapel" from Tod Machover's *Vocal Vibrations*. Paris 2014.

such physicalisztion and abstraction may amount to a voicing, one that is not limited to vocal or verbal utterance.

Vocal Vibrations has a contrary focus. It employs a vocal practice and converts harmonic singing into tactile vibrations. The project investigates the effects of the vibrations on the body and on well-being. How is singing converted into tactile vibrations? What kind of voice is generated by tactile vibrations? Can this voice function as a common medium, like a shared skin? Considering these questions, I explore the implications of tactile vibrations as immunity of vibrations. Without being captured as one single body or converted into a particular message or pushed in a single direction, I suggest that the vibrations enable us to endure and evolve with various degrees or forms of uncertainty.

The Chapel

Vocal Vibrations explores tactile vibrations in two exhibition spaces: the Chapel and the Cocoon. The Chapel is a public listening space, where participants listen to Machover's vocal composition, "based on vocal recordings of soprano Sara Heaton and the Blue Heron Choir".[1] The composition includes both solo and choral soprano sections. At its core, there is a recurring pitch (D). The unfolding of multiple components of the piece around a recurring pitch allows Machover to weave together practices from a wide variety of musical cultures, including, "Tuvan throat singing, early polyphony of Renaissance choral music, and improvisatory arpeggios of solo soprano explorations".[2] Despite their different contexts, one can observe a feature shared by all these diverse musical influences. They all prompt an engagement with the physical environment through singing. Likewise, Machover's composition engenders an engagement with the exhibition space through singing.

The Chapel is a surround audio environment of ten high-fidelity speakers installed in an oval.[3] Each one of the speakers plays back different components of the composition.[4] The playback draws attention to the recurring D and its overtones and undertones, as well as to the interplay between the multiple and the solo voices. The Chapel is presented as a zone for "focused listening".[5] It is a site for wonder, a call for hearing vibrant differences both in the music and in the room. Participants are encouraged to sit, meditate, listen to and sing with the prerecorded

composition in the Chapel. There are no specific instructions. The oval shape of the speaker installation evokes a metaphor of womb. The space includes a special chair, titled the Gemini chaise, devised by architect and designer Neri Oxman in collaboration with scientist W. Craig Carter. The Gemini chaise makes direct reference to the metaphor of the womb.

Gemini chaise

The Gemini chaise is an acoustic "twin" chair (see Figure 8.1). As Oxman et al. note, it extends "the warmth of the womb to the stretches of the Gemini zodiac in deep space", and performs on the human body "like a Gemini constellation, drifting in space".[6] With Gemini chaise, Oxman and her collaborators "explore interactions between pairs: sonic and solar environments, natural and synthetic materials, hard and soft sensations, as well as subtractive and additive fabrication".[7] Perhaps one could add to these pairs another two: containment and extension, and silence and noise. The chaise has a semi-closed form with a "solid wood-milled shell".[8] It looks like an open envelope. The cellular skin inside the chaise is a "hybrid fabrication" including "a 3D printing of polymeric texture" and materials that absorb "reflections of sound or electromagnetic waves" and protect from "exterior sources of noise".[9] The shell and the cellular skin together provide this "calm and silent" acoustic environment, which is imagined like a womb and executed like an anechoic chamber. Indeed, the sonic environment of the womb, as scientific research shows, is not like an anechoic chamber.[10]

Depending on the developmental stage, a foetus can hear maternal sounds. Before birth, it is possible for the foetus to be affected by the mother's voice and the sounds of her heartbeat, as well as by environmental sounds to a certain degree.[11] Oxman and her collaborators' approach does not necessarily suggest the opposite. However, what they wish to achieve with the Gemini chaise is to enable participants to "quieten the thinking mind", to experience "a stimulation-free environment" and get in contact with "inner voices".[12] Inner voices, in this context, refer to "prenatal", "amniotic" as well as unconscious, unattended or "otherwise not audible"[13] voices. Sitting in the chaise, the suggestion is, means noticing the inner voices not through the audible frequencies of the surface or its surroundings, but through the touch of the surface.

The surface is devised as a "multifunctional skin" that acts like an "acoustical barrier" as well as a "cushionlike shell".[14] It draws inspiration from the flower *Ornithogalum dubium*, which has a structure of "interlocking fingers or units that attach one cell to its neighbours".[15] It is useful to note how the details of this structure are implicated in the Gemini chaise. The geometry of the chair, Oxman et al. write, "enables an increased surface area-to-volume ratio, maximizing the number of bounces a wave makes within the structure. With each bounce, the wave loses energy to the 3D-printed material and thus exits with reduced signal strength."[16] The structure of the Gemini chaise does not convert the singing or speaking voice into tactile vibrations, but it points at a transition from audition to taction.[17] The chair works with tactile stimuli and frequencies, rather than the audible stimuli. As Oxman notes, the digital and printed configuration of the surface and the shell underscore the structural integrity, warmth and comfort that a participant may experience with the bodily contact.

Oxman is a designer inspired by nature. In her 2015 TED talk, she explains how she turns to nature to create sustainable and augmented life forms. She is interested in uniting the split "between nature and machine assemblies".[18] What we observe in nature, she says, is not homogenous material parts but "heterogenous materials with varying properties that behave as one single unit."[19] She gives as evidence human skin. Different areas of human skin, for instance, vary in thickness, elasticity and sensitivity, as well as in functions such as filtering and protecting us from the outer effects. Nevertheless, human skin behaves as a single entity with no parts or assemblies.

Oxman explores design as the creation of a single object, building ecological and sustainable materials that interact with and are scaled in proportion to their environment. Key to the overall process is Oxman's use of the term "material ecology", the idea of which, Oxman, Ortiz, Gramazio and Kohler write, is "the realisation that the environment and design object interact through multiple dimensions and a spectrum of environmental variables".[20] The authors suggest that material ecology intends to bridge the disproportion between the dimension of "environmental space" and that of "conventional design space".[21] The "dimensional mismatch", they argue, leads to "ecological mismatch", which can be improved by "increasing the dimensionality of the design space through multifunctional materials,

high spatial resolution in manufacturing and sophisticated computational algorithms".[22]

In line with the idea of material ecology, the Gemini chaise exemplifies how multidimensional and multifunctional materials can bridge the machine to the organism, enabling us to move away from mechanical life to a form of living organism that interacts with its environment. Concerning this bridge, however, we also need to look into the ways in which biological life and growth already interact with other forms of life and growth, be they economic, societal or political. Indeed, machine and organism, technê and bios, have long been entangled with one another. In *Biomedia*, media theorist and philosopher Eugene Thacker crystallizes this point:

> On the one side, a concern with "life itself"; on the other, with code, message, and information. More often than not, the two endeavours are assumed to be separate and qualitatively different. This presumption has its historical and philosophical roots in the separation of life (bios) from technology (technê), nature from artifice, the living from the nonliving. Nevertheless, biological life can be approached as technical, open to being designed and engineered at the molecular or genetic level. And information is increasingly seen as having "vital" properties of its own, a capacity to adapt, evolve and mutate. The two perspectives are never so close as when they take each other as their object. Thus our question: What happens when "life" is understood as being essentially informational? What happens when certain types of information are understood as being indelibly connected to and constitutive of key biological processes?[23]

What Oxman means by growth is precisely a capacity to "adapt, evolve and mutate", which Thacker portrays above as information. Based on this idea of growth and information, recall the notion of plasticity, transformation of one material into another, as well as the questions relating to the pre- and post-temporal within the context of nature.

Is nature endlessly self-generative? If we give back what we gather from nature in augmented, sustainable and multifunctional life forms, are we simply healing and paying our debt to nature, or are we, as humans, pursuing an immortal form of life, as well as an endless and pointless growth? If technology is not simply "the extension of the human" but also the "extension of natural resources",[24] how do we deal with the processes involved in consuming natural resources for the very production of smart

technologies, as well as the augmented, sustainable and multifunctional life forms that we fabricate by means of these technologies?

There are no simple answers to these questions, but I wish to note some of the questions here, as the design of the Gemini chaise brings them to mind. The spatial design of the chair, its semi-open figure, evokes a sense of both mortal and divine life. The surface of the chair is intended to bridge "sonic and solar environments, natural and synthetic materials, and hard and soft sensations".[25] Within the context of *Vocal Vibrations*, I turn to Oxman's account of skin as a multifunctional and multidimensional surface with varying properties that behaves like a single object. I wonder how this account can be applied to the distributed appearances of voices in the Chapel.

The irregular and sound-absorbing surface pattern of the Gemini chaise is generated by printing "44 different properties that vary in rigidity, opacity, and colour and correspond to pressure points on the human body."[26] As Oxman explains, the surface becomes multifunctional not by adding material or creating an assembly but with these varying material properties. One can consider the internal surface of the Gemini chaise as skin. However, one could ask why the Gemini chaise was called an acoustic chair, when it was designed to behave like an acoustical barrier whilst being associated with the womb. The metaphor of the womb, as mentioned earlier, points to a return to hearing your inner voice rather than silence. It also imagines the female body as the site of life, reproduction, and growth. The placement of the Gemini chaise in the Chapel extends both the gendered metaphors it references and the architecture it performs.

The Chapel is an open and shared zone, joined by the participants that pass through, listen to and/or perform with others in the space. It is the first zone that the participants encounter in the exhibition. The spatial configuration includes a surround audio that envelops participant bodies as well as the room. Nevertheless, what this setting gives rise to is not a total containment. The Chapel is defined as a "public space" where people come and go. Like the Gemini chaise, it has a semi-open configuration. And, like skin, it both filters and connects to external variables. The Gemini chaise, in this context, doesn't simply enable a meditative experience or cocooning but also interacts with the other variables in the room, including other voices and bodies.

In particular, the speakers articulate an expansion and release of the audio, both physically and figuratively. Here the interaction between the chair and other variables does not seem to be translated into a single body. In other words, the sonic, visual and spatial variables in the room do not necessarily behave as one. The surface that the participants' varying features weave can rather be considered as a distributed organism that may appear also in parts, in moments, perhaps without a sense of growth. Being public, the Chapel performs an open and transitional stage, which does not allow a unified or complete experience. Instead, it prepares the participants for the next space, the Cocoon, which is designated for both "interactive and private" vocal experiences.

