ROUTLEDGE RESEARCH IN MUSIC

Bodily Expression in Electronic Music

Perspectives on Reclaiming Performativity

Edited by
Deniz Peters, Gerhard Eckel,
and Andreas Dorschel

Going in the other direction, a listener might have the attitude of empathic participation. This foregrounds an interest in hearing a making, or a maker (concrete or imagined), of the sounds, as rooted in, importantly, feeling the sounds via imaginative enaction in the way presently conceived. While the history of Western classical music has seen feats of expressive intimacy connected with this mode of listening, listening to some electronic music with this attitude may be pointless. However, there is much electronic music where human agency, or natural (environmental) agency, and the experience thereof, *is* aesthetically paramount. For instance, behind works such as those of Elsa Justel or Natasha Barrett there is a sophisticated weaving of minuscule points of contact, in complex constellations of sonic intimations; works through which we may grasp expressive facets of the world, and empathic listening is here implied. These works are composed, I claim, in the empathic mode, in order to provide the various levels of gestural surrogacy achieved therein.

in:"Bodily expression in electronic music"
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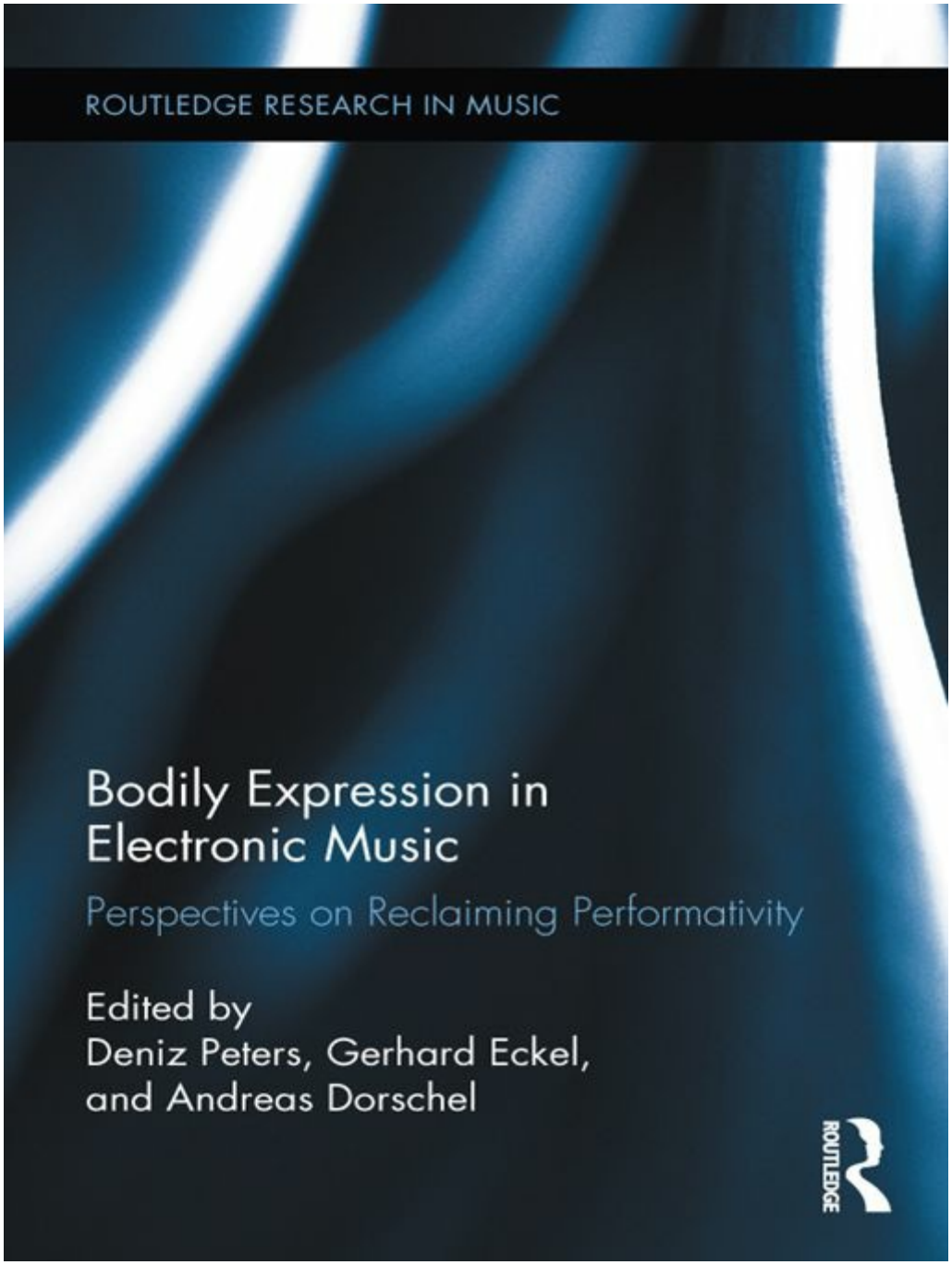
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Preface

Electronic music, by virtue of the particular conditions whereby it is made, can both unsettle and inherit the expressive domain of the body. Realising the opportunity it thus offers to interrogate the body's role in musical expression and experience, the editors mounted a symposium on the topic. The symposium Bodily Expression in Electronic Music took place in 2009 at the University of Music and Performing Arts Graz (Austria). It attracted thinkers and artists to engage together in a discourse that would heed both the poietic perspectives of a variety of music and dance practitioners, and a multidisciplinary range of intellectual perspectives, particularly those of music aesthetics, theory, sociology, philosophy of dance and interactive performance arts, philosophy of mind, and phenomenology. This book grew from the vibrantly discoursive setting of the symposium, featuring presentations, comments, replies, and group discussions. These have since been refined and integrated into the present individual chapters, expanded, and edited. The purpose of gathering the initial collaborative impetus was to bring existing discourses in electronic music, contemporary dance, and aesthetics—each enclaves in their own rights—into dialogue. We believe the book proves this combination to be epistemologically insightful, and we hope it will incite further thought and discussion to cross the lines between avant-garde practitioners and thinkers.

As editors we wish to voice our gratitude towards this exciting constellation of authors, first and foremost for their dedication to the quality of their contributions, and for their patience and determination in following through with an intricate editing process. We thank Liz Levine from Routledge, four unknown reviewers for their acute suggestions, and independent copy editor Sara Peacock for a superb preliminary copy-editing run, plus Michael Watters of IBT. We further thank Breitkopf & Härtel publishers for image permissions, and Kunstsammlung Nordrhein-Westfalen, as well as, Städtische Galerie im Lenbachhaus Munich, for academically suitable image permission fees. We acknowledge financial support by the Austrian Science Fund (FWF): L399–G13 and the University of Music and Performing Arts Graz (specifically the Embodied Generative Music research project, the Institute of Electronic Music and Acoustics IEM, and the Institute for Aesthetics of Music) enabling us to hold the symposium, and funds generously given by the Institute for Aesthetics of Music to support the editing process, including the price monies from the Congress Award Graz 2010, conferred on the symposium.

Deniz Peters, Gerhard Eckel, and Andreas Dorschel

Introduction

Deniz Peters

'Music affords bodily expression. It is the direct result of bodily acts.' 'It is with one's body, sometimes with an additional artefact, that one makes music.' Truisms like these reflect the seemingly inseparable bond between music and the body as has been part of countless cultures since the dawn of humankind. Musicking is something people *do*.[1] Such truisms have been questioned if not invalidated by the advent of electronic music. This book is a reflection on ways in which the fundamental correlation between music and the body has since *changed*, and on ways in which it *continues* despite fundamental alterations to the bond. It is a joint effort by scholars and artists to shed light on concepts and experiences tied to bodily expression in electronic music—unearthing, observing, contemplating and questioning the body's presence and aesthetic significance where such is perhaps little or least expected.

As audible music was, for a long time, *exclusively* brought into existence with the body, the very idea of music being a medium of human expression implies bodily sound making. Indeed, 'expression' is, taken literally, a bodily act. If transfixed in a dream or if paralysed by illness, one ceases to be able to express oneself. To someone in such a state, agonisingly, thoughts or feelings become unshareable. Music as an expressive medium follows on as an extension from the bodily act of expression. This extension seems so natural that it is easily taken for granted that music should be, like bodily expression, a means of psychological expression, in prolongation of emotional expression as given to us via the face, voice and entire body.[2] However, the entrenchment of music with the body is also a messy one, not least because the libidinous body colours music as sensuous activity, but also simply because the musician's performing body is, crucially, an unpredictable entity. Reactions wishing to depart from this entrenchment, seeking for a transcendence or liberation from the body, have been many. Specifically, to overcome the fallacies of a musician's body or the limits of a traditional acoustic instrument intervening during the sonic realisation of a composer's (supposedly unbound) sonic imagination was one of the driving ideas behind the modernist aesthetic preceding some electronic music aesthetics.[3] The hopes of this modernist aesthetic were on the machine, not only on the noise machines make, but, just as importantly, on the mechanistic production of sound;[4] that is, the hopes were tied to the image of the generation of sound using a perfectly suited, untiring and infallible body, or, in stark contrast, no body at all.

Before this canvas, one may ask: Where is the body in electronic music? Does it 'disappear' when performers or performing composers are absent from the stage, at least from an audience's point of view, as in some acousmatic music? Is it reduced to an intangible degree, abstracted away? Or does it persist, though in a transmuted form? Is the body transfigured? If so, into what? If its role has been compromised or lost, what else has taken its place? What *could* take its place? Further: to hear is to hear *something*. It is also, usually, to hear *someone*. Where and who is this someone in electronic music, even of the performed sort? Can a performer (or composer) be heard in it, in cases where there is a delayed or otherwise altered performance, or no (human) performance? Or can a performance be heard without a performer? Or, given both performer and performance, can both actually be heard in the music, instead of being somewhat arbitrary to or removed from it? As performance rests on bodily acts, one may reframe these questions in terms of the body, giving the overall question of this book: how can one *conceive* of bodily expression in electronic music?

But as one begins to ask these questions, so begins the need for differentiation. Behind the general category of 'body', for one, there appear numerous distinct kinds: the composers', performers' and listeners' literal (living) bodies, for instance, as well as the (dead) body of an instrument, machinery or circuitry, and the figurative body of 'the music', the score, a venue or a recorded soundscape, and, finally, bodies that might be imagined by listeners or composers. And within these instances that all enrich the concept of body understood in narrower and wider senses both literally and figuratively lurk questions such as those of what a living as opposed to a dead body is, and how far 'objects' may nevertheless be considered 'lived bodies'. In other words, questions that concern the dialectic interrelations between the drawn distinctions. The body's roles in musical expression, specifically, have for a long time not been a topic of inquiry, perhaps because the earthly labour of bodily expression in musical performance was seen as a necessary but aesthetically superfluous or even distracting occurrence, a tedious means to an end—to ideally become transparent in reception. Also, the material and sensual associations of the body's involvement in music making and appreciation might have led thinkers to *avert* their attention from closer scrutiny of its roles and presences. Until recently, the body has been a rather neglected, shunned or even repressed topic in academic discourse on music,[5] despite the upsurge of interest in the body and embodiment as witnessed, for example, in phenomenology, cultural studies and sociology (such as the developing anthropology of the body).[6] The awareness that, in Jonathan Sterne's lucid words, "the history of sound implies a history of the body" calls for a conceptual elucidation.[7]

It is also not at all clear what constitutes a music's expressivity, and whether expressivity is even a requirement for music. The debate over what expression—and in particular musical expression—is has been widespread and is ongoing still. The view that a composition is the result of and communicates a composer's

emotional expression is disputable, and so is the very concept of expression as to its epistemological usefulness in the consideration of artistic production and art appreciation. It has been fashionable to claim that music can be rid of its expressivity and to think that this might be readily achieved by the use of an automatised production of music that is bereft of manual (or vocal) expression on behalf of the composer and also of the performer's interpretative intervention. But neither is expression as pervasive in music as dedicated debates might suggest, nor is it as easily eliminated through the avoidance of bodily expression in the act of making music. Musical expression, and its ancestor bodily expression, deserve a closer look, a look that questions stereotypic conceptualisations of expression and its role in art.

Quite apart from the above issues, electronic music itself as a genre is marked by plurality and hazy definitions. Broadly speaking, electronic music is any music that in the process of its creation uses electronic devices, be they analogue or digital, or a combination. This broad definition includes the pioneering genre historically called 'electronic music' (*Elektronische Musik*), with works by Pierre Schaeffer, Stockhausen and Pierre Henry, amongst numerous others. This subgenre, which peaked in the 1950s, is limited to music made using analogue electronic equipment (within a studio like the *Studio für elektronische Musik Köln*), such as a sinus generator, ring modulator or a tape recorder. While the playing of compositions resulting from studio work to an audience takes place only after the event of its composition and without performers (in the narrow sense of the term), composers soon introduced electronics to stage performance, for example, in the form of live electronics. Between computer music on the one hand—that is, the digital successor of *Elektronische Musik*, with either the composer 'performing' the sonic definition and assembly offline in composing collages of recorded or synthesised materials akin to tape music and additionally altering the materials by way of software manipulations, or with the composer concentrating on algorithms that generate and alter sounds and their organisation—and live improvisation on the other hand—using hyperinstruments or other instruments employing sensory devices to drive or shape a sound generation during an actual performance before an audience—there is an array of *mixed* forms. Such mixed forms are laptop music (computer music with live software coding) or electroacoustic music (music on electronically augmented instruments, or, more generally, music combining traditional with electronic instruments, in both live or studio settings), circuit bending (again a live performance 'on' electronic circuitry, tweaking and tampering it, of which David Tudor was a pioneer) and turntabling. Further examples: sound installations come closest to computer music compositions, although they involve some external influence in varieties that interact with an audience; soundscape music relies on found environmental sounds; any music using loudspeakers can, by virtue of loudspeaker positioning, involve audience interaction by way of audience mobility. While these are all forms of electronic music largely concentrating on the auditory (with varying levels of visible performance), electronic music may also

appear within the context of an intermedial artwork or improvisation (as a component it may be primary, such as in network music, or integrated, for instance as part of a contemporary dance work or a multimedia installation).[8]

'Which body?', 'What expression?', and 'In what artistic setting?', then, are the three questions into which the book's three parts form entry points. Part I approaches and deepens the concept of body and its relevance to music making. Deniz Peters, in Chapter 1, addresses touch as the experiential link between making a sound and sound made, and the felt aspects of touch that come into play when listening only, allowing, as he argues, for the body's extension into instruments and into the sound itself, and harbouring the intersubjectivity of sonic experience. Peters's starting point is that whenever someone uses her or his body to make music, the act of sounding is determined by the way in which the body is used, with the actual sound being a consequence of the nature of acoustic causation. Acoustic instruments are artefacts whereby part of this causation is extended by design, but is still within the continuum of natural causation, and *palpably* so—by means of *touch*. Conversely, electronic, and more specifically digital, instruments are not necessarily bound to replicate the natural touch-sound relation, and replication of the richness of the relation is, in fact, a sophisticated challenge. There may or may not be a bodily act that gives rise to a digital process that affects the excitation of a sound; but the actions of this process are not themselves *shaped* by the manipulation. While designed automatisms are no longer bound to being mechanical, extension—via touch—is here no longer granted; rather, it may now be crafted and supported, or forsaken and displaced. However, it is untrue, Peters argues, to believe that a music not engendered by a body via continuous instrumental performance might no longer be grasped in mechanical and, less so, in bodily terms. Peters's point is that the body appears to us via extension in listening activated by bodily knowledge all listeners have acquired during a lifetime experience of everyday touch-sound relationships. Thus the metaphoric use of language in speaking about music, as displayed for instance in Isabel Mundry's chapter, is grounded, as Peters argues, in the nonmetaphoric, literal (felt) bodily domain as active in perception. Despite a lack of a mechanical continuum, a body might therefore still appear (and in continuation might impress as the virtual person argued by Simon Emmerson in Chapter 11). How this appearance is affected by compositional or improvisational means, with or even against the composer's or improviser's volition, is therefore a point of high aesthetic relevance in approaching electronic music. Absences and presences of real or apparent bodies, in their organisation through sound, Peters concludes, articulate meaning. Awareness as to their expressivity is thus relevant to the aesthetics of electronic music, as their design not only affects symbolic communication (as insightfully discussed in Joanna Demers' *Listening through the Noise*),[9] but may tap the listener's nuanced engagement on the level of bodily knowledge, feeling and emotion.

In Chapter 2, Sondra Fraleigh enlarges on and refines the phenomenological

concept of lived body drawn on by Deniz Peters, Jaana Parviainen, Susan Kozel and other authors in this volume. In discussing the alterability and fallibility of a performer's body in dance and in music, after characterising how dance styles have different 'bodies', Fraleigh underlines the aesthetic relevance of the body's essential variability attended to by phenomenology. The body, in Fraleigh's words, is

> not simply an object, nor merely physical. … [It is] a shifting totality that includes identity … Embodiment is vastly more than physical; it is … an ongoing process [that] involves development of the will. … We cannot think outside of our sentient bodies. Body and mind as separable aspects of ourselves to be reconciled indicate outdated lingering ways of using language that assume the brain with its capacity for thought exceeds the body, … [what] Gilbert Ryle identified as the myth of 'the ghost in the machine'. … Consciousness … is founded in our bodily being.

Bodily intentionality, as Fraleigh argues, is not static, but may grow. Art works on the body, affecting alteration, "carry[ing] us beyond the body as familiar". Fraleigh goes on to discuss the unfamiliar body presented in Butoh: the "emaciated body". "Butoh embodies the awkward, the painful, and the messy". In pointing out such alteration, and in discussing affinities between Butoh and electronic music, with which it is often combined, Fraleigh implicitly suggests possible aesthetic avenues of bodily alteration in electronic music. Music may, then, "give us new bodies", or even support one to "project oneself toward non-being". Ultimately, Fraleigh sees in art that attends to the unfamiliar body the possibility to "extend cultural consciousness as a whole".

Alva Noë, in Chapter 3, responds to Peters's idea from Chapter 1 that musical experience is embodied, in which, as Noë summarises, "sounds themselves show up for us as if made by us … and [this] is the basis of musical comprehension and the intersubjective availability of music". As a consequence of agreeing with Peters's point, Noë finds that the "pervasiveness of touch and the body and feeling-in in our experience of the world of sound and the world of sight" seems to logically trouble the *reverse* idea of disembodiment—asking whether music can be embodied *only*. Taking a lead from examples in architecture, Noë discusses disembodied sounds, comparing recorded voices played back on a cheap speaker with a performer's actual voice at a live concert, wondering whether from this basis one could "stepwise ramp up what we might mean by disembodiment, to more radical forms of disembodiment". While Noë's first point thus calls for a closer consideration of the "liberation of our musical imaginations from the body", at least in compositional terms (thinking of the score as a kind of body), Noë's second point concerns the very way in which music or sound can or could be conceived of as an embodied experience. Again, Noë endorses Peters's enactive

approach to the listening experience, but remarks that for sonic experience to be understood in terms of sensorimotor experience, this would require (1) a fuller understanding of the ontology of sound (proposing to think of "sounds as … features … of the things and events": "when I hear your voice it is *you* that I hear"), and (2) an understanding of the experienced temporal extension of a voice (the "meaningful arc of the singer's action") in terms of Merleau-Ponty's concept of intentional arc. Noë thus pushes the borders in both directions, in calling for a more nuanced conception of what disembodied music might be (though concluding, not unlike Peters, that "sound or line [cannot be] divorced from movement" and that electronic music thus "doesn't take the body away"), and for a consideration of sonic embodiment that comes even closer to illuminating its sensorimotor intricacies.

How can the extensions of dancers' bodies within the virtualities of interactive multimedia works be grasped and described, if an important part of the virtuality unfolds via the auditory? Susan Kozel in Chapter 4 reflects on the sonic dimension of some of her works, and specifically on the effects that it has on the dancers, the dance, and also the audience. Dancers' bodies, she finds, "sound … from within or without", a view that synthesises various aspects of dancers' bodily experiences and expressions as arising from the audible and sometimes even inaudible (and therefore, intriguingly, imagined?) components of her works *figments, immanence, exhale* and *The Yellow Memory*. The notion that harbours this synthesis, which extends the 'inaudible' to incorporate senses of density, latency (with which Kozel means the temporally displaced as well as the hidden), and collectivity, Kozel terms 'sonic invisible'. (In this, she applies Merleau-Ponty's concept of the 'invisible' to the auditory realm.) Kozel thus conceives the sonic invisible not as an emptiness, but as a source for movement improvisation. The body, to her, is a listening organ, listening beyond what can be actually heard, into an 'intercorporeity', to which the electronic music components of her works create an entrance. Kozel's reflection adds depth to the idea of an arc of bodily intention Alva Noë considered in his earlier chapter, and also touches on the idea of an interactive computer system's 'liveness' that Simon Emmerson addresses in his later chapter.

In Chapter 5, following like Kozel a Merleau-Pontian line of thought, Jaana Parviainen expands on bodily knowledge, intentionality, and learning as part of dancers' bodily experience in performing with a specific interactive musical instrument. (The case study her analysis draws on was part of the Embodied Generative Music research project described from a compositional perspective in Gerhard Eckel's chapter.[10]) Parviainen applies Merleau-Ponty's notion of reversibility to the touch-sound relationship, in order to comprehend a type of haptic illusion performers experience when playing the (non-haptic) instrument Parviainen considers. Parviainen concentrates on how dancers may be supported in making their experience with this instrument more visible to the audience as well as intensifying it, discussing a choreographic method she devised drawing on ideokinesis to enhance dancers' expressive clarity. Expression, to Parviainen, who

in this follows John Shotter's work on participatory thought and understanding, is something our bodies *do* independent of intellectual knowledge or rational deliberation. It is the reflex or involuntary aspects of expressive movement, to a large extent based on habitus, and their overcoming in artistic performance, to which Parviainen devotes particular attention as they occur in the sonically altered interactive environment she discusses, also taking into view the future artistic potential of such interactive environments.

Part II holds accounts that seek to describe, analyse and conceptualise expression in music, from the vantage point of regarding the body's role in it, and with a particular eye on the conditions and possibilities of electronic music. Expression is, of course, not only a matter of the act of perception, but also a question of aesthetic choices. Musical expression is indeed not a *necessary* given in a composition, as Federico Celestini and Andreas Dorschel explain, nor is the role of the body in expression a fixed or even granted one, as Isabel Mundry elaborates in the context of discussing her own compositions. The body's role can exceed metaphorical attribution, and can be one of literal causation: as Kendall Walton argues, the entire body can be shown to be physically involved not only in expressing but also in the listening impression (with listeners' physical activity in response to hearing being yet another issue). And meaning as embodied in a composition may be analysed given adequate theoretical models, as Christian Utz suggests in his analysis of the expressive dimension of, in turn, the very same composition of Isabel Mundry, the compositional decisions and process of which she herself expands on in her earlier chapter.

Isabel Mundry, in Chapter 6, describes how a collaboration with author Yoko Tawada supported her own anachronistic standpoint in attending to a music's expressive 'body'—a body that Mundry locates beyond the listener, composer or performer, in the music itself, but also as what appears an implicit force that organises the act of composition (in other words, Mundry discusses composing with the body in mind—that is, composing for, or even from, the body). To Mundry, the body motivates music, and, thus, a different body—say, a postmodern one—will give a different music. And while, to her, the body disappeared for a period of time in serialist music after 1945, the possibilities of music that idealises abstraction from the body are confined and were soon exhausted, leading to a compositional shift back to the body, in the varied concrete and metaphorical manifestations Mundry outlines. Sonic art, new simplicity and spectral music take up different bodies and different aspects of these bodies, reassembling the body on some compositional levels, whereas deconstructing it on others, effectively—in some styles—hybridising historic means of composing with the body (through tonality) with serial means of composition. Mundry views herself as a composer who works with such "bodily assonances". Given compositional attention, bodily expression thus fluctuates, with meanings arising from this—and Mundry devotes a considerable part of her chapter to describing the meaning-making by such fluctuations in her own work.

Neither music nor music theory has been nearly as devoid of bodily considerations as is often held, argues Christian Utz in Chapter 7. Giving historical evidence for rejecting the view that theoretical thought about music has been marked by an absence of interest in perception and experience, Utz confirms such an absence only in the context of some mid-twentieth-century music theoretical models. Instead, Utz problematises music theoretical knowledge about the *relation* between bodily experience, auditory perception and musical structure, finding that "serial and post-serial music … might in fact be considered as *markedly* embodied", given the heightened attention serialist composers paid to "listening expectation, auditory perception and bodily sensation". To Utz, such bodily listening ties back to "continuously (re-)activati[ing] perception mechanisms based on everyday listening, thus primarily being instigated by elementary perceptual faculties" rather than semantisation. As opposed to Mundry, Utz views intertextuality as a deviation from a bodily narrative a composition might unfold. In this light, Utz seeks to analyse Mundry's *Ich und Du* (see also Mundry's own analysis, Chapter 6) in terms of an intention to "relate to experiences of daily life *without* resorting to conventional musical gestures, figures or topics". He approaches Mundry's composition using a method he calls "morpho-syntactic" analysis. His method addresses the "productive paradox" of generating embodied referentiality without resorting to stereotyped semantisations, in combining a gestalt-oriented search for characteristic (but additionally temporally developing, i.e. transforming) features of sound organisation, with an observation of the "contextual emergence of meaning" (in the case of Mundry's work this is present as an "identity discourse" initiated by the title's philosophical undertones). Remarkably, by considering "bodily momentum and gestural precision", and, on a higher structural plane, shifts of gestures from local to macroformal levels part of "semantised structural transformation", as linked to an identity discourse, Utz arrives at an understanding of meaning embodied in Mundry's *Ich und Du* not unlike the composer's own.

Kendall Walton distinguishes two kinds of physicality related to the experience of music in Chapter 8: physicality as apparent to the listener in the impression of how sounds have been produced, and physicality as part of the listener's response. Both kinds occur within the listening experience in any music, including electronic, though with important differences. Walton argues that the deliberate actions with which a person might be believed to have made a sound fall outside the boundaries of Michel Chion's categories of causal or reduced listening; as Walton explains, they are experienced as appearances for their own sake, with their apparent deliberation resulting from the listener's (prior) knowledge or belief or internalisation about "how certain *kinds* of things are actually produced", as different from their actual production. Such deliberate actions are unfamiliar, but not absent, in the case of electronic music, says Walton, which leads to their expressivity being tied to "*ethereal, disembodied, mysterious* qualities" that characterise the specific ambiguities of source attribution in the experience of some

electronic music. The second physicality as part of the aesthetic (musical) experience that Walton considers as equally applying to electronic and acoustic music concerns the listener's impression of being "inside the music, or it [being] inside [the listener]". Walton points out the surprising intimate literality of this impression, which he traces back to two experiential properties peculiar to sounds: reification and physicality. (To Walton, the opacity of the composer's activity in electronic music can be likened to that of a photographer's.) The former enables the latter: "Sounds fill rooms, and travel across streets … they enter our bodies and animate us". Walton notices that, in contrast to visual experience, sonic experience is somatic, from there arguing that somatic sensations of sounds can be "imagined to be feelings associated with full-blown emotions"—an insight with bearings on the discourse on the emotional impact of musical expression (Walton fends off an immediate quibble regarding the somatic experience when wearing headphones, proposing that, in lieu of being concrete, it might be *suggested*). The body conceived by Walton, then, is convergent between the body as vibrating in sound, and the vibrant, affective body.

In Chapter 9, Federico Celestini and Andreas Dorschel set out to clarify the non-essential role expression—and, with it, bodily expression—plays in music, by giving historical counterexamples. In *musica mundana*, in the aeolian harp, and in the phenomenon of white noise, Celestini and Dorschel identify non-expressive forms of music and music making. They argue, for example, that Bach's *Musikalisches Opfer* is a derivative of *musica mundana*, and, in being this, approaches the "music of the heavens"—in Keplerian mechanistic terms the heavens are "not … a divine organism, but … clockwork"—which is thus not a medium of (emotional) expression, but 'objective music'. In examining examples of such objective music, Celestini and Dorschel carve out true and false characteristics of expressive music: unpredictability, for one, is *not* a foolproof indication for expressivity. And although made by a human subjectively prearranging the conditions for music, the aeolian harp is played by nature, and thus non-expressively—a situation that invites analogous consideration of algorithm-based music that is not performed. And the formless and non-expressive noise that is *Rauschen* can nevertheless be *part* of expressive aesthetics, demarcating its very borders, in being the perception of the borders of perception (noting, for instance, that *actual* silence is "the *Rauschen* of the body"). With this, Celestini and Dorschel clear the philosophical ground for a discussion of works of electronic music in terms of their objectivity *or* expressivity.

Composers, improvisers and performers of electronic music have very personal and first-hand experiences of the relation between body and the making of electronic music. The third part of this book concerns a variety of artistic efforts directed towards the inclusion of such bodily expression: in striving for an integration of the feeling of 'embodiment' that an electronically processed sound may have when encountered or played with in performance (as Gerhard Eckel elaborates), in wishing to locate and influence the liveness experienced in a work

or a performance (reflected on by Simon Emmerson) and in experimenting with the audience's experiences of its multisensory perceptive borders (as discussed by Chris Salter). Georgina Born puts such efforts in (anthropological and sociological) perspective, recasting individual experiences in the light of collective creativity's own effects, and the role and potential of electronic media in this.

When, in electronically generated music, the feedback cycle between composing, hearing the composed work or passage, altering it, rehearing it, and so forth, is short enough, the composer's role may overlap with that of a performer (a condition incidentally shared by many composer-performers of the past, as diverse as Bach and Prokofiev), as Gerhard Eckel describes in . In the musical setting Eckel discusses not only do such changes occur immediately (turning the generative music model into a kind of instrument), but the act of potentially expressive performance—beyond that on a laptop—reenters the algorithmic composer's formerly symbolic domain, reintroducing performers including, but also other than, the composer into the (thus collaborative) creative equation. The musical process running as a consequence of its digital automation may thus be spontaneously redirected, and with the introduction of bodily intervention into the automatic generation there arises the question of the expression inherent in the trace of a bodily action. Given real-time processing of performer movement and sound production, the situation Eckel discusses amounts to an "embodied form of interactive generative music". But despite the temporal immediacy between movement alteration and sonic alteration in such a performance situation, the act of playing may *not* feel embodied—that is, it may feel awkwardly detached from the sonic result. In the artistic research Eckel undertook to investigate this challenge, dancers play a virtual instrument (of the interactive generative music model kind just mentioned) that uses tracked motion—that is, an instrument that is not based on physical contact. Eckel's discussion of his research in this direction as part of the Embodied Generative Music (EGM) project exemplifies the analytical challenges composers encounter when inviting co-composers into the creative process via interactive performance technologies; it also gives a first-hand account of the recasting of performative experience in a bid to extend the borders of musical expression.

It should be mentioned that the EGM project considered in Eckel's chapter formed part of the backdrop for the Bodily Expression in Electronic Music symposium from which this book grew. Because of Eckel's statement and because it is also addressed in Deniz Peters's, Jaana Parviainen's and Georgina Born's chapters, however, the EGM project will not be given a close description at this point beyond pointing out that it was a research project conducted at the University of Music and Performing Arts Graz from 2007 to 2010, geared at improving artistic means and philosophical understanding of bodily expression in and beyond electronic music. The project method combined artistic research with applied phenomenology and aesthetic reflection, and involved a range of dancer-

choreographers exploring in—and performing with—the EGM interactive sound environment, plus a collaborative process that motivated changes to the very composition of this environment.

The 'embodiment' performers may encounter in the interactive situation Eckel discussed seems the kind of experiential relation Simon Emmerson calls "feel[ing] out" via technology. Emmerson, in Chapter 11, engages with the question of the 'live' in a musical setting, moving from a straightforward opposition of the conceptual conglomerates 'live', 'human' and 'embodied' versus those of 'real-time', 'machine' and 'disembodied' to a more subtle relation: the " 'live' has shifted territory away from issues of *physical action*". Emmerson views artistic engagement with the extension of the 'live' as a sort of animation of the inanimate, and ultimately, as Emmerson surmises, as a reanimation of the world. The question of the body's role in this reanimation, and, specifically, of bodily expression in 'intelligent music', prompts Emmerson to a thought experiment in which he adapts the Turing test for intelligence to situations involving electronic music practice. Emmerson arrives at asking if it matters "whether I know the identity of those entities I am playing with", effectively extending the listener's imaginative situation that Kendall Walton discusses in his chapter, to that of a performer in musical dialogue: the 'other body' perhaps felt as present in a performative encounter with electronic music, Emmerson concludes, is then "a matter of *negotiation*", of the kind given in ensemble improvisation.

Georgina Born, responding to Emmerson's chapter, agrees in dismissing the idea of a dualism between humans and machines, but finds nondualistic (post-)phenomenological approaches in film theory, literary theory and media theory, and relational ontologies, in their focus on issues of embodiment, materiality, presence and the haptic to be negligent of the social. In the remainder of Chapter 12, Born then articulates how a social phenomenology could "take cognisance of the multiple modalities of the social to which music … require[s] us to attend, and moreover … the capacity of music … to generate new forms, relations and experiences of the social". Testing how actor network theory fares in analysing the social aspects of George Lewis' *Voyager*, and, similarly, putting vitalism to the test in analysing Bruce Gilchrist's and Johnny Bradley's *Thought Conductor #2*, Born finds that actor network theory "risks ignoring the performative ways in which concepts of the social … have been folded into historical process to self-fulfilling effect", but that it does recognise that the "ontology of the machine as actor or creative agent is central" to musical assemblages. In *Voyager*, Born identifies the "de-instrumentalised machine". With vitalism, in turn, Born remains sceptical, amongst other issues, of its "monotemporality". Awareness as to the inflections of the social characterise Born's own position: "there is no musical object—sound, score, performance, technology—that stands outside mediation"; the analyses in terms of social inflictions and mediations Born then gives of *Bodyscapes* (an EGM performance), and in comparing an improvised work of Pauline Oliveros with a subsequent composition of hers that followed an improvisational aesthetic,

exemplify her approach in elucidating the social mediations in assemblages of electronic music.

Chris Salter's artistic research as part of his interactive installation *JND* ('just noticeable difference') concerns his own and, subsequently, the public's borders of bodily perception, negotiated in a setting where perceived environment and a participant's self-perception may stop being readily distinguishable. Salter's work thus concerns phenomenological shifts and extensions between body and space as mediated by haptic, sonic and visual stimuli composed in the installation and also —via the subduing of nonrelated perceptions Salter achieves by asking the public to enter and lie down in a confined and hermetic space—composing it. Salter describes the ideas that motivated this work, including little-known psychophysical experiments as well as Dewey's pragmatist concepts of art as experience, leading thought to a point where he relates the (fairly) immobilised experiencer within the artwork's environmental alterations with Alva Noë's (amongst others') ideas on active perception. In the participants' experiences, which Salter recounts on the basis of qualitative interviews, the virtuality of the environment appears to flip over and mingle with what participants experienced as their own bodily extension, or as their doing. Salter's chapter, which concludes this book, is thus an instance of artistic work that, via electronic means of multimodal stimulation and feedback through an interactive floor, shifts artistic focus onto an audience's (partly subconscious) bodily expression, after entangling the artist's own bodily experience. The individual participants become co-creators of their experience, not only in imagination, but as part of the subtle sensorimotor interaction with the responsive artwork.

The three parts that make up the book are not separated from each other as parts of a mosaic or individual components of an engine. Each angle holds within it an awareness of the others—that is, the parts make up approaches that delve into the concepts central to the other parts. All chapters, albeit with different weight on theoretical or practical knowledge, are unified by a central concern for the body, and for the discerning of its presences. It is left open to the reader with which of the three parts to engage initially and with which to proceed. The first part might attract those who seek a widened background to the topic of body and bodily experience in dance and music; the second enters the overlying topic from the side of the question of musical expression; and the third voices artists' experiences and reflections on the role or place of the body in the creative process. All parts feature critical readings originally based on responses and which introduce elements of transgression into the other parts or beyond the presently established horizon.

Composers of all times have productively composed with and against the body.[11] The discourse present in this book addresses the thought that the body is more volatile in electronic music than it has hitherto been, but shows that its presence, though perhaps displaced and obscure due to an offline montage or an inaccessible mapping, can still be composed with or against. On the artistic side the shaping of such bodily expression has been a long and ongoing quest rather than

a ready-at-hand success-story,[12] so much so that it indeed makes sense to speak of a disembodiment to be overcome, rather than an embodiment nonchalantly and trivially sustained. A persistent 'reclaiming of performativity' seems a major thread in aesthetic practices, which have shaped electronic music history and are currently experiencing a culmination of aesthetic interest and potential. Which bodies are we regaining, creating, appreciating, experiencing through it? This question is not only one for a theoretical encounter with culture, though its philosophical reflection may be revealing. It is one, as this book contends, that we are confronted with when we take part in *any act of musicking and any work of* electronic music, witnessed in concert or wherever else we may be listening, dancing to, or practising it.

NOTES

1. Christopher Small, *Musicking: The Meanings of Performing and Listening* (Middletown, CT: Wesleyan, 1998), 8.
2. As done, for instance, by Christopher Small in his discussion of gesture (Small, *Musicking*, 57–61).
3. For example, Busoni's, Futurist and Varese's aesthetics. See also Nicolas Collins's characterisation of tape music as embodying "a kind of high Modernist desire for extending composerly control and independence" (Nicolas Collins, 'Live Electronic Music', in Nick Collins and Julio d'Escriván (eds.), *The Cambridge Companion to Electronic Music* [Cambridge: Cambridge University Press, 2007]), 39. For an alternate take on the limits of imagination and their positive aesthetic use see Adorno's remarkable point, Theodor W. Adorno, *Aesthetic Theory*, eds. Gretel Adorno and Rolf Tiedemann (London: Continuum, 2004), 48.
4. Christopher Salter aptly terms the Futurists' engagement in the mechanistic production of sound "utopian machine aesthetic" in his recent *Entangled: Technology and the Transformation of Performance* (Cambridge, MA: MIT Press, 2010), 182. The term holds well for similar sonic constellations that have since ensued.
5. Characteristically, a recent collection with high relevance to the present topic addresses the mediality of the body without offering a deep interrogation of the concept of body. See Michael Harenberg and Daniel Weissberg (eds.), *Klang (ohne) Körper: Spuren und Potenziale des Körpers in der elektronischen Musik* (Bielefeld: Transcript, 2010).
6. See, for example, Margaret Lock, 'Cultivating the Body: Anthropology and Epistemologies of Bodily Practice and Knowledge', in *Annual Review of Anthropology* 22 (1993), 133–55.
7. Jonathan Sterne, *The Audible Past: Cultural Origins of Sound Reproduction* (Durham, NC, and London: Duke University Press, 2003), 12.
8. A caveat: it is not at issue whether some or all electronic music is art music or not. Rather than asking 'Is sonification music?' or 'Is this or the other work an instance of art music?', the present authors have set themselves to the task of conceiving of and interrogating bodily expression *in*—not *as constitutive of*—music where the body's implicit complicity may have been unsettled or undone. Indeed, the very unsettling of the body is the source of a culture that forms in response to this unsettling. A philosophical and aesthetic awareness of ways of bodily expression in electronic music could then support a cultural analysis and interpretation of what body can be heard in, say, a track by Aphex Twin, or Ceephax, or a sonification of

earthquake data.

9. Joanna Demers, *Listening through the Noise: The Aesthetics of Experimental Electronic Music* (Oxford: Oxford University Press, 2010).

10. See also Deniz Peters's 'Enactment in Listening: Intermedial Dance in EGM Sonic Scenarios and the Listening Body', *Performance Research* 15/3 (September 2010), 81–7, for a discussion of the dancers' intermedial aesthetic experience in the same project.

11. Composers such as Ferneyhough positively require performers' bodily limits (both in terms of ability and physique) precisely for their specific aesthetic. In other cases, the challenges of some scores serve to highlight the individuality and uniqueness of some performers. Others again (Rachmaninov, for example) write a music so suffused with bodily knowledge that, without close and practical knowledge of the score, some works may appear unplayable to a listener, while in fact being technically less demanding than others that confront performers with extremely awkward sequences of hand and finger positions.

12. This finds illustration in, for example, a notable ideal of the New Interfaces for Musical Expression (NIME) community to create electronic instruments with a sonic identity and movement relation sufficiently 'intuitive' and appealing for sustained aesthetic interest.

Part I

Bodily …

1 Touch: Real, Apparent, and Absent

On Bodily Expression in Electronic Music

Deniz Peters

To make a sound—be it with one's body, or with a traditional instrument—retains a direct, visible, audible, and tactile link between the human making it and the temporal, timbral, and spatial organisation of the sound made. In listening to sounds made and organised in this bodily way, a listener, even if not directly involved in the making herself, partakes in this game of contact, articulation, and withdrawal. One facet of the game is that one can hear something of the human making the sound *in* the sound, or, to appeal to Roland Barthes's frequently quoted notion of 'grain': one can hear the musician's body in the music.[1]

The link by virtue of which the musician's body can be heard is, by some, thought of as irrelevant to, or even in the way of, the process of listening to music. To Roger Scruton, we would not yet be listening to music, but merely to a sequence of sounds, if we listened to an implied body. Instead, in listening "with understanding", the body is *abandoned*:

> It is as though human movements were lifted free from the bodies in which they originate and released into tonal space, there to achieve a togetherness beyond anything that could qualify our bodily life.[2]

In emphatically shutting out source-related bodily associations of players and instruments alike, Scruton's abstraction from the body amounts to a disembodied listening. Scruton views the knowledge we have of what is ultimately the performativity of traditional music as a *hindrance* to the reception of its expression; in what he calls 'acousmatic experience', music ideally remains opaque to us in terms of how its sounds are made, as do the speaker's facial and gestural expressions in the case of the Pythagorean students (*akousmatikoi*) listening to their teacher speaking from behind a veil.[3] In a sort of undoing of the Barthesian 'grain', and of the instrumental qualities of the sources of sounds, Scruton's view requires us to remain oblivious as to—primarily the visuality, but in sum the materiality of—the act of musical production.

Any such hindrance should disappear, or so one might think, where there are no longer players or instruments in the traditional sense, as is the case in much

electronic music.[4] The abstraction from sources and playing beings Scruton takes as essential to the listening experience is *implicit* to music played using machines, with its sounds being generated algorithmically or as a result of sampling, or in a combination of both. Even in electronic music involving live performance, the heard qualities are physically unbound from the performers' actions, and the link's composition may often escape even the informed listener. Electronic music could thus, in Pierre Schaeffer's but also even in Scruton's sense, be thought of as paradigmatically acousmatic—its corporeality being opaque or even nonexistent to the listener, without the need for an abstraction from its live production (as there may be none). With no body to abstract from, neither on the side of production, nor on the side of listening, is such music perhaps simply one without bodily expression—that is, *inevitably* disembodied?

The answer I shall support in this chapter is 'no'. If by 'disembodiment' one understands the undoing of the spatial, temporal, and qualitative ties between maker of sound and occurring sound—as when a sampled female voice is injected at the DJ's will into the fabric of some house or trance music, or as in Luc Ferrari's *Presque rien avec filles* and other anecdotal music—I shall argue there is nevertheless a residue of bodily presence in the sounds we hear, both on the side of the sound and its organisation as chosen for a piece, and on the side of the listening experience. One might think that such a residue is precisely *only that*, an imprint, a pale trace of the full presence given when the maker is physically there. But I think there is reason to doubt this. Even in the presence of the physical making of organised sounds in performance, what we hear becomes *expressive presence* only via our bodily experience in listening. Unless what we hear is shaped in a bodily prefigured way, and unless this is heard in the sounds and their organisation, the music will not become palpable to us, as I shall explore throughout this chapter. My thesis is that *despite* the often noted "disruption"[5] of bodily sound-making in music using electronic media, and despite listening attitudes and theories that construe listening as disembodied, there is much more bodily presence in what we hear when we hear music than hitherto acknowledged, and that, in terms of aesthetic perception, it may even be *omnipresent*. I argue that our listening experience is embodied not as a consequence of the Barthesian 'grain', but as a consequence of active perception (*enabling* the experience of grain). What I here discuss in terms of bodily presence and the appearance of touch is at work even in aesthetics rejecting such material or sensual ties.[6] The idea I shall expand on in what follows is that, behind metaphorical ascriptions of organised sounds as gestural or in other bodily terms,[7] there is a literal aspect, grounded in the act of perception understood as a *bodily act*. The literality of these ascriptions, in other words, lies in their proprioceptivity (including tactility), and emerges from bodily knowledge. Bodily expression, as a consequence of this view, can be seen as an issue electronic music (like other contemporary and traditional musics) is deeply suffused with. Its understanding may, for instance in addressing tactility as a component of sonic organisation and character, help to shed light on intersubjective aspects of our

aesthetic experience of specific works or performances. The result is a diversified view: touch—occurring during sonic articulation via bodily expression and, as a feeling of touching or being touched, in the listener's proprioceptivity—can be absent or present, and in its presence apparent or real, in electronic music. Electronic music becomes an *interrogation* of human presence or absence by the very difficulty that composing this presence in fact entails.

LOCATING TOUCH IN BODILY EXPRESSION

In music played on traditional instruments, touch forms a subtle part of a performance. It is present in the performers' literal tactility on the instrument, which we are so used to viewing as a kind of sound-generating labour that we might be misled to deem the nuanced skin contact here as aesthetically irrelevant. Upon listening with our eyes closed we might drift into believing that the sounds are there for themselves, 'pure' sounds, leading an independent existence from the wordly labour or play of performance, making performance *transparent*. Thinking that we appreciate what we hear without an interest in how it is made, we might overlook that we are blocking out the makers, and the conditions of making.[8] We might then even be led to think of the making as *obtrusive* to musical experience (see Scruton's point as discussed above). But, in so doing, we bracket something this literal tactility *also* provides: there are aspects of bodily presence that go beyond the obvious given that performers literally touch the instruments to make sounds: (1) we hear musical gestures *other* than the performers' individual and idiomatic playing gestures *in* the latter, something that would cease if the latter were not organised through the medium of the body; (2) we can be 'touched' by music and experience musical chills;[9] (3) there is a hue of haptic experience: music can be and has been described in terms of texture, physiognomy,[10] tactility, and breathing, either in bodily terms (as if it had a body), or in terms of visceral experience (as felt in the body);[11] and (4) even when sounds from various sources blend (as in harmony) or fuse sequentially (as in *Klangfarbenmelodie*), this might be seen as a form of touch outside what is literally done by performers. These four forms of touch do not take place between players and instruments; they name invisible meetings of bodily presences, with bodies being those of listeners, of the music, and of the sound vibrations and instruments' sonic identities. But despite the figurative description, some of what we experience when we are literally being touched does reside there somehow, and with this the intentionality implied in touch as a psychologically coloured act of contact.

The presence of touch just described eventuates between two materialities: next to the physicality of performance, the listening experience introduces a second, *invisible* materiality, a second tactility, in its being grounded in the body—not only in the bodies of others, as they make the sounds, but also, importantly, in our *own* bodies. What we hear is, by physical necessity, the sound of contact and excitation; and we have embodied knowledge of the making of such contact to effect such sounds. Even without knowing how these sounds and sound sequences were made in terms of instrumental playing technique, we may hear them *as* touch (quite aside from a comparative listening to their structural organisation).

This second tactility—a tactility experienced through the sound and from the body—is given to all listeners as part of their bodily experience, and, if sufficiently

so, it can enable mutual empathy. It can amount to an invisible yet palpable bodily presence in the music which, given the awareness, may be anticipated, arranged, and apprehended. Hearing (from) the body means to hear *crudeness* and its overcoming; *identity* in the unified range of its patterns (affected by anatomy); *intimacy* in the skin-tight proximity of haptic sensation and the familiarity with one's own bodily realm of being—that is, *shared existential givens*; via this, *stamina* and *endurance*, in the knowledge of efforts behind *articulate* tactility; believed physical limits and their virtuosic *transcension; gender* and *self*, via significant habits and their individual constellation and dissolution as achieved in different works; and *memory* and *discipline*, in the ability to repeat and to recognise repetition. In sum: tactility speaks of specificities and agglomerations of the enumerated qualities making up bodily expression.[12] I regard this as a crucial condition for our ability to grasp music at large, which, as I shall presently argue, includes our ability to grasp electronic music.

All that can be heard as touch-related in the above sense has two perceptive components: a heard component, and a felt component. The meaning of 'felt' or 'feeling' in the present context is not to be confused with that of 'emotion', nor does it necessarily include a judgement of like or dislike. Rather, it concerns the listener's proprioception—that is, the feeling of one's bodily extension.[13] Proprioception, unlike sensation as caused by skin contact, is an *awareness* of the body, as it is sustained without direct haptic stimulation. The second tactility I spoke of is, in this sense, one felt proprioceptively.

