EDITED BY

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The Oxford Handbook *of* SOUND AND IMAGINATION

VOLUME 1

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OXFORD
UNIVERSITY PRESS

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Oxford University Press is a department of the University of Oxford. It furthers the University's objective of excellence in research, scholarship, and education by publishing worldwide. Oxford is a registered trade mark of Oxford University Press in the UK and certain other countries.

Published in the United States of America by Oxford University Press
198 Madison Avenue, New York, NY 10016, United States of America.

Library of Congress Cataloging-in-Publication Data
Names: Grimshaw-Aagaard, Mark. | Walther-Hansen, Mads. | Knakkergaard, Martin.
Title: The Oxford handbook of sound and imagination / edited by Mark Grimshaw-Aagaard, Mads Walther-Hansen, and Martin Knakkergaard.
Description: New York, NY : Oxford University Press, [2019] |
Series: Oxford handbooks | Includes bibliographical references and index.
Identifiers: LCCN 2018049753 | ISBN 9780190460167 (v. 1: cloth : alk. paper) |
ISBN 9780190460242 (v. 2: cloth : alk. paper) | ISBN 9780190460198
(v. 1: oxford handbooks online) | ISBN 9780190460273 (v. 2: oxford handbooks online)
Subjects: LCSH: Music—Psychological aspects. | Sound—Psychological aspects. | Imagination.
Classification: LCC ML3830 .O92 2019 | DDC 781.1/1—dc23
LC record available at https://lccn.loc.gov/2018049753

1 3 5 7 9 8 6 4 2

Printed by Sheridan Books, Inc., United States of America

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Acknowledgments

This handbook has been a four-year labor of, if not unconditional love, then surely a love tempered by blood, toil, tears, and sweat. Completing the task from proposal to completion, of compiling, editing, and publishing a two-volume work of over 650,000 words, requires dedication, attention to detail, and, at times, sheer bloody-mindedness. Here, thanks are due to the many people without whom the book you now hold in your hand would not have seen the light of day. Our first thanks go to our commissioning editor, Norm Hirschy, and music editor, Lauralee Yeary, both of Oxford University Press, who not only had the vision to see beyond the shortcomings of our initial proposal but also firmly and patiently guided us through the many twists and turns of putting together the final manuscript. Additionally, we are grateful to their many nameless colleagues at the press who have tirelessly labored over copyediting, proofing, design, indexing, and a host of other unknown tasks that take place behind the scenes. Thanks are also due a number of anonymous reviewers, from proposal through to draft manuscript, who were overwhelmingly supportive of what they read while also presenting us with many suggestions for expansion and improvement. Alistair Payne, Professor of Fine Art Practice and Head of the School of Fine Art at the Glasgow School of Art, has our gratitude for allowing us to use his magnificent diptych *The Fall*, as the cover art. Finally, although it is our names on the front of the handbook—and thus our responsibility for any errors that remain—none of what you are reading would have been possible without the contributions of our authors, who have neither ceased in their enthusiasm for the project nor flagged in the face of countless e-mails from us. Our heartfelt thanks go to them; we hope you enjoy their efforts.

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The Companion Website

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Oxford has created a website of images to accompany *The Oxford Handbook of Sound and Imagination, Volume 1*. Readers are encouraged to consult this resource while reading the volume as many images on the website are in color.

INTRODUCTION

Volume 1

MARK GRIMSHAW-AAGAARD,
MADS WALTHER-HANSEN, AND
MARTIN KNAKKERGAARD

Fümms bö wä tää zää Uu, pögiff, kwiiee.
Dedesnn nn rrrrr, Ii Ee, mpiff tillff toooo, tillll, Jüü-Kaa?
Rinnzekete bee bee nnz krr müüüü, ziiuu ennze ziiuu rinnzkrrmüüüü,
Rakete bee bee.
Rrummpff tillff toooo?
Ziiuu ennze ziiuu nnzkrrmüüüü, ziiuu ennze ziiuu rinnzkrrmüüüü,
Rakete bee bee.
Rakete bee zee.

—Kurt Schwitters, *URSONATE* [extract]

A working assumption might be that imagination has its genesis in past experience, whether that genesis is social, cultural, or individual, and this influences the interpretation of context and directs the thinking and ideas that arise from it. This is the theme that fundamentally constitutes the substance of this handbook: the role and effect of imagination in the development and use of sonic processes and artifacts. Whether the act of imagination is a previously unheard sound in a science fiction movie or a new compositional style, such a process always derives from, and may be discussed and made sense of in relation to, something preexisting; the mundane recordings of wildlife that form the basis for the alien's screech, for example, or a distinctive difference from other compositional styles. Yet, one should not make the mistake of assuming sonic imagination is purely to do with the creation of new artifacts; one can rehearse mentally a piece of music or recall and imagine a previously heard sound for the silent action seen on screen. Equally, imaginative sound processes and artifacts themselves provoke other instances and forms of imagination often far removed from the field of sound. It is this broad reach that the handbook endeavors to cover.

A quick perusal of books on imagination will demonstrate that, if it is not viewed as abstract or creative thought, imagination is typically discussed in terms of image, as is clear from the root of the word itself. Equally, previous works on sonic imagination are predominantly on the subject of musical imagination, but they disguise the topic of imagination under themes of musical compositional creativity or performance techniques such as improvisation or deal solely with auditory imagery in the domain of neurosciences and psychoacoustics. When initially proposed to Oxford University Press in early 2015, the handbook then envisioned consisted of forty-nine chapters and, while we included chapters covering the "traditional" areas of sonic imagination already noted, we also deliberately included chapters that dealt with other aspects of musical and auditory imagery and, bringing in other viewpoints from study areas that, prima facie, have little to do with sound, speech, and what might be called pure sound (that is, sound that, in English, is classed neither as music nor as speech). The handbook has since grown to seventy chapters, and the "sound" in the handbook's title covers the broad domains of pure sound, music, and speech from numerous perspectives both conflicting and complementary.

This is neither a humanities handbook nor a natural sciences handbook. As we make clear in what follows, we eschew such proscriptive labels. The handbook is determinedly multidisciplinary and so includes contributions from scholars and practitioners from numerous disciplines and fields including musicology, acoustics and psychoacoustics, sound studies, film studies, soundscape practice, literature, computer sciences, psychology, computer games, acoustic ecology, and cognition and neuroimaging, and the list goes on. Thinking about and working with sound and imagination belongs to no one area.

The Chapters

The handbook comprises seventy chapters (excluding this Introduction) shared across ten parts and two volumes that broadly arc across philosophical concerns to more practical matters before returning to philosophical issues again. However, the reader should not expect a particular part to be purely philosophical and untainted by practice or for those parts ostensibly dealing with practice to be unsullied by philosophy. As a multidisciplinary handbook, we have endeavored to maintain that ethos across all parts meaning that the reader, moving sequentially through the book, will, for instance, find a chapter on the relationship of imagination to presence in the context of multimodal surfaces juxtaposed to one dealing with the science of auditory imagery or a chapter on synesthetic art and hallucination abutting another detailing the process of controlling or even excluding the listener's imagination from auditory imagery. This is quite deliberate and is a demonstration that particular topics within the broad theme of sound and imagination are as common to a variety of disciplines as those disciplines' writing styles are diverse. Yet there is a more devious method at work here: in a world where universities, politicians, and research funding bodies all implicitly or explicitly work toward the

prioritization of certain forms and areas of research, we would rather present a handbook structure that ignores the barriers that arise in response to such short-term, limited, and, yes, unimaginative thinking in order to show that the conditions for new thoughts and ideas and for the synthesis of new knowledge are best nurtured and sustained in the *absence* of academic siloes. So, our advice to the reader of this handbook is to indeed read sequentially, and, in this, we trust that inspiration will be found.

Volume 1 of the handbook comprises five parts: "Foundations," "Society and Identity," "Language," "Image," and "Space and Place." Part 1 of the handbook broadly covers foundational aspects of the topic of sound and imagination. It contains a mix of discursive essays on auditory imagination, definitions of sound, historical and philosophical positions on imagination in the context of music and sound, and the roles of ambiguity, listening, and multimodality in sonic imagination, as well as an overview of the perspective on auditory imagery from the natural sciences.

Part 2 contains chapters dealing with sound and imagination in the context of society where this also includes aspects of culture, community, and individuality. Some of the chapters explore non-Eurocentric views, touching on musical imagination in Myanmar and South Africa. Some discuss the sonic realism experienced by those experiencing industrial warfare in contrast to the imagining of that experience by civilians, or the role of radio and the cultural heritage movement in promoting an artificial, false imagining of sound. Other chapters cover censorship and the abjection of sound in the law, while yet others focus on musical imagination in educational communities, the control of musical imagination in displaced communities, the cocreation of meaning in sound branding, and the imaginative development of personal musical identity.

The next part focuses on language. Here are found chapters dealing with the imagery and ambiguity of poetry; the acoustic imagination and sound symbolism of the literature of the Sinosphere cultures; sonic narratives in sound collages; sound descriptors and cognitive metaphors; the voice, both natural and technologically enhanced; and the importance of sound to the development of musicality and language acquisition.

Image and the imaginative relationship of sound and music to it is the topic of Part 4, of which a number of chapters deal with film. These include a discussion of the Beatles and their "cinema for the ears," the use of music to import connotations into film from beyond the screen, the use of cinematic sound design in facilitating audiences' creations of imaginary worlds, and the experience of meaning through sound in documentary film. Also within this part of the handbook are an essay on the sensoriality and implied aurality of comics and a chapter on forms of screen-based art, where sound is used to create those immersive qualities desired by artists.

The sonic imagination in relation to space and place constitutes Part 5, in which real worlds and virtual worlds and other imagined places are facilitated or created by music and sound. The part begins with a chapter on soundscapes as acoustic communities preceding one on the role of sound in presence in worlds both actual and virtual. Next are four chapters on music: the first deals with the transportation of the listener to imaginative music places; the second of the four discusses the sonic spaces and politics of concert halls; the third looks at the use of empirical research on music-space correspondences for

musical analysis; and the last concerns itself with the musical exploration of public space. The part concludes with a chapter on the construction and inhabitation of reality through auditory stimuli and a chapter on sound in digital games dealing with the process of world-building and the concept of world-blurring.

Foundations

Saam Trivedi ponders the *Sangita Ratnakara* by the Ayurveda physician Sarangadeva. In this thirteenth-century manuscript, Sarangadeva asserts that Sound, identical to the Absolute, is the only fundamental thing in the universe and that all other things are illusory or, at best, some derivative or manifestation of Sound. While the twenty-first century, non-monist Trivedi is critical of this claim, he finds much to be fascinated by and, in his dissection of the main points of the *Sangita Ratnakara*, he offers the reader an imagining of sonic monism that, while far removed from the orthodoxy of today's acoustics and natural sciences, might one day come to be seen as inspiration for the latest scientific ideas concerning sound.

Sven Hroar Klempe traces the concept of imagination in the history of philosophy and empirical psychology focusing on the period starting from the German enlightenment, and his chapter deals intensively with the works of a number of prominent scholars from the past three centuries, such as Christian Wolff, Alexander Baumgarten, Immanuel Kant, and Carl Stumpf. How the imagination of sound and music can be seen as a specific type of imagination is the basis of the chapter, and Klempe aims to elucidate how sound and music provide an alternative understanding of imagination to that provided by language. This discussion focusses on the relation between sensation and imagination and the complexity of sensory processes that music and sound reflect in a way that language cannot.

Malcolm Riddoch's chapter investigates the relation between the auditory imagination and our perception of sound. He states that, from a physical perspective, imaginary sound is the product of neurological processes that are not directly triggered by the external stimulation of the sense of hearing. From a phenomenological perspective, however, sound is fundamentally something that is heard. This apparent paradox leads Riddoch to present and discuss a variety of different forms and understandings of sound and to eventually posit that the sounds themselves—imagined or externally stimulated—are "nonphysical phenomena disclosed in the lived experience of hearkening to the meaningful sounds one hears in the world."

Daniel Schmicking explores auditory imagination from a phenomenological perspective. The chapter starts with an outline of phenomenological tools building mainly on Husserl's thinking, and it then sets out to analyze the structure of auditory imagination and its function in collaborative music making. In his account of the workings of auditory imagination, Schmicking challenges the traditional Western notion of imagination as something private. A central part of Schmicking's account of auditory imagination comprises a distinction between pure and weak forms of imagination, and this distinction is further used to explore how imagination contributes to other intentional forms, such as perception and memory.

Vagueness and ambiguity are the twin topics of Mark Grimshaw-Aagaard's first chapter in the handbook. Rather than suggesting that these should be eschewed and that precision and directness should be the goal when designing audio for sonic experiences or analyzing physical sound (as the natural sciences would have it), Grimshaw-Aagaard instead chooses to highlight the value of these to the sonic imagination. Indeed, it is argued that vagueness and ambiguity are essential to the imagining of sound, in engaging with the existential task of deriving function and meaning from its perception, and thus engaging with actual and virtual worlds.

The focus of Marcel Cobussen's chapter is the connection between imagination and different forms of music listening and it includes an exploration of the idea that listening—as a creative endeavor—is always linked to imagination. Cobussen deals with several music and sound art examples in his reflection on this idea, and he outlines how imaginary processes function in different ways to complete the insufficient information brought to the listener by the senses. Cobussen devises the term *imagining-through-listening* to reconsider how imagination is tied to perception, and he closes with a personal story that outlines how listening is a process of oscillating between a sonic reality and a sonic imagination.

Joaquim Braga deals with the role of sound in multimodal environments and multimodal surfaces. He argues that imagination not only bridges sensory dimensions that are absent from perception but that it is central to "the relationship of presence," that is, the connection between presently perceived sensory input. This involves assessing both the individuating dimension and the relational disposition of sound that allow sound—through the activation of imagination—to develop sensory relations. Central to the chapter's discussion of the function and contribution of sound in different media is the process of *sonic individuation*—a process of individuation of different modalities—that is presented as a precondition for the creation of relations between these modalities.

Timothy Hubbard's chapter offers a discussion of recent findings related to auditory imagery. These findings allow Hubbard to focus on how auditory imagery can occur automatically and involuntarily and can be evoked by different activities and/or triggered by memories from previous musical exposure. Hubbard discusses different forms of auditory imagery (e.g., anticipatory musical imagery, earworms, notational audiation, inner speech, in silent reading of text, auditory verbal hallucinations), and he explores differences between the inner ear and the inner voice, possible contributions of subvocalization to auditory imagery, and potential of auditory imagery as a component in musical practice and performance. Suggestions that auditory imagery reflects dynamic representation are considered, and Hubbard speculates that auditory imagery has a more profound role in a wider range of cognitive activities than is commonly assumed.

Society and Identity

"No one ever left a cinema with shell-shock" is an apt summary of Michael Bull's study of the relationship between soldiers and civilians; between those experiencing sonic

warfare and those consuming an imagining of the sounds of war. Bull builds his chapter around evidence and artifacts from World War I—firsthand testimonies of those experiencing the sounds of war, attempts to recreate the sound of industrial warfare through poetry, novels, and film, the propaganda of popular song and theatrical revue, and early attempts to record the sounds of war. Bull establishes a trope of sonic realism and, throughout, shows us that the imagination of that realism, on the home front, was merely a simulacrum of the everyday, sonic realism experienced by those on the Front; there remains a distance between testimony and mediated reception no less so for the sounds of war than for its horrors.

In a chapter that takes its point of departure in a surprisingly prophetic citation regarding sound and music by Francis Bacon, Petter Dyndahl examines how different epistemological positions and metaphors can contribute to the imagination and understanding of musical knowledge and learning. Dyndahl's main focus is on discourses regarding these subjects, and the chapter considers how knowledge in music consists of, and is expressed by and communicated via, musical imagination. In this manner, Dyndahl discusses how different kinds of metaphors and tools are central to learning in general and how the discussed approaches and perspectives, in terms of music and music education, are relevant to learning communities, the educational and professional fields of music.

In his chapter on fantasy control, Ulrik Volgsten focuses on the control of sonic imagination in general and takes as his point of departure a discussion of how imagination is reflected in a number of theoretical perspectives. He proceeds to supplement these perspectives with the dimension of social interaction and its role in paving the way for "an emerging sense of music," uncovering two different modes of connection: metaphorical projection and affect attunement. In the second half of the chapter, Volgsten discusses how the three thematically distinct aspects of imagination—musical archives, places and contexts, and identifications—are distributed, and he concludes with a case study on a Kurdish cultural association, exemplifying different ways in which imagination can be controlled for good or for bad.

Alexandra Lamont discusses how music preferences are a way to construct, reconstruct, and communicate a sense of identity, indicating aspects of personality, attitudes, and lifestyle. Her chapter reviews recent research demonstrating how music preferences can inform considerations about age, gender, and personality. Besides the social dimension, she also touches on aspects of the personal musical identity that is developed through imagination. The chapter furthermore considers our imagined relationships with the music itself and with the musicians responsible for creating and performing it, taking a lifespan perspective from childhood and adolescence through to old age.

An exposition of the Burmese *nat pwe* spirit possession ceremony provides the vehicle for Judith Becker to explore the uses of music for imaginative transformations of the autobiographical self. In these rituals, the spirits of historical personages, *nats*, bestow their powers on the androgynous, transgendered person of the medium, whose autobiographical self is transposed to that of the *nat*, who is then able to bestow favors on supplicants. Becker makes the case that it is the power of the rituals' musical accompaniment

that, through sensory overload and high emotion, provides the means to actualize the imaginative realm of the *nats*.

The growth in popularity of opera among the black population of post-apartheid South Africa allows Christopher Ballantine to investigate how the least discussed parameter of music's sounding can have the most striking implications for music's meaning. Ballantine's focus is on timbre, in particular the timbre of the singing voice and how this combines with the imagination to create musical experiences that have particular, and perhaps surprising, resonances for listeners. Sometimes indeed, as in his case study, these resonances have extraordinary consequences for meaning-making. Through interviews with leading figures in South African opera, Ballantine demonstrates that timbre is a vital, yet neglected, wellspring of imagined meaning; it should especially be seen thus if we seek to understand the singing voice in a sociopolitical context such as that of South Africa during and after apartheid.

In tracing archaeological, poetic, artistic, literary, legal, and political factors, Odd Are Berkaak investigates and discusses a number of controversies in relation to the sound environment around the world-famous prehistoric monument Stonehenge. The chapter pieces together an understanding of how imagination—as built on subjective impressions, on the one hand, and on collectively constructed cognitive schema, on the other—links the sensory experience of tranquility and the cultural category of dignity. Throughout his quest, Berkaak touches on a number of aspects including the promotion of cultural heritage and painting and literature.

Two claims are made by Veit Erlmann in his chapter on sound and violence in the legal imagination. The first claim is that, certainly as regards sound, the concept of the object is ill-defined. Instead, Kristeva's notion of the abject should be used to describe the place of sound, as there is a repression of the initially ambiguous nature of the subject-object relation. The sonic abject is to be found within the unstable boundary between subject and object. The second claim is that, in law, sound can be seen as an abject. Discussing the prominent role of sound in two cases from international criminal law and US constitutional law, Erlmann demonstrates that sound sits uneasily amid legal discourse about agency and intention.

By conforming to the enactive approach to human cognition, and by adopting Tia DeNora's concept of *human-music interaction* as an "in-action" perspective, Kai Tuuri and Henna-Riikka Peltola explore socially extended imagining with sounds and music. This is conducted through a questioning of how "shared places" of imagining with sound are established and maintained. Defining the activity of imagining as an essentially dynamic and generative process that takes place in a social reality, the authors propose that the processes of imagining are not only individual but also become exhibited and jointly engaged in social dialogues. Theoretical foundations of this shared imagining with sound form the first part of the chapter and then, by examining two case examples, the chapter focuses on the ways that imagination—as a joint, active engagement—becomes shared in an interaction between individuals.

In a chapter on branding, Clara Gustafsson takes issue with the belief, prevalent among brand managers and brand researchers alike, that sonic branding is first and

foremost about the music. Instead, Gustafsson suggests that sonic branding should prioritize branding and cocreation, with the consumer, of the music. The consumer thus becomes a valued cocreator of meaning and brand identity; the consumer's imagination playing a role in developing a meaningful platform for the brand. Gustafsson explores this viewpoint by arguing for the use of immersive research methods, cultural branding, and ethnographic techniques in shifting the focus away from the music and onto the consumer in order to develop a new approach to sonic branding research.