The Cocoon

In the Cocoon, participants individually explore their singing holding an Oral Resonance Ball (ORB), a biosensing device that translates the singing voice into tactile vibrations. This translation, as the research team posits,

Figure 8.2 Individualized "Cocoon" experience from Tod Machover's *Vocal Vibrations*, installed at Le Laboratoire in Paris, 2014.

intends to raise awareness of the "variation and externalisation of the range of human voice", as well as the impact of such awareness on "physical and mental health".[27] The research team demonstrates various studies of the role of vocalization in revealing the reciprocity between the physical and mental processes of the human body. In the light of neurological findings, the team indicates that the human brain is "goal-oriented" when producing a vocal signal and it separates voice from speech "when processing vocal information".[28] The "physical processes" of producing a vocal signal, including "breath, the tongue, the vocal tract muscles, the tension of the vocal folds and the lips", demand a "psychomotor synchronization", and hence relate to mental processes as well.[29] Consider, for instance, how stress and anxiety may change the sound of voice. Or how singing may shift an emotional state. The research team notes a good number of scientific studies to support these propositions.[30]

The installation furthers the related research highlighting not simply singing but also vibrational experiences that are extracted from or emerging with singing. The highlighting of vibration, especially the conversion of a vocal signal into a seemingly non-vocal experience, as the team mentions, makes reference to other multimedia explorations of the voice, such as the public installations *RE:MARK* (2002), *Hidden Worlds of Noise and Voice* (2002), and *Messa di Voce* (2003) created by artists, composers and designers Golan Levin and Zachary Liberman.[31] These installations are suggestive of *Vocal Vibrations,* because they also employ the acoustic content of vocalizations – vocal spectrum, intonation, amplitude, etc. – and concretize voice as a multimedia projection, experience or medium. Levin and Liberman explore the idea of "visible speech" in these installations with the following question: "If we could see our speech, what might it look like?"[32]

In *Hidden Worlds*, participants wear "special see-through data glasses, which register and superimpose the images in 3D graphics".[33] The idea is to generate varied "abstract and coloured forms", out of the "tone and volume" of the participants' voices.[34] *Messa di Voce* follows a similar conceptual thread. Joined by vocal artists Joan LaBarbara and Jaap Blonk, the installation examines visual representations of non-verbal vocalizations. However, in this installation, Levin and Liberman project and manipulate LaBarbara's and Blonk's vocalizations with voice recognition and

motion-detection technologies.[35] In *RE:MARK,* two participants vocalize phonemes with two microphones. A phoneme recognition system classifies and projects the phonemes on the participants' installation display. If a phoneme is not recognized, "an abstract shape is produced, based on the tonal features of the vocalizations".[36] Meanwhile, other visitors can interact with the projected shapes by means of a computer-vision system, which generates, as the artists describe, "a consensual hallucination".[37]

The notion of "consensual hallucination" first appears in William Gibson's award-winning 1984 sci-fi novel *Neuromancer*.[38] Gibson uses this term to describe a "cyberspace" which is a computerized network. Gibson's depiction is not far from today's plugged-in society, considering how computerized networks have penetrated into our everyday lives, as well as into creative works that engage with science and technology. Philosopher Franco "Bifo" Berardi designates "consensual hallucination" as a meta abstraction, a "hypothesis", which is essentially a "projection", a "shared imagination" that creates the urge for meaning-making.[39] Consensual hallucination, Bifo argues, displays the reality of the "technosocial", a collective projection that is fed by both the indeterminacy of the neoliberal economy and capitalist automatisms and the indeterminacy that avant-garde and experimental art practices have explored conceptually since the early twentieth century.[40]

The ORB in *Vocal Vibrations*, and the exploration of visible speech in Levin and Liberman's installations, employ this reality of the "technosocial" while generating a shared imagination, which is essentially informed by the translations and indeterminacies of voice and speech-recognition technologies. I wonder why we want to visualize, exteriorize, control and detect voice and speech, and how this process relates to a consensual hallucination, as well as the implication of consensual hallucination for our understanding of voice as a multisensory phenomenon.

On visible speech and voice recognition

Visible speech goes back to nineteenth-century experiments using phonetics, speech and communication, and sound-recording technologies. The most well-known tool is Alexander Melville Bell's visual alphabet developed for deaf and hard-of-hearing people in 1849. Media historian Robert

Brain portrays other tools of visible speech in line with Bell's alphabet. As Brain explains in *The Pulse of Modernism*, "from 1875, when the French Société de linguistique joined forces with Étienne-Jules Marey, important networks of collaboration between physiologists and linguists were developed to investigate speech acts using graphic inscription devices".[41] This network led to the foundations of "experimental phonetics" at the Collège de France in 1897.[42]

One motivation behind developing a laboratory working on experimental phonetics, as Brain posits, was to correct the errancies of hearing. The aural medium of communication was not considered measurable or reliable enough. However, "translation of acoustic data"[43] into inscription – be it a visual image or a written word – was treated as controllable and exchangeable. Another important motivation was to convene a system that could allow further examination of the components of individual vocal production. Leon Vaïsse, the president of the French Société de linguistique in 1874 and an expert in deaf-oral education, along with Michel Bréal, the leading figure in linguistics at the time, advocated for the "individual speaking subject and its volitional capacity to alter its manner of articulation," as well as for the "physical and psychological determinants of the act of speaking," as opposed to the "German notion of language as abstract imagination."[44] Connected to such physicalism and atomism, graphic inscriptions were used to make direct associations between sight and articulation of phonemes, as well as between bodily organs and acts of speech. Vaïsse considered the use of graphic inscriptions in a similar way and as an extension of Melville Bell's visual alphabet.[45]

Graphic inscriptions were explored as an educational tool for deaf and hard-of-hearing individuals, as well as for "objective" measurement of vocal production. For instance, Marey-Rosapelly's vocal polygraph "inscribes the vibrations of the larynx, movements of the pressure within the nasal passages and the lips".[46] The articulation of "phoneme" is treated as a "materialized scientific object".[47] As Brain delineates, the study of vowels initially proved less measurable in this history. The fleeting and surrounding presence of vowel sounds complicated the written representation. In effect, such complication led to further experiments and informed the development of mid to late nineteenth-century sound-media technologies such as Leon Scott de Martinsville's phonoautograph,

which, as scholars like Brain, Kursell and Sterne argue, made speech "visible through a representation of the wave forms produced by speech, rather than through a representation of positions of the mouth".[48]

The implication of the so-called objective measurement of vocal production was ironically an abstraction of voice and language. Despite its opposition to an "abstract imagination" of language, the physicalism and atomism of physiology and experimental phonetics led to an artificial construction or synthesis of speech on the one hand, and a moving imagination of voice and sound waves on the other. Speech is a living phenomenon. It is a series of both vocal and non-vocal acts, movements and expressions projecting and producing varied voices, both in abstract and in concrete forms. Phoneticians like Abbé Rousselot, as Brain tells us, worked with linguistic geographers and inferred that the lives of vowels, vibrations and voices were migrating and changing. Rousselot's measurement kit included his own inventions, the "larynx explorer, and speech inscriptor", as well as Edison's gramophone and phonograph, which enabled the recording of vocals without the need for a physical contact between lips and the recording device. The studies of "living speech", however, demonstrated errancies of measurements, as well as the individualities of voices.[49]

Still puzzled with this errancy, twentieth and twenty-first century voice-detection and speech-recognition technologies follow these histories of visible and living speech. Media scholars Mara Mills and Xiochang Li assert that acoustic data collected and translated into waveforms, was used for deciphering speech content: for "speaker identification" in a legal context, and for "speaker replacement" with an automated voice in a commercial context.[50] Central to this genealogy was the visualization of acoustic and linguistic patterns in waveforms with sound spectrography, developed at the Bell Telephone Laboratories in the 1940s.

Sound spectrography was used to reveal "coded speech signals", and later extended to a study on "voiceprint identification" devised by Ralph Potter, George Kopp and Harriet Green in 1944, during WW2.[51] Similar to fingerprints, voice-printing aimed at marking individual voices, both physically and socially. As Mills and Li explain, individual features of vocal production – including "breathiness, monopitch, nasality, accent" – were studied, quantified and categorized with respect to "gender, accent and

affect".[52] Taking fingerprinting as a model, Bell Labs engineer Lawrence Kersta, "a minor member of the spectrograph research team," expanded on this research and suggested voice-printing "as a tool for criminal identification in legal contexts in the 1960s".[53] Nevertheless, given the changing and performative features of both voice and speech, voice-printing proved inaccurate.[54]

Mills and Li tell us how technologies of "speaker identification" have led to "speaker replacement." This transition seems not linear but rather convergent. Some of the technologies that Mills and Li exemplify, including John Flowers' 1913 "voice-operated typewriter," the 1920 "voice-activated toy" Radio Rex, and the 1952 digit recogniser Audrey, draw attention to earlier attempts for speech recognition, which employ "phonetic pattern recognition."[55] The stress on specified phonetic patterns suggests an abstraction of speech, rather than a recognition of speech. Within the context of telecommunications, this abstraction is intended for functional extraction and transmission of information, as well as for automation in lieu of "human telephone operators".[56]

Contemporary speech-recognition and automated-voice technologies can easily be examined as an expanded version of Audrey. The difference is that recent technologies, such as digital assistants like Alexa or Siri, perform patterning and synthesizing not simply visually or acoustically, but also syntactically and semantically. Indeed, patterning and recognizing are not exactly the same. Patterning mainly refers to identifying a recurring shape or form. Humans can habituate a pattern to the extent that it becomes unrecognizable or unrecognized. A recurrence of the same pattern may also lead to the recognition of the unexpected or unnoticed. Human recognition, as involved in live process and experience, is more complex and plastic than the pattern recognition of computers. Digital assistants, for instance, make likely and sometimes unlikely associations between words and sounds, based on their acoustic database and on the principles of machine-learning algorithms.

A machine-learning algorithm can also participate in a live and collaborative process, as opposed to "rule-based algorithms."[57] A supervised algorithm can have extended features such as recognition, classification and synthesis of audio, visual and linguistic patterns. However, the responses and associations of these algorithms are often abstractions.

Consider your everyday interactions with automated voices. They may well entail miscalculations, errors, unlikely responses or no response at all. Relating to Levin and Libermen's installations and *Vocal Vibrations*, I want to emphasize the errancy of voice and speech that the extended features of machine-learning algorithms suggest.

Machine speech, in effect, reinforces the uncertainty of human speech. Given the wide use of digital assistants, many people welcome such errancy and uncertainty in daily life and yet treat these technologies as reliable, helpful and effective. It would be hard to compare the plasticity of the machine brain to the plasticity of the human brain. But it would be fair to suggest that machine voices and speech train humans in a certain way, demonstrating the plasticity of language, the artificial synthesis of words as patterns, and the collaborative and contingent processes of sense-making.

Machine voices encourage us to question to what extent humans understand and rely on one another, how we interact with nonhumans, and how both humans and nonhumans, all together, participate in a non-dialogue, a non-reciprocal but distributed mode of interaction. Creative works such as *Vocal Vibrations* and Levin and Libermen's installations, I argue, demonstrate and reproduce this non-dialogue. They deal with the transition from the visual patterning of speech and the measurement of vocal production to the generation of an invisible and errant voice, which can be both individual and anonymous.

Visible and tactile speech in *Vocal Vibrations*

Vocal Vibrations does not directly translate vocalizations into graphical representations. However, it draws on the idea of visible speech, while converting the vocal vibrations into tactile vibrations by means of a tangible and visual object. Recall Levin and Liberman's question: "If we could see our speech, what might it look like?"[58] Levin and Liberman depart from the idea of measuring vocalizations, but their installations explore the errancy of voices and "consensual hallucination". For instance, in *RE:MARK*, if the phoneme recognition system does not recognize a vocal rendition of the phoneme, the vocalization takes the form of an abstract shape or figure. The way such a figure speaks back or with another is not necessarily

legible. The figure "re-marks" the constitution and the implications of a possible voice as being open to change. Considering *Vocal Vibrations*, we can rephrase Levin and Liberman's question as such: "What would happen if we could feel our speaking voices as moving vibrations?"

In *Vocal Vibrations*, the multimedia projection and distribution of vocal inputs generates a "consensual hallucination" and highlights the errant and contingent aspects of voice. The installation externalizes singing voice in the form of an Oral Resonance Ball (ORB). A voice-activated device the participant holds in their hands, ORB converts vocalizations into tactile vibrations. Fingertips, the research team notes, have more sensor receptors than the vocal vibrating chamber.[59] In our fingertips we can loudly hear "variations in vibrations caused by frequency, amplitude and timbre".[60] Accordingly, the acoustic content of a vocalization can be felt in one's hands in the form of an object.