This claim affords further explanation. Before I do so, the issue of an intermodal perceptive phenomenon as part of the listening experience needs further clarification. It is widely acknowledged that the experience of music transcends the hearing of sounds as mere sounds. We hear motion and action, gestures and personal expression in music.[14] The underlying notion of *hearing in* is widespread amongst music philosophers. Roughly, the idea is that there is an affiliation of mental states with musical processes, thought of as given in *hearing in* as if there were some immediate correspondence between some motion in music—a motion thought ideal—and the recognition or even experience of, for instance, emotional and other psychological states. Even the most sophisticated conceptions of this interrelation, as for instance Jerrold Levinson's concept of persona, however, fall short of closing the gap in our comprehension of how hearing a *specific* instance of motion in music goes into our hearing a specific instance of personal expression in it; no doubt that we can experience this, but how does the latter arise from the former *qualitatively*?

Paul Boghossian is one of the authors to notice this explanatory shortcoming in Roger Scruton's conception of double intentionality.[15] In a nutshell, Scruton conceives of the experience of music as *music* (as opposed to mere sound sequences) as given in a double bind between a world of sound and a metaphorical world of tones, strangely uniting *hearing in* with the heard like a change of aspect. Boghossian rightly raises that the grounds of the metaphorical experience at the

basis of a hearing in so conceived remain inexplicable. How come we are able to hear specific sound sequences as *these* specific personal expressions of mental states, in a non-arbitrary way, granted that we do this? Levinson's argument stops at a similar point as Scruton's: the abstract musical persona's gestures *somehow* have a literal aspect, and we recognise and experience personal expression through these; but any talk of musical gestures is metaphorical. What links one with the other?

A way out of this dilemma appears via a less noted perceptive intermodality that extends *hearing in*: musical experience includes a felt dimension. The idea of such a felt dimension is gaining recognition in recent years. For example, Andy Hamilton, in his *Aesthetics and Music*, speaks of the felt correlation between rhythmically organised sound and bodily rhythm.[16] Andrew Mead, in his 'Bodily Hearing' (1999), and Arnie Cox, in his 'Hearing, Feeling, Grasping Gestures' (2006), speak of a viscerality in musical experience.[17] Cox bases his "mimetic hypothesis"—where a listener supposedly mirrors the performer's excitation—mainly on subvocal imitation—that is, a silent vocal mimicking. David Burrows, in his *Time and the Warm Body* (2009), speaks about implicit tactility and bodily aspects of listening to timbre, texture, and voice.[18] These authors all hint at musical experience as being grounded in the body. But, as before, it remains obscure what precisely constitutes this grounding.

This is where I return to my earlier claim that there is a tactile strand of musical experience (involving proprioceptive awareness), which is as essential as *hearing in*, and which amounts to *feeling in*, and that the latter grounds the former. We may experience sonic gestures haptically, feeling their tactile qualities as arising from *our* bodily knowledge. It requires a phenomenological deviation to support this claim, as I shall give now in abbreviated form.

Merleau-Ponty, in his *Phénoménologie de la perception* (1945), presents an elaborate argument for his view that body and mind are not separate entities—ontologically split onto physical and metaphysical realms—but intertwined. Our bodily perception is not constant, but malleable, and may extend into the environment, as much as the environment extends into us, structuring our perceptive abilities. We may extend into the tip of a pen, or the end of a walking stick, and feel as if we were touching right through these objects, thus incorporating, or *embodying*, them. A violinist may prolong her touch in this way through her bow to the point of contact with the string or corpus; a pianist may similarly prolong her touch through to the hammers' felts. This *felt* body—that is, a body that is also charged already with a history of perceiving space via haptic and visual perception, a body that is deeply imbued with holistic sensual experience of being in the world—is called 'lived body', *corps propre* in French, or *Leib* in German. Merleau-Ponty views the lived body as a place of synaesthetic experience. I propose that it is precisely by virtue of our lived bodies, and in particular our everyday experience of the touch-sound correlation which has been with us all our lives, that we are able to extend into sounds. When making sounds ourselves, this

experience always incorporates haptic qualities along with sonic qualities. Upon hearing sounds alone, unthinkingly, our lived body suggests potential feelings, *as if* we made those sounds ourselves. Auditory perception invites us to extend and *feel into* the heard, in a sort of haptic completion.

In saying that we feel as if we made these sounds upon hearing them alone, I do not mean that we somehow imitate the *performers'* playing gestures, as Arnie Cox and Jerrold Levinson, along with many other authors on musical experience, hold.[19] From what I said about the lived body, it follows that an essential part of our listening experience draws on what our *own* body suggests might have gone into the making of this sound. This suggestion is an animation of the *heard*, and not, as is mostly held, the transfer of what is *seen* in a performer (imagined or real). It comes as an inkling of a *feeling*.[20] The sustained sound of a piano, after a single keystroke, despite the hammer falling back, still feels *as if* continuously made, as if made by an invisible touch sustaining a process of friction. That is not at all how the pianist makes it, but rather how we would use our voices or bodies to produce a similar sustained sound. (Incidentally, Collingwood, in his *The Principles of Art*,[21] relates a similar impression: "As we seem to see the puppets' features move, so we seem to hear a pianist producing a *sostenuto* tone, almost like that of a horn.") While this might seem counterintuitive to the physical facts of instrumental sound production, clearly, a *cantabile* in the piano as achieved by sophisticated players would be an impossibility without an anthropomorphisation of some sort. We hear a voice going through a sequence of piano notes, if adequately played, and, importantly, we may feel a gesture going through it as well. How could we hear such a voice? What would be a convincing example for such an active completion of the heard in the act of perception?[22] Because that voice is obviously *not* in the piano. Or is it?

In trying to shed more light on the issue of perceptive completion, consider Peter Ablinger's *Quadraturen III*, which presents an intriguing example of a voice the spectrum of which is only rudimentarily given and which becomes a *voice*, in my view, only as a consequence of completion via active perception.[23] Ablinger took a recorded speech by Fidel Castro (1974), and, in collaboration with programmer Thomas Musil, quantised its waveform's frequency spectrum to fit the 88 keys of the piano. When playing back the result through an automatic player piano built by Winfried Ritsch, the first impression is that of a chaotic and frantic agglomeration of notes. A few seconds into the listening experience, a human voice emerges from the piano. Its speech can in some passages even be understood. Although not every listener will discern it,[24] this composition makes the act of completion explicit. It is one of Ablinger's exquisite and revealing ventures into the workings of (auditory) perception.[25]

I think a similar act of completion enables us to hear and feel gestures literally in music—the tactility mentioned above.[26] In the case of gestures, as different to the voice, completion stems not primarily from vocal knowledge, but from tactile knowledge—in other words, embodied knowledge of how *touching*, rather than vocalising, in specific ways creates specific sound qualities and modulations. In

my view, we listen (like we see) *as if* touching, using the latter bodily knowledge. Thus the process of enaction in vision, as argued by Alva Noë, to me, has its equivalent in auditory perception: in listening, our bodily intentionality engages, though in a covert form, in imaginative enaction.[27] Our perception actively completes the heard with *felt* gestures of touching, which to some extent we can make explicit at any time by using gestures, or by way of dancing. These gestures embrace articulation, emphasis, and all other nuanced qualities felt when touching things, their surfaces, or a person. The active completion occurs *from* the lived body, as the lived body holds within it knowledge of *possible* gestures, part of a bodily intentionality as conceived by Merleau-Ponty.[28] As we listen, the gestures' potentiality continually becomes a bodily actuality, forming felt shapes of sonic motions.

At this point one might ask, following a mental simulation theory that has received much interest recently: could this actuality arise as a consequence of simulation? The theory of mental simulation has been applied to music in different detail by a number of authors, notably Alain Berthoz, Rolf Inge Godøy, Jerrold Levinson, and Tom Cochrane.[29] Simulation theorists basically argue that the act of perception involves mental simulation of world events. Some areas in the brain are thought to model behaviours, such as a thrown ball's flight path, thus to predict its potential and probable movement. In an analogous fashion, some authors envisage qualities beyond those of 'pure' sound to be a result of the brain's simulation of the environment in which a sound is generated and which makes it the sound it is. For example, Godøy's account conceives the perceptive process as one in which, via mental simulation of sound generating actions using sensorimotor models, abstract sound becomes multimodally enriched. Put differently, our knowledge of bodily action is used to backtrack what it feels like to be making the particular sound one hears; thus one hears that noise as a scraping stone based on a simulation of the scraping that one may witness at a contemporary performance of sonic art. Godøy's simulation theory account shares many observations and subarguments with what I am currently proposing.

But there are reasons to be sceptical of a conception that mainly draws on the brain's abilities of simulation to further the understanding of *hearing in* and *feeling in*. The first is that in the absence of a visual stimulus, say when listening to a recorded performance, hearing in still takes place. The question here is: given the enormous variety of potential sound generating actions, how could the brain know *what* to simulate? What would be the brain's starting criterion for knowing what model to use? An initial orientation of the simulation capacity would obviously first require a sort of recognition (at least a rough one) before a simulation could take off on those grounds. But, for a recognition to take place, a simulation would have to be engendered first (unless our brain is believed to somehow store and recall representations of former experience). Any simulation would therefore be necessarily preceded by another simulation, which, again, would require a prior simulation for orientation. Even if the threat of circularity here might be avoided

somehow, it is still hard to imagine how the chain of simulations would eventually be grounded in the appropriate knowledge. In the musical case, a satisfying explanation based on simulation theory would clearly have to address this problem, however. And any recourse to mental representations further complicates and clouds the issue, raising questions as to how non-musicians acquire sufficiently refined (multimodal) representations of playing actions for them to appreciate music emotionally as a consequence of simulation.

Put briefly, the simulationist approach to musical experience puts imitation of performer's actions before experience, as experience is viewed a consequence of simulation. In contrast, I have argued that hearing in and feeling in are being provided by the listener's bodily intentionality, which may (or may not) eventuate to a form of empathic following of a performers' actions or parts thereof. Rather than sheer imitation, there is a kind of imagination active in this, but a kind that is partly involuntary. Plus, unlike projective imagination, it is not superimposed on an existing perception in the same modality, as would be a daydream landscape, or a fictive pink colouring of the walls in a white room, but corresponds to something actually *given in bodily experience* simultaneously. In this, it is closely linked to recall. Recalling childhood smells can make them appear present to our olfactory senses here and now, albeit ethereally so. They become present in imagination through voluntary recall. The presence of felt shapes of sonic motions is imagined in (partly) involuntary recall, provoked by auditory perceptions.[30]

As much of human bodily existence, particularly in its sonic presence, is shared, these literally felt, though imaginatively enacted, gestures, I believe, are fundamental to the intersubjectivity of musical experience. A composer draws on her experience of such gestures in conceiving a work to be performed; a performer draws on her working knowledge of such gestures to enrich the underdetermined score with articulation and expressive plasticity; and a listener brings to the listening experience her lifetime experience of such gestures, and their affective charge. With the described completion, the act of perception adds a latent expressivity to listening. Musical experience thus gains a dimension of personal expression. When, now, the *making* of sounds changes, this alters something within this grounding of the intersubjectivity of personal expression. And the making of sounds changes fundamentally in electronic music.

AESTHETIC CHANGES PARADIGMATIC TO ELECTRONIC MUSIC

Sounds come into being by way of excitation, movement, and friction. This link between qualities of human touch, material touched, and sound is unhinged in electronic music, with its doubly altered performativity: (1) recording media and sound synthesis have bracketed the performer in some practices (with the composer of course still 'making' the music); (2) in the case of electronic instruments—and this justifies talking of a new instrumental paradigm—there is a gap that needs to be filled between human touch and sound made, despite—or as part of—their instrumentality. This gap is no longer bridged by a mechanical device, as in the piano's action. Unless specifically designed, an electronic instrument is no longer a bodily extension that prolongs the touch, but something that supplants its functionality. As a visible physical detachment, this is perhaps most tellingly apparent in the theremin, one of the first electronic instruments. More subtly, in a given mapping (that is, the freely determined projection of a set of movement data onto a set of sound data), the sound projected by the loudspeaker for example *may* be completely arbitrary to any meaningful human motion, resulting in a profound form of detachment. Human motions, in their particular qualities, might cease to be heard as causing the sound. The *making* of music then virtually fades as a bodily act, or as an anticipated bodily act.[31]

I shall now consider the particular situations of composer, performer, and (in the next section) listener as to the altered conditions of production and reception in this context.

(1) Composers' situation. What if there is no performer shaping sound processes gesturally? In composing electronic music of the acousmatic type, or computer music, live performance is largely absent, the only 'performance' often being one in inverted commas: that of hard- and software (the electronic and algorithmic automata). In these genres—unlike in algorithmically composed scores, or computer-aided composing, where performers still interpret a score—composers no longer anticipate anyone performing their work.[32] Such compositions are quite transparently represented in a recording, or in their generative algorithm, ready for repeated listening. This does not mean that a composition of this kind would necessarily be fixed: it may have an inbuilt variability.[33] As a consequence of dealing with the sounds directly, composers in this situation define sound objects with more detail than in a notated work; they may work on microstructural levels, as described, for example, by the composer Horacio Vaggione,[34] or on other structural levels, down to intricate manual selection of organisation and perceptive qualities. The composer thus arranges actual sounds, unlike the imagined sounds that usually are concomitant with a score. Unlike the performer's body, though, the

composer's body is, at least on first sight, pointillistically present. Bodily limits do not impose limits on the sound, and manual actions at the computer occur as part of programming algorithms, changing parameters, and using varied input devices.

Despite all this intermittent activity, the individual actions *may* amount to a minuscule sculpting of sound. And arguably it is the composer's listening body as present in imaginary enactment (or even literally, as in an inspired gesture carried out amidst the studio during composition to test the 'feel' of a passage) that is then ineffably present.[35] A composer's motion might also, in a kind of performative fieldwork part of the compositional process, be captured in the motion of a microphone, or, even more subtly, in the placement of a microphone, and in the choices of recording conditions. Someone else's movements, or movements from nature, may be borrowed using a microphone, or by way of algorithmic modelling. Sound bodies might become objects of refined exploration, as in Gerriet K. Sharma's and Dirk Spechtl's *Abandonee* (2007). The limits of these activities are not those of physical skills; they are limits and characteristics of the technologies used, the performativity of the hard- and software—their figurative bodies. To be clear: these limits do not define human bodies, but within these limits human bodies' expressions can *sometimes* and *to some degree* be discerned.

Assessing the vast possibilities of choice in the acquisition and organisation of materials, Denis Smalley discusses the role of musical gestures in the aesthetics of electronic music composition. He distinguishes between primary (physical) gesture and different levels of "surrogacy", and displays a remarkable attention to the varied *levels* at which gestures can be "detected".[36] Smalley's awareness as to the link between gestural organisation and a listener's intimate personal experience, and, conversely, its distancing in the absence of attributes linked to the "gestural field" supports the view that composers of electronic music are especially challenged to be aesthetically attentive to this situation, which results from the absence of a performer whose work this would hitherto have been. The act of composition itself may thus be as rich in possibilities to use gestures, as in notation-based work, except that it occurs with only faint participation of the moving body as material medium. In heeding the gestural field Smalley describes—that is, in meaningfully imbuing electronic music with gestural qualities—one can then speak of a kind of success, at least in styles interested in deliberately addressing this aesthetic category.

(2) Performers' situation. With the possibility of inventing concrete but non-traditional ways of organising electronic music using gestural expression as part of what Hugh Davies calls "the reintroduction of the performer into electronic music",[37] a number of styles involving performative activity have evolved. Electroacoustic music—that is, music involving performance with traditional instruments, augmented by live electronic processing of their sounds as recorded by microphones—is one of these. But it is not at all self-evident that the (re-)integration of performance actually has the intended gesturally enriching effect. As John Croft writes of the challenges in electroacoustic music, there is little aesthetic

space between a simple duplication of traditional instrumental performance, and, on the other hand, the (very local) triggering of precomposed materials.[38] Croft finds the main cause for this difficulty manifest in the mapping between motion and sound, which splits what he after Simon Emmerson calls 'liveness' into "procedural liveness" and "aesthetic liveness"[39]—in other words, performative activity and activity *heard in* the performance. Croft states that all too often the "poetic significance of 'liveness' is lost" as a consequence of this split, and that a concert might equally consist of a fixed tape in such cases.[40]

A mapping needs to inherit the attributes of what Smalley called "gestural field", at least to some degree, if it is to be expressive in this regard. This is recognised by many as an enigmatic problem, and a vexed subject in electronic music composition and instrument design. Guy Garnett's conclusion on this subject, for example, as delineated in his 'The Aesthetics of Interactive Computer Music', voices a decisive interest in meeting these challenges against what he calls the "machine aesthetic", for the sake of expressivity.[41] At the same time, many composers' aesthetic interests are removed from this problem; but then, arguably, their interests also leave the entire area of bodily expression, moving towards what Federico Celestini and Andreas Dorschel conceive as 'objective music', and towards a radical disembodiment in Alva Noë's sense.[42]

ABSTRACTIVE AND EMPATHIC LISTENING MODES

Composers and performers are themselves listeners. A basic experience that has captivated numerous phenomenologists, amongst them Husserl and Merleau-Ponty, is this: when touching ourselves, such as in touching one hand with the other, we simultaneously perceive ourselves as touching, and touched. Following on from the idea that sound involves touch, this self-immersion is as well present, via imaginative enactment, in hearing the sounds one actually makes. Performers directly, and composers indirectly, engage in this experience of self-touching via the listening experience. The experience of composing and performing knows moments of grasp, in which the sounds made or 'made' become palpable, which might be a subtle reason for the attraction of the metaphors of form and shape in describing temporal musical processes (quite apart from their transfer from the *visual* domain of the score).

This grasp, or a version of it, may also strike a listener. Whether it does, though, depends on the *mode* of listening. To listeners, as opposed to composers or players, the sounds occur without their doing. Upon hearing a sound, one instinctively attends to the sound source's location and kind or character. In active ignorance of this, our listening attitude can direct attention away from the real and worldly, and towards the abstract. Abstractive listening—called 'reductive listening' by Pierre Schaeffer, and 'acousmatic listening' by Roger Scruton—is uninterested in the 'natural' causes of sounds. It keeps *feeling in* as discussed in this chapter at a distance, disembodying the listening experience.

Upon close scrutiny, though, there is a dialectic twist to the abstractive direction in listening. As Godøy unearths from his close reading and analysis of the Schaefferian *Traité des objets musicaux*,[43] there are gestural qualities that emerge from composition via reduced listening after all. And while abstracting away the sources of the sounds leaves one with Hanslickean "tonally moving forms", the word 'moves' betrays the remaining attachment to the world, since, where there is movement, there is the possibility of expression, as Scruton points out himself against Hanslick.[44]

Going in the other direction, a listener might have the attitude of empathic participation. This foregrounds an interest in hearing a making, or a maker (concrete or imagined), of the sounds, as rooted in, importantly, feeling the sounds via imaginative enaction in the way presently conceived. While the history of Western classical music has seen feats of expressive intimacy connected with this mode of listening, listening to some electronic music with this attitude may be pointless. However, there is much electronic music where human agency, or natural (environmental) agency, and the experience thereof, *is* aesthetically paramount. For instance, behind works such as those of Elsa Justel or Natasha Barrett there is a sophisticated weaving of minuscule points of contact, in complex constellations of

sonic intimations; works through which we may grasp expressive facets of the world, and empathic listening is here implied. These works are composed, I claim, in the empathic mode, in order to provide the various levels of gestural surrogacy achieved therein.

This brings me to my conclusion. Despite an absence of the bodily making of sound, the graspable bodily expression in tactile musical gestures, as discussed so far, lies within the reach of electronic music as it does with other music; only the provision of it is either removed from concrete bodily making, or is somehow simulated or otherwise designed as part of a performative component. Tactility as an aesthetic category is therefore a useful notion in comprehending and distinguishing works of electronic music. And it can be real (as in: actually performed), apparent (as in: simulated), or absent (as in: avoided). Since transformations and transitions between the latter aspects are possible, this may throw new light on what we hear in works of electronic music. While overall there are abstractive and empathic tendencies in composing, performing, and listening, mixtures and oscillations will prevail in concrete instances. As Andy Hamilton likewise suggests, listening may alternate between the two types of aesthetic interest I described as empathic and abstractive.[45]And both faculties might be at work at once, as for instance in the expressive displacement of a sound's known source. Such displacement requires both detachment and attachment: it is by way of detachment (involving abstraction) that we come to hear the sounds as sourcing from locations *other* than the loudspeakers—which may be hung at a distance or hidden from view, or be worn right on our ears as headphones. I regard Bernard Parmegiani's *Incidentes/Résonances* as a stunning example of displaced source attribution. If heard via headphones, the work superimposes a strangely mechanical 'performance' of altered resonators into the area of one's brain and inner headspace. This source-displacement can also be initiated by visual cues—when we are watching a music video, the sound often seems to come from the displayed people, for instance—or it may be the result of a spatialisation. Or, via more markedly embodied participation, it may be the result of an imaginative completion of a sound's maker, an implicit agency, in Parmegiani's case a cerebrally placed quasi-mechanical device.

To bring the body to appear expressively in sound, then, as it appears in the painter's brushstrokes, the drawer's *ductus*, or the dancer's outright bodily articulations, is a matter of artistic achievement in electronic music, where the making of sounds may disappear elusively into mappings. Whether to include or abandon bodily expression is an aesthetic decision. It is thus not only in recent works composed explicitly in this spirit that one may discern the presence of an alternative aesthetic to what Adorno exposed as the "taboo on the sensual";[46] instead, given an awareness, bodily expression can be encountered throughout the history of electronic music. And, inversely, approaches to objective music will benefit from a refined understanding of bodily listening. The body does not disappear, but we never know *how* real the touch is towards which our listening

extends in works using electronic media, and who the agency behind it is. Some music will speak of an abandonment, as the absence of expression is the expression of absence. Bodily expression in electronic music, conversely, lets reciprocity, intimacy, and responsibility into the experience, celebrating presence despite the paradigmatic disruption. Between these two extremes there is a vast area of aesthetic exploration, brimming with the full potential of our human perception and imagination, and inquiry through art.

NOTES

1. Roland Barthes develops his notion of 'grain' in 'The Grain of the Voice (*Le grain de la voix*)', as part of his *The Responsibility of Forms* (*L'obvie et l'obtus*), trans. Richard Howard (Berkeley and Los Angeles: University of California Press, 1991), 267–77, esp. 276 f.). Grain, to Barthes, is the (voluptuous) presence of the performer's body to the listener, in the act of listening. Via the voice, the singer's body appears not in a language type of expression (symbolic and inferred), but sensually. Examples of reliance on this aspect of Barthes's notion in recent discourse on music are Tara Rodgers's 'On the Process and Aesthetics of Sampling in Electronic Music Production', *Organised Sound* 8/3 (2003), 313–20, esp. 317, and John Croft's 'Theses on Liveness', *Organised Sound* 12/1 (2007), 59–66, esp. 65. However, it is important to note that, as may be gathered from two other texts within *The Responsibility of Forms*, Barthes's fuller idea of the body's appearance in music includes the composer's body ('Rasch', pp. 299–312), and a sort of performative listening ('Musica Practica', pp. 261–6). I agree with these three aspects of bodily presence, yet do not follow Barthes's dualistic juxtaposition of body and soul and the linguistic conception of expression he derives from it. I therefore refrain from adopting the notion of grain for my approach. For a consideration of the aspect of the composer's body, see Stephen Rodgers's ' "This Body That Beats": Roland Barthes and Robert Schumann's Kreisleriana', *Indiana Theory Review* 18/2 (1997), 76–91.
2. Roger Scruton, *The Aesthetics of Music* (Oxford: Oxford University Press, 1997), 438–9. Scruton there devotes an entire chapter on his specific concept of musical understanding (pp. 211–38, esp. p. 221). His utterances on musical movements, "understood" in the way he suggests, all follow along the lines of the above quote; e.g.: "The completion of human gesture in this sphere of total freedom excites us beyond anything that we can encounter in our own bodily movement. In music gestures are entirely unimpeded and can project themselves as far as they require for their quiescence" (p. 340); or, to the same effect: "Imagination cleans the window of perception", p. 236.
3. Scruton, *Aesthetics of Music*, 2–3. For concise descriptions of Pierre Schaeffer's respective concept of acousmatic listening see, for instance, Rolf Inge Godøy, 'Gestural-Sonorous Objects: Embodied Extensions of Schaeffer's Conceptual Apparatus', *Organised Sound* 11/2 (2006), 149–57, and Andy Hamilton, *Aesthetics and Music* (London and New York: Continuum, 2007), 96 *ff*., esp. 101.
4. For the present purpose, I use the term 'electronic music' as more inclusive

than the genre of 'electroacoustic music'. The terminological practices of the relevant communities are, however, unsettled: Richard Orton, for example, inversely prefers 'electroacoustic music' as the overall term, whereas Hugh Davies's choice resembles mine: see John Paynter et al. (eds.), *Companion to Contemporary Musical Thought* (London and New York: Routledge, 1992), 320 and 501. For a discussion of further terminological intricacies, see Leigh Landy, *Understanding the Art of Sound Organization* (Cambridge, MA: MIT Press, 2007).

5. See, for example, Guy Garnett, 'The Aesthetics of Interactive Computer Music', *Computer Music Journal* 25/1 (Spring 2001), 21–33, and John Croft, 'Liveness'.
6. This rejection of an audience's grasp of bodily expression—or at least the indifference to it—appears in texts such as Nick Collins's 'Generative Music and Laptop Performance', *Contemporary Music Review* 22/4 (2003), 67–79 (Collins writes: "Live coding is probably the antithesis of revealing work to the audience" [p. 76]; "The laptop performer … designs systems that provide the optimum balance of control and freedom of expression for their performance needs—whether the audience appreciates it or not" [p. 77]), and Julio d'Escriván's 'To Sing the Body Electric: Instruments and Effort in the Performance of Electronic Music', *Contemporary Music Review* 25/1–2 (February/April 2006), 183–91 ("This designation can redefine dramatically how effort is to be expended in the production of sound, in fact, it can obviate it altogether; the performer becomes a musical teleoperator" [p. 189]; "If the music captures our imagination, it does not really matter whether the laptop musician is sweating" [p. 190]).
7. See Isabel Mundry, '*Ich und Du*', this volume, Chapter 6.
8. Compare the appreciation of puppetry.
9. See Jerrold Levinson, 'Musical Chills', in his *Contemplating Art: Essays in Aesthetics* (Oxford: Oxford University Press, 2006), 220–36. There is also an extensive discourse on musical chills in music psychology. Such chills are instances of a broader category of somatic experiences tied to listening that occur when one is in, but also quite apart from, the emotional state of being moved.
10. See, for example, Adorno on Mahler. Theodor Adorno, *Die musikalischen Monographien* (Frankfurt am Main: Suhrkamp, 1971), 149–309.
11. See Arnie Cox, 'Hearing, Feeling, Grasping Gestures', in Anthony Gritten and Elaine King (eds.), *Music and Gesture* (Aldershot: Ashgate, 2006), 45–57; Andrew Mead, 'Bodily Hearing: Physiological Metaphors and Musical Understanding', *Journal of Music Theory* 43/1 (Spring 1999), 1–19; Evelyn Glennie, 'Hearing Essay' (www.evelyn.co.uk/Evelyn_old/live/hearing_essay.htm); Don Ihde, *Listening and Voice: Phenomenologies of Sound* (Albany: State University

of New York Press, 2007), esp. 136; David Burrows, *Time and the Warm Body: A Musical Perspective on the Construction of Time* (Leiden: Brill, 2007).

12. A detailed treatment of these latter aspects of heard tactility would go far beyond the scope of this chapter; for the present purpose, I limit the discussion to the mere phenomenon of heard tactility.
13. This use of the term 'proprioception' is more inclusive than Kendall Walton's (see his Chapter 8, p. 127, this volume).
14. For example, Scruton, *Aesthetics of Music*, pp. 76 and 79 (agency and action); Levinson, *Contemplating Art*, p. 85 (gestures and personal expression).
15. Paul Boghossian, 'On Hearing the Music in the Sound: Scruton on Musical Expression', *The Journal of Aesthetics and Art Criticism* 60/1 (Winter 2002), 49–55.
16. Hamilton, *Aesthetics and Music*, pp. 119–48, esp. pp. 129 and 146.
17. See also note 11.
18. Burrows, *Time and the Warm Body*, pp. 82–4, 92 and 97.
19. Jerrold Levinson, 'The Expression of Emotion in Music', in Levinson, *Contemplating Art*, p. 85; Cox, 'Gestures'.
20. I view Kendall Walton's position on tension and relaxation as argued in his 'Projectivism, Empathy, and Musical Tension', *Philosophical Topics* 26/1–2 (Spring and Fall 1999), 407–36 as closely related to my own. Walton shows that all ability in musical empathy must draw on the ability to hear musical tension not only metaphorically, as tension in the music, but also literally, in the music as being tense—that is, as bodily tension experienced by the listener.
21. Robin G. Collingwood, *The Principles of Art* (Oxford: Oxford University Press, 1938), 142.
22. Collingwood displays a similar understanding of active perception in describing how a spectator experiences the tactility of painters' brushstrokes *through* the canvas; these brushstrokes, in their dabbing or sustained contact (and, as he refines: implicit "muscular movements") give form to an imaginative act. Collingwood then loosens his grip on the felt experience in favour of "distance and space and mass" in his analysis. See Collingwood, *Principles of Art*, pp. 142–51; esp. 146–7.
23. Examples are found on http://ablinger.mur.at/docu11.html#qu3 (accessed 22 May 2011).
24. When the example was played at the Bodily Expression in Electronic Music symposium, about half the audience identified the voice. I expect the percentage would have been higher had the sound come from an actual piano; as it were, the sound quality of the recording compromised the already fragmented spectrum of the original voice.
25. Another striking example is Ablinger's *Voices and Piano* (a large cycle of

pieces for piano and tape, started in 1998 and at time of writing comprising 35 pieces; see http://ablinger.mur.at/voices_and_piano.html, accessed 22 May 2011), in which a pianist plays pitches matching the prosodic line of recorded speeches that are played back simultaneously with the pianist's performance. After a number of such combined renditions of various speeches, there is a section in which the piano is heard on its own. Strikingly, a 'voice' emerges (muttering unintelligibly) in the listening experience that again, in my view, derives its hallucinatory existence solely from the act of perceptive completion.

26. Concerning the concept of musical gesture, see also Deniz Peters, 'Zum Konzept musikalischer Gestik', in Christian Utz (ed.), *Musiktheorie als interdisziplinäres Fach. 8. Kongress der Gesellschaft für Musiktheorie Graz 2008; Musik.Theorien der Gegenwart*, 4 (Saarbrücken: Pfau, 2010), 243–51.

27. Alva Noë, *Action in Perception* (Cambridge, MA: MIT Press, 2004). I further apply Noë's point that visual perception is enacted (as is tactile perception) to auditory perception and musical experience in 'Enactment in Listening: Intermedial Dance in EGM Sonic Scenarios and the Listening Body', *Performance Research* 15/3 (2010), 81–7.

28. Maurice Merleau-Ponty, *Phenomenology of Perception* (*Phénoménologie de la perception*), trans. Colin Smith (London and New York: Routledge, 2002), 157–61.

29. Alain Berthoz, *The Brain's Sense of Movement*, trans. Giselle Weiss, (Cambridge, MA: Harvard University Press, 2000); Rolf Inge Godøy, 'Motor-Mimetic Music Cognition', *Leonardo* 36/4 (2003), 317–19; Jerrold Levinson, *Contemplating Art*, pp. 87–8; Tom Cochrane, 'A Simulation Theory of Musical Expressivity', *Australasian Journal of Philosophy* 88/2 (2010), 191–207. Cochrane offers a detailed simulationist account of the emotional experience of music. His argument for how we hear emotion in music, unlike Godøy's, recognises that it cannot be first and foremost that the performer's experience is simulated by the listener, but that the listener's arousal is connected with behaviour of 'the music' (or, as in Levinson's account, a persona)—i.e., the performer's sound producing actions become of secondary influence to the experienced state). In this it matches the present argument. However, Cochrane argues that music uses mental simulation capacities to arouse (imagined) bodily changes, and that these bodily changes become the intentional objects of the emotions we thus come to experience. For this, Cochrane's concept rests on the assumption that emotions are perceptions, in particular perceptions of bodily changes. He relies on this claim strongly at the crucial point where his argument links aspects of resemblance and arousal theories with simulation theory. With this, for all I can see, Cochrane construes a neural version of William James's objectionable theory of emotions as *stemming* from bodily states.

See also Andreas Dorschel, 'Emotion und Leib', in *Philosophia Naturalis* 36/1 (1999), 35–52, for a severe critique of Jamesonian reasoning in this regard.

30. 'Imagination' here is not understood as a purely mental act, but as inclusive of bodily sensations: i.e., the described felt presences are a sort of bodily imagination. In it, voluntary and involuntary movement mingle, going beyond the motor intentionality described by Merleau-Ponty, perhaps along the lines suggested by Sondra Fraleigh in conceiving "the unseen openness of our bodily being" in her *Dance and the Lived Body: A Descriptive Aesthetics* (Pittsburgh, PA: University of Pittsburgh Press, 1987), 89f. There might be ways in which simulation theory could unlock aspects of the imaginative act, as Kendall Walton demonstrates in 'Spelunking, Simulation, and Slime: On being Moved by Fiction', in Mette Hjort and Sue Laver (eds.), *Emotion and the Arts* (New York and Oxford: Oxford University Press, 1997), 37–49, for example. The issues arising, however, require a separate treatment.

31. The challenges of mappings have been noted by some authors, such as Garnett, 'Aesthetics of Interactive Computer Music'; Croft, 'Liveness'; and, though with a dismissive air towards the "traditional paradigm of effort", by d'Escriván, 'To Sing the Body Electric', p. 184. D'Escriván, however, misconstrues the notion of effort in the context of traditional performance, where, conversely, apparent effortlessness is often regarded a very goal in virtuosity, and where virtuosity for its own sake is not at all regarded as essential to expressivity; he also misconceives the 'effortlessness' of electronic music performance: contrary to what d'Escriván suggests, laptop performers and other performers of electronic music can quite plainly be seen to engage in their music making *with effort* (however small this may be in *physical* terms, and however disconnected the auditory result may appear); only their *specific* effort cannot be linked *readily* and *continuously* to the sonic result.

32. Caveat: in many cases, the *spatialisation* of the sound during a concert is performed after all, often by the composer herself; spatial aspects of the heard are, however, only a fragment of the whole. This situation thus represents a hybrid case.

33. As in instances of generative music; see Gerhard Eckel's chapter in the present volume, pp. 144–5.

34. Osvaldo Budón, 'Composing with Objects, Networks, and Time Scales: An Interview with Horacio Vaggione', *Computer Music Journal* 24/3 (Fall 2000), 9–22.

35. Thanks to Ramón González-Arroyo for relating and exemplifying this image in personal conversation.

36. Denis Smalley, 'The Listening Imagination: Listening in the Electroacoustic Era', in Paynter, *Contemporary Musical Thought*, pp.

514–52, esp. pp. 523–5.

37. Hugh Davies, ‘New Musical Instruments in the Computer Age’, in Paynter, *Contemporary Musical Thought*, pp. 500–13; p. 513.
38. Croft, ‘Liveness’.
39. Croft, ‘Liveness’, p. 61.
40. Croft, ‘Liveness’, p. 60.
41. Garnett, ‘Aesthetics of Interactive Computer Music’.
42. See this volume, Chapters 9 and 3, respectively.
43. Godøy, ‘Gestural-Sonorous Objects’.
44. Scruton, *Aesthetics of Music*, pp. 341–2.
45. Compare Hamilton’s “twofold thesis” in Hamilton, *Aesthetics and Music*, pp. 108 *ff*.
46. Theodor W. Adorno, *Ästhetische Theorie* (Frankfurt am Main: Suhrkamp, 1970), 30; translated by Robert Hullot-Kentor: Theodor W. Adorno, *Aesthetic Theory*, eds. Gretel Adorno and Rolf Tiedmann (London: Continuum, 2004), 18. I consider works such as Chris Salter’s recent *Schwelle II*, and pieces and explorations within the framework of the *Embodied Generative Music* project, as examples of this emerging aesthetic.

2 How Things Fall Apart

Alteration of Body in Music and Dance

Sondra Fraleigh

WHAT THE BODY KNOWS AND INTENDS

Western dancers study composition. In disappearance, butoh dancers study decomposition. Electronic music also assembles and dissembles bodily states. I mean that music flows from the body, and is like dance in this respect. Everything starts with bodily being and potential states of expression. Like all of the arts, music and dance come into being through the choices and intuitions of some human agent.

We imagine and invent because we are human, and we can. Or maybe we merely discover or uncover what is already present but not yet apparent, as Plato teaches in the *Timaeus*, and Heidegger shows in drawing a wordy portrait, 'The Origin of the Work of Art', his treatise of that name.[1] I would like to invent or discover something here—because I can—drawing up thoughts and feelings through words to evoke the gains of human autonomy, albeit within our social embeddedness and continuity with what we commonly and self-consciously call 'nature'. First I want to talk about the body, and then I will shift to questions of music, dance, and bodily alterations.

We cannot adequately address the question of the body in relation to electronic music without defining what we mean when we use the term 'body'. (The organizers of the conference that gave rise to this essay, and the literature they point to, define electronic music, but it is equally important to say what we mean by 'body'.) I took definition of the body as one of my projects in *Dance and the Lived Body* (1987), where I depended on existential phenomenology to a large extent, and I later broadened my inquiry into cultural and metaphysical meanings of the body in *Dancing Identity: Metaphysics in Motion* (2004). I do not want to repeat myself here, but I would like to continue to build on a basic understanding of the body that takes into account the voluminous literature in phenomenology on this topic and also recent studies in neurobiology.

Most basically, the body is not simply an object, nor merely physical. The word 'body' may be used to describe something physical, but when it refers to a specific body, yours and mine, it points toward life in a larger sense, a shifting totality that includes identity; everything we do, say, and make stems from that. When I identify my body as myself, I am tacitly identifying self and body as who I am. This also implicates the cultural immersions that shaped my body and my social evolution in relation to others. One of the basic meanings of life is "to be born", to be embodied.[2] My body will always bear the imprint of my birth: the place and the time, the surrounding environment, and the social milieu. Embodiment is vastly more than physical; it is not a single event, but rather an ongoing process by which our acts and thoughts are made visible, tangible, and audible. Thus, the process of embodiment involves development of the will, the subject that has engrossed philosophy from Kant through Schopenhauer to Nietzsche, and on through

Foucault. The study of the will, thus human agency, is the study of embodiment and the emergence of self. Paul Ricoeur in his study of voluntary and involuntary movement taught that the will becomes the form of the body.[3] In yoga, the will is located at the level of the third chakra, the solar plexus at the base of the sternum in front, and the vertebral attachment of the primary breathing diaphragm in the back. It arises as a vortex of energy between the thorax and the abdomen, roughly analogous to the origin of the breath. From this standpoint, the will reflects the breath, and can be quieted or activated consciously through the breath.

Can we say that any kind of music, or indeed anything that begins with a human agent, escapes the body? Like many things that humans make, music can eventually exist in a medium outside the body, but human agency, and thus the body, will always be implicated. The source, the origin, for all our making and doing is human, thus founded in our bodies. I have never mistaken myself for a house, although I have dreamed of my body as having rooms. Philosophers have had various ways of speaking about the body as an object and subject, but I try to remember that these are simply forms of analysis. Jean-Paul Sartre puts the problem of the body best, I believe, when he asserts that we can never know the body-subject, because human subjectivity is always in process. The body-subject, he concludes, cannot be defined or known analytically; it can only be lived.[4] Stating this insight in terms of self-evidence, he says: "I exist my body".[5] A more recent phenomenologist, Maxine Sheets Johnstone, says in *The Primacy of Movement* that 'the lived body' of phenomenology inevitably falls into history. The concept of the lived body has historical limits, she holds, and clings to the past tense, especially through Merleau-Ponty.[6] The term still has relevance for me, but only as I am able to place it in the present, not recycling its exegetic baggage.

There is perhaps no more difficult phenomenon to understand than the body, because we are never outside of our bodies to gain an outside glance. We can of course look at the bodies of others, but that is not the body we know, only the body we see. We might see body images, but these are not the bodies we live. We are far too close to ourselves to be objective, as Sartre taught and new physics shows. True objectivity is not possible, philosophy and science agree. We are *part* of our scientific investigations: what an idea! Phenomenology from Husserl to Heidegger and Simone de Beauvoir has consistently presented the limits of objectivity, the closeness and ambiguity of the body. Butoh founder Hijikata Tatsumi called his body 'the most remote thing in the universe', as he struggled to state his experience of embodying the dance he envisioned. Whether near or far, our bodies as experienced are difficult to grasp. They are what we are, here and now, or perceptually far away.

Sometimes people say they leave their bodies, in near-death experiences, or under duress, and there is a commonly held belief that the mind is not the body; so it somehow needs to find a connection to the body. Consider how often you read about the body/mind connection. I wonder what is being connected? Not two differing entities, surely. Consider how *the body thinks* as a matter of the function

of the nervous system and with the support of emotional life. We cannot think without emotions, as Martha Nussbaum shows in *Upheavals of Thought*, her study of the intelligence of emotions.[7] We cannot think outside of our sentient bodies. Body and mind as separable aspects of ourselves to be reconciled indicate outdated lingering ways of using language that assume the brain with its capacity for thought exceeds the body, or else the brain as mind guides the body—as 'mind over matter'. This is the problem that Gilbert Ryle identified as the myth of "the ghost in the machine".[8] In this myth, bodies are situated in space; minds originate inside while mysteriously extending outside, and the mind commands the body. If we shifted the mechanistic command model to one of guidance, would we fare any better? Does the thinking mind ensue from the brain and thus guide the physical body, or is the mind/brain part of the body? Might both of these be true? Certainly the eyes are part of the head and vision guides the rest of the body because we need to see where we are going, but no part of the body functions alone, including the eyes and the brain. The senses are associated in the brain and function along with the whole body. The auditory center in the most folded part of the brain is related to movement and speech, which are closely allied in the cerebral cortex. I have done somatic movement therapy with stroke victims and observed first-hand how speech, sound, and movement involve each other.

What about those near-death experiences and traumas where people look down on themselves from above? Are these not simply altered states of consciousness, rather than body/mind or body/soul separations? Phenomenology and neuroscience continue to provide more holistic ways of defining the body and explaining the myriad ways of human experience. As Husserl explained the core of phenomenology in his works: 'Consciousness is consciousness of something'. Consciousness has an object, in other words, and does not float free of the physical body. Rather it is founded in our bodily being, what existential phenomenology originally called 'the lived body', to signify that the body is lived as a subject. The body is not merely an object, even if it can be objectified for good and ill.

The human body has agency as a matter of its totality and life. In fact we grow toward agency through the growth of bodily being in personhood, as feelings of 'I can' ripen in infancy and childhood. Of course, we humans also embody feelings of failure as well. Motion, mind, sense, and consciousness are part of physicality. Stated in terms of self-evidence:

> I move as I think and intend, not as a result of my thoughts and intentions, but in tune with them. If I am out of tune, I can stumble, lose my sense of balance or control, but that would be momentary. I need to organize myself in whole sentences and paragraphs, as I move, and this is not something I think about. Rather my bodily intentionality, if I compare it to language and music, has grown quite naturally through use. I also move in concert with my vision and hearing, certainly in concert with the orchestra of my breath, which supports all of my thoughts and acts.

Most generally, the physical is a category of knowledge that attempts to explain what is real, materially observable, and it also refers to physiological processes. The physical can never be what we are; rather, it is a way we parse and explain material substance and process as 'matter'. The brain body extends throughout the physical in the whole-body responses of the nervous system and in tandem with all bodily systems, which are necessary to each other. The brain research of Antonio Damasio and other neurological scientists is affirming the mind of the body in the same arena of body/mind theory that phenomenology entered earlier. Both of these fields study consciousness, one from the vantage point of intuition and self-evidence and the other through scientific observation and speculation: phenomenology reaches toward the contents of consciousness and its perceptual outcomes, while neurobiology seeks to know what consciousness is and how it evolved. These fields provide rich crossing points for understanding the body in terms of consciousness, which is the basis for human culture and the arts as well as social interactions.

THE BODY IN FLUX

As a postmetaphysical phenomenologist, I would say that the body is in flux and cannot be essentialized. It is not static, solid material, nor is it always tending toward strength and integration. The body weakens and falls apart as well, as butoh dancers explore in their aesthetic of 'the weak body'. The body morphs, organizes itself in aloneness, or interactively with others, and is emotionally metamorphic.

The body is already musical in its potential for voice and silence, and it already always dances in its movements. The pedestrian body of dance became the central aesthetic of the American postmodern, as Tricia Brown, Steve Paxton, Yvonne Rainer, and others made use of the everyday body of task and play. They represented a deceleration of dance techniques, which is not to say that they replaced high-level technical dance in modern dance and ballet. But they did allow us to see that the body contains dance in its basic movements and everyday comportment. The experiments of John Cage brought a similar perspective to music, and Henry Cowell before him had already opened up this area of musical perception.

Composers and choreographers make use of sounds and movements that are already given in human life, and build on these. In the process, they project their compositions outside themselves, the better to hear what lies in human imagination and can be created by extrinsic means through manmade instruments or the management of electric currents and waves. Such extrinsic means toward musical ends bear a relationship to the intrinsically felt experiences and electric currents of their own bodies and those of the audience who complete the perceptual cycle, both auditory and tactile/kinaesthetic. The classical philosophers of Greece would say that human beings are not originators in any case; we simply work with what the cosmos provides. An existentialist, however, believes that the intervening hand of the individual makes a difference. I will keep with human variability and intention. If perception of sound and movement begin with the body, it is through human intentionality and its creative direction that they are shaped in music and dance, as through bodily perception they are received and interpreted.

Beneath these shapes and sounds lies metaphysics of motion and being. I want to appeal to Heidegger's postmetaphysical stage, to say that *Wesen* (nature), what he calls "the sway of being", is a fluctuating dance of fullness and emptiness, of gifts given and withheld. Human transformation and even transcendence are part of life's movement and "everydayness", not separate in some abstract sense, as he explored in several contexts in *Being and Time*, and later in *Contributions to Philosophy.* Here is Heidegger on *Wesen*: in "fullness" and "gifting" lie hidden "the most sheltered essential sway of the not, as not-yet and no-longer".[9] If we understand how works of art fall apart, what they hold at their metaphysical root, I suspect we will be left with ourselves, and that what we call the 'self' also falls

apart, but not into classical or Cartesian splits of body, mind, spirit, and soul. Phenomenology and modern neuroscience would see these as mythopoetic categories, aspects of experience, and ultimately indivisible.

The human body of life, intelligence, and affect is the potential home base of all the arts. Take away the canvases, the musical scores and electronics, take away the leaping and crawling dances, and see what is left. I think it would look a lot like you and me. And perhaps we would appear even better than we are, having been stripped of egoic attachments.

Composers and choreographers discover what the intentional body already knows or can conjure. The means of discovery vary, ranging in music from traditional instrumentation to electronics. It may be easier to discern bodily expression in dance, because dance is not separate from the body organism, except in movies or when it is electronically displayed or digitalized and simply implied. Even then we can recognize bodily sources, as in the remote somatic strokes extracted from the body through motion sensors in Bill T. Jones' *Ghostcatching*.

All of the arts carry us beyond the body as familiar, even as they may connect us back to it in familiar ways. Part of the function of the arts is to explore new paths toward bodily renewal through the expansion of consciousness. Visual art is more than visual image, dance is more than body movement, and music is more than sound; all arts engage human imagination and the bodymind in flux. We seek to move past the ordinary in art even as we include the elusive and obvious. In our bodies, we want renewal. Music should give us new bodies. I do not want to experience my old body all the time everyday. I listen to music to feel better, to be renewed and remain curious.

Phenomenologically speaking, the body is the source for music as well as dance, and these arts can both exist outside the body organism as they are projected through film and electronic technological sources. If they gain a second life beyond the physical body, that does not mean they are not tethered there. In action and stillness, the sense and bodymind trace of the maker will remain, how he or she placed sound in time's space, with what care or abandon, how tightly repetitive as in Stravinsky's ballet music, or vocally spread, as in Australian composer-performer Donna Hewitt's work with live electronics, dance, theater, and video. Hewitt inserts herself between music and dance, manipulating female voice and found sounds toward complex music-motion outcomes.