Morten Michelsen's chapter deals with a number of dualities—intimate/social, private/public, and introvert/extrovert—that are evident in the imaginative production and, especially, consumption of radio broadcasts. Michelsen explores the fields of the micro-social and the macro-social in the context of radio, how radio broadcasts are used to negotiate social structures in spaces such as the home and how they are used to form imagined communities between groups of people separated by geography (those communities formed primarily across space). To illustrate these two fields, and to exemplify the imaginaries of radio, Michelsen first explores 1950s Europe, as radio practice was becoming gendered through advertising and new broadcast and reception technology, before analyzing two Danish radio broadcasts of the same era, one a program dealing with the decolonization of Africa and the other a typical, light variety program.

Language

The sonic imagery of poetry and the poetry of radio are the subjects of Seán Street's chapter. Street argues for a poetics of sound whereby sound, like poetry, can stimulate images and feelings from the breadcrumbs contained within. Sound, especially that sound forming sonic art as found in many radio dramas and narratives, is essentially ambiguous and it is this very ambiguity that sparks the imagination of the listener, plucking long-forgotten experiences from the deep recesses of our memory, which, Street claims, are crucial factors in the preservation of our sense of self.

Kerim Yasar's contribution to the handbook comprises a consideration of the acoustic imagination of the literature of the Sinosphere (China, Japan, and Korea). The chapter explores the development and use of sound symbolism in the countries' writing systems arguing that, even with such sound-symbol-rich systems to hand, the Sinosphere's authors depended, and still depend, on the active imaginative participation of their readers to cocreate the acoustic depictions found in their work. Spreading his survey of the literary traditions of the Sinosphere across three-thousand-year-old Chinese literature to modern Japanese manga, Yasar further demonstrates that it is the conceptualization of sound within the Sinosphere cultures that helps shape the imagination and representation of sound within that culture's language and literature.

Sonic narratives are the subject of Vincent Meelberg's chapter, where he discusses the capacity of sound not only to trigger narratives but also to tell stories that unfold over time. Meelberg uses his own work on sound collage as an example of how narratives can be created through a sequence of sounds. He further argues that sonic narratives emerge when the sequence of sounds represents a temporal development. Examples are provided

that show how this temporal development emerges from either the referential qualities (hearing a succession of concrete events) or the acoustic qualities (for instance, the succession of tension and release) of the sound.

As Mads Walther-Hansen makes clear in his chapter, we regularly make use of cognitive metaphors when appraising sound quality. For example, nonauditory descriptors such as *warm*, *cold*, and *rough* might be used to describe auditory parameters, such as when assessing loudspeakers. Equally, we measure such assessments of sound quality against an ideal that, so we are told, is grounded in past sensory-motor experience. However, as Walther-Hansen argues, this explanation is problematic when viewed in light of evolving audio technologies, because the cognitive structures behind value- and sense-making are themselves evolving hand-in-hand with those technologies. The chapter's focus, therefore, is on the processes of structural coupling that take place between imagined cognitive ideals of sound quality and ever-changing external factors. Walther-Hansen's thesis is that, in order to explain this process, language should be viewed as a fundamental part of cognitive processing rather than merely being controlled by it.

In their chapter, "Speech, Sound, Technology," Johannes Mulder and Theo van Leeuwen investigate how the microphone, the amplifier, and the loudspeaker have changed the semiotic potential of the sound of the voice. Based on a social semiotic understanding, the chapter discusses the voice from three perspectives: a physical focus on how bodily experience from speaking and singing informs the understanding of the sound of the voice, covering implications such as pitch, loudness, and alterations of various kinds; a social focus that is based on the way human's social and cultural experience—like, for instance, accents and different vocal styles—informs the understanding of sound; and finally the technologically enhanced voice, showing that, even though the appreciation of this voice rests on the understanding of the biological and the social voices, it introduces extra-experiential dimensions that slowly assimilate into the culture, perhaps even when it is a disembodied, nonhuman voice.

Michael Forrester's chapter concerns itself with the significance of sound for neonates and infants in the development of their language and musical abilities. In particular, it makes an effort to understand precisely what it is that underpins adult imaginings, both parental and academic, of what the experience of sound is for these developing humans. Forrester presents several ideas dealing with child-directed speech that underpin language acquisition and the development of musicality before assessing two models of early sound experience: that of communicative musicality and that of psychoanalytic, developmental psychology. Throughout, Forrester keeps his focus on the imagery that the child might be experiencing and argues that early sonic exposure is crucial to the growth and maintenance of a coherent self.

Image

Adopting a diegetic and semiotic approach to multisensoriality in comics, rather than approaching the sensuous materiality of the comics' mediums, Marco Pellitteri discusses the aural dimension of this specific art form. The workings of comics are traced

back to Aristotle's concept of *noesis*; the mental activity of reading comics, Pellitteri suggests, involves a willingness to actively conceive of images and ideas in one's mind not least of which are those belonging to the aural dimension. To argue this point, Pellitteri concentrates on the comic's layer of actual or suggested sensoriality and illustrates the sensorial suggestiveness of comics' graphics by discussing the implied aurality of lettering, fonts, word balloons, graphic onomatopoeias, and the representation of music.

In his chapter, "Sound, Museums, and the Modulation of the Imagination," William Whittington discusses how screen-based art provides alternative approaches to sound design that challenge perception and subjectivity through the manipulation of sound hierarchies, idiosyncratic patterns of design, and customized modes of deployment. His focus on sound is warranted by the observation, that sound is often the key element that holds works together aesthetically and temporally as it activates the immersive qualities that many artists strive to establish, and, in this way, the chapter could also be read as an effort to counter the abundance of critical analysis related to the visual aspects of art. The chapter references a variety of works that highlight issues of unity and disjunction, audibility and intelligibility, and synchronization and synthesis as they seek to strip away narrative logic in order to rewrite expectations in regard to image and sound relations.

François Ribac discusses how the Beatles—within the field of popular music—gave substance to a technical and social organization that the cinema made culturally possible. Cinema, being just as much a technique as a way of organizing the world, introduced the Beatles and their sound engineers to a nonnaturalistic use of sound and simultaneously to the rock "n" roll that made it possible for them to invent "a cinema for the ears." Ribac describes how the methods and temporality of the cinema, as well as its conventions and division of labor, and the concept of the studio inspired the envisioning of a musical form that was disconnected from traditional music making of the time.

Michael Chanan's chapter investigates the complex implications of what is referred to as musical iconography, in which music works as a subtle and polysemic signifier of nonmusical associations and connotations, thereby functioning as a cultural symbol that is at once fixed yet still ambiguous. Through a loosely sketched historical view from the days of the silent movie to the present, Chanan points out how music brings codes and connotations from outside and beyond the screen into film. He discusses how music augments narrative ambiguity, but also how it can encompass different superimposed temporalities comprising historical events, private biographies, and collective memory.

Martine Huvenne discusses how imagined worlds in film originate in a human's bodily resonance with movements in sounds themselves and not solely in the interaction between the audio and the visual. Besides her own research, Huvenne bases her chapter on a case study of the work and practice of the sound designer Nicolas Becker, in this way making use of informed knowledge and insight from the producer's perspective. She argues that sounds can reveal invisible aspects of characters, relationships, and inner

worlds, allowing an audience to experience a lived world and thus providing perceptual elements that enables that audience to create an imagined world.

In Ola Stockfelt's chapter, listening is theorized through discussions of a number of personal cases, such as listening sessions in his car and his observations during teaching sessions where he has taught film music for film students. Stockfelt suggests that meaning comes before hearing sounds. Hearing something, Stockfelt argues, is a cultural conception of reality and we usually just imagine that we heard sounds first, whereas we really experienced meaning. This idea is further illustrated in studies of storytelling in documentary films.

Space and Place

In a chapter where the notion of acoustic ecology is used as the main framework, Barry Truax theorizes listening as an embodied interface to our auditory environment. Acoustic spaces, Truax argues, should be understood as simultaneously real and imagined and he discusses how such forms of dual perception exist in both everyday soundscapes and technologically mediated soundscapes. Truax argues that memory, imagining, and anticipation are each closely connected to all stages of listening and these aspects of listening are further used to explore and define what Truax calls the *acoustic community*—a soundscape that emerges as a product of collective, individual imagination.

Mark Grimshaw-Aagaard's second chapter addresses the role of sound in the creation of presence in virtual and actual worlds. He argues that imagination is a central part of the generation and selection of perceptual hypotheses—models of the world in which we can act—that emerge from what Grimshaw-Aagaard calls the *exo-environment* (the sensory input) and the *endo-environment* (the cognitive input). Grimshaw-Aagaard further divides the exo-environment into primarily auditory and primarily visual dimensions, and he uses the actual world of his own apartment and the virtual world of a first-person-shooter computer game to exemplify how we perceptually construct an environment that allows for the creation of a sense of presence.

In "Music Places: Imaginative Transports of Listening," Judy Lochhead initially considers the ambiguity of the term "music places" as either physical spaces in which music occurs (the living room, the concert hall, and other similar locations) or types of music that are characterized by their physical or social characteristics. She then introduces yet another understanding of the term—and the focus of the chapter—whereby it conceptualizes that music that actively places (transports) listeners to imaginatively enacted virtual places of musical sounding. The latter perspective is thoroughly discussed and leads to the notion that music transports its listener to an imaginative sonic place characterized by feelings, emotions, and expectations, an understanding that is substantiated and concluded by two personal listenings to relatively new works of music.

In his first chapter for the handbook, "Beacons of Sound," Martin Knakkergaard discusses expectations and imaginations vis-à-vis the concert hall of the twenty-first century. The chapter outlines some of the central historical implications of Western culture's haven for sounding music. Based on the author's study of the Icelandic concert-house Harpa, the chapter considers how these implications, together with the prime mover's visions, have been transformed as private investors and politicians took over. The chapter furthermore investigates the objectives regarding musical sound and the far-reaching demands concerning acoustics that modern concert halls are required to deal with.

Zohar Eitan and Hila Tamir-Ostrover start their chapter with a survey of existing empirical studies of sound-space mappings—particularly pitch/spatial height associations. Using Ligeti's Endless Column as a case in point, they exemplify how music can challenge these mappings by pointing out contradictions in the associative link between the auditory dimension and the spatial and motion features. These contradictions, the authors argue, on the one hand illustrate novel opportunities for composers to use music-space correspondences in order to create paradoxical spaces and, on the other hand, illustrate how music-space correspondences revealed by empirical research could be used in the analysis of music.

With the general goal of describing "how music understands itself socially and politically," Sabine Sanio, in "Auditory Mirrors: About the Politics of Hearing," starts out by focusing on the musical neo-avant-garde, and especially on John Cage, and goes on to discuss aspects of the musical idea of space. Although her chapter draws on several threads dating back to the beginning of the twentieth century, the central topics of the chapter are "current concepts of musically investigating sound itself, musical explorations of modern data technologies, and musical explorations of public space that started in the 1960s." Supported by a number of examples, the chapter discusses how the relationship between composers and audiences, socially and aesthetically, is challenged by the redefinitions of the concept of the space and the character of the musical live event or live-like event.

Linda-Ruth Salter deals with the ways in which hearing contributes to our sense of reality. Discussing different cognitive theories and findings from neuroscience, she discusses how sensory data—specifically auditory stimuli—are processed and how this processing activates imagination and influences who we are, where we are, and how we are. Reality, Salter argues, is a cognitive construct; hearing plays a significant part in forming our realities—for instance, by guiding our attention to certain stimuli rather than others—and it further allows us to successfully inhabit these realities.

Through the theoretical frameworks of sonic virtuality and embodied cognition, Tom Garner considers the role of imagination in the context of sound in actualizing the virtual worlds of digital games. In a chapter that takes in Spinoza, Hume, Kant, and Deleuze, Garner uses this consideration of imagination as the foundation to explore world-building in digital games—where the player is significant in constructing a viable

world in which to be present—concluding that sound, when allied to imagination, is a major player in *world-blurring*, Garner's term for the convergence, and inability to distinguish, between the real physical world and the *other-real* virtual world.

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PART I

FOUNDATIONS

CHAPTER 1

IMAGINING SOUND AS THE ABSOLUTE

The Case of Sarangadeva

SAAM TRIVEDI

Introduction

A volume such as this, *The Oxford Handbook of Sound and Imagination*, must necessarily have a variety of contributions about sound and imagination from all kinds of scholars working in various disciplines, ranging from musicology to psychology to neuroscience to anthropology to philosophy and so on.[1] In this chapter, I discuss critically the writings on sound of the medieval Indian musicologist, philosopher, and Ayurveda physician Sarangadeva (1210–1247 CE)[2] from the perspective of one analytic philosopher with a background in musical composition and not completely unfamiliar with non-Western traditions.

In his text *Sangita Ratnakara* (a title that could be translated from the Sanskrit as *Jewel-Mine of Music* or even as *Treasury of Music*),[3] Sarangadeva puts forth a conception of Sound as identical with the Absolute (*Nada-Brahma-Vada*), as the *one* fundamental thing in the cosmos (see Figure 1.1). I will first set out Sarangadeva's various claims about this and also about other things. Next, I will very briefly assess these views critically. I myself am not a monist—monism being, very roughly, the philosophical position that ultimately there is only one sort of thing in the world.[4] (Usually, monistic positions are either idealist, and claim that the only kind of thing in the world is mind or the mental, or else they are materialist, and claim that the only kind of thing in the world is matter and different arrangements or configurations of it.) And Sarangadeva's belief in the Absolute is one kind of monism. Nevertheless, it is fascinating for anyone who loves sound and music to think that ultimately the only kind of thing there is in the cosmos is Sound (with an uppercase "S," not sound with a lowercase "s"), all other things being, if not illusory, at best mere aspects or derivatives or forms or manifestations of Sound in

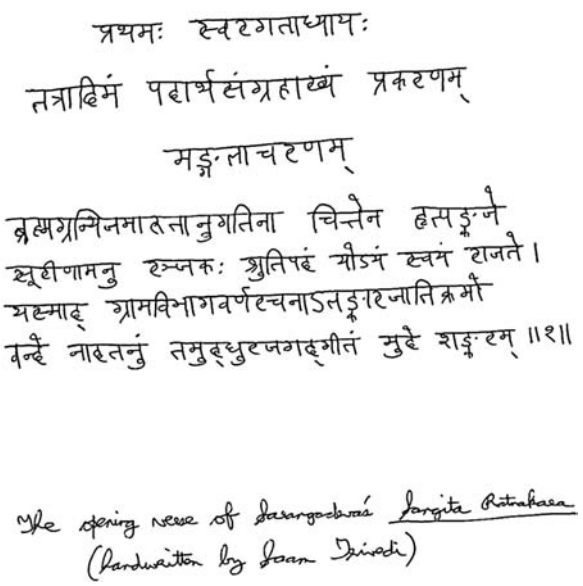

FIGURE 1.1 The opening verse of Sarangadeva.

some sense. *Without* endorsing such a position, I will conclude by exploring sympathetically what such a view of Cosmic or Primordial Sound might entail, both philosophically and otherwise. (See Yasar, this volume, chapter 21, for thoughts on sound and the cosmos from the Chinese, Korean, and Japanese perspective.)

Explaining Sarangadeva

Let us begin with some history. Sarangadeva's very influential and seminal Sanskrit text—*Sangita Ratnakara*, which I will hereafter abbreviate and refer to as SR—is regarded as definitive by both the North Indian or Hindustani tradition of music and the distinct South Indian or Carnatic tradition of music, and there were in fact many commentaries on it, of which only three survive today (those by Simhabhupala, Kallinatha, and Gangarama). To a large degree, SR compiles a lot of earlier work within the Indian tradition (both the North Indian and the South Indian traditions) and prior to Sarangadeva (such as, for example, Bharata's [2007] *Natyasastra*, Matanga's *Brhaddesi*, and Abhinavagupta's *Abhinavabharati*, which greatly influenced Sarangadeva). The text was written before the Muslim conquest of the Deccan plateau of southern India—where Sarangadeva's grandfather, the Ayurvedic scholar and physician Bhaskara, had moved from his native Kashmir in northern India—and before the great Islamic influence on Hindustani music. As such, SR is often seen as a bridge between the ancient and medieval periods of Indian music.

At this point, I also need to say a quick and very rough word—for the benefit of at least some readers—about the Upanishads and their philosophy, a philosophy that greatly influenced Sarangadeva and, indeed, many Indian thinkers both prior to and after Sarangadeva and also that influenced Western philosophers such as Schopenhauer. The Upanishads are the last part of the ancient Hindu texts, the Vedas, the first of which—the *Rig Veda*—may have been composed by the Aryans as early as 1500 BCE; the very word "Aryan," by the way, derives from the Sanskrit word "Arya," meaning noble. All the Upanishads seem to be expounding, in different ways, an Absolute Idealist philosophy about the nature of reality, the self, and the relation between the self and reality. According to this vision, very roughly, Brahman or the Absolute is the underlying mental or spiritual ground or essence or substratum of all things; it is also often referred to as the Supreme Spirit or the Universal Self. The individual Self or Atman has the nature of pure knower and is said to have the same essence as Brahman. Atman is also said to be part of Brahman, which is much greater. Since they have the same essence, by knowing Atman in a mystical experience that is said to involve the bliss of total self-consciousness, one comes to know Brahman and the entire cosmos that is believed to be identical with Brahman. This kind of experience involves going beyond the illusion of mistaking one's ordinary, empirical, waking self to be one's true self. There are later debates and discussions within Hindu philosophy about the nature of Brahman, specifically within the very influential Vedanta school of Hindu philosophy—which influenced Sarangadeva too—where some such as Shankara (788–820 CE) see Brahman as non-dual and devoid of qualities (*Nirguna Brahman*), whereas others such as Ramanuja (1077–1157 CE) see Brahman as non-dual but as having qualities (*Saguna Brahman*), the world being different, multiple attributes, or qualities of Brahman such that Brahman is the unity that underlies all diversity.

With that very brief history behind us, I turn now to explaining some of Sarangadeva's main *philosophical* claims as found in the first chapter of SR. I will focus primarily on what Sarangadeva has to say about *Nada* or Primordial Sound, leaving aside a lot of his very rich and fascinating musicological and music-theoretical remarks—made over the course of seven chapters—about such things as different kinds of musical microtones and tones; various musical scales and patterns; the varieties of melodic movement and of musical motifs and ornamentation; melodic improvisation; the varieties of song and singing; time-cycles and rhythms of all sorts; musical instruments of different types and their construction and modes of playing; musical forms; dance forms; melodic themes used in dramatic performances; and so on.

Sarangadeva states four reasons for composing SR: (1) to liberate all from three kinds of pain—physical, psychological, and that associated with or caused by natural calamities; (2) to uphold eternal virtue; (3) to obtain fame; and (4) to achieve liberation. And Sarangadeva divides music (*sangita*) itself into three kinds: vocal music or melodic forms (*gita*); instrumental music and especially forms for drumming (*vadya*); and dance (*nrtta*).

Identifying the Absolute with Primordial Sound (*Nada*), Sarangadeva claims that the Absolute is embodied in the form of Primordial Sound. This Primordial Sound is seen as

the manifestation of the first of the five elements of creation, space or ether (*akasa*), in its original state; the other four elements of creation being earth, fire, air, and water, much as in ancient Greek cosmogony.

Some schools of ancient Indian philosophy, such as Yoga, regard Primordial Sound as the cause of the world. Of the five elements of creation mentioned above, ether or space is heard (earth being smelled, water tasted, fire seen, and air touched or felt). And ether is believed to be the most pervasive and the cause of the others. Sarangadeva seems to be following this way of looking at things and considers the sounds we hear externally to be the manifestation of Primordial or Cosmic Sound, which in turn Sarangadeva identifies or equates with the Absolute or Brahman of the ancient Hindu texts, the Upanishads. Since Brahman is seen by the Upanishads as the cause or underlying ground of all things, it would seem to follow that Sarangadeva thinks Primordial Sound, identified with Brahman, is the cause of ether (besides being a manifestation of ether).

Returning to Sarangadeva, he sees Primordial Sound as the intangible, which manifests itself through articulate sounds. Primordial Sound, or *Nada*, is the essence of vocal music, and instrumental music is pleasurable as beautiful because it manifests *Nada*; dance follows both vocal and instrumental music and so it too depends on *Nada*. Moreover, *Nada* or Sound is not just the basis of music and dance for Sarangadeva but also the basis of all manifest life and the entire business of life, as it is the substance of speech, the means of communication. *Nada* on this conception manifests or makes up the letters of the alphabet, the letters in turn making up words, which constitute sentences. The entire business of life is carried on through language, and so the whole phenomenal world is based on *Nada*, which is seen as its cosmic basis.