The team designates the ORB as an "external instrument", which facilitates an experience of exploring the voice similar to improvising on a piano or violin. The ORB exteriorizes the acoustic aspects of voice; however, it has a non-linear orientation. Its shell is made of ceramic-materials, an "ovoid porcelain with five transducers attached on the inside wall".[61] The ceramic material presents "no directional atomic order" and "offers beneficial properties blending vibration from one transducer to another while keeping certain localised effects".[62] The technology of converting vocal inputs into tactile vibrations entails both physical and computational processes.

Participants send vocal inputs to a software environment, which filters the audio inputs in real time to optimize them to the "hardware characteristics" of the ORB so that the signals can be perceived by touching. The software sends the filtered signals to five localized channels on the ORB. Perception of signals is informed by "non-linear sources", including "the transducers, the material of the shell and the skin of the user's fingers and palm".[63]

The ORB is seemingly customized, as it is triggered by one's skin and voice. However, given the changing features of one's voice and skin, as well as the ORB's physical composition, the vibrations that one may feel are also non-linear and contingent. As such, they cannot be perfectly customized to one single person or counted as one single voice.

Figure 8.3 The ORB from *Vocal Vibrations*, designed by the Opera of the Future Group, MIT Media Lab.

Although the Cocoon is an isolated space in which participants meditate through singing on their own, it enables an expanded exploration of the vibrations. Participants' singing is neither informed by a particular technique or method nor prompted with a phonetic alphabet or a verbal or written text. The intent is to enable the participants to feel the vibrations and to experience a multisensory manifestation of voice, in both meditative and creative terms. This setting and its particular emphasis also encourage us to reflect on the idea of voice as expanded and shared.

A thought experiment: Alexa and the ORB

Imagine possible similarities and differences between the ORB and an everyday digital device, such as Alexa. Both Alexa and the ORB are tangible objects. But they can also be understood as black boxes. Users of Alexa or participants in *Vocal Vibrations* do not necessarily know how the cylinder of Alexa or the ovoid ORB works or what is inside them. In the case of *Vocal Vibrations*, participants can access the information about the technical

and conceptual basis of the ORB, but the research team does not necessarily highlight such technical details as part of the preparatory phase in the exhibition. There are also noticeable differences between Alexa and the ORB. For instance, we need to speak to Alexa in a legible accent that she is trained to recognize and with a vocabulary to which her database has access. The ORB, on the other hand, is not about verbal exchange or commands. Devised to transmit vibrations, it is meant to be touched and affected by one's voice and skin, whereas Alexa operates as a disembodied, "disaffectionate"[64] and gendered voice that we are accustomed to interact with from a distance.

Alexa recognizes words as audio, visual and linguistic patterns. And yet we assume that we are speaking with Alexa. She may come up with an unlikely combination of patterns, which may sound irrelevant or wrong, as well as responding to our questions relevantly or correctly. She can talk with affectation, but not necessarily with affect. The errancy of machine speech, however, does not completely erase the question of affect. Users may respond to the silences or errors of machine speech with affect. Perhaps speech emerges with the possible affects of a non-dialogue. In the event of an unlikely answer, or a deviation from the question, we can repeat the question for Alexa. In the event of no response, we can indeed restart the machine and its voice.

The case of correct response or no response is not applicable to the ORB, but the experience of a non-dialogue is. The ORB is a "resonance ball" without a verbal content or dyadic exchange attached to it. The vibrations felt through the fingertips lead to a global and expanded sense of voice. I wonder whether or how we can explore the affect of vibrations as a form of speech. For instance, can we consider a participant's sense of the warmth of vibrations as a form of speech? If so, what kind of speech would that be? What might it say? The ORB prompts a form of tactile speech, which speaks through the affect of skin. Vibrations do not say anything in particular, but they encourage us to think about the embodiment of sounds, the sonic interactions across both human and nonhuman bodies, as well as the extension of voice to others in various forms.

Neither the vibrations of one's voice nor the words one speaks amount to a single entity that can be fully detached from others. Any act or gesture of voicing is inevitably errant and in touch with its environment, diverging

from perfect measurement or translation. Alexa and the ORB display this divergence in different ways. The former underlines the artificial synthesis of speech and voice with respect to limitation, to a defined capacity for storage of patterns. The latter highlights a material sense of voice before or beyond any given language, with respect to sensory expansion. The non-dialogue of each one encourages us to revisit voice as a common medium, through which we need to deal with both limitation and expansion, through which the individual and the anonymous may come together in a common experience. The thought experiment that I suggest here shows that the ORB and *Vocal Vibrations* crystallize voice as a common medium through non-verbal content and tactile vibrations, which interact with and spread across a shared space.

The notion of the common, to reiterate Hart and Negri's discussion, indicates both limitation and expansion. The common, be it a space, a code, a body or a voice, belongs to many. Thus it implies a sense of multiplicity as well as the necessity of boundaries, of being responsible for another. *Vocal Vibrations* encourages us to hear the many in the form of vibrations, which cannot be perfectly owned, fixed or exchanged as one single pattern or currency. From the Chapel to the Cocoon, I suggest, engagement with this common voice strengthens our immunity to the complacency of a given reality or a false sense of certainty.

On immunity of vibrations

We function in a world of uncertainty. Anything can happen at any time. We all know this very fact, and yet we cannot live with a constant awareness of it. But the times we live in, especially the almost daily evidence of various economic, political and ecological crises – not the least of which was a global health pandemic – have made the uncertain and the indeterminate synonymous with the precarious and the anxious. There are of course different kinds of uncertainty. One cannot compare, for instance, the uncertainty relating to housing, health, education and work services with the uncertainty that one may experience in a gallery or a concert space. Nevertheless, there is value to found in looking at the effects and implications of aesthetic uncertainty, as well as in considering the possible aesthetic responses to various societal crises.

With a similar consideration, Bifo examines the indeterminacy of neoliberal economies together with the indeterminacy of avant-garde projects. He writes:

> The whole system precipitates into indeterminacy as all correspondences between symbol and referent, simulation and event, value and labor time no longer hold. But isn't this also what the avant-garde aspired to? Doesn't experimental art wish to sever the link between symbol and referent? In saying this, I am not accusing the avant-garde of being the cause of neoliberal economic deregulation. Rather, I'm suggesting that the anarchic utopia of the avant-garde was actualised and turned into its opposite the moment society internalised rules and capital was able to abdicate both juridical law and political rationality to abandon itself to the seeming anarchy of internalised automatisms, which is actually the most rigid form of totalitarianism.[65]

Bifo's observation is worth pondering. It is true that the "non-sensical and indeterminate" can be instrumentalized as a symptom of crisis, as a tool for normalizing the lack of transparency, an invisible function of capitalist economies and other forms of totalitarianism. However, it is also necessary to differentiate the indeterminacy explored in experimental art works from capitalist automatisms and neoliberal economies. The products of neoliberal economies goad us with their promises of constant growth, instant communication, meaning-making, as well as worn-out conceptions of a "good or better life".[66] The indeterminacy of aesthetic experiments does not suggest the same goals.

For instance, the biosensing musical interfaces' conversion of bodily signals into sounds or the ORB's conversion of singing into vibrations underlines the idea of indeterminacy not as a discursive or automated journey in a given direction but as a creative exploration without a goal in mind. Such practices are not invested in branding or monetizing a particular meaning, affect or outcome. In effect, they show how a meaning, or a voice that speaks, can emerge without a necessary object of intention.

The intended disorder – or the unusual ordering of things – in these practices is closer to states of affective indifference.[67] Think about affective indifference not as careless or irresponsible apathy but as a modest and honest awareness of the limit to knowing. That awareness is important. Like death, it is cold and real. Just like we cannot make sense of death, no matter how we prepare ourselves for it, we may not be able to perfectly

make sense of a case of *nothing really happens*. Ironically, such indifference and awareness potentially make it easier to acknowledge differences between and solidarity among all kinds of bodies. Such an awareness can also make us immune to the standard notions of certainty and control. It makes us resilient in the face of the unknown, enabling us to accept and to live with indeterminacy and uncertainty, while the ethical distance it affords us improves our capacity for empathy.

In *Vocal Vibrations,* the ORB transmits the warmth of vibrations. And yet the vibrations also evoke a degree of indeterminacy. Within the context of the installation, tactile vibrations may be experienced in meditative terms, leading to a sense of wellbeing, as well as to the sense of touching and even holding a voice. But the vibrations cannot be captured as one single thing or translated into one single meaning or direction. They rather extend the participants' bodily experiences to the gallery space and/or to an imagined space.

The unknown here springs from the variation and distribution of vibrations in and across various bodies. The ORB is devised as a medium to externalize the voice; but, after all, it facilitates an effective disappearance of the voice into the air and space that we share. It crystallizes the disappearing voice as tactile vibrations, and tactile vibrations as the common medium itself. This common medium, I argue, offers us a safer mode of uncertainty. It may generate points of contact between strangers, and between humans and nonhumans. The common medium, the uncertain expression of tactile vibrations, is vital, especially when there is less oxygen in the air both literally and metaphorically, when the accountability of language and liability of people visibly shatter, when trust is a constant question mark, when, as Bifo puts it, "connectivity and precariousness are two sides of the same coin".[68]

Notes

1 Charles J. Holbrow, Elena Jessop, Rébecca Kleinberger, "*Vocal Vibrations*: A Multisensory Experience of the Voice," NIME 14, 30 June–03 July 2014, Goldsmiths, University of London, UK.
2 Ibid.
3 Ibid., 2.
4 Ibid.
5 Ibid.

6 Neri Oxman, Daniel Dikovsky, Boris Belocon and W. Craig Carter, "Gemini: Engaging Experiential and Feature Scales Through Multimaterial Digital Design and Hybrid Additive–Subtractive Fabrication," *3D Printing and Additive Manufacturing 1*, no. 3 (September 2014): 108–14. http://dx.doi.org/10.1089/3dp.2014.1505, 108.
7 Ibid.
8 Ibid.
9 Ibid., 108–09.
10 Researchers Alexandra R. Webb, Howard T. Heller, Carol B. Benson and Amir Lahav investigate "how early and to what extent maternal sounds—in particular mother's voice and heartbeats—impact brain and auditory cortex development of a newborn". Their findings show that the newborns' auditory cortex "is more adaptable to maternal sounds than environmental noise". Alexandra R. Webb, Howard T. Heller, Carol B. Benson and Amir Lahav, "Mother's voice and heartbeat sounds elicit auditory plasticity in the human brain before full gestation," *PNAS*, ed. Mortimer Mishkin, Vol. 112, No. 10, March 10, 2015, 3152–57. www.pnas.org/cgi/doi/10.1073/pnas.1414924112
11 In my dissertation, *La Voix-Peau* (2011), drawing on Anzieu's skin-ego, I suggested that the mother's voice can be considered the primary tactile envelope.
12 Oxman et al., 108–09.
13 Ibid.
14 Ibid., 109.
15 Ibid.
16 Ibid.
17 See Eric Gunter. "Skinscapes: A Tool for Composition in the Tactile Modality," (PhD Thesis, Massachusetts Institute of Technology, 2001), 13–17.
18 See Neri Oxman, "Design at the Intersection of Technology and Biology," *TED Talk*, 29 October 2015. https://www.youtube.com/watch?v=CVa_IZVzUoc Last accessed on 30 July 2022. See also Neri Oxman, "Bio-Inspired Design," Talk given as part of the World Economic Forum, 19 February 2016. https://www.youtube.com/watch?v=nAA0DfAdiIU Last accessed on 30 July 2022.
19 Ibid.
20 Oxman, Neri, Christine Ortiz, Fabio Gramazio, and Matthias Kohler, "Material Ecology," *Computer-Aided Design 60* (March 2015): 1–2.
21 Ibid.
22 Ibid.
23 Eugene Thacker, "Biomedia," *Critical Terms for Media Studies*, ed. W.J.T. Mitchell and Mark B.N. Hansen (Chicago, London: The University of Chicago Press, 2010), 117.
24 See Kate Crawford and Vladen Joler, *The Anatomy of an AI System: The Amazon Echo as an anatomical map of human labor, data and planetary resources*, 2018. https://anatomyof.ai/ Last accessed on 31 July 2022. See also Kate Crawford, *Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence* (New Haven and London: Yale University Press, 2021).
25 Oxman et al., "Gemini: Engaging Experiential and Feature Scales Through Multimaterial Digital Design and Hybrid Additive–Subtractive Fabrication," 108.
26 Oxman, "Design at the Intersection of Technology and Biology," 2015.