The body leaves a historical trace in any case. To use the present examples, Stravinsky in his collaborations with Diaghilev and Nijinsky in the early twentieth century, especially through his most advanced work, *Rite of Spring* (1913–14), constructs driving rhythms in spatial percussions that impact the body of the dancer and listener. Theodor Adorno calls such "spatialization" Stravinsky's "one clever trick" to gain power over the subconscious.[10] What Adorno does not see is that the *Rite of Spring* propels the audience toward a dominant male mythology: the god's orgasm and sacrifice of a captive virgin, as the maiden (called "The Chosen One" in Stravinsky's program) falls at the end to the pounding of the timpani. Almost a

hundred years after Stravinsky, feminism shows up in music with awareness of gender, even in electronics. Increasingly, we find that music, like the other arts, does not escape the body or its gendered reality. Donna Hewitt and others seek to subvert male musical construction. Hewitt does this through taking charge of processing the female vocal performer, not leaving this to the male mix engineer,[11] as has been typical in the past.

Is Stravinsky a male mix engineer? Well, conceptually yes; he commands what the audience will see and hear and the story behind it. Why does the coming of spring require the rape of a young girl?[12] We could say "it is written" because Stravinsky adopted the story for his music from Russian folklore. When he was asked if he thought his music would last, he said famously: 'Yes my dear, until the end'. His story for *Rite* also parallels Homer's myth on Hades' abduction and rape of Persephone. It goes back to the ancients, but other stories could be written about the changing of the seasons, and they have been. We need to rewrite the stories that see women as helpless victims. Molissa Fenley dances a bare-breasted solo version of Stravinsky's *Rite of Spring* that challenges her strength to keep moving nonstop through the evening and into darkness. She calls her work *State of Darkness* (1988), much like the prepatriarchal myth of Demeter and Persephone in the Eleusinian mysteries, where Persephone travels into the underworld, not to be raped by Hades, but to rescue her ancestors.[13] Nothing is written as incontrovertible truth, including music, as attested in Renee Lorraine's 'A History of Music', from a female point of view.[14] Perhaps we need more female mythologists and composers. In the broad sweep of musical history, composition has been almost exclusively a male activity. As art, music speaks for and through its own time. Many artists today interrogate gender stereotypes and establish new norms through exploration. Music does not drop from heaven readymade, even if that of Mozart and Mahler seems to. The naturalness of music is never natural. Music making, like all art, involves human intervention and social conscience, the intelligent body at rest and in flux, human histories in the making.

Dance and music proffer the intelligence of the body, and are always inside of each other. Take apart dance, and you will find its musical structure: how it fits in time, how it flows or stops and fades, what its tone color is, and its pitch or slant. Take apart music and you will find the dance in it: how it moves and alters the body thereby, or how its movement is textured and layered as it proffers an array of bodies interacting. There I've said it: "movement is alteration". Alteration, modification, and change are definitions of movement, and also marks of music and dance. Yet elements of continuity and presence are equally important markers. Let us look in the direction of presence first, and return to our major topic of alteration soon.

PRESENCE AND PRESENTING

If we know ourselves through experience, we also know by seeing ourselves through other people and through the otherness of media that reflect back upon our *presence*. All making and doing, invention and discovery are forms of presentation that have the potential for intensifying *presence* and self-knowledge. Presentations are risky; they involve the other—the likes and dislikes of others and the potential for rejection. If we do not risk, however, we do not develop. Speaking phenomenologically:

> The risky mode of 'I can do and make, speak, sing, and dance' projects my presence to a second level. In presentation lies my voice, my truth, the power of my word and work in relation to others. In the risk of presentation, I am not alone. Rather, I reach out and have the potential to receive back. I test myself in social space, which is not to say that I am in a contest, but simply that I am testing my boundaries, pushing them wider in relation to others. This kind of social motility gives me new access to my identity. In other words, I get to know more about who I am.

Reflective life is not a singular narcissistic knowing, a mirror of the self. Presentational modes augur responsiveness in others, unpredictability, a lack of art in the beginning, and the possibility for abundance at the end. Presenting moves out of presence and into the field of the other. In the presentational field between self and other lies a second level of knowing—on an epistemic scale, a second level of self-knowledge surpassing that of presence.

Technology is an important, even indispensable, part of presentational knowledge, especially in contemporary life. We can become the passive partner of technology or engage it aesthetically and critically. *Indeed, the use of technology produces a second life for music and dance, and this alters their bodily origins.* Everything changes, and we get a second look, which can be an aesthetic good, depending on the quality of the work. The projection of bodily intention into electronic media through music and dance produces an aesthetic that can be appreciated for itself. Moreover, several combinations of electronic works involving music and dance can and do exist. Merce Cunningham made digital dances involving sound technology that drove his already abstract work further into objectivity, most notably *Biped* (1999) in his eightieth year. Not everyone likes his computer dances, of course, but I am not arguing on matters of taste. There is a long history of the use of electronic music in dance performance. Is there a choreographer over the age of forty who has not borrowed inspiration from Edgard Varèse's colliding sound masses in *Poème électronique* (1958), Karlheinz

Stockhausen's orbiting sounds in *Kontakte* (1960), or the burning embers and naturally occurring statistical distribution of Iannis Xenakis' early work *Concret PH* (1958)? Now with the growth of computer technology, today's electronic music demonstrates many more divergent practices and opportunities for music and dance collaborations.

Electronic works can have a dialogical relationship to materially concrete works that maintain a performative relationship to the body organism. I have danced to and seen countless dances on traditional proscenium stages set to electronic scores, as I have already mentioned. One hardly finds a dance concert today without this asset. (What are emerging or even most experienced choreographers to do, hire a string quartet or full orchestra? Some state-supported ballet companies can afford to, but thankfully the dance field is more diverse than this.) Electronic scores are easier to access and to dance to than live musicians. They generally cost less, and all you need is a good speaker system, unless for instance the magnetic field of the body moving in space is choreographed to activate the sound. The mechanisms for this, of course, are seldom simple. We will no doubt see new emerging relationships between music and dance, as well as the digital and electronic processing of these. And theoretic underpinnings of dance and music will continue to grow also, as evidenced by this volume. We have achieved a lot of theoretical ground in the arts since the mid-twentieth century. *Philosophy of New Music* by Adorno, originally published in 1949, has this quaint assessment of dance: "Real dance, in contradistinction to mature music, is temporally static art, a turning in circles, movement without progression."[15] That would be 'real dance' for Adorno, but not for any critic of the twenty-first century.

We have seen that the body in motion can be processed, especially through film and computers. Long before Cunningham's experiments with technology, Alwin Nikolais' dance works became famous as multimedia art in the mid to late twentieth century. The body can be changed from its original state on film, as in the multimedia works of Laterna Magika in Prague. The body altered on film and then poured through any number of presentational styles would not be yours or mine, however. Our body of time and space is organically whole; when it is radically altered or dismembered, we usually die. I first saw Laterna Magika in 1965, seven years after its inception when what was then Czechoslovakia was under Communist rule, and I wondered how this performance group might have changed when I saw them again in 2005 forty years later. The major difference was clearly in technology. The original use of mime and gestural dance, however creatively staged, mostly in silence, had morphed to panoramic screen, electronic scores, and mythical stories wrapped in filmic dance, which would be impossible to perform on a traditional proscenium stage in real time.

'How far can one stretch an art form and still recognize it?' we might want to ask. In terms of electronics, I believe we recognize electronic and digital works as dance or music because we have a historical reference for these arts that aids our recognition. No matter how far out they go, we still call them 'music and dance'.

Something remains constant, if only the dots in our minds. Many examples can exist that consciousness construes as art. To appeal to Husserl once more: "Consciousness is consciousness of something". Now why should we call something without bass and treble clef, with no pull toward a tonic key or traditional instrumentation, music? We name things through historical reference, through family resemblance to similar phenomena. We group according to personal or cultural activity, or aesthetic purpose. Still further, according to our imaginations, we devise new categories. "We name things, and then we can talk about them" is how Wittgenstein puts it in his theory of family resemblance.[16]

When music and dance break with the past, they seem to be in search of new categories. I think this is often a quest to extend cultural consciousness as a whole. To provide an interesting global example of recent music and dance in relation, we turn momentarily to electronic music combined with nature-oriented dance—especially as these might appear to be polar opposites. Butoh, the form of dance coming out of Japan after World War II and evolving now in a global context, makes explicit use of metamorphosis, or the ability of the body to alter itself in expressive movement through the use of transformative imagery. Another key ingredient of butoh is its close relationship to nature, the nature of the human body that is, as also the natural environment that contains and pervades the body. Yet butoh choreographers often choose electronic music as part of the total theatrical fabric of their work. Why? I think it has to do with the basic topic of aesthetics, which is not beauty (even if beauty has a long history in aesthetic discourse) but human perception, and it has to do with my major topic of bodily alterations in terms of consciousness. *Butoh-ka* (dancers) seek to challenge human perception and thereby extend cultural consciousness.

Most of us live in chaos of intentions, daydreams, and distractions. Or else we fool ourselves into believing that we actually direct our consciousness in a controlled fashion. In my teaching of dance and somatic movement processes, I observe how difficult it is for people to sustain attention throughout a simple movement process. They wander away from it, or wish for something more complex or exciting to carry them out of their habitual self. For some, any task will prove too confining for sustained attention. And then there are others who have learned how to simultaneously stay in the flow of their intentions while interacting purposefully with their surroundings. We might say these people have presence, that they are able to come into the present moment and be at home in their bodies as selectively permeable to the outside. Their sense of control is internalized with ease, if not all of the time, at least a lot. I am suggesting that the invisible body of attention and awareness is vast, and that it is here and now with us daily and hourly. I am also saying that how we direct attention alters our body, because bodily being is not passive; it is malleable, shaped through our intentions and actions, moving always just beyond comprehension, lest we forget the many aspects of life that we do not control.

PRESENCE, DISTANCE, AND DISAPPEARANCE

Not favoring control, butoh attends to stillness. Heightening a sense of presence via meditative and sometimes shamanistic presentation, butoh often moves whole vistas of stillness. It does this in several ways, one of which involves distance. Butoh dancers seldom dance in metric rhythms, nor are they attracted to a full orchestra, as ballet is. They construct distance between music or sound and the moving body. This distance is sometimes called *Ma* in Japan, or the space between where disjunction can heighten presence. Butoh choreographers use a great deal of electronic music, as has also been the case in modern dance and its later developments. Electronic music in butoh also coexists in collage with other musical genres. Distancing auditory and kinaesthetic/visual aesthetics, electroacoustic music may arrive at ear-splitting levels in butoh, while a solo dancer moves slowly into disappearance, as happens in *Niwa*, Nakajima Natsu's classic butoh solo (1982) that shaped much of what later developed in North and South American butoh. In *Niwa*, the garden of a woman's life, the body becomes more transparent as the sound becomes sharper and louder. This happens through a long beginning line of motion as the dancer moves from upstage left toward center stage, a very auspicious diagonal in Japanese theater. The dancer seems sucked into a central vortex, as the more visible she becomes the more she also descends into disappearance; then eternity slips into time, change occurs in the dance and thus morphology.

In my book on butoh founders Hijikata Tatsumi and Ohno Kazuo, I describe a butoh process of disappearance taught by Hijikata that I experienced with his student Nakajima Natsu, the dancer/choreographer of *Niwa.* In disappearing, one moves into nonbeing gradually over time through slow walking and concentration of the third eye of the forehead; and then, step by step, one moves into reappearance. Does the body really disappear? Well, to the outside eye, maybe not, but as a matter of consciousness, yes; one can project oneself toward non-being. For me the process of disappearing is always a meditation, and I receive a surprising spiritual gift from it every time.[17]

In various states of beauty and decay, the body of butoh, like the body of nature, moves slightly beyond comprehension. It is certainly not the perfected body of ballet, the expressive body of modern dance, or the cool body of postmodern dance. Quite the opposite; butoh founder Hijikata Tatsumi wanted to present a vulnerable body in decline. He sometimes said he danced 'the emaciated body'. At other times, he constructed his butoh ambiguously, presenting a tough exterior with a vulnerable core. In his first surrealist treatise, 'From Being Jealous of a Dog's Vein' (1969), Hijikata describes how emotions go astray in his body. The title of his work *Keijijogaku* (*Emotion in Metaphysics*, 1967) defies the logic of essentialist philosophies where the mind is in control and emotions are what we

are not supposed to have, or even bodies for that matter. The body of butoh from the time of Hijikata until now is natural and objective, also culturally constructed, and at the same time immaterial, illusive, strange, and transformative. As such, it cannot be pinned down with logic, and its music cannot be found in linear, tonally magnetic structures. Musical collage, surreal and morphic, has suited it better. In the morphing of butoh, stillness seems to extend time, making it visible and expansive. We witness such stillness in surreal juxtapositions with nature through the environmental butoh of Hijikata and Ohno and their inheritors: Diego Piñón, Takenouchi Atsushi, Stuart Lynch, and Tanaka Min.

Butoh-ka study the affective matter of body alterations, and they are inclusive in their use of music. No sources are discounted, including popular music. The grandfather of butoh, the world-renowned and beloved Ohno Kazuo, born in 1906, liked to end his performances by dancing to the music of Elvis Presley: 'I can't help falling in love with you'. Ohno, a Japanese veteran of World War II, was criticized for clashing contrasts, but I see the distance he spanned between popular iconography and esoteric art as an example of healthy globalization through *Ma.* Ohno drew a portrait of hanging awkwardness in his dance 'The Marriage of Heaven and Earth' at the end of *La Argentina Sho* (1977), based on the famous tango dancer, La Argentina. Holding a tenuous stillness, he panted and hanged as though from a bent coat hanger with his knees knocking for several minutes. Most dancers would eschew awkwardness, and Ohno could certainly choose grace, but butoh manages to subvert intentional grace, making it more interesting and perhaps more real.[18] Ohno danced partly in silence in this dance, and also to the music of Chopin and a Japanese tango orchestra. In another example, eerie distance entered his work *Suiren*, based on Monet's painting of water lilies, when he morphed from electronic scores to the rock music of Pink Floyd, and then to a distant Ave Maria.

If this sounds messy, Ohno answered that "we cannot turn away from the messiness of life".[19] Butoh embodies the awkward, the painful, and the messy. It uses sounds from nature, popular music, classical, and electronics. Its metaphysical structure does not require the dancer to seek perfection. Metaphysically speaking and contextually, *butoh-ka* are neither graceful nor awkward; rather, their movement is simply what it is. Like butterflies, *butoh-ka* settle into the images they inhabit with light control, the whole of their being ready to disappear. In his dances, Ohno reached through time and across culture as only an elder can; the particulars matter less than his efforts to cross boundaries. I last saw him when he was 100 years old and resting in his bed with his teeth out, his eyelids fluttering responses to my whispered appreciation. Ohno held the whole world in his hands.

MA (THE SPACE BETWEEN) AND ALTERATION OF THE BODY

We have been setting the ground to consider affective alterations of the body through change and proximity. *Ma* is the space between in Japanese, as we have said. We do not have an English equivalent. It is a spiritual and spatial concept that brings mystery to language. What is the space between? What is space, for that matter? *Ma* is an experience even more than a concept, the experience of space itself. We make much of this experience in music and dance, as we place sound and movement in time's space. Gaps bring attention to the canyons of the mind. Silence and stillness are spacers for the emotions. Close connectivity births lyrical line, while distance projects the self beyond the sensate familiar. Distance is the desire that opens up from one touch to another, to use the language of kinaesthesia, or how the eyes connect one vista to another, to use the language of vision; distance spans from one tone or cluster to another in music, or from one gesture in space to another in group dance.

Distances and proximities between music and dance thicken historical experiment in perception. Classical ballet is at one end of the Western spectrum—from the closely wrought relationship of dance and music in Tchaikovsky's *Swan Lake* and *Sleeping Beauty* to Balanchine's numerous tightly crafted modern ballets, based on his structural understanding of music. Balanchine, who updated and Americanized Russian ballet, deserved a full orchestra because he understood it. In the late modern period preceding the postmodern, we find the collaborations of experimental composer John Cage and choreographer Merce Cunningham. Through their influence, chance relationships of dance and music became 'a method'. Not until Pina Bausch turned on a tape recorder to play the opera *Bluebeard* in the background of her dance of the same name at the Wuppertal Opera in Germany did another paradigm arrive. Music for dance could be full orchestra, which she used in her 1975 version of Stravinsky's *Rite of Spring*, or music might be incidental only. Then coming from the East in the guise of butoh, music began to morph in collage along with the dance, or at a distance from it. In any case, music and dance have had a history of rich juxtapositions, and will probably continue to do so.

In seeing how things fall apart in bodily alterations, matters of relationship turn us toward the experienced ground of perception itself—the nervous system. On a very basic level, music and dance are arts that affect the body. Thus they place us in community, leaping directly from one nervous system to another, regardless of the instrumentation or source of sound. As foundational, the nervous system may be defined as full-body responsiveness and also the perceptual basis for communication. The nervous system, we know, does nothing all by itself, but is interdependent with all the other systems. We sense, move, and act as a whole

body, and sometimes fragmentally, because of our variable capacities to attend in the moment or to be fully present in the here and now.

Current brain research shows that conscious awareness arises in layers. Antonio Damasio defines a preconscious somatic level, "the proto-self", at the foundation, and succeeding layers that move toward 'extended consciousness', which is characterized by creative and presentational knowledge and the possibility of conscience. Consciousness elaborates throughout the whole a sense of connectivity. I am not speaking of the cliché of body/mind connectivity but the creation of an autobiography, a self with a history.[20]

> The nonconscious neural signaling of an individual organism begets the *proto-self* which permits *core self* and *core consciousness*, which allow for an autobiographical self which permits *extended consciousness.* At the end of the chain, *extended* consciousness permits conscience.[21]

Music and dance are rooted in what Damasio identifies as the core self, a nonverbal accounting of modifications of the proto-self. Anything—the inner landscape of thought, sound, and feeling, overt expressions of these, as well as encounters with others and the objective environment—can provoke modifications or changes that generate the core self. The means of producing the core self change minimally across a lifetime, Damasio says, and in addition, with "the permanent availability of provoking objects", the core self, however transiently emerging, is renewed again and again through sensory, motor, or autonomic recall; thus, the sense of being a self is continuously generated, or continuous in time. Our sense of being the same person from day to day depends on the core self. The autobiographical self—more dependent on language, conceptualization, and creative work—requires the presence of the preverbal core self to begin its gradual development. Thus the making and doing involved in music and dance are witness to extended consciousness and its somatic preverbal *Ursprung* (origination).

Technology gives us yet another way into somatic origination. We observe these surfacing in the computer-generated strokes of such works as Bill T. Jones's *Ghostcatching*, distilling emotional traces of capture and breaking free. His work is made possible through advances in motion capture, a technology that tracks motion through sensors attached to a body. The resulting record captures forms of motion without preserving the material body. Recorded phrases become the basis for virtual composition, edited and performed in the 3D space of the computer. I think of the extracted images as soma strokes somewhat like the painter's marks that nevertheless bear the imprint of their origin: as in computer-generated music, the vulnerable human body is implied.

Through advanced technologies the collaborative group Luftwerk constructs interactive installations that also implicate the body, sometimes as shadows of the mind, sculpting visual and sound environments as moving canvases with the

illumination of video projection. Their work *Doppelgänger*, created with sound and motion sensors, suggests a double or mirror image showing inverted shadows of people filmed and recorded as they murmur the preoccupations of their minds. *Doppelgänger* has the potential to make us conscious of how the will appears when it is on automatic pilot. Other perceptual experiments could give us outlines of creative thought in action and harbor the possibility of polishing the mind.

However, such work is not fundamentally new. Abstracted images have always flourished in the arts: as danced, visually presented, sounded out in music, and captured in pictures of thought. Humans have for thousands of years made abstract marks by which they identify themselves as able and curious, willing to risk, wanting to see themselves from outside in and inside out, while engaging each other in challenging dialogues that have ethical as well as aesthetic dimensions. We call these marks art, as they involve the senses moving inside the body mysterium.

Long before neurobiological brain research, phenomenologists had articulated with great beauty what it means to be awake, aware, and productive through the conscious body. They gave this phenomenon a history and autographic character in calling it 'the lived body', as mentioned in the first section of this chapter. Experiential description derives from this concept, and lends to theories of the body that consciousness matters. Whatever our sense of being the same person from day to day, we may also experience disjunction, or why do we sometimes say: "I just don't feel like myself today". Sometimes we have to become ill to understand bodily alteration, as I state in terms of self-evidence:

> Illness reminds me that my body is sensitive and variable, not solidly continuous, that my body is vulnerable. But this is the same bodily vulnerability that wakes me to sound and music, the changeability that constitutes the wordless, soundless impulse to dance. In this impulse toward movement, I listen to my body; I am soma through and through, before thought arises, and I am whole. Then I become conscious of myself and autographic. At this point, I could fall apart or gather my energies and follow through.

If the body is variable and capable of disconnects, that does not mean that its nature is fracture. The figure of the fractured subject has disappeared along with twentieth-century avant-gardes. As Luc Ferry puts it: "We are resolutely, if not joyously, entering the era of the post-avant-garde, or as the architects say, of 'post-modernity'. Innovation for its own sake is over and 'revivalism' signals the return to lost traditions".[22] That trajectory for dance differs somewhat, as the postmodern beginning in the 1960s with Yvonne Rainer and others began with fascination for task dance, or mundane acts and movements like walking and sitting, as mentioned. Ordinary acts took on extraordinary significance. The postmodern in dance has turned more recently to social commentary as in the work of Bill T. Jones, and vigorous technique, as in the work of Lucinda Childs. The music of Terry Riley,

Steve Reich, and Philip Glass has been woven inextricably into postmodern developments in dance in America and still is; the subtle repetitive and nonprogrammatic approach of this music suited the homeostasis that emerged in dance, especially the ritually inspired, hypnotic dances of Laura Dean, who worked with Steve Reich and also composed her own scores.

Current choreography is taking many forms in societies liberated from tradition. The designation 'postmodern' fails to capture global multiplicity in the arts. Perhaps we need a new word. We see something new emerging that speaks of an age where nation matters less and worldwide communication is immediate. If the arts are no longer bound by aesthetic conventions, we do see them mixing world traditions. African dance blends with butoh, for instance, in the collaborations of Atsushi Takenouchi from Japan and Tebby W. T. Ramasike from Africa with his TeBogO (TBO) Dance Ensemble, and we see cultural cross-pollination in the neo-expressionist work of German choreographer Susanne Linke, who explores African sources also. Rather than escape the subject, we see multiple subjectivities and a global expansion of the Self with the attendant challenge of how to relate to such variety. This is ultimately a happy globalization that either dilutes or intensifies difference. In any case, as dancers and musicians experiment in positive globalization, whatever the aesthetic results, they deepen a sense of world community.

Community, a traditional Japanese value, is one of the things that draws me to butoh: *butoh-ka* have traversed the cultural *Ma* or space between, rather than emphasizing culturally circumscribed techniques. I suspect that the advent of technology in music also creates situations for global community. One does not have to play Bach or Beethoven, much as one might like to, in order to make a computer composition to share on the Internet, in a movie (along with a dance), or in the theater. Sound belongs to everyone without envy. There is no conceit in digital manipulations of sound waves. Well there might be if the composer is really good and his ego becomes apparent. But my point is that we have equal access to sound. What we do with it is part of how we extend our consciousness: creativity, invention, communication, and excellence.

But I am less concerned with how we meet goal-setting criteria for excellence in the arts. Along with Heidegger, I see that "lack" in art provides space for renewal.[23] I describe this experientially:

> My body spans the distance, the incredibly pregnant *Ma*, between music and dance, or the nearness, and fills the gap intuitively. My presence alters from moment to moment as I connect the dots. My body may seem to disappear in space or in the distance, but I know I am there in my breath. Somehow, it is important for me to realize this aspect of my being suspended between sound and movement as I continuously adjust to the temper and tone of my responsiveness.

Why is this important? Because I want to find as many ways of being awake, of flowing and being suspended, of falling and catching the air as I can. Otherwise, I would get bored with myself. Let me live with lack. Let me fall apart. Let me breathe and be surprised by excellence.

NOTES

1. Martin Heidegger, 'The Origin of the Work of Art', in *Poetry, Language, Thought*, trans. Albert Hofstadter (New York: Harper and Row, 1971), 45–78.
2. Robert Lawlor, *Sacred Geometry: Philosophy and Practice* (London: Thames and Hudson, 1982). Lawlor states that "to be born" into the material world of bodily forms, moving vibrations, light, and sound is the cosmological and most basic meaning of life and nature, p. 24.
3. Paul Ricoeur, *Freedom and Nature: The Voluntary and the Involuntary*, trans. Erazim V. Kohak (Chicago: Northwestern University Press, 1966), 328, 249.
4. Jean-Paul Sartre, *Being and Nothingness*, trans. Hazel Barnes (3rd edn., New York: Citadel, 1965), 300.
5. Sartre, *Being and Nothingness*, p. 327.
6. Maxine Sheets Johnstone, *The Primacy of Movement* (Amsterdam: John Benjamins, 1999).
7. Martha Nussbaum, *Upheavals of Thought: The Intelligence of Emotions* (New York: Cambridge University Press, 2001).
8. Gilbert Ryle, *The Concept of Mind* (London: Hutchinson, 1963), 12, 29–33.
9. Martin Heidegger, *Contributions to Philosophy (From Enowning)*, trans. Parvis Emad and Kenneth Maly (Bloomington: Indiana University Press, 1999), 288.
10. Theodor Adorno, *Philosophy of New Music*, trans. Robert Hullot-Kentor (Minneapolis: University of Minnesota Press, 2006), 143. Originally published in 1949 as *Philosophie der Neuen Musik* (Frankfurt am Main: Suhrkamp, 1976).
11. Nick Collins and Julio d'Escriván (eds.), *The Cambridge Companion to Electronic Music* (Cambridge: Cambridge University Press, 2007), 186.
12. For a feminist examination of several versions of *Rite of Spring* and the myths that support it, see Sondra Fraleigh, *Dancing Identity: Metaphysics in Motion* (Pittsburgh: University of Pittsburgh Press, 2004), 159–60.
13. This prepatriarchal source myth of Persephone giving women power over their bodies and not glorifying female martyrdom and rape is detailed by Mara Keller in 'The Eleusinian Mysteries: Ancient Nature Religion of Demeter and Persephone', in Irene Diamond and Gloria Feman Orenstein (eds.), *Reweaving the World: The Emergence of Ecofeminism* (San Francisco: Sierra Club Books, 1990), 41–51.
14. Renee Lorraine, 'A History of Music', in Peggy Zeglin and Carolyn Korsmeyer (eds.), *Feminism and Tradition in Aesthetics* (University Park:

The Pennsylvania State University Press, 1995), 161–4.

15. Adorno, *Philosophy of New Music*, p. 143.

16. Here Wittgenstein explores family resemblance as a central matter of linguistic definition. Ludwig Wittgenstein, *Philosophical Investigations*, trans. G. E. M. Anscombe (3rd edn., New York: Macmillan, 1958), 66–77.

17. For an extended account of disappearing in butoh, see: Sondra Fraleigh, 'My Mother's Face', in *Dancing into Darkness: Butoh, Zen, and Japan* (Pittsburgh: University of Pittsburgh Press, 1999), 87–96. See also Nakajima Natsu's butoh method, 'Becoming Nothing / Becoming Something', in Sondra Fraleigh and Tamah Nakamura, *Hijikata Tatsumi and Ohno Kazuo* (London: Routledge, 2006), 105–12.

18. This passage relates to a section of Sondra Fraleigh, *Butoh: Metamorphic Dance and Global Alchemy* (Urbana: University of Illinois Press, 2010).

19. From my workshop with Ohno in 1986, Yokohama, Japan.

20. Antonio Damasio, *The Feeling of What Happens: Body and Emotion in the Making of Consciousness* (New York: Harcourt Brace, 1999), 217–18. Damasio explains the conceptual basis of the autobiographical self this way: "Unlike the core self, which inheres as a protagonist of the primordial account, and unlike the proto-self, which is a current representation of the state of the organism, the autobiographical self is based on a concept in the true cognitive and neurobiological sense of the term" (p. 173). An autobiographical self utilizes implicit memory and grows continuously with new life experiences.

21. Damasio, *The Feeling of What Happens*, p. 230.

22. Luc Ferry, *Homo Aestheticus: The Invention of Taste in the Democratic Age*, trans. Robert De Loaiza (Chicago: University of Chicago Press, 1993).

23. Heidegger says: "Epochs which through historicism know much—and soon everything—will not grasp that a moment of history that lacks art can be more historical and more creative than times of a widespread art business … Lack of art is grounded in knowing that corroboration and approval of those who enjoy and experience 'art' cannot at all decide whether the object of enjoyment stems generally from the essential sphere of art or is merely an illusionary product of historical (as discipline) dexterity, sustained by dominant goal-settings". Heidegger, *Contributions to Philosophy*, pp. 355–6.

3 What Would Disembodied Music Even Be?

Alva Noë

Physics may be the substrate of sound, but the domain of music is action. We *make* music; we do so by vocalizing; we do so by hitting, banging, scraping, plucking and blowing. And the contours of musical soundscapes are shaped by what we do—by the energy, power and delicacy with which we act. Music, like speech, shoots forth from us and reflects our energetic and embodied presence in the world.

This picture of music as arising out of our active embodiment and efficient agency can be challenged from different directions. In this chapter I want to consider one kind of challenge that starts from the intuition that at the end of the day music is sound and sound is distinct from that which causes it. A musical space is closed unto itself and bears little interesting relationship to the mechanical activities that are necessary to actualize it. To perceive the song is not to perceive the singer, and it is ultimately a kind of impurity to think that song, that music, is essentially the expression of the feeling or body or action of the singer. It is with *electronic music* that this possibility becomes, or seems to become, actual. For when it comes to electronic music, we realize this conceptual divorce between the music and the maker. Digital means of production seem to screen off the creator, or the maker, who may merely be a programmer, from anything like direct involvement with the music that results.

I shall take the thoughts developed in Deniz Peters's chapter on embodiment in musical perception of electronic music as my point of departure.

The question that Peters begins with and that structures and animates his chapter is this: does the way electronic music is made (e.g., the use of computers) necessitate that electronic music is 'disembodied'? Peters's answer is 'No'. And the reason that he gives is this: listening and hearing, but also producing sounds and composing music, are all, in ways that Peters explains, profoundly embodied. He discusses at some length an idea that he calls 'feeling-in', which is the idea that sounds themselves show up for us as if made by us, and that this is part of what it is for sounds to be intelligible.[1] This phenomenon of 'feeling-in', which complements another notion of 'hearing-in' Peters also mentions, is rooted in the body, and is the basis of musical comprehension and the intersubjective availability of music. Indeed, if I understand this correctly, these are actually considerations that are meant to spell out conditions on the possibility of the intelligibility of meaningful sound (not merely musical sound—but that maybe is a point for clarification: are we talking about *meaningful sound* in music, or is that not an important

distinction?).

I find Peters persuasive on this point. I am not a musician. When I listen to a pianist I cannot really imagine myself moving my fingers as he does. And yet it is clear, I think, that my understanding of what I hear is informed by my appreciation that it is the shadow cast, as it were, by delicate and thoughtful movements, and moreover, movements made by a person whose body is like mine. We can join Peters in asking *Must electronic music be experienced as disembodied?* and we can join him in saying 'No'.

But now we have a new question. Peters's aim was to show that electronic music must not be disembodied. But he has actually delivered something much stronger than that. He has given us the resources to appreciate that electronic music must *necessarily* be embodied. Because, after all, he has just described how the intelligibility of the acoustic universe is grounded on acts of our feeling-in, which in turn depend on our embodiment. We started with a worry: must it be disembodied? And now we arrive at the thought that necessarily it must be *em*bodied (though the text leaves it open whether that actually *is* his view). If one is persuaded, as I am, by the considerations gathered by Peters regarding the pervasiveness of touch and the body and feeling-in in our experience of the world of sound and the world of sight—and the entire sensory world actually—then we assume a standpoint from which the very idea of disembodied music can come to seem strange and unintelligible. What could it even *mean* for music (or anything else that we might perceive) to be 'disembodied'? Is there even a coherent possibility of disembodied music, and what would it be?

When I was nine years old, I owned a little portable record player and I owned a copy of *Through the Past, Darkly* by the Rolling Stones; this was an early "big hits" album. I used to walk through my neighborhood and play '*Paint It, Black'*. A tinny, low-quality, portable record player LP reproduction. In some sense that is an example of disembodied sound. It is sound coming out of a cheap speaker; there is nobody making the sound there. It is disembodied sound as compared to what it would be like to be sitting in front of Mick Jagger and the Rolling Stones, having them sing *to* you: *that* would be embodied sound. So that is one example of what it might mean to speak of disembodied sound.

Here's another question, which I will pose and only partially answer: can we stepwise ramp up what we might mean by disembodiment, to more radical forms of disembodiment than this straightforward disembodiment where you hear the voice but there is nobody making it, where you hear the singer but there's nobody singing?

This last question is interesting because if it should turn out to be the case that Deniz Peters is right (if I interpret him correctly), then there's actually no possibility for a more radical disembodiment in music. And so the threat that the possibility of such a disembodied music might seem to pose is no real threat. Or maybe we shouldn't speak of a threat here, but of the missed possibility of a sort of liberation. One might, after all, have *hoped for* the liberation of our musical imaginations from the body. To point in the direction of what such a liberation might

look like, consider, in a sidestep into a different medium, the architecture of Frank O. Gehry, which you may or may not admire, but you're surely familiar with it (examples: the Guggenheim Museum in Bilbao, the Hotel Marqués de Riscal, or the Experience Music Project in Seattle, Washington [see Figure 3.1]). I myself am not an admirer of his architecture. But one thing which is striking about it is that it was imaginatively *impossible* to make in the pre-digital era. He uses technologies that outstrip what a draftsman ever could have drafted seventy-five years ago. It is not by accident that it has taken this age for those buildings to be imagined, let alone built. A similar thing can be said of the artist Richard Serra. In his most recent sculptural installations I believe he really is working at a step beyond what he can imagine with traditional media and tools in order to build it. He has an idea of a shape, and torques it, and then torques it again, rotates it, and arrives at something he had no prior picture of. Richard Serra works at the limits of what is possible from an engineering point of view. There are only one or two shipbuilding yards in the whole world capable of producing the steel he needs with exactly the curvature that he wants. Of course, once he builds those sculptures and you get inside one of them, you have a very embodied experience. But the work itself seems to have come from (I say this with a question mark) going beyond the body.

Figure 3.1 Frank Gehry, Experience Music Project, Seattle, Washington.

Photograph © Peter Carroll/First Light/Corbis.

Is there a musical analog of Gehry's architecture and Serra's sculpture? Let's just leave this question out there.

I was speaking to a composer the other day. He was praising the work of a certain composer. He said: 'Speaking musically, that is, just thinking about notes on paper, there's really nobody doing anything like what he can do'. An interesting comment, for it suggests that to take a composer's work seriously as music is to take it seriously as notes on paper. And that, in turn, would seem to suggest that a composer is, first and foremost, a writer. But then we have a paradigm of what a disembodied music might be. It would be music without a score or text, a musical practice not grounded on the specific activities of manufacturing a text. Which is of course an altogether different thing from what we had in mind with the comparison to Serra and Gehry. After all, Serra and Gehry make work from a score.

So, can we make sense of a form of radical disembodiment in music? And can we transcend the body and is it good and exciting that we might be able to do this? This is still an open question for me.

I turn now to Peters's extended, enactive conception about touch: I like this very much; but I want to suggest a different way of putting the matter. I think this is an important issue, especially if one pursues it into the cognitive science. Roughly, the issue is this: Peters refers to the idea that seeing is, fundamentally, a kind of touch.[2] This is an idea that has played a big role in my work, and part of what has motivated me and others to think of seeing this way was the wish to get away from a 'projective' idea of what seeing is.[3] On the 'projective' view, the world sends signals to the nervous system. What we experience, really, is the effects of this bombardment of the nervous system. This view conveys a sense in which we are removed from or alienated from the world. I think the reverse is true: we are already in contact; we are in the world and interacting with the world. It is to take a step towards this recovery of the world, or this denial that the world was ever lost, that I insist that instead of taking seeing as our paradigm, we should think of touch as the paradigm of our perceptual relation with reality. Once we make this shift, we are no longer confined to the resources of our own interior neural events. And so with hearing. Hearing too is, properly understood, a kind of contact sense, a mode of being in touch with the world. I say this in *Action in Perception*. In short, I wholeheartedly endorse Peters's idea that we can extend this 'engagement with the world' quality of touch and sight to hearing.

But now we come to the interesting point. The very problem that confronts us when we theorize sight and touch—namely, how does the world get into the act?—confronts us when we think about touch itself. Consider, when I hold the bottle in my hands I have a tactile perceptual experience of the bottle. I experience the bottle and not *merely* the parts of the bottle that my skin is touching—the bottle as a whole: with its shape; with its contours; with its 'wholeness'. Of course, as a matter of fact, I am only touching parts of the bottle; it is impossible simultaneously to touch every part of it. And yet by touch I can perceive 'the whole bottle', or so I would say. So already with touch we have the same question: how does the world show up for me in perception when our tactile perceptual experience is always limited and partial? But then it is not enough to say that seeing or hearing is like touch—this doesn't free us from our quandaries—because the same problems that plague our accounts of seeing and hearing plague our accounts of touch.

So we need some account of how we achieve perceptual access to the world which is not confined just to raw bits of sensory given—how we 'get' the world. It is this phenomenon that we must explain, and here, I think, Peters and I share common ground: the world is made available in experience thanks to our (embodied) sensorimotor fluency.[4] What can enable me to feel the whole bottle even though I am only touching five isolated parts of it is an understanding—and I don't mean an *intellectual* but a kind of *practical* understanding—that, *were* I to move my hands in certain ways, I would get certain points of resistance. The shape necessarily goes beyond what I can grasp all at once. For it to show up for me at all requires me to have a kind of comprehension of my relationship to this glass, mediated by very complicated practical skill. One could develop a practical-skill-

based account of hearing and touch and seeing that is unified. At the highest level, these all are ways of active exploration of the world, based on bodily skill. What makes one hearing and one seeing and one touch is the different styles. The difference is in the repertoire of skills that one is actually applying.

I would argue that sensorimotor understanding is basic in all perception, including the perception of sound. But perhaps in a different way than Peters thinks. It is not that when I hear you speak, I experience your words as if I were making them myself. This doesn't seem quite right. And anyway, it can't be required. When I watch a musician play, it isn't even true that I can imagine myself doing what he or she is doing. How can a nonpianist imagine what it is like to play piano?

The relevant embodied sensorimotor understanding that underlies our comprehension of sound and music is rather of a different sort. I suggest a more neutral way of putting it might be something like: I understand the sound qualities as occupying a space whose structure and significance for me is given in sensorimotor terms. Now that is perhaps a cryptic remark, but I tried to amplify it in my previous statements about the bottle and I will come back to it in something else I say in just a moment. I want to agree with Peters in his wish for an enactive account of hearing. But I also want to suggest that the formulation 'when I hear a sound I hear it *as if* I made it, or could make it, or were making it, or might make it' does not capture it.

* * *

Two more points. The first is a very general point that I cannot do justice to in the context of a short chapter; even if I had ten times the scope I could not do justice to it because it is such a big issue. Nevertheless it is worth just *mentioning* that there is something substantially problematic, in physical and philosophical terms, about the nature of sound. What is the ontology of sound? What are sounds? Where are they? What kind of being are they? I think there is actually a pretty poor level of understanding about that. Whether you ask an average physicist or an average philosopher, they are not going to give a satisfying answer. People tend to make two assumptions about sound that I think are questionable: Firstly, people often say that sounds are detachable qualities, qualities with no interesting linkage to that which causes them. And, secondly, it is widely supposed that we should think of sound as itself devoid of natural meaning and natural significance. Sounds are taken to be that which is described in terms of some spectral composition. So, putting these two points together, the standard view of sound goes something like this. *Physicalists* think the sound is the event in the world that produces the disturbance in the air. *Psychologists* think the sound is an event in the brain. Either way, whether the sound is in the medium or the sound is in the head, the sound is not part of the event one is perceiving; it is this extra thing caused by it. The action produces the sound.

But we don't need to think of sound this way. When Peters during his presentation at the Bodily Expression in Electronic Music conference did this

gesture of knocking and scraping on a table, I started thinking: the sound *is* the scraping. The sound is the wrapping itself. The sound is the very *touching*, the very action. When I hear the sound, what I am hearing is the knocking. That is the sound. When I hear the burglar below it is the burglar below whose shuffling I hear. And when I hear your voice it is *you* that I hear. Maybe we should think of sounds as, in this sense, features or expressions of the things and events around us in the world. If we follow this idea through (despite the fact that philosophers can argue endlessly about it), different possibilities open up. Suddenly we can begin to see why it is not going to be physical properties of the sound stimulus but rather their *meaning* at which our interest is really directed. From the standpoint I develop here, when I record a voice, I am not recording physical stimuli. I am recording *this* person. Just as when I look at a picture of someone, it is *this someone* I see in the picture. Pictures and recordings on this view are ways of achieving access to *the musician*. Or *the composer*. Or *the car accident*.

My second and final point is this: I'd like to offer an example which will allow me to summarize some of these themes. Peters gives an example of what he calls "perceptive completion".[5] And I thought it might be interesting just to think of the simplest case (which I am sure he has thought about) and this once came up in a debate I had with somebody else. Peters's example is: the piano strikes, the hammer retracts, and it is as if the sound was being made. But think of a singer's voice, holding the note. You only ever hear the portion of the sound which is being produced by the singer *now*. You don't still hear what has ceased sounding, and you don't hear what has not yet sounded. How could you? And yet I think we would all recognize that phenomenologically (meaning: 'reflecting on the character of your experience') it seems as if you do in fact experience the temporally extended shape and quality of the sound. You are not confined to the slice of noise in time. And I think what that means is that we are perceptually sensitive to something more than *merely* the physical stimulus. The stimulus is not what we are paying attention to. In this case we are paying attention to something more like the meaningful arc of the singer's action, what Merleau-Ponty called the intentional arc. It is as if we perceive laws, the development of the curve, rather than points that satisfy the equation. And this illustrates one of the characteristic ways our perceptual capacities are bound up with broader cognitive (and sensorimotor!) capacities. But here cognitive means not *in contrast with* embodied, but rather precisely *as embodied*. And this relates to the question of intermodality, or cross-modality. If sounds are in the world, if sounds are the doings and scrapings and knockings and wrappings of people, and if perceiving is not responding to mere stimuli but is actively engaging with the things going on around one, then it would be very surprising if perceptual experience was not richly cross-modal all the time, which, as far as I know, empirical data suggest that it is.

I would like to turn aside from Peters's excellent discussion and offer a concluding thought about the topic that interests us. In a way the puzzle that confronts us is a simple one. Traditionally all music is the product of movement,

just as traditional drawing is the product of scraping stylus on paper.

What happens when sound or line is divorced from movement? Answer: it *can't* be. The digital is just a different way of making the movement happen. And anyway, our musical sensitivity to movement is really a sensitivity to intelligibility; it is really a form of understanding.

We start our lives with the body, and the body is the substrate of our understanding. But as we learn to do new things, as we learn to use new tools, we extend and transform our body, just as we extend and transform our understandings. Electronic music doesn't take the body away. It gives us a new body.

NOTES

1. Deniz Peters, this volume, pp. 21–3.
2. Ibid., pp. 19–20.
3. I discuss this history in Chapter 2 of *Action in Perception* (Cambridge, MA: MIT Press, 2004). For a detailed historical investigation, see David C. Lindberg, *Theories of Vision, from Al-Kindi to Kepler* (Chicago and London: University of Chicago Press, 1976).
4. See *Varieties of Presence* (Cambridge, MA: Harvard University Press, forthcoming) for more on this topic.
5. Peters, this volume, pp. 22–3, esp. 23.

4 Embodying the Sonic Invisible

Sketching a Corporeal Ontology of Musical Interaction

Susan Kozel

> The sonorous … outweighs form. It does not dissolve it, but rather enlarges it; it gives it an amplitude, a density, and a vibration or an undulation whose outline never does anything but approach. *Jean-Luc Nancy*[1]

> Like crystal, like metal and many other substances, I am a sonorous being, but I hear my own vibration from within. *Maurice Merleau-Ponty*[2]

Do electronic media "vaporize the body, making it invisible"?[3] I take this provocation as a starting point, and consider the existence of a sonic invisible following the later phenomenological writings of Maurice Merleau-Ponty informed by my experiences as a dancer in responsive musical environments. The discussion below is based on a contemporary interpretation of phenomenological method unfolding as attention to shared lived experience filtered through the senses and refined by the process of descriptive writing. Memory and forgetting invariably play a role, "for without forgetting there is no space left by which to navigate the meaning of what one has remembered".[4]

Sonic experiences from specific dance performances and installations with electronic or interactive music provide the basis for this discussion. My body—or the moving, breathing bodies of others—is the interface for the elaboration of the ideas below which form the beginnings of a corporeal ontology associated with the sonic invisible. This ontology is to be understood dynamically in terms of the phenomenological tradition of thought: referring not just to what beings are, but to ways or modes of being. It is with reference to this philosophical context that the sonic dimensions of being are explored. *figments* (1999) offers a sense of density, *immanence* (2005) invites a consideration of literal versus indirect relationships between movement and interactive music, *exhale* (2005) opens the collective dimension, and *The Yellow Memory* (2009) draws electronic music closer to the vibration of voice. With the exception of *The Yellow Memory*, the elaboration of ideas below come from revisiting older pieces in order to excavate the sonic components. Electronic music was central to each of these pieces but was never explicitly discussed or considered in any theoretical context. Music remained just

outside the lens of conceptual investigation in the domain of the invisible if, following Merleau-Ponty, the invisible is seen to be the lining of the visible, sustaining and nurturing it while remaining unseen. After reflecting upon density, indirectness, collectivity, and voice, this chapter works its way toward asking why a sonic invisible might be a desirable way of considering electronic music and whether a notion of the inaudible might work as well as the cross-sensory formulation of the sonic invisible.

DENSITY

The vaporization of the body into the invisible is not a dematerialization. A phenomenological approach to music, particularly from the position of a dancer, cannot rest with such a suggestion. Jean-Luc Nancy has written of sound that it outweighs form but "does not dissolve it". Instead, the sonorous gives amplitude to form, gives it density, vibration, and undulation. Sound becomes permanent by appearing and fading away.[5] Vapour, to elaborate the metaphor, has material qualities and invites sensory and poetic engagement.

figments (1999) can be described more aptly as the creation of a movement laboratory than the presentation of a polished performance. As a performance experiment it offers reflections upon sound rather than music because the corporeal and philosophical complexity of this piece resided not in the musical score but in the do-it-yourself ultrasonic motion-capture system that translated dancers' movements into visuals.[6] Inaudible to the human ear, the ultrasonic sound waves generated the data required for the dancers' bodily movement to control visualizations appearing on small LCDs and projected onto a large screen. With small microphones on the dancers' bodies and transmitters in the corners of the room, the computers used sound to identify the body in space—albeit very imprecisely. The goal was to map movement into visuals by way of sound: the sound in the motion-capture system was an inaudible means for a dancer to manipulate an abstract poetic human figure that resembled a stick figure made up of rubber-band arms and legs. There was also a musical score by recording artists Hertz that was not a part of the interactive system. This thirty-minute-long piece of electronica, redolent of 1990s UK trip hop, had enough rhythmic texture to make it rich for movement improvisation, while its digitized and sampled sounds made it consistent with the digital aesthetic of the visuals. On the whole, *figments* had a clubby, site-specific ambience to it, feeling more like a movement intervention in daily life than a carefully staged performance.

The deeply flawed but evocative system that tracked bodily movement on the basis of transmission and reception of sound waves fostered debates around sound and presence, prompting one audience member to relate how her blind friend identified the people he knew according to how they marked an absence of sound in the environment containing them. The body of the person absorbed sound, creating an absence. This absence had a form that became their physical identity for him. Theirs was an identity through what was inaudible, corporealizing the otherwise abstract notion of negative sonar spaces or a 'sonic invisible'. *figments* brought to life a sense of sonic invisible because the ultrasonic soundscape was so cacophonous and hard to decipher (with sound waves bouncing on the hard surfaces of walls, floor, and ceiling) that moments of stillness or silence—where the visual figure became quiet—became our anchor points in composing meaningful

movement amidst the noise.