Sarangadeva sees *Nada* or Primordial Sound itself as having two forms, the created and the uncreated. That is to say, this is a monistic view where there is *one* fundamental thing, *Nada* or Primordial Sound, that has two forms. The first kind (*ahata*) is produced or created or struck, and so is heard externally through the ears. Here Sarangadeva seems to have in mind the manifest, ordinary sounds that we hear and make, for instance, and these would be the manifest, audible forms of Primordial Sound that have its essence. The second kind (*anahata*) is not produced or struck or created and so is not heard externally through the ears but is instead to be experienced mystically in a yogic experience when both sound and light are fused together and perceived directly. Here, Sarangadeva probably has in mind the unmanifest form of Primordial Sound.

About Brahman or the Absolute, Sarangadeva follows the Upanishads and the Vedanta philosophers Shankara and Ramanuja, mentioned earlier, and tells us that it is the essence of all existence, it is blissful awareness and self-illuminating, it is non-dual and the ultimate cause, it is timeless, formless, imperishable, omnipotent, and omniscient. He sees Brahman as the supreme ruler or deity. Proceeding from Brahman to individual being (*jiva*), Sarangadeva claims that individual beings are all the relative, conditioned, limited manifestations of one and the same unlimited awareness, Brahman. Using an analogy, Sarangadeva suggests that this is just as the different sparks of fire all have the same essence—fire or heat—and are constituted by it but yet are different in arising from different circumstances such as different kinds of wood, with different colors and

intensity, for example. In this sense, there is an *identity in difference* when it comes to the sparks of fire and fire itself, or when we consider Brahman and the individual selves. Similar remarks about identity in difference apply to the relationship between various manifest, ordinary sounds (the first form of *Nada* mentioned in the previous paragraph) and the unmanifest Primordial Sound (the second form of *Nada* mentioned in the previous paragraph), the former all having the *essence* of the latter in being audible manifestations of it but nevertheless differing from each other in being produced in different ways and in different places and times by different sources, agents, and such. There is thus *an identity of substance but difference in form*, just as ornaments made of gold are all made or constituted of the same essence or substance or chemical element—gold—and yet differ in form and have different names such as bracelet, chain, earring, and so on.

Sarangadeva also tells us that Brahman first gives rise to ether, then to air, then to fire, then to water, and then to earth. Ether is thus the first of the five elements. Moreover, ether is seen as that objective reality which is the substratum of sound that is heard by the ear. And Primordial Sound (by which Sarangadeva does not mean mere vibrations), must come from all of the cosmos in some sense, and at any rate from *outside* the Earth, *unlike* tactile feels, colors, tastes, and smells. This makes sound the primary or most basic of all the sense-data on Sarangadeva's view and hearing the first of all the senses. Sarangadeva also suggests that these five elements make up the physical cosmos, which itself is seen as essentially *conscious* and perceptive, making Sarangadeva's view of reality a kind of Metaphysical Idealism insofar as he sees reality—identified with Brahman and Primordial Sound—as being ultimately *mental*.

In the conclusion to the second section of the first chapter of SR, Sarangadeva tells us that music and sound can be used—and so have value—not just for aesthetic enjoyment (besides generating wealth for those associated with performances) but also for spiritual enlightenment or liberation (*mukti*) from the limitations of the finite world. This liberation can be attained through meditating on the second and uncreated kind of Primordial Sound (*anahata*) mentioned earlier, which can be mystically experienced (or felt) inside our heads and our bodies if we attend to it carefully with a clear, unperturbed, and unburdened mind. Laypersons, however, may find this pure sound uninteresting as it is devoid of emotional color, and so we need a science of music in order that people can both enjoy the world and also attain liberation from it.

In the third section of the first chapter of SR, Sarangadeva says many interesting things about *Nada*, and also about microtones (*sruti*) and tones (*svara*). Identifying *Nada* with Brahman or the Absolute which is manifest as *Nada*, Sarangadeva claims *Nada-Brahman* is incomparable bliss, which is immanent or present in all beings as consciousness or intelligence and is manifest in the phenomena of the cosmos in an all-pervading way. *Nada* is the primordial sound that has space or ether as its base. It is the subtlest of all five elements and the first among them, as we have seen before. *Nada-Brahman* is thus the cause and, in fact, the very substratum of the manifest universe. *Nada* is the source of microtones, tones, letters, words, and so on, on which all worldly conduct is based.

Nada-Brahman is actually undifferentiated consciousness and to be distinguished from sound. Sound is purely objective, that is, produced out there by objects and perceived by subjects who are different from objects. But *Nada-Brahman* is the perception where the perceiving subject just *is* the perceived object, *without* any difference between them, and in this sense, Sarangadeva's view is monistic. Put differently, *Nada-Brahman* is the one, single, *undifferentiated* state of consciousness, which should not be seen in terms of differentiated consciousness. Later Indian commentators on Sarangadeva such as Kallinatha suggest that *Nada* is also called *Sabda* or the Word, and so *Nada-Brahman* is also called *Sabda-Brahman*. In this sense, it might not be too much of a stretch to see Sarangadeva as claiming that in the beginning was the Primordial Sound or the Word.

To conclude this brief exposition of Sarangadeva's philosophical claims, Sarangadeva tells us about the manifestation of sounds in the human body; and ordinary sounds are also a manifestation themselves. He claims that the vital force (*prana*) in the body is stationed around the base of the navel and rises upward to manifest *Nada* first in the navel, then in the heart, then the throat, then the cerebrum, and finally the oral cavity of the mouth. Corresponding to these five places in the body, *Nada* is theoretically seen, respectively, as extremely subtle, subtle, loud or strong, not so loud, and artificial (because the sound after being produced by the vocal chords is modified by the tongue, teeth, lips, and so on, and so loses its natural texture). In practice, however, and speaking with reference to singing and musical performance, *Nada* is seen as having three registers: in the heart, in the throat, and in the head (correspondingly roughly and respectively to the chest voice, throaty voice, and head voice we talk about in Western music). Also, the word "*Nada*" itself is seen as consisting of two syllables: *na* stands for the vital force, while *da* symbolizes fire, *Nada* thus being the interaction of the vital force and fire. Finally, *Nada* is divided into twenty-two grades or microtones or *srutis* that are audible and free of resonance and tonal color and seven tones or *svaras* that arise from, and are manifested by, the *srutis* in groups of two, three, and four, and are resonating and sweet. These twenty-two microtones do not have an obvious Western equivalent, though the seven natural or "pure" (*suddha*) tones (*sa re ga ma pa dha ni*) correspond very roughly to the first seven notes of the sol-fa scale of the West; note, however, that while the pitches of notes are fixed at least traditionally, for example, A = 440 Hz (even though nowadays many orchestras, pianos, and so forth are standardly tuned to a higher value for A than 440 Hz), the pitches of *svaras* are not absolutely fixed (though it remains the same in relation to the others of the scale) as performers of Indian music are free to fix their own fundamental note.

Questioning Sarangadeva

Fascinating as Sarangadeva's claims are, we who live in the twenty-first century (and at a time when the initial reconnaissance of our solar system has been completed by the New Horizons probe when it flew past the dwarf planet Pluto in July 2015) and know much

more about science and about the cosmos must question a lot in them, rather than take them as the gospel truth. And questions arise naturally in many minds even if these questions might be answered ultimately on a different occasion elsewhere.

To begin with, one must doubt the very notion of the Absolute, whether set forth in ancient and medieval Hindu texts and philosophies such as the Upanishads and in monistic Vedanta schools and by Sarangadeva in the form of Brahman or *Nada* or *Nada-Brahman*, or in the West by philosophers such as Hegel and those who follow him. Is there really such an entity (or being), which is one and mental or spiritual in nature, and which alone is ultimately real, all other things if not being illusory then being merely different qualities or aspects or manifestations or forms of it? There is little scientific or physical evidence for such a claim, to say the least.

At this point, defenders of this kind of monistic Absolute Idealism often claim in response that the existence of Brahman or the Absolute cannot be proven scientifically or rationally, and such a demand is unfair. Rather, they suggest that the Absolute must be *experienced* in a mystical experience to know it, and that the experience is ineffable and cannot be described to those who have not had it, who will remain unconvinced about it. Two analogies are used sometimes to illustrate this point. First, you cannot describe what it is *like* to be in love or to love something to someone who has never experienced love. Second, there is a famous (Theravada) Buddhist story about the tortoise walking on land and then returning to the lake to swim, but not being able to describe to the fish what land is like, that it is solid not liquid, that one walks on it rather than swims in it, and so on. To these, one might add a third analogy (which I first heard from the philosopher Raymond Martin), using E. A. Abbott's justly celebrated fantasy *Flatland* (1992). In the scenario Abbott sketches, the Square who lives in a two-dimensional flat world goes to worlds with three dimensions (Spaceland); one dimension (Lineland); no dimensions (Pointland); and thinks of visiting a world with four dimensions. When he returns to his flatland, the Square cannot describe to the Circle and the Line what it is like to be in a three-dimensional world (where the Circle would be a Sphere) or a world with four dimensions, and so on. This is because the Square's companions have not had the right kind of experience, and so lack the right kind of concepts and language.

In reply, skeptics about mystical experience claim that mystical and religious experiences are often caused by such things as fasting (as both Christ and Mohammed are supposed to have done), or consuming certain foods or narcotics (as some Hindu mystics do), or going without sleep for a long time, or deep breathing exercises, or at high altitudes (as in the case of many Hindu and Buddhist mystics), or in deserts (as in the case of Moses), or by whirling and singing for a long time (as the Sufi dervishes do), and so on. Note, by the way, that between them, these kinds of cases cover what are considered the five major religions of the world today: Hinduism, Buddhism, Judaism, Christianity, and Islam; it is good and only fair to be an equal opportunity questioner! At any rate, skeptics continue that all of this goes to show that there is an alternative psychophysical explanation for mystical and religious experiences insofar as these experiences are caused by the mechanical, physical, chemical, electrical, neurophysiological,

and other changes in our body, brain, and nervous system induced by fasting, taking opiates and hallucinogenic drugs, being at high altitudes where the oxygen is rare, and so on. It is not, claim skeptics, that these kinds of mystical experiences reveal a special, ineffable knowledge of reality "as it is" as mystics claim. Instead, skeptics urge that these experiences are illusory and are caused by us rather than by something "out there," and so must be explained away in psychophysical terms.

Suffice to say then, without going much further into this debate, that there are then at least some *initial* reasons for doubting the existence of the Absolute or Brahman or *Nada*, and mystical and religious grounds for it. I grant, though, that these reasons might not convince some and may well be defused ultimately by other considerations. Perhaps mystical experiences open "doors of perception" beyond ordinary, sensory experience, as Aldous Huxley famously suggested in his book with that title. Maybe one needs to be slightly "cracked" anyway to experience reality beyond our familiar modes of knowledge, as the philosopher C. D. Broad once remarked (Broad 1953). As an agnostic about such matters, I will leave things there for now.

Imagining Sound as the Absolute

We have seen so far that Sarangadeva *equates* or identifies *Nada* and Brahman, claiming they are one and the same. That is to say, he thinks that *Nada* (in both forms, the created and the uncreated) is Brahman or the Absolute, and also that Brahman or the Absolute is *Nada*. But given that there are at least *some* grounds for doubting the existence of the Absolute, as we saw in the previous section of this chapter, let us leave aside talk of the Absolute being manifest or embodied as *Nada*. Instead, in what follows, let us look at things from the other direction, reversing them as it were, and focusing on Sound as the Absolute (even if this part of what Sarangadeva is saying). Note I am not talking about Sound *without* the Absolute, but rather only talking about Sound *as* the Absolute. This is a difference of emphasis, a reversal of direction, that leads to a perspective one might not expect at first.

So, what if all in the cosmos were basically Sound or Primordial Sound or *Nada*, in the ultimate analysis? What would such a picture of reality look—or sound—like? It would mean, at the very least, that the entire universe would consist fundamentally of sound and sound vibrations, and different arrangements or configurations of these; silence too might be seen as part of the sonic realm insofar as it is something that is audible and can be *heard* (though some might see it as the absence of the audible). All of this would apply to humans too, who also might be seen as having sounds as their basic building blocks. It would mean also that the world is *not* fundamentally made up of matter and particles and different arrangements of these, as materialist philosophers and a lot of current science tells us. Instead, it would mean that the world is fundamentally constituted by sound and sound energy in motion. If that is right, then a form of acoustics might even replace a lot of current physics as our basic empirical science of the world, and perhaps a

discipline—let us call it astroacoustics—might play the role that astrophysics currently does in our system of knowledge of the universe.

It should be clear that we are talking not just about the sensory properties of sound, including music and the pleasure it provides. Rather, it is Sound (with an uppercase "S") or *Nada* that we are talking about, something that is the unique and common essence of all sounds and sound waves and vibrations. While the latter can be, and often are, heard or felt through our senses, mainly through the ears and perhaps also sometimes through the body and our skin, Sound or *Nada* itself is not manifest in this way, as Sarangadeva himself might say.

Indeed, this may open up one sort of way to achieve a kind of unity with all in the cosmos. If Sound or *Nada* pervades everything in the world, from the manifest sounds we hear ordinarily to the sounds in our body to the sounds throughout the universe including in its outer reaches, then somehow getting in touch with our inner sounds would mean tapping into the all-pervasive Sound or *Nada*. If the manifest sounds—or *ahata*, to use Sarangadeva's term—we hear are a kind of external music, and our personal sound vibrations that are unique to us are a kind of internal music, then uniting our self and body to the Sound—or *anahata*, to use Sarangadeva's term—or *Nada* that is the cosmos may lead to a kind of cosmic unity as the inner sound vibrates though the entire universe.

What might this involve? Perhaps a focused mind that is concentrated on our various bodily sounds such as controlled breathing, especially deep breathing and the sounds it makes as we inhale, retain, and exhale air in increasingly prolonged ways, just as is done in the practice of deep breathing or *pranayama* in hatha yoga and other forms of yoga. Other such bodily sounds one might focus on may include our heartbeats, the beat of our pulse, and so on. Focusing on such continual sounds may help one listen in on one's inner sounds, and perhaps lead to an inner awareness that may well be a kind of awakening in the ultimate analysis.

It is interesting to note in this connection that these days in the United States, many people visit float centers and spas to use isolated, float therapy tanks in pitch-dark chambers, with saltwater at their exact body temperatures, and earplugs so they block out all external sounds, focusing only on the sounds of their bodies such as breathing, heartbeats, gastrointestinal organs, and so forth.[5] Through doing this, they try to achieve a relaxed, meditative state that involves sensory, specifically *auditory*, enhancement (rather than sensory deprivation). The number of such float centers has in fact gone up more than three times in recent years, from an estimated 85 in 2011 to 271 in 2015, in part due to the rising popularity of mindfulness in the United States and in the West more broadly. And one might see float therapy as involving a kind of *auditory* mindfulness focused on sound and sonic properties.

Lest it be thought that all this talk is merely speculative and without any textual basis, let me now offer the following from various Eastern traditions by way of *some* support. In the Mahayana Buddhist text *Surangama Sutra* (Goddard 1938, 108–276) used by the Cha'n tradition of Chinese Buddhism (which later became Zen in Japan), Avalokitesvara (who is a Mahayana Buddhist deity) claims that he attained enlightenment by focusing

on the subtle inner sound. At this point, the Buddha praises Avalokitesvara's way as supreme, and claims that the pure Transcendental or Brahman Sound brings liberation and peace to all, urging his followers to reverse their outward hearing and instead listen inwardly for the intrinsic sound of one's own Mind-Essence.

Likewise, the nineteenth-century Buddhist master Jamgon Kongtrul of the Mantrayana or Vajrayana tradition of Tibetan Buddhism (to which the Dalai Lama belongs) suggests that the primordial, timeless, indestructible, indivisible, all-pervasive *vital essence* that is the ground of all life and peace has many synonyms, including Primordial Sound or *Nada* (Kongtrul 2005, 431).

In a similar vein, the Mahasiddha Vinapa, a Buddhist adept and musician, claims that he attained *mahamudra*—a vivid, ineffable experience of phenomenal reality—by contemplating the unborn, unstruck sound (what Sarangadeva calls *anahata*): "With perseverance and devotion, I mastered [the musical instrument] vina's errant chords; but then practicing the unborn, unstruck sound I, Vinapa, lost my self" (Dowman 1986, 91).

And the Vinapa continues:

> [H]is mastery of the "unborn, unstruck sound" made audible by eradication of concepts, judgments, comparisons, and criticism that obscure cognition of the pure sound of the instrument, is accomplishment of the fulfillment process. The unstruck sound is the sound of silence and is the auditory equivalent of phenomenal emptiness. It is absolute sound; it is the potential sound of everything composed and waiting to be composed. Lost in this non-sound, the sense of self becomes infinitely diffused in emptiness. (Dowman 1986, 93)

This Buddhist passage is particularly interesting and calls for some comment. Mastering the unborn, unstruck sound—the Primordial or Cosmic Sound that Sarangadeva calls *anahata*—is seen as becoming fulfilled or enlightened, and the Hindu Sarangadeva might agree that to know *Nada* or Primordial Sound via an inner awareness and unity with *Nada* is to be self-realized. And to eradicate concepts, judgments, and the like is to get rid of the external as one is left behind only with the internal and with inner sounds.

Last but not least, I turn to the *Nada Bindu Upanishad* (Aiyar 2011), a text that is part of the *Rig Veda* (an ancient Hindu text dating to about 1500 BCE, which I mentioned earlier). The philosophical ideas in this text mesh well with those in the other Upanishads and must have percolated down to such thinkers as Shankara, Ramanuja, and Abhinavagupta, who all influenced Sarangadeva, as noted earlier. At any rate, here are verses 31–39 of this text, which are considered very important by those who practice *Nada yoga*, that is, the yoga of sound (or the path of union through sound):

> The [adept] being in the . . . (posture) . . . should . . . always hear the internal sound. . . . The sound which he thus practices makes him deaf to all the external sounds. Having overcome all obstacles, he enters the [blissful, self-realized] state within fifteen days. In the beginning of his practice, he hears many loud sounds. They gradually increase in pitch and are heard more and more subtly. At first, the

> sounds are like those proceeding from the ocean, clouds . . . in the middle (stage) those proceeding from . . . (a musical instrument), bell and horn. At the last stage, those proceeding from tinkling bells, flute, Vina (a musical instrument), and bees. Thus he hears many such sounds more and more subtle [sic]. When he comes to that stage when the sound of the great kettledrum is being heard, he should try to distinguish only sounds more and more subtle. He may change his concentration from the gross to the subtle, or from the subtle to the gross, but he should not allow his mind to be diverted from them towards others. The mind having at first concentrated itself on any one sound fixes firmly to that and is absorbed in it . . . (the mind) becoming insensible to the external impressions, becomes one with the sound as milk with water and then rapidly becomes absorbed in [the ether where Consciousness prevails].

This passage calls for some comment. Toward the very beginning of the lines just quoted we see an inward movement going from the external, where the adept hears many loud sounds, to the internal, where the adept becomes deaf to external sounds and enters a blissful, self-realized state. This kind of inward movement mirrors what we find in the Yoga school of Hindu philosophy, and indeed in forms of yoga such as hatha yoga and its eight steps. The "great kettledrum" referred to toward the middle of the passage just quoted is *Nada*. And the blissful, self-realized union with *Nada-Brahman* is described toward the very end of the lines just quoted, in terms of the analogy with milk merging with water to become one as the adept's mind is absorbed in *Nada-Brahman*.

Continuing with the *Nada Bindu Upanishad*, here now are verses 42–47 that can be found toward the end of this short text:

> Just as the bee drinking the honey (alone) does not care for the odor, so the [Consciousness] which is always absorbed in sound does not long for sensual objects, as it is bound by the sweet smell of Nada and has abandoned its flitting nature. The . . . [Consciousness] through listening to the Nada is entirely absorbed in it and becoming unconscious of everything concentrates itself on the sound. The sound serves the purpose of a sharp goad to control [that mind which like a maddened elephant] roves in the pleasure-garden of sensual objects. It serves the purpose of a snare for binding [that mind which flits like] the deer. It also serves the purpose of a shore to the ocean waves of Consciousness. The sound proceeding from . . . Brahman is of the nature of effulgence; the mind becomes absorbed in it.

At the start of the lines just quoted, we see a description of self-realization focused on *Nada* as the external is transcended to go to the internal, just as the bee goes beyond the smell of honey to focus solely on drinking it. This blissful union with *Nada* involves a focused mind, a discipline. And discipline is very important in Hindu philosophy, particularly in yoga; the very word "yoga" incidentally has the same etymological roots as the English word "yoke." After the mind is disciplined so it does not flit about like a deer or a maddened elephant, it ultimately becomes one with *Nada*, being merged with it and overcome by it.