27 Charles J. Holbrow, Elena Jessop and Rébecca Kleinberger, "*Vocal Vibrations*: A Multisensory Experience of the Voice," 2014. See also E. Gunther, *Skinscape: A Tool for Composition in the Tactile Modality*, 2001.
28 Holbrow et al., 2.
29 Ibid.
30 Ibid.
31 Ibid. Also, see the noted works via the following links: https://www.fondation-langlois.org/html/e/page.php?NumPage=364 Last accessed on 2 September 2024.
32 See Jacques Perron, "Golan Levin, *Messa di Voce*," 2004. http://www.fondation-langlois.org/html/e/page.php?NumPage=364 Last accessed on 31 July 2022.
33 Ibid.
34 Ibid.
35 Ibid.
36 Ibid.
37 Ibid.
38 William Gibson, *Neuromancer* (London: Gollancz, Orion Publishing Group, 1984, 2016).
39 Bifo quotes Williams here. See P. Williams, *Only Apparently Real: The World of Philip K. Dick*. (Maryland: Arbor House, 1986), p. 170; Franco (Bifo) Berardi, *After the Future*, eds. Gary Genosko and Nicholas Thoburn, trans. Arianna Bove, Melinda Cooper, Erik Empson, Enrico Giuseppina Mecchia and Tiziana Terranova (Edinburgh, Oakland, Baltimore: AK Press, 2011), 33.
40 Ibid., 34.
41 Robert Michael Brain, *The Pulse of Modernism: Physiological Aesthetics in Fin-de-Siècle Europe* (Seattle, WA: The University of Washington Press, 2015), 64.
42 Ibid.
43 Ibid., 65.
44 Ibid.,67–8.
45 Ibid., 68.
46 Ibid., 69, 70–1.
47 Ibid., 73.
48 Ibid., 73–4. Brain here refers to Julia Kursell and Jonathan Sterne. See Julia Kursell, "A Gray Box: The Phonograph in Laboratory Experiments and Field Work, 1900–1920," *The Oxford Handbook of Sound Studies*, ed. Karin Bijsterveldt and Trevor Pinch (New York: Oxford University Press, 2011), 176–97, and Jonathan Sterne, *Audible Past: The Cultural Origins of Sound Reproduction*, 34–9. Drawing on physiologist Ernst Brucke's research, Brain also shows, how in light of the phono-autograph, the perception of vowels and consonants changed. Brucke considered vowels "clear and audible sounds," whereas consonants were "mixtures of sounds and noises". Ibid., 75.
49 Ibid., 81–3, 87, 89.
50 Mara Mills and Xiaochang Li, "Vocal Features: From Voice Identification to Speech Recognition by Machine," *Technology and Culture*, Volume 60, Number 2 Supplement, April 2019, S129-S160. DOI: https://doi.org/10.1353/tech.2019.0066
51 Ibid., S136, S138.
52 Ibid., S133, S138.
53 Ibid., S139–S140.

54 As Mills and Li posit, Kersta's supervisors at Bell Labs, phonetician Peter Ladefoged and the Acoustic Society of America reported that voice-printing was not reliable. Ibid., S139, S140.
55 Ibid., S147.
56 Ibid.
57 On related topics, see, for instance, Hannah Fry, *Hello World: How to be Human in the Age of the Machine* (London: Black Swan, 2019).
58 Perron, "Golan Levin, *Messa di Voce*," 2004.
59 Holborn et al., "*Vocal Vibrations*: A Multisensory Experience of the Voice," 3. The team draws on neuroscience, acoustical science and phonetics.
60 Ibid.
61 Ibid.
62 Ibid.
63 Ibid., 3, 4.
64 See Frances Dyson's discussion on conversational digital agents and disaffectionate voices in *The Tone of Our Times,* 2014.
65 Bifo, *After the Future*, 34–5.
66 On the conception of a "good life," see Laurent Berlant, *Cruel Optimism* (Durham, London, NC: Duke University Press, 2011).
67 I explore the notion of "affective indifference" in my earlier essays as well. See Zeynep Bulut. "Anonymous Voice, Sound and Indifference," *Einstein on the Beach: Opera beyond Drama*, eds. Jelena Novak and John Richardson (London: Ashgate, 2019), 174–93.
68 Bifo, *After the Future*, 35.

9

Distributed Speech: *Voice Tunnel and Atmospheric Memory*

In August 2013, Rafael Lozano-Hemmer exhibited his interactive public installation *Voice Tunnel* in the Park Avenue Tunnel of New York City. It was part of Summer Streets, an annual street festival in New York City that encourages New Yorkers to participate in "open streets", "healthy recreation" and "sustainable forms of transportation" such as biking and walking.[1] *Voice Tunnel*, which corresponds to the festival's interest in fostering

Figure 9.1 Rafael Lozano-Hemmer, "*Voice Tunnel, Relational Architecture 21*", 2013.

Photograph: James Ewing.

an engaged interaction with the city, is a piece of "relational architecture", in Lozano-Hemmer's description. Lozano-Hemmer uses the term "relation-specific"[2] instead of site-specific. What he means by it is not necessarily a given connection between a public space and the occupants in that space. Rather, it suggests that we should question our ideas of participation, community and public space.

Running from East 33rd Street to East 40th Street, Park Avenue Tunnel is a transitional passage, initially designed for a railway in the 1830s and later used for streetcars. During the exhibition, the tunnel was closed to traffic and opened to pedestrians for the first time in history.[3] The Park Avenue Tunnel became a voice tunnel with pedestrian voices. The installation used 300 theatre spotlights and 150 loudspeakers. Participants spoke or sung to an intercom placed in the middle of the tunnel, which recorded voices. Played as a loop, each new recording mobilized the previous one and activated the lights that were "immediately beside it".[4] The traces of speaking voices mingled with one another modulated the brightness of the lights, which disappeared and reappeared at different times:

> The intensity of each light is automatically controlled by the voice recording of a participant who speaks into a special intercom that is in the middle of the tunnel. Silence is interpreted as zero intensity and speech modulates the brightness proportionally, creating a morse-like code of flashes. Once a recording is finished, the computer plays it back as a loop, both in the light fixtures that are closest to the intercom as well as on an inline loudspeaker. As new people participate, old recordings get pushed away by one position down the array of lights. So that the "memory" of the installation is always getting recycled, with the oldest recordings on the edge of the tunnel and the newest ones in the middle. At any given time the tunnel is illuminated by the voices of 75 visitors. Once 75 people participate after you, your own recording disappears from the tunnel, like a memento mori.[5]

Thinking through *Voice Tunnel*, I examine the symmetry between voice and light it instantiates, as well as the proportional distribution of voices and their alignment, the "memory" of the voices that "gets both recycled and disappeared", and how communal and improvisatory voice-making can function as a kind of tactile speech.

Voice as light

In *Voice Tunnel*, a voice recording is translated into light by analyzing volume, frequency and intonation. This translation articulates voice not necessarily as a source of illumination or enlightenment. When asked about light, Lozano-Hemmer references two contexts: the use of lights in the club scene and the use of light as a tool of interrogation and violence. These remarks are mentioned in various interviews with Lozano-Hemmer and texts on *Voice Tunnel*.[6] In our conversation at the exhibition *Atmospheric Memory*, Lozano-Hemmer explained what he meant by these references.[7]

Club lights, he mentioned, allow people to both appear and disappear. People could express, forget or hide themselves on the dancefloor, a disorienting public space that can function in different ways. It can be a bubble in which people can affirm their identity in the company of others from a similar socioeconomic and cultural background. It can be a medium through which people can lose, find and transform themselves. But the dancefloor is also a contested site, where people from different

Figure 9.2 Rafael Lozano-Hemmer, "*Voice Tunnel, Relational Architecture 21*", 2013.

Photograph: NYC Department of Transportation.

backgrounds may watch and/or desire to be watched by one another, and in effect, where different identities may compete as well as unite.[8]

Listening to Lozano-Hemmer, I was reminded of various dance music cultures, primarily within the context of 1970s disco culture. Scholars of this history such as Alice Echols, Will Straw, Tim Lawrence and Luis Manuel Garcia-Mispireta[9] examine how urban decay and regeneration policies, alternative economies of communal gatherings and parties, sound system and atmosphere, media and broadcasting have played into identity formation and transformation, as well as offered a critical perspective for revisiting notions of race, class, gender and sexuality. Of course, histories of dance-music cultures are not the point of *Voice Tunnel*. However, Lozano-Hemmer's remark on light brings this scene to mind. Furthermore, as a child of night club owners in Mexico City, where he was exposed to strobe lights, disco balls and color-changing luminaires, histories of dance music cultures do not seem so far away from Lozano-Hemmer's imaginative transformation of voice into light.

The second context corresponds to Lozano-Hemmer's reflection on light as "blinding device". "I am interested in the light used at the border and for interrogation. I am interested in the light that doesn't know whether it's a particle or a wave",[10] he says. Both light and vibration can be used as tools of violence. As Lozano-Hemmer mentions, the idea of light as interrogation was subtly implicated in *Voice Tunnel*. His other remark, the light "that doesn't know whether it's a particle or wave",[11] is more suggestive for the installation. That is, the light that does not know whether it takes place in a particular spot or spreads out over the tunnel, or whether its appearance or force is temporary. With this idea, *Voice Tunnel* employs both the visibility and the invisibility of light. It activates the (in)visibility of light while converting voice into light. And it considers lightened voices in a "party" context, generated by "a lot of people speaking all together, a certain cacophony, and a very urban experience rendered by the lights".[12]

Regardless of what participants may vocalize, when a voice gets recorded in *Voice Tunnel*, it becomes both audible and visible whilst being played back. Like the construction of light as arcs, the installation draws attention to the construction of voices, which Lozano Hemmer identifies as a "mapping of voice into light".[13] This mapping is also informed by the direction "the linearity of the tunnel", prompting the participants to "go from story to story" and "tune into people's different realities".[14] Lozano-Hemmer considers the

Figure 9.3 Rafael Lozano-Hemmer, "*Voice Tunnel, Relational Architecture 21*", 2013. Photograph: James Ewing.

mapping of voices an "architectural narrative", which is not preconceived but live and emergent, given the "crowd-sourced" and interactive nature of the installation.[15] This idea was previously referenced in another installation by Lozano-Hemmer, titled *Pulse Park* (2008).