My experience of movement improvisation in this piece revealed that the sonic invisible has density and temporality. Bodily expression in this system became a matter of engaging with these qualities. Turning to Nancy: “To sound is to vibrate in itself or by itself; it is not only, for the sonorous body, to emit a sound, but it is also to stretch out, to carry itself and be resolved into vibrations that both return it to itself and place it outside itself”.[7] The dancers’ bodily experiences in this space were constant negotiations of emitted and received sound waves. This relation between sonic emission and reception was the basis of both our improvised movement and the visual figure’s response. Meaning, paradoxically, resided in shaping the density of inaudible sound, both for ourselves as dancers and for the audience. All bodies continuously sound and are heard, as noise, silence, or the many registers in between such as whispers, grunts, or sighs heard either from within or without. This thread of reflection could be pursued in several directions but for now it is enough to extract the notion of sonic density that is evident in particular through silence or absence. This density is characterized by indirectness, subtlety, and latency.

INDIRECTNESS

In previous writing I have discussed the motion-capture systems operational in the performance of *immanence* (2005) but have not yet reflected upon its final section, which offered a responsive sound composition designed according to a complicated Venn diagram in space.[8] The dancers created the interactive sound composition by moving within the frame of a simple camera-based sensing system.[9] This system worked flawlessly; we controlled with precision the sounds we plucked from the space at the same time as the three of us improvised with each other, but from the perspective of bodily expression as a dancer and compositional depth as a choreographer it still felt somehow lacking. Why? I suggest that this is because the sonic invisible was limited as a consequence of the interactive model being too literal.

I would like to frame the problem of literality in musical interaction as a structural challenge for the composer and an expressive or improvisatory challenge for the dancer. *immanence* had an overly direct relationship between movement and sound and a certain formalism that I could not assimilate or work intuitively within. It was too immediate, and as a result the movement felt somewhat flat. I was missing an element of latency or indirectness. In this context the latent is that which is just under the surface of voluntary action or consciousness, but also quite simply that which occurs at a temporal lag or following a hiatus of attention or focus.

Julian Rohrhuber, writing about networked electronic music, indicates that sound is associated with the notion of either an "immediate connection" or an "activity of decoding", which is an extraction of meaning and listener interpretation. An immediate connection is one way of understanding literality: "a direct effect of a more or less remote sound source" such as lifting an arm and hearing a particular sound sample.[10] In interactive environments this tends to be overused because it is the easiest to enact; in dance performance it often remains the main mode of aesthetic interaction due to a limited rehearsal period for dancers to become habituated to the sensing or motion-capture system. Rohrhuber helpfully complexifies causation pointing to what is beyond a literal expressive relation: it can be, he suggests, random, consequential, or intentional.[11] The latter intentional aspect of complexity can be taken to refer to audience or co-performer attribution of sonic event back to a performer's actions or intent, but it can also refer to the as yet unactualized part of a dancer's trajectory of movement or the initiation of a gestural quality that has the potential to unfold over time. Composer Tamara Smyth's plans for the sound interaction of a performance following *immanence* called *Other Stories* (2009) illustrate an interpretation of an intentional interactive modality. She sketched her attempt to work beyond the simple literal spatialization of triggering sounds in particular locations by affording a sonification of the dancers' intended movement trajectories. It is worth pointing out that these

movement trajectories are not entirely predictable.

> I recall trying to pull some interactive audio processing together within a couple of days. The problem was that because the Vicon [motion-capture] system was extremely buggy, data could not be reliably received by the effects algorithm. If that system had worked, I think there would have been several interesting things that could be done that would go well beyond simple triggering. I was merely trying to do spatialisation (quite a simple idea really). The idea I had is that the dancer could move the sounds around the space at rates dependent on her gestures (placing or carrying vs. throwing for instance). That is, you wouldn't only know the position at any given time of those Vicon points, but you would also observe how their position changed over time: a quick gesture in one direction might mean the dancer is taking the sound and throwing it into a corner. I think it could sound really interesting, and might be more effective than having the dancer control musical data/content (which is sometimes less successful).[12]

Compositional strategies that transcend literality can be described in terms of indirectness or noncoincidence, both significant terms in the history of phenomenology. In his book on Jean-Luc Nancy, Jacques Derrida writes that one's experience of one's body is "constitutionally haunted" by the other. Derrida challenges the possibility of pure immediate experience, of pure auto-affection, or of the body that is entirely present to itself. With these words, he articulates the basis of many contemporary interpretations of phenomenology which see the body as dynamically enmeshed in a reversible relation between subject and object, between self and other. Indirectness is an intuition based on inadequation, distance, and noncoincidence.[13] I argue that a version of this indirect intuition is at work in the corporeal responsivity to interactive sound compositions and that it is directly linked to latency. A sonic interaction characterized by indirectness or latency introduces a dimension of unpredictability into the dance improvisation: dancing with the system becomes more like dancing with another being inasmuch as the response to one's movement can be unexpected, lending a freshness and excitement to the exchange.

At this point it is important to articulate that it is too simplistic to assume that immediate relations between sound and movement are weak or that latent ones are preferable. Instead, literality between physical gesture and emission of sound is a building block for coherence in any interactive relation between dancer and sound; it is an important anchor for the audience to obtain a basic understanding of the dynamics of the interaction. Yet I argue here that richer meaning and complexity in a system are achieved when literal mapping is released and re-established with elasticity and breath, components of what I have called latency. There needs to be a play across these aspects: immediate and the indirect, or the synchronous and the

latent. Without the immediate movements the logic of the responsivity is lost from the perspective both of the dancer and the audience member; without the indirect play, or intrusion of strangeness, the system runs the risk of becoming banal.

It is possible to expand further the mechanisms of indirectness or non-coincidence by returning to Rohrhuber, in particular two questions he identifies as significant to the culture and techniques of network music: "how to transmit?" and "how to create a network of relations?"[14] These are important questions, but constitute only half the picture. 'How to listen?' and 'how to respond?' form the other half of what together makes up a fundamentally Merleau-Pontian ontological relation: in the spirit of seeing and being seen, touching and being touched, there is transmitting and listening. This is not just a philosophical trope; it is enacted in live performance with responsive systems by virtue of technological and physical skills, techniques, and sensitivities.[15] In effect, it is possible to argue that bodily expression in electronic music occurs through embodied listening as much as through movement, with the body as a listening organ. It is through the moment of such embodied listening that immediacy can be punctuated with latency or the unexpected. The significance of this is more than aesthetic; it is ontological, relating to intercorporeal beings.

COLLECTIVITY

The discussion thus far can be seen to be based on interactive electronic music, but the sense of the network relates to more than communication protocols of software and hardware systems. The sonic invisible is not a solitary construction; it maintains the inherent intercorporeality of Merleau-Ponty's ontology and is manifested across a plurality—or network—of bodies, sounds and systems.[16]

A little discussed element of the *Exhale* (2005) phase of *whisper[s]* (an elaborate, wireless, networked, bio-sensing project in wearable computing) was the prototype sound wall which translated the respiration of a collectivity into a distributed composition emitted by dozens of small speakers embedded into a fabric wall.[17] The sonic invisible in this context acted as connective tissue for the bodies of the participants in the space. In brief, the compositional principle was to create an emerging, shifting, electronic soundscape from the respiratory data of six participants wearing the garments embedded with respiration sensors. This soundscape was programmed to shift in texture also with the mini-events that were the participants' decisions to share their respiration with one another. The sound composition was conceived as a generative, ambient, networked portrait of the shifting corporeal exchanges between a group of people; unfortunately, it never came to be. By August 2005 for the Emerging Technologies exhibition component of SIGGRAPH (the Association for Computing Machinery's Special Interest Group on Graphics and Interactive Techniques) the hardware and software platform performed simple corporeal exchanges, but the sound dimension was not fully integrated. Only one participant's respiration data was sonified, but as this person's breath was responding to exchanges with the five other participants he or she acted as a sonic filter for the group's activities. Despite its partial functionality, the proposed musical dimension to this project is intriguing. The sonic invisible is based on sonic elements that did not occur but remain very important parts of the projects in my recollection of them; it is as if these unactualized musical scores are part of the projects' musical imaginaries. The generative dimension of memory is revealed, how it is not just a recording of past events but is imbued with desire and imagination.

The sonic invisible is anything but a void, and *Exhale* made this very clear. It was a shared and kinetic ontological state. As Deleuze says of Spinoza, it is important to understand life as "a composition of speeds and slownesses on a plane of immanence". When he says that "one never has a tabula rasa; one slips in, enters in the middle; one takes up or lays down rhythms",[18] the implication is that we do not do so alone. The sonic invisible is a shared space, a collaborative composition and an ontological exchange that precedes and follows on from us. *Exhale*'s sonic composition was designed to be a body that was made up of other bodies; the differing speeds and slownesses created the texture of the sound. An interactive

composition like this is an unruly collectivity akin to the unruly collectivity that is each person's body. I frequently practice a kinaesthetic awareness technique for bodily integration that involves calling attention to what I am sensing in my body as I perform certain simple actions like raising my arms and turning my head. After twenty minutes of consistent breathing and internal focus I notice that my body is anything but kinaesthetically homogeneous. Parts feel numb, parts vibrate intensely, sometimes aches surface and need to be let go as if they were gaseous or liquid. These different sensations can be viewed as different temporalities with the opening state being one of oblivion, disconnection, or unawareness, the intermediate state one of cacophony, and the closing state one of a transformed set of vibrations. In my phenomenological experience of music I cannot avoid a convergence between the kinaesthetic, the energetic, the temporal, and the rhythmic. Further, I am able to affirm viscerally Rohrhuber's words: "the variable and interlocated structure of causal topology" are at work in networked electronic music.[19] The topology refers to sound, to the network of bodies participating in the sonic event, and to the variable and heterogeneous qualities of each body.

VOICE

And now, a possibly contentious move in a discussion of electronic music: turning to voice in order to understand electronic music in dance performance. Transitioning to *The Yellow Memory* (2009) and the reflection upon voice, that most analogue of instruments, is the suggestion by Brandon LaBelle that "mobile speech throws the body into a network of orality that sustains relationships through always being available, ready to answer, across spatial coordinates".[20] Mobile speech is a vast area for research in music composition and human communication relating to the use of communication networks, and this is the context for LaBelle's comment. Yet equally relevant is the consideration of dancers and performers who use speech in performance, less as script or traditional narrative, but as sonifying movement according to loose codes or principles. This version of mobile speech is at once physical, public, personal, and interpersonal. Voice in *The Yellow Memory* was a hybrid between physical and electronic. A site-specific piece at the Ukrainian Institute in New York City, this performance explored the notion of architectural, personal, and collective memory. Director and dramaturge Svitlana Matviyenko recorded voices of audience members as they recalled the previous year's performance, simply called *The Yellow*, and integrated these words into the sound score for the following year's *The Yellow Memory*. Sound was digital and electronic, and I argue that it was also interactive and generative, but not as a function of hardware and software. The dancers provided the interactive and generative dimensions to this system according to the improvisatory structures set in place by choreographer Inka Juslin.

The electronic score had a lot of breath in it; not digitized sounds of breath as were prevalent in the 1990s, but rather pauses and gaps like a Feldman score. The instrumental components combined hanging piano notes, offering a suspended or airy quality, with harsh or dissonant pulls from a violin that felt like ragged breaths: as if ease and unease repeatedly gave way to one another. The recordings of people describing their recollections from the previous year were layered so that one could listen to one narrative before it dissolved into another. Building a coherent picture of the reminiscences of a collective was more important than sonic fragmentation or counterpoint as a musical aesthetic. The voices had a reflective texture of people uncertainly plumbing their memories; this sense of finding the right word to express a now fading recollection prompted a movement improvisation about finding a suitable gesture or quality of movement to inhabit the moment, before letting it fall away and be replaced with another. The dancers (Juslin and I) repeated phrases from the sound recording, explicitly lifting words from several of the audience members. We integrated these into our improvisation by speaking or muttering them aloud while we danced. We dancers were listeners: listening to the words as they came out of our mouths and listening to our movement

to see where it wanted to take us. We were sonorous beings, hearing our own vibrations from within and without at the same time.[21]

The impulse for movement came through the words and between the words, where memories seemed to reside, my own and those of others. The words I chose to repeat from the sound composition included "that skin on wood sound", and "bodies created slaps and squeaks". I found my body drawn to the floor, or pressed against the wall; slapping my hand loudly on the floor caused pain in my ear and an almost involuntary lurch upwards with surprising physical force—as if the sound waves forced my body upwards. Jean-Luc Nancy writes that "to be listening is always to be on the edge of meaning";[22] relevant also to the experience of bodily expression in electronic music, this dance improvisation revealed that to be listening was to be on the edge of movement, not entirely sure where it might go next or which sound quality the motion might adopt. The sonic momentum rippled outward, drawing my body to my feet and into the wall where I could listen to the sound score, to my own breath, or to the invisible musings of the old building: at once that skin-on-wood sound and the feedback loop within me of the voices on the recording determined my next physical response.

In closing I ask whether I should be considering not the sonic invisible but, in fact, the inaudible. It is thinkable that, with further reflection, it would be possible to work through all the qualities of the invisible and map them onto the inaudible, but at this stage I offer two simple reasons why I wish to hold onto the sonic invisible as an ontological approach to musical interaction. The first is because the sonic invisible is similar to much improvisation with electronic music in that it is synaesthetic: a convergence of sound and vision, with strong implications for touch. Merleau-Ponty's careful, and sometimes baffling, description of the invisible is based on charting the reversibility of seeing and touch; as such, the construction of the sonic invisible lets temporality, spatiality, and tactility bleed into one another. The second reason is that Merleau-Ponty's notion of the invisible is inextricably entwined with the irreducibility of the other. This is key: the layers of the visible and the invisible are a constant reminder of how I cannot fully comprehend the other—to integrate the other into myself; to do so would have ontological and ethical consequences. Non-comprehension and non-coincidence are very important to the approaches to phenomenology that I value and permeate all of my experiences with electronic music, both as a performer and as an audience member. This chapter's sketch of the sonic invisible as a corporeal ontology of musical interaction unfolds across density, indirectness, collectivity, and the vibration of voice, but I am quite convinced that these are not the only relevant qualities. This ontological palette can and will be expanded in both my own work and that of others.

NOTES

1. Jean-Luc Nancy, *Listening*, trans. Charlotte Mandell (New York: Fordham University Press, 2007), 14.
2. Maurice Merleau-Ponty, *The Visible and the Invisible*, trans. Alphonso Lingis (Evanston, IL: Northwestern University Press, 1968), 44.
3. The suggestion that electronic media "vaporize" the body comes from the call for contribution to the Bodily Expression in Electronic Music symposium.
4. James E. Young, 'Foreword' to *Oblivion* by Marc Augé (Minneapolis: University of Minnesota Press, 2004), p. viii.
5. Nancy, *Listening*, p. 2.
6. *figments* was a collaboration between Kirk Woolford and me with a series of invited improvisers. It had a recorded musical score for movement improvisation by UK electronica artists Hertz. See Susan Kozel, *Closer: Performance, Technologies, Phenomenology* (Cambridge, MA: MIT Press, 2007), Chapter 4.
7. Nancy, *Listening*, p. 8.
8. *immanence* was a commission by Studio XX in Montreal, as part of the HTMlles festival. Dancers included Tara Cheyenne Friedenberg, Helen Terry and me, visual and software were by Robb Lovell and Jamie Griffiths, and music was by Jonathan Owen Clark. See Susan Kozel, 'Revealing Practices: Heidegger's Techne Interpreted through Performance in Responsive Systems', *Performance Research* 10/4 (February 2006), 33–44.
9. The camera-based sensing system was a variation of the Eyes system designed by Robb Lovell.
10. Julian Rohrhuber, 'Network Music', in Nick Collins and Julio d'Escriván (eds.), *The Cambridge Companion to Electronic Music* (Cambridge: Cambridge University Press, 2007), 141.
11. Rohrhuber, 'Network Music', p. 150.
12. *Other Stories* was part of a research project into ethics and motion capture that occurred in the Interactivity Lab of Simon Fraser University's School of Interactive Arts and Technology. Inka Juslin and I danced, Greg Corness wrote and operated the visual software, Tamara Smyth consulted on sound composition, and bassist Tommy Babin provided the live music. This quote is from e-mail correspondence (August 2009).
13. Jacques Derrida, *Le toucher, Jean-Luc Nancy* (Paris: Galilée, 2000), 205.
14. Rohrhuber, 'Network Music', p. 155.
15. Listening was clearly evident in the performance component of the Electronic Generative Music (EGM) project presented during the BEEM

symposium at the University of Music in Graz (collaborators Gerhard Eckel, David Pirrò, and Valentina Moar). In the final section of a four-part improvisation the sound seemed to escape Valentina Moar more than previously, requiring a different quality of listening and feeling the space, as if the music were an other creature dancing with her. This is not to say that this section was better, but I believe it was further along the learning curve with the system; it demonstrated an indirect qualitative relationship between dancer and system provoking a different sensory engagement with the space and the sound.

16. Merleau-Ponty is mistakenly held to assert the primacy of the subject when in fact some of his more complex and beautiful passages in *The Visible and the Invisible* describe ontological relations between bodies, or *intercorporeity*: "The body is lost outside of the world and its goals, fascinated by the unique occupation of floating in Being with another life, of making itself the outside of its inside and the inside of its outside. And henceforth movement, touch, vision, applying themselves to the other and to themselves, return toward their source and, in the patient and silent labor of desire, begin the paradox of expression". Merleau-Ponty, *The Visible and the Invisible*, p. 144.
17. The *whisper[s]* project was directed by Thecla Schiphorst, with artistic collaborators Sang Mah, Susan Kozel, Robb Lovell, Jan Erkku, and Kristina Andersen. Gretchen Elsener designed the sound wall and the composition was by Brady Marks. For details on the *whisper[s]* project see http://whisper.iat.sfu.ca (accessed November 2010).
18. Gilles Deleuze, *Spinoza: Practical Philosophy*, trans. Robert Hurley (San Francisco: City Light Books, 1988), 123.
19. Rohrhuber, 'Network Music', p. 150.
20. Brandon LaBelle, *Background Noise: Perspectives on Sound Art* (London and New York: Continuum, 2008), 269.
21. Merleau-Ponty, *The Visible and the Invisible*, passim.
22. Nancy, *Listening*, p. 6.

5 Seeing Sound, Hearing Movement

Multimodal Expression and Haptic Illusions in the Virtual Sonic Environment

Jaana Parviainen

We possess strong associations between the materiality of objects and sounds commonly made with them. This implies that an object's function is intimately bound up with the sound it makes when we handle it. Within the Embodied Generative Music (EGM) project, which took place from 2007 until 2010, Gerhard Eckel, Deniz Peters and David Pirrò created a virtual instrument that deconstructs and reconstructs the connection between bodily movements and generated sounds that exists when a traditional instrument is played. They invited dancers to explore this instrument, actually an entire virtual sonic environment, and its movement-sound relationships in the project's aesthetic lab.[1] The expectation was that dancers have a greater sensitivity to tactile-kinesthetic-sonic stimulation in a digital environment than average movers. My own research contributes to developing understandings of human movement and kinesthesia in interaction design which, in turn, can inform the design of movement-based interaction.[2]

In 2009 I collaborated for two and a half months with Eckel, Peters, and Pirrò, and guest dancers, to analyze the dancers' improvisations. I worked with four dancer-choreographers from Vienna Tanzquartier: Anna Nowak, Alexander Gottfarb, Alexander Deutinger and Magdalena Chowaniec. When improvising in the EGM virtual environment, dancers generate sounds through their movements while simultaneously hearing the sounds as a trace of their motion. Without any physical contact with a sound source—that is, solely by moving in the virtual environment—dancers, responding spontaneously to an enormous multitude of sound qualities, generate a sonorous environment.

In a related paper, I examined performers' perception of the EGM interface applying Maurice Merleau-Ponty's notion of reversibility.[3] For Merleau-Ponty, the basis of the reversibility of touching is simple.[4] When I touch my left hand with my right hand, I am both a subject and an object through the act of touching. The body's touching of itself gives rise to a differentiation which is neither sheer identity nor nonidentity. There is then a gap (écart) between ourselves as touching and ourselves as touched, a divergence between the sentient and sensible aspects of our existence.[5] After the realization of touching-touched or seeing-seen, Merleau-Ponty

argues that touching-seen or seeing-touched regarding external objects operates in a similar manner: when seeing brown bark on a pine tree trunk, we can almost feel its coarseness on our fingertips. Equally, moving an object and hearing its sound are not separate orders of being in the world. For Merleau-Ponty, they are reversible, since hearing a mere sound of sawing, for instance, reminds us of this physical action. The EGM interface plays with this reversibility between moving and hearing sounds, exploring and elongating its limits.

In this chapter I discuss tactile-kinesthetic experiences and haptic illusions that certain 'scenarios' of the EGM interface can generate for movers who in turn make these experiences visible on stage to an audience. I suggest that dancers' kinesthetic-visual-sonic expression feeds both the artists' and the audience's imaginations. The chapter intends to show that, in EGM, sound, movement and touch forge a special kind of the structure of reversibility. First, I discuss Merleau-Ponty's notion of the body's expressivity to introduce ideas of multimodal expression. I then describe some technical details of the EGM interface to understand haptic illusions and as-if-touch in this environment, seeking to specify how the EGM interface and its 'scenarios' intensify feelings of touching. In examining dancers' sonic-tactile-kinesthetic expression, I use my notes from a five-day collaboration with Anna Nowak as she was working on her performance *Anna in Wonderland*. Nowak's improvisation shows how physical action induces kinesthetic imagination. I conclude by discussing kinesthetic intelligence and its importance for developing movement-based interfaces in the future.

MULTIMODAL EXPRESSION

In the past, expressive movements were understood as gestures, connected to inner mental representations and requiring interpretation in terms of shared rules, conventions, or principles if their meaning is to be understood. This view of communication and understanding as 'information processing' has been hegemonic in cognitive science, psychology, analytical philosophy, and aesthetics, and even in phenomenology.[6]

I explore here an alternative way to discuss bodily expressivity. Merleau-Ponty says:

> We are always in a plenum, in being, just as a face, even in repose, even in death, is always doomed to express something (there are people whose faces, in death, bear expressions of surprise, or peace, or discretion), and just as silence is still a modality of the world of sound.[7]

This is to say the body always reveals and expresses something intentionally or unintentionally, passively or actively.[8] People are capable of controlling the expression of their bodies to others only partially. The body's expressivity can be direct and indirect, immediate or constructed, voluntary or involuntary, physiognomic or gestural. Additionally central to expressivity is interactivity as it occurs, for instance, between artists and an audience: the latter responds to bodies' expressions with the emergence of dynamically unfolding structures where all participate in 'shaping' their own bodies and actions. It is in the power of living bodies to affect each other in this expressive way through movements.[9] This multilevel expressivity of embodiment cannot be fully controlled by the agents themselves.[10] Regarding the involuntary dimensions of bodily expression, we can never escape, for instance, our skin colour or sex. Obviously, depending on cultures and societies, people are treated differently because of some features of *Körper*, such as their sex, race and age, or due to *Leib*, such as ethnic features, social manners or gender.

When dancers improvise with EGM, their hearing becomes a real-time manifestation of their kinesthetic and motor activity, as there is not sufficient time for sonic information to be turned into gestures intellectually. The dancers' movements are expressive not in the sense that Gallagher suggests, in other words in the sense of pointing or nodding,[11] but in the functional sense of grasping or reaching. I am not claiming that dancers perform functional movements to express mimetic content like Marcel Marceau in his mime performances. I assume that their manifest movements in response to sound express the human body's 'basic' movement motives from everyday activities. Merleau-Ponty calls these motives

"motor intentionality". By 'basic movement motives' I do not mean functional movements such as grasping, pushing, or hitting, but the *internal* dynamics of these movements, like feelings of being pushed, being lifted or touching surfaces. Dancers in EGM do not literally hit or lift something, but their movements when responding to sounds have the characteristics and dynamics of hitting or lifting.

Merleau-Ponty discusses motor intentionality by considering the difference between pointing (*Zeigen*) and grasping (*Greifen*). Drawing on a pathological case of a subject called "Schneider", he argues that the patient was not able to perform "abstract movements" such as pointing to his knee with his eyes shut, but that he breezed through "concrete movements" like hitting a mosquito on his arm.[12] Merleau-Ponty concludes that there is motor intentionality (i.e., *Greifen*) between the mere reflex and the representative function of movements (i.e., *Zeigen*).[13] He says that

> movement is not thought about movement … In the action of the hand which is raised towards an object is contained a reference to the object, not as an object represented, but as that highly specific thing towards which we project ourselves, near which we are, in anticipation, and which we haunt.[14]

With Merleau-Ponty, when a dancer's hand is raised the dynamics of the movement contain a reference to an imagined object and its sounds. In most of the improvisation sessions that I attended in the EGM project, I witnessed the dancers' movements to be expressive, not in the sense of *Zeigen* but, as Merleau-Ponty here addresses, in the sense of *Greifen*.

SCENARIOS GENERATING HAPTIC ILLUSIONS

One of the technical-aesthetic innovations of the EGM project resides in sound processing algorithms ('patches') designed and implemented by its team. They have termed this algorithmically designed correlation between movement and sound 'scenario'. When working with the *Schwitters* scenario, Eckel and Peters discovered that it was able to generate slight haptic illusions for movers. Peters began to explore and improve the sonic-haptic illusion by devising collaboratively a new scenario type called *Spheres* at the end of 2007. Aiming to create a volume with haptic effect, a sonic sphere (of which a variable number can be placed into performance space) is perforated by silent 'holes' that are about 5 cm in diameter and about 15 cm apart in all directions. To have varying pseudo-tactility within a sphere, these holes are fully silent in the sphere's center and are increasingly filled with sound towards its surface. One could say that the scenario provides a method for creating haptic illusions with sounds.

Overall, the research group has developed two types of scenarios: 'relative' (intra-body-distance oriented) and 'absolute' (space oriented). Roughly speaking, in absolute scenarios the sound-movement combination is related to specific body placement in performance space, while in relative scenarios it is based on distances of tracked targets within bodily space, regardless of their absolute spatial location. In absolute scenarios, such as *Spheres* and *Tube*, recorded sound material is projected in its placement into space. The setup of the *Spheres* scenario I observed includes three spheres, one rather small (about the size of a soccer ball), one medium sized and one large (a few meters in diameter), each placed at different heights and in different areas of the stage. The *Tube* scenario features a vertical tube about the size of an advertising pillar positioned in the middle of the performance space.

The dancers reported experiences, such as that they felt as if they 'touched' the sound, as if a certain spot in space was 'thicker' or 'magnetic', or as if the sound 'entered' them, becoming their very own 'voice' or 'breathing'. Certain sonic scenarios induce dancers to touch and to imagine surfaces and materials in the digital landscape, although they do not simulate strong haptic illusions (which I explain in a moment). Dancers tend to behave and move as if sounds were located in surrounding space, close to their skin or even inside their bodies, despite knowing that they come from the loudspeakers. These tactile surface qualities are perceived differently across the body and comprise a range of stimuli such as pressure, vibration, temperature and texture of materials. The propensity of the body acquires tactile qualities through the whole body, not only the hands.

Haptic sensations are generally conceived as resulting from successive experiences in which substance is encoded; vision is thought to provide information concerning shape and location. Illusions may occur with all human senses including

haptic sensations. The term ‘illusion’ refers to a specific form of sensory distortion; the best known and most widely studied illusions are visual, such as the Müller-Lyer illusion. The study of haptic illusions, however, is still in its infancy.[15] With ‘haptic illusion’ I refer to subjects’ feeling as if there were shapes, textures, and surfaces in a space or inside a thing. A strong haptic illusion refers here to the distortion of the tactile sense when subjects cannot tell whether they feel a real thing or an image of it. Weak haptic illusions occur when subjects perceive haptic feelings but do not mistake them for real objects. EGM scenarios can generate weak haptic illusions, which I with Husserl call ‘as-if-touch’.[16]

Connections between vision, touch and hearing inevitably have an impact on perception and influence imagination. The importance of as-if-touch within kinesthetic sensitivity for dancers is evident in the audiovisual material recorded for research. Dancers move and modify their movements as if the sonic scenarios are producing a material resistance. The characteristics of the dancers’ chosen movements reveal muscular tension and physical pressure. The creative choices experienced in their improvisation are not solely the result of their response to sounds but are also informed by the body’s sensory stimulation from as-if-touching surfaces and feeling material qualities. These ‘haptic sounds’ stimulate the dancers’ kinesthetic body memories, brightening the dancers’ movement qualities and bodily expressivity on stage. These changes in the dancers’ physical bodily presence become visible to viewers. Emphasizing the importance of haptic illusions, I will next look at how moving back and forth between ‘real’ sensation and imagination has creative and artistic potentials in choreographic contexts.

CREATIVITY AND TACTILE-KINESTHETIC IMAGINATION

Dancers' sensory systems perceive both the real world and the virtual world as generated in digital environments such as that of EGM. They are capable of differentiating between these worlds without disturbing the feeling of immersion. The dancers' movement motivations are partly intuitive reactions, partly active interferings, and partly learned manipulations based on the body memory connected with the sounds of the sonic scenarios. The dancing body is geared towards existing or possible movements it is able to make even if it has never made them before. Choosing movements in improvisation proceeds intuitively, without cognitive decision making. However, after improvisation sessions the dancers were willing to reflect on their movement choices.

I will now examine in more detail my five-day collaboration with Anna Nowak when working on her performance *Anna in Wonderland*. Within a couple of days we developed a method to create choreographies for EGM. I call it 'working with images', the aim being to evolve an 'organic' connection between the quality of a sound and a lived movement that is also visible to another person.

We noticed that the very act of the performer observing her motions altered the performer's way of responding to sound and even her perception of the sound quality itself. When in aesthetic lab discussions she described her own movement motives and feelings, I suggested clearer images to intensify her physical presence when making her movements. When Nowak reported that a sound felt "like something organic, fluid and outside [her] body", I asked her to move as if her body was filled with a heavy liquid. Back in improvisation, Nowak specified this image, naming it 'oily liquid'. We developed similar 'images' such as 'magnetic field', 'sprinkling water on the face', 'icy landscape', 'star trek', and 'crazy man', into which she plunged, specifying and clarifying her own motives for bodily expression. Witnessing the performance, the research team was fascinated by the raised expressivity of her improvisation, her more powerful bodily presence, and the clarity and vividness of her micro-movements.[17]

Working with images is understood in cognitive psychology as ideomotor action. Mabel Elsworth Todd pioneered the method of 'ideokinesis' in the 1920s, defining it as the process of using mental imagery to affect the body's postural alignment. One focuses a thought or a mental image on a certain part of the body topography or on the whole body, bringing about muscular tensions in that area. Concerning themselves with the body's expressivity rather than mere postural alignment, dancers thus 'color', deepen or intensify their movements or bodily presence using ideomotor response. When improvising, Butoh dancers use images that are drawn from organic and inorganic nature to intensify their own bodily awareness, stage presence, and visible movement qualities. Butoh dancers also use ideomotor mimicry, which they call 'transformation'.[18] According to Bargh and

Barndollar, merely to think about natural entities such as trees, stones, water, or animals can induce ideomotor mimicry as to the behaviour of these entities.[19] Without necessarily recognizing the specific reference of the dancers' transformation, an audience witnesses special atmospheres and qualities in their bodily presence and movements.

When Nowak played the virtual instrument, a change in her ideomotor responses had an effect on the sound qualities she produced. This implies that minor changes in bodily movements (i.e., micro-movements) alone can generate much perceptual information of the sound-movement relationship.

Merleau-Ponty[20] and Casey[21] have suggested that the living body has an unconscious ability to remember and reproduce specific movements, complex coordination, and habitual movement responses. Such body memory is related to proprioception, body schema, and body topography. Associational kinesthetic body memory in the present context concerns emotions, gestures, images, moods, movements and movement qualities stored in our body memory until triggered by existing conditions during an improvisation. Nowak reported that one of the spheres in the *Spheres* scenario (with three spheres) drew out movements from the body memory that reminded her of the American television series *Star Trek*. Instead of representing mimetic memories of this TV program or its characters, Nowak improvised as if working in a fictional spaceship.

In improvising with the EGM instrument, dancers appeared to become increasingly aware of the new multisensoral experiences—especially aural, kinesthetic, and haptic sensations—the interface evoked in their bodies. They felt that they needed to reflect the 'natural' correlation between everyday movements and material objects. Our ability to make causal inferences between sounds and material objects does not depend on our understanding of an abstract rule or concept of causality; instead, the reversibility between movement and sounds implicates a complex plexus of cultural, historical, individual, and organic meanings.

One of the most intriguing questions in this study concerns the grounds on which dancers choose or reject movements in generating movement-sound combinations. Are these purely individual choices or can we identify probable ways to choose movements in improvising a certain scenario? Unfortunately, I do not have an answer to this question, but I assume that tactile-kinesthetic intelligence, to which I turn now, has a central role in this process.

TACTILE-KINESTHETIC INTELLIGENCE

For Howard Gardner,[22] tactile-kinesthetic intelligence involves two capacities: to control one's bodily motions and to handle objects skillfully. These two core elements may exist separately, but typically skills in using the body for functional and expressive purposes tend to go hand in hand. Our kinesthetic system, which monitors the activity of these regions, allows us to judge the timing, force, quality, and extent of our movements and to make necessary adjustments in the wake of this information. Gardner pinpoints the difference between what are mere reflex loops, or automatised movements, on the one hand, and highly skilled voluntary activities on the other.[23] Much voluntary skilled activity requires interaction between perceptual and motor systems. For Gardner, highly skilled kinesthetic activities are based on automatic and overlearned sequences of actions that are of little help when an individual improvises in a foreign environment. When a new situation challenges one's own tactile-kinesthetic intelligence, one has to unlearn and detach oneself from habitual manners of moving. Discussing mainly overlearned sequences of actions, Gardner ignores improvisatory movement, which is a more powerful indicator of tactile-kinesthetic intelligence than motor skills.

All dancers I worked with in the EGM project displayed extraordinary talents in tactile-kinesthetic intelligence. First, they were able to unlearn—that is, release their bodies from—habitual responses to learn new 'rules' of scenarios and to adapt this to a new environment.[24] Second, they regarded their confusing experience within the different scenarios as an opportunity rather than as a disappointment or as an experience of personal failure.[25] They were kinesthetically intelligent in responding to various sounds instantly and capable of learning to use this new environment for pursuing their own artistic tasks.

Traditionally, motor activity has been considered a less 'high' cortical function than mental activity such as linguistic or mathematical reasoning. In Jean Piaget's developmental psychology,[26] motor activities are treated as a preliminary phase on the way to higher cognitive operations.[27] However, recent brain research shows that the operations of the movement system are tremendously complex in activating various parts of the cortex. The motor areas are not located in a certain part of the cortex, but, for instance, mirror neurons have an active role in the cognition of movements. Mirror neurons are found in the frontal, parietal, and temporal lobes, and in the Broca area. They are also called 'empathy neurons', and react to movements, sounds, facial expressions, and gestures or movement intentions. New findings in neurophysiology on the human kinesthetic system look very promising in furthering the theory of tactile-kinesthetic intelligence.[28]

It seems that phenomenologically oriented research on tactile-kinesthetic intelligence and kinesthetic imagination has just begun, not to mention applications, such as new digital interfaces, that are capable of utilizing our complex ways to

interact with the world. For the time being, there are few interfaces like the EGM instrument that appreciate our complex kinesthetic system and the reversibility between movement and sound.

DISCUSSION

A central discovery of the EGM project was that some sonic scenarios can create haptic illusions—that is, as-if-touch experiences. These tactile surface qualities are perceived differently across the body. The dancers' improvisation indicates that the body has the propensity to acquire tactile sensory information through the whole body, not just the hands. This tactile information is mediated visually and sonorously when dancers perform for an audience.

The EGM interface seems to intensify the dancers' tactile-kinesthetic sensations and stimulates spatial imagination, making this whole process visible to the audience. The interface does not simulate strong haptic-sonic illusions, but it induces dancers to imagine that space or specific spots contain animate or inanimate characters or different atmospheres.

The case study on Nowak's improvisation provides an example of an artist who integrates kinesthetic imagination within a digital environment in order to create a choreography. The description of her working process shows how bodily engagement with the world is crucial for creativity in virtual environments. By exploring the potential of bodily movements within EGM, we also developed a new method based on ideokinesis to work within this interface. Nowak's choreography would have been difficult if not impossible to achieve by any other means. The EGM instrument assists in the development and selection of new movement ideas and bodily knowledge that can convey emotions and meanings in performance.

In a parallel to traditional instruments, EGM yields tactile-kinesthetic experiences of sounds to its movers. However, intangible interfaces such as the one used in EGM open up more intuitive interactions with digital systems that are not yet widely available. If EGM were able to convey tactile-kinesthetic experiences for nonexperienced movers, it could offer new information about our intuitive means of interacting and orienting ourselves in everyday environments. In working with EGM scenarios, dancers reported that they began to think of their more or less automatic manners of responding to sounds that movements make in everyday life. In a way, by deconstructing expected sound-movement relations, the experience in the EGM interface leads movers to reconsider their 'natural' ways of connecting a certain movement with a sound. On the other hand, findings of this study also suggest that it is difficult for us to unlearn our inherent intentions to connect sound and movement together.

Most digital devices based on tactile-kinesthetic experience—such as haptic mice, joysticks, and touch pads—have originally been developed for the computer-games industry.[29] Much of the games software, however, does not support sensitive tactile-kinesthetic input and output. Interaction design for movement-based input raises new questions about the potential use, and consequences of use, of the active,

moving body in human-computer interaction.[30] Developments in movement-based interfaces will provide a greater potential to translate physical movement experiences into a new format, resulting in digital devices that will better support creative practice and stimulate the imagination.

NOTES

1. The virtual instrument is located in the aesthetic lab of the Institute of Electronic Music and Acoustics (IEM) at the University of Music and Performing Arts Graz (KUG), Austria. It consists of two technical components: a motion-tracking system (Vicon) and a sound-processing system (SuperCollider). For motion tracking, the aesthetic lab in the CUBE (the performance space of IEM) is equipped with 15 Vicon M2 infrared cameras, hung from the ceiling in an almost circular fashion around the dance floor. The dance floor area is about 6 meters square with 4 meters of space above. The cameras send out strobed infrared light, reflected back via hemispherical reflectors. For full-body motion tracking, dancers wear special suits with 24 reflectors attached. Because a reflector is easily occluded by some part of the dancer's body, and because of the limitations of the area a single camera is capable of viewing, a minimum of 4–5 reflectors are needed for a particular point to be tracked reliably. Motion is tracked with a temporal resolution of 120 frames per second, and a spatial resolution in the millimeter range.
2. See Lian Loke et al., 'Understanding Movement for Interaction Design: Frameworks and Approaches', *Personal and Ubiquitous Computing* 11/8 (2007), 691–701.
3. Jaana Parviainen, 'Dwelling in the Virtual Sonic Environment: Phenomenological Analysis of Dancers' Learning Processes in Working with the EGM Interface', *The European Legacy* (forthcoming).
4. Maurice Merleau-Ponty, *The Visible and the Invisible* [*Le Visible et l'invisible*], ed. Claude Lefort, trans. Alphonso Lingis (Evanston, IL: Northwestern University Press, 1968 [1964]).
5. See Susan Kozel, *Closer* (Cambridge, MA: MIT Press, 2007).
6. Sean Gallagher distinguishes four different types of movement: reflex (Babkin reflex, sneeze), locomotive (walking, sitting), instrumental (grasping, reaching), and expressive (pointing, gesturing). See Sean Gallagher, *How the Body Shapes the Mind* (Oxford: Clarendon Press, 2005), 122.
7. Merleau-Ponty, Maurice, *Phenomenology of Perception* [*Phénoménologie de la perception*], trans. Colin Smith (London: Routledge, 1992 [1945]), 452.
8. I discuss this further in Jaana Parviainen, *Bodies Moving and Moved. A Phenomenological Analysis of the Dancing Subject and the Cognitive and Ethical Values of Dance Art* (Tampere: Tampere University Press, 1998), 46–7.
9. See John Shotter, 'Responsive Expression in Living Bodies: The Power of

Invisible "Real Presences" within Our Everyday Lives Together', *Cultural Studies* 18/2–3 (2004), 443–60.

10. Western dance education systems largely ignored this multilevel expressivity of embodiment. Dance students are expected to modify and construct their bodies with various body and movement techniques to become instruments for choreographers. One of the results is that the expressivity of their cultural bodies or physical features, such as gender or race, fades away on stage.
11. Gallagher, *How the Body Shapes the Mind*, p. 122.
12. Merleau-Ponty, *Phenomenology of Perception*, p. 103.
13. Ibid., p. 137.
14. Ibid., pp. 137–8.
15. Andrew H. Gosline, Emre Turgay, and Iman Brouwer, 'Haptic Illusions: What You Feel Isn't Always What You Get' (2007) www.cim.mcgill.ca/~andrewg/papers/HapticIllusions_UBC_ECSE596_pap (accessed January 28, 2011).
16. Edmund Husserl, *Ding und Raum: Vorlesungen 1907*. Husserliana 16, ed. Ullrich Claesges (The Hague: M. Nijhoff, 1973), 167.
17. Nowak performed the piece for members and visitors of the EGM project four times in April and May 2009.
18. See Sondra Horton Fraleigh, *Dancing into Darkness: Butoh, Zen, and Japan* (Pittsburgh: University of Pittsburgh Press, 1999), 23; and Michael Haerdter and Sumie Kawai, 'Tradition, Moderne und Rebellion', in *eid*. (eds.), *Butoh—Die Rebellion des Körpers. Ein Tanz aus Japan* (Berlin: Alexander Verlag, 1988), 9–33, 24.
19. John A. Bargh and Kimberly Barndollar, 'Automaticity in Action: The Unconscious as Repository of Chronic Goals and Motives', in P. M. Gollwitzer and J. A. Bargh (eds.), *The Psychology of Action* (New York: Guilford, 1996), 457–71.
20. Merleau-Ponty, *Phenomenology of Perception*, p. 139.
21. Edward S. Casey, *Remembering: A Phenomenological Study* (Bloomington; Indianapolis: Indiana University Press, 1987), 178.
22. Howard Gardner, *Frames of Mind: The Theory of Multiple Intelligences* (New York: Basic Books, 1983), 206.
23. Ibid., p. 221.
24. See also Jaana Parviainen, 'Dance Techne: Kinetic Bodily Logos and Thinking in Movement', *The Nordic Journal of Aesthetics* 27–8 (2003), 159–75.
25. Ann Cooper Albright, 'Dwelling in Possibility', in *ead*. and David Gere (eds.), *Taken by Surprise. A Dance Improvisation Reader* (Middletown: Wesleyan University Press, 2003), 256–66, 263.
26. Jean Piaget, *The Principles of Genetic Epistemology* (London: Routledge & Kegan Paul, 1970).

27. Maxine Sheets-Johnstone, *The Primacy of Movement* (Amsterdam; Philadelphia: John Benjamins, 1999), 288.
28. See, for example, Marieke Longcamp, Topi Tanskanen, and Riitta Hari, 'The Imprint of Action: Motor Cortex Involvement in Visual Perception of Handwritten Letters', *Neuroimage* 33/2 (2006), 681–8; and Riitta Hari and Miiamaaria Kujala, 'Brain Basis of Human Social Interaction: From Concepts to Brain Imaging', *Physiological Reviews* 89/2 (2009), 453–79.
29. See Cathy Treadaway, 'Translating Experience', *Interacting with Computers* 21/1–2 (2009), 88–94.
30. Loke, 'Understanding Movement for Interaction Design', p. 692.

Part II

… Expression in …

6 *Ich und Du*

On the Relation between Body Image and Sound Structure in Contemporary Music[1]

Isabel Mundry

NOT I

"Since having been born onto this earth I have never seen my face from the outside."[2] This is what Japanese writer Yoko Tawada responded when within an artistic dialogue I asked her to create a text which I, as a next step, wanted to take up in a live-electronic composition. Originally, my idea was to position two singers and two percussionists facing each other, one at each of the four sides of the concert hall, within which thirty-two electronically generated sound sources would be added. With this constellation I wanted to create wide-spaced mirror relationships between the four musicians and the artificial sound sites. The intention was that the mirror reflections would eventuate within musical structures as well as between the sound's spatial refractions. And my hope with Yoko Tawada's text was for it to *complement* such sonic and structural considerations by means of language, without my giving her conceptual guidelines.

Yoko Tawada took up my metaphorical mirror literally. She gazed into it to see what she would be unable to discern in there: neither the reflections of her expression in the encounter with other people, nor the reflections of others in the features of her own face. Thus she embarked on different perceptive avenues, withdrawing from a supposedly external view, and instead tentatively feeling out for her own face and that of another person. Yoko Tawada calls this feeling out by way of touch a "seeing without distance".[3] Tawada thus avoids falling into ordinary schemes of description, such as 'long nose' or 'strong eyebrows', opening herself to searching movements into an unfamiliar language rich with imagery. Five sections grew out from the above first sentence, following the perspective arising from the initial feeling-out. The face now becomes a "landscape bereft of humans",[4] into which the text enters, gradually finding itself, meaning its form, verbal sonority and figuration.

THE DISAPPEARED BODY

Yoko Tawada here takes up an artistic perspective which has temporarily gone missing in new music. Avant-garde music has at times striven to cut itself off as much as possible from the well-known. Tawada's text goes in the opposite direction, precisely turning towards the well-known in order to discover the unknown in it by way of heightened attention. Its view on the self and the body, a view that is thereby altered, entails unimagined exploratory movements within language, generating an equally altered view of the relation between the well-known and the new, within literary form itself.

In avant-garde music, references to the body and the idea of the new have at times been opposed. Gestural, agogic or expressive moments still present in the second Viennese School were vanquished in music after 1945 and replaced in favour of pure abstraction. Serialist composers such as Boulez, Stockhausen or Nono endeavoured to cut themselves loose from all external lines of influence to the greatest possible extent, and to concentrate on the isolated self-determination of individual works. The only legitimate area of influence for the idea behind a particular work was to be the state of the art in conceptions of compositional technique. According to such maxims, all other adoptions of external experience into musically immanent practice were thought to inevitably blur a composition's autonomy, with the composition running the danger of becoming conventional and thus irrelevant in terms of believed statutes of progress on the one hand; on the other hand such a composition also threatened to operate on a manipulative level because of its use of aesthetic means long settled into the subconscious of a well-established receptive habitus. These composers were too aware of how music's sensuous presence was used for totalitarian purposes for them to have been able to imagine encountering something new or indeed futuristic in the relationship between body and music.

In contrast to this, the history of tonal and metrically bound music, from which music after 1945 wanted to distance itself, is rich throughout with referential relations to bodily and, in line with this, spatial perception. Not only has it frequently turned to dance forms, but it has also distinguished, for instance, between a *strong* and *light* beat, *high* and *low*, tonal centres and peripheries, tension and release. In pointing towards musically immanent as well as extramusical perceptions, such terms are helpful in spelling out a musical given, as opposed to only naming it technically; however, they not only serve to describe music but also to constitute its design. The doctrine of musical-rhetorical figures and harmonic semantics, as existed throughout the Baroque up to the Late Romantic periods in various forms, base themselves on such correlations between intra- and extramusical meaning. These reach well into the musical structures' innermost being and are therefore essential to the sensual understanding of a composition.

Only via the interplay of interpretative realms is it possible to follow how music and worldliness are sometimes opposed, as when, for example, a text proclaims pain while the respective harmony promises redemption; or when, in Schubert's Winterreise, an 'I' lingers before a fork in the road whilst the harmony is already heading off; or when, in J. S. Bach's *Ehre sei Gott in der Höhe*, harmony stands in fierce contrast to the textual content, for the former plunges from b-minor to g-minor while the latter sings of "peace on earth".

Despite changing emphases and practices in different epochs and languages of sound, the coupling between musical and bodily-spatial perceptions is inseparably tied to tonality. At its core, tonality is shaped by the correspondence between spatial-bodily and musical perception, since the cadence itself is a phenomenon between tension and release, and also between opening and closure within a paced-off field of sounds, namely the scale. It would make it impossible to understand a tonal composition and misconceive the character of its language if its hearing and description were reduced to the identification of sound structures. The purely atmospheric perception of dynamic envelopes between tension and relaxation would, on the other hand, reduce a work to rough schemata in a way that would make its structural peculiarities almost inaccessible. In tonal music, structural and bodily perceptions both cause each other and mutually differentiate each other.

The interplay of sensual experience and structural deliberation was to be disconnected in serial music. The desire to compose a pristine and innocuous music equally demanded that it separate from traditional ties and associations, and also that it concentrate on considering the abstract. No longer was a bass to carry a melody, no chordal behaviour was to form the canvas for all else, no gestural play was to distinguish between the emphasized and the subsidiary, no quote or historic allegory between *then* and *now*. Side by side and unweighted, constellations of sound were meant to create content and meaning from within themselves.