Conclusion

I have tried in the preceding section of this chapter to sketch sympathetically (and somewhat speculatively) a conception that imagines Sound as the Absolute, a conception that one might call sonic monism. But is it true, and do I buy it myself? I do not know, though I confess to having at least some doubts. Nevertheless, it is a fascinating view, one that will—and perhaps should—enthrall many to whom music and sound in general mean a lot. Indeed, I myself find the picture just sketched thrilling if not captivating. At any rate, I hope at least some readers *see some new possibilities* that draw on ancient and medieval musicological and philosophical thinking outside the West; philosophers—including non-Western philosophers such as Sarangadeva—can often see new possibilities that might initially seem weird but are later often confirmed by other disciplines such as the sciences, as shown by the recent talk of multiverses in astrophysics anticipated earlier at least to some degree by philosophers' talk of many worlds and possible worlds. If that happens, one large objective of this chapter will have been achieved.

Before taking your leave, though, it might seem that some things need to be clarified. First, it might seem that it is not clear what the difference is between Sarangadeva's theory and an imagination of what sound is. If there is no difference, then all theories of sound are ways of imagining sound and this needs to be stated. Here is my response. To begin with, Sarangadeva's theory is *more comprehensive* than the kind of imagination or conception of what sound is that you will find elsewhere. Recall Sarangadeva's distinction, discussed in the first section of this chapter, between the two forms of *Nada*, the created (*ahata*) and the uncreated (*anahata*). Other theories of sound (outside the various Eastern views discussed in the first and especially the third section of this chapter) are typically focused only on the first of these, to wit, the sounds, noises, silence, musical tones, and the like that we hear *externally* through the ears (whether these be birdcalls, the roar of a waterfall, the sound of cannon firing, or a trumpet, or a drum, or the human voice, or traffic, and so forth). Sarangadeva certainly has these in mind. But in addition, he also takes on board the second kind (*anahata*), which is not produced or struck or created and so is not heard externally through the ears but is rather the *ground* and essence of all sounds and is to be experienced mystically. Moreover, it does seem in any case that to have a theory of sound is in part at least to imagine sound as being a certain way, given the terms of that theory. So, for example, if A thinks sound is energy and B thinks sound is the manifestation of the all-pervasive snores of a giant, sleeping cosmic deity (if you will indulge me for a bit), they imagine and conceive of sound differently. Of course, to *believe* A's (or B's) theory is to do more than just imagine sound as being a certain way in the sense of entertaining the possibility or fancying or supposing[6] that sound is energy (or the manifestation of cosmic snores); it is also to believe that this possibility is real and to commit to it.

Second, it might seem that it is unclear what the link is between Sarangadeva's theory of sound and (the Western ideas of) the psychophysical illusion of sound. By way of response, I refer the reader back to the previous paragraph. Sarangadeva seems to be taking on board (Western) ideas of ordinary, manifest sounds that are created or produced or struck, whether by us or by nature. Indeed, these are all captured by the first kind of *Nada* (*ahata*) that he admits. It is not clear, though, that he would regard these as illusions of any kind, whether psychophysical or not, though he might say that there is in addition to these a *fundamental*, underlying Sound, to wit, the second and uncreated form (*anahata*) of *Nada*, that we must all be aware of and experience.

Third, it might seem that the kind of sonic monism under discussion here is essentially the same as the view of the Pythagoreans in ancient Greece. For, it might seem that in their talk of "the music of the spheres," the Pythagoreans were saying the same things as the Eastern views discussed previously. In response, I want to point to a crucial difference between the Pythagoreans and those views. The Pythagorean view is, at root, a number-monism, not a sonic monism, and a number-mysticism; numbers being for them the basis of all in the cosmos, including musical ratios, harmonies, and such. In sharp contrast, the Eastern views make no reference to numbers, and instead talk about music, sounds, and Sound. This should serve to distinguish the two views.

Fourth, it might seem that to ask, as a question about reality, what would it be if "all in the cosmos were basically Sound or Primordial Sound or *Nada* in the ultimate analysis" has the same ontological status as wondering whether the ancient Greek deities do exist. Here is my response. I take it that to ask about the Greek deities is to raise a question that is at least in part religious or theological. In contrast, to ask about whether the cosmos is Sound is to wonder about the *metaphysical* possibility of a kind of sonic monism, a kind of inquiry that can be conducted *without* religious commitment, given the kinds of issues discussed in the second section of this chapter, as careful readers will note. To this, I want to add the following. Even though I have some doubts about his philosophical views, I love Sarangadeva. Compare here briefly the case of a Western philosopher, George Berkeley (1685–1753), whom I also love even though I find his views very provocative. Berkeley is an Idealist who claims that ultimately the only things that exist are minds and ideas, all objects being merely collections or bundles of mind-dependent qualities or ideas. And he claims that to exist is to perceive or to be perceived, the essence of objects consisting in being perceived and their essence being what is perceived, in his view. As to whose mind we are talking about, and what it is that allows the table in my room to exist even when I am not perceiving or thinking of it, Berkeley makes a move that very conveniently also serves him well professionally as a bishop when he claims that it is God's mind. This makes Berkeley an Objective Idealist rather than a Subjective Idealist, who would claim that things depend only on my mind. This is not the place to take issue with Berkeley at length, but suffice to say that I could not disagree more with Berkeley, even though I absolutely love him for putting forth a very provocative view. In like manner, I am not (yet) completely persuaded by Sarangadeva but still find his sonic monism thrilling. One might even read this chapter as a sympathetic and affectionate, albeit not uncritical, tribute to Sarangadeva.

Notes

1. For my earlier forays into our topic of sound or music and imagination, see Trivedi (2006), Trivedi (2011), and especially Trivedi (2017).
2. For a different take on Sarangadeva, see Berendt (1991).
3. In my discussion of Sarangadeva's work, I will rely on the text and translation provided by Shringy and Sharma (2007).
4. One might make a distinction between two kinds of monists, global monists and local monists. Local monists might be monists in one domain, say metaphysics, but not be monists in another domain, say value, where they might be pluralists. In contrast, global monists might be monists across the board, in all domains.
5. See Oaklander (2015).
6. Entertaining a possibility without actually believing it; fancying; supposing; and so on are all different kinds of imaginings. See Walton (1990, chap. 1) and Trivedi (2017, chap. 5) for discussion of different kinds of imaginings.

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CHAPTER 2

THE SENSATION OF SOUND AND IMAGINATION IN A HISTORICAL PERSPECTIVE

SVEN HROAR KLEMPE

Introduction

When a rock musician enters with a guitar riff inspired by the groove, it has something to do with the performer's musical imagination. Likewise, when a jazz saxophonist follows up the chords played by the pianist, it demonstrates how those harmonies are envisaged and thereafter transformed into a spontaneous musical act. In the same vein, when the organ player starts with a short melodic line, or a more or less incomplete theme, and then manages to let this theme show up in different voices and in counterpoint with other voices, along with an elaboration of the whole thing by going through different transformations in terms of new keys and different versions of the theme, we are probably encountering one of those moments where the human capacity is forced to its limits. In this situation, all capacities in terms of imaginary, cognitive, sensational, and bodily efforts and exertions are mobilized. This is what the term "imagination" may embrace, as it is a broad term that may refer to "creativity," "ideas," "fantasy," "representations," and maybe much more. Thus, the term reflects exactly how composed and complex a human musical act can be, yet without specifying how these acts of musical imagination are actually to be understood.

To achieve a full understanding of this situation is quite difficult, maybe even impossible. This uncertainty counts for all types of imagination, but it is certainly true for sound and music. Imagination normally refers to something specified, whether this is a certain

concept or something we can talk about. Yet music is in fact characterized by an ephemeral, nonverbal quality that makes it difficult to transfer it into terms and topics we can talk about. As self-reported verbal statements have very much represented the data applied for understanding cognitive processing and social behavior, psychology has apparently emerged as a verbally oriented science that apparently does not take musical aspects fully into account. However, this is not exactly true, especially seen from a historical perspective. The best example is the core argument von Ehrenfels presented for the idea of the Gestalt Quality already at the beginning of the 1890s. He referred to a transposed melody, in which all the pitches—that is, elements—are replaced by other elements. The fact that we still recognize it as the same melody must depend on a certain quality that goes beyond the sum of the elements, and cannot be deduced solely from the elements as such (Ehrenfels [1932] 1988). This tells us that music is embedded with a sort of unobservable element that is highly decisive for how it is perceived and imagined. If the Gestalt Quality had not been there, the two melodies would have been imagined as completely different.

However, in order to obtain a more thorough understanding of the role of sound and music in a psychological understanding of imagination, we have to go further back in history with a closer look at the time when psychology appeared as a more or less independent discipline. This brings us back to the German enlightenment philosopher Christian Wolff, who was the first in history to publish a volume on empirical psychology in 1732. Although many would say that the term referred to something quite different from our understanding of the same term today, and it certainly did, there were in any case some foundations that were laid in the eighteenth century which have had tremendous impact on the understanding of imagination even today. And the most prominent figure in this respect is Immanuel Kant, who very much developed his critical philosophy in the wake of Wolff's *Psychologia empirica*. Thus, in this chapter the aim is to pursue this historical line, to help us discover how imagination of sound and music differs from other types of imaginations. Accordingly, the overall thesis here is that imagination, when analyzed from a perspective of sound and music, may provide an understanding that goes beyond the framework provided by language, but also that this alternative perspective is traceable as a connecting thread within the scientific history of psychology.

Sensation in Early Empirical Psychology

Historically, the psychological perspective is primarily related to sensation. This is the aspect that can be traced back to Aristotle and his thesis about the soul. Yet, through almost two thousand years many things changed. One of them was that metaphysics expanded and ended up including all types of principles that formed the basis for the

process of acquiring knowledge. The soul was still the centerpiece, however; metaphysics was in the late medieval time regarded as an overall term that united all these aspects and principles. Thus, this unification represented a great difference from Aristotle. He had made clear distinctions between the role of the soul, the first principles for scientific thinking and emotional reactions in three different theses: *De Anima*, *Metaphysics*, and *Rhetoric*, respectively. All these areas were brought together and mixed up under the label of metaphysics, allegedly because it was difficult to make clear borders between them (which is the explanation Immanuel Kant suggested [(1781) 2010]). Therefore, early psychology and a psychological understanding of sensation are hard to grasp without knowing that psychology was historically deeply entrenched in metaphysics.

Psychology as a part of metaphysics formed the background when the German enlightenment philosopher Christian Wolff published *Psychologia empirica* in 1732. Yet this was still a part of metaphysics, and it was just one volume out of six published between 1730 and 1737 (covering ontology, cosmology, psychology [empirical and rational], and natural theology [vols. 1 and 2]) which together constituted Wolff's understanding of metaphysics. Metaphysics, as such, constituted the basis for scientific knowledge, and Wolff's publication in 1732 declared empirical psychology to be an explicit part of metaphysics. This was the year when all of its parts, which included sensations, observations, emotions, and everything that can be related to subjective experiences, were explicitly embraced by metaphysics. This contradicted Aristotle tremendously, not because he had not been aware of these subjective factors, but because they were not included in how he conceptualized scientific knowledge. However, after Wolff had published this volume in 1732, the interest in sensory aspects exploded, and this is strongly traceable not only in music from that time but also in natural science, where observations and experiments became more and more accepted.

Wolff's empirical psychology introduced the area that has been labeled "faculty psychology" in textbooks (Smith 2013). Primarily, this is about the soul's different abilities, and the faculty of imagination is a part of this, in addition to the faculties of sensation, perception, invention, memory, forgetting, memorizing, cognition, attention, reflection, and so forth.

The number of faculties varied, but there was always a strong distinction between the so-called inferior and superior forms of cognition (Wolff [1732] 1738). That is to say, the inferior form refers primarily to sensation and perception, whereas the superior faculties are about all the different aspects of cognition. The distinction between the inferior and the superior reveals an evaluation that goes far back in history, where sensation was given the lowest status of the two forms. To place the emphasis on empirical psychology, therefore, represents a radical turn, as it unites these forms. This unification is done by means of the faculty of imagination, which is dependent on both sensation and cognition. Wolff, therefore, makes of imagination another dichotomy: that of the reproductive and the productive aspects of imagination; the former includes perception, whereas the latter refers to intellectual processes. This division between the reproductive and the productive aspects of imagination is crucial in Kant's understanding of imagination.

One of the students of Wolff, Alexander Baumgarten, passed his master very soon in fame. One of the reasons is that he is regarded as the founder of modern aesthetics by virtue of publishing the two volumes of *Aesthetica* in 1750 and 1758 respectively (Baumgarten 2007). He also had already published a thesis in 1735 titled *Meditationes philosophicae de nonnullis ad poema pertinentibus* (*Reflections on Poetry*) (Baumgarten 1968). Yet it is not so much referred to, compared to his *Metaphysics* published in 1739, after the model of Wolff, including ontology, cosmology, psychology (empirical and rational), and natural theology (Baumgarten 2004). This was reduced to just one volume and translated from Latin to German in the 1760s. The size and language of Baumgarten's introduction to metaphysics made it widespread and famous. These three publications, however, have to be seen in conjunction with each other, as there is one main thread that unites them and this is sensation. In his thesis from 1735, the poem was regarded as the most complete sensitive discourse (Baumgarten 1968). In the same vein, empirical psychology is the only part of metaphysics that deals with sensation and sensitivity, and the term "aesthetic" is derived from the Greek term for sensation. In other words, the aspect of sensation unites empirical psychology and modern aesthetics.

Yet Baumgarten's intention in writing the two volumes of *Aesthetica* was not primarily, if at all, to establish a new understanding of art, but rather to establish a broad foundation for scientific knowledge. In this achievement, the aspect of sensation could not be left out. To a certain extent, Aristotle had already included a similarly broad perspective as he combined imagination with sensation: "To imagine, then, will be on this supposition to opine directly, not indirectly, that which we perceive" (Aristotle 1907, 127). Moreover, "it is in the sensible forms that the intelligible forms exist" (145). However, Aristotle is not talking about scientific knowledge when he combines intellect and perception, but rather common knowledge and memories. In line with this idea, the British classicist Robert Drew Hicks uses the formulation "nothing, but what is sensible is remembered directly" (Hicks 1907, lviii), which emphasizes that this is first of all practical knowledge. However, this relationship between perception and imagination is at the core of psychology, and therefore Ernst Cassirer refers to the expression "Nothing is in the intellect, which was not first in the sense" as the "psychological axiom" (Cassirer 1968, 99).

When Baumgarten tries to develop a foundation for scientific knowledge by means of the psychological approach, he is transforming trivial knowledge into scientifically valid knowledge. This is based on the notion that it is impossible to imagine anything without combining the imagination with what has already been perceived, which highlights the superiority of experiencing things in their particularity: "What then is the abstraction, if not just a loss?" (Baumgarten 2007, 538, my translation). Consequently, imagination is a capacity, but a capacity is empty unless it is applied on real experiences. On this basis, Baumgarten launched the term "aestheticological" that refers to rationality based on sensation. For him, the best example would be a poem that, by means of the perceived words, creates a sensitivity to the meaning, which broadens the imagination of its message. Although this meaning goes beyond the lexical content of each word, it is still rational, and that is the reasoning behind the term "aestheticological."

Kant on Sensation, Imagination, and Music

Unlike Baumgarten, Kant did refer to music. Yet his references to music seem to have been more or less reluctant. In his third critique, he admits that he preferred poetry (Kant [1790] 2002). What characterizes Kant's third critique, though, is that it has to be regarded as a continuation of the project he started with—the *Critique of Pure Reason* (Kant [1781] 2010). To establish the foundation for a pure, scientific thinking implied, among other things, that it was first of all about productive and not reproductive imagination. By leaving out the reproductive aspects of imagination, he excluded also all kinds of sensation, which includes all types of empirical research. This is why in this critique he said that empirical psychology must be "banished from the sphere of metaphysics, and is indeed excluded by the very idea of that science" (Kant [1781] 2010, 472). This is a crucial statement. It attacks both Wolff and Baumgarten, who had included empirical psychology in metaphysics. Moreover, it tells us that the investigation he made in the first critique is deliberately excluding some important human factors, but also that these factors had to be followed up in later investigations.

There are two aspects that are crucial in the *Critique of Judgment*. One is that it includes sensational aspects. This comprises the aspect of feelings in terms of pleasantness und unpleasantness. The other is that Kant tries to detect how aesthetical judgments can acquire the status of being generally acceptable, in other words, being related to synthetic a priori statements. Kant's answer to the first point is that pleasure is present on two levels, first of all in reflection in itself, but also in the object's existence. The latter is a type of interest that is unavoidable. So, when Kant defines the beautiful as something that pleases "without any interest" (Kant [1790] 2002, 150), he talks first of all about an intellectual interest, that is, that the beautiful cannot be conceptualized: "That is **beautiful** which is cognized without a concept as the object of a **necessary** satisfaction" (124, bold in original). This is the answer to the other aspect, specifically that when the beautiful is released from concepts, it is to be regarded as a free play of imagination. This is regulated by judgments and reflections instead of concepts, and both make the imagination acceptable for the whole intellect. This is the formal dynamics of the whole process of acquiring knowledge, which is demonstrated through the aesthetical judgment but is exemplary for the process of cognition in general.

This follows up Baumgarten's term of the aestheticological, in the sense that Kant makes a rational connection between the inferior and the superior forms of acquiring knowledge, although he does not apply the term (Nerheim 1991). Yet this is the place where music comes in as a more or less involuntary aspect of Kant's reasoning. "One can also count as belonging to the same kind what are called in music fantasias (without a theme), indeed all music without a text" (Kant [1790] 2002, 114). Hence, music is characterized by not having any other intellectual adherence but itself, and consequently music therefore represents the "free beauty (*pulchritudo vaga*)" (114).

Yet music is at the same time an art that unites sensations with reflections in a formal way, as colors can also provide:

> If one assumes, with Euler, that the colors are vibrations (*pulsus*) of the air immediately following one another, just as tones are vibrations of the air disturbed by sound, and, what is most important, that the mind does not merely perceive, by sense, their effect on the animation of the organ, but also, through reflection, perceives the regular play of the impressions (hence the form in the combination of different representations) (about which I have very little doubt), then colors and tones would not be mere sensations, but would already be a formal determination of the unity of a manifold of them, and in that case could also be counted as beauties in themselves. (109)

This quotation from §14 in the *Critique of Judgment* tells a lot about how Kant more or less reluctantly looks at music as a kind of ideal example of the beautiful in art, but also that it represents an ideal exemplification of how knowledge is acquired formally; by uniting sensation with representations and reflections that, together, form the basis for our intellectual activity.

Kant keeps his ambivalent attitude to music during the whole investigation and also when he comes to the final comparison of the aesthetic value of the beautiful arts in §53, where he regards the art of poetry as claiming "the highest rank of all" (Kant [1790] 2002, 203). This is primarily because poetry satisfies both intellect and reason, by applying given concepts, but additionally goes beyond their limits because the imagination is set free to create a completeness that turns the concepts into a more or less inexpressible sphere. The art of music, or "Tonkunst" (Kant [1790] 1974, 185), is in second position, primarily because of its ephemeral character whereby it does not "leave behind something for reflection" (Kant [1790] 2002, 205). Nevertheless, "it moves the mind in more manifold and, though only temporarily, in deeper ways" (205). This is the affective side of music, but the point is rather that music establishes a connection between the affective aspects of being moved and the more formal aspects of thinking, which also underlines even more the inexpressible aspects of musical imagination compared with the effect of poetry. In line with this, Kant talks about music "as a language of affects" (206) that communicates "aesthetic ideas of a coherent whole of an unutterable fullness of thought, corresponding to a certain theme, which constitutes the dominant affect in the piece" (206). Thus, music activates the whole spectrum of faculties that are involved in the process of acquiring knowledge; from sensation to reason but without bringing in concepts, which rather emphasizes the form of the process, just because it is so sensory on the one hand and, on the other hand, activates a numerical exactness in terms of the harmony.