A large-scale interactive installation exhibited in Madison Park in New York City, *Pulse Park* is a network of light beams modulated by a sensor that records and measures the heartbeats of participants. The heartbeats are projected as pulses of light that move around 200 spotlights, which turn the park into a "fleeting architecture of light and movement",[16] in Lozano-Hemmer's words. Exploring the ways in which public space and interactive participation emerge and develop, Lozano-Hemmer employs "information technology, computerised surveillance and biometrics".[17] He uses these technologies while providing a critique of them. Here what we have is a critique of this kind, using recording and measurement of an individual heartbeat and concretizing it into a fleeting pulse. In so doing, Lozano-Hemmer converts information into noise. He introduces a safer mode of being out and about, where one can appear and disappear simultaneously within the web of lights in a fleeting way. Manifesting in

around 200 lights, the "who" of the heartbeat gets lost and multiplied in a playful way.

Both *Voice Tunnel* and *Pulse Park* multiply the "who" of life, be it in the form of breath, heartbeat or voice, and remake a public space through this multiplication. In *Voice Tunnel*, the recorded voices that interact and become light also facilitate "a fleeting architecture" of movement. This we are encouraged to experience in the form of a timeline, a passage of various pasts, presents and futures. In the middle, there is an intercom that records voices that come from the past, voices that speak with the present, and voices that are projected toward possible futures. These voices mingle with one another in an order and in multiple languages and sounds. Together they make noises and light up the tunnel.

Proportional distance and alignment: A midpoint but not a "cacophony"

> "It is better to light a candle than curse the darkness…"
> "If you can make it here, you can make it anywhere"

There was singing, screaming and laughing in *Voice Tunnel*. Participants "posed and stood in line to be able to have their voice heard".[18] One participant proposed to his partner via the intercom. Walking the tunnel together, a marriage proposal may sound romantic. But the acoustics of the tunnel made it difficult to hear what was said. Indeed, such acoustics facilitated a comfortable environment for the participants for saying things out loud without anxiety, given that nobody could perfectly hear anyone else. The proportional alignment was also the proportional distance between the voices.

Lozano-Hemmer's architectural narrative is a live processing of that kind. He forms a communal space where voices appear and move in proportion with one another and with the space that they occupy. The voices spatially extend and expand the tunnel. They suggest a mapping of the tunnel in a way participants have not considered before. As Commissioner of NYC Department of Transportation Janette Sadik-Khan says, the project encouraged New Yorkers to explore "underneath NYC for the first time in history".[19] Pedestrians got to investigate a public zone that they were not allowed to enter before. This intervention already suggests an alternative mapping of the tunnel, as well as engaging with what's underneath the

Figure 9.4 Rafael Lozano-Hemmer, "*Voice Tunnel, Relational Architecture 21*", 2013. Photograph: James Ewing.

city, the common grids of many. The common grids of many, as Lozano-Hemmer conveys, are not cacophonous.[20] Speakers do not play the 75 recordings simultaneously but in an order, in synch with the lights. The order of this process, or what I call communal and participatory voice-making, in effect generates distributed speech.

I suggest distributed speech as a form of non-dialogue, which does not necessarily operate with verbal reciprocity. Non-dialogue does not address a single person. It does not have a single direction. It comes and goes through multiple directions, as partial and plural. Voice is already a plural phenomenon. Each one of us carries another's voice, both in physical and in cultural terms, with various somatic and linguistic embodiments. This process changes with age and environmental factors, and also varies according to languages that we speak and culturally operate in. But we tend to consider the phenomenon of the voice mostly at the heart of syntax, verbal exchange and intentionality.

Husserl's speech paradigm suggests intentionality as a linguistic exchange between an addressing subject and an addressee. This

intentionality implies a dyadic and indexical transaction. In effect, what is meant is never fully indexical. What speaks and what is heard are almost always shaped by multiple histories and subject positions. Bakhtin's theory of "dialogism" and its difference from dialogue are important to note in that regard.

There are certain methodical procedures of listening and arguing implicated in a dialogue, especially in a Socratic dialogue. Bakhtin's literary methods, such as heteroglossia, divert us from methodical procedures of listening and argumentation. They rather point to the social contingency of language, a patchwork of multiple discourses and interrelated actors and multiple directions of speech. Bakhtin's dialogism, as Paul de Man writes, manifests "fiction and fact" as co-emergent and co-dependent, and treats the characters "not as voices of authorial identity or identification but voices of radical alterity, not because they are fictions and the author isn't, but because their otherness *is* their reality".[21]

The highlighted difference between dialogism and dialogue is parallel to the nuanced distinction between the otherness and the other.[22] It is not easy to tap into the otherness of the other or decipher what is meant or being fabricated as meaning at a societal level. It takes a "shared communal labor"[23] to "decrypt the repressed message hidden in the public utterance".[24] The repressed message is not always a subtext of what manifests or is said otherwise. It can also be a message that operates in a present tense being generated communally. It demands recognizing the "otherness of the other"[25] in the making of a message. Paul de Man underlines this point, while reiterating Bakhtin's emphasis in his methods on dialogism rather than dialogue.[26]

The distributed speech, the non-dialogue, of *Voice Tunnel* can be understood as a prolongation of Bakhtin's notion of dialogism instead of dialogue. This configuration of voices draws attention to the divergences and deviances of speech, as well as to the points of disconnect and the moments of interruption in any discursive interaction. The aesthetics of sound poetry, contemporary art music and experimental music traditions – such as the use of phonemes, glossolalia, neologisms, bodily noises – contest the syntax and reciprocity of language, be it verbal, musical or theatrical. Michel de Certeau summarizes well what these experimentations suggest in his discussion on glossolalia. As he writes, "glossolalia

is a deviant linguistic, language but not a structure, which functions like a facade".[27] Distributed speech can be aligned with this idea of social facade. It is a shared surface of vocal fragments, instances of visuals and the touch of sonic occurrences. It speaks from both structural networks and "raw oralities",[28] in Brandon LaBelle's terms.

In *Voice Tunnel*, the voices are distributed physically and virtually, but, more importantly, proportionally. Proportional distribution of voices is activated by light, not simply because speech gets materialized and mobilized as light, but because such a speech also articulates the appearance and disappearance of voice physically. This is how Lozano-Hemmer imagines voice as light, one that manifests both appearance and disappearance, that becomes both individual and anonymous. The uncertainty of speech is woven by the individuated, anonymous, context-sensitive and unsettled voices that are both underneath and up in the air. The uncertainty highlights the quest for what is being heard and said more than the identity of the speaker. The midpoint marked by the intercom makes the mingling of voices neither perfectly clear nor perfectly chaotic. The intercom performs the proportional alignment and distance across the voices, without a sense of synthesis or resolution.

Tactile speech in a memory of voices

The midpoint may lead us to the acknowledgement of distant intimacies, to a conscious feeling of the momentary touch of both familiar and strangers' voices, to an active recollection, a memory of voices. "Memory of voices" directly echoes Lozano-Hemmer's interactive media exhibition *Atmospheric Memory* (2019).[29] Like *Voice Tunnel*, the works included in *Atmospheric Memory* pursue distributed speech and translate live-fed voices into various physical appearances and disappearances. If *Voice Tunnel* surfaces the voices underneath, *Atmospheric Memory* materializes the voices up in the air.

The title of the exhibition takes its cue from scientist and computer pioneer Charles Babbage's question: Can we imagine the air that we share as a "vast library of voices"? Inspired by this question, *Atmospheric Memory* concretizes the voices not simply in the form of words but also in the form of light, of three-dimensional sculptures, tactile experiences and

sonic and physical actions. In the age of cloud computing and datasets, our voices are recorded, tracked, stored and categorized on a daily basis. Babbage's imagination has long been manifested in sound-recording and voice-recognition technologies. Nevertheless, manifestations of voices are not perfectly measured or locked into a single physical form. They are rather distributed and shared by many. In line with the ideas of distribution, library and memory, the exhibition took place in the old warehouse, built in 1830 at one end of the Liverpool to Manchester Railway, which now forms part of Manchester's Science and Industry Museum. The warehouse was reimagined as an immersive art environment, consisting of old and new works by Lozano-Hemmer. These works included *Atmosphonia* (2019), *Cloud Display* (2019), *Voice Tank* (2019), *Weather Vanes* (2019) and *Volute* (2016).

Atmosphonia featured "3,000 audio channels on custom-made speakers with LED lights". Designed as a tunnel, it was the first installation and led to the exhibition's main site. In the tunnel, the audience heard various recordings, from "wind, water, fire, ice" to "over 200 types of insects, over

Figure 9.5 Rafael Lozano-Hemmer, "*Linear Atmosphonia*", Atmospheric Memory, Manchester International Festival, Manchester, 2019.

Photo: Mariana Yañez.

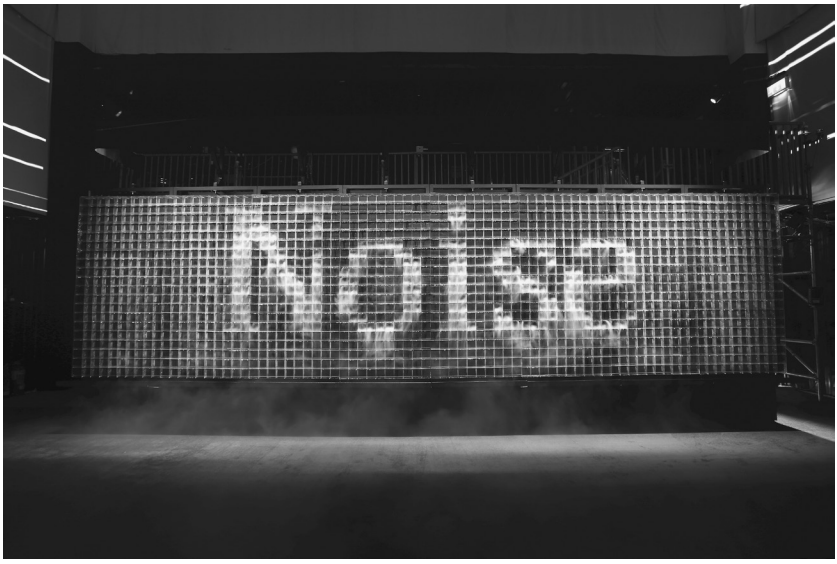

Figure 9.6 Rafael Lozano-Hemmer, "*Cloud Display*", Atmospheric Memory, Manchester International Festival, Manchester, 2019.

Photograph: Jason Lock.

300 types of birds, bells, bombs and so on".[30] The recordings had an order, and yet they also drew attention to the co-existence and affinities between human and nonhuman sounds, as well as speech and non-speech sounds. Similar to *Voice Tunnel*, lights lit up when the recordings played.

The main exhibition site hosted *Cloud Display*, a "text display with 1,600 ultrasonic atomizers, controlled by voice recognition system".[31] Lozano-Hemmer explains the mechanism of the display as such: "Using water vapour, the display writes any words spoken into an intercom. The atomizers are typically used for cold-water humidifiers. In Manchester the system was set to recognize different accents in English from single words to full sentences".[32] *Cloud Display* is a poetic realization of Babbage's imagining of air as the library of voices and of Lozano-Hemmer's account of voice as both appearance and disappearance.

An audience member speaks a word into the intercom and the display writes the word spoken. The words first get materialized and then disappear into the air. The display concretizes voices as words but more importantly draws attention to the fleeting process of voicing and wording,

Figure 9.7 Rafael Lozano-Hemmer, "*Cloud Display*", Atmospheric Memory, Manchester International Festival, Manchester, 2019.

Photograph: Jason Lock.