But when we actually listen to these works, other experiences arise. In reading a score one may have understood set tables and structural analyses, and discerned and comprehended any technical deliberations; yet the listening experience will drift as well as follow up a compositional technique. Listening gets caught up even where its entanglement is sought to be avoided at all cost, as it distinguishes, for instance, between an empty fifth and a tense seventh, although both intervals are standardized [levelled] in the context of their serial organization; or one senses beauty where emotions were supposedly meant to be categorically denied.

Composers of those times have themselves reacted in various ways to the experienced difference between compositional ambition and aesthetic experience, by facing those phenomena once again that had been declared obsolete by serialism. For instance, Bernd Alois Zimmermann in his texts and compositions turned his attention to how listening and imagination proceed less linearly than a mere satisfaction of the latest aesthetic postulations might require. His expression *Kugelgestalt der Zeit* (spherical shaping of time) supposes that each renewed listening instance articulates the listener's perspective afresh. In this conception,

depending on the concurrence of work and moment of reception, an old music may sound surprisingly new, and also, conversely, new music may sound unexpectedly old. Zimmermann's compositions take this up by nesting and interrelating serial compositional techniques, quotations, and also historic idioms, into and against each other in complex ways. Thus, emphases and relationships of meaning and tension return into the composer's ambit—and with them comes the question of expression and of the bodily dimension in music.

While Zimmermann's music brings forth expression implicitly, György Ligeti dedicates himself explicitly to it in his compositions *Aventures* and *Nouvelles Aventures* (1962–65). Therein he focuses on characters of expression involuntarily given to speech. He does this by discoupling affects or emphases from semantic attributions, so that one can recognize phonemes known from everyday communication without being given a corresponding text. In being isolated and apparently theatrical phenomena, these expressive gestures become reinterpreted as sound elements of a through-composed musical form. In this way they become ambiguous, impressing us as familiar and alien at the same time, because one can identify sound characteristics known from everyday life while their musical contextualization remains elusive. With this, Ligeti has put formerly lost affects back into compositional view, simultaneously maintaining a distance from them. He has dislodged the expressive characters from their familiar associations and observed them for themselves, before implanting them into the *musical* context newly yet strangely.

These are but two versions of the renewed orientation towards questions of expression and the body after a period of maximal abstraction. Other composers have chosen different avenues, but, in general, they have reopened the gate back to declaring bodily presence a central concern in music. But such new avenues into an old topic have remained just as heterogeneous as the problems, techniques, means and topics of contemporary composition in general. As little as it is possible to bring the aesthetic positions of present music into accord, just as little can this be done in the question of their thematizing the body. The body has remained an entity marked by multiplicity just as new music itself has.

THE BODY MULTIPLE

Since the 1970s, compositions have been devoted to the idea of a New Simplicity, and all that was once declared historic and surpassed has now become possible again. The old—mostly symphonic—means of expression have become available again in a postmodern manner: the gestural, the massive, the lyrical and delicate, the vocal, and so on. Often these expressive characters remain disjunct from the tonal and formal implications from which they once emerged, running the danger of lining up as loosely juxtaposed gestures devoid of meaning.

Conversely, other composers have continued to ask questions regarding possibilities for newness in sound, structure, form or conditions of reception. In doing this, they have concentrated not only on abstract sound organization but also on aspects of perception—that is, the question of transfer between sound and body. The ways of reorientation towards the body in music have become vastly diverse; however, it is possible to discern and outline some orientations.

The wide field of sonic art, for one, has come into view. There now are various areas into which the sonic arts can be subdivided, each having engendered and discriminated their own different context and aspirations. Whether it be an exhibition of sound objects in a gallery or the staging of a partially composed work in the context of an installation, works of sound art share a dislodgement of the relation between their own temporal frame and the time of their interpretation. In ceasing to create a consistent dramaturgy with beginning, inner organization, and end, instead keeping the time of an encounter with them open, the recipient's self-awareness and deliberate decision comes into play. Entering or leaving, lingering, sitting down, turning, meandering, or moving on become central categories of coming to terms with the work, categories which are to be decided upon and positioned by the recipients themselves. Instead of being pulled into the dramaturgy of a composition, one is thus led back to oneself in the encounter with the sound events and the body's positioning in it.

There are other formats in contemporary music which also include the audience's movements but set their temporal frame, such as some experimental music theatre works. These can cause perception to oscillate between sound art and concert. For this reason I believe it sensible to skip those here and to go on to observe the opposite side immediately, namely the temporally defined composition (in which I include less determined works such as those of John Cage or Benedict Mason).

Here as well, one can roughly identify lines in which the body becomes a topic. For one, some works effectively seek to get in someone's face, for example, by being so loud or otherwise aurally offensive (scratching plates with forks and the like) that one is led to close off one's ears; or so soft that one involuntarily arrives at hearing one's own sounds, such as one's breathing, or, say, the rustling of

an audience member. Those compositions produce from among them a drive that, as it were, leads outside them, away from auditory perception and towards bodily perception. They too cause oscillations, in this case between being drawn in and then expelled, or between following sound structures and concentrating on one's bodily reactions to them.

Other composers devote compositions to the body by converting scientific knowledge of sound conditions and listening into aesthetic deliberations. An example here is spectral music. Spectral music relies on the analysis of overtone structures from which it derives sound shapes and sound processes. Found sounds undergo spectral analyses to reveal resonant partials. The sounds analysed in this way are artificially 'reconstructed' in turn, by being newly assembled through orchestral instruments. In this way an entire orchestra might form the sound of a single clarinet, or the voice of a Mongolian overtone singer. Additionally, one can effect spectral modulations by way of stepwise addition, filtering or alteration of frequencies. Since this idea recurs to the 'nature' of the sounds, it implicitly addresses the listener's natural need to recognize on the concert stage that which would also appear if the elements were left to their own devices: namely the emergence of pure intervallic relations. A single sound allows for this simply through itself, on the basis of its inherent spectrum. When instruments sound together, though, it becomes a matter of intonation. Composers of spectral music therefore view tempered tuning as a cultural deformation, since it does not project the vibrations' natural characteristics, sounding 'wrong' in reference to this. They seek to correct this 'mistake' with their sound constructions by using microtonal adjustments to the harmonic series. The listener's body takes on the role of an imaginary resonance space in which sounds turn out to be accordant or unfitting in various ways. Spectral composers derive their concept of the body from acoustic knowledge. Rather than seeking to oppose the body with their music reflexively, they wish to approach it with their sounds.

BODY AND REFLECTION

Despite their grave differences, these three positions—sound art, music that operates on aural extremes, and music founded on psychoacoustic knowledge—jointly cling to the serialist concept that the body ought to have no place in the musical structures themselves. But at the same time they have just as little interest in preserving serialism's tendency to abstract, which is why they have altered the arena. These positions no longer address the body as an imaginary structure which engenders the music in the first place; instead, they focus an imagined listener's 'real' body, enmeshing the listener with their aesthetic intentions. Audiences are supposed to experience the sounds by roaming around, exposing themselves to sonic attacks (as in 2008 in Donaueschingen, where noise protection was placed on the chairs, ready to be put on), or are expected to rediscover through them their own natural origins. While the image of bodily presence in music has receded, the listener's ostensible body now occupies centre stage.

Via neo-expressive approaches, New Simplicity and its repercussions aim to dismiss the avant-garde's logic of progressive outrivaling. They return to drawing on the expressive means and corporeity of tonal music without being tonal themselves. In contrast, the other standpoints aim at writing the history of musical progress in a different key, by seeking new ways primarily in a shifted relation between sound events and listener's body. As suggested by Bernd Alois Zimmermann, these two possibilities can be juxtaposed by a third: the producing of a sensual bodily presence immanent to the sound structures themselves without a recourse to tonality. By using tonal citations, on the one hand, and serial procedures, on the other, Zimmermann has created two poles which he balances out against each other and within which he articulates himself. For example, his music places emphasis on central tones or characteristic figures which—in this being similar to a tonal situation—distinguish between what can be remembered and what is temporal, or between what is important and what marginal. This generates gestures and shapes—that is, bodily assonances—yet these are tied back to strict formal principles, or arise from them. This is to say that bodily presence here doesn't stand for expressive elements implanted from tonality (thereby becoming meaningless), nor does the music protect itself from bodily presence via purely abstract calculations. With curiosity and artistic yearning, Zimmermann moves towards familiar realms of experience. In so doing he generates perspectives which claim an autonomy for themselves: the autonomy of questions posed, means of expression, and compositional devices.

Zimmerman has reopened a gate for relating undirected perception with compositional reflection. His image of the *Kugelgestalt der Zeit*, in which the old can suddenly become new or the new suddenly becomes old, could be expanded to give a spherical shape of perception, in which the question of what is meaningful

and what is not is asked and articulated afresh, varying across artistic perspectives and ideas. Worldliness and compositional design here produce each other, also determining the relation between body and music.

This option is open in its means. It cannot be defined in positivistic terms and cannot be recognized in adherence to a specific ‘sound’, technique, spatial constellation or other significant characteristics. It implicates all the above possibilities, including the use of spectral chords, the work with auditory limits, and audience motility. The option cannot and will not orient itself on apparent knowledge, neither about compositional means, nor about listeners. Rather, it defines itself by creating anew artistic knowledge about means and techniques through the given problem and vision. It comes to exist and falls apart from work to work. Knowledge about possible presences of body in music similarly waxes and wanes. It cannot be encompassed as a whole. The relation between body and sound remains that of a broken mirror.

Ruptured, too, is the relation between language and music in my composition *Gesichter* (1997), which grew from the abovementioned dialogue with Yoko Tawada. “No mirror reveals to me what I look like when speaking with another”,[5] reads the second sentence of her text. In turn, no mirror indicated to me what kind of refraction could have been imposed upon my music by Tawada’s verbal figments. The text’s pictorial power produces a plenitude of associations. Its form and structure create a musicality that is all its own. I did not want to contort the text’s inner realms of perception, which is why I refrained from setting it to music in the classical sense. Yoko Tawada moved along her face, touching it, to derive a distinct textual structure from this. In turn I attuned my compositional interest in the text into touching proximity with it, disassembling each phrase and each word into a multiplicity of perceptive possibilities. I thus followed its verbal imagery as much as its temporal structure, its structure of sentences, syllables, and letters. But the closer I drew to the text, the more it alienated itself from me, and it was precisely that which allowed me a deeper insight into it. Tawada’s near view onto the body created images and constellations of language which withdrew from my ability to imagine their creation the more precisely I sought to portray the process of origination. Through my increasing approximation towards its structural detail, the text as I perceived it tilted into a progressive alienation, which would have remained locked for me if I had decided on a given standpoint beforehand.

Facing such momentary shifts between distance and proximity, my composition deals with exploring the other by touch. It exposes such a two-faced perspective on the text as early as its first measures. After a brief opening by the percussion, the text’s initial phrases spoken by the writer can be heard from a preproduced recording. Proximity and distance intertwine using the simplest means, because, on the one hand, the text cannot be heard with this level of intelligibility for a second time and, on the other hand, the text is never again placed into such distance as in its placement on an audio recording. The loudspeaker position remains inflexible, and temporality is fixed and impalpable through the recording. The remaining electronic part in the piece is more organically involved in the live events, with its temporality being established by the performers, and in reacting to the sound structures with finely aligned spatial refractions. Whereas then it takes on the role of a mirror, before it remains that of a frozen other. In parallel with the passages of text played back from a recording, live voices and percussion manipulate excerpts of the same passage, but on a microscopic level. The music here fragments the text into syllables and letters, to be articulated and prolonged by the voices, and to be transformed timbrally by the percussion. The music dislodges itself steadily from the spoken text. Music’s endogenous view onto the words’ sonic parts unravels a distinct time. Further, the same principles of sound transformation are transferred

into a spatial dispersion. The electronics part directs three imaginary mirrors onto the live sounds, generating varying refractions and spatial placements thereof. By this, words attain a through-composed close-up position impossible to enunciate vocally.

Two perspectives on the text have moved further away from each other through this process and by this parallel treatment. Where language remains intelligible, it loses its presence. Because of being played back, it stays disjointed from the temporally sensitive responses between the live musicians. And where the text is tangled up in performance interactions it loses its textual meaning.

The ambivalence between proximity and distance continues throughout the composition in various layers, occurring in parallel as well as sequentially. Later in the piece, for instance, consonants and vowels detach themselves separately from words spoken in isolation. The consonants take on a life of their own within layers of percussive rhythms; the vowels entail sung and highly sustained sounds. Those held tones are later taken over by even further sustained glissandi in the timpani, and those again are increasingly spatialized by the electronics. What remains is a floating plane of sound in space. With each step language has lost its contours. The text, its intonation, its transfer into musical contours, and the latter's transformations have all been abandoned by this unlocatable floating sound. Transitorily, the body has again evaporated from music.

The composition *Gesichter* relates to the text as counterpart, which again relates to a face as counterpart. Starting from its observation in the mirror, the body, through many steps and defractions, finds its way into the ramifications of musical decisions.

In my composition *Ich und Du* for Orchestra (2008), such a counterpart no longer exists; all relations are sounded out within the music. Yet here also I was concerned with phenomena such as proximity and distance, the other and the own, centre and margin, or body and abstraction. Concepts such as these are equally open to extramusical or intramusical construal. But they are associated with experiential realms of the lifeworld, which is why they keep their ties to them even if they change domains and become significant to composition. The concepts then pertain to the threshold between extramusical experience and intramusical making of meaning. Such interplay between various venues of perception were what interested me when writing the music, without however going back to concrete references such as texts, samples or sounds from everyday life. My point was to approach my music with the general phenomena of perception, or, inversely, to tie my ideas back to extramusical realms of experience and to examine them differently and define them more precisely from this angle.

The title *Ich und Du* does not refer to a concrete experience or even a biographical constellation. I did not want to reference something, but sketch a relation unavoidable in daily life but consciously focussed and elucidated here from the vantage point of a musical idea. The concepts 'I' and 'you' have a principal effect on the artistic ideas and musical decisions in this composition,

from formal characteristics all the way through to individual sounds. The ‘I’ is the place of a centred perception, the ‘you’ the place of a projection. This relation captivates me in everyday life as much as in composing, particularly in the ways it comes to be and dissipates. It is linked to the questions of how something individual takes on, alters, or loses its form, how it arises from attributions or self-definitions, and through what kinds of resonances it might engage with its environment. The composition is therefore based on the daily clashes of intimacy and publicity (as, for example, in the involuntary overhearing of mobile-phone conversations) just as much as in the artistic-existential question of what it means to shape a musical thought and to stay close to it while keeping the noise of aesthetic multitude permanently active at the back of one’s mind.

This disposition suggests understanding the solo instrument as the ‘I’ and the orchestra as ‘you’; yet the music is about displacements and interpretive shifts, establishing of borders, transgressions, attributions or self-allocations. In this sense the musical roles are continuously redistributed. For instance, the decaying sound of a piano can become the ‘you’ as a counterpart to an individually contoured orchestra. The solo instrument can also within itself create transitions from autonomy to heteronomy, by mutating from intimate sonic articulations to mechanistic motive-machineries. The attributions of ‘I’ and ‘you’ each result from interpretive realms created and questioned by the music from its innermost substance.

Again the beginning of the composition exemplifies this. It starts with an isolated G1 struck by the solo piano. At once the sound is dampened slightly at the string, allowing for an ambivalence in identifying it either as a noise or as a pitched sound. It is thrown into space as an open sign, but the subsequent music does not catch it but opens up a field of overlapping spaces of interpretation. In my sketches I drew three lines of interpretation which unfold and branch out like a genealogical tree. The first line follows up the possibility of unraveling the sound, for example in the shape of a through-composed reverberation, a concurrent addition of other sounds into a chord, or of an attaching figure. The second line traces the possibility of keeping the pitch identity of the initial sound, while extending it temporally and inspecting it timbrally and dynamically. At most a neighboring note can be appended to it. The third line pursues the noise component given in the dampening of the initial sound. It fabricates further fields of noise with different characteristics between the breathy, soughing, and raspy. These three lines of interpretation derived from the initial sound are now not developed in the piano, but unfold in three different parallel versions in the orchestra. The orchestra is grouped into three parts on the stage, and each of these three groups pursues one viable avenue. The three parallel versions are not to be confused with the three typologies of unraveling, inspection, and noise elaboration. Instead, each of the groups progresses on its own path through the fabric of the full repertoire of possibilities, with all possibilities only being represented once as a rule. In this way, the three groups face each other as equals, each in itself entirely covering the possible

domain. The process of furcating lines is framed temporally, however, with a varying design of the temporal dimensions of its interior elements. One can, for example, encounter a noisy sound that is given the time to develop its contours, whereas another might pass by fleetingly and shadowy. Like people with whom one meets, the elements gain different levels of significance. On the whole, though, they become more and more complex. The more they gain distance from the initial piano sound, the more they build up and differentiate internally. This causes an increasing overlay of complex gestalts, finally causing perception to switch. I myself, in composing increasingly dense orchestral polyphonies, cannot keep in contact with the single events. Attention shifts from the individual to the swarm. It is now the latter to whose individual shaping I turn my thought. I responded to this switch with a change of compositional technique. I progressed inductively—structuring the ambitus, harmony, and temporal shape of the whole—and let the pursuit of the lines and their elements evaporate. The overall body of the polyphonically split orchestra has now been charged individually. It has become the 'I' of the music. But even this remains temporary. The orchestral polyphony ends, leaving behind a distant final sound, a piano chord.

The initial 'I', the piano sound, was lost, having been pulled into and enmeshed by different contexts. In the end it reemerges as a 'you', a counterpart of the orchestra. It has transformed itself and became a different 'I'. The music reacts to this, changing its vantage point, its questions and, along with this, its compositional technique.

WHICH BODY?

What sort of body imagery could become the topic in contemporary music for it to create corporeality in it? What do we know about the body in our times of its technical manipulation, its virtuality, its mediatization, and its multicultural presence? And how do the other and the own, the familiar and unfamiliar, the secure and the unsafe, the known and the unknown relate to each other, within my own body as much as in encounters with others? How are borderlines drawn, how transgressed or re-opened? It is possible to construe partial answers and model explanations for such questions, or to leave them principally vague, which would also be a sort of patterning. Or one could address these questions afresh time and again, because they pose themselves differently within each different context and every different moment of contact. This would mean for them to become fragile as well as actual. And for this reason they would yet again require new realms of expression for their articulation, differentiation, and reflection—for example, a new music.

NOTES

1. Translated by Deniz Peters.
2. “Seitdem ich auf dieser Welt geboren bin, habe ich niemals mein Gesicht von außen gesehen.” Yoko Tawada, ‘Ges-ICH-ter’, in Isabel Mundry, *Gesichter* (Breitkopf & Härtel, 1997), appendix p. 1. Translator’s note: Tawada’s creative exchange with Mundry was in German, and led to the text “Ges-ICH-ter”, which is also the name of Mundry’s composition for soprano, female speaker, two percussion parts and live electronics. Tawada’s text is featured as a two-page appendix to the score (thanks to Dr. Frank Reinisch of Breitkopf for supplying a copy) and is presently referenced as such. Mundry’s quotes from the original German passages are given in footnotes. Tawada’s ‘Ges-ICH-ter’ is parenthetically entitled ‘working title’, and also appears in Yoko Tawada’s book of the same year, *Aber die Mandarinen müssen heute abend noch geraubt werden* (Tübingen: Konkursbuch, 1997).
3. “Sehen ohne Distanz”, Tawada, ‘Gesichter’, p. 2.
4. “menschenlose Landschaft”, ibid., p. 1.
5. “Kein Spiegel zeigt mir, wie ich in einem Gespräch mit einer anderen Person aussehe”, ibid., p. 1.

7 Isabel Mundry's *Ich und Du* and the Elusiveness of Musical Meaning

Variations on Music, Body, Structure, Perception

Christian Utz

MUSIC THEORY, NEW MUSIC AND EMBODIMENT

Music theory has a reputation for neglecting bodily, tactile aspects of musical experience. A closer look, however, reveals that sonic 'physicality', the fascination with the (physiological) perception of sound, has been a critical issue of music-theoretical discourse ever since antiquity and Aristoxenus' insistence on *aisthesis* as a complement of *logoi* in his *Elementa Harmonica*[1]—although eventually the latter was to become the model that dominated the discipline at least until the sixteenth century. Indeed, before the close interaction between music theory and music or tone psychology (significantly emerging from tone 'physiology') in the late nineteenth and early twentieth centuries,[2] which was guided not least by the joint endeavour to thoroughly understand the perception of tonal music, most major music theorists had granted that aural experience functioned prominently within their models of tonal music organisation. During the advent of work-centred musical analysis in the early nineteenth century, for example, Gottfried Weber had introduced 'the ear' as the ultimate judge for his meticulous segmentation of musical syntax.[3] Although this invocation of the organ of hearing arguably was still largely conceived as "separated from the individual who listens" and thus, in the epistemological tradition of Rameau's theory, constructed a "privileged domain of knowledge" explaining "subjective experience … through being derived from a reality that is cognitively inaccessible to the individual",[4] the dominating role of a minutely described auditory sensation signalled a new dimension in the impact of the body on theory. In the same period, the 'shivers' and similar bodily reactions experienced due to the novel effects of the latest music—explicated in a highly technical manner—amounted to major tropes in writings at the borders of theory and aesthetics.[5] More generally, several recent studies have highlighted the significance of the body in theories throughout music history, including medieval as well as new music since the 1970s, prominently motivated by Roland Barthes' influential essays on the presence of the body in (classical-romantic) music.[6]

It seems that, after a long period of ratio-oriented speculative music theory during the sixth to fifteenth centuries, around the mid-twentieth century a new coherentist 'soberness' and quest for objectivity again provided a major music-theoretical model that neglected to consider the body, particularly in North American music theory following World War Two. Such approaches—with the notable exception of Leonard B. Meyer's—at first pursued an author-centred rather than listener-centred methodology and largely limited themselves to a rationalised categorisation of pitch structures. This development was paralleled in post-1945 art music developments where the rationalisation of musical parameters aimed at *non-referentiality* (or more adequately, *auto*-referentiality)—that is, the liberation from *any* references to the pitch and time organisation and motivic gestures of tonal music. This key request of new music aesthetics is epitomised by Boulez' reproach

of Schoenberg's "stream of infuriating clichés and formidable stereotypes redolent of the most wearily ostentatious romanticism",[7] directed against Schoenberg's indebtedness to motivic-thematic development.

Yet such a view of recent music-historical developments might easily lead to misconceptions. To begin with, a comprehensive theory of how bodily experience, auditory perception and musical structure relate to one another (generally or in specific sociocultural contexts) has yet to be formulated. If we do not want to cut the discussion down to simple notions of 'listener-friendliness' or equate 'bodily experience' with a more or less unconscious bodily quivering in reaction to outward stimuli (such as a stomping drum beat), we will have to admit that the distinction between 'embodied' and 'disembodied' kinds of music (including graduations of embodiment) is far from self-evident. To put it differently, it seems to me that in recent music studies the concept of the body has been sometimes linked to a value discourse where much post-1945 music, especially serial music, appears highly disembodied and thus least valuable, while tonal music—pop as well as classical-romantic music—is granted a considerably higher degree of embodiment.[8]

Such value judgements seem to be highly dependent on unreflected sociological phenomena: they are guided by a view of contemporary music practices that intermingles social acceptance of musical styles with their degree of embodiment. A reliance on well-established musical topics and gestural types in some supposedly 'audience-friendlier' variants of contemporary art music, however, might with equal right be regarded as a hindrance to body-centred perception. In a recent paper I argue that precisely because serial and postserial music aim to liberate musical processes from a conventional gestural repertoire and tonal centricity, they have the potential to throw listeners back to elementary auditory reflexes such as contour and streaming detection rather than activating the memory-laden associations of tonal music listening. Thus they might in fact be considered as *markedly* embodied.[9]

Indeed, criticism of serial music's complex structures evading the listener is based on a surprisingly enduring misunderstanding. I would like to argue, on the contrary, that hardly any serial composer ever intended direct correlations between serial structures and listening experience. Rather, there is sufficient evidence given in writings by serial composers (among others, in Stockhausen's 1955 essay 'Struktur und Erlebniszeit')[10] that listening expectation, auditory perception and bodily sensation were at the core of a musical aesthetics which misleadingly (and on first sight) might appear dominated by a highly technical discourse. It was precisely this perception-oriented tendency of early serialism that later on was highlighted and developed in the aesthetics of post-structuralist composers such as Helmut Lachenmann, Brian Ferneyhough or Gérard Grisey. Their gestalt- and performer-based musical writing—sometimes described by the composers in terms highly reminiscent of Ernst Kurth's energetics (especially with Ferneyhough)—makes us realise how serial music has helped to emancipate musical listening from

the centricity and closure-oriented perception of tonal music. Its contours, often emerging from auditory streaming effects created out of a complex juxtaposition of simultaneous pitch-timbre structures,[11] continuously (re-)activate perception mechanisms based on everyday listening, thus primarily being instigated by elementary perceptual faculties, rather than by what Ferneyhough has polemically called " 'Pavlovian' semanticism": "a rather limited repertoire of gestural types calculated to energize the receptive and interpretational faculties of the listener in a culturally quite specific fashion".[12]

It is therefore unclear why the degree of a music's referentiality (especially its referentiality to tonal music) should be linked with its degree of embodiment (if there can be any sound criteria to determine such degrees at all). I would even doubt the argument given by Isabel Mundry in the present volume that the reflexive montages and allusions to historical idioms in Bernd Alois Zimmermann's music are necessarily more embodied than the musical structures in 'strictly' serially organised pieces.[13] It is obvious that referentiality (a more precise term may here be 'intertextuality') in Zimmermann's music—just as in Charles Ives's—can be interpreted as an invocation of collective memory and as a prominent feature of a potentially utopian universalism, despite the efforts both composers continuously directed at structural integration.[14] I think that consequently Zimmermann's and Ives's musical intertextuality is more adequately grasped through a discourse of identity, rather than of the body, notwithstanding their common ground. It can certainly be argued that Zimmermann's and Ives's intertextual borrowings, quotations, allusions and paraphrases show traits of the political and cultural upheavals of their time. As a consequence, both composers themselves came to accept fragmentation at the core of their utopian concept of the musical work and thus arrived at a refracted, multiple form of cultural-musical identity. It is instrumental that this identity only emerged after both composers at least partly 'failed' to fulfill the orthodox aesthetic demands of their historical periods—'total serialism' in the case of Zimmermann and nationalistic symphonicism in the case of Ives.

ICH UND DU AND THE OSCILLATION OF MUSICAL IDENTITIES

Clearly, Zimmermann's conception of referentiality is attractive to Mundry because her music is permeated by the idea of unseizable musical meaning and of the fluent, transient, impermanent states of sound, space and time out of which such meaning emerges.[15] Mundry's music refuses to be reduced to the representation of specific ideas, terms, ideologies or objects, yet her scepticism towards musical representation is complemented by the insight that all music—even when constructed according to rigorous anti-syntactic, anti-rhetorical and anti-figural methods—produces or embodies referentiality. Mundry evokes Nelson Goodman's concept of 'metaphorical exemplification'[16] as a link to the desire in her music to open a horizon beyond 'pure listening'—in other words, to create musical situations that can be related to experiences, recollections or emotions from everyday life. She elsewhere quotes the piano accompaniment of the song 'Die Krähe' from Schubert's *Winterreise* to illustrate this principle: the piano figure creates "an experiential correspondence between our sensual perception of the music and what we experience during a walk when birds circulate above our heads".[17] More formally than Mundry but still in analogous terms, Christian Thorau describes the transfer of Goodman's concept to musical contexts as a "mode of reference that is linked to the exhibited sensual properties of the sign, i.e., as implanted in the music, while at the same time transcending it in the manner of a metaphor".[18] However, Mundry's intention is to relate to experiences of daily life *without* resorting to conventional musical gestures, figures or topics such as Schubert's, a point that leads us back into the substance of the discussion of serial music above: Mundry's rejection of " 'Pavlovian' semanticism" on the one hand and her insistence on referentiality on the other provide the productive paradox from which the character of her music emerges.[19]

The title *Ich und Du* of Mundry's 2008 composition for piano and orchestra clearly points at her intention of referentiality. It stands for the construction and deconstruction of identity, the theme of the essay of Japanese philosopher Kitarō Nishida (1870–1945) *Watashi to nanji* (*I and You*), first published in 1932, which Mundry references.[20] In his texts Nishida, principal exponent of the Kyoto School, has explored classical topics of Western philosophy such as logic, subject-object dichotomy, knowledge and identity, with his later texts (after *I and You*) increasingly reflecting on cross-cultural thought figures in these fields. The key ideas of *I and You* are summarised by Rolf Elberfeld succinctly: "Since at the heart of self-determination we confront absolute negation, we experience absolute Otherness within ourselves. Thus, a 'You' is given within myself, an absolute Other that opens the path to the 'You' of another person".[21]

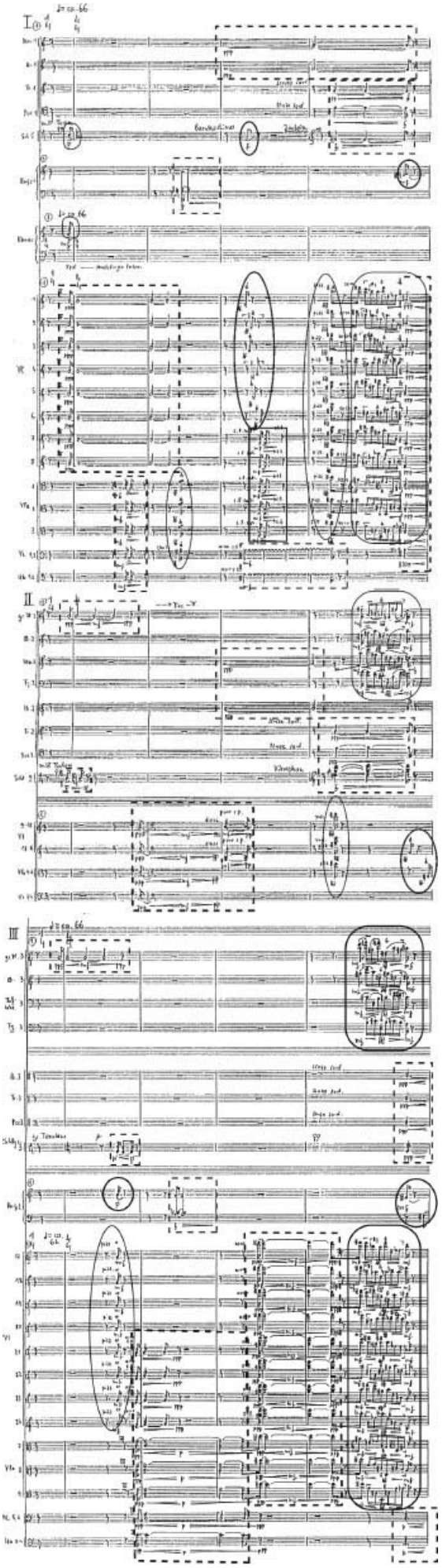
Mundry's introductory text characteristically plays with the interlocking of philosophical-semantic and musical-structural realms. The composition, according to the composer, does not deal with a "biographical 'I' and 'You' ", but rather understands 'I' as a "place of centred perception" and 'You' as a "place of projection". In the composer's own words, the music is about "shifts and reinterpretations, demarcations and encroachments, ascriptions and self-determinations". Although the disposition might readily suggest to conceive the piano as 'I' and the orchestra as 'You', the piano may turn into a 'You', from which the orchestra either might distance itself as an 'I' or from which it "might grow apart by mutating from intimate sound to a heteronomous machine".[22]

Such a personification and semantisation of musical structures has gained significant prominence in new music discourse since the 1970s, predated most notably by Olivier Messiaen's influential *personnages rhythmiques* metaphor and Adorno's process-oriented interpretation of Mahler's steadily varied musical 'characters': "Driven on by impulses, as the same beings they yet become different, shrink, expand, even age. This modification of fixed elements … is as unclassical as the toleration of an individual musical identity. … Time passes into the characters and changes them as empirical time alters faces".[23] Since the 1970s several composers, among them Helmut Lachenmann, Klaus Huber, Brian Ferneyhough and Salvatore Sciarrino,[24] have developed similar concepts of semantised structural transformation. This tendency might be interpreted as safeguarding the political and social relevance of contemporary music without striking a compromise with the listening habits shaped by the domination of pop and classical-romantic repertoires. It reflects the necessity to reach beyond the non-referential and techno-essentialist paradigm vigorously criticised, among others, by cultural-studies-influenced musicological writing.[25]

A music which, referring to Mundry once more, describes "shifts and reinterpretations, demarcations and encroachments, ascriptions and self-determinations" is arguably best approached by a gestalt-oriented analytical perspective that I have coined 'morpho-syntactical'. By this, I mean a perspective that conceives of music as a succession or juxtaposition of sound events either distinct from, or transforming into, one another.[26] Mundry's *Ich und Du* appears as a highly adequate object of study for such an approach. It most prominently describes the contrast between, one, the concentration of considerably rich sonic forces into single time-space points and, two, the rigorously emerging proliferations of complex, multilayered sound lines. These two *topoi* predominate throughout the entire work and are built upon bodily momentum and gestural precision. This character of the *topoi* can be demonstrated by a short morpho-syntactic description of the first page of the score (Figure 7.1). Marked time-space points and gestural proliferations here are complemented by a third element, a composed-out resonance. These three components—point, proliferation and resonance—provide a particularly simple material full of potential for evolution and remain the only components of the 15-minute piece. In Figure 7.1, points (or, more adequately put in

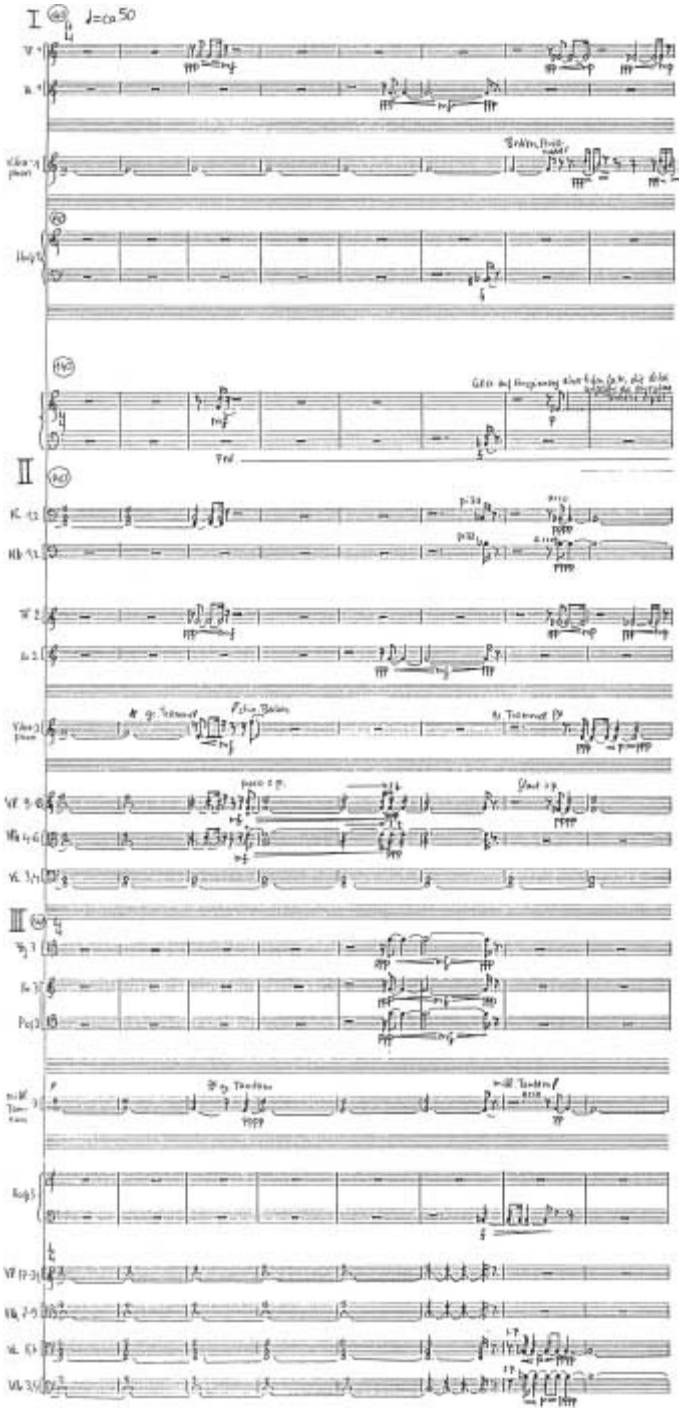
an ‘energetic’ terminology, impulses) are marked by ellipses, resonances by rectangles with dotted lines and proliferations by rounded rectangles. The half-muted piano-impulse at the beginning (G4, b. 1) triggers a sequence of four further impulses, all performed *pizzicato* by the strings (b. 2/III,[27] b. 3/I, vla., vc., ‘Bartók pizzicato’, b. 4/I, vl. ‘Bartók pizzicato’ behind the bridge, b. 5/I+II, pizzicato in the high register). While the first four impulses are succeeded by echo-like resonances, the last pizzicato effects a cascade-like proliferation (b. 5). In the ensuing development these cascades, initially triggered rather hesitantly, are increasingly condensed from bar 10 on, leading to a steady figuration of the piano solo part shaded by an extremely fragmented orchestration. This situation is repeatedly inverted with the piano temporarily becoming a ‘shadow’ of a dominating orchestra. Within this process, the proliferations that at first appeared as *results* of impulses now are repeatedly transformed into triggers themselves leading towards synchronised attack points. After the clear-cut morpho-syntactical scene at the beginning, we thus approach a surrounding where the distinction of individual sound events seems not feasible. This surrounding also entails a blurring of sound sources: after the initially clear distinctions between piano and orchestral sound (with the half-muted attack in the first bar already suggesting some deviance from instrumental conventions), the music now clearly tends towards ‘chimeric assignments’, where the relation between resultant sound and sound-creating forces is intentionally left ambiguous.[28]

Figure 7.1 Isabel Mundry, *Ich und Du*, b. 1 *f*. © 2008 by Breitkopf & Härtel, Wiesbaden. Figure continued on following page.



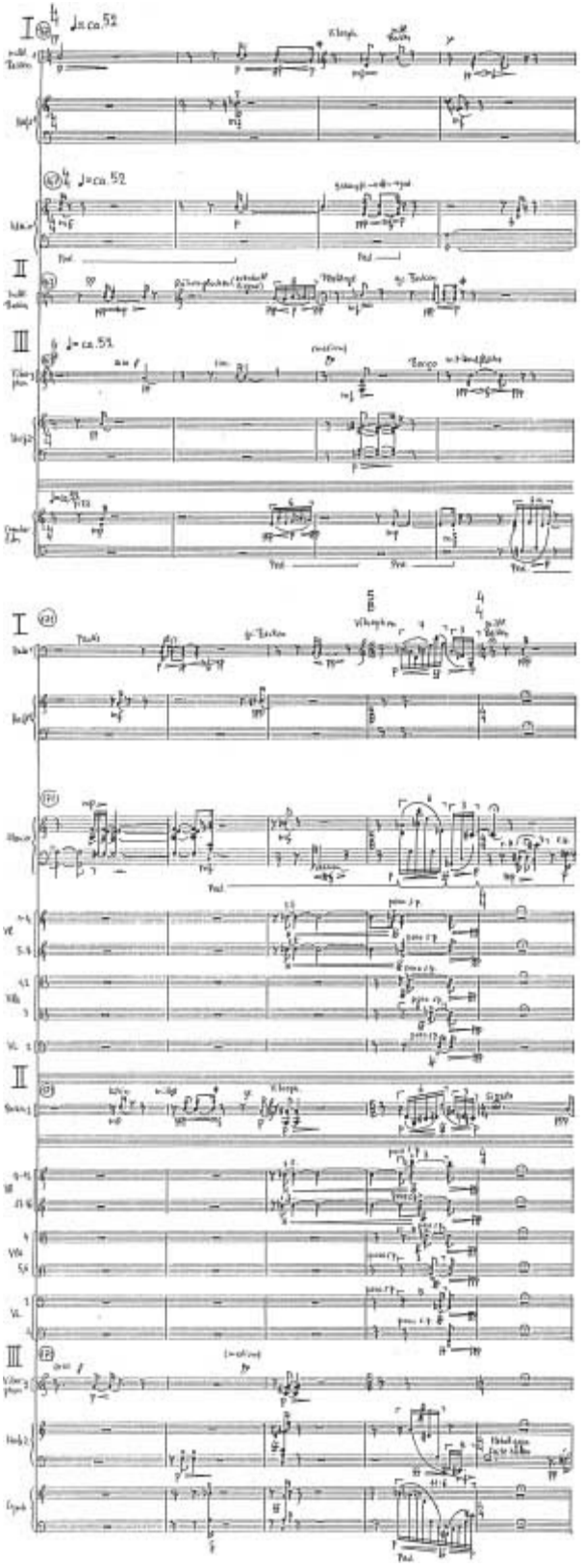
A sequence of crotchet pulses slows down the piano figuration before the second phase of the work begins in bar 140 (Figure 7.2). This phase is again marked by a half-muted piano attack in bar 142, now on F4. Its reflexive character is marked by the recurrence of distinct sound events (single tones followed by long resonances), and thus transforms the introductory echo principle from a local phenomenon into a macroformal one.

Figure 7.2 Isabel Mundry, *Ich und Du*, b. 140 *f*. © 2008 by Breitkopf & Härtel, Wiesbaden.



The third phase is once more demarcated by a half-muted piano point in bar 167, now elevated to A4 (Figure 7.3). This phase is dominated by attempts of the piano to recall the cascade-like figurations from the first phase. These attempts, however, are repeatedly interrupted and dissolve into short chord sequences which take up the crotchet pulses from the end of the first phase. Destabilisation is enhanced by timbres that 'compete' with the solo piano far more explicitly than in the *tutti* constellations of the first phase, namely cymbalon and vibraphone (Figure 7.3, b. 174), increasingly deforming the energetic gestures of the piano. 'Chimeric assignments' are thus developed to a new point, where the 'piano gestures' can no longer be clearly attributed to the piano *proper*. The final proliferations in bars 243 *f*. and 249 *f*. are followed by a long composed-out resonance (bars 253–269), again extending two of the three central gestures to a macroformal dimension.

Figure 7.3 Isabel Mundry, *Ich und Du*, b. 167 *f*. © 2008 by Breitkopf & Härtel, Wiesbaden. Continued on following page.



A morphological and gesture-oriented description as the one just given risks "homogenizing the complexity of music to gradations of intensity", turning "it into a crude textural plasma"[29] or, as Isabel Mundry puts it, "The purely atmospheric perception of dynamic envelopes between tension and relaxation would … reduce a work to rough schemata in a way that would make its structural peculiarities almost inaccessible".[30] This is the problem faced by many gestalt-theory-oriented

music-theoretical approaches (as given, for example, in Ernst Kurth's energy-related imagery) and I therefore attempt to complement it with a discussion of structural detail in its *temporal* placement and the contextual emergence of meaning. The identity discourse suggested by the title of both Mundry's work and the underlying Nishida essay provide such a contextual layer, which indeed helps to grasp a facet of meaning that can be traced in the detailed musical structure: the polyvalence—or even evasiveness—of (musical) identities: whether the proliferations oscillating between the piano and the orchestra in the first phase are heard as an affirmation of their respective identities (I/piano, You/orchestra—or vice versa) or whether this oscillation conversely is already heard as a sign of 'interpenetration' (a concept that Mundry's programme note mentions only in connection with the final section of the work) is far from evident; the interpretation given by Mundry in the present volume is thus only one among various possible options.[31] The concept of 'chimeric assignments' over the course of the musical process becomes a key concept enhancing the destabilisation of sonic identities and intentionally subverting the perception of complex sequences or juxtapositions of individual, distinguishable gestalts to an overall global perception (in this bearing analogy to Lachenmann's distinction between *Strukturklang* [structure sound] and *Texturklang* [texture sound]):[32] "I myself, in composing increasingly dense orchestral polyphonies, cannot keep in contact with the single events. Attention shifts from the individual to the swarm".[33]

Put briefly, the identity discourse suggested by Mundry's title and its Nishida reference successfully evokes a polyvalent situation while avoiding a denotative coherence of musical meaning. This situation can shed further light on Mundry's illustration of (Goodmanian) metaphorical exemplification: Schubert's piano figuration from 'Die Krähe' can only be understood as the movement of a bird circulating above our heads within the context provided by the titles of the song and the song cycle, and the song's lyrics. As an analogous example from instrumental music, Christian Thorau cites Schumann's *Vogel als Prophet*, where title and musical structure interlock to produce "referential complexation".[34] The strong morphological character of Mundry's piece, however, testifies to her intention to lift the destabilisation of an identity discourse beyond a *Gedankenexperiment* based on the interplay of title and musical events, to become an actual, undeniable and inescapable—embodied—experience.

EPILOGUE: MUSICAL MORPHO-SYNTAX AND NARRATIVITY

Martin Kaltenecker has argued convincingly that since the 1980s the paradigm of 'perception' has been added to or even replaced that of 'structure' in new music discourse, which implies that works are no longer conceived mainly as "decodable structures" but as "surrounding situations", enhancing the status of the "first encounter" with the music (a tendency that also explains the increasing attention given to sound art or sonic art).[35] This has also affected methods of musical analysis. My interpretation given above—based on such a first-encounter experience but then extending further into several directions (in a manner maybe not unsimilar to Gottfried Weber's analysis of Mozart's string quartet K. 465)[36]—might claim some plausibility in such a context. It also might be viewed as an example of the performative turn in twentieth-century music theory and the pragmatic conviction that "there is no theoretical knowledge that is not at the same time a way of hearing things".[37]

The perception paradigm also reflects the fact that morphological and energetic conceptualisations increasingly tend to outweigh the more strictly technical information in the writings and statements of contemporary composers and theorists. In some instances this has given rise to a new subjectivism and a restoration of the idea of musical 'expression'. However, 'decoding'—in other words, the aesthetic understanding of a conventional form of musical expression as a more or less obvious presence of the compositional subject in impulsive, ostensively instantaneous musical gestures (as suggested in some works by Wolfgang Rihm)—presupposes a considerable complexity of cultural codes and socio-psychological normativity: a musical gesture can only be understood as subjective, bodily, or impulsive if historical and cultural contexts are activated during the listening process. And while the threat exerted on the listener by unusually loud sounds (as in the music of Dror Feiler) or, in contrast, by almost imperceptible accidental sounds that extend the context of a musical performance (as in the music of Benedict Mason) undeniably affect the 'real' body of the listener without metaphorical detours, their full aesthetic meaning can arguably only be adequately grasped if additional layers of the listening experience are taken into consideration, layers which Roger Scruton summarises as "tertiary qualities":[38] facets of musical meaning that emerge beyond the bodily sensation of sound events.

The obvious conclusion that real and metaphorical bodies in music cannot be neatly separated from one another—or that they even inevitably *produce* one another—can be linked to the analogous interdependence between musical morpho-syntax and musical meaning. Insight into this interdependence can be gained by conceiving of musical syntax not, as has often been done, as a realm completely

separate from musical semantics but rather as a structural means that triggers archetypical, though most likely ambiguous, meanings (or 'topics'). Some of these syntax-generated archetypes are widely known as call-and-response patterns (e.g., the pairing of open dominant and closed tonic phrases in tonal music), the evocation of nearness and distance (e.g., by echo effects in dynamics, in tonal music often supported by the identical repetition or sequence of a harmonic progression), or ascending and descending pitch and register movements linked to rising and diminishing musical tension. While some of these archetypes depend on a syntactic rule system as provided by major/minor tonality, most can be extended into various less codified syntactic contexts (open and closed phrases; echo effects or ascending/descending motion can be realised quite convincingly in nontonal music as well). Mundry's three basic topics—attack, proliferation and resonance—belong to this category. On a microstructural level, these syntactic formulae constitute elementary components of musical narrativity, although this need not imply their connection to a *causal* narrative thread. Musical narrativity, in such a more comprehensive sense, can, according to Robert Samuels, only be inferred from a piece of music if it describes a non-reversible, continuous change in time, composed of identifiable musical 'characters' and, secondly, if these characters mould a new, complex meaning that is not reducible to its components.[39] Piano and orchestra in Mundry's piece, mediated by diverse 'chimeric assignments' and tilting movements between structure sound and texture sound, can most likely be attributed to this form of narrativity. They are characters that "become different, shrink, expand, even age. … Time passes into the characters and changes them as empirical time alters faces".[40]

The prevalence of concepts such as 'perception' and 'embodiment' in new music discourse testifies to the increasingly apparent tendency to connect musical experience to experiences of contemporary life, to social and political reality. The connection is achieved not by communicating *affirmative* models for identification —as many artists in popular culture do now or politically dedicated new music of the 1950s or 1960s did—but rather by reflecting the *instability* and connectivity of identity concepts in today's multiply stratified and fragmented societies. Perhaps art music always aims beyond a mere reflection of actual fact: Isabel Mundry's *Ich und Du* exemplifies a utopia of social interaction, identity (de-)construction and worldly experience rather than an inventory of reality.