Although cognition is included because of the close relationship between music and mathematics, it leaves the listener in a certain affective state. Affect, therefore became an important term during the eighteenth century and certainly so in connection with music. This is what Kant is following up, and affects, he says "are related merely to feeling; [they are] tumultuous and unpremeditated, [and] in the case of an affect the freedom of

the mind is certainly **hampered**, in the case of passion it is removed" (Kant [1790] 2002, 154, bold in original). There are therefore distinctions between feeling, affect, and passion. Affect is a kind of state that can partly be articulated and conceptualized, as is also the case when we talk about passion. The examples Kant applies are "anger," which is an affect, whereas "hatred" is regarded as a passion. That is also why he says that affect inhibits the freedom of the mind whereas a passion removes it. Yet the more fundamental term "feeling" refers to a bodily reaction, and so is free of concepts. This term lies behind the whole thesis about judgment, and that is why he starts the whole discussion by defining feeling as one of the three faculties in the human mind: "We can trace all faculties of the human mind without exception back to these three: the **faculty of cognition**, the **feeling of pleasure and displeasure**, and the **faculty of desire**" (Kant, [1790] 2002, 11, bold in original). And he continues: "However, there is only one so-called sensation that can never become a concept of an object, and this is the feeling of pleasure and displeasure" (26). Nevertheless, feelings stand in direct connection with cognition because the relationship between representations and what is perceived is what creates feelings—a pleasure or displeasure, respectively. But

> a perception can also be immediately combined with a feeling of pleasure (or displeasure) and a satisfaction that accompanies the representation of the object and serves it instead of a predicate, and an aesthetic judgment, which is not a cognitive judgment, can thus arise. (168)

To understand the nature of feeling, therefore, is the key to understanding musical imagination. In addition to being a kind of necessary and inevitable bodily reaction in the process of perception, it may also be characterized as a "momentary *inhibition*" (Kant [1790] 2002, 111, my italics). This brings the feeling into the core of the joke and the laughter: "**Laughter is an affect resulting from the sudden transformation of a heightened expectation into nothing**" (209, bold in original). The joke, therefore, is characterized by a play that "begins with thoughts, which [...] in so far as they are to be expressed sensibly, also occupy the body," and this is comparable with music, where "the play proceeds from sensation of the body to aesthetic ideas" (209). They both connect sensation with the intellect but in the opposite order. However, the most important outcome of this analysis is how Kant is highlighting the free play of incongruity between sensation and thinking, which is in any case united through the process of integrating new representation derived from perceived objects. This is the process of apperception, which was at the core of Kant's analysis of pure reason, however the aspect of reflection "arrives at the same result that pure rational apperception achieves" (Zammito 1992, 294) in the analysis of judgment.

Kant's references to music are sincere in the sense that he obviously did not like it too much but nevertheless has to take it into account because it exemplifies so eloquently the free play of imagination by being so deeply entrenched in sensation on the one side and, on the other, so genuinely embedded with the subtlest mathematical order. This positions music as a representative of beautiful arts but, even more, as an illustration of

the sublime in art, which is about what is experienced as boundless and interminable: "We call **sublime** that which is **absolutely great**" (Kant [1790] 2002, 131, bold in original). This is first of all the achievement of uniting the asynchronous extremes in the process of imagination, which are sensation and thinking. This is the duality, or even multiplicity, which is so obvious in the joke when it "produces the successive movement of the mind in two opposite directions, which at the same time gives the body a healthy shake" (211). Although Kant is not focusing on it, this is what characterizes the imagination of music as well for various reasons. One of them is that music unites the asynchronous aspects of sensation and intellect, but another is that musical polyphony and counterpoint represent musical articulations that draw the musical attention in different directions at the same time.

Changes in Musicological Imaginations

Kant is not only a transition figure who paves the way for a modern understanding of philosophy, he is also going through some transitions himself, specifically from highlighting purity in thinking to gradually including emotional aspects. In the eighteenth century, the understanding of music developed slightly differently. The classical epoch in music history achieved a kind of clarity by highlighting homophony. Rationality was the guiding principle although music was also considered as the emotional art par excellence. In other words, affects, and the theory of affects in music, is probably the best expression for how music was imagined and understood in the eighteenth century but it had to be presented as rational. One of the most prominent scholars in musical practice at that time was the German composer Johann Mattheson (1681–1764), who published the book *Der Vollkommene Capellmeister* (*The Complete Conductor*) in 1739 (1981). This book contains all the new aspects that formed the understanding of music at that time.

One of the most important aspects was the affect, which Mattheson understood as an emotional state in terms of temperaments: "The . . . most important things that a composer and director would have to master . . . having mastery of the most refined teachings on temperaments" (Mattheson [1739] 1981, 262), and he continues, "For no one who is not acquainted with a passion as if he had experienced it himself or is experiencing it, will be skilled in exciting a similar passion in other people's feelings" (262). Although Kant meant passions more or less contradicted the beautiful, Mattheson includes them because they are so embedded with a certain emotional interest. Their specificity makes them easy to label. Yet the emotional state does not have to be that strong, but "it is absolutely necessary that he [the composer] open his mind and heart to the affection at hand and to a certain measure: otherwise he will fare badly" (262). The feelings have to be evoked by the music, and they have to be summed up in a certain affect. This affect should not only be specified but should also be just one at the time: "One may always aim at one specific passion" (311), which ensured clarity in music. Thus, it is important not only to include emotions but also to subordinate them to a certain degree to rationality as well.

One of the most pervasive changes in the understanding of music in the history of Western music has been the movement from the so-called *quadrivium* to the *trivium* (Dahlhaus 1989; Finscher 1997). Whereas music since the age of Pythagoras and Plato had been regarded as belonging to the mathematical sciences, along with arithmetic, geometry, and astronomy (*quadrivium*), it became more and more regarded as belonging to rhetoric, grammar, and dialectics (*trivium*). This gradual change was very much accomplished during the eighteenth century, and Mattheson is probably one of the most important proponents for this. He was one of the first to publish a thesis on how to write melodies (Mattheson [1737] 1976) which regarded rhetoric as the main inspiration for a composer rather than the theory of harmony:

> No one has to my knowledge, ever written purposely and expressly on melody. Everyone deals only with harmony, and even the most skilled composers are more deficient in melody than in anything else: because they always put the cart before the horse in their endeavors. ([1739] 1981, 300)

Mattheson was not alone in emphasizing this, but he opened the path to a movement that culminated in the early nineteenth century when the German musicologist Adolph Bernhard Marx developed the notion that forms in music as a subject in composition were of the same importance as the theory of harmony. This subject imported in Germany technical terms from linguistics, like "Satz," "Phrase," "Motif," "Thema," "Vortrag" ("sentence," "phrase," "motive," "theme," "the expressed lecture"), and so forth (Marx 1857). Music, therefore, was imagined as if it were a speech, yet as long as words were not included, the affective content was the only thing left, which led to the catchphrase: "Music is the language of feeling." Due to Kant's understanding of the relationship between language and feelings, the critic Eduard Hanslick (1891) regarded the expression as a contradiction in terms. Yet even Kant made a connection between them in his third critique, and this made his system quite complicated. This points directly to the core of the aspect of sensation and its relation to imagination: specifically, that we refer to a kind of complexity that reaches far beyond what language is able to express.

The Early Experimental Psychology

One of the most neglected scholars in musicology and psychology is Johann Friedrich Herbart (1776–1841). His thinking was an important precursor to experimental psychology. The key term for Herbart is "apperception." He explains the content of this term by referring to music and mathematics. The stable self can be said to contain a certain "apperceiving mass" that consists of the experiences and knowledge one has acquired so far. However, the apperceiving mass is not stable. One constantly accrues new experiences and consequently acquires new knowledge almost all the time. Thus, the process includes what Jean Piaget more than one hundred years later described as an adjustment

of the self to the other in terms of accommodation, which normally results in a fusion of old and new knowledge in terms of assimilation. This is the process Herbart called apperception, but he was interested in explaining this and did so by referring to music. The two crucial terms here are "contradistinction" ("Gegensatz") and "fusion" ("Verschmeltzung"). The point is that these terms reflect the situation our minds are in in the process of apperception when two or more representations or ideas are merged into the one united apperceiving mass. A similar process is easily seen in music as well, and Herbart refers to the octave as the best example. It consists of two clearly discernable pitches, but is at the same time perceived as if the two are one, which the term "octave-equivalence" may express. "The interval with the most complete contradistinction is the octave" (Moro 2006, 58, my translation) he says, but all chords in music consist of this combination of contradistinctions and fusion; however, the level of both aspects may vary and therefore Herbart avoids talking about "consonance" and "dissonance," but rather refers to different levels of contradiction and fusion (Moro 2006). Thus, the merging process not only depends on the pitches per se but also depends on how they are organized and related to each other. Thus, the most important contribution he came up with was that he demonstrated how music and mathematics envisaged aspects of thinking that are difficult to derive from language.

Herbart's interest in music had a great impact on the early experimentalists in psychology. This is true for Gustav Theodor Fechner, who is to be regarded as one of the pioneers. However, there is one important change in perspectives that can be traced in this transition. Whereas Herbart followed a theoretical approach in his research, Fechner was instead interested in exploring the actual relationship between sensation and representation. Thus, the early experimentalists pursued the actual content of the Wolffian *psychologia empirica*. They emphasized the aspect of perception by pursuing it from an experimental perspective. In other words, the task was to investigate how and to what extent our ideas can be said to be a result of sensation. This implied that they had to control for cognition and find a way—or rather a stimulus—that was able to reduce the cognitive activity in a way that made the sensory aspects more dominant. On this basis Fechner looked toward music and presented it as the "direct factor" (Fechner [1871] 1978, 157ff.).

Fechner could talk about music as the direct factor because music represents an extraordinary mixture of abstractness and concreteness. This makes music radically different from all other types of communication. Visual communication normally presents conceivable content, especially at that time when nonfigurative painting was almost nonexistent. Fechner focused on aesthetical communication, because it is characterized by the inclusion of emotional reactions. At that time, visual abstracts only existed in terms of geometrical figures, and Fechner discusses these but refuses them because they do not provide the same kind of emotional engagements as paintings do. Literature is connected with the same problems as paintings. Stories may definitely evoke the most intense feelings, but they appeal at the same time to a cognitive processing that includes conceptualizing and rational reasoning. Consequently, in order to deal with a kind of bottom-up perspective in the process of perception, music represents the

most interesting stimulus because it makes it possible to control for some aspects of the superior cognitive processes.

Fechner provided in many ways the basis and the direction for experimental psychology in Germany in the nineteenth century, and his contribution is closely related to German idealism. Yet, his contribution is completely different from Hegel's version, as he wanted to explore the interface between the outer and the inner world in terms of the process that changes the immediate sense-impressions into representative ideas and notions. Yet ideas and notions represent not just the immediate sense-impression but also the activity of the superior cognitive processes. In line with this, he makes the distinction between the bottom-up and the top-down perspective; he focused on the bottom-up perspective—not because he did not acknowledge the top-down perspective, but rather because the latter had been favored too much, which was an obstacle to achieving a complete understanding of the whole process. On this basis, he made some interesting experiments on the disposition of geometrical forms. These experiments are interesting also from a musicological perspective, as they investigated the preferred ratios for geometrical forms. His findings show that the simple ratios that are regarded as fundamental in musical harmony, like 1:1, 1:2, 2:3, and 3:4, do not count in the preferred geometrical forms but rather the ratios close to irrational numbers like the Golden Section (app. 34:21). In other words, the perceived preferences did not coincide with the theoretical preferences.

Consequently, the imaginative process that is based on immediate sensory impressions is guided by neither numerical inferences nor conceptual corollaries, but rather by the feelings of pleasure and displeasure. According to Fechner, these feelings form the basis for our awareness of sense impressions in general. We do not notice a sensory impression before it evokes a feeling of pleasure or displeasure. On this basis, he introduced the term "aesthetical thresholds" ("ästhetischen Schwelle"; Fechner [1871] 1978, 49), of which there are two sorts: the absolute threshold and the threshold for experienced changes. The former is about what we notice or not, and the latter is the so-called Weber–Fechner law that says that a linear and incremental increase of a stimulus' intensity will not be experienced as a gradual intensifying of it but, rather, as increases in leaps until there comes a point when there are no more experienced changes. This is why the experienced differences can be expressed in terms of a logarithmic curve; yet, to detect this process we have to make use of what Fechner called experimental aesthetics, and this requires stimuli that can serve as a "direct factor."

The Role of Sound and Music in Wundt's Laboratory

Fechner's "experimental aesthetics" had few successors apart from the most famous founder of experimental psychology, Wilhelm Wundt (1832–1920). In an article published in 1910, Wundt says something about what kind of role aesthetics and music had

in early experimental psychology. This article is primarily a presentation of all the activities in the laboratory from 1879 to the turn of the century but, when he summarizes them and the applied equipment, we get the impression that Wundt followed up Fechner's idea about experimental aesthetics and music as the direct factor. In this phase, three theses were published in experimental aesthetics, and twelve on the psychology of tones (*Tonpsychologie*) (Wundt [1910] 1983); yet a closer look on the other theses shows that musical stimuli were applied in very many of them that were published at the same time (Klempe 2011). Moreover, Wundt wrote an introduction to psychology in which the metronome represented the exemplar to understand the most basic human psychological functions, and the reason for this was that "our consciousness is rhythmically disposed" (Wundt 1912, 5) but also that we are more sensitive to auditory stimuli in the sense Herbart underlined; namely, that auditory sensation is characterized by a precision comparable with Kantian a priori knowledge. Wundt is interested in the same type of purity in sensation that is achieved by "using a tuning-fork, and a resonator tuned to its fundamental tone" (56). Consequently, Wundt equipped his psychological laboratory with an abundance of tuning forks, maybe more than 350 in all, just to explore the precision of the ear (Klempe 2011).

Thus, in experimental psychology there are three reasons to focus on sound and, more specifically, musical stimuli. One is to regard music as a "direct factor," which means that it indicates the close and uninterrupted connection between the inferior and the superior cognitive processes. The second reason is the understanding of consciousness as being rhythmically disposed, and the third is the mind's precision demonstrated in perceiving musical pitches. The unbroken line between sensation and cognition meant that Wundt ended up with a more nuanced understanding of emotions. Whereas all scholars earlier had referred to pleasure and displeasure as the fundamental dichotomy of emotions, Wundt added two more. The most important from a musical point of view is the aspect of tension and release. They are not the same as displeasure and pleasure in the sense that the tension is related to the complete span of sequences that represents just one aspect of the pleasure in music, as it cannot be completed before it ends in a final release. However, the release is not satisfactory as a release unless there have been some prior tensions. The third type of emotion, the excitation and quiescence (Wundt [1900] 1983; 1912), exemplified with high (excitation) and low pitches (quiescence), is probably not so convincing, but the aspect of strain and relaxation is followed up and developed by musicologists such as Leonard B. Meyer (1956), and Eugene Narmour in terms of "implication" and "realization" (1990, 1992).

It is important to stress that the aim of experimental psychology was to achieve a more thorough understanding of the relationship between sensation and representations (*Vorstellungen*) in terms of a bottom-up perspective, as Fechner referred to. Thus, experimental psychology did not deal with the top-down perspective and consequently did not pay very much attention to thinking and language. Since the latter can be regarded as the core of psychology, Wundt admitted in his last publication—his autobiography—that experimental psychology can only be regarded as a *supportive science* ("Hilfsmitteln"; Wundt 1920, 201), whereas folk psychology, defined in terms of "language, mythological

ideas, and laws of custom," is to be regarded as the gateway "to the understanding of all the more complicated psychical processes" (Wundt 1902, 11). However, the bridge from sensation to the more complicated psychological processes is provided by the role of *affection*, which is defined as a paramount term that includes both feelings and emotions in Judd's translation of Wundt (1902). Sensory qualities are defined as the physiological impression, which does not necessarily include the subjective investment of affections. Hence, there is a huge difference between sensory and affective qualities. In line with this, Wundt applies the term "differences" when it comes to sensory qualities and "oppositions" when he refers to affective qualities (1902, 37). The latter emphasizes that affective investment is the basis for a form of meaning-making that points very much toward the Saussurian thesis of the arbitrary sign (de Saussure 2011). This is probably not a coincidence, as de Saussure graduated in Leipzig and attended Wundt's lectures on the gesture in the 1890s (Blumenthal 1973). However, Wundt describes this aspect of oppositions as a basis for meaning-making in music: "As sensations, a high and a low tone present differences that approach more or less the maximal differences of tonal sensation; the corresponding tonal feelings are opposites" (1902, 37).

The latter has a lot to do with our understanding of imagination, which became very important in the eighteenth century's psychology that focused on human faculties. For example, the faculty to unify a term with a certain reference is interesting in itself but it is only possible because of our ability to imagine. The Latin term "imaginatio" primarily refers to a type of vision that is not exactly entrenched in reality. However, this type of vision is also the creative glue in the cognitive processes that generate notions and the understanding we may have of the world. The latter is, at the same time, our representation of the world, and the term "representation" is normally used as a translation of the German "Vorstellungen"; this, we must add, with good reason, as the term "Vorstellung" is normally applied as the German translation of the Latin term "representatio" (see, e.g., Baumgarten 2004). However, the term "representation" appears to suggest that our inner understanding almost reflects the outer material world. This understanding of the relationship between sensation and cognition is exactly what is questioned when Wundt related affects to the term "opposition." This embryonic understanding of the role of affective loading paved the way for a new explanation of the process of meaning-making. By applying the term "opposition" in terms of differences in affective loading, meaning is detached from outer references and is rather generated from the distinctions between the terms themselves. The process of meaning-making, therefore, is provided by the system itself, and this is exactly the way Jean Piaget several decades later defined structuralism: "first an ideal (perhaps a hope) of intrinsic intelligibility supported by the postulate that structures are *self-sufficient* and that, to grasp them, we do not have to make reference to all sorts of extraneous elements" (Piaget 1971, 4f., italics added). The term "structuralism" was also related to Wundt's psychology, primarily because Eduard Titchener used the term to emphasize that experimental psychology was first of all about uncovering the inner structure of the mind. However, we see that Wundt could be associated with a broader understanding of the term as well, which also includes the Saussurian thesis of the arbitrary sign, which is far from and almost in opposition to Titchener's use of the term.

Sound as Sensed Relations

Some of the most important discoveries in psychology were made during the second half of the nineteenth century. The fact that music functioned as a leading exemplar in some of these discoveries has not been fully acknowledged. One of the most obvious examples of a scholar placing music at the forefront of psychological research is Carl Stumpf. He intended to be a musician, and music became a passion for him during his whole life. This personal interest in music, however, cannot fully explain why music was regarded as important in psychology. The attention to music can rather be explained by the fact that the musical system generates stimuli that activate the process from sensation to cognition to its fullest extent. Hence Stumpf followed Fechner's understanding of music as the direct factor. However, Stumpf's contribution to psychology was not primarily his inclusion of music, but rather that he uncovered and demonstrated some basic factors in perception (which was regarded as a process that turned sensation into representation). Looking at perception as a process was deeply entrenched in the German tradition (see Wundt 1902). The most important factor is the aspect of relativity that is fundamental in the enjoyment of music but also a basic characteristic of the process of perception in general. Stumpf applies the German term "Empfindung," which, in this context, could be translated as "impression" because of its connotations to something indefinite. Both terms combine the unlimited sensory aspects with the activity of the mind.

Stumpf's focus on the aspect of relativity must be regarded as a continuation of that side of German idealism that highlighted subjectivity as an active contributor in the process of acquiring knowledge based on sensation. In line with this, Stumpf presents five tenets that are crucial when it comes to a psychological understanding of the human mind; he calls this set of tenets the *theory of relativity* (*Relativitätslehre*; Stumpf 1883). The first one says, (1) *there are no pure impressions*. Every single impression is related to another impression (Stumpf 1883, 10). This is obvious when it comes to music. The high or low pitches are relative to a certain reference point—either to tones already presented or a bodily impression of the limitations of the range of one's voice. The second says, (2) *in order to be conscious about an impression, it has to be related to another impression* (Stumpf 1883, 12). This statement is first of all related to expectations, which are based on earlier impressions. When, for example, a melody in C major ends up with an a minor chord after a G7 chord, we become aware of it by feeling a kind of deceit, which is also its name, that is, a "deceptive cadence." The third statement brings in the aspects of change and movement: it says, (3) *the content of an impression is not absolute, but depends on relationships, differences, and changes* (Stumpf 1883, 13). Again, the relationship between chords is the best example, and Stumpf refers to dissonant chords that apparently strive toward a resolution. Even at his time, in the early 1880s, he admits that it does not have to be like that; he elaborates on this in the second volume of *Tonpsychologie* (1890) where he discusses how tones merge or not. Yet the best example is an ordinary G major triad

that, in one context, can strive for a resolution (in the key of C major) but, in another, can be the resolution (in the key of G major). This also illustrates Piaget's point about a structure being self-sufficient. The triad does not mean anything by itself, but it acquires a certain meaning by being different from and standing in opposition to other chords. In other words, Stumpf also anticipates the thesis of the arbitrary sign by referring to music. Thereafter, he transforms the examples to illustrate some general principles for how the world is imagined in the human mind.