Figure 9.8 Rafael Lozano-Hemmer, "*Cloud Display*", Atmospheric Memory, Manchester International Festival, Manchester, 2019.

Photograph: Mariana Yañez.

a process that is both physical and poetic. The audience hears and sees, and is touched by, the cold water vapour. Words evaporate and so do their loaded meanings. But the display also reveals how words and voices can come back and activate movement in different forms. The other two installations, *Voice Tank* and *Weather Vanes,* demonstrate how a voice can trigger turbulence.

Literally a tank, *Voice Tank* works with "polyphonic pitch detection" and "motorised components", which enables pitch analysis of two participants' speaking voices, resulting in "waves" that "created patterns".[33] The tank manifests voice as water waves, patterns and movement. *Weather Vanes* takes this idea further and shows a case of turbulence generated by live voices and speech. The system uses a "pneumatic turbulence generator controlled by Mel-frequency cepstrum voice analysis",[34] which examines a wider spectrum of pitches and signals that may not be equally distanced. The piece "features 99 brass arrows inspired by anemometers and weather vanes", which "measures wind speed and

Figure 9.9 Rafael Lozano-Hemmer, "*Voice Tank*", Atmospheric Memory, Manchester International Festival, Manchester, 2019.

Photograph: Mariana Yañez.

Figure 9.10 Rafael Lozano-Hemmer, "*Weather Vanes*", Atmospheric Memory, Manchester International Festival, Manchester, 2019.

Photograph: Mariana Yañez.

direction and miniature computerized fans" activated by live voices that "creates turbulence".[35] In effect, the installation visualizes the process of generating turbulence.

Finally, *Volute* (2016) is a 3D sculpture, "a speech bubble printed in steel, capturing the exhaled breath and the air turbulence ejected as a sentence is spoken".[36] The sculpture is "made with laser tomography scans, photogrammetry and 3D printing." The chosen speech for this work is "*Au clair de la lune*" – the first ever mechanically recorded human voice, recorded by Édouard-Léon Scott de Martinville in 1860.[37] *Volute* materialized recorded breath and speech. Its sculptural form but was not displayed in the reverent way an art gallery might display such a piece. Instead, given permission to touch the sculpture the audience was encouraged to imagine the contours, textures and curves of Martinville's voice. The sculpture also encouraged those who saw it to consider whether this voice still belonged to Martinville. Externalized and re-formed in a tangible way, the sculpture incites the audience to touch

Figure 9.11 Rafael Lozano-Hemmer, *"Volute 1: Au Clair de la Lune"*, Atmospheric Memory, Manchester International Festival, Manchester, 2019.

Photograph: Jason Lock.

and to embody Martinville's breath and speech, so that Martinville's voice is no longer only his voice.

Taken together, the installations mobilize and distribute voice as material forms, as multisensory experiences, as vocal and sonic acts. Together they emphasize temporary, fleeting, and both measurable and unmeasurable aspects of voicing. They articulate how a voice can be both individual and anonymous. The sky of *Atmospheric Memory* is a "stream of letters drawn from the text of the collected works of Charles Babbage and Ada Lovelace",[38] projected onto the ceiling of the exhibition room. And the ground of the exhibition is the audience voices, faces and bodies, live-fed into the activation of the installations. From *Pulse Park* to *Voice Tunnel* and *Atmospheric Memory*, Lozano-Hemmer employs biometrics, biosensing, voice- and facial-recognition technologies to precisely critique the measurement and classification of voices. In so doing, he also raises a question about the authenticity of identities, of voices, as well as the question of control and biased surveillance.[39]

Figure 9.12 Rafael Lozano-Hemmer, "*Babbage Lovelace, Text Stream 1*", Atmospheric Memory, Manchester International Festival, Manchester, 2019.

Photograph: Rob Connor.

Communal non-sense: wake-up or dream call?

The age of CCTV, cloud computing and datasets urges us to critically revisit the parameters and agents of machine listening and speech, environmental damage that such technologies generate, and our habituated reliance on or lack of knowledge about algorithms. Algorithms govern our everyday lives. They make us think about the errancy of both human and machine speech. In a recent interview, when asked about the implications of immersive art environments and *Atmospheric Memory*, Lozano-Hemmer said that he considered the exhibition not as an immersion to escape reality but as "a call to action against the catastrophic collapse of the atmospheric conditions for planetary survival; against the concentration of all the power of the digital atmosphere into very few hands; against the weaponisation of the sky via guided missiles and drones; and so on".[40] In short, he suggested *Atmospheric Memory* was "a wake-up call".[41]

Figure 9.13 Rafael Lozano-Hemmer, "*Babbage Lovelace, Text Stream 1*", Atmospheric Memory, Manchester International Festival, Manchester, 2019.

Photograph: Mariana Yañez.

What I wish to underline here is how such a wake-up call, the common ground and air of people's voices, is generated with a palpable uncertainty, with a communal non-sense or state of not-knowing, which, in reminding us of our shared vulnerability, gives rise to solidarity. The wake-up call is indeed a "dream call". Artist and healer Carole IONE, referring to psychologist Arnold Mindell's notion of "non-consensus reality", emphasizes the "multidimensional world of the dream of reality and the reality of dream".[42] That is, dream and reality are intertwined, and what we experience in this intertwined moment may not be fully resolved. Dream worlds are often fragmented. Day or night, what we gather from dreams are individual scenes and feelings rather than a complete story. We can analyze and make up dreams by telling them in a particular order. Regardless, we do not necessarily resolve them. The disconnects, the seemingly unrelated signs in dreams, can remain as fleeting signals that can return to woken awareness from time to time.

If we can have a "non-consensus reality" in dreams, how can we respond to a non-consensus reality when we wake up? If we can fall

asleep together, can we somehow dream together? Interactive and participatory art prompts us with a case of dreaming together, without a resolution. The distributed speech in both *Voice Tunnel* and *Atmospheric Memory* creates a platform for "the dream of reality and reality of the dream",[43] in IONE's words. Recall the voices turning into light and speaking in multiple languages, speech sounds mingling with concrete and non-speech sounds, words passing through or enveloping us as water vapour, vocal acts activating air turbulence and movement, and breath solidified as a three-dimensional sculpture. Participants are all involved in the making of a voice that manifests itself as many voices in various forms and senses. As this voice gets mobilized, what it says also gets mobilized.

Response and responsibility

If we don't know who is speaking, if there are no names associated with the voices or utterances, who will be accountable for what is being said?[44] Anonymity and constant derivation of voices point to questions about response and responsibility. This question is most often asked in relation to social media platforms, but participatory art is also no stranger to it. Art historian Claire Bishop stresses the need for "tension" between "spectacle" and "participation".[45] As she writes:

> Participatory art is not a privileged political medium, nor a ready-made solution to a society of the spectacle, but is as uncertain and precarious as democracy itself; neither are legitimated in advance but need continually to be performed and tested in every specific context.[46]

In other words, participatory art is a context-sensitive and crowd-sourced process. It can be socially engaged and impactful, but it cannot perform a calculable social or aesthetic result. It is rather an experiment that makes the uncertain and the precarious endurable and, more so, shared.

And this is exactly what distributed speech (and non-dialogue) performs in *Voice Tunnel* and *Atmospheric Memory*. The memory lane of voices on both occasions is precarious, uncertain, and shared. The voices are also "untimely",[47] in philosopher Elizabeth Grosz's terms. The "untimely" is a "cut, nick, crack, rupture",[48] which makes us reflect on the "endurance"[49] of the material aspects of the present time, as well as on the stretch to a

still-distant future. As Grosz posits, "the more clearly we understand our temporal location as beings who straddle the past and the future without the security of a stable and abiding present, the more mobile our possibilities are, the more transformation becomes conceivable".[50]

The process of manifesting, projecting and experiencing voice in multiple physical forms and cross-modal intensities encourages participants to face this temporality. Participants listen in the presence of another, in movement. The process highlights how one individual sense, body, image, name or word is implicated in another, how bodies co-exist and co-operate without completely disappearing, merging or resolving. It also points to the various instances of voicing across bodies of all kinds, not simply as tangible but also as insensible. Response and responsibility, in this framing, are entangled, as geographer Kathryn Yusoff tells us.[51] Exploring this entanglement, Yusoff refers to Karen Barad's notion of responsibility and Jean-Luc Nancy's notion of sense.

According to Barad, responsibility is "not an obligation that the subject chooses".[52] It is an "ongoing and incarnated relation"[53] already embedded in emerging and evolving responses that we are generating and participating in. Such a relation, Barad argues, is produced "not through the realisation of some existing possibility but through the iterative reworking of im/possibility, an on-going rupture".[54] Responsibility is a heavy word. It does indeed imply rupture more than possibility. It sheds light on limitation, as well as on extension and expansion as these are related to limitation. To revisit the notion of responsibility at the heart of response is suggestive. A response can take many forms, but in all forms, it manifests itself as a relational gesture. More than the call, the response prompts us to consider both the sender's and the receiver's ends, and the gap between the two.

For Nancy, a state of "being-here and exposed there" can count as response, one that similarly situates "a rock and a human".[55] How can a rock and a human be similarly situated? In what language, in which timeframe or tense, and under which bodily limits and formations, might a rock respond? We might hear the response of a rock while touching the rock or attending to the environment of the rock. We might also imagine a response while wandering along a memory lane associated with or triggered by the rock.

The point is that we would hear a variety of voices including the ones we might possibly miss or otherwise dismiss. Such an interaction is exploratory. One hears, listens, feels the other without presuming or settling into a single response. There may be several responses distributed across multiple times, spaces and bodies, similar to the distributed speech that one can experience in *Voice Tunnel* and *Atmospheric Memory*. The multiplicity of responses and distributed speech contests given meanings, given voices, and the habitual acts of giving a voice to others. The multiplicity sustains a shared unknown not in a mystified but precisely in a material sense. It generates affinities among strangers. It highlights the acts and processes involved in responding with others. It thus renders each of us responsible for others.

The tactility of this speech, as prompted in *Voice Tunnel* and *Atmospheric Memory*, is twofold: First, the sense of touch becomes a catalyst for imagining, materializing and embodying a voice. Second, the touch of the voice – be that the touch of solidified breath, the momentary touch of another's voice, voice as warmth of light or as evaporating air – establishes a tension between intimacy and distance, a precarious ground that maintains the uncertainty of who, when, where and what is speaking. This tactile speech, I argue, facilitates the process of building a voice together, one that is individuated but anonymous, one that makes every *body* responsible for each other.

Notes

1 See the description of *Voice Tunnel* on the artist's website: http://lozano-hemmer.com/voice_tunnel.php. Also, see the description of the NYC Summer Street Festival via the following link: https://www1.nyc.gov/html/dot/summerstreets/html/about/about.shtml Last accessed on 13 March 2023.
2 See Zeynep Bulut, "*Last Breath*: Sensing Life," 2021.
3 See the description on the artist's website and project page. http://lozano-hemmer.com/voice_tunnel.php
4 Ibid.
5 Ibid.
6 Anna Altman, "Voice Tunnel," *The New Yorker*. 8 August 2013. http://www.newyorker.com/online/blogs/culture/2013/08/voice-tunnel.html Last accessed on 13 March 2023.
7 Zeynep Bulut, "Interview with Rafael Lozano-Hemmer," *Atmospheric Memory*, Manchester International Festival, Science and Industry Museum, 2019.