NOTES

1. It is important to remember that the image of Aristoxenus rejecting all rational foundation of theory in favour of aural perception is a crude simplification. See Albrecht Riethmüller, 'Musik zwischen Hellenismus und Spätantike', in Albrecht Riethmüller and Frieder Zaminer (eds.), *Neues Handbuch der Musikwissenschaft*, i: *Die Musik des Altertums* (Laaber: Laaber, 1989), 207–325; 249f. In part this simplification may be attributed to Boethius, who linked Aristoxenos exclusively with the *sensus* principle and the *iudicium aurium*, in contrast to the Pythagorean *ratio* principle, the *iudicium rationis* sustained by Boethius and his followers.
2. See Youn Kim, 'Interdisciplinarity and Metaphors: Historical Reflections on Music Theory and the Psychology of Music', in Christian Utz (ed.), *musik. theorien der gegenwart*, iv: *Music Theory and Interdisciplinarity. 8th Congress of the Gesellschaft für Musiktheorie Graz 2008* (Saarbruecken: Pfau, 2010), 577–88.
3. Gottfried Weber, 'Ueber eine besonders merkwürdige Stelle in einem Mozart'schen Violinquartett aus C', in Ian Bent (ed.), *Music Analysis in the Nineteenth Century*, i: *Fugue, Form, and Style* (Cambridge: Cambridge University Press, 1994), 161–83.
4. Nicholas Cook, 'Epistemologies of Music Theory', in Thomas Christensen (ed.), *The Cambridge History of Western Music Theory* (Cambridge: Cambridge University Press, 2002), 78–105; 92.
5. "They [i.e., the chords from bar 168 in the first movement onwards] are sounds at which the breast, constricted and affrighted by presentiments of enormity, struggles for air. … The restless yearning inherent in the theme [the principal theme of the third movement] now reaches a level of unease that so constricts the breast that only odd fragmented sounds escape it; … [the dissonant C in the timpani is continuously repeated over changing harmonies in the transition between movements 3 and 4:] These heavy, dissonant blows, sounding like a strange and dreadful voice, arouse a horror of the extraordinary, of ghostly fear". E. T. A. Hoffmann, 'Review: Beethoven's Symphony No. 5 in C minor', in Ian Bent (ed.), *Music Analysis in the Nineteenth Century*, ii: *Hermeneutic Approaches* (Cambridge: Cambridge University Press, 1994), 145–60, 150, 156. Such shivers have been described as 'chills' and explored systematically in recent music psychology; see Oliver Grewe, Reinhard Kopiez and Eckart Altenmüller, 'The Chill Parameter: Goose Bumps and Shivers as Promising Measures in Emotion Research', *Music Perception* 27/1 (2009), 61–74.
6. For an overview see Björn Gottstein, 'Körper / Leib', in Helga de la Motte-Haber, Heinz von Loesch, Günther Rötter and Christian Utz (eds.),

Handbuch der Systematischen Musikwissenschaft, vi: *Lexikon der Systematischen Musikwissenschaft* (Laaber: Laaber, 2010), 237–9.

7. Pierre Boulez, 'Schoenberg is Dead' [1951], in Pierre Boulez, *Stocktakings from an Apprenticeship* (Oxford: Oxford University Press, 1991), 209–14; 212 *f*.

8. This point would of course require a more elaborate discussion; one would at least have to distinguish between the more frequent and more general attacks at serial music on the grounds that—in contrast to tonal classical music—it disobeys 'natural' laws or rules of auditory perception (see, for example, Leonard B. Meyer, *Music, the Arts and Ideas: Patterns and Predictions in Twentieth-Century Culture* (8th edn., Chicago: University of Chicago Press, 1989), Chapter 11: 'The Perception and Cognition of Complex Music' or Fred Lerdahl, 'Cognitive Constraints on Compositional Systems', *Contemporary Music Review* 6/2 (1992), 97–121 and more specific repudiations of serial music as manifestations of non-referential accounts of 'pure' structure—a misunderstanding diffused most prominently by Milton Babbitt's infamous 1958 article 'Who Cares If You Listen?', *High Fidelity* 8:2 (February 1958), 38–40, 126–7, reprinted in Elliott Schwartz and Barney Childs (eds.), *Contemporary Composers on Contemporary Music* (New York: Da Capo, 1978), 243–50 (see, for example, Susan McClary, 'Terminal Prestige: The Case of Avant-Garde Music Composition', *Cultural Critique* 12 (1989), 57–81). McClary places a song by the group Earth, Wind and Fire against Milton Babbitt's serialism, concluding: "The kind of intelligence that shines through this song … accepts the experiences of the body—dance, sexuality, feelings of depression and elation—as integral parts of human knowledge that accrue value precisely as they are shared and confirmed publicly. … a song that gives no credence whatsoever to the mind/body split or to the defensive autonomy that infects so much of Western music, especially that of the avant-garde which fetishizes intellectual work for its own sake" (p. 80).

9. Christian Utz, 'Entwurf einer Theorie musikalischer Syntax', in *id*., Cle mens Gadenstätter, and Dieter Kleinrath (eds.), *musik.theorien der gegenwart, v: Musik-Sprache. Entwürfe und Annotationen im Dialog mit Albrecht Wellmer*, Saarbruecken: Pfau 2012, *forthcoming*.

10. Karlheinz Stockhausen, 'Struktur und Erlebniszeit' [1955], in *Texte zur Musik*, i: *Aufsätze 1952–1962 zur Theorie des Komponierens* (Cologne: du Mont, 1963), 86–98. [English translation: 'Structure and Experiential Time', trans. Leo Black, *Die Reihe* (English Edition) 2 (1959): 64–74.]

11. Several examples of this phenomenon are discussed in Utz, 'Entwurf einer Theorie musikalischer Syntax', including Schoenberg's piano piece op. 11 no. 3, Boulez' *Structures Ia*, Ligeti's *Kyrie* (from *Requiem*) and Ferneyhough's *Incipits*.

12. Brian Ferneyhough, 'Form—Figure—Style: An Intermediate Assessment'

[1982], in James Boros and Richard Toop (eds.), *Collected Writings* (2nd edn., Amsterdam: Harwood, 1998), 21–8; 23. Ferneyhough directs his criticism against the exponents of *Neue Einfachheit* (New Simplicity). Isabel Mundry makes a similar argument in the same context when she writes: "Often these expressive characters remain disjunct from the tonal and formal implications from which they once emerged, running the danger of lining up as loosely juxtaposed gestures devoid of meaning". Mundry, '*Ich und Du*', in this volume, p. 88.

13. See Mundry, '*Ich und Du*', p. 87–8 and 90–1.

14. See Christian Utz, 'Bernd Alois Zimmermann und Charles Ives. Schichtungsverfahren, Intertextualität, kulturelle Verortung', in Ulrich Tadday (ed.), *Musik-Konzepte Sonderband: Bernd Alois Zimmermann* (Munich: Text + Kritik, 2005), 121–41; 132–41.

15. See Jörn Peter Hiekel, 'Über Isabel Mundry' [2000], www.breitkopf.com/author/show/8 (accessed 30 July 2010).

16. Nelson Goodman, *Languages of Art. An Approach to a Theory of Symbols* (2nd edn., Indianapolis: Hackett, 1976).

17. "erzeugt … eine Erfahrungs korres pondenz zwischen dem, was wir in der Musik sinnlich wahr nehmen, und dem, was wir von einem Spaziergang kennen, nämlich daß über unseren Köpfen Vögel kreisen". Isabel Mundry, 'Resonanzverhältnis zwischen kompositorischem Ich und Gesellschaft', (Munich: Thinkers' Corner, 2005).

18. "Referenzmodus, der an die gezeigten sinnlichen Eigenschaften des Zeichens gebunden, also in der Musik verankert ist, und diese zugleich nach Art einer Metapher übersteigt". Christian Thorau, 'Interagierende Systeme —Überlegungen zu einem zeichentheoretischen Rahmen musikalischer Analyse', in Clemens Kühn and John Leigh (eds.), *Systeme der Musiktheorie* (Dresden: Sandstein, 2009), 70–84; 77; translation by the author.

19. See Christian Utz, 'Musik von einem fremden Planeten? Variationen über Struktur, Wahrnehmung und Bedeutung in der Musik des 20. und 21. Jahrhunderts', in Christian Utz (ed.), *musik.theorien der gegenwart*, iv: *Music Theory and Interdisciplinarity. 8th Congress of the Gesellschaft für Musiktheorie Graz 2008* (Saarbruecken: Pfau, 2010), 377–99.

20. Nishida's philosophy has received considerable attention in recent contemporary music. It exerted a major influence on Hans Zender, who in turn pointed Helmut Lachenmann to Nishida. The latter referred to Nishida's philosophical positions and quoted text fragments in *NUN. Musik für Flöte, Posaune, Männerstimmen und Orchester* (1997–99/2003); see Jörn Peter Hiekel, 'Interkulturalität als existentielle Erfahrung. Asiatische Perspektiven in Helmut Lachenmanns Ästhetik', in Jörn Peter Hiekel and Siegfried Mauser (eds.), *Nachgedachte Musik. Studien zum Werk von Helmut Lachenmann* (Saarbruecken: Pfau, 2005), 62–84; 77. Independent

from Zender and Lachenmann, I realised a 40-minute composition based on Nishida's essay *Place* [*bashō*] (1926), *Site* (2001), for *gagaku* ensemble and live electronics during a two-month residency at the Akiyoshidai International Art Village, Japan.

21. "Da wir im Grunde unserer Selbstbestimmung auf die absolute Negation stoßen, treffen wir in uns selbst auf das absolut Andere, wodurch in mir selber bereits ein Du bzw. ein absolut Anderes gegeben ist, so daß sich durch den absolut Anderen in mir selbst ein Zugang zum Du der anderen Person eröffnet". Rolf Elberfeld, 'Einleitung', in Kitarō Nishida, *Logik des Orts. Der Anfang der modernen Philosophie in Japan*, trans. and ed. Rolf Elberfeld (Darmstadt: Wissenschaftliche Buchgesellschaft, 1999), 1–19, 11.

22. "In der Komposition geht es nicht um ein biografisches Ich und Du, sie thematisiert vielmehr das Ich als einen Ort zentrierter Wahrnehmung und das Du als einen Ort der Projektion. … Die Disposition legt nahe, das Soloinstrument als das Ich und das Orchester als das Du zu denken, doch die Musik handelt von Umschichtungen und Umdeutungen, von Grenzziehungen, Übergriffen, Zuschreibungen oder Selbstbestimmungen. Insofern kann das Klavier zum Du werden, vor dem das Orchester sich als ein Ich abhebt, oder es kann sich selber fremd werden, indem es vom intimen Klang zur fremdbestimmten Maschinerie mutiert". Isabel Mundry, *Ich und Du* [programme note], in Armin Köhler (ed.), *Donaueschinger Musiktage 2008* (Saarbruecken: Pfau, 2008), 28 *f*.; translation by the author.

23. Theodor W. Adorno, *Mahler: A Musical Physiognomy*, trans. Edmund Jephcott (Chicago: University of Chicago Press, 1996), 72.

24. For a more detailed discussion, see Utz, 'Musik von einem fremden Planeten?' and three other articles where I discuss this tendency in case studies of Lachenmann, Sciarrino and Huber: 'Klangkadenz und Himmelsmechanik. Alterität und Selbstreferentialität in Helmut Lachenmanns *Das Mädchen mit den Schwefelhölzern* und *Concertini*', in Christian Utz and Clemens Gadenstätter (eds.), *musik.theorien der gegenwart*, ii: *Musik als Wahrnehmungskunst. Untersuchungen zu Kompositionsmethodik und Hörästhetik bei Helmut Lachenmann* (Saarbruecken: Pfau, 2008), 125–52; 'Statische Allegorie und "Sog der Zeit". Zur strukturalistischen Semantik in Salvatore Sciarrinos Oper *Luci mie traditrici*', *Musik und Ästhetik 53*, 14/1 (2010), 37–60; 'Morphologie und Bedeutung der Klänge in Klaus Hubers *Miserere Hominibus*', in Jörn Peter Hiekel and Patrick Müller (eds.), *Transformationen im Werk Klaus Hubers* (Mainz: Schott, forthcoming).

25. See, for example, McClary, 'Terminal Prestige', and Georgina Born and David Hesmondhalgh, 'Introduction: On Difference, Representation, and Appropriation in Music', in Georgina Born and David Hesmondhalgh, *Western Music and Its Others: Difference, Representation, and*

Appropriation in Music (Berkeley: University of California Press, 2000), 1–58.

26. See Christian Utz and Dieter Kleinrath, 'Klangorganisation. Zur Systematik und Analyse einer Morphologie und Syntax post-tonaler Kunstmusik', in Jürgen Blume and Konrad Georgi (eds.), *Musiktheorie und Improvisation. Kongressbericht der IX. Jahrestagung der Gesellschaft für Musiktheorie* (Mainz: Schott, forthcoming).
27. Roman numerals designate the three orchestral groups.
28. "We use the word chimera metaphorically to refer to an image derived as a composition of other images. An example of an auditory chimera would be a heard sentence that was created by the accidental composition of the voices of two persons who just happened to be speaking at the same time. Natural hearing tries to avoid chimeric percepts, but music often tries to create them. It may want the listener to accept the simultaneous roll of the drum, clash of the cymbal, and brief pulse of noise from the woodwinds as a single coherent event with its own striking emergent properties. The sound is chimeric in the sense that it does not belong to any single environmental object". Albert S. Bregman, *Auditory Scene Analysis. The Perceptual Organization of Sound* (Cambridge, MA: MIT Press, 1990), 459 *f*.
29. Michael Spitzer, *Metaphor and Musical Thought* (Chicago and London: University of Chicago Press, 2004), 88.
30. Mundry, '*Ich und Du*', p. 87.
31. Ibid., p. 93–5.
32. Helmut Lachenmann, 'Klangtypen der Neuen Musik' [1966/93], in Josef Häusler (ed.), *Musik als existentielle Erfahrung. Schriften 1966–1995* (Wiesbaden: Breitkopf und Härtel, 1996), 1–20; 16–20.
33. Mundry, '*Ich und Du*', p. 95.
34. Thorau, 'Interagierende Systeme', pp. 79–82; translation by the author.
35. Martin Kaltenecker, 'Subtraktion und Inkarnation. Hören und Sehen in der Klangkunst und der "musique concrète instrumentale" ', in Christian Utz and Clemens Gadenstätter (eds.), *musik.theorien der gegenwart*, ii: *Musik als Wahrnehmungskunst. Untersuchungen zu Kompositionsmethodik und Hörästhetik bei Helmut Lachenmann* (Saarbruecken: Pfau, 2008), 101–26, 115.
36. Weber, 'Ueber eine besonders merkwürdige Stelle'.
37. Cook, 'Epistemologies of Music Theory', p. 97.
38. Roger Scruton, *The Aesthetics of Music* (Oxford: Oxford University Press, 1999), 160–5.
39. Robert Samuels elaborated on Jean-Jacques Nattiez' essay 'Can One Speak of Narrativity in Music?', *Journal of the Royal Musical Association* 115 (1990), 240–57.
40. Adorno, *Mahler*, p. 72.

8 Two Kinds of Physicality in Electronic and Traditional Music

Kendall L. Walton

> Suddenly a violent noise leaped at them from no source that he could identify. He gasped in terror at what sounded like a man trying to gargle while fighting off a pack of wolves.[1]

I will examine two very different ways in which listeners' experiences of musical works sometimes involve physical actions or events—in many instances emotions and other mental states as well. Both concern music that is often described as 'expressive'. But they are so different that I question whether it is reasonable to subsume them under any single category, whether, for instance, they are aptly characterized as two kinds of expression or expressiveness. The first consists in the impressions appreciators have of physical activities or events that produced the sounds they hear. The second is the tendency of listeners to engage in physical activity themselves in response to music.

I.

How a work of art, or a performance, appears to have come about often has a lot to do with its interest, its aesthetic character, and the experiences of appreciators.[2] This includes psychological facts about the artist—her apparent objectives in creating a work, and facts about her attitudes, personality, or mood that it seems to reflect. It also includes (in many cases) apparent physical causes; a work or performance may seem to have resulted from actions or events of one or another sort.

A few quick examples: whether a story seems to have been meant to be funny, or not, is often important. A story told with a straight face may be funnier than it would be otherwise. Or its humor might be so subtle that audiences miss it. A story with a serious moral might undercut its purpose if the storyteller gives the impression of trying to be humorous. Alternatively, the apparent jocularity might make palatable to readers an unpleasant, serious message that the story aims to get across. That a picture was painted in a childish style, as though by a child, may give it a kind of charm that it wouldn't have otherwise (Jean Dubuffet).

In musical performances (and in ordinary life as well), there are crashing, clanging, scraping, caressing, and wailing sounds—sounds that sound as though they were made by crashing, clanging, scraping, caressing, wailing actions or events. Violent or gentle sounds seem to be sounds of violent or gentle happenings.

The difference between the impression that sounds we hear were produced by a *person's deliberate actions*, actions of banging or bowing or blowing or vocalizing, and the impression just of sounds caused by physical events of certain kinds, objects scraping or banging against one another, whistling wind, and so on, this difference is of first importance. Insofar as our impression is of the former sort, we might be said to be recognizing something like a fictional character in the music. It may be reasonable to say that the music is (minimally at least) representational, that the sounds of a performance represent or depict themselves as having been made by a person of a certain kind.

Appearances need not correspond to reality, of course; the impression a work gives of its genesis may not be veridical. But appreciators are often interested in the appearance itself, regardless. (I do not rule out their being interested, *also*, in how a work actually did come about, nor do I assume that this is not an 'aesthetic' interest. But interest in its apparent sources is not itself interest in its actual sources.) The score of William Kraft's percussion piece *Momentum* contains the notation "run amok". I doubt that this instruction is meant to be taken literally. More likely the performers are expected to produce sounds that merely seem to be made by people running amok. Perhaps they are expected also, in a live performance, to behave so as to *look* as though they are running amok.

Interest in appearances regardless of their veridicality is an interest of a

special and somewhat unusual kind. In many or most ordinary (non-artistic) contexts, appearances are important primarily for what they might indicate about reality. A long tradition in philosophy, going back to Plato's Cave, wrestles with questions about the legitimacy of inferring how things are from how they appear—as though *that* is why appearances are important. Aesthetic contexts are different. Appreciators notice and enjoy appearances more or less for their own sake, without necessarily even wondering whether or not things actually are as they appear.

This fact has two important consequences. First, we recognize, attend to, care about conflicting appearances in works of art without feeling any particular need to resolve the conflict. Consider the joke told with a straight face. The impression of seriousness and that of joking are both important; to fully appreciate the story, we must be sensitive to both. It may be obvious, in the end, that the storyteller was not serious, that she meant only to be joking. But we miss something important if we ignore or fail to detect the appearance of seriousness. What appreciators are likely not to do is to weigh the two contrary appearances and replace them with a single all-things-considered appearance: 'All in all, she seems to have been joking *rather than* being serious'.

Given that multiple conflicting appearances are to be noticed and often relished, things can be fascinatingly complicated. A joke told with a straight face might also be intended to make a serious point. One's first, most immediate impression may be that the speaker did not mean to be funny (the 'straight face'). The air of seriousness may be exaggerated, however, making it seem that the speaker did intend to be funny after all. Finally, it may be apparent on reflection that the speaker meant to be making a serious point, that she intends the story to have a serious moral. The speaker tells an apparently serious story in a way that makes it seem to have been meant to be funny, evidently intending thereby to make a serious point. Jonathan Swift's *A Modest Proposal* may be an example of exactly this.

The second consequence of the fact that appreciators attend to appearances for their own sakes is that the appearances that matter include ones that, on pain of circularity, *could not* constitute a reason for thinking that things actually are as they appear to be. Lying in a tent in the wilderness, someone tells me that there is a grizzly bear outside. 'That is a bear!' she says, referring to what until then sounded to me like a squirrel scrambling up a tree or branches blowing in the wind. These sounds now have a sinister, scary quality. They seem to me to have been made by a bear; my impression is of a bear prowling around looking for food, bumping into vegetation, and so on. Insofar as my prior, independently acquired belief that there is a bear in the camp is responsible for the (auditory) appearance of a bear, that appearance gives me no reason to think that the sounds *are* those of a bear. (I may or may not realize that this is so.) Nevertheless, the impression that they are bear sounds is part of my auditory experience. If, perchance, I am not especially interested in what actually is the case, whether the sounds I hear were or were not

actually made by a bear, I may be interested in, I may notice and enjoy the bearish quality of the sounds more or less for its own sake.[3]

The point I just made is a special case of a more obvious one. What we know or believe or have internalized about how certain *kinds* of things are actually produced has a lot to do with how a particular one seems to have been produced. A loud sound seems to be the result of more violent happenings than a softer one does because we realize (implicitly) that violent actions or events actually do, ordinarily, produce louder sounds than gentler ones do. It is largely because we have observed the antics of pianists in making piano sounds, not to mention our own attempts to play the piano, that we have the impressions we do, when hearing a recording of a piano sonata, of the performer's antics in making the sounds we hear. My present point is that how a particular sound sequence seems to have come about may depend on one's prior knowledge of how those very sounds did come about, as well as on prior knowledge of how other similar sounds normally do—although the appearance counts as evidence for the reality in one case but not the other.

Michel Chion distinguishes between *causal* listening—"listening for the purpose of gaining information about the sound's source", and *reduced* listening —"listening for the purpose of focusing on the qualities of the sound itself (pitch, timbre, etc.) independent of its source or meaning".[4] Listening to sounds noticing or attending only to how they *appear* to have been produced is neither of these. It isn't paying attention to the *actual* cause of the sounds, but neither is it focussing just on sonic properties.

* * *

It is obvious that the apparent genesis of much electronic music is very different from that of traditional acoustic music. One might suppose, however, that there isn't much difference in the case of electronic music that mimics traditional acoustic instruments. Don't electronically generated sounds that successfully reproduce sounds like ones made by musicians playing violins or accordions or whatever sound as though they were made in those ways? This ignores the influence awareness of how sounds are actually made has on how they seem to have been made. Listeners' experiences may include an impression that the sounds were made by violins or accordions, in any case, but this impression will mix with other contrary ones, for listeners who have some awareness of their actual genesis (even if little more than a realization that violins or accordions were not involved). I suspect that interactions between the different impressions are important. (I am not considering, now, recordings of actual violin or accordion music, or electronic music that makes recognizable use of such recordings.)

What about entirely unrecognizable sounds generated electronically? The ethereal, disembodied, mysterious character often attributed to such sounds is no doubt largely a matter of the impressions listeners have or do not have about their sources. At the premier of his *Hymnen*, Stockhausen remarked that:

> Many listeners have projected that strange new music which they experienced—especially in the realm of electronic music—into extraterrestrial space. … Several have commented that my electronic music sounds "like on a different star", or "like in outer space". Many have said that when hearing this music, they have sensations as if flying at an infinitely high speed, and then again, as if immobile in an immense space.[5]

It may be unclear whether listeners—I am thinking now about naïve listeners, with only the foggiest idea of actual electronic music production—simply *lack* any sense of how the sounds were generated, or whether they *do* have an impression of their origin, an impression of their having come from nowhere, out of the blue, of their *lacking* any physical cause (or perhaps any cause at all). There may be no fact of the matter about this. In either case, I think it would be a mistake, misleading anyway, to deny that the music is 'expressive'. The *ethereal, disembodied, mysterious* qualities are aesthetically important whether or not they count as 'expressive' properties. The music may inspire awe if not empathy. It might be especially appropriate in religious contexts (compare church organs). There may or may not be such a thing as totally 'disembodied' music. But music may be strikingly lacking in *one* particular kind of embodiment, and this absence may be immensely important aesthetically.

Some justification for denying that the music is expressive, insofar as expressiveness depends on the impression it gives of the generation of its sounds, might come from the fact that the apparent genesis of the sounds doesn't depend much, if at all, on their specific sonic qualities—beyond their merely lacking sonic qualities indicative of familiar sound sources. Changes of timbre, pitch, volume, attack and decay properties, and so on make little or no difference (so it seems to me, anyway) in *this* respect: the sounds do not seem to have any particular physical sources or seem not to have physical sources at all—no matter. I doubt that listeners, naïve ones anyway, follow the music's expressive, emotional development as they often seem to do (sometimes with empathy) in the case of acoustic music—insofar as the emotional development consists in impressions the music gives of the expressive behavior of a creator of the sounds. They may of course follow the progression of sounds intently for other reasons, and there may be expressive or emotional development of other kinds.

Again, I would expect that the situation is somewhat different for sophisticated listeners with more or less detailed knowledge, more or less internalized, either of how electronic sounds of the kind one hears are ordinarily created, or how the very sounds in question actually were. But, still, the sonic properties of the various sounds will not make much difference to what physical actions produced them—maybe a difference in which keys are pushed, or in what order (on an organ, which stops are pulled out).

As always, there are complications. Don't louder sounds, even unfamiliar

electronically generated ones, seem to result from more violent events than softer ones do, and quick successions of different sounds from faster moving successions of events? Probably. But in my experience, at least, these impressions are vague, muted, at best, when I have no sense of what kinds of events produce the louder or softer sounds, or the sounds that succeed one another more or less quickly.

Even naïve listeners are likely to have an impression of psychological states of the music maker—whether she was trying to be funny, for instance, or wanted to fool listeners about where the music would be going next—or whether the music is improvised or composed. No doubt sophisticated listeners will have more detailed impressions of this kind than naïve ones do.

II.

> I feel intimate with the music, more intimate than I feel with the world of a painting. The world of a painting … is out there, something I observe from an external perspective. But it is as though I am inside the music, or it is inside me. (Kendall Walton, 1994)[6]

Walton's impressionistic observation is hardly a paradigm of philosophical rigor! It may or may not seem, initially, to be somehow apt, as a characterization of one's experience of some kinds of music. I will suggest that there is more to it than one might think. Indeed, it may be more nearly literally true than even Walton thought possible.

There is nothing especially special about music (in general), as far as apparent circumstances of production are concerned. Apparent painters and sculptors are no less important than apparent music makers. The same goes for our impressions of physical activities or events that give rise to musical performances, and to visual works of art. We certainly have a sense of the physical movements that resulted in the paintings of Wassily Kandinsky and Jackson Pollock, and an impression of Van Gogh's brushstrokes, as well as those of typical Japanese ink painters. Photographs, like much electronic music, are likely not to give viewers a very vivid impression of the activity of the photographer—perhaps little more than the clicking of a shutter. This impression will be the same in many instances, no matter what the photograph depicts. (Sometimes, however, it will seem as though the photographer was hanging from the ceiling, or staring into a rhinoceros's mouth, when she clicked the shutter.)

Music clearly *is* special in some respects, however—a diverse conglomeration of aestheticians and musical scholars have thought so, in any case. I mentioned that apparent music makers are, in some ways, like characters in (visual and literary) works of fiction. The apparent creator of a musical work or performance, like characters in a movie, for example, may be in a certain emotional state, and may engage in certain physical activities. Watching the movie or listening to the music, we have a third-person relation to the character or apparent music maker and her emotions and activities.

The contrasts between music and the visual and literary arts (the contrasts I have in mind) have more to do with appreciators' own affective states and physical responses than with emotions and activities of characters or apparent artists. Music seems to exert an especially powerful and direct influence on listeners' emotions or moods, and to have a unique tendency to evoke certain kinds of physical responses in listeners. We can begin to clarify and explain this difference by thinking about differences between visual and auditory perception, between sounds and sights

themselves, apart from particular uses in works of art. I won't be concerned with the physics or the physiology and neurology of visual and auditory perception, rather with our experiences when we see and hear. For that is what matters in our appreciation of works of art. (Our intuitive, internalized conceptions, or misconceptions, of the relevant physics and physiology color our experiences, however.) Nor am I much concerned now with seeing and hearing as sources of information.

I will focus on two related differences between our experiences of sights and sounds: *reification* and *physicality*.

Reification

Italo Calvino, in 'A King Listens', introduces the first of these, reification:

> The music comes and goes, in gusts, it oscillates, down in the rumbling groove of the streets, or it rises high with the wind that spins the vanes of the chimneys.
>
> And when in the darkness a woman's voice is released in singing, … What is it? … That voice comes certainly from a person … ; a voice, however, is not a person, it is something suspended in the air, detached from the solidity of things.[7]

Calvino brings out our tendency to think of sounds, to experience them, as things (or stuff) that travel to us, to our ears, from objects or events that emit them, from bells and trains and gurgling brooks and people speaking or singing. Sounds have lives of their own. They are distinct from and independent of their sources, of the things or events that emit, cause them. They have their own spatial locations, as they move away from their sources. They have their own temporal dimensions as well: a sound arrives at our ears after the event that gave rise to it; in some cases perceptibly after the event. Sounds fill rooms, and travel across streets. Sights don't do that.

But smells do. A smell might fill a room, or be carried by the wind away from the skunk or the incinerator that emitted it. A smell, like a sound, may be in a different place, and also a different time, from that of its source.

What about sights? What we *call* 'sights' are things like the Grand Canyon, the Eiffel Tower, a sunset.[8] We think of ourselves as seeing objects *out there*, ones that stay out there while we examine them visually. We do, sometimes, speak of seeing glimmers, flashes, reflections. These are distinct from their sources. But they are on or next to their sources, even if they are not parts of them; they are *out there*, at a distance from us. And usually it is the object itself that we think of ourselves as seeing. (We know that *light* travels from the objects we see to our eyes. It enables us to see objects. But we don't usually think of ourselves as seeing light.)

It isn't clear that there is a mode of visual perception analogous to reduced listening, in Chion's sense (what some call acousmatic hearing).[9] If we subtract from our usual visual experiences the physical objects that we see, what would be left to count as objects of our visual experiences?

Physicality

If sounds come to us, what do they do when they get there? Here is a thought: they enter our bodies and animate us—that is, we think of, or experience sounds, some sounds, as doing this.[10]

That they animate us, that some musical sounds stimulate or encourage physical behavior is obvious (though until recently musicologists have not paid much attention).[11] One of the main objections some people had to jazz in its early days was based on its tendency to make people move. "After impudence comes the determination to surprise: you shall not be gradually moved to the depths [by jazz], you shall be given such a start as makes you jigger all over".[12] The National Dancing Masters Association adopted the rule: "Don't permit vulgar cheap jazz music to be played. Such music almost forces dancers to use jerky half-steps and invites immoral variations".[13]

It is not just jazz (or rock 'n' roll, etc.) that makes people move. We march and dance to music of more sedate sorts; we tap our feet and sway with it. We are supposed to control ourselves in concert halls, but the inclination to move is there; our muscles contract. The pianist and composer Oscar Levant tried to explain his way out of a speeding ticket by pointing out that "You can't possibly hear the last movement of Beethoven's Seventh [Symphony] and go slow".[14]

Levant was speeding to a steady, insistent rhythm, a hurried one. You will remember the irregular, unpredictable crashes in Stravinsky's *Rite of Spring*. This passage makes me feel off balance—like walking downstairs without knowing how many steps there are.

That sounds tend to produce immediate physical reactions is an obvious commonplace; I didn't need to belabor the point as much as I just did. But it is remarkable. We can begin to appreciate how remarkable it is by noting that nothing very similar occurs in the visual realm. Visual objects have 'rhythms' also—at least we describe them thus. Here is a regular visual rhythm:

Figure 8.1 Agra Fort. Photograph © Kendall Walton 2010.

There is some point in this comparison. We will be reminded of the idea that architecture is frozen music. But the comparison is limited: architecture doesn't cause foot tapping, not even frozen foot tapping. We don't march or dance or tap our feet to Paul Klee's *Camel in Rhythmic Landscape* (Figure 8.2), although we see the analogy between it and the Beethoven; we see that there is one.

Figure 8.2 Paul Klee, *Camel in Rhythmic Landscape* (1920). Photograph © Walter Klein. Reprinted with permission from Kunstsammlung Nordrhein-Westfalen.

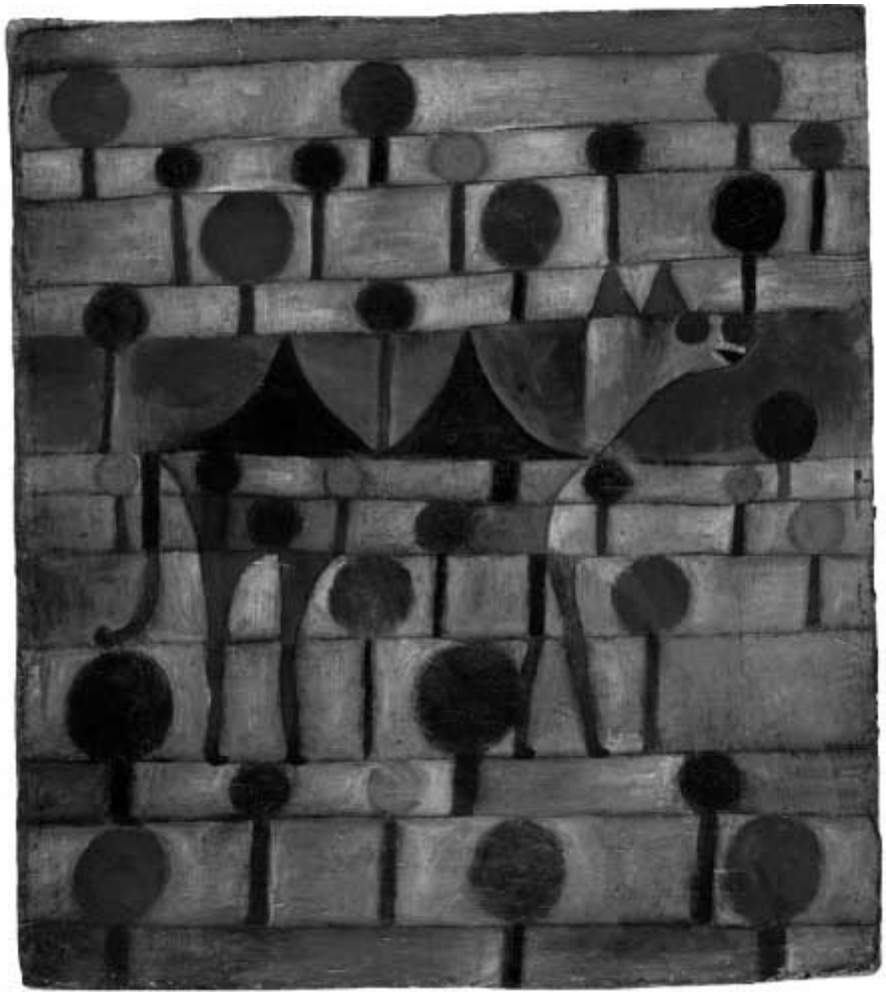
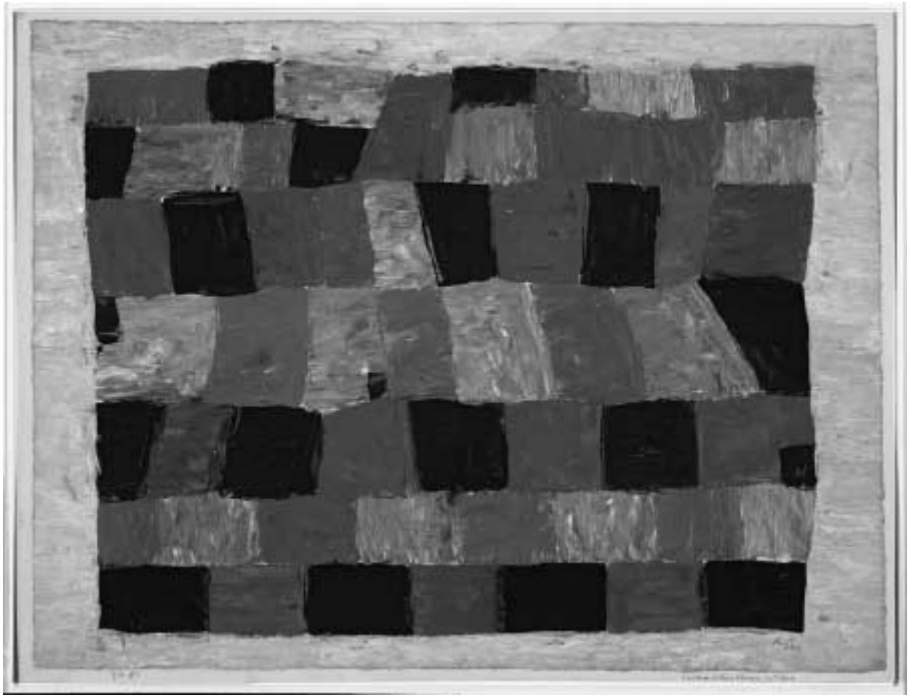


Figure 8.3 has an irregular rhythm. Again, we see something of an analogy with the *Rite of Spring* passage. But we don't *feel* the rhythm in the same physical way.

Figure 8.3 Paul Klee, *Rhythmical, More Rigorous and Freer* (1930). Photograph © VBK, Wien, 2010. Reprinted with permission from Städtische Galerie im Lenbachhaus, Munich



These are still pictures. Perhaps moving ones will approximate the physical effects of musical motion? Take a rhythmically regular screen saver. We can appreciate the analogy with regular musical rhythms. But we don't march or tap our feet.

A quick experiment: compare two video clips (thanks to Alicyn Warren), available here: http://musikaesthetik.kug.ac.at/institut-14-musikaesthetik/publikationen/sammelbaende/bodily-expression.html.[15]

Clip #1 is a regular rhythmic alternation between a blue-black movie and a red-white one, without sound. This doesn't make me want to march or dance or tap my feet.[16] Clip #2 adds sound—a clicking metronome, in 2/4 time. I at least find this a little more encouraging of movement.

Why the difference? And can we give any sense to the idea that it is by entering our bodies that sounds make us move, animate us? This is an empirical question calling for empirical research. But I will speculate. A clue may come in the observation that low frequencies have a greater tendency to get us moving than higher ones do. We are more likely to move and groove with the thumping of a bass than the twittering, even rhythmic twittering, of a piccolo. In the case of low-pitched tones especially, we *feel* the vibrations. We experience sounds *somatically*, as well as through our ears, especially if we are in contact with a vibrating solid object linking us to the sound production, such as a dance floor. You will remember Evelyn Glennie, the percussionist who lost most of her hearing by the time she was a teenager. She is deaf, but not insensitive to sound. "Hearing is a form of touch", she said, "you feel it through your body, and sometimes it almost hits your face".[17]

One doesn't have to be deaf to feel sounds, to experience them somatically. I expect that most of us fail to realize how much of our detection of sounds—even not very low-pitched ones—is somatic rather than aural. Experiments have shown that much of what we call taste is actually smell. (People have trouble distinguishing

potatoes and apples by taste, when their noses are pinched.) I don't know of similar experiments in the case of sound. But I wouldn't be surprised if a significant part of what we think of as hearing is actually feeling, experiencing sounds somatically. We can't help noticing our somatic experiences of very low-frequency sounds. We may be only vaguely aware of feeling the vibrations of mid-range sounds. Perhaps very high-pitched sounds are felt almost not at all.

These somatic experiences, however vague our awareness of them, help to explain the impression that sounds not only come *to* us, but are experienced as being inside us, in a way that visual objects aren't. Perhaps we identify sounds with physical sensations, on a par with itches, pains, and adrenalin rushes, sensations of muscles tensing or relaxing, and so on, all of which are 'inside' us and often give rise to physical behavior. Or maybe we (implicitly) identify sounds with the vibrations that we feel, the sensations, the feelings in our muscles, these being sensations *of* movement or incipient movement, rather than causes of movement. Probably our experiences are simply not definite enough to admit of precise characterization. But that is not needed, I think, to see that listeners' somatic experiences encourage the idea that sounds enter their bodies and animate them.

My speculative hypothesis—to be slightly more explicit—is that somatic experiences of sound, feelings of vibrations in our bodies, cause tendencies to tap our feet, march, dance, and so forth. I won't speculate about the mechanisms involved beyond proposing that the causation is relatively direct and mechanical (physiological, neurological), and does not involve anything like (even implicit) cognition, or imaginings or deliberate action.

This, I said, is speculation. But it is not entirely without empirical support. If we are willing to grant, on the basis of our own experience, that low-frequency sounds have a greater tendency to encourage foot tapping or marching than higher-frequency ones do, and also that the vibrations of low-frequency sounds are felt more strongly than those of high-frequency ones, we have a correlation between somatic experiences of sounds, relatively intense ones anyway, and physical responses. This correlation suggests a causal relation. The hypothesis also nicely explains the fact—which I assume is obvious enough—that music has a much greater tendency to elicit physical activity than the visual arts do, absent other explanations (I will sketch some in a moment). We experience sounds, but not sights, somatically. Again, a correlation suggestive of causation.[18]

The somatic perception of sounds goes some way toward explaining what has seemed to many the extraordinarily direct and immediate way in which music affects our emotions. Somatic sensations themselves qualify as what psychologists call 'affective' responses. Part of what we feel, when we feel rage or anger or fear or love or contentment, is sensations of muscles tensing or relaxing. Physical sensations constituting the perception of sounds are easily imagined to be feelings associated with full-blown emotions, when we imagine a situation in which the emotions in question are called for. They are easily imagined to be feelings of rage, when one imagines something to be angry at, or fear when there is something to be

afraid of. They may actually be feelings of rage when one actually is angry at something. An important function of music accompanying narrative works—film, theater, opera—is to generate somatic sensations, sensations constituting our perception of the sounds, which we then construe as feelings of anger at the bad guys, or disgust at their evil doings, or worried concern for the good guys. This is a contribution that the piano or organ player in silent movies makes, a job taken over by sound tracks, often electronic ones, in latter-day talkies.

One more speculation: why do rock musicians so often want their music to be as loud as possible? Surely not to make for dramatic contrasts between loud and soft passages; what needs explaining is their dialing up the volume of an entire performance, soft passages (if there are any) included. The objective may be to maximize the intensity of listeners' somatic sensations, and so the intensity of their affective/emotional responses.

If these speculations are on the right track, it would be a serious mistake to think of feeling sounds, experiencing them somatically, as merely a backup system, a convenient alternative means of access to sounds for the hearing impaired, but redundant for the rest of us. I suggest that somatic perception is an integral part of ordinary experiences of sound, one that supplements in crucial ways, rather than duplicates, auditory perception. Daniel Levitin is seriously mistaken, I believe, when he claims that our access to the "auditory world" is almost entirely through the eardrum.[19]

If somatic perception of sounds is crucial in listeners' experiences in the ways I have described, this would seem to apply equally to electronic and acoustic music. It shouldn't matter how the sounds are produced, or whether they are familiar ones with recognizable sources. It shouldn't matter what impression we have, if any, of a music maker or sound creator. But the contrast between music, whether electronic or acoustic, and the visual arts (not to mention literature) is profound. We do not experience sights somatically, in anything like the way we do sounds.

Visual and literary works of art do frequently cause affective, emotional states in appreciators, and also elicit physical responses (tensing or relaxing of muscles, for instance, if not foot tapping and marching). Music is not unique in *this* respect. But the mechanisms by which pictures and novels and movies (apart from their sound tracks) have these effects do not seem to involve anything comparable to somatic perception, and most of them seem to be indirect in ways that somatically perceived music is not.[20] Many of these responses are to characters recognized in works of fiction, or to apparent artists. Watching a film or reading a novel, we may respond emotionally and physically to what we understand about the characters or apparent artists and their situations. Our responses are not always cognitively mediated, however. There is more or less automatic *motor mimicry*: we may unwittingly adopt the posture of a depicted character, or mimic her facial expression, or tense our muscles as we watch a dancer using hers. Emotions or moods of characters can be infectious. Appreciators can catch them from characters

or apparent artists, via whatever mechanisms, I suppose, are involved when we catch them from real people. There is also something like motor mimicry in response to inanimate objects, rather than persons (fictional or actual) or anything we think of as being sentient—mimicry of the shape or movements of objects. Observing the Tower of Pisa, one might find oneself diagonally inclined, in 'sympathy'.[21]

* * *

Music employs a variety of devices for inducing physical and affective responses in listeners, including most of the ones just mentioned, which it shares with the visual arts. There are responses to apparent music makers: listening to sounds seemingly made by a person acting in an overly aggressive manner, a listener may feel intimidated. The impression of a calm producer of sounds may be calming. A pompous apparent music maker may be disgusting. These affective emotional responses are likely to have physical manifestations, in the case of music as in those of the visual arts and literature; one's muscles tense or relax. Probably there is something like infectious emotions or moods, and motor mimicry.

My hypothesis is that somatic sensitivity to sounds, feeling vibrations, is responsible for physical reactions in a very direct way, one not involving any (even implicit) cognitive processes, or recognition of characters or apparent music makers, or anything like motor mimicry or empathy with either a sentient being or an inanimate object.

Some have argued that *proprioception*, the perception of the position and movements of our limbs, is important aesthetically—in appreciating dance, for instance, or architecture. Somatic experiencing of sounds, feeling vibrations, is not proprioception (although it might aid us in detecting the positions and movements of our limbs). Those who regard proprioception as part of aesthetic experiences often take it to result from or consist in a kind of empathy with (for example) a dancer or a building; one mimics with one's body the movement or stance of the object of appreciation.[22] Feeling vibrations in our muscles when we listen to music, I am suggesting, is more direct and automatic than this. It is not that we observe and somehow take on the physical stance or motions of something outside of us.

One final note: Daniel Levitin wrote that "Music communicates to us emotionally through systematic violations of expectations", obviously taking a cue from Leonard Meyer.[23] I suggest that somatic perception of sound—an important feature, I believe, of our experiences of both acoustic and electronic music—is a powerful vehicle of emotional "communication" that has nothing to do with expectations, let alone violations of expectations. This is important. Traditions and standard formulae internalized by listeners are largely responsible (arguably) for the expectations operative in music of the common practice period. Electronic music (and contemporary music of various other kinds) does not often exploit these traditions or formulae, and listeners may not have internalized other newer ones that the music might utilize. Experiencing the music somatically can work

emotionally on them nonetheless.[24]

NOTES

1. Douglas Adams, *The Hitchhiker's Guide to the Galaxy* (New York: Simon and Schuster, 1979), 56.
2. I have more to say about apparent circumstances of production in the arts in 'Style and the Products and Processes of Art', reprinted in Kendall Walton, *Marvelous Images: On Values and the Arts* (New York: Oxford University Press, 2008).
3. See my discussion of a similar visual example in Walton, 'Style and the Products and Processes of Art', *passim*, pp. 245–6.
4. Michel Chion, *Audio-Vision: Sound on Screen*, trans. Claudian Gorbman (New York: Columbia University Press, 1994), 222–3. 'Reduced' listening is approximately what some call *acousmatic* listening. Chion recognizes a third mode of listening as well, *semantic*—"listening for the purpose of gaining information about what is communicated in the sound (usually language)" (p. 224).
5. Thomas B. Holmes, *Electronic and Experimental Music: Pioneers in Technology and Composition* (New York: Routledge, 2002), 145. *Hymnen* does contain recognizable recordings of a human voice, as well as many unfamiliar sounds.
6. Kendall Walton, 'Listening with Imagination: Is Music Representational?', *The Journal of Aesthetics and Art Criticism* 52 (1994), 47–61, 54. Reprinted in Walton, *In Other Shoes: Music, Metaphor, Empathy, Existence* (New York: Oxford University Press, forthcoming).
7. Italo Calvino, 'A King Listens', in *Under the Jaguar Sun*, trans. William Weaver (San Diego: Harcourt Brace Jovanovich, 1988), 50, 53.
8. Stanley Cavell, *The World Viewed: Reflections on the Ontology of Film* (New York: The Viking Press, 1970), 20.
9. Thanks to Alicyn Warren.
10. "Seeing is like touching, hearing like being touched. But the touch of sound does not stop at the skin. It seems to reach inside of us and to attenuate along with the distinction between here and there the still more basic distinction between inner and outer" (David Burrows, 'On Hearing Things', *Musical Quarterly* 66/2 [1980], 180–91; 183–4). "Musical sound has direct access to the soul. It finds there an echo, for man hath music in himself" (Wassily Kandinsky, *Complete Writings on Art* [New York: Da Capo Press, 1994], 161).
11. We don't just experience music as animating us; it really does. Daniel Levitin has emphasized this (*This Is Your Brain on Music: The Science of a Human Obsession* [New York: Penguin, 2007]). There is plenty of empirical confirmation, much of it usefully summarized by Jenefer

Robinson, *Deeper Than Reason: Emotion and its Role in Literature, Music, and Art* (Oxford: Oxford University Press, 2005), 395–8. I discussed some implications of music's tendency to induce physical behavior in Walton, 'Listening with Imagination', *passim*, pp. 75–7.