The aspect of change is followed up in the fourth statement that says, (4) *an impression is not a function of stimuli, but rather of the changes in stimuli* (Stumpf 1883, 15). The most striking example is smell, which we get used to after a while. Yet in music, the most obvious example would be dynamic expressions. The intensity of *forte* is hard to define unless it is compared to another level like *piano* or *fortissimo*. However, there are more factors that influence this, and not least the physiological conditions of the nerves. These are different depending on what kind of nerves are referred to and where they are placed on the body. To make the fourth statement general, the fifth statement take these physiological conditions into account: (5) *The quality and the intensity of an impression is not only a result of the stimulus and the location of the organ it effects, but also of previous stimuli and their effect on the same organ, and simultaneous stimuli that effect other parts of the same organ* (Stumpf 1883, 19).

One of the fundamental questions in Stumpf's research is presented in the Introduction to the first volume of *Tonpsychologie*: namely, Is the impression of a tone exclusively related to sine waves? (1883, vii). The answer to this question tells us something about how the term "Tonpsychologie" is to be understood properly. His answer is "No." A tone that is a single sine wave means that the tone is completely without overtones and dynamic changes. A tone that is a sine wave is, in other words, the tone *in abstracto* and without any type of context. The five tenets presented here all state that the impression of a tone is always dependent on its context. Even when we talk about people who have absolute pitch, their ability to grasp the pitch out of nothing, so to speak, is not very often true. Very few of them are able to pitch a sine-wave tone unless the pitch is transformed into a certain memory, which is very often related to their own instrument. A singer will tighten the muscles as if she is going to sing the tone, and a violinist will envision the proper finger grips and reproduce the same pitch as if it sounds like a violin and, through this, construe a context for the pitch. The tone in *Tonpsychologie*, in other words, is about the whole feeling of the quality of the sound (*Klanggefühl*), which turns the tone into something other than just a bare stimulus, but rather into the musical qualities of it.

As already mentioned, this is exactly the background for the term "Gestalt Quality" (Ehrenfels [1890] 1988). Stumpf is also commenting on the aspect of absolute pitch, which he says is possible to acquire by means of memorizing. He refers to Wagner's music; this is characterized by sudden changes of keys, and the melodies therefore have to be related to their keys. The point is, to memorize a single item is more difficult than when the same item is placed into a certain context, whether this context is a popular tune or one's own instrument.

Sound and Unconscious Imaginations

Quite a few discoveries were made during the 1890s in the German-speaking world, but one of the most radical was probably Sigmund Freud's disclosure of human desires and their unpredictable impact on the human mind and behavior. Freud admitted his disinterest in music, and he almost never refers to music. Some would also regard him as being in opposition to the experimental psychologists. Nevertheless, some of his contributions follow up aspects that are partly entrenched in experimental psychology, and he introduced some aspects that are quite illuminative in an understanding of musical imagination. The aspect of free associations has a prehistory in experimental psychology, and the aspect of unconsciousness is historically primarily related to music.

Although the unconscious can be traced far back in the history, it is first of all related to the European rise of self-awareness, that started in early modernity (Whyte 1962). Gottfried Wilhelm Leibniz seemingly gave the unconscious a role in his philosophical system. According to Leibniz, there is continuity from the inorganic via the organic to the highest consciousness. The human being is placed near the end of this line, but not at the end (this is God). However, what characterizes human beings and makes them different from all other creatures on earth is their ability to be aware of themselves, to perceive themselves, which Leibniz termed "apperception." Although other creatures can be more or less conscious, the lower down in the hierarchy they are placed, the more unconscious they are about themselves and their surroundings. Yet, humans are also not necessarily fully aware of all their own reactions to the environment, and one of the examples Leibniz refers to is music: "Music is a concealed arithmetic exercise the soul does not know it executes" ("Musica est exercitium arithmeticae occultum nescientis se numerare animi," from a letter Leibniz wrote to the mathematician Christian Goldbach in 1712, quoted in Dammann 1967, 79, my translation). The most important part of this, however, is that Leibniz related the state of unconsciousness to perception. Stumpf emphasizes this aspect by declaring that Leibniz applied the term "perception" as standing in opposition to "apperception" as the former refers to "the unconscious awareness" (1898, 22).

Associations, on the other hand, are normally referred to as a characteristic of British empiricism and Hume's psychologism. However, the concept of associations formed an important factor in German psychology as well but not as an argument for psychologism. Herbart, for example, followed up Kant's focus on the faculty of judgment. Yet, in contrast to Kant, who narrowed the concept of associations down to its classical laws, Herbart saw them as fundamental factors in all types of judgments and therefore defined them more broadly and as something more fundamental. A judgment is first of all about making a choice between different alternatives given simultaneously. Simultaneous givens represent also a kind of vertical dimension. Associations therefore form the vertical dimension of both reproductive (perceptual) and the productive (ideal) imaginations, and this is a point Fechner also followed up, especially their role in aesthetical experiences.

According to him, associations provide our aesthetical experiences. The colored circle that gives us the image of an orange makes us associate not only the image of the fruit but also its smell, its taste, and maybe even some pleasant or unpleasant social experiences. All these associations are triggered immediately and simultaneously when we see the colored circles that portray fruit on a platter, for example. They are not only characterized by their simultaneous presence, but the associations the images produce are also strongly private.

All these aspects of the unconscious, privacy, and free associations lead us immediately to Sigmund Freud, and more specifically, to *The Joke and Its Relation to the Unconscious* (Freud [1905] 2002). It was the psychiatrist and musicologist Daniel Sabbeth who discovered the relationship between Freud's structuring of the unconscious and how music is structured ([1979] 1990). He refers to one of the first examples of a joke presented in Freud's book, specifically to a situation from Heinrich Heine's *Reisebilder*, where the poor lottery-agent and quack-surgeon Hirsch-Hyacinth have met the wealthy Baron von Rothschild, who had treated him as his equal and "quite famillionairely" (Sabbeth [1979] 1990, 49). Freud's explanation of the linguistic blending of "familiar" and "millionaire" is that this reflects one of the most important mechanisms of the unconscious, namely *condensation*, which Freud explains as a "considerable abbreviation" ([1905] 2002, 18), but at the same time he presents this example in a diagram to emphasize the vertical dimension of the mechanism of condensation as if it forms a score:

FAMILI AR (familiarly)
MILIONAR (millionaire)
FAMILIONAR (famillionairely)
(Sabbeth [1979] 1990, 50; see also Freud [1905] 2002, 13)

According to Sabbeth, the joke's transformation techniques have two different aims: "to produce pleasure, by allowing us to recognize and rediscover the familiar in unexpected places; and to divert our attention from verbal meanings towards sound" ([1979] 1990, 51). The latter is crucial in psychoanalysis in the sense that the word representation in a psychoanalytic process is not only focusing on meaning, but even as much on the sound of the word. This is why a neurotic person, who may have had a traumatic experience with their own sexuality, is so focused on, and may even talk a lot about, sexuality and, paradoxically enough, appears as apparently quite free in verbal expressions about sexuality. However, the words applied are mostly just synonyms for the word that is connected with the origin of the neurosis. Thus, the meaning is not necessarily the most important in a psychoanalytic process but rather the actual word-sound that is loaded with the specific energy. Hence, the enjoyment of a joke for example is also related to the sound itself, as is the case in the example.

The other aim Sabbeth mentions is just as important, namely that the enjoyment is related to something familiar presented in an unexpected way. This bridges the sensory with the intellectual in the sense that the enjoyment of the sound itself provides a kind of

new understanding. The sound of the term "famillionairely" is on the one hand enjoyable in itself but also it indicates that the fences between poor and rich are almost torn down and therefore produces this meaning, which appears as rational as well. This brings the associations back to Kant again. He also made a connection between the enjoyments of music and the joke. He established a connection between them by pointing at Epicurus, "who made out all gratification as at bottom bodily sensation" (Kant [1790] 2002, 207). The process of imagination therefore presupposes the inclusion of the whole spectrum from sensation to intellect, but also that all components act simultaneously, which creates the verticality that challenges intellect and almost contradicts the sequential aspects of language. This was exactly what Freud depicted when he described the mechanism of the unconscious, however, the same verticality is present in the conscious process of imagination, which can be compared with the joke in the sense that there are transformations from sensation, via nerve impulses, to the intellect and language, and this produces not only transformations but also comparisons that the mind has to decide and assess according to different types of criteria. This is the dynamic of *imagination*, which makes it both reproductive or even recurring and productive or creative at the same time.

Although imagination is a fundamental trait with the human mind, and the combination of verticality and time reflects the core of human life, none of the human forms of expression are able to absorb this combination to its full extent. Also, music has its limitations, especially when it comes to conceptualizations that form an essential part of imagination. Nevertheless, musical polyphony is probably the type of expression that combines vertical simultaneity with the unfolding in time of its actual, sounding expression to the greatest extent. De Saussure also included the vertical dimension in language by making a distinction between the so-called syntagmatic and paradigmatic dimensions of language. The former is the sequential discourse that exists "*in preaesentia*" (de Saussure 2011, 123, italics in original), whereas the latter represents "the associative relation [that] unites terms *in absentia* in a potential mnemomic series" (123, italics in original). The latter refers to word classes but goes far beyond those in the sense that they include all types of associations a word may create. According to de Saussure, the oppositions consist of syntagmatic and associative relations; he did not use the term "paradigmatic relations." Thus, in de Saussure's terminology, the psychological aspect is taken into account but it also emphasizes the aspect of verticality. However, another important perspective he introduced on language is that the associative relation represents a *potentiality*, which exists *in absentia*. In language, there is an absolute mutual exclusion between elements in an associative relation. If one word is chosen, one cannot at the same time articulate another. They have to be taken one at the time. This makes it different from music, where the elements are not necessarily excluding each other, which can be seen clearly in a chord where the elements are united in harmony. There are restrictions in combinations due to the musical style, but as long as there are harmonies, the mutual exclusion is not absolute; this is the polyphonic aspect of music.

Since A. B. Marx and the emphasis on the theory of forms in musicology, the aspect of polyphony has not had so much focus. There is one important exception to this, which is

the musical analysis of Heinrich Schenker. The so-called Ursatz, or fundamental structure, Schenker regarded as the kernel of all pieces of Western tonal music is first of all characterized by a polyphonic texture. According to Schenker, all good music can be reduced to this kernel of a falling melodic line from the major third to the fundamental tone contrasted with a counterpoint movement in the bass from the fundamental tone to the ascending fifth and back again. All musical structures, Schenker claims, can be reduced to this Ursatz, however the Ursatz itself cannot be reduced. This tells us first of all that a polyphonic texture can never be reduced to just one melodic line. But it tells us also that music has to be envisaged as motion in time that includes the change from tension to release. The musicologist Eugene Narmour presented a critic of Schenkerism in the 1970s in which he targeted the notions that it could represent a valid formal theory and that it embodies an unbiased method in interpreting the harmonic development of an actual piece of music. However, "we keep coming back circularly looking for the meaning of some chord in the chord whose meaning we originally set out to find" (Narmour 1977, 13f.). That is one problem, but the other is that musical elements are never comparable with unambiguous, formal statements quite simply because there are many different underlying structures in music and they are all present at the same time. "My argument here, however, is not only that two "readings" of the melody … are possible or that two different hearings are equally plausible, but rather that *both* the axial and the descending linear structures are heard *simultaneously*" (Narmour 1977, 23, italics in original). The point is that musical polyphony presents so much information at the same time that ambiguity is an inevitable outcome. Thus, an almost infinite number of different chords can follow a certain chord because the same chord can be interpreted differently depending on what follows it. The alternatives are embedded in the actual sounding chord, and, therefore, ambiguity is to be regarded as a fundamental trait of the actual music.

In line with this, one may say that associations are embedded in the actual sounding music. This makes it different from language, but there are definitely overlaps between the two systems as well, and this is very much included in one of the more interesting theories in the late twentieth century, the so-called generative theory of tonal music (GTTM, Lerdahl and Jackendoff 1983). One of the most interesting aspects of this theory is the way it handles overlaps in musical phrases; that is, that the end of a musical phrase at the same time forms the beginning of the next phrase. According to this theory, the overlaps refer to a substructure in which the first phrase is completed before the next phrase begins. This is due to a linguistic understanding of a well-formed phrase, which must be completed before the next begins to get a rational meaning out of the two phrases. This is the same as with words, and that is why "famillionairely" appears as a kind of irrational term. Yet this term is in any case understandable, not only because we know the substructure from which it is derived but also because the construed neologism "famillionairely" expands the associations compared with what the two underlying terms are able to produce when they are articulated separately. So, when a musical phrase consists of several overlaps, like the two parts of the recurring theme in Maurice Ravel's *Bolero*, for example, it generates an aspect of verticality

in the melodic line that constitutes the meaning of the theme. It could have been divided into separate, two-measures phrases, but the drive and meaning would then completely fall apart.

Musical imagination therefore must be understood from two different perspectives: the sequential and the vertical. However, this two-dimensional understanding of imagination is not unique for music, as the relations in language have to be understood not only from a syntagmatic perspective but also from an associative perspective. The difference between music and language, however, is that, in the former, the associative relations can be articulated due to the musical style whereas in language, the associative or paradigmatic dimension exists only in absentia, as de Saussure formulated it. The sensation of sound therefore demonstrates how concealed processes of thinking and imagination can be mirrored and articulated in an actual system of expression.

Conclusions

We can conclude that the historical evolution of empirical psychology from the age of the enlightenment until today gives the sensation of sound a peculiar role in the understanding of human imagination. This is true both in the way sensation is emphasized by sound, but also how it envisages in different ways how the nature of imagination breaks the limitations delineated by language. The rational use of language strives for clarity and simplicity, whereas the sensory process is characterized by complexity. In this perspective, the texture of polyphonic music might represent a model for how imagination can be conceptualized. A sound is a kind of undifferentiated signal having embedded within an undefined potential. Thus, the sensory awareness of appearances is, at the same time, the encounter between the one and the other that is at the core of perception. "Perception," therefore, is not just a synonym for sensation but, rather, a term that also comprises higher cognitive functions. The English term "imagination" may count as a bridge in the sense that it reflects the complexity of higher cognitive functions and is therefore hard to specify. Kant tried to specify these functions by making distinctions between reproductive and productive imagination, and, in his first critique, he solely focused on the latter in terms of pure reason and the intellect. He discovered very soon, however, that this model was not satisfactory as it excluded feelings and affects. So instead, he investigated the power of judgment ([1790] 2002) that also included bodily reactions in the process of perception.

Kant reluctantly accepted the sound of music as a unique source for the understanding of the process of acquiring knowledge. Yet the German pioneers in the nineteenth century's psychology followed this up by underlining music as: (1) reflecting the process of merging different ideas into a whole (Herbart); (2) being a stimulus that acts as a control for too much involvement of the higher cognitive functions (Fechner); (3) a self-sufficient system constituted by oppositions in the affective loading of its elements (Wundt); and (4) an exemplary proof of the aspect of relativity in all types of perception (Stumpf).

All these four aspects point toward the vertical dimension in music that makes it different from language. For the empirical psychologists, it was important to emphasize this difference. With the entrance of the theories of forms in musicology at the beginning of the nineteenth century, we see that musicology and empirical psychology tended to go in opposite directions. However, this is not true if we look at musical practice in the same century. The compositions rather tended to subvert the clear forms, especially those of Richard Wagner, who created a continuous flow within his operas by avoiding double bars and complete cadences. Polyphonic structure has always been important in music, not least when we look at music from different cultures, and that is probably why we can trace a direct link in ethnomusicology back to Stumpf via his assistant E. M von Hornbostel. Yet, the polyphonic structure in music is primarily an expression of the dynamic forces of concurrence and simultaneity that are at the core of real life as well. Thus, as long as music mirrors these aspects of life, it can serve as a model for the interaction between sensation and imagination.

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CHAPTER 3

IMAGINING THE SOUNDS THEMSELVES

MALCOLM RIDDOCH

Introduction

> Only one who already understands can listen.
>
> —Martin Heidegger, *Sein und Zeit*[1]

From one's cognitive imagination to the sensory imagination and on to the sounds we hear in the world, what might it mean to imagine the sounds themselves? Which is to ask, what is the relation between works of the human imagination and the sounds themselves? Here, we make a basic distinction between the sensory or perceptual imagination (hearing a sound) and the cognitive imagination (thinking about or reflecting on that and other sounds).[2] Given this distinction, one can certainly think about sound, recalling sounds that have been heard at some place and time, and wondering about those sounds yet to come. These sonic works of human imagination can be found in flights of fantasy and daydream; or in response to hearing everyday sounds such as the urgent car horn and identifying a friend's voice in a crowd; or in the thoughtful work involved in reflecting on the sequencing of sounds for a musical composition, and in the careful production of those sounds for performance and in the studio. One's cognitive imagination is also engaged by literary, scientific, and philosophical works concerning sound, such as the imagination involved in engaging with this text itself. In broad terms, what we are dealing with here is the auditory imaginary, the realm of the possibility and actuality of the human experience of sound. In terms of one's own cognitive imagination then, one might think about sounds in general or in the specific, and perhaps even commit that thought to paper and/or pixel. This work of the cognitive imagination can be conceptual, or contemplative, or practical and, as auditory imagination, it retains a meaningful relation to the sounds one hears in the world one lives in.

One can also of course imagine the sounds themselves and actually hear them in one's "inner" auditory perception. In terms of the sensory imagination, one might hear sounds either in memory or in make-believe, in hallucinations or in dreams. These imagined sounds might reproduce sounds we hear in the everyday world or may sound strangely novel to our mind's ear. Yet, while the auditory imagination can produce a perception of sound without any direct acoustic stimulation, the imagined sounds are still experienced as sound, as something heard, and thus have a direct relation to one's "external" world and its acoustically generated sounds. Even the fantastic sounds encountered in dreams and hallucinations are precisely strange only in relation to that which is always already familiar and mundane, which is the world of our everyday sonic experience, the world of the sounds themselves. It would appear then, that in order to explicate this relation between one's imagination and its sounds, one would need a working definition of what constitutes the "sounds themselves" that are to be imagined in the first place.

Defining the Sounds Themselves

Historically speaking, the term "the sounds themselves" belongs primarily to the milieu of twentieth-century avant-garde Western art music that saw its conceptual heyday in the mid-century tape and transistor music revolutions. The advent of these new music technologies after World War II allowed for the direct manipulation and creation of any musical sound based on control voltage synthesis and/or the electroacoustic manipulation of recorded audio including environmental field recordings. Following alongside and often heralding the development of this modern electronic form of composition, composers from Busoni to Varèse and on to Feldman, Schaeffer, Cage, Eimert, and Stockhausen, to name but a few notables, shifted their attention away from traditional Western modes of music composition toward dealing with the concrete, empirical phenomenon of sound itself. Through this technological music revolution, avant-garde composition and its musical imaginary moved beyond the constraints of traditional notation, acoustic timbre, and Occidental tempered scale and metric rhythms, to directly organizing the temporal and harmonic structure, and timbral possibilities of the electroacoustic sounds themselves.

This immediacy of the modernist composer's relation to the concrete materiality of sound was interpreted in different senses by different composers, such as in Pierre Schaeffer's phenomenological notion of the "sonorous object." His acousmatic practice involved a form of deep or "pure" listening following a Pythagorean model, bracketing out interpretations of the heard sound based on cultural conditioning and environmental causes, and thus focusing in on the phenomenal sensory experience itself.[3] This focus on the immediacy of the experience of the sounds themselves is also arguably to be found in Morton Feldman's desire to compose sounds "more direct, more immediate, more physical than anything that existed heretofore";[4] as well as Cage's focus on the worldly experience of silence, for which "THERE IS NO SUCH THING AS SILENCE"

(Cage 2011, 249). Given that all musicians are trained and experienced listeners, one might argue that what binds these disparate musical imaginaries together is a phenomenological shift away from traditional conceptual notions of musicality and toward focusing on the concrete and immediate experience and manipulation of actual sounds as they are heard in the world. This shift is made explicit in Pierre Schaeffer's work, where his early intuitive sonic arts practice was later interpreted in phenomenological terms: "For years, we often did phenomenology without knowing it, which is much better than talking about phenomenology without practicing it" (Schaeffer 1966, 262).

The sounds themselves are thus here defined as the auditory phenomena of one's own conscious experience, where phenomenal sounds are what one hears in the first instance, that is, perceived sound as such in the world one lives in. By "conscious experience" I mean here not merely self-consciousness or self-reflection but rather the direct, personal quality of one's own subjective experience of sounds as heard in the phenomenal world.[5] In terms of the introductory question regarding the relation of one's cognitive and sensory imagination to the sounds themselves, one might ask what then constitutes this conscious experience of the sounds themselves such that those sounds can be imagined? What is the basis of phenomenal sound?