8 See Alice Echols, *Hot Stuff: Disco and the Remaking of American Culture* (New York: W.W. Norton, 2010); Will Straw, "Dance Music," *The Cambridge Companion to Pop and Rock*, eds. Simon Frith, Will Straw and John Street (Cambridge: Cambridge University Press, 2001), 158–75; Tim Lawrence, *Love Saves the Day: A History of American Dance Music Culture* (Durham, NC: Duke University Press, 2003).
9 Ibid. See also Luis Manuel Garcia-Mispireta, *Together, Somehow: Music, Affect, and Intimacy on the Dance Floor* (Durham, NC: Duke University Press, 2023).
10 See the video documentation and Lozano-Hemmer's portrayal of light and voice, Park Avenue Tunnel, DOT Summer Streets, New York City, United States, 2013. Video by The Creators Project, a Vice Production. https://lozano-hemmer.com/voice_tunnel.php Last accessed on 13 March 2023.
11 Ibid.
12 Ibid.
13 Ibid.
14 Ibid.
15 Ibid.
16 My discussion of *Pulse Park* and on the affinities between *Pulse Park* and *Voice Tunnel* is based on my article, "*Last Breath*, Sensing Life," 2021, 367–83.
17 Ibid.
18 See the video documentation. DOT Summer Streets, Park Avenue Tunnel, New York City, New York, United States, 2013. https://lozano-hemmer.com/voice_tunnel.php
19 Ibid.
20 See video documentations. https://lozano-hemmer.com/voice_tunnel.php Last accessed on 13 March 2023.
21 Paul de Man & Godzich, W. "Dialogue and Dialogism," *Resistance to Theory* (Minneapolis: University of Minnesota Press,1986), 109, 110.
22 Ibid., 110, 111.
23 Ibid., 108.
24 Ibid., 108, 110, 111.
25 Ibid.
26 Ibid.
27 Michel de Certau, "Vocal Utopias: Glossolalias," *Representations*, No. 56, Special Issue: The New Erudition (Autumn, 1996), 29.
28 See Brandon LaBelle, "Raw Oralities: Sound Poetry and Live Bodies," *VOICE: Vocal Aesthetics in Digital Arts and Media*, eds. Norie Neumark, Ross Gibson, Theo van Leeuwen (Cambridge, MA: The MIT Press, 2010), 147–73.
29 *Atmospheric Memory* (2019) was commissioned by Manchester International Festival, Science and Industry Museum, FutureEverything, ELEKTRA / Arsenal Contemporary Art, Montreal and Carolina Performing Arts – University of North Carolina at Chapel Hill. The exhibition is supported by Wellcome, and education programme promoted by The Granada Foundation.
30 See https://www.lozano-hemmer.com/linear_atmosphonia.php Last accessed on 14 March 2023.
31 See https://www.lozano-hemmer.com/cloud_display.php Last accessed on 14 March 2023.
32 Ibid.

33 See https://www.lozano-hemmer.com/voice_tank.php Last accessed on 14 March 2023.
34 See https://www.lozano-hemmer.com/weather_vanes.php Last accessed on 14 March 2023.
35 Ibid.
36 See https://www.lozano-hemmer.com/volute_1_au_clair_de_la_lune.php Last accessed on 14 March 2023.
37 Ibid.
38 See https://www.lozano-hemmer.com/babbage_lovelace.php Last accessed on 14 March 2023.
39 See Zeynep Bulut, "*Last Breath*, Sensing Life," 2021.
40 "Interview with Rafael Lozano-Hemmer," https://factoryinternational.org/whats-on/atmospheric-memory/interview-rafael-lozano-hemmer/ Last accessed on 14 March 2023. See also https://futureeverything.org/portfolio/entry/atmospheric-memory/
41 Ibid.
42 Carole IONE, *Listening in Dreams: A Compendium of Sound Dreams, Meditations and Rituals for Deep Dreamers* (Ebook, Ministry of Maat, 2020), 15.
43 Ibid.
44 During my talk on *Voice Tunnel* and distributed speech at the University of Aberdeen in 2021, my friend and colleague Jonathan Hicks asked what would have happened if a participant said something offensive during *Voice Tunnel*. This question made me think about response and responsibility, a theme I further developed in a subsequent talk on the same topic as part of the lecture series *Whose Voice Matters? The voice (in art) as material, sense, meaning and power,* convened by Salomé Voegelin at Die Hochschule für Bildende Künste Braunschweig, Berlin in 2021. My thanks to Jonathan Hicks and Salomé Voegelin for inviting me to present early excerpts of my book at these events.
45 Claire Bishop, *Artificial Hells: Participatory Art and the Politics of Spectatorship* (London, New York: Verso Books, 2012), 277, 278.
46 Ibid., 284.
47 Elizabeth Grosz, *The Nick of Time: Politics, Evolution, and the Untimely* (NSW: Allen and Unwin, 2004), 14.
48 Ibid.
49 Ibid.
50 Ibid.
51 Kathryn Yusoff explores "insensible" modes of interactions across bodies of all kinds to suggest alternative ways of dealing with climate change and biodiversity loss. See Kathryn Yusoff, "Insensible worlds: postrelational ethics, indeterminacy and the (k)nots of relating," *Environment and Planning D: Society and Space* 2013, volume 31, pp. 208–26.
52 Yusoff quotes Barad. Karen Barad, "Quantum entanglements and hauntological relations of inheritance: dis/continuities, spacetime enfoldings, and justice-to-come," *Derrida Today* 3, 2010, 265. Yusoff, 208, 209.
53 Ibid.
54 Ibid.
55 Here Nancy makes an association between the biblical meaning of the name Peter and the rock. Yusoff quotes Nancy. See Jean-Luc Nancy, *The Sense of the World* (Minneapolis, MN: University of Minnesota Press, 1997), 71. Yusoff, 208.

Conclusion: That Uncertain Voice

If we need to pick one word that defines our times, it would be uncertainty. This book has underscored that voice as skin generates an uncertain voice. This uncertain voice is both particular and anonymous, and significant. By building a voice, I have considered dynamic, ongoing, interactive, environmental and emergent processes of voice-making, both individually and collectively. The examples in the book demonstrate varied acts and ways of voice-making. I have expanded on these examples by looking at them through the lens of everyday voices, clinical cases, and everyday digital-media technologies, and vice versa.

Situating voice-making in such an expanded context manifests voice not simply as an aural, linguistic, vocal or sonic effect but also as a tactile and haptic affect. The conception of "voice as skin" points to imagining voice as a multisensory interface, a tactile and haptic affect across bodies of all kinds, without being limited to the human body, to human audition or the labels of verbal language. The processes involved in building a voice actively establish this interface as a shared surface. The surface behaves as both boundary and point of contact, like skin. This surface, I have argued, capacitates environmental awareness – awareness of other beings as similarly situated – the ethics of listening and the humility of not-knowing, that is, of searching as opposed to presuming, imposing or giving a fixed meaning or account.

Writing and talking about this book, almost everyone has asked me where skin is in the book. Skin is between the lines, skin is the shared surface, skin is where the voice is, where I have departed from and ended up. I have offered a reality and a fiction of voice-as-skin in three parts. In Part 1, I have discussed skin as a common ground prepared and performed by individual and collective acts of voicing. In my use of the word

"common", I am referring to Hardt and Negri's notion of commonality, that is, "common" as both limitation and expansion. A common voice is no different from a common space that we share. A common space is a medium in which we can participate together, but also a medium where we need to recognize the presence of others, where we encounter the rights of others and their claims to those rights. Meeting another is meeting a limit, as well as an extension. When both malleable and resistant features of voices meet, what happens? These aspects may be a sound interacting with other external sounds, a word uttered in an unfamiliar accent, a word so deformed as to become meaningless, a bodily noise, a vocal gesture amplified or a physical act that tries to express something. Sonically, culturally and politically, situated echoes of these voices create and perform a shared surface, one that behaves both as a point of connection and as a point of differentiation, one that highlights both the limitation and the expansion of the common.

The surface, along with voices, changes with a particular environment as well as being resistant to change. Examples in Part 1, Henry Eliot's multimedia walk, *The Waste Land*, devised for raising awareness of environmental and financial crises, the Solos in John Cage's *Song Books*, and Pauline Oliveros's deep-listening meditation *Environmental Dialogue*, make us consider this plasticity of the voice and the surface, whilst facilitating multisensory interactions between voice and environment. Some of the key themes that I have highlighted in these discussions – such as voice as a plastic medium for recycling and renewal, voicing across humans and nonhumans, and non-dialogue as a distributed mode of interaction – further explain how a voice emerges in the context of various ecologies, how it partially appears and disappears, and how it gets lost and refound with a live and distributed network of varied bodies, without a necessary object of intention.

Such an emergent voice offers mobility in time and place but also situates one in a particular context. I consider the tension between the mobile and the situated in line with the tension between limitation and expansion of the common. The common voice, and skin as common ground and shared surface, help us notice the co-operation of the individual and the anonymous, the interdependencies across multiple species, the contingencies of humans and their infrastructures, and the possible alternative

modalities of interacting with nonhuman forces. In Part 2, I have discussed how we embody this emergent voice, how we perform and differentiate the common in a particular body with particular names or identities. The common surface, the skin, I have suggested in this part is an imagined realism of voice, one that creates as well as regenerates the split between "my voice" and others' voices.

Examples in Part 2 have led me to this point. I have looked at Christina Kubisch's *Electrical Walks* as a case of kinetic and multisensory interaction between bodies and voices. I have considered how one hears speech sounds and makes a voice in the midst of non-speech sounds. Various experiences of voice-hearing in both clinical and nonclinical contexts demonstrate a similar inclination, a case of making voice in the midst of environmental noises. These experiences show the multiplicity and mobility of voices, appearing and disappearing with particular and commanding tones, yet also with various names and figures. VoiceWear, an AI technology devised by Modulate, gives us a parallel account of the plasticity of voices in an everyday context. It enables people to remake their identities by synthetically changing their voices in gaming. Where is that uncertain voice in this picture? I would say it is everywhere. In effect, these examples make us embrace the limits of voice, of the body, of voice and skin as both particular and shared, as uncertain, unfixed, unfinished.

In Part 3, I have discussed the limits of voice and skin mainly through a cross-reading of the histories and technologies of tactile speech developed for deaf and hard-of-hearing people as well as biosensing musical interfaces and participatory multimedia experiences. As part of this discussion, I have also referred to wearable health technologies and machine speech. Tactile speech technologies such as the hearing glove and signing glove treat human skin as a medium of translation and signification, of verbal exchange and linguistic voice. Wearable health technologies also employ human skin as a tactile surface for collecting and translating bodily data. Digital assistants, often considered as conversation partners but ultimately pattern detectors, work with a similar abstraction whilst translating acoustic, phonetic and linguistic data.

Literary scholars, artists, media historians and cultural theorists, as noted earlier in the book, have examined skin as a medium of translation, of inscription, of personal and collective memory, and a re-make,

re-mark, and transformation of the body, identity and subjectivity. By juxtaposing biosensing musical interfaces with various voice, touch and speech-driven technologies, I have explored skin not simply as a medium of translation, signification and transformation, but also as a medium of stimulation, expression and limitation. Biosensor performances, such as those of Tanaka, Sonami and Donnarumma, and participatory multimedia experiences such as *Vocal Vibrations* by Tod Machover and the Opera of the Future, as well as *Voice Tunnel* and *Atmospheric Memory* by Lozano-Hemmer, I argue, present a different case of tactile speech.