12. Clive Bell, 'Plus De Jazz', *New Republic* 21 (September 1921), 93. Thanks to Mark Katz.
13. Quoted in Anne Shaw Faulkner, 'Does Jazz Put the Sin in Syncopation?', *Ladies Home Journal* 38 (August 1921), 16.
14. Kathleen Kimball, Robin Peterson, and Kathleen Johnson, *The Music Lover's Quotation Book: A Lyrical Companion* (Toronto: Sound and Vision, 1990), 44.
15. Both clips © Alicyn Warren (2008).
16. "I found it quite hard to pick up a beat—or rather, to 'stay with the beat'—just from watching" (Alicyn Warren, personal communication).
17. Quoted in Stephen Holden, 'How Sound Feels to a Musician Who Lost Her Hearing', *New York Times*, September 7, 2005.
18. Alicyn Warren (personal communication) pointed out that participants in Silent Raves dance wildly to music transmitted through individual headphones. If the music, which they hear but scarcely experience somatically, nevertheless provokes movement, this would seem to suggest that my speculation is wrong. But it is possible that *suggestion* is at work in this case—recognizing what they hear as something that ordinarily would encourage movement, the Silent Rave dancers expect to be moved, and so are moved. (Compare: the sight of a glass of whiskey might make an experienced heavy drinker feel sick.) Perhaps also the merely heard music might not stimulate behavior as strongly, or as automatically, as somatically experienced music would.
19. "Virtually all of your impressions of the auditory world come from the way in which [the eardrum] wiggles back and forth in response to air molecules hitting it" (Levitin, *This Is Your Brain on Music*, passim, p. 102).
20. Visual works no doubt have some relatively direct influence on viewers' physical states (if not their behavior). Certain colors may be exciting, or calming, for instance. Thanks to Richard Daniel Blim.
21. This probably would be an instance of 'empathy', in its original sense, when it was introduced into English as a translation of *Einfühlung*. Cf. Theodor Lipps, *Ästhetik* (Leipzig: Leopold Voss Verlag, 1903). Vernon Lee, *The Beautiful: An Introduction to Psychological Aesthetics* (Cambridge: Cambridge University Press, 1913).
22. Cf. Gregory Currie, 'Empathy for Objects', in Peter Goldie and Amy Coplan (eds.), *Empathy: Philosophical and Psychological Perspectives* (Oxford: Oxford University Press, forthcoming); Barbara Montero, 'Proprioception as an Aesthetic Sense', *The Journal of Aesthetics and Art*

Criticism 64/2 (2006), 231–42; Richard Shusterman, 'Somaesthetics: A Disciplinary Proposal', *The Journal of Aesthetics and Art Criticism* 57/3 (1999), 299–314; Kendall Walton, 'Projectivism, Empathy, and Musical Tension', *Philosophical Topics* 26/1&2 (1999), § IX.

23. Levitin, *This Is Your Brain on Music*, passim, p. 172.

24. This essay benefited from helpful observations by Alicyn Warren.

9 Objective Music

Traditions of Soundmaking without Human Expression

Federico Celestini and Andreas Dorschel

Is this music? Is it still music? Such questions presuppose that there is *one* feature or set of features that has to be in place if something were to count as music. That feature is then meant to be music's essence. Some electronic music has met essentialist misgivings: 'This is not music any more: it does not *express* anything'. Methodically, there can be at least two approaches to such an objection, one philosophical and the other historical. On the one hand, one could try to settle by way of conceptual analysis whether being expressive is in any sense of the word essential to music or not. We do not wish to establish here whether such an approach would or could be fruitful. Rather, we take a historical route: whatever a philosophy of music says, we should be able to find out whether human expression *has been* essential to music (in our tradition) or not.[1] To this question we wish to suggest an answer in the negative. As evidence, we shall present three instances of what, lacking a better term, we shall call 'objective music'—in other words, musical processes not unfolding from human subjectivity. We shall exemplify objective music by (1) *musica mundana*, (2) the Aeolian harp, (3) white noise (*Rauschen*). With a few qualifications, we shall conclude our argument (4). *Pace* the alternative set out before between a philosophical and a historical approach, the latter may entail a philosophical stance as well: recognizing the validity of *different* traditions in music.

MUSICA MUNDANA

Music played some role in ancient philosophy. Plato, in the *Republic*, notably ruled out certain modes and metrical patterns as a danger to virtue. Yet this hardly amounts to a systematic philosophy of music, nor would such a label fit anything Aristotle set out in his *Poetics*, or the Hellenistic philosophers—the Stoics, Epicureans, and Sceptics—in their treatises. It is rather striking that the most thorough treatment of music in ancient philosophy was delivered at the very close of ancient culture, in the sixth century—by Boëthius in *De institutione musica*. And, in a way, that may be exactly what we should expect. After all, Christianity conquered the pagan culture of outwardness by a culture of inwardness. Consequently, if music is the 'language of the soul', Christians would have had to position it prominently. As—to quote St Paul—'faith, love, and hope' are the most important features in man, music should be ready to express them.

But is Boëthius's *De institutione musica* really about that? Our expectation in place, we are struck by the fact that the author considers music's *primary* being as outward as it can be: it is out there in the universe, a cosmic phenomenon. In pedagogical fashion Boëthius presents *musica instrumentalis*, being nearer to us, before he moves on to *musica mundana*,[2] the heavenly harmony. Yet there is not a moment's doubt that the latter forms the perfect eternal model and the former an imperfect finite copy. Boëthius's *musica mundana* is firmly set on Pythagorean tracks.[3] Harmonical relationships among the planets, so the story goes, are governed by their respective speeds and thus by numerical proportions. Harmony is not a matter of whether we derive pleasure from what we hear, but a matter of *rationes*—that is, of mathematical data.

We may be led to believe that *musica mundana* was rendered irrelevant as soon as astronomy became scientific, following the discoveries of Copernicus. But, rather, the new astronomy of the sixteenth and seventeenth centuries kept celestial music in a central place. Its preserved eminence was monumentally testified by Johannes Kepler in his *Harmonices mundi* of 1619. Among seventeenth- and eighteenth-century musicians of some sophistication, Boëthius's threefold division of *musica mundana* (or, as it was called later, 'musica coelestis'),[4] *musica humana*, and *musica instrumentalis* was considered basic—a commonplace—and scholars as well as composers of higher sophistication found in Kepler's harmony of the world an innovative rendering of the ancient idea.[5]

One of these scholars was Lorenz Christoph Mizler (1711–78).[6] Mizler had set up a *Correspondierende Societät der musikalischen Wissenschaften* that existed from 1738 to 1761. As secretary to that academy, Mizler bore the name Pythagoras.[7] Within a quadrangle of philosophy, mathematics, astronomy, and music, Mizler's arcane society was committed to Pythagorean principles. In June 1747, while working on his *Musicalisches Opfer*, Johann Sebastian Bach was allowed to join

the ranks of that highly exclusive club—only the fourteenth member accepted over a ten-year period of existence. Mizler then circulated the *Musicalisches Opfer* right away in the correspondence of his society.[8] It had proven worthy of its fellows' modernized—heliocentric—version of celestial harmony. The three fascicles into which Bach divided the original 1747 print of his *Musicalisches Opfer* correspond to the tripartite music of Boëthius, interpreting Boëthian cosmic music in Keplerian fashion. Andreas Werckmeister's writings had made Bach thoroughly acquainted with Kepler's idea of world harmony.[9] Hence the analogy between Bach's *Musicalisches Opfer* and Kepler's *Harmonices mundi* is precise: the five numbered 'Canones diversi super Thema Regium' correspond to Kepler's five planets (Saturn, Jupiter, Mars, Venus, Mercury), the 'Fuga canonica in Epidiapente' to the planet Earth, the 'Canon à 2' to the Moon, and the 'Canon à 4' to the Sun.[10]

As long as art was understood as *mimēsis*, as imitation of nature—from classical antiquity up to the eighteenth century—an ambitious project for music on earth had to be to approach the music of the heavens. The order of the planets, Boëthius had said, sets a paradigm for the order of strings on human musical instruments. The lyre of Orpheus possessed four strings "by way of imitation of the cosmic music which consists of four elements" (*ad imitationem scilicet musicæ mundanæ, quæ ex quatuor* [*sic*] *constat elementis*); after adding a fifth and a sixth string, finally a seventh was put in place "according to the similarity to the seven planets" (*secundum septem scilicet planetarum similitudinem*).[11] The order of the strings Boëthius had called "as it were a copy of the heavenly order and division" (*quasi quoddam ordinis disjunctionisque cœlestis exemplar*); the string called 'nete', for instance, he had argued, follows the example set by the circle of the moon (*nete autem Lunaris circuli tenet exemplum*).[12]

This form of reasoning could then be transferred from the craft of constructing musical instruments to the craft of musical composition. In book V of his *Harmonices mundi*,[13] Kepler directly turned to the composers of his time, asking them to write six-part motets that would let us imagine the polyphonic music of what Kepler considered the complete set of planets—that is, the following six: Saturn, Jupiter, Mars, Venus, Mercury, and Earth. The fugues and canons from Sebastian Bach's *Musicalisches Opfer* form a late response to this request.[14] Whoever makes this music a medium of expression will distort it. For Kepler's vision of the universe aims at the pinnacle of objectivism:

> My aim is to show that the heavenly machinery is not to be conceived of as a divine organism, but rather as clockwork (whoever believes a clockwork to be alive shifts the artist's glory onto the work); as nearly all the manifold movements depend on the one quite simple magnetic force of bodies, in the same way all movements in a clockwork depend on the one quite simple clock-weight. And I teach to make this physical argument in terms of arithmetics and geometry.

Scopus meus hic est, ut Caelestem machinam dicam non esse instar divinj animalis, sed instar horologij (·qui horologium credit esse animatum, is gloriam artificis tribuit operj·), ut in qua penè omnis motuum varietas ab una simplicissima vi magnetica corporalj, utj in horologio motus omnes a simplicissimo pondere. Et doceo hanc rationem physicam sub numeros et geometriam vocare.[15]

Music that mirrors such a universe will itself be objective. Humans, no doubt, are emotional beings. Yet such music does not set the stage for them to express themselves.

AEOLIAN HARPS

Aeolian harps are string instruments that stand out by one distinctive feature: rather than a human performer, nature itself—the wind—plays on them. Hence their name: Aeolus is the god of the winds. The sounds Aeolian harps produce depend on the velocity and direction of the wind. Breezes and gushes do not express anything. Yet the etheric music that ensues from Aeolian harps is intriguing. Quite plausibly, it has been compared to electronic music.[16]

As we consider expression to be rooted in subjectivity, sound production that lacks human intervention will be perceived as non-expressive. Such is our perception of sounds made by music machines or automata. In fact, the Jesuit scholar Athanasius Kircher (1602–80) called the Aeolian harp 'Machina harmonica Automata',[17] and this designation does not appear far-fetched. Yet the case of Aeolian harps *is* different from music machines or automata. Unlike mechanical music, that of Aeolian harps defies calculation.[18] It is unpredictable, irregular as the wind that produces it. Strikingly, it shares this feature with expressive music, indeed with expression in general. A smile that becomes predictable is no longer perceived as expressive of, say, friendly feelings, but rather, for instance, as frozen—a mask. There has to be something unpredictable—something spontaneous—about expression, yet not everything that is unpredictable will be expressive. In fact, the music of Aeolian harps will often be even *less* predictable than composed works—music that we know to follow forms such as rondo, sonata, or theme with variations. Yet this does not render Aeolian music more expressive or even expressive at all—not even quasi-expressive. An Aeolian harp's sounds hold listeners' attention very much like waves may hold viewers' attention for hours as they roll over the beach: they are never the same. Such events are contemplated, and their contemplation is intensified by the fact that no manipulation, no intentionality and subjectivity, is involved in their production.[19]

Yet again we need to distinguish. The waves on the beach may be purely natural effects. The Aeolian harp, by way of contrast, is a product of human craft. Those who made it, however, arranged mere preconditions of music. They are not involved in manipulating the actual musical outcome on a given occasion. The outcome will depend on whether the weather is calm or stormy on a given day. Like sailors, we experience *luck*; but, unlike sailors, we contemplate rather than act. The tension between art in setting the preconditions and non-art: nature, in working out the actual result makes up part of the spell that these sound sculptures have so long exerted over the musical imagination. While we tend to see the mind as free and nature as determined, the music of Aeolian harps appears free precisely by virtue of nature. "The mind does not resemble an Aeolian harp", says Coleridge in his marginalia on Kant's *Critique of Pure Reason*;[20] for the mind constructs and acts where the Aeolian harp remains passive and receptive to nature. This instrument

fascinates not because it bears likeness to the mind, but because it differs from the mind. Unlike old-fashioned machines in their repetitive stupidity, however, Aeolian music is objective in an intriguing way—ordered perhaps, but in more complex ways than human subjectivity can grasp. This fact informs the actual aesthetic experience of such sounds; but it has also elevated the Aeolian harp to symbolic significance.

RAUSCHEN

The motive of *Rauschen* has been present in German poetry since the end of the eighteenth century. *Rauschen* can mean the rustling of leaves in a forest as well as the rushing of water in a creek, river, or sea, and also the whispering of wind. Forests and creeks are omnipresent in romantic poetry, but earlier occurrences of the *Rauschen* motive are already to be found in Goethe and Schiller, often in explicit connection with music.[21] In Goethe's ballad *Der Fischer* (*The Fisherman*, 1778), the association between *Rauschen* and music is established by the singing of a mermaid, who tempts the fisherman to follow her into the water. In this poem, the erotic implications of this temptation are explored, evoking death in the last strophe:

> The water rustled, the water rose,
> wetting his naked foot;
> his heart swelled full of longing
> as though his beloved had called.
> She spoke to him, she sang to him;
> and then it was all over:
> half she drew him, half he sank in
> and never was seen again.

> *Das Wasser rauscht', das Wasser schwoll,*
> *Netzt' ihm den nackten Fuß;*
> *Sein Herz wuchs ihm so sehnsuchtsvoll*
> *Wie bei der Liebsten Gruß.*
> *Sie sprach zu ihm, sie sang zu ihm;*
> *Da wars um ihn geschehn:*
> *Halb zog sie ihn, halb sank er hin*
> *Und ward nicht mehr gesehn.*

This theme, clearly derived from the sirens' episode in the twelfth book of the *Odyssey*, forms the basis of the Lorelei legend and is present in E. T. A. Hoffmann's opera *Undine* (from a fairy-tale novelette by Friedrich de la Motte-Fouquée) as well as in several poems of Wilhelm Müller, Joseph von Eichendorff, and Heinrich Heine.[22] Although *Rauschen* is an acoustic phenomenon, it is mainly through poetry that it finds its way into the music of the time, namely in several songs of composers such as Schubert and Schumann. A very powerful, fully orchestral *Rauschen* is evoked by Richard Wagner in the Introduction to *Rheingold*.

As in Schubert's song cycle *Die schöne Müllerin*, the rushing water depicts both the origins and the end of the story in Wagner's tetralogy.

From a cultural historical point of view, the emergence of *Rauschen* in German poetry is connected with a general revaluation of sensorial perception, finding perhaps its most important manifestation in Alexander Gottlieb Baumgarten's work *Aesthetica*, published in the mid-eighteenth century. This revaluation of perception in comparison to rational knowledge is also related to an enhanced appreciation of the sense of hearing. Johann Gottfried Herder's aesthetics clearly demonstrate an acoustic predominance.

The phenomenon of *Rauschen* arises through the combination of many single oscillations, such that no particular aural event may be perceived. According to Novalis, this indetermination causes a transition from perception to imagination. He considered this transition to be the essence of poetry. Only a few years before Novalis, Tieck and Wackenroder claimed the category of indetermination to be central to aesthetic experience; Jean-Jacques Rousseau had considered it a fault in instrumental music. Along the same lines, Johann Georg Sulzer, the editor of the influential dictionary on arts *Allgemeine Theorie der schönen Künste*, defined concertos, symphonies, and sonatas as a "vivacious and not disagreeable noise [*Geräusch*]".[23] The reassessment of aesthetic values by the early romantics is impressive: exactly that which was regarded as a deficiency in instrumental music, namely its indetermination, became the true essence of poetry and arts. Consequently, instrumental music became the ideal form of the arts.[24]

The perception of *Rauschen* is an encounter with formless reality, in which the dissolution of the object of perception corresponds to the dissolution of perception itself. Thus, through the experience of *Rauschen*, the listener (the hearing subject) experiences the borders of perception.[25] *Rauschen*, in its formlessness, does not contradict the arts. Rather, it is a requirement for their very existence. This dialectic is demonstrated by mythological and poetic images in which the singing of sirens and nixies originates, like Venus, from the rushing of water. The intriguing relationship between formless *Rauschen* and the beauty of forms is also demonstrated by the correlation between marginal arabesques and the central figures in ancient Roman painting. Goethe described one such example he saw in Pompeii during his journey to Italy.[26] *Rauschen* and arabesque are analogous phenomena in the respective fields of hearing and sight, as they provide the perception with the fascinating experience of formless forms. Therefore, it is no coincidence that romantic aestheticians were greatly attracted to both of them.

If we think of *Rauschen* in terms of objectivity, we soon arrive at a paradox. *Rauschen*, unable to convey subjective expression, is equally lacking a distinct object for its perception. Thus, we are engaged with a type of enigmatic objectivity in which the object dissolves. In a similar way, we usually associate singing with expression. But what sort of expression is transmitted by the singing of sirens? Can they be considered to be subjects? There is a mirroring similarity between *Rauschen* as objectivity without an object and sirens singing as expression without

a subject.

While composers of the nineteenth century were concerned with giving compositional form to the transition from *Rauschen* to music, Hermann von Helmholtz, in his *Lehre von den Tonempfindungen*, published in 1863, attempted to establish a clear distinction between sound and noise. With the invention of the first electromechanical devices only few years later, the spectrum of *Rauschen* in auditory culture attained new dimensions. When the protagonist of Thomas Mann's novel *Der Zauberberg*, Hans Kastorp, listens to a record of Schubert's 'Der Lindenbaum' on a primitive noisy gramophone from the early twentieth century, he staged a symbolic encounter between the poetic *Rauschen* of the romantic era and the modern *Rauschen* of the recording age.

The relationship between *Rauschen* and the arts is particularly productive in electronic music, as white noise, together with sine tones and impulses, constitutes the fundamental trinity of electronic material. Furthermore, through radio telescopes we can listen to the *Rauschen* of the universe, a sort of cosmic arabesque, a primeval vibration which, defying any particular form, allows for the production of forms. Maybe this is the sound of spherical harmony in the electronic era?

Yet *Rauschen* is not only a cosmic phenomenon; it also has a human dimension, corresponding to Boëthius's *musica humana*. John Cage discovered this dimension in 1951, when he first entered the so-called 'anechoic chamber'—that is, a completely acoustically isolated environment. This experience deeply influenced Cage's thinking about silence, and led to his famous work *4'33"*, which had its world premiere on August 29, 1952. In the anechoic chamber, Cage recognized that the real form of silence is *Rauschen*.[27] In the absolute absence of sound, he could listen to the rushing of his own blood and nervous system—that is, the *Rauschen* of the body.

CONCLUSION

In response to our line of argument, the position it responds to may be set out anew: perhaps expression is not essential to music rather than accidental, but it certainly is central rather than peripheral. 'Objective music', as we have called it, would then, by way of implication, have to be considered peripheral rather than central.

Yet that is not altogether credible either. For, in the Middle Ages, *musica mundana* was considered normative with regard to *musica instrumentalis*, as nature was considered normative with regard to art. And norms are central to the practices they govern. The 'harmony of the spheres' played a key rôle in making sense of the emergent polyphony from the ninth century onwards.[28] Aeolian harps, by way of contrast, may well look like mere curiosities. As regards the actual apparatus in its technical varieties, there is some truth in that judgement. Nonetheless, the Aeolian harp constituted one of the most powerful *symbols* of "Nature's music"[29] in Western musical history. In relation to the music of the planets, the Aeolian harp poses the complementary and equally important aspect of nature: nature insofar as it is incalculable contrasted to nature as subject of reckoning in terms of rational proportions. Again, *Rauschen* is not only crucial to an understanding of composers at the centre of the present repertoire as Schubert, Wagner, Bruckner, Mahler, and Strauss, but also makes up an important aesthetic link between romanticism and modernism. With essence and accident one may surely evade history. Centre and periphery, however, must be conceived of as historical categories. Music history is a process of ongoing centralization of certain aspects and marginalization of others—such as music's 'expressive' and 'objective' aspects.

By way of objection to the line of argument set out in this paper, it may also be argued that we are prone to underrate the expressivity of any past music. As values change over time, emotional attitudes change, too; they are simply less well preserved than mathematical structures. Our access to the Pythagorean theorem is straightforward, yet the awe and wonder Pythagoras may have felt towards the music of the spheres is lost on us. So much seems fair enough. Yet there is also sufficient evidence that there have been and possibly are musical traditions committed to something different from the expression of human emotion. That this something—nature, for instance, or the order of the universe—has been considered actually *grander* than human emotion has not to be endorsed by us when we approach such traditions as historians. Rather, the point is to realize that they aimed at something *different*. Such a claim does not imply that traditions of objective music existed or exist in purity. Actually, nothing in cultural history may ever be pure. All the time, traditions blend and mix in ways beyond control. Yet the purpose of analysis in the humanities is not to make claims about separateness of cultural

phenomena, but rather to distinguish relevant aspects of them. In this modest way we believe the distinction between objective music and expressive music to be a valid one—at least from the perspective of music production.

NOTES

1. For a classic statement to that effect, see Ernst Theodor Amadeus Hoffmann, 'Die Automate' [1814], in Hartmut Steinecke and Wulf Segebrecht (eds.), *Sämtliche Werke in sechs Bänden*, iv. (Frankfurt a. M.: Deutscher Klassiker Verlag, 2001), 396–429, 419: "Der größte Vorwurf, den man dem Musiker macht, ist, daß er ohne Ausdruck spiele, da er dadurch eben dem eigentlichen Wesen der Musik schadet, oder vielmehr in der Musik die Musik vernichtet, und doch wird der geist- und empfindungs loseste Spieler noch immer mehr leisten als die vollkommenste Maschine, da es nicht denkbar ist, daß nicht irgend einmal eine augenblickliche Anregung aus dem Innern auf sein Spiel wirken sollte, welches natürlicherweise bei der Maschine nie der Fall sein kann". The passage, drawn from a piece of fiction where it is uttered by a character called Ludwig, should of course not be attributed to the author Hoffmann.
2. Boëthius [Anicius Manlius Severinus Boëthius], *De institutione musica* [around 500], 1.2, *Patrologia Latina*, 63, ed. Jean-Paul Migne (Paris: Garnier, 1847), 1167–1300, 1171.
3. Cf. the legend of Pythagoras in the smithy, ibid., 1.10–11, pp. 1176–7.
4. The terms are equivalent in the treatise *De harmonia institutione* by Regino of Prüm (around 900). Some later authors, such as Aegidius Zamorensis in the thirteenth century, used 'musica coelestis' for the real sounds of the spheres and 'musica mundana' for their conceptual relata, the objects of rational speculation. Reinhold Hammerstein, *Die Musik der Engel. Untersuchungen zur Musikanschauung des Mittelalters* (Bern/Munich: Francke, 1962), 128.
5. Michael Dickreiter, *Der Musiktheoretiker Johannes Kepler* (Neue Heidelberger Studien zur Musikwissenschaft 5, Bern/Munich: Francke, 1973).
6. Hans-Eberhard Dentler, *Johann Sebastian Bachs "Musicalisches Opfer". Musik als Abbild der Sphärenharmonie* (Mainz/London/Berlin: Schott, 2008), 81.
7. Ibid., p. 31.
8. Ibid., pp. 30, 81.
9. Ibid., pp. 87–93.
10. Ibid., pp. 58–65.
11. Boëthius, *De institutione musica*, 1.20, p. 1183.
12. Ibid., 1.27, p. 1192.
13. Johannes Kepler, *Harmonices mundi* (Linz: Tampach, 1619), p. 208.
14. Dentler, *Bachs "Musicalisches Opfer"*, pp. 61, 137.
15. Johannes Kepler, 'Letter to Herwart von Hohenburg, 10 February 1605',

in Walther van Dyck and Max Caspar (eds.), *Gesammelte Werke*, xv. (Munich: Beck, 1951), 145–7; 146.

16. Mins Minssen, Georg Krieger, Erich Bäuerle, et al., *Äolsharfen: der Wind als Musikant* (Frankfurt a. M.: Bochinsky, 1997), 7; track 4 of the audio CD attached to the book exemplifies the claim.

17. Athanasius Kircher, *Musurgia universalis sive ars magna consoni et dissoni*, ii. (Rome: Corbelletti, 1650), 352–3; cf. Athanasius Kircher, *Phonurgia nova sive conjugium mechanico-physicum artis & naturae paranympha phonosophia concinnatum* (Kempten: Dreherr, 1673), 143–6.

18. Ulrike Kienzle, 'Der Meeresklavierspieler. Max Klingers Graphik *Accorde* und ihre musikästhetischen Implikationen', in Peter Ackermann, Ulrike Kienzle, and Adolf Nowak (eds.), *Festschrift für Winfried Kirsch zum 65. Geburtstag* (Tutzing: Schneider, 1996), 386–413, 400.

19. Georg Christoph Lichtenberg, 'Von der Aeolus-Harfe' ['The Aeolian Harp'] [1792], trans. Maynard Schwabe, in Stephen Bonner (ed.), *Aeolian Harp: The History and Organology of the Aeolian Harp*, ii. (Duxford, Cambridge: Bois de Boulogne, 1970), 83–5, 84.

20. As quoted in Meyer H. Abrams, *The Mirror and the Lamp: Romantic Theory and the Critical Tradition* (New York: Oxford University Press, 1953), 346, cf. 61.

21. Early connections between the phenomena of natural *Rauschen* and music may be found in ancient pastoral poetry. See, for instance, the beginning of Theocritus's first Idyll (approximately 270 BC). According to Lucretius, the whispering of the wind in the canes 'instructed' the shepherd to blow into the syrinx (*De rerum natura*, book v., lines 1382 *f.*).

22. Federico Celestini, 'The Acoustic Proximity of Temporal Distance: Auratic Sonority in Mahler's *Lieder eines fahrenden Gesellen*', in Melania Bucciarelli and Berta Joncus (eds.), *Music as Social and Cultural Practice: Essays in Honour of Reinhard Strohm* (Woodbridge: Boydell, 2007), 355–73.

23. Johann Georg Sulzer, *Allgemeine Theorie der schönen Künste*, iii. (2nd edn., Leipzig: Weidmann, 1793, reprint Hildesheim: Olms, 1969), 431 *f.*

24. Federico Celestini, 'Schuberts Rauschen. Eine Verwandlung', in Barbara Boisits and Cornelia Szabó-Knotik (eds.), *Sapienti numquam sat: Rudolf Flotzinger zum 70. Geburtstag* (Vienna: Mille-Tre, 2009), 51–60.

25. Martin Seel, 'Über das Rauschen innerhalb und außerhalb der Kunst', in Otto Kolleritsch (ed.), *"Laß singen, Gesell, laß rauschen ... ". Zur Ästhetik und Anästhetik der Musik* (Studien zur Wertungsforschung 32, Vienna and Graz: Universal Edition, 1997), 70–94; 77 *f.*

26. Johann Wolfgang von Goethe, 'Von Arabesken', in *id.*, *Schriften zur Kunst* ii., ed. Wolfgang von Löhneysen (*Gesamtausgabe der Werke und Schriften*, xvii., Stuttgart: Cotta, 1962), 74–8.

27. Christian Scheib, 'Die indiskrete Arbeit am Realen. Das Rauschen ist die

Musik', in Sabine Sanio and Christian Scheib (eds.), *Das Rauschen. Aufsätze zu einem Themenschwerpunkt im Rahmen des Festivals musikprotokoll '95 im steirischen herbst* (Hofheim: Wolke, 1995), 67–80, 68 *f*.

28. Stefan Kunze, 'Harmonie der Sphären—Harmonie der Musik' [1980], in *id*., *De musica: Ausgewählte Aufsätze und Vorträge*, ed. Rudolf Bockholdt (Tutzing: Schneider, 1998), 1–18; 10–11.

29. Robert Bloomfield, *Nature's Music. Consisting of Extracts from Several Authors; with Practical Observations, and Poetical Testimonies, in Honour of the Harp of Æolus* (London: J. Swan, 1808).

Part III

… Electronic Music

10 Embodied Generative Music

Gerhard Eckel

INTRODUCTION

Embodied generative music (EGM) is a compositional approach developed in the context of an artistic and scholarly research project carrying the same name.[1] The project had two complementary objectives. On the one hand, it aimed at furthering the understanding of the relationship between musical and bodily expression. Music philosopher Deniz Peters investigated this aspect from an aesthetic perspective as documented, amongst other publications, in his contribution to this volume. On the other hand, the project developed and explored a new kind of intermedial artistic expression, an embodied form of generative music. This is the project's poïetic perspective as developed by the author in cooperation with the composer and researcher David Pirrò. The present chapter concentrates on the latter poïetic perspective, which—on a more general level—concerns itself with expanding the artistic possibilities of electronic music composition (using the term 'composition' in a widened sense, to include collaborative means of composition and coauthorship, and to regard an algorithm as an alternative to—and not a precursor of—a score).

GENERATIVE MUSIC

Before concentrating on embodied generative music, I would like to focus on a particular notion of the broader genre of generative music which forms the basis for the EGM approach. This notion shares many features with what is commonly understood by 'generative art' and 'algorithmic composition', but there are also significant differences. A generative artwork is usually produced through an autonomous process driven by an algorithm the artist conceives. An algorithm is a finite sequence of instructions intended to solve a particular problem. Once the process defined by the algorithm has started, no further significant human intervention with the process is required. This compositional method is partly motivated by desiring to reduce the influence of an artist's intentionality in the creation of art. It may also be regarded as a means to transcend the horizon of artistic imagination—similarly to the introduction of chance operations in creation. In the field of music, related compositional approaches can be found in John Cage's work—for instance, in the first four pieces of his *Variations* series, which he wrote between 1958 and 1963. For those pieces the performer produces the score prior to each performance according to the composer's algorithm as represented in natural language. Such an approach incurs a significant shift in the division of labor between composers and performers, typical also for EGM.

In algorithmic composition of the instrumental type, algorithms are—at least nowadays—implemented by composers as computer programs, and serve to produce a score. The score is then interpreted by human performers. In this case the compositional task can be viewed as a modeling task, as found in scientific modeling. There, computer modeling techniques are used to understand and predict the dynamics of complex systems, such as in weather forecasting. Unlike in scientific modeling, the musical model given in algorithmic composition is not used to explain empirical data or predict the dynamics of complex systems; rather, it is used to *generate* the dynamics determining the way a system evolves over time. From this perspective it can be said that the model in the case of algorithmic composition has more of a poïetical than an epistemological function.

When algorithmic composition is combined with sound generation—either by digital sound synthesis and sound diffusion via loudspeakers, or through computer-controllable mechanical instruments such as a self-playing piano—the composer may listen to the intermediate results of the composition process. The production situation created thus is completely different from the traditional one. (Traditionally, the composer produces a score, which is only accessible through inner hearing during the composition process—to the extent the complexity of the score and the imagination of the composer allow.) The particular action-perception loop enabled by combining algorithmic composition with sound generation became a new creative tool in the compositional process.

The degree of temporal tightness of the thus introduced feedback is of central relevance for the kind of generative music I am trying to characterize. To a certain degree, a similar action-perception loop can be identified in the classical case. There the feedback loop occurs once the composer listens to the piece in the rehearsals prior to the premiere. This feedback will certainly inform future compositional actions, but usually not affect the work being premiered. For the kind of generative music described here, which could be called an 'interactive generative music', it is essential that the audible consequences of a compositional action—typically involving changes on a certain level of the music model—can be perceived as soon as this action leaves a trace in the music being produced in real time. This allows the composer to actually *perform* certain aspects of the music in the process of being composed. This 'performance' is an experimental, improvisational, explorative kind of performance, typically carried out alone in the studio.

There are certain technological conditions that have to be met in order to realize such a tight feedback loop and it is only recently that computer hard- and software have become elaborate enough for this. In the early days of electronic music, the manual realization of a composition using sound generators, filters, and tape operations could take several months. After more than half a century of development in electronic music, simple music models can today be instantiated on mobile computing devices. A prominent example is *Bloom*, created in 2008 by Brian Eno and Peter Chilvers. *Bloom* is a generative music composition for Apple's iPod. It is also an example of interactive generative music, as the listener may influence the unfolding of the music through an interface—in this case the iPod's touch screen. *Bloom* can be used in two modes. In 'listen' mode, it works autonomously; in 'create' mode it reacts to the listener's input. This example illustrates that the traditional roles of the composer, performer, and listener no longer apply in the case of a piece of generative music.

An interactive generative music practice further transforms the categories of 'composition', 'work', 'instrument', 'interpretation', and 'performance'. For example, the possibility of performing certain aspects of a generative music model has different implications for the composition and the reception of the music. The performer becomes a component of the model and may therefore interact with any other component. For the composer, the possibility of changing the musical process intuitively in an explorative interaction with the model is attractive, as these changes do *not* need to be formalized but may be performed—only the possibility of interaction has to be prepared in the model. If the composer has foreseen a possibility for the listener to interact with the model, the listener may then customize the piece, adapt it to the listening situation, explore it playfully, or use the model as an instrument, not only producing sound but also allowing the shaping of structure and direct form—incurring a significant shift in the notion 'instrument'.

From what has been said so far, we may characterize generative music as resulting from a musical process[2] conceived by the composer in algorithmic form.

This process is represented by a computer model created as part of the compositional work. The model describes the dynamics of the music—that is to say, how the music unfolds in time. Models may be conceived such that each instantiation of them leads to a different—potentially infinite—musical process, thus again widening traditional notions of form and work.

In my own artistic practice the generative music approach began to play a role in the early 1990s, when hard- and software technology had advanced sufficiently to enable the realization of interactive music models. In my sound installation *en face* from 1993 I used the possibility of interaction with the model in the compositional process only. The installation evolved autonomously, without any performer or audience intervention. But the possibility of improvising with the model soon created the desire to do so not only in the studio while composing but also on stage in a performance setting.

My first attempt in this direction resulted in a structured improvisation piece called *Traverse* from 1999, which I developed in cooperation with the viola player Vincent Royer, and with whom I shared the stage playing a generative music model on a laptop computer, using a mouse, a computer keyboard, and a foot pedal as interfaces. The experience of creating, rehearsing, recording, and performing this piece many times triggered my wish for an embodied form of interactive generative music.

Figure 10.1 Valentina Moar *dancing the sound* in the EGM intangible instrument (photo: Gerhard Eckel).

The difference in the degree of embodiment achievable with the two disparate instruments in *Traverse*—the viola and the laptop—was obvious for performers and audience. I see two main reasons for this difference, one linked to the interface and the other to the particular kind of computer instrument. The keyboard, mouse, and foot pedal allow only for a very limited bodily engagement with the music model. Compared to the viola, the subtlety and range of control over the sound production is very restricted—it is basically reduced to triggering sound samples. The fact that the music model does not only produce individual sound events but whole sound gestures and textures, a characteristic uncommon in traditional music instruments, compensates for this limitation to an extent. The elements of the complex sound structures were not played directly but rather shaped or steered with the mouse and the pedal. The piece had been rehearsed in depth, and much of the compositional work actually happened in these rehearsals by adapting the music model to performance requirements. Although I managed to improve my technique as a music model performer on my laptop, I started to see the interest of having professional performers actually *play* the music model.

This was motivated by the desire that human agency would gain more importance in the performance of computer music, with interpretation becoming an essential part of generative music practice more often. What was not obvious at this point was what 'playing' might mean in this context. And this is how many years

later the central artistic research question of the Embodied Generative Music project could be formulated as: ‘how can a generative music model be played by an onstage performer?’

EMBODIED GENERATIVE MUSIC

Very early in the process of conceiving a project to answer this question, I decided to rely on dance performers as partners in this endeavor. Their highly refined kinaesthetic intelligence puts them into an ideal position to help developing artistic solutions to the said problem. The perceptual appreciation of the dancing body seems to gain its strength and fascination from the audience's innate capacity to empathize with it—potentially creating an intense bodily resonance, a strong quality the project was thought to draw on. The rich evolution of the dance-music relationship in the twentieth century also provided a motivation to investigate yet another new possibility: here, it is the dancer who creates or shapes the music through the dance—an unusual situation compared to the traditional dance-music relationship, where the dance does not create but follows the music.

In the context of the project a pool of dancers[3] was formed with whom the project team[4] conducted a series of aesthetic experiments in a research infrastructure called the Aesthetic Lab. Most of the experiments carried out in the Aesthetic Lab were based on a condition which may be called 'instrumental'. In the simplest case, a certain movement of a certain body part at a certain location in space would consistently produce a sound of a certain quality; in other words, the dancer is moving in an invisible sonic topography. Using different sound materials and sound-generation strategies, the possibilities of this instrumental condition were explored in order to develop a basic understanding of sensible movement-sound relationships and their articulatory properties. The experiments showed clearly that dancers, once accustomed to particular movement-sound relationships, could engage in—and sustain—an intermedial performance addressing both musical and bodily articulation, while acknowledging a strong interaction between the two. In a sense they became musician-dancers playing an unusual type of intangible instrument[5] through their dance—they *dance the sound*.

The experiments in the Aesthetic Lab also showed that the dancer's body may extend into the sound-generation process in a way similar to the musician's body extending into the instrument—a phenomenon I refer to as 'embodiment'. This was a main result of a first set of experiments, which were based on the direct or immediate movement-sound relationship of the *instrumental* condition. These findings also led to a hypothesis about what else playing a generative music model may involve—the *structural* condition, where the relationship between movement and sound is not immediate but mediated and deferred in time. The hypothesis states that playing a generative music model has to allow for the dancer's body to extend into the music-generation process in a way analogous to the performer's body extending into the sound-generation process.

A closer look at this analogy reveals that playing implies being part of a 'system'—the body extended into the instrument—and being an agent in a system,

capable of feeling, perceiving, and grasping the dynamics of the system, the way it reacts to being acted upon.[6] In the case of an acoustic instrument, musicians become aware of the constraints of the physical system through touch and sound. Through practising they learn to control and predict the instrument's dynamics until they can imagine precisely the sound that will be created by a particular action—a process by which they deepen their embodiment of the instrument. They build kinaesthetic knowledge, ingrain motion sequences in their body memory, and react to affordances of the instrument.

In the context of the EGM project it could be shown that this also works without actually touching a physical instrument (through motion-tracked dance), with sound synthesis and composed dynamics—as opposed to the physical dynamics shaped by the traditional instrument maker. An important remaining question is if we can also take the next major step—finding a way for the performer not only to dance *the sound* but to dance *the music*—that is, the *music model*. As our research approaching this central goal was moving into uncharted terrain, we decided to advance slowly, only taking little steps at a time—also in order to take the time to better comprehend each of them.

EXPERIMENT

An example for one of these steps was an experiment with what we so far consider to be the simplest case of going beyond the instrumental condition. In this experiment the sound produced as a function of the dancer's movement does not become audible immediately but only after a delay of a few seconds—thus hinting at an imagined agency mediating between action and reaction. With this experiment we created a 'mediated case', or structural condition, mentioned earlier. One consequence of this simple system is that the dancer dances to the sounds his or her own movement has created in the past. And while the dancer is moving with these sounds, new ones are created, to become audible subsequently. The sonic trace of the movement functions as a motion memory—a pointer into the past—and the awareness of presently creating a yet inaudible sound gives rise to an expectation or projection—a pointer into the future. By dancing to the sonic consequences of one's past movements and by projecting sound into the future by one's current movement, the performer negotiates the structural genesis of the music, under the conditions of a simple, time-delay-based generative music model.

There is yet another aspect to this experiment. The delay time between movement and its sonic consequence is variable and inversely proportional to the speed: the faster the movement, the shorter the delay. When the dancer is moving slowly, a maximum delay occurs (e.g., 4s) and when moving fast, the resulting sound is audible immediately. Thus a performer can achieve a seamless transition between the instrumental and the structural condition by changing his or her speed of body movement.

The variation in the delay also introduces a pitch modulation to the sound that is linked directly to movement acceleration or deceleration, which is a consequence of using a delay with a variable delay time. When accelerating, the delayed sound is sped up and thus transposed upwards. The inverse occurs upon deceleration. Therefore the dancer's movement has both an immediate and a deferred consequence. Changing the speed of the movement immediately changes the speed at which the memorized sonic trace is played back, also stretching or compressing it in time. When the movement speeds up, the delayed playback catches up with the past and when it slows down the playback lingers over the sonic memory. Attempting to keep the speed constant will, after a transition phase, result in an unmodulated playback of the motion trace at a fixed delay time. The deferred consequence concerns the sonic trace itself, which depends on the dancer's location in an invisible sonic topography. This consequence is only perceived after the speed-dependent time, approaching immediacy at high speeds, when the delay time becomes zero.

What could potentially have been a rather confusing situation by the parties performing the experiment could actually be mastered by the dancers once they had

grasped the dynamics of the system with their bodies. Rationally it is very difficult to come to grips with the situation created in the experiment, while a sort of bodily 'intelligence' seems to provide the means to actually play and perform with it. The reason may be found in the consistency of the system, which makes it predictable—not necessarily to the mind, but apparently to the body. The result is a fascinating spectacle of identity and difference, past and future, correspondence and contingency.

CONCLUSION

The poïetic component of the EGM project developed the idea of an embodied form of generative music based on the notions of generative art, (interactive) generative music, and algorithmic composition. The artistic ambitions motivating the embodied generative music approach towards composition were introduced and put into perspective with respect to related practices in the first section of this chapter. The central findings of the artistic research efforts performed in the context of the EGM project led to the formulation of a new hypothesis about what playing a music model may involve. First steps in approaching the utopian artistic idea of 'dancing the music' (and not only 'dancing the sound') appear in the analysis and interpretation of the results of an experiment carried out with the "experimental system"[7] established in the EGM project, the Aesthetic Lab. This experiment led to a completely unexpected and unforeseeable result, reminding us of Goethe's dictum found at the end of his *Maxims and Reflections*: "We never go further than when we no longer know where we are going".[8] In this sense, the artistic research component of the EGM project helped pave the way for further artistic investigations also by having shown how a productive methodological framework may be developed. A follow-up project, called The Choreography of Sound,[9] has been based successfully on the Aesthetic Lab approach.

Figure 10.2 Valentina Moar working in the Aesthetic Lab (photo: Gerhard Eckel).

NOTES

1. The research project 'Embodied Generative Music: An Investigation of the Relation between Bodily and Musical Expression' (EGM), devised by Gerhard Eckel and Deniz Peters, was funded within the *Translational Research Program* of the Austrian Science Fund (FWF): L399, from September 2007 until May 2010. The Bodily Expression in Electronic Music symposium, which took place in Graz in November 2009 and in which most of the contributors to this volume participated, was part of the EGM project and was organized by Deniz Peters.
2. The process is called musical, because it is meant to engender music. The process is not the music and the music is not process music.
3. Magdalena Chowaniec, Alexander Deutinger, Alexander Gottfarb, Valentina Moar, Anna Nowak, and Jianan Qu.
4. Deniz Peters, David Pirrò, and the author.
5. As the musician-dancers are tracked with a camera-based motion-capture system and their movements are used to control a virtual instrument, this instrument provides only for auditory and not for tactile feedback.
6. Cf. the notion of composition as modeling the dynamics of a system introduced in the earlier section on 'Generative music', page 144.
7. I am referring to the notion of *Experimentalsystem* as developed by the German historian of science Hans-Jörg Rheinberger in his book *Experiment, Differenz, Schrift: Zur Geschichte epistemischer Dinge* (Marburg/Lahn: Basilisken-Presse, 1992).
8. As quoted in Rheinberger, *Experiment*, p. 56.
9. The artistic research project The Choreography of Sound by Gerhard Eckel and Ramón González-Arroyo has been granted funding within the *Program for Arts-based Research* (PEEK) of the Austrian Science Fund (FWF): AR41, starting in September 2010 for a period of 3 years.

11 Live Electronic Music or Living Electronic Music?

Simon Emmerson

WHAT IS ‘LIVE’?

In my article ‘ “Live” Versus “Real-Time” ’ of 1994,[1] I suggested that something had been lost in the apparent eclipse of the term ‘live’ by ‘real-time’ in the 1980s. While ‘live’ is embodied and essentially human, ‘real-time’ suggests the disembodied, the machine. I claim that the shift of the term ‘real-time’ into domains which are *essentially live* is invasive. I wish to argue that the reverse is true—we have an opportunity to *humanise the technology* and to *animate the technological world* through art and music made with technology. But, whatever my misgivings, increasingly the evidence for something ‘being performed live’ has shifted territory away from issues of *physical action* towards something we do not fully understand. Exactly what does ‘live’ mean any more?

Over a long period in the 1990s I came to change my views somewhat—or at least to see the question differently. ‘Live’ came to mean something more than just producing sound physically. I observed and listened to many performances at which humans were evidently manipulating technology to produce sound, taking decisions based on their own and their companions’ decisions. I concluded a more sophisticated model of ‘living presence’ in music performance was needed. Figure 11.1 is my ‘three-world’ view of this.[2]

Figure 11.1 ‘Living presence’.

The first world is that of ‘Physical presence—action and agency’. This is a world that embraces ecological listening. The world of sound gives us vital information for our survival. Listening to sounds we might be able to work out: What materials? What shape and size? How set going? What agency? Where? What kind of space?[3]

The second world involves psychological presence: we are also thinking beings and we know there may be other such beings that perhaps we cannot see but

believe to be influencing what we hear. We try to find out something about matters of *will, choice* and *intention*, which are important constituents of two of music's key metaphors: *game* and *narrative*. We try to follow the participants' choices and decisions in weaving a line through the forking paths.

Then there are entities that apparently have *no will, no choice* and *no intention*. This has been seen as the world of *inanimate* things and systems: for example, algorithms derived from organic, biological, physical, social and other systems. From this point of view it is the algorithm that is inanimate even if abstracted from an apparently animate origin. However, this view might be challenged—we will need more than a philosopher to help us decide at what point a computer programme displays the qualities of will, choice and intention which seem primarily animate. Alan Turing made a start—and we shall return to this below. These entities play an increasingly important part in recent 'live' electronic music.

Our third world wraps around the other two. It is one of personal and social presence, summed up in the phrases 'what you mean to me', 'where I am' and 'who I am with'. Humans are a balance of solitary and pack animals. Christopher Small argues in his book *Musicking* that "it is the relationships that it brings into existence in which the meaning of a musical performance lies".[4] This included performers, venue, audience and musical material. If performing 'icons' give the audience a buzz, a sense of occasion, isn't that part of the essential ritual? And this may certainly transform the sensation of the music.

THE WORLD AS MUSICAL INSTRUMENT

Reanimation of the Nonsentient World—Relocating the Live

The anthropologist Tim Ingold has often focused on minimising dualistic thinking:

> For life is not a principle that is separately installed inside individual organisms, and sets them in motion upon the stage of the inanimate. To the contrary … life is "a name for what is going on in the generative field within which organic forms are located and 'held in place' ".[5]

Thus living is a description of a behaviour, not a property of one object rather than another. We co-evolved with our environment; how we perceive it is a product of our, and its, evolution. Luke Windsor summarises Gibson:

> Rather than assuming that the sensations passed from the sense organs to the central nervous system represent a chaotic source of information that mental processes organise and store in the form of meaningful percepts and memories, the ecological approach assumes that the environment is highly structured and that organisms are directly 'sensitive' to such structure.[6]

The mimicking of environmental sounds is common in the sonic arts of many cultures. I have elsewhere distinguished *spectral* (timbral) from *syntactical* (behaviour) mimesis in electroacoustic music.[7] We have several important historical pointers to this. Here is Thoreau in the 'Sounds' section of *Walden*:

> At a sufficient distance over the woods this sound [bells] acquires a certain vibratory hum, as if the pine needles in the horizon were the strings of a harp which it swept. All sound heard at the greatest possible distance produces one and the same effect, a vibration of the universal lyre.[8]

Murray Schafer recognised this clearly in his conservationist approach and dislike of the industrial invasion of the soundspace.[9] For an apparently contrary view as held by the 'hard edge' of sonic art we must acknowledge the futurists:

> To convince ourselves of the amazing variety of noises, it is enough to think of the rumble of thunder, the whistle of the wind, the roar of the waterfall, the gurgling of a brook, the rustling of leaves, the clatter of a trotting horse …, and of the generous, solemn white breathing of a nocturnal city.[10]
>
> We will sing of the vibrant nightly fervour of arsenals and shipyards

> blazing with violent electric moons; … deep-chested locomotives whose wheels paw the tracks like the hooves of enormous steel horses bridled by tubing; and the sleek flight of planes whose propellers chatter in the wind like banners and seem to cheer like an enthusiastic crowd.[11]

The *behaviour* characteristics of such environmental events needed the application of statistics and more recent algorithms for systems analysis. Following Xenakis's famous description of a political demonstration and its temporal and spatial sonic evolution, he adds:

> The statistical laws of these events, separated from their political or moral context, are the same as those of the cicadas or the rain.[12]

Xenakis is clearly here in the second of our mimetic areas ('syntactical' or behavioural mimesis). These statistical laws can be generalised in their mathematical abstraction effecting, in Xenakis's view, some kind of higher truth.