On the Physicality of Sound

From acoustic waves to the tympanum, the ossicles to the cochlea and its basilar membrane, and on to the hair cells and their excitation of the auditory cortex: the physicality of sound here concerns the physical phenomena associated with the conscious experience of hearing the sounds themselves.

Cochlear Sounds

What then is perceived sound itself in the first instance such that it can be imagined? From a physical perspective, the question concerning the sounds themselves asks about the physical processes that are associated with the perception of sound, for which we have a reasonably thorough psychophysiological understanding. The sounds themselves are first encountered in a three-dimensional acoustic space, with the phenomenon of sound generally being associated with the external acoustic stimulation of the body's sensory organs via the kinetic propagation of acoustic energy in sound waves through air. Of course, however, one does not directly hear the acoustic compression and rarefaction of air molecules, as these compression waves need to first travel through space in order to then impact on one's sense organs of hearing. Thus, the acoustic energy propagating spatially in three dimensions through air and other media is reflected via the pinnae into the ear canal, absorbed by the tympanic membrane that articulates the auditory ossicles that pass that kinetic energy on to the coiled, fluid-filled bag of the

cochlea, its tapered basilar membrane, and connected hair cells. This biomechanically derived cochlear vibration is the primary means by way of which external acoustic energy impacts on our sense of hearing, although it is not the only access this external physical world has to stimulate our "inner" sense perception of sound.

Now, if I may digress for a moment, I should like to deal with the notions of internality and externality introduced so far inasmuch as these can lead to a degree of ambiguity when talking about the perception of sound in its phenomenal and physical senses. In the already described sense of the external world's impact on one's "inner" sense perception, there is a physical world of acoustic energy that is obviously external to the inner workings of the physical organism's ear. That is, in this physically empirical sense, there are internal physiological mechanisms as opposed to external acoustic stimulations.

This empirically physical notion should be carefully distinguished from notions concerning the phenomenal internality of one's conscious auditory experiences. From the first-person perspective, phenomenal "internality" can refer to one's own private cognitive or sensory imagination as opposed to the other phenomenal sounds one hears in the external or public world. However, from an objective, third-person perspective, the "inner" is also commonly used to refer to the entirety of the "internal" subjective experience of sound and other perceptions; that is, to the entire phenomenal world of one's own conscious sensory experience. Subjectively phenomenal "internality" is here opposed to the objectivity of the external physical world that apparently supports it.

Interpretive confusions can arise when the distinction between the physical and the phenomenal, and between the objective and the phenomenological, are ignored and the different senses of the terms become conflated. I will attempt to navigate these empirical, phenomenal, and objective internal/external perspectives as they arise, or at very least use scare quotes as needed, for the reader should be forewarned that there is a fair degree of ambiguity in the literature concerning not merely the usage but also the underlying philosophical assumptions belonging to each.

Somatic Sounds

Now, concerning the various other ways the "external" physical world can stimulate our "inner" sense perception of sound, a related and somewhat problematic form of hearing is that of infrasonic or very low frequency sound waves that can be felt via the body as much as heard via the ear. This is problematic in the sense that the bodily perception of very low frequency sound may or may not itself be considered a form of hearing. At infrasonic frequencies, around 16–18 Hz or lower depending on the subject, cochlear audition fails to detect tonal information at all and sensitivity to the vibration falls away the lower the frequency. This is simply a physical limitation of the biomechanics of the middle and inner ear at very low frequencies (cf., Watanabe and Møller 1990). Amplitude thresholds for perception vary depending on age and other physiological factors, but there is a crossover in perception between the auditory pathways of the cochlea and the bodily sensation of such low frequency sound. Various studies have pointed to the Merkel cell, Meissner's corpuscles, and Pancinian corpuscles in the

body's largest organ, the skin, as possible somatosensory receptors for low frequency sonic vibrations (Leventhall 2003, 22).

Alongside these skin receptors, the chest cavity can resonate from around 50 Hz and lower, depending on one's physical build, and thus it also plays a role in the low frequency, noncochlear perception of sound (cf., Takahashi and Maeda 2003). These low frequency effects are commonplace in loud, amplified music venues and are especially emphasized in contemporary electronic dance music genres such as techno or drum and bass, as well as in various forms of experimental music, sound art, and so on.[6] One has to feel the bass, and it is an embodied, somatic, and synesthetic auditory experience. Such effects can also be felt in the ultra low frequency vibrations that herald an earthquake, or in the near imperceptible rumble of machinery that can cause various public health and safety problems for those afflicted with a heightened attention to infrasonic frequencies. In this public health context, the term "cognitive itch" is related to brain plasticity, wherein continued attention to an annoying low frequency sound can have the effect of training the auditory pathways to become even more sensitive to that frequency and thus increasing the perceived loudness.[7]

However, the relation between the bodily reception of sound waves and the auditory perception of the sound is not clear. There is a gray area where the sensitivity crosses over to bodily reception of the sound without cochlear input, and whether or not one considers this a form of noncochlear, somatic hearing is an interesting question. While participating in a group soundwalk through the port of Lyttelton in New Zealand on February 14, 2016, I was focusing in on a deep listening experience of the low frequency port sounds when the Valentine's Day earthquake occurred, registering 5.7 on the Richter scale. From this quite amazing sonic experience I can honestly report that there does seem to be a remarkable crossmodal crossover in the sensory experience of infrasonic phenomena and low frequency sound; it is as if the entire body hears/feels. As the renowned experimental sonic artist and Christchurch, New Zealand, resident Bruce Russell stated, with regard to his experience of the 2010–2013 Canterbury earthquakes, "We got quite acquainted with the sound of earthquakes. I don't know if I felt or heard some earthquakes first, as there's a point with subsonic activity when hearing and feeling are the same thing; it's like your whole body is an ear."[8]

Furthermore, the percussionist Evelyn Glennie, although profoundly deaf from a young age, describes hearing/feeling sounds with her body and makes the point that hearing is merely a specialized form of touch. It may be that her early percussion training as a child through the gradual onset of her cochlear deficit synesthetically blurred the distinction between audition and touch. Whatever the case may be, her finely nuanced and bodily enhanced perception of sound as evidenced in numerous compositions over a long career challenges our concept of what "hearing" means.[9]

Crossmodal Sounds

Another example of the phenomenon of hearing deals with clinical synesthesia and the crossmodal perception of one sense via the stimulation of other senses. While a generally

rare condition, most commonly synesthesia presents itself in the form of black printed characters appearing colored, while there is another form of synesthesia for which sound is heard as color.[10] The mechanism for this effect appears to be some form of crossmodal stimulation in the brain between auditory and other neural pathways.[11] Aside from the somewhat rare phenomenon of auditory synesthesia, crossmodal associations in general highlight a rather interesting characteristic of our sense perception—namely, that all perception is an interconnected multisensory phenomenon.

"Oenosthetic"[12] or crossmodal perceptual associations between sound and the taste of wine, for example, have been investigated and put to use in multisensory art installation and performance. Musical listening is here a multisensory activity engaging all the senses, where auditory perception is not solely the product of the acoustic stimulation of our cochlear or somatic organs of hearing, as the perception of sound is also influenced by—and influences—other sensory inputs and their associated perceptions.[13] Which is to say, the sounds themselves are merely one interconnected part of the whole ongoing, integrated multisensory experience of the phenomenal world we live in.

Neurological Sounds

These various auditory pathways, from acoustic space to cochlear, somatic, and crossmodal sensory stimulations, do not as yet result in the conscious experience of the sounds themselves. One does not directly hear the articulation of one's own ossicles, or the compression of one's own Merkel cells, as these kinetic energies must first be transduced into electrochemical stimulations for there to be anything like what it is to hear a sound. For the primary sensory pathway, one's ear, stimulation of the cochlear structures produces an electrochemical propagation of binary signals triggered by the hair cell excitation of the auditory nerve through to the brain stem's cochlear nucleus, the medulla, inferior colliculus, auditory thalamus, and on to the auditory cortex, or what is termed the ascending auditory pathway within the brain. There are also feedback mechanisms built-in via descending auditory pathways whereby cortical stimulations can modify lower level processes.[14] Audition being a whole brain phenomenon, these acoustic vibrations, along with low frequency somatosensory vibrations, synesthetic and other crossmodal sensory inputs, the auditory imagination, and even the direct cortical stimulation[15] of auditory nerve cells, all produce highly complex neuronal excitations within the brain's auditory pathways that are very directly, positively correlated to the conscious sensory experience of actual sounds.

While the neuronal chemistry is relatively simple, basically consisting of sodium potassium ion exchanges triggered by and triggering synaptic neurotransmitters, the physical complexity of the whole brain's neuronal network is truly gigantic, as each neuron averages around 1,000 synaptic connections firing off an electrochemical impulse 40–1,000 times per second. The axons themselves are very dynamic and can grow new connections or wither away depending on the signals they receive in a neurological network of around 80,000,000,000 neurons, making the human brain and

its information-processing capacity one of the most complex physical structures known to science. If the physicality of the sounds themselves is to be found anywhere it will be here in the brain's gigantically complex and dynamic neuronal network.

We also know that the auditory pathways in the human brain are especially adapted to organized sounds, exhibiting pattern sensitivity to different melodic and rhythmic sequences, and sensitive tuning to different discrete pitches (Weinberger 2004, 88–91). This sensitivity is exhibited even in newborns, whose cross-cultural preference for consonance would indicate that an entrainment to organized sound is an evolutionary adaptation in the human species.[16] Furthermore, the brain exhibits plasticity in frequency and pattern discrimination such that aural training can improve sensitivity to the trained frequencies and produce measurable cortical changes in the brain (cf., Pantev et al. 1998). Not only are we born with a developed auditory cortex but also the whole brain continues to adapt to our evolving soundscapes throughout life.

On the Physicality of the Sounds Themselves

It would seem then, at least from a physical perspective, that we have a preliminary definition of what constitutes the sounds themselves in terms of the neural correlates of auditory sense perception.[17] In the case of acoustically derived sounds, the perceived sound is correlated with the kinetic energy vibrations within the cochlea or skin that produce electrochemical signals in the auditory cortex and on to the whole brain. Likewise, for imagined and synesthetic sounds, the heard phenomenon is presumably correlated with neuronal excitation without cochlear or somatic stimulation, for how might one hear anything imaginary or otherwise without a brain? However, just precisely what this "correlation" is, between the conscious experience of hearing sounds and the evolved, biological sensory mechanisms of our auditory perception, remains somewhat ambiguous.

Given this ambiguous correlation one might be tempted to simply conclude that all phenomenal sound is merely a subjective, psychological effect directly caused by neuronal excitation. The precise character of this presumed physical causality and its psychological "effects" remains ambiguous however, and any attempt to define this ambiguous relation must first overcome the philosophical naiveté inherent to such seemingly logical conclusions. The recursive notion of a "Cartesian Theater" situated somewhere in the brain from which one somehow hears and views the phenomenal world, like a "movie playing in your head," is one such stubbornly naive idea, an idea that nonetheless remains implicit in many causally reductive explanations of the physical provenance of conscious experience.[18] Nevertheless, given this causal ambiguity, and following on from the above definition of the physical basis of sound, one might still reasonably state that the sounds themselves disclosed in the conscious experience of one's own auditory perception, whether imaginary or otherwise, are always correlated with the physical excitation of the auditory cortex in one's own brain. That is, the physical basis of the sounds themselves is reflected in the neural correlates of our conscious

auditory experience. What precisely then is this relation between the sounds themselves and their neural correlates?

On the Nonphysicality of the Sounds Themselves

If the neural correlates of the consciousness of sound constitute the physicality of sound at the end of the causal chain of physical cause and effect, from acoustic space to the brain's neuronal network, then where does that leave our auditory consciousness? And, if neural mechanisms ultimately define what is the physical in sound, then does that mean that the phenomenal experience of sound is in some sense nonphysical, at least from a scientifically objective perspective? Here, the notion of physical sound is contrasted with that of the nonphysical and subjectively phenomenal character of sound as something that one hears in the world.

Meaningful Sounds

With regard to the sounds of one's sensory imagination, as in the remembrance of past events and their signatory sounds; auditory dreams or hallucinations (including hypnagogic and hypnopompic experiences); the recollection of a melody, or for musicians the precise recall of a performative work of music; or for composers the contemplation of a new work and its possible auditory aesthetic: all these works of the imagination can involve the perception of sound and the excitation of the auditory cortex without sensory inputs from the physically external world and its acoustic waves. In this simple, nonacoustic sense, imaginary sound is thus a form of nonphysical sound, although this is to say no more than that the sounds of one's private imagination are not directly produced by that external physical world. Imaginary sounds of course retain a relation to the neural correlates of that imaginary auditory consciousness.

Yet, while the inner world of one's own imagination is replete with auditory perceptions that have no direct cochlear or somatic input, it remains that the sounds of our imagination are still largely derived from those of the acoustically external world we live in. Even the fantastic sounds heard in hallucinations and dreams with seemingly no worldly counterpart are meaningful precisely by being other than the worldly sounds we hear. That is, they derive their unique strangeness only in contrast to and in the meaningful context of one's own conscious experience of sounds in the world one lives in. Imaginary sounds thus also have a nonphysical relation to the external or public sounds themselves in that the former are meaningful or meaningless only in the context of the familiar, everyday experience of hearing sounds in the world. In this way, one's own inner auditory imagination is bound to the public, worldly experience of sound by

the nonphysical meaningfulness of the conscious experience of those internal/private and external/public sounds.

Along with the nonphysical meaningfulness of these imagined and worldly sounds, both these forms of hearing also of course belong to one's own conscious auditory experience and they are thus in the psychologically subjective sense also nonphysical, auditory phenomena. Here we have a second form of the nonphysicality of the meaningful sounds themselves, that of one's own subjectively "inner" auditory perception of phenomenal sound. Now what may seem rather strangely unintuitive to the sonic artist here is that science generally conceives all mental states, including the entirety of one's own subjective, conscious experience of sound, as nonphysical phenomena. For there is no way for a scientist to objectively observe and measure someone else's conscious perception of sound, as all they can do is measure the physical correlates of that consciousness, such as for example the verbal reports, and behavioral and neurological responses of experimental subjects to controlled, acoustic stimuli. For the sonic artist however, the worldly immediacy of that phenomenal auditory experience is precisely the most physically concrete medium of their discipline, like the plasticity of clay for the sculptor or colorations of pigment for the painter. Again, here we are confronted by two differing perspectives, one being the third-person objectivity of science and the other a more phenomenologically oriented, first-person perspective more or less common to the arts. Both of these perspectives, however, can be said to be empirical, as both forms of knowledge are grounded in, and arise from, a conscious experience of the world we live in.

Nevertheless, the scientifically nonphysical or phenomenal sounds themselves remain correlated with and presumably produced by, in some yet to be explicated physical sense, the neuronal excitation of one's auditory cortex. The nature of this relation between the nonphysical sounds themselves—as in the perceived sounds we hear in the world and in our sensory imagination—and our physical, auditory brain functions is an interesting conundrum. Where does the sound, whether acoustically derived or imaginary, actually occur? Is the conscious experience of sound fundamentally a physical phenomenon occurring "in" the brain, in the dynamic cascade of electrochemical impulses that never ceases until death? Or do the sounds themselves first occur "in the world" of one's own conscious experience, in a nonphysical sense yet to be fully explicated? And what is the logical difference between these two propositions?

Worldly Sounds

An interesting example of this physical/phenomenal ambiguity and an extrapolation of this notion of the nonphysical, subjectively meaningful provenance of sound, can be found in John Cage's composition 4′33″. In the performance of this work the sounds themselves are called to presence simply by their absence. In place of the music, one's musical imagination is challenged by a musical void, by a silence that is filled with worldly sounds, and by a musical relation that reveals itself as a tension between

audience and performers and the mutual acoustic space they occupy. The composition is conceptually nonphysical due to the absence of any organized sounds, and yet the silence is not silent; one still hears. More to the point, one *hearkens!* Attention is given to both the absence of the work and the loudness of the silence that fills the musical void. Beyond this apparent silence of the work, one's attention is drawn to the musical relations at play in a traditional performative context between audience and performers on stage. The sonic artwork here directs one's attention to the wider phenomenal world within which one hearkens to the meaningful sounds themselves. From the meaningfulness of the sounds themselves one is thus led toward the worldliness of sound, that is, toward the embodied, conscious experience of sound as it occurs in the world one lives in.

Here, perhaps, we have come to a possible definition of nonphysical sound, via the cognitive imagination, in terms of the intentionality or directedness of worldly sounds. That is, the sounds themselves—whether associated with cochlear vibrations, with crossmodal synesthesia, with somatic stimulations, or with the sensory imagination—generally direct our attention to something other than merely the sound itself. Sound art, such as Cage's work, is especially adept at this form of sonic manipulation of the cognitive and sensory imagination and its relation to the phenomenal world, and it has long been a creative research interest of mine that perhaps it is from sound art that a nonphysical notion of sound might best be demonstrated. The problem to be demonstrated here, however, via this textual interpretation, is that phenomenal sounds are not merely a sequence of individual sense perceptions, or merely a dynamic network of meaningful symbols or signs, but rather they only occur within, and also articulate the meaningfulness of, the phenomenal world we live in. The sounds themselves are meaningful, worldly phenomena. Our question here now becomes: what is the relation between the worldly meaningfulness of the nonphysical sounds themselves and the neurological basis of the physical concept of sound?

One possible (and rather stubborn) answer to the above question might be to postulate an auditory chain of physical events ending in the electrochemical stimulation of neurons in the brain that then cause the perception of a sound to arise. This perceived sound is in turn identified in terms of other sounds with various aspects of what we cognize as the world we live in. In short, we hear because we have the physiological and cognitive structures that allow us to piece together the flux of auditory perceptions that constitutes our everyday world. But what is it that we actually hear first and foremost? Is it acoustic vibrations and neurological processes producing raw noises and tone complexes that are then processed as this or that sound? Or is it the meaningful sounds themselves as they arise and fall in the world we live in? Does one hear the familiar melody first or a pattern sequence of tones that are identified after the fact as this or that popular tune?

These two perspectives, the objective and the phenomenal, or the third person and the first, would seem here to be at odds with one another in terms of the causality of the worldly meaningfulness of sound. For, from the phenomenologically empirical perspective of one's own conscious auditory experience, what one first hears is the melody

as it flows and never a series of tones, noises, and abstract timbres.[19] One hears Wagner's symphonic crescendo, the wind in the trees, the car in the street and the voice of a dear friend.[20] Sounds, whether associated with acoustic vibrations or the sensory imagination, are always in the first instance meaningful, worldly sounds. From a phenomenological perspective, this worldly relation is a fundamental characteristic of sound as something that is heard. Even so-called noise music is meaningful precisely as noise music, as an attempt to negate or transcend the timbral, harmonic, and rhythmic limitations of the Occidental tempered scale and metric rhythm tradition from which the genre has largely derived its reversed, mirror image. Which is to say, the concept of noise in music is defined by the world in which it is perceived as noise. Likewise, if one awakes suddenly at night on hearing an inexplicable sound, its inexplicability is meaningful only in the context of everything that is already explicable, that is, in contrast to the familiar sounds of our everyday world.

Furthermore, this form of meaningful hearing is not random as it occurs in the context of a life that is lived by oneself. Hearing in this sense is even further removed from any psychological notion of piecing together random noises, for all active hearing is a form of hearkening, that is, a form of directed auditory attention and understanding. One does not merely hear the sounds themselves: if one listens, one hearkens to them. This is especially so in the case of musical perception, where the sounds themselves are lifted up from the background noise and brought to presence as the musical work—unless of course one is bored with the music, in which case attention may lapse and one hearkens to the sound of another drum, perhaps one's own thoughts or perhaps the hum of the stage lights and so on.

But where has this sonic argument taken us? From the nonacoustic auditory imagination, to the auditory perception of both "inner" imagined and real "external" sounds, and on to the meaningfulness of those sounds in the context of hearkening to the worldly sounds themselves. From the perceived sounds of one's own conscious experience—conceived as the nonphysical, psychological effects of the physicality of sound in terms of cochlear, somatic, and crossmodal stimulations and their neurological propagations—to sounds of the imagination with no immediate acoustic input, then to sound in terms of artistic conceptuality, and on to sounds as first and foremost meaningful, worldly phenomena. If the phenomenology of sound art points us in the direction of the world within which we hear and hearken then is this merely an artistic contrivance or does the world that sound art discloses bring us to a far more fundamental phenomenon in terms of the nonphysicality of the sounds themselves? The function of art, in this sense, is not to be mere entertainment or craft, but rather one for which it can open up an originary relation to the phenomena themselves, where the artwork thus "opens up a world" (Heidegger 1993, 169).