These performances and experiences also employ a series of translations and mediations of acoustic, vocal, visual and tactile data; however, they do not aim to provide a functional translation or a linguistic voice. They rather evoke a voice, which has multiple bodies, echoes and directions, in a non-dialogic way, without being reduced to verbal labels. This voice is errant, uncertain, unsettled, unassumed and unassuming. It does not belong to one single body. It is live and dynamic. It is shared as much as it can be individuated. This voice reveals the making of multiple voices, which is the making and the performance of a shared surface that facilitates both contact and differentiation among bodies of all kinds. The shared surface, the skin, is thus not a medium through which one becomes another completely or fully, but one that makes a body vulnerable to affect and be affected by another, on the one hand, and on the other that differentiates one body from another.

What is the significance of that uncertain voice, of the shared surface, of voice-as-skin, after all? What might voice-as-skin capacitate for our uncertain and precarious times? Voice-as-skin generates an environmental awareness of varied bodies, forces and matters by providing critical and sensory tools to reflect on the limits and limitations of human cognition and communication patterns. It leads to an ethical consideration for empathy, while drawing attention to how bodies make contact in differentiation and distance. It enables a coming to terms with an unassuming account of what another may go through. It makes a shift in how we hear one another. It encourages an awareness of the limitation of knowing, not to mystify forms of knowledge or to instrumentalize a lack of transparency, but precisely to question existing forms of knowing and acting together, so as to recalibrate how to live together.

We live in peculiar and unsettling times. In the midst of various global crises, we may be reminded of notions of understanding, empathy, connectivity, immunity and solidarity. I have echoed these notions throughout the book. The examples in the book offer a sensory politics, deconstruct language literally or/and metaphorically, and reveal voice and sense-making as a mobile and distributed, plastic and fragile, and both individuated and shared process. In short, they demonstrate and further encourage thinking about the reality of uncertainty. We take the ground beneath our feet for granted. In fact, the tectonics of neither earth nor human life are safe. Both are fragile and constantly in movement.

Geophysicist and spiritual thinker Xavier Le Pichon underlines "fragility" as inevitable and necessary for the life cycles of earth and of humans.[1] Le Pichon explains his discovery of both vertical and lateral movement of tectonic plates, which challenges his early education, one he now considers "fixist".[2] In this sense of fragility, he addresses being wilfully vulnerable to movement as a way of being. In other words, he also encourages us to acknowledge uncertainty and to be willing to be affected by others, be they the plate tectonics of the Earth, other people, other life cycles and ecologies, or environmental and structural causes and effects. I find Le Pichon's account of fragility particularly inspiring and helpful for the notion of immunity.

The etymological roots of the word "immunity" indicate exemption from liabilities. In immunology, immunity refers to innate or acquired protection of a body from foreign organisms such as bacterias and viruses. The kind of immunity that an uncertain voice offers is not necessarily an innate protection from or an acquired resilience against foreign organisms. Instead, that uncertain voice, voice-as-skin, strengthens our resilience against certainty and fixity, presupposition and prejudice, and given meanings and labels. Voice-as-skin makes us immune to giving a voice to something or someone without consideration. It rather makes us pause, reflect and listen in various ways. It puts into action our relations with others. It helps us build a voice together.

Notes

1 Xavier Le Pichon,"The Fragility at the Heart of Humanity," *On Being with Krista Tippett.* 25 June 2009. https://onbeing.org/programs/xavier-le-pichon-the-fragility-at-the-heart-of-humanity/ Last accessed on 12 March 2023.

2 Ibid.

Acknowledgements

This book has been developed through various engagements and conversations I have had over the years, which I wish to acknowledge with sincere gratitude. I would like to thank Atau Tanaka and Goldsmiths Press for believing in this project, to Angela Thompson and Ellen Parnavelas for their considerate editorial guidance, to Jann Pasler, Emma Dillon, Martin Stokes, Roger Parker, Jonathan Sterne, J. Martin Daughtry, Nina Sun Eidsheim, Brandon LaBelle, Sarah McCleave and Paul Stapleton for generously supporting my book. I am grateful to peer reviewers for their critical engagement with the book, to Atau Tanaka, Martin Delaney, Tod Machover, Marco Donnarumma, Henry Eliot, Georgina Gould, Christine Sun Kim, François Ghebaly Gallery and White Space, Christina Kubisch, Rafael Lozano-Hemmer and Laetitia Sonami for granting image permissions.

My thanks to J. Martin Daughtry, Deborah Kapchan, Michael Beckerman, Marina Peterson, Dominic Pettman, Jaime Oliver La Rosa, Alice Teyssier, Una Chaudhuri, Sukhdev Sandhu and Jairo Moreno for their kind contributions to the seminar on voice and environment at NYU, and to Christoph Holzhey, Manuele Gragnolati, Claudia Peppel, Arnd Wedemeyer, Chris Wunch, Frauke Both, Silke Schwarz, Florian Rosenbauer, Naomi Waltham-Smith, Jessica Feldman, Oriana Walker and Andreas Borregaard for their contributions to the workshop "Voice and Environment", which I co-convened with J. Martin Daughtry at the ICI Berlin. I am grateful to Henry Eliot for enlightening me about his multimedia walk, Christina Kubisch for guiding me to *Electrical Walks* in Berlin, Pedro Rebelo for drawing my attention to the *Listening to Voices* project, Tom Craig for informing me about Avatar Therapy, Atau Tanaka, Miguel Ortiz and Marco Donnarumma for their advice on biosensing musical interfaces, Rafael Lozano-Hemmer for sharing his thoughts on his work, and to Irini Papadimitrou for warmly welcoming me to Lozano-Hemmer's exhibition *Atmospheric Memory*. I am also indebted to the Centre for Deep Listening at Rensselaer Polytechnic Institute NY and the community of deep listeners for their contributions to my practice of deep listening.

The study on tactile speech and the ideas that I discussed in Part 3 were developed during a postdoctoral research residency at the Max Planck Institute for the History of Science. Between July and September 2018, I visited the research group "Epistemes of Modern Acoustics", led by Prof. Dr. Viktoria Tkaczyk at the Max Planck Institute for the History of Science. My sincere thanks to Prof. Tkaczyk for hosting and supporting my research, and to the members of the research group for their contributions to my thinking and study on tactile speech.

Relating to the themes that I have explored throughout the book, I have been invited to present my work in conferences, workshops, research colloquiums and seminars, and to contribute to publications. I would like to express my gratitude to Brandon LaBelle, Annette Stahmer, Holger Schulze, Carla J. Maier, Viktoria Tkazcyk, Marianthi Papalexandri-Alexandri, Nina Sun Eidsheim, Annette Schlichter, Gascia Ouzounian, John Bingham-Hall, Sarah Lappin, Stefanie Arend, William Drummond, Jason Stanyek, Laura Tunbridge, Chris Tonelli, Geoff Lehman, Ambrose Field, Gilles Aubry, Hannes Liechti, Federico Reuben, Clara Latham Hunter, J. Martin Daughtry, Ece Pazarbaşı, Salome Voegelin, Cathy Lane, Melissa Van Drie, Melle Kromhout, Sherry Lee, Daniel Grimley, Jonathan Hicks, Michael Uy, David Trippett, Georgina Born, Aura Satz, Irene Revell, Dame Evelyn Glennie, Carmel Raz, Francesca Brittan, Sander van Maas, Jacqueline Waeber, Seth Brodsky, Amy Cimini, Michael Gallope, Sophie Hayles, Jonathan Brennan, Gelsey Bell, Jane Alden, Jelena Novak, John Richardson, Lydia Rilling, Elaine Mitchener, Christopher Dingle, Xenia Pestova Bennett, Dieuwke Boersma, Milla Tiainen, Amanda Cachia, Christabel Stirling, Merijn Royaards, Ruth Bernatek, Luis-Manuel Garcia-Mispireta, Peter McMurray, Alexander Khalil, Maria Witek, Jillian Rogers, Erin Brooks, Michelle Meinhart, Landon Morrison, Andrew McPherson, Mark Pedelty, Allen Roda, Guy Harries, Lisa Skuret, Seth Ayyaz, Fatoş Üstek, Selçuk Artut, Jeremy Woodruff, Brendan J. Thornton, Mike Silvers, Tomos Watkins, Laura Anderson, Marië Abe, Rachel Beckles Willson, Stephen Cottrell, Aaron Einbond, Sabine Sanio, Julia H. Schröder, Anna Bromley, Millie Tyler, Dominic Symonds, Jane Grant, John Matthias, David Prior, Susanna Davies-Crook and Sarah Shin at Ignota Books, Canan Batur at Nottingham Contemporary, and Melih Fereli and Aslıhan Tuna at Arter, Istanbul for inviting me to join research colloquiums, meetings, seminars,

panels and publications. I also wish to thank Jonathan Sterne, Mara Mills, Xiaochang Li, Jillian Rogers, Kristen Turner, Rebecca Geoffroy-Schwinden, Stephanie Doktor, Alexandra Apolloni and Sarah Gerk for their contributions to my inquiry into the themes and to the writing.

Finally, I wish to acknowledge the long journey of building a voice. The conceptual journey of this book began at the University of California San Diego during my PhD studies (2005–11). I was fortunate to be a part of a critical and creative research community, which allowed me to experiment with ideas in a highly interdisciplinary way. My postdoctoral study (2011–13) at the ICI Berlin broadened this theoretical and creative pursuit in remarkable ways, encouraging me to consider new concepts and sound and media art works. Some of the ideas that I developed in the book were presented at research colloquiums at the ICI Berlin. I am grateful to the members of the research colloquium, including Christoph Holzhey, Manuele Gragnolati, Claudia Peppel, Luca Di Blasi, Arnd Wedemeyer, Sandrine Sanos, Bobby Benedicto, Anaheed Al-Hardan, Aaron Schuster, Kit Heintzman, David Kishik, Daniel Colucciello Barber, Honor Gavin, Brigitte Bargetz, Benjamin Dawson, Gal Kirn, Nahal Naficy, Robert Meunier, Beau Madion-Mount, Stefano Osnaghi and Volker Voltersdorff for their genuine engagement with my theoretical exploration of voice and sound.

In 2013, I joined the Department of Music at King's College London as an Early Career Lecturer in Music (2013–17). Colleagues and friends at KCL have generously and warmly welcomed my research and ideas, and offered great support for my research initiatives and future endeavours, for which I am sincerely indebted. Special thanks to Martin Stokes, Emma Dillon, Roger Parker, Frederick Moehn, Matthew Head, Daniel Leech-Wilkinson, Bettina Varwig, Katherine Butler Schofield, Michael Fend, Cliff Eisen, Heather Wiebe, Andy Fry, Elisabeth Giselbrecht, Flora Wilson, Jonathan Hicks, Thomas Hodgson, Gavin Williams, Carlo Cenciarelli, Katherine Hambridge, Tamara Turner, Jean Beers, Jenny McCallum, Fabio Morabito, Yvonne Liao and Richard Williams for sharing thoughts and reflections on my work during my time at KCL. Since 2017, I have been a faculty member of SARC Centre for Interdisciplinary Research in Sound and Music at Queen's University Belfast. I have been fortunate to continue my research at SARC, and I am thankful to all colleagues at SARC for their support for

my work and in the writing of this book. As part of my scholarly work, I have also had the opportunity to explore, exhibit and perform sound and voice works in Belfast. My thanks to Kurt James Werner for his compositional contribution to practice-based workshops, and to Una Lee and to HIVE Choir and John D'Arcy for their invitation to contribute to exhibitions and performances. Lastly, I wish to thank my students at KCL and QUB, who have greatly enriched my research and learning experience, and to my family and friends, who have listened to me with care throughout this journey.

Index