The fact that the sounds we hearken to are already meaningful would indicate that the conceptual in sound is not merely an afterthought, an artistic contrivance of the cognitive imaginary, or a subjective, psychological construction. The meaningfulness of what we hear is a fundamental aspect of the sounds themselves as we encounter them in the first instance. The nonphysical conceptuality of perceived sound in this

everyday sense is thus both an abstract and yet also a most concrete phenomenon associated with hearing sounds in our world.

Scientific Limits of Sound

Yet what is the relation of the actual sounds, imagined or otherwise, of our conscious auditory experience to the psychophysiological processes associated with those everyday auditory perceptions? Which is to restate our question concerning the physical notion of sound: where is the sound in an acoustic vibration, its sensory reception, and subsequent neurological effects? In a colloquial sense, one might still insist that self-evidently sound is perceived "in" the brain or "in" the mind and leave it at that. However, a practitioner in sound for whom the sounds themselves are the very medium of their craft may not be satisfied with such an easy answer. Of course, there are no worldly sounds "in" a brain for the brain is quite simply a biological network of neurons floating in cerebrospinal fluid in a skull. Here, what is termed the "mereological fallacy" concerns a conflation of psychological and/or phenomenological states with physical brain processes, a conflation that is a reflection of the general confusion found in both reductive materialist and dualist notions of the mind and its relation to the body.[21] Which is to say that what is demonstrably "in a brain" is an exceedingly complex pattern of neurochemical reactions, and no one has as yet uncovered where the associated conscious experience might occur in any fundamentally physical sense whatsoever.

Also, at least from a phenomenological perspective, there are no sounds "in" a mind, for the mind or ego is itself not a thing, or a receptacle, but rather is an ongoing process of perception and reflection forming the conscious experience of one's own being in this world. Which is to say, sounds are heard not "in the mind" but in the world we already live in and understand in one sense or another—sounds occur in the phenomenal world disclosed in and for one's own conscious experience of that world.

Furthermore, the sciences (neurobiology, physics, chemistry, and so on) still have as yet been incapable of demonstrating any causal mechanism linking our neurological processes, auditory or otherwise, with the apparently subjective effect—the phenomenal world of our conscious experience and its perceptual phenomena. There are of course concrete associations between our physiological organism and the sounds themselves, as evidenced in the medical and biological sciences, but there is no objectively verifiable mechanism to explain how electrochemical patterns in the brain actually become something heard. As the philosopher David Chalmers asks in his influential question concerning the "easy and hard problems" of consciousness, "how does the brain process environmental stimulation? how does it integrate information? how do we produce reports on internal states? These are important questions, but to answer them is not to solve the hard problem: why is all this processing accompanied by an experienced inner life?" (1996, ix). Interestingly, the hard problem remains here, for Chalmers, one concerning the objective or third-person relation between an "inner" subjective sensibility and its presumably "external" physical world, rather than a phenomenological

or first-person relation between the "external" phenomenal world and its observed physical phenomena.[22]

Nevertheless, there remains a stubborn "explanatory gap"[23] regarding this relation between our physical bodies and phenomenal experiences. At this point, one might want to still insist that the electrochemical processes in the brain are precisely the experienced sounds, imaginary or otherwise, for the mind experiencing them. However, I would rather say that, strictly speaking, the electrochemical processes are, in the objective sense, electrochemical processes, and that the experienced sounds are, in the subjective or phenomenal sense, the experienced sounds. Furthermore, it would seem to be the current state of affairs in philosophy and science that all we can say about the relation between these two sets of phenomena is that all available empirical evidence shows simply that they are, as one might expect, very strongly, positively correlated.

The physical sciences by definition deal with objectively verifiable, physical phenomena and the mathematically calculable data associated with these. Other phenomena such as the everyday world of our conscious experience and its ongoing flux of auditory perceptions are by definition "subjective" and not directly amenable to objectively verifiable empirical analysis. From this objective perspective, the phenomenal sounds of one's conscious experience are strictly nonphysical in the strong sense of that term. Science is a discipline the limits of which are generally defined by its physical scope, and all nonphysical phenomena such as the sounds themselves are thus more or less beyond the scope of strictly empirical science. Put another way, there is currently no scientifically (as in objectively) verifiable, causal relation but rather an associative, empirical correlation between physical processes such as neuronal activity and the nonphysical, conscious auditory perceptions associated with those physical processes. Given this physical limitation, one can also say that there is neither a currently fundamental objective basis nor a conceivable causal model for any scientifically based belief that consciousness and its auditory phenomena must be constituted by, or in any way arise from, physical processes: such is the auditory finitude of our scientific imaginary.

The Auditory Imaginary

From the perspective of this scientific limit concerning the objective concept of sound, phenomenal sound as such is simply beyond the physical scope of the natural sciences' remit. In this physical sense, the scientific limit itself defines the nonphysicality of the sounds themselves. Conversely, from a phenomenological perspective, since phenomenal sound is a nonphysical entity from the scientific perspective, I would like to propose that there is therefore no such thing as a "physical sound" in any observable empirical sense. In the first instance, there are only the physical phenomena associated with the nonphysical sounds themselves that one hears and hearkens to in one's own conscious experience of the phenomenal world we all live in. These nonphysically phenomenal sounds are of course still correlated with the physical processes associated with their auditory perception, such as acoustic waves through to neuronal stimulation, but the sounds

themselves occur only in and for consciousness. In this phenomenal sense, one's own conscious experience of sound is an always already established fact concerning hearkening to the sounds of one's everyday soundscape. Furthermore, it is only on the basis of this everyday familiarity with the nonphysical sounds of our auditory perception, that one might then look for empirical correlations between those sounds themselves and the physical phenomena (acoustic, neurological, and so on) associated with that conscious auditory experience.

From this first-person, experiential, and thus strictly empirical, perspective, all sound as something heard in the world is first and foremost a nonphysical phenomenon of consciousness with no demonstrable causal relation to the physical processes associated with it. In this empirically nonphysical sense it is thus posited here that the sounds themselves, whether experienced in dreams or in everyday interactions, are wholly mental phenomena and thus essentially imaginary, being the nonphysical auditory phenomena disclosed solely in one's conscious experience of hearkening to the meaningful sounds one hears in the phenomenal world. Now while the sounds themselves may be said to be imaginary perceptual phenomena, this does not necessarily mean that the question concerning the nonphysical nature of conscious experience is thus an illusory one, for even illusory experiences leave open the question as to the nature of the conscious experience of illusions.[24] Both illusory and presumably real perceptual experiences of the sounds themselves are nonphysical experiences. In this sense then, all phenomenal sound, both potential and actual, both imagined and worldly, belongs wholly to one's own auditory imaginary.

One might, however, object that this conclusion regarding the imaginary nonphysicality of the sounds themselves is merely an empty exercise in semantics, and if we were to leave the matter there I would tend to agree. Yet what is at stake in this argument is not merely a specific interpretation of the terms "nonphysical," "imaginary," and "sound" but also the notions of causality that inform our everyday understanding of sound in general and the ways we talk about it. For those of us with a scientific background, including those of us schooled in a modern education industry, it can be easy to assume a form of popular materialism in regard to the causal relation between scientific truths and the phenomenal world they attempt to describe, the world of one's conscious experience. Thus, it might still appear stubbornly self-evident that the perception of sound somehow occurs "in" the brain or mind as a function of the imagination that is itself directly caused by the electrochemical stimulation of one's auditory cortex. Such a basic presupposition can be the cause of a good deal of confusion when talking about sound, for sound in this case is explained in terms of something other than the phenomenon of sound itself and primarily as a psychological "effect" of physical neurological processes.

In fact, here the sounds themselves of one's auditory imaginary are relegated to a closed "inner" sensibility that remains mysterious while the physical causes that are somehow "external" or "underlie" this sensibility assume priority in terms of understanding those very sounds. Yet the notion of an "inner" psychological experience as opposed to an "external" or "underlying" physicality places consciousness and its phenomenal world inside an objectively nonobservable space, that of the third-person subject's presumed conscious experience. From this objective, third-person perspective the only

evidence for the phenomenon of conscious experience is to be found solely in the reportage and observable behavior of subjects, thus essentially reducing the question concerning consciousness to one of beliefs about subjective experience.[25]

It remains a curious fact however, that there is only one empirically observable instance of consciousness and its associated phenomenal contents in the known physical universe, that being of course, in each case, one's own consciousness. In phenomenological terms, one's already "being-here" in this phenomenal world, implies that the transcendental character of being "mine" belongs to being-in-the-world in each case. It thus follows that there is only one observable instance of "mineness," and thus only one observable instance of consciousness existing in and for the phenomenal world.[26] From this phenomenal perspective concerning one's own conscious auditory experience and its auditory imaginary, there is no "internality" to the sounds themselves, as these sounds self-evidently occur "in the world" one hearkens to, and one must also presume the same of the others and their conscious auditory experiences. Strictly speaking, from this phenomenally empirical perspective, other people are all merely bodies, simply biological machines (or philosophical zombies[27]), inhabiting one's own phenomenal world. They have no observable perceptual experiences, merely observable sensory inputs triggering sensory and cognitive processing in their brains with subsequent behavioral outputs, and all taking place alongside an empathically presumed "internal" conscious experience.[28] This phenomenal lack, however, might also be taken to imply that there is no phenomenal experience to be found "inside" any physical body, and that therefore one's own body is also a "philosophical zombie" inhabiting, and animated by, an apparently external phenomenal world, along with all the other sentient bodies.

Furthermore, and again following this phenomenal perspective, the notion that the physical phenomena associated with the sounds of one's auditory imaginary are somehow "external" to or "underlie" this phenomenal world would seem to be largely a rhetorical device in support of the philosophical belief, common in the sciences, that all phenomena must be ultimately explicable in physical terms. Now while an understanding of the psychophysiological processes associated with audition is obviously useful, such as in the psychoacoustics of digital reverb modeling, such a scientific and engineering perspective does not necessarily require such a philosophically dogmatic worldview, and many scientists and philosophers of science have a much more pragmatic notion of the role of truth in the scientific project.[29] Finally, if, as a lay person, scientist, or sonic artist, one wishes to understand sound in terms of the sounds themselves, then it might also be useful to deconstruct one's own presuppositions about sound and its relation to the physical and perceptual phenomena associated with hearing in the first instance.

Imagining the Sounds Themselves

Our introductory question, concerning what it is that constitutes the "sounds themselves" that are to be imagined, remains here an open question concerning the provenance of phenomenal sound. This openness to the question of sound is not a failure on our part

but rather a positive result of opening up the relation between the sounds themselves and the physical understanding of sound. Fundamentally, as regards the conscious experience of phenomenal sound, we do not know what it is, how it comes to be, and why it even should be anything at all! All those who listen and understand can attest to the actuality of their conscious auditory experience, but what is this phenomenal, nonphysical auditory stuff made of? If we do not know what it is then how can we even begin to think how it might arise from the physical neurochemical processes in our brains? And if the evolution of our human organism is a purely biological affair, which it seems to be, then why do we even need a conscious experience of sound in the first place? All that our evolutionary mechanisms apparently need are sensory data inputs, data processing, and behaviorally adaptive outputs, all of which can be accomplished by the organism without the added feature of phenomenal consciousness: where is the evolutionary advantage for the human species in the appendage of an otherwise superfluous but self-evidently sophisticated and feature-rich, conscious auditory experience? Now while the neurosciences continue to make significant progress toward uncovering the structure and functioning of the neural correlates of consciousness, something is seriously amiss with our objective understanding of consciousness itself, or rather our near total lack of understanding, a lack that must also call into question the basic assumptions of that understanding.

The Phenomenal Causality of Sound

What does it mean then to have imagined the sounds themselves of our auditory imaginary? In terms of the cognitive imagination we have arrived at a number of philosophical difficulties regarding the rather mysterious relation of our auditory imaginary to the physical processes associated with that conscious auditory perception. Philosophical notions concerning the supposedly "underlying" or "external" physical nature of the world, and especially some of their more dogmatically reductive imaginaries, would have us believe that the sounds themselves simply are physical processes, or are at least "internal" subjective effects, illusions or mere semblances somehow produced by "external" physical processes. The relation between phenomenal sound and its physical correlates is seen here as one of physical causes and phenomenal effect, where the sounds themselves are, in some way yet to be discovered, the product at the end of the physical, causal chain.

There is also a related belief, inherent to more dualistic notions of the mind-body or phenomenal-physical problem, that, while the conscious experience of sound is a fundamental phenomenon irreducible to physical processes, auditory consciousness is still held to arise (or supervene) on the apparently closed causality of the physical world, the latter being the assumption that all observable physical effects in the world are solely the result of physical causes. This basic physicalist assumption, regarding the causal priority of the physical world described by the sciences, would also seem to be true of all forms of dualism, whether naturalistic or epiphenomenal, substance or property.

Chalmers, for example, in what I would call his residual physicalism, while highlighting the "hard problem" of consciousness, still frames the problem as one of an "inner" conscious experience arising from the underlying physical processes: "The hard problem, as I understand it, is that of explaining how and why consciousness arises from physical processes in the brain" (1997, 23). It is precisely this basic assumption concerning either the causal or supervenient priority of the physical over the phenomenal that I should like to call into question. This does not, however, mean simply inverting the problem and suggesting that the physical world somehow arises from or is caused by the phenomenal world. On the contrary, given that we still do not know what, how, or why consciousness is what it self-evidently is, then calling into question (or bracketing) the notion that conscious auditory phenomena are produced by or arise from "underlying" physical phenomena would seem to me to be a first step toward opening up the possible relations between phenomenal consciousness and its physical world.

From this critical, phenomenal, and first-person perspective, the term "sound" thus stands for an open question disclosed in one's own conscious experience of hearing and hearkening to the meaningful sounds encountered in the public world one lives in and shares with the others. The phenomenal causality of sound is here proximally related to one's directed attention (intentionality) within that phenomenal world, or in other words, one hearkens and thus hears. This is a very different relation to causality than the physical notion of the still unknown but presumably neural provenance of phenomenal sound, and it is a relation that perhaps opens up the possibility of talking about sound qua sound.

Such an open perspective also problematizes the causal relation between sound and our biology. For one could say that, in an evolutionary sense, we do not hear because we have evolved the biological mechanisms for audition; rather, precisely the opposite: we have evolved the biological mechanisms for audition because the ability to hearken to sound proved beneficial. Why else would the human species have developed a complex auditory cortex if not for the evolutionary advantage of hearing and hearkening to the sounds themselves? From this phenomenal perspective, the conscious experience of sound is no longer an epiphenomenon, a mere appendage to the "external" physical correlates of that auditory consciousness.

Where the sounds themselves are concerned, one first hears them in a worldly context, such as when one is out in the field recording environmental sounds, perhaps for use in a soundscape composition or a sound art installation. Using electronic technology, one can enhance one's auditory perception with headphones, a digital audio recorder, and a shotgun microphone, focusing in on specific sounds in various locales beyond the limits of technologically unaided perception. At the same time, one might appreciate the acoustic properties of those locales and their sounds, their spatiality and natural reverberation, even perhaps taking measurements such as B-Format impulse response recordings to reconstitute the acoustic spaces in convolution reverb software. Binaural microphones can also allow for the reproduction of the attention-driven hearing that is constitutive of any human listening experience, with three-dimensional printed pinnae providing the directional cues that assist in the spatial recognition of environmental sounds.

These empirical field-recording experiences are also of course, in each case, one's own conscious experience of the sounds themselves, whether one hears them in the field or later on as digital audio recordings played back in the studio. It is electronic technology and its related scientific knowledge that has expanded the phenomenal field of our conscious auditory experience. In doing so, science and technology have also enabled the development of a naturalistic account of that conscious auditory experience in terms of the associated and objectively (or intersubjectively) verifiable physical phenomena. It is on this empirical and phenomenal basis that one might then reasonably discuss issues to do with material causality and suchlike. In phenomenological terms, the physical facts of these phenomenal matters at hand are "judgements of perception"[30] founded in the observed regularities of auditory sense perception that are only disclosed in and for the empirical, conscious experience of sound. At no point in these presumably conscious and definitely empirical experiences is there the need to subscribe to the notion that all phenomenal auditory consciousness derives from an "external" physical world. On the contrary, phenomenal sounds, and their associated physical phenomena, self-evidently derive from the phenomenal world within which one hearkens to the sounds themselves.

A Phenomenal Conclusion

From this phenomenal perspective, there would seem to be no logical basis (as yet) for claiming any relation between the conscious experience of sound, or one's auditory imaginary, and its physicality beyond the empirically observed, correlative associations. That is, in the relation between the physical and the phenomenal one can only appeal to a strict correlation between the two rather than to a cause and its supervenient or otherwise effect. Or at the very least, there is as yet no logical necessity for the latter belief in the physical causality of all conscious phenomena. This conclusion would thus also not require of us a commitment to the related belief that all auditory phenomena must be ultimately explicable in purely physical terms. These ambiguities in our understanding may be resolved in the future with the discovery of a physical basis for phenomenal sound, or not, but currently all we have is the fact of correlation. What is logically certain at this point, which is the contemporary and finite basis for talking about the phenomenal sounds themselves and their relation to their physical correlates, is that *there is only an empirical correlation*.

For one has always already come to understand what sound is by having heard and by hearkening to sounds in the everyday world of one's conscious experience. It is on this straightforward perceptual basis that we might then come to articulate our auditory imaginary by talking about those sounds in terms of say, the sounds themselves; or their correlated physical processes; or Duchampian artistic conceptuality; or indeed that world of everyday conscious experience itself. From the phenomenal perspective of the priority of conscious experience, the sounds themselves are neither in the first instance mere products of biological processes nor subjective epiphenomena, rather they are an empirical, that is, experiential, condition for the possibility of conceiving of physical

notions of sound in the first place; the sounds themselves are thus precisely the matter to be investigated.

Given this phenomenal conclusion, and beyond a mind-body or phenomenal-physical dualism, is it possible to rethink the relation between consciousness and its physical correlates from a purely phenomenal perspective? There is, of course, a historical and philosophical precedent for just such a phenomenal analysis; Edmund Husserl's phenomenological-empirical project from its inception through to his later "neo-Cartesian" analyses, was posited on just such a possibility, that of uncovering the phenomenal basis of scientific truth and logic in general.[31] Here the physicality of sound would need to be understood solely in terms of the physical phenomena disclosed only in and for one's own conscious experience of the phenomenal world, which is already the case for all empirical investigation. In this phenomenal sense, rather than constantly attempting to shoehorn conscious experience into the causal network that the natural sciences describe[32] perhaps one might just as well attempt to locate the causal network of physical truths inside the phenomenal world of one's conscious experience instead, from where those truths are always already empirically disclosed. Given the obstinate and apparently ever widening explanatory gap within the hard problem of consciousness, one might perhaps posit that all physical phenomena are already fundamentally phenomenal. From Husserl's Lebenswelt to Heidegger's Seinsfrage, phenomenology calls into question the internality/externality of the subject/object and thus also the logical coherence of the debates concerning idealism/realism.[33] From this phenomenal perspective, one might perhaps posit something like a synthesis of direct and phenomenal realisms for which our subjective experience of the phenomenal world is not an "internal" mental state, and where all consciously observed phenomena instead occur in the apparently "external" phenomenal world.

Notes

1. Adapted from Heidegger (1967): "Nur wer schon versteht, kann zuhören" (164). See Heidegger (1962) section 34, "Being-there and Discourse. Language," on which the notions of "hearing," "hearkening," and "listening" in this work are based.
2. This is not to suggest, however, that cognitive processes are not involved in sensory perception but rather the distinction is a philosophical generalization for the purposes of this argument. For a philosophical discussion of the "sensory and cognitive imagination," see McGinn (2009).
3. See Schaeffer (2005, 76–81).
4. Morton Feldman, as cited in Hirata (1996, 6).
5. Following Nagel, "We can say that a being is conscious if there is something it is like to be that being, to use a phrase made famous by Thomas Nagel" (Chalmers 1996, 4; see also Nagel 2002).
6. The multisensory artist Jo Burzynska, aka Stanier Black-Five, has used low frequency vibrations and infrasonic phenomena in sonic art installation and experimental music performance, proceeding from her own recordings of tremors from the February 11, 2011, Christchurch earthquakes to produce her Body Waves series, with myself as a collaborator (see http://joburzynska.com/body-waves. Accessed June 5, 2017).