> It [art and, above all, music] must aim through fixations which are landmarks to draw towards a total exaltation in which the individual mingles, losing his consciousness in a truth immediate, rare, enormous and perfect.[13]

This might represent the emergence of a musician as a kind of shaman: not representing the world but revealing it. Xenakis seems to suggest nothing less than an ecstasy (*ekstasis*) in the participant. Perhaps this constitutes a *reanimation* of the world.

DOES 'INTELLIGENT MUSIC' HAVE 'BODILY EXPRESSION' OR 'A BODY TO EXPRESS WITH'?

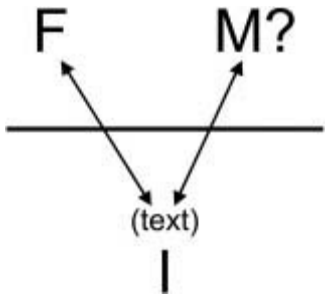
> But what is the essence of these [musical] materials? This essence is man's intelligence, in some way solidified. Intelligence which searches, questions, infers, reveals, foresees—on all levels. Music and the arts in general seem to be a necessary solidification, materialization of this intelligence.[14]

In the world of artificial-intelligence studies (to which live electronic music has a cautious relationship), Alan Turing was one of the first to establish a basic judgement criterion for machine intelligence. To summarise Turing's conclusion as it is most often given: if the responses of a machine were indistinguishable from those of an intelligent human, then the former might be said to be displaying intelligence. In this model only the observation of *responses* was pertinent to the question—it would not matter if the method of generating the responses was entirely different from those of the 'real' human. I will examine whether there might be parallels to Turing's criterion for the judgement of music—more specifically the judgement of musical performance—made with machines (computers).

The 'Imitation Game' (Alan Turing 1950)[15]

Alan Turing's famous game is usually badly paraphrased in the literature as simply 'if you cannot tell the difference between a human and a machine response then the machine is acting "intelligently" '—but it is a lot more subtle: an Interrogator (I) addresses two entities s/he cannot see; s/he is told one is Male (M) one Female (F). All communication is by exchange of written text. The Interrogator asks questions of the pair and must decide from their responses which is M or F (Figure 11.2). The M is instructed to be obstructive and may lie; the F is instructed to be helpful. The M's aim is to get the I to make a mistaken identification.

Figure 11.2 Turning's Imitation Game.



The Interrogator decides and notes the decision. An observation mechanism records the actual situation and the Interrogator's decision. The experiment is repeated many times. Unknown to the Interrogator the Male is replaced by a Machine for a number of these tests. The tests conclude and are then analysed by an objective party to answer the question: has the Interrogator assessed correctly the M/F distinction better or worse for the games when the Machine played instead of the Man? We must remember that the task for both the Male and the Machine was to get the Interrogator to make an incorrect M/F assignment.

So if the Interrogator performs *as well or worse* for the Machine instances, the machine is performing *as well as or better* than a human in the game. The Turing test is thus at two levels or stages:

- Level 1 task: Interrogator assigns M/F designation;
- Level 2 (meta level) task: analysis of results. Has the Machine tackled the task as well as (or even better than) a human or not?

This does not rule out the possibility of a 'genius machine' which fools the Interrogator 100 per cent of the time. Turing withdrew the question: 'Can machines

think?' and replaced it with this behaviourist reframing: 'Can the machine tackle tasks as well as (or better than) a human?' He also does not (*prima facie*) use the term 'artificial intelligence' but titles his paper 'Computing Machinery and Intelligence'.[16] 'Behaving like a human' is the phrase commonly used, but it is misleading. Does the computer show behaviours such as delight, frustration, anger or patience?

It must be noted that the level 1 game task is not directly addressing the key question ('do machines behave like humans?') but is one task *the analysed results of which* address that question. Note that the task includes the concept of the untruthful, misleading answer, personified in the 'trickster' Male—with the intelligence to mislead!

Can the Turing Test be Adapted to Live Electronic Music?

Music is a bit more complex than language, and words such as 'truth' and 'misleading' are difficult to translate from the domain of language to that of music. But there are some useful parallels. I propose that 'M' and 'F' are replaced by an improvising duo which may be human-human or human-machine. There are two immediate mapping problems: the original Turing test was based on a text-based exchange, and music performance may include text but must at all times be interpreted (that is, performed); also, the Interrogator has not necessarily got a simple binary (either/or) decision to make.

I propose two alternative reworkings of this mapping dilemma:

- Version I: The role of the Music Interrogator is to assess (through a curtain) 'how good the music is' when the duo plays. There are repeated performances, some human-human and some human-machine (Figure 11.3). The second layer assessment then analyses those results and decides if the machine performed the task as well as the human performer.
- Version II: The game is reconfigured. The Interrogator joins in and the performance becomes two duos. S/he plays with each participant in turn, then makes an assessment of the performance (Figure 11.4). (This version more closely models [translates] the 'text exchange' as 'music exchange'). The second-layer assessment is as before.

Figure 11.3 Rethinking Turing's Game for Music (I).

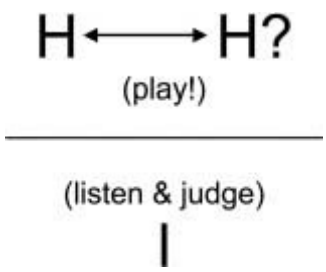
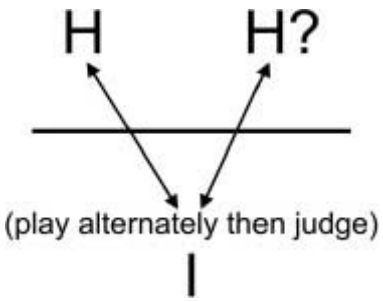


Figure 11.4 Rethinking Turing's Game for Music (II).



The binary (M/F) decision has been replaced by a general linear assessment 'how good is the music?' (difficult but not impossible).

The role of the 'trickster' M is not easily modelled. But there may be an equivalent somewhere: creativity and the unexpected? The 'unwanted' musical event? Trying to put you off your stride, testing you? Being irritating? (The speck of grit that becomes a pearl.) These may be fundamental to our perception of 'the human'.

There seem to be some parallels between Turing's Interrogator and our acousmatic listener. Both might ask:

- What aspects of the sound flow have had conscious decisions taken about them?
- Has the sound been 'composed' (put together)?
- What aspects of the sound flow might lead me to believe that decisions and actions were being taken (by a thinking and feeling agent) at the time of my hearing?
- But what kind of agent—human or machine?

We might also add an overriding question: is the aim to mimic 'humans'? In acousmatic music we do not make this assumption: there may be no 'real' agent behind the curtain.

Relocating the 'Work' also Relocates the 'Live' and Hence the Body

Let us imagine two instances of the test above resulting in two short improvisations. One was created by the human-human duo, the other by the machine-human duo. Let us suppose they are sonically identical. They appear (without knowledge of the identity of the performers) to be the same; but then we get to know how they were created. Does this change our decision? Are the two performances still 'the same work' and do they have 'the same meaning'? If we follow Turing's behaviourist line, the answer is 'probably yes'. He was not, of course, addressing this issue directly, but on balance the same musical behaviour must be judged 'equally good' by the Interrogator, so there is no reason not to consider it the same. This follows the tradition that the meaning of the music is constituted fundamentally by its *sonic relationships*.

For Christopher Small, however, the answer might be different. As already cited, the meaning of the performance is *in large part* constituted by the relationships of its performers. Thus the genesis of the work is crucial in contributing to its meaning, so the two performances would probably not be the same. The set of relationships would be profoundly different in each case. Furthermore, there was not explicitly an audience to our musical Turing test. Any improviser knows that audiences (and venues) influence response. We could (and should) add one but we might have to separate it from the Interrogator, though obviously not from the performers. (A machine performer may have means of following and responding to audience reaction.)

We have added without noticing an ethical problem: knowledge of the truth. The relationship of the sounds to one another is but one small part of the totality of the meaning of the work. The sum total of all these relationships and responses (including the audience) embodies the meaning of the music. Christopher Small's world was rooted in a reaffirmation of essentially tribal systems of values and beliefs. The idea of a remote networked and thus possibly anonymous co-performer is potentially problematic—but then again it might define a new tribal grouping.

Does it matter whether I know the identity of those entities I am playing with (human or machine)? Perhaps if I am jamming with a machine, believing it is a human may not matter and may give me a real thrill. The 'I don't know' relationship is a new kind of relationship and may therefore generate a new kind of music. This is one thing that both Small and Turing have in common. They both rest on a meta level of truth—'that which is the case'. But perhaps that will not be available in the future, or perhaps the question itself will become less important.

Turing's channel of communication is severely constrained. It is reduced to text (no voice—just text!) sent through the disembodying curtain between the Interrogator and the participants or players. In musical terms, Turing's text exchange is like swapping score fragments—but it need hardly be said that *how* those sentences (scores) are spoken (performed) contains *further* meaning. Thus, obviously, in my two versions above I insisted on *sound* as the basic exchange (as electroacoustic music must do). But if musical communication is reduced to the single mode of listening to sound, this will exclude other fundamentals of performance practice: no eye contact because no eyes, and no body. Clearly this is the equivalent of the acousmatic curtain between listener and sound—source unseen—as discussed above. Only here (unlike in fixed acousmatic music) there *may* be a live performer somewhere. This 'reduced' tradition (focusing on non-visual sound exchange) carries on in many AI and interactive developments (including George Lewis's *Voyager*,[17] which I heard performed as a live duo with Evan Parker, and computer-controlled player piano in London in 2005). Turing's world is therefore our 'World 2' (Choice, Will, Intention)—the body is 'bracketed out'. Yet of course the space of embodied performance is multisensory, including sound, vision, touch, taste and smell.

In a recent chapter for *The Oxford Handbook of Computer Music*[18] I suggested that there were two distinct paradigms of human-computer interaction. In the first the computer acts to extend the human action 'outwards'—we can play over an increasing range and area—both physically and psychologically. In the terms we discuss here, this is a kind of 'extension of the body'—we *feel out from* where we stand and perform. This is a strongly self-centred idea—its (scarcely parody) example is that of a laptop soloist conjuring up 'the world' under his/her control. Some might object to such exaggerated soloistic individualism. The second paradigm is different. Here the computer creates quite clearly *another performer*. This poses an interesting dilemma: where is this 'other body'? The dilemma is not insoluble. Haptic technologies restore physicality—resistance and touch—to our possible interactive perceptions. We could try to shift the Turing test here. Could the machine 'feel like' playing with another human?

I sense this last question is a false one, but I do need a bit more evidence. We need to broaden the discussion. Must a body be present to generate 'bodily expression'? Or is 'bodily expression' a euphemism for 'sympathetic response'? That is, 'I feel a "real" (responsive) person is present'. Such response is a matter of *negotiation*. No one in a real relationship gets their own way all the time. (Perhaps our first paradigm soloist might.) Responses may entail challenges, demands, restatements, compromises. The polar opposite of such individualism is not the traditional ensemble, with its 'top-down' eighteenth- to nineteenth-century

model of authority and group structure. A progressive version of the second paradigm model is nearer that of chamber music or, more appropriate here, improvised interaction. Groups such as the Evan Parker Electroacoustic Ensemble, the British improvisation group AMM, and Musica Elettronica Viva operated networks of more or less equal nodes well before the advent of interactive performance software and the Internet. Only in our brave new world some of these nodes may not be human.

CONCLUSION

If live electronic music is acousmatic, we may not know whether we are performing with human or machine, especially when carried out distributed on a network. Some developments continue the tradition of music perceived through sound behaviour alone, while others argue that a multisensory relational aspect is intrinsic to musical meaning. Hence some may now try literally to equip computers with bodies to articulate this: to tear down the acousmatic curtain, to generate ‘presences’ for the other perceptions and sensations of touch, feel, texture and vision that ‘express’ something which enhances the musical experience. Both Alan Turing and Christopher Small might then contribute.

ACKNOWLEDGEMENT

The sections “What Is ‘Live’ ” and “The World as a Musical Instrument” summarise (and refocus) material from *Living Electronic Music* (Ashgate, 2007); “Does ‘Intelligent Music’ have ‘Bodily Expression’ or ‘a Body to Express with’?” extends a keynote address (unpublished) for the Live Algorithms for Music conference (Goldsmiths College, London, December 2005) and includes much new material.

NOTES

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12 Digital Music, Relational Ontologies and Social Forms

Georgina Born

Like recent posthumanist writing on digital culture and new media, Simon Emmerson's evocative chapter in this book can be understood in part as problematising the assumption of a radical dualism between humans and machines (or media). Citing the anthropologist Tim Ingold, Emmerson advocates an overcoming of dualistic thought and argues that 'living' is a behaviour manifest in the co-evolution of human or organism and environment. With reference to Iannis Xenakis and Murray Schafer, Emmerson magnifies these ideas on to the plane of music and sonic art, such that the musician can be reconceived as "a kind of shaman": as one who does not so much represent the world as reveal and (re-)animate it.[1] At the same time he considers a shift in what the term 'live' has meant in regard to musical performance; noting that it used to refer to experiences of music that are "embodied and essentially human", Emmerson proposes instead a model of 'living presence' in musical performance, one that incorporates the relations between musicians and technologies.

In many ways Emmerson's ideas echo the interest in issues of embodiment, materiality, presence and the haptic that is currently raging across the humanities—from the work of Vivian Sobchak and Laura Marks in cinema studies,[2] to that of Hans Ulrich Gumbrecht in literary theory,[3] to that of Mark Hansen in new media theory.[4] All of these writers find it necessary to move beyond merely semantic, meaning-based accounts of media, or in cinema an exclusive focus on visual experience; all address themselves to (post-)phenomenological ideas in order to transcend dualisms of subject and object, mind and body by uncovering the somatic, sensory, object-al nature of mediated cultural experience.[5] Marks, for example, when analysing the "postcolonial situation of intercultural cinema", advocates a theory of haptic visuality or sensory representation.[6] She states that "the elements of an embodied response to cinema, the response in terms of touch, smell, rhythm, and other bodily perceptions, have until recently been considered 'excessive' and not amenable to analysis".[7] Proposing that they can be analysed, she claims that "our experience of cinema is mimetic, or an experience of bodily similarity to the audiovisual images we take in. Cinema is not merely a transmitter of signs; it bears witness to an object and transfers the presence of that object to viewers".[8]

More equivocally, Gumbrecht sets out to challenge the "institutionalized tradition according to which interpretation, that is, the identification and/or attribution of meaning, is the core practice … of the humanities".[9] Instead, he

intends to rebalance the attention of the humanities towards questions of materiality, the 'nonhermeneutic' and presence, arguing that we should "conceive of aesthetic experience as an oscillation (and sometimes as an interference) between 'presence effects' and 'meaning effects' ".[10] Drawing inspiration from sources as distinctive as Heidegger's concept of 'being-in-the-world', which, Gumbrecht argues, "tries to recuperate the presence components in our relationship to the things of the world",[11] and Judith Butler's concern with the materiality of the body and with the processes of materialization over time that she encapsulates with her idea of performance, Gumbrecht stresses the paradoxical potential of developing "concepts that would allow us to point to what is irreversibly nonconceptual in our lives".[12]

Similar concerns also characterise another influential theoretical development: what is called the affective turn, a stream of thought that can be traced back through Deleuze and Guattari to Bergson and Spinoza. In the words of Patricia Ticineto Clough, it treats "affectivity as a substrate of potential bodily responses, often autonomic responses, in excess of consciousness. … Affect refers generally to bodily capacities to affect and be affected or the augmentation or diminution of a body's capacity to act, to engage, and to connect".[13] Notable is the cultivation by affect theory of what, after Spinoza, Michael Hardt calls a "new ontology of the human" focused on the relations between mind and body, reason and passion.[14] This is an ontology that suspends any assumption of the primacy of the first term in each dualism by posing the relation between the two terms—mind and body, reason and passion—as a problem, a correspondence or mutuality that cannot be known in advance. Such a correspondence exists also between the power to act and the power to be affected; indeed, in this regard it "applies equally to the mind and the body: the mind's power to think corresponds to its receptivity to external ideas; and the body's power to act corresponds to its sensitivity to other bodies" and to the environment.[15] What is proposed, then, is a relational ontology, one that is concerned with the mutual mediation of the human and the environmental, whether that environment is material or immaterial, organic or inorganic, expressive or technological.

In light of this brief overview of currents in the humanities and social theory, currents that might be illuminating when taken to the focal concerns of the Embodied Generative Music (EGM) research project,[16] I want to make one critical point in this chapter. My contention is that, while the interest in the materiality and corporeality of cultural and media practices—including musical practices—is surely welcome, and while the development of relational ontologies is also highly fruitful, these approaches risk neglecting the social valences of such practices; and, moreover, that music poses most acutely the need to take into account, in analysing the nature of cultural practice and aesthetic experience, not only the corporeal and material, but also, crucially, the social. The body in these accounts is, then, invariably *de-socialised*—as though the boundary between individual and (social) environment was absolute, and as though the operations of the body can be understood without reference to that environment.

If we take affect theory to exemplify this problem, although it is taken to be foundational that "affect is not 'presocial' ",[17] the 'social' is conceptualised in this domain through a bouncing between, on the one hand, the micro-level of individual consciousness and memory and, on the other, macro-processes of history. Thus, Clough enjoins us to think about affect

> in terms of the historical changes in Western capitalist industrial societies … [and particularly] the ongoing transformation of relations of power across international organizations, regions, nations, states, economies, and private and public spheres. … [These changes are] indicative of the changing global processes of accumulating capital and employing labor power through the deployment of technoscience to reach beyond the limitations of the human in experimentation with the structure and organization of the human body.[18]

While such a critical stance on the analysis of social processes in contemporary cultural and technological formations is salutary, the social remains conceptually abstract and non-specific, and overly circumscribed by a post-Marxist orientation. In this way affect theory can occlude other dimensions of the social immanent in cultural and musical practices that also demand to be acknowledged. Indeed, compounding the continuing, if ambivalent, enlargement of phenomenological thought that is such a marked feature of corporeal and materialist directions in the humanities, I will suggest that it is productive to formulate a social phenomenology that can take cognisance of the multiple modalities of the social to which music and other cultural practices, particularly the performance arts, require us to attend, and moreover of the capacity of music and other cultural practices to generate new forms, relations and experiences of the social.[19]

Returning to Emmerson, it is clear that he is travelling in this broad direction of thought. His concern with the social dimensions of musical practice is obvious, first, in the way that in his model of 'living presence' in musical performance he conceives of his 'third world', that of 'personal and social presence', as encompassing the other two 'worlds' (of 'physical presence' and 'psychological presence').[20] It is also apparent in his extension of Turing's Imitation Game, which he refracts through an analysis of musical engagements between humans, and between humans and machines. Emmerson raises the challenging idea that if the sonic musical results are identical, this serves to justify placing the human-machine improvisation on the same plane as the inter-subjective human musical encounter. One referent here is George Lewis's musical system, *Voyager*, to which I will return. But Emmerson then goes further, implicitly questioning a strong post-humanism. Drawing on the ideas of Christopher Small, he contends that if we conceive of a musical event as more than its sonic existence, such that "the meaning of the performance is *in large part* constituted by the relationships of its performers", then our analysis of the musical Turing game will change: the same

musical event cannot be said to have occurred. This is a perspective with which I am sympathetic, and which—stripped of the romantic communalism and organicism of Small's vision of music's socialities—has been central to my work. In my ethnographic study of the computer-music institute IRCAM, the same perspective led me to expand the 'musical object' to encompass the entire, heterogeneous universe of social mediations that together composed IRCAM's music: that is to say, it encompassed IRCAM's institutional division of labour—those dozens of technicians, secretaries and receptionists, as well the software developers, hardware engineers and psychoacousticians, who, through their interrelations, formed the social environment mobilised or called into being by IRCAM's musical practices and outputs.[21]

Following Emmerson's lead, I therefore situate my remarks with reference to the current interest in materialist and relational ontologies as they address not just the relations between music and technology, but the environment, or the world. I will approach this by extending the preceding discussion of relational ontologies to two recent, comparable contributions from social theory—actor network theory and the renewed interest in vitalism—in order to assess how well they fare in addressing these issues. Specifically, I want to compare what each theory accomplishes when taken to a contemporary digital musical experiment.

VOYAGER MEETS ACTOR NETWORK THEORY

Conceived as a methodology, Bruno Latour's actor network theory, which he also describes as a "sociology of associations",[22] is most famous for its insistence on the need to conceive of the world in terms of networks of human and non-human actors, themselves linked via relations that are both material and semiotic. Latour advocates what he calls a flat ontology in which no *a priori* assumption is made that some actors or relations are bigger, more effective or more powerful than others. Relations between actors are constantly in process, performed, made and remade through practices that effect chains of associations, forming open networks that may be strong or weak. Hence the human and non-human actors composing the network exist or have certain properties by virtue not of their own innate or intrinsic qualities as entities, but through their mutual interrelations, interferences and mediations—understood as transformative relations. In this sense, as Annemarie Mol puts it, reality is 'enacted' through practices in which subjects and objects mix and merge.[23]

In this way, by warning against any attempt to theorise the social other than as the outcome of chains of associations, Latour is rightly criticising the continuing recourse to neo-Durkheimian conceptions of the social evident in the use of reified and deterministic notions of 'culture' and 'society'. Nonetheless, I am myself a sceptic regarding actor network theory's adequacy for dealing analytically with the interrelated problems of scale, influence and power, the relative endurance or instability of networks, and thus the questions of historicity and temporality that it brackets with its flat ontology.[24] Moreover, it risks ignoring the performative ways in which concepts of the social, as well as other closely linked concepts such as social class and social identity, have been folded into historical process to self-fulfilling effect.[25] On the other hand, actor network theory does seem to elucidate remarkably well aspects of such musical assemblages as George Lewis's *Voyager*, for which an ontology of the machine as actor or creative agent is central. Lewis is an African-American composer, philosopher and technologist; he combines in his person two American traditions: that of experimental electronic music and that of the Chicago-based Association for the Advancement of Creative Musicians, a movement committed to improvisation as at once a social and a musical form.[26] *Voyager* is designed by Lewis to be a

> nonhierarchical, interactive musical environment that privileges improvisation. In *Voyager*, improvisors engage in dialogue with a computer-driven, interactive "virtual improvising orchestra". A computer program analyzes aspects of a human improvisor's performance in real time, using that analysis to guide an automatic composition program … that generates both complex responses … and independent behavior that arises from its own

internal processes.[27]

Lewis therefore understands *Voyager* as a performance-based system that endows the personal computer with interactive agency, while favouring a certain musical aesthetic. Indeed, Lewis's philosophy is that "Notions about the nature and function of music become embedded into the structure of software-based musical systems and … interactions with these systems tend to reveal characteristics of the community of thought and culture that produced them".[28]

With *Voyager*, Lewis intends to deconstruct prevailing orthodoxies both of the universal, culturally neutral computer system and of human-computer interaction. He developed his stance on these issues through earlier residencies at IRCAM, on the basis of which he conceives of his present work as embodying a critical response to IRCAM's high modernist paradigm, manifest as this is in the philosophies, technologies, scientific research and music issuing from the institution. Instead of an instrumental, 'information retrieval' model of interactivity, Lewis favours one that conceives of human-computer relations in terms of dialogical operations between two improvising subjectivities. He portrays this as an "improvisational, subject-subject model of discourse, rather than a stimulus/response setup". The computer is therefore endowed with a kind of musical personality and autonomy: it "does not need to have real-time human input to generate music. … The program exhibits generative behaviour independently of the improvisor".[29]

Musically, a performance of *Voyager* exhibits multiple parallel streams of music emanating from computer and humans. Moreover, the system's simulated subjectivity is designed to emulate African-American aesthetics. Lewis calls this an "aesthetics of multidominance", drawing attention in this way to "the multiple use of colors, [textures, shapes] in intense degrees", and in music to the use of "multidominant rhythmic and melodic elements".[30] His concept of multidominance is derived from the AACM's practice of multi-instrumentalism, in which players were expected to perform on a number of instruments so as to achieve great timbral diversity and a range of musical colours—an "extreme multiplicity of voices, embedded within an already highly collective ensemble orientation".[31] On the question of the computer's aesthetic subjectivity, Lewis comments:

> In the context of improvised musics that exhibit strong influences from African-American ways of music-making, … "one's own sound" … becomes a carrier for history and cultural identity. … 'Sound' becomes identifiable … with the expression of personality, … the assumption of responsibility and an encounter with history, memory and identity. Part of the task of constructing *Voyager* consisted of providing the program with its 'own sound', … a kind of technology-mediated animism.[32]

For Lewis, such animism can be connected to the trope, present in several African cultures, of musical performance as a mode of communication between two intelligences. *Voyager* therefore amounts to an improvising musical assemblage that "incorporates a dialogic imagination"; the mode of interactivity that it embodies is grounded on "negotiation, difference, partial perspective".[33] In a reflexive and parodic anthropomorphism, Lewis has designed into the system a quasi-human agency and subjectivity replete with expressive powers, an aesthetic imagination, and a capacity for intersubjective negotiation, while all of these are taken to be fuelled by a machinic 'experience' of alterity. Lewis has modelled a dialogical musical-social-technological assemblage, one that is intended to embody the "'anti-authoritarian' impulse in improvisation".[34] For Lewis, *Voyager* envisages a de-instrumentalised machine.

THOUGHT CONDUCTOR #2 MEETS VITALISM

An alternative relational ontology is evident in the current preoccupation in anthropological and social theory with the vitalism of Bergson and Whitehead, centred on an anti-teleological ontology of process and becoming. On this basis, Vikki Bell criticises Butler's theory of performativity for what Deleuze calls 'preformism', in which "the real is thought to be the image of, or to resemble, the possible that it realizes". Following Deleuze, himself drawing on Bergson, Bell asks, "Rather than a belief in unified and unifying structures, could we not begin with a belief in difference as the fundamental principle and differing as the ontological assumption?"[35] In Bergson's account, according to Bell, premised on the creativity and self-organisation of the material world,

> Evolution is a process of differentiation that has to be understood as mobile and open-ended. … [In turn] life is not passive adaptation to the activity of the external environment but is itself an active response, a differentiation. … Life rises to the provocations of the environment.[36]

Pursuing the self-organisation of matter, Bell cites Monica Greco's resonant idea—which itself draws on Isabelle Stengers's work on complexity—that our very participation in the world as human subjects both depends upon and elicits a response from that world. In this light, Greco argues that the term 'complexity' demands "that we acknowledge *a sensitivity of the world to our interest in it, and to the forms in which this interest is expressed*".[37] Bell adds, "In Bergson the process at stake is precisely the organism's relation to the environment, the elaboration of the environment's stimulus";[38] while, in Stengers's words,

> For Whitehead the ethos of an organism, its specific grasping together of aspects of its environment, cannot be dissociated from its ecology, that is from the way other organisms prehend and grasp together aspects of this organism, including the way they are themselves prehended and grasped by it. Each organism thus depends on what Whitehead calls the "patience of the environment". … Whitehead uses the beautiful word "infection" to describe the etho-ecological regime of reciprocal prehensions.[39]

Tim Ingold articulates a different Bergsonian critique of preformism when he problematises the modernist opposition in which creativity is held to be the antithesis of imitation.[40] Instead, he contends that mimesis and creativity are intimately bound in many cultures, that creativity is ubiquitous in cultural life, and that, given the radical contingency of the world, it is also necessarily

improvisational. In his account, people

> are compelled to improvise, not because they are operating *on the inside* of an established body of convention, but because no system of codes … can anticipate every possible circumstance. … The improvisational creativity of which we speak is that of a world … "always in the making".[41]

Ingold employs Whitehead's concept of concrescence, inspired by Bergson, which suggests that "Creativity … [lies] in that very movement of becoming by which the world, as it unfolds, continually surpasses itself".[42]

It should be apparent that these recent vitalisms acknowledge, more than Latour, the qualities of human agency as distinct from—if also caught in a web of—non-human, prehending and self-organising entities. Their focus is more on the existence and the nature of mutuality and co-evolution. Moreover, they are attuned to temporality and process as inherent qualities of organic and inorganic life. Yet, while propitious, such vitalist ontologies can themselves be problematic if taken as an all-encompassing optic. The conceptualisation of temporality as a dimension of becoming, to take a critical issue, tends in these accounts to be singular and continuous—a monotemporality. But this evades the need to investigate the nature and the multiplicity of temporal processes and of differentiations, for example, as manifest in the differences between styles, degrees and rates of improvisatory creativity, or between more and less genre-bound or mimetic creative practices.[43]

One musical assemblage which approaches a vitalist ontology of this kind is *Thought Conductor #2* (*TC2*): a performance installation designed by the artist-engineer Bruce Gilchrist in dialogue with software writer Johnny Bradley. Gilchrist's work exploits raw neurophysiological material to generate art and musical events. In *TC2* "the signals generated by an individual hooked up to an electroencephalogram [EEG] are converted, via a relational-database …, into 'musical score' ".[44] The score appears on computer monitors, ready to be played by a live string quartet. As the quartet plays the musical notes generated by the database's translation of the brain signals emitted by the wired-up individual, the musical sounds affect the neurophysiology of the wired-up individual, which in turn affects the derived EEG readings, the real-time musical score, and thus the string quartet's playing. To produce the relational database when preparing *TC2* for a performance in Oslo, Gilchrist and Bradley were resident for several weeks at a local studio where they collaborated with twelve local composers. Each composer was asked to sit and compose some new notated music for string quartet in real time, and, while they wrote, their brain activity was recorded by an EEG. Following this process the EEG recording for each composer was linked to a midi version of his or her notated score and archived in the database.[45] The 'composerly' basis of the relational database thus in some ways mitigates the arbitrary nature of its translation of brain-wave activity into musical notes, while at the same time

highlighting and parodying this arbitrary translation.

In Mariam Fraser's insightful and playful commentary, in *TC2* "score and sound acquire an immediacy which is characteristic of neuroscientific imaging technology in general, but which in this specific context lends new meaning to the notion of a 'live' performance".[46] With reference to Bergson and Whitehead, Fraser understands *TC2* in terms of the spatialisation and temporalisation of duration through processes of creative activity or actualisation. As she puts it, "There is indeterminacy and contingency in *TC2*, but it is not the indeterminacy and contingency of sounds that are accidentally/unintentionally captured *in* time, but of the actualization *of* sound *and* time out of potentiality".[47] But I would emphasise more the ways in which *TC2* performs music as a continuous process or circuit of mediations, mediations that demonstrate artfully, and performatively, the mutable boundaries, connections and translations between particular human bodies and subjectivities, scientific technologies and visual representations, musical literacies, performance gestures and expressive interpretations, musical sounds and human affective states. Brain-wave patterns are converted into immaterial form (EEG readings, and thence digital signals), which are translated via the relational database into material and embodied form (the real-time musical score, and thence the quartet's playing), and from there into musical sound, and back into the responsive consciousness of the original, wired-up body. *TC2* exemplifies multiple transitions between (prehending and prehended) subject and (prehending and prehended) object, or rather between subject (wired-up individual) becoming object (EEG readings, visual representations) and object (notated score, musical sound) becoming subject (string players' gestures, wired-up listener's affective response). *TC2* therefore amounts to, and humorously dramatises, a fluid circuit of unending translation—or of the mutual negotiation of difference—between subjects and objects, humans and technologies, a circuit in which human subject becomes object becomes musical sound becomes subject … *ad infinitum*. This circuit of translation is at the phenomenological core of all musical experience, but in *TC2* it begins, radically, with a non-expert human listener as involuntary initiator of a collective and distributed creative musical process that encompasses human and non-human, material and immaterial, and embodied and machinic actors.

POST-POST-HUMANISM: THE SOCIAL IN MUSICAL-SOCIAL-TECHNOLOGICAL ASSEMBLAGES

The relational ontologies that I have outlined in discussing *Voyager* and *Thought Conductor #2* are potentially generative also when taken to the EGM project. But here I want to suggest that we should take a further conceptual step, especially for music, but not limited to it. Like Emmerson in his homage to Small, I find it impossible to evade the need to address, and theorise, music's manifold socialities, and indeed those of cultural production writ large; yet the ontologies to which I have just alluded, like the post-humanist accounts from the humanities with which I began, frankly fail to do this.

In the remainder of the chapter, I want to sketch my own position on theorising the social in musical assemblages. To begin with, musical sound—as an aural, non-representational abstraction—is never experienced as pure and autonomous. Whether it is perceptually focal or not, musical sound invariably comes to us not only embodied in the socialities of musical performance but inflected by other social processes and relations, infused by beliefs and discourses, embedded in physical and technological environments, and thus entangled in 'mixed realities'. In this way music poses conceptual challenges both for the analysis of its modes of signification and for any attempt to develop a phenomenology of musical experience. A starting point in addressing such challenges is to acknowledge that music is both constituted by and itself engenders mediation. As we have seen, it entails relations between objects and subjects, non-human and human actors. It construes what I have called a musical assemblage:[48] a network of relations between heterogeneous entities—musical sounds, human and other subjects, practices and performances, discourses and representations, material and immaterial technologies, and spaces and locations—while all of these elements in the constellation are themselves entangled in social mediation, in processes of human association and aggregation and in the relay of social relations. It follows, as I have suggested elsewhere, that music is never singular but always a multiplicity; it exists only in and through its evolving mediations, in the guise of such assemblages. There is no musical object—sound, score, performance, technology—that stands outside mediation; just as there is no musical subject that is not drawn into an affective relation with a musical object in the act of listening. For most musical subjects a significant musical experience is one in which the listener, entangled in a musical assemblage, feels and finds herself transformed. By producing particular engagements or combustions between musical objects and subjects, musical experience can generate affect and catalyse transformative effects. Such effects, however, are contingent and irreducible, and far from universal. On these occasions musical experience takes the form of an event: one

that augurs transformations in the object-subject relation—in the assemblage.

But it is the social mediation of music that has hitherto been most neglected conceptually; indeed, I would suggest that the question of the social has been the constitutive outside of existing debates on mediated music. It is time that we grasped that this social is itself multiple, and extends beyond the socialities of musical performance. It demands a social phenomenology that registers the myriad forms of the social in music and their complex interrelations. Let me set out briefly my own working scheme. At base it is possible to identify four orders or planes of the social mediation of music. In the first order, music produces its own socialities —in performance, in musical ensembles and recording studios, in the musical division of labour, in listening. Second, music has powers to animate 'imagined communities', aggregating its listeners into virtual collectivities or publics based on musical and other identifications.[49] Third, music inflects wider social relations, from the most abstract to the most intimate—music's embodiment of stratified and hierarchical social relations, of the competitive accumulation of legitimacy, authority and social prestige, and of the structures of class, race, gender and sexuality. And, fourth, music is bound up in the large-scale social, cultural, economic and political processes that provide for its production, reproduction and differentiation or transformation—whether elite or religious patronage, mercantile or industrial capitalism, public and subsidised cultural institutions, or late capitalism's multipolar cultural economy. In all four of these ways, as demonstrated by the rich empirical traditions of ethnomusicology and music sociology, music is immanently social. The point is that the four planes are not reducible to one another: the first and second amount to forms of sociality specifically engendered by musical practices; the third and fourth amount to the way in which music is mediated by, and entangled in, wider social relations, institutions and conditions. Non-linear and contingent relations—of conditioning and affordance—exist between the four orders; but there is also an autonomy operative in each of the four. Acknowledging the four begins to allow us to conceive of music's entanglement with these distinctive orders of social relations and aggregation, as well as the connections between them.

For the EGM project, with its focus on embodiment in performance, the most obviously relevant of the four orders is the first, the sociality of musical performance, which amounts to the immediate social environment to which the performing body as prehending entity is attuned, just as co-performers and audience engage in reciprocal prehensions. Here we approach the musical intersubjectivities at the heart of Alfred Schütz's classic essay in social phenomenology, 'Making Music Together'.[50] In this essay, Schütz portrays music as a paradigm of communicative social relations, a "mutual tuning-in relationship by which the 'I' and the 'Thou' are experienced by both participants as a 'We' in vivid presence" and one that "originates in the possibility of living together simultaneously in specific dimensions of time".[51] Music's particular significance, for Schütz, is that our experience of music unfolds in 'inner time', Bergson's *durée*, and while music

also occurs in 'outer' or chronological time, inner and outer time are incommensurable. Moreover, musical meaning is polythetic or non-conceptual: it can be grasped only by immersing oneself in the ongoing flux of inner time.[52] On this basis Schütz discerns three modes of intersubjectivity in music. The first involves performer and listener, who are "living together through the same flux … while the musical process lasts", simultaneously tracing "the polythetic steps by which the musical content articulates itself in inner time".[53] The next involves composer and listener or performer: "Although separated by hundreds of years, the latter participates with quasi simultaneity in the former's stream of consciousness by performing with him step by step the ongoing articulation of his musical thought".[54] Finally, Schütz considers the intersubjective relations in a small ensemble, in which "each coperformer's action is oriented not only by the composer's thought and his relationship to the audience but also reciprocally by the experiences in inner and outer time of his fellow performer".[55] The distinctive quality of this third form of intersubjectivity, according to Schütz, is that it entails sharing the other's "stream of consciousness in immediacy", as well as responding to facial expressions and bodily gestures face-to-face and in shared space.[56]

I have cited this essay at length in order to show, first, how marginal to Schütz's analysis of musical intersubjectivity, and his social phenomenology, are the corporeal and material; second, how limited is his conception of the scope of a social phenomenology of music, focused as it is primarily on structures of consciousness with a relatively confined attention to the sociality of musical performance; and, third, how haunted by a romanticised metaphysics of musical co-presence are his writings on musical performance (as are Small's writings). On this last point, my response is to resist such a metaphysics by evading any *a priori* sacralisation of musical co-presence, and by addressing the sociality of musical performance as a type of musical public that evidences its own autonomy—the specific qualities of which cannot be known in advance. Here I find it beneficial to open a dialogue with aspects of Hannah Arendt's thought. This is appropriate since Arendt's preferred idiom for conceptualising political action in the public realm was the performing arts. Her primary concern was with the systematic renewal, through action in the public realm, of political praxis.[57] For Arendt, plurality is the fundamental condition for such action, the essence of which is continuous, direct civic participation—a way of being-in-the-world.[58] As Dana Villa explains, "No other human activity, according to Arendt, 'produces' meaning as naturally as does action in the public realm. … [Her] performance model … emphasizes the embeddedness of action in the 'already existing web of human relationships', while stressing its phenomenality, its need for an audience. … Arendt directly links the meaning-creative capacity of initiatory action to its 'futility, boundlessness, and uncertainty of outcome' ",[59] while insisting that the public realm is both artificial and autonomous, and an end in itself.

My contention, then, is that to theorise music's present and historical condition we require an analytics of music's social mediation, for which an Arendtian

conception of the musical public constituted by performance as autonomous, artificial and uncertain, and yet as embedded in pre-existing social relations and institutions, is productive both descriptively and normatively. What Arendt points to is an approach to the nature of sociomusical relations which—in contrast to Schütz, Small and other romanticised visions—permits us to *de-idealise*, to analyse the actual nexus formed between the four planes of social mediation, and to grasp the underdetermined, non-linear and autonomous nature of those relations. These conceptual moves augur a non-idealising and non-essentialising social phenomenology of music, one that can augment or supplement the existing concern with materiality and embodiment in digital, electronic and acoustic musical assemblages.

In the concluding section of the chapter, and with the foregoing ideas in mind, I turn to two musical elements of the Bodily Expression in Electronic Music conference, which helped to generate this volume. Both elements exemplify themes of this chapter.

Informing the EGM research project, performances of which were given at the conference, and about which we heard from Gerhard Eckel and Deniz Peters, was a history of developing goals within electronic and computer music. In particular, two aims concerned with enhancing and expanding compositional and performance possibilities appear to have been central to the genesis of EGM. The first aim was to develop the tools for interactive generative music, a kind of empirically responsive, real-time, algorithm-based system in which the composer can perform and hear certain aspects of the music during the very process in which it is being composed. The second aim was to (re)introduce stage-based performance and especially the performing human body into such interactive and generative computer music. The consequence of these cumulative goals was a research project in which dancers were brought into the assemblage to shape the music in real time, and to introduce an "intense bodily resonance", thus stimulating the audience's "innate capacity to empathize with [the dancing body]".[60] Through aesthetic experiments in improvised performance over many months, in which dancers, musicians and generative system engaged mutually in learning each other's expressive and musical repertoires and co-developing new possibilities, an environment for intermedial performance gestures was created and codified. This environment takes the form of a physical space in which a dancer's movements, captured by motion-capture sensors, are tracked in real time, resulting in coordinates that in turn trigger certain predetermined algorithmic musical-sonic responses afforded by the system. Most ambitiously, it becomes possible for the "dancer's body [to] extend into the sound-generation process in a way similar to the musician's body extending into the [musical] instrument".[61] According to Eckel, this depends on the existence of a "highly refined kinaesthetic [or bodily] intelligence" employed in expressive gestures that are "predictable to the body, not the mind"; in this sense, it is the dancer's body that performs and drives the generative process.

At the same time, the system is set in motion with a defined set of affordances that condition and set limits to how the dancer can respond. Yet the system also learns, via its human designers, from the dialogue with the dancer over time, such that, in Eckel's words, "there are moments that are quite exquisite, and that's what we are looking for! … We are collectively developing an instrument". This 'learning' by the system from the dancer's interactions with it is not immediate, but a relayed process in which the dancer can become part of the distributed compositional process—the composition of a co-evolving generative system or assemblage. In this sense EGM incarnates precisely "a sensitivity of the world to our interest in it" (Greco): performance, compositional process and technological design process become integral to one another, effecting the co-evolution of each element of the assemblage. Importantly, this is primarily an *empirical and inductive* process of co-evolution which unfolds throughout the period of research and rehearsal, and which is oriented to achieving an intermedial aesthetic that crosses between dance and music.

However it is also worth examining how the social enters into this assemblage. If EGM's performance-compositional process succeeds in manifesting a quasi-vitalist ontology, and if it also affords a novel, non-hierarchical, 'flat' division of musical labour—that is to say, composition is distributed between the various actors, and composition has no special authority over performance—as an assemblage EGM nonetheless conjures up the orthodox social relations of the publicly subsidised concert hall; it enjoins relatively passive audiences to engage in quiet and receptive obeisance to performer-composers active on their behalf. Moreover, where *Voyager* purposefully draws into the assemblage and encodes in its interactive music software the imagined community called into being by certain African-American aesthetics, and thus evokes the wider social relations of race and class, EGM does not conceive of itself as intervening in wider social relations of this or any other kind. It is not concerned with revising or being inventive in relation to the ritualised social relations of the concert venue, nor music's institutional forms. The novel socialities of performance are therefore unmatched by invention or differentiation in other orders of music's social mediation.

A second musical component of the BEEM conference was the rich presentation given by the composer, improviser and philosopher Pauline Oliveros, who narrated a journey through her music using illustrative recordings. In particular she described an early transition. The transition was in the guise of a shift between a 1957 free improvisation performed by the trio of herself, Terry Riley and Loren Rush, which Oliveros described as probably the "first ever group improvisation by Western art musicians", and her fully notated 1960 composition *Variations for Sextet*. After we had heard the taped improvisation, Oliveros, preparing us for a recording of the *Sextet*, commented that "it might well sound like it's improvised". As it turned out, what was fascinating to hear were the subtle but palpable aesthetic differences between the two recordings, in that the first, the live improvisation, was audibly more suspended, fragile, hesitant and feelingful than the soundworld

proffered by the composed piece. To my ears, when compared to the improvised trio, the performance of the notated piece seemed to lack the equivalent sense of mutuality, co-creation and heightened listening among the human players. In this way Oliveros demonstrated how the real-time social and corporeal mutuality that is a unique feature of humanly mediated free improvisation had powerfully audible musical effects. The musical and social, in this sense, were co-constitutive and aligned. The experience made evident the sounding sociality of improvised human musical performance, and this was apparent even in its recorded form. Put another way, and to return finally to relational ontologies, and particularly to vitalism: the contrast between the two aesthetics showed unequivocally how the social relations of improvised performance epitomise in their *musical-aesthetic* effects the Whitehead-ian concern with reciprocal prehensions—with how, as Stengers puts it,

> the ethos of an organism, its specific grasping together of aspects of its environment, cannot be dissociated from its ecology, that is from the way other organisms prehend and grasp together aspects of this organism, including the way they are themselves prehended and grasped by it.

NOTES

1. Simon Emmerson, 'Live Electronic Music or Living Electronic Music?', this volume, p. 155. The present chapter draws on and refines my response to Simon Emmerson's paper at the Bodily Expression in Electronic Music (BEEM) conference, Graz, 5–7 November 2009. It forms part of a group of papers in which I develop these ideas.
2. Vivian Sobchack, *The Address of the Eye: Phenomenology and Film Experience* (Princeton, NJ: Princeton University Press, 1992); Laura U. Marks, *The Skin of the Film: Intercultural Cinema, Embodiment, and the Senses* (Durham, NC: Duke University Press, 2000).
3. Hans Ulrich Gumbrecht, *Production of Presence: What Meaning Cannot Convey* (Palo Alto, CA: Stanford University Press, 2004).
4. Mark Hansen, *New Philosophy for New Media* (Cambridge, MA: MIT Press, 2004).
5. I write (post-)phenomenological in order to point to the ambivalent attitude to phenomenology evident in writing of this kind even when it draws on Deleuze, a critic of phenomenology. See, for example, Marks's discussion (*The Skin of the Film*, pp. 145–53) of Sobchack's and her own indebtedness to Merleau-Ponty, in which she criticises Deleuze's work on cinema: "Deleuze says 'Give me a body, then,' but his interest is not in exploring how cinema relates to the bodies we have already been given" (p. 150). Or Hansen's reworking (*New Philosophy*, Chapter 7) of Bergson and Husserl via Deleuze's account of the time-image in cinema, as well as the work of neurobiologist Varela in his analysis of the "technical contamination of time-consciousness" (p. 260) manifest in the work of video artists Douglas Gordon and Bill Viola.
6. Marks, *The Skin of the Film*, p. xiv.
7. Ibid., p. xvii.
8. Ibid.
9. Gumbrecht, *Production of Presence*, pp. 1–2.
10. Ibid., p. 2.
11. Ibid., p. 66.
12. Ibid., p. 140.
13. Patricia Ticineto Clough, 'Introduction', in *ead.* and Jean Helley (eds.), *The Affective Turn: Theorizing the Social* (Durham, NC, and London: Duke University Press, 2007), 1–33, 1–2.
14. Michael Hardt, 'Foreword: What Affects Are Good For', in Clough and Helley, *The Affective Turn*, p. x.
15. Hardt, 'Foreword', p. x.
16. The EGM project is briefly discussed in the introduction of this book, p.

11, and in more detail in chapters by Gerhard Eckel and 5 by Jaana Parviainen.

17. Clough, 'Introduction', p. 2.

18. Ibid., pp. 2–3.

19. In referring to the potential for a renewal of social phenomenology, I take my bearing from recent attempts to transcend the impasses between deconstruction and phenomenology: see, for example, Christopher Watkin, *Phenomenology or Deconstruction? The Question of Ontology in Maurice Merleau-Ponty, Paul Ricoeur and Jean-Luc Nancy* (Edinburgh: Edinburgh University Press, 2009). Watkin, drawing on Nancy, writes of the need to conceptualise "presence as passage, an ontology resituated in the relational …, an indirect ontology thought in terms of a mutual implication of 'subject(s)' and 'world' in a play of call and response" (p. 207). On the relation of singularity and plurality, moreover, Watkin argues against any "privileging of plurality over singularity. … Neither unity nor multiplicity is primary. … [Nancy] is suspending, not reordering, the hierarchy of the two, a move emphasised in his warning that fragmentation can, if we are not careful, become the reverse (and therefore the twin) of totalisation" (p. 181). For those of us engaged in empirical research, I take these thoughts to indicate the need for close empirical studies of the variety of the forms of, and relations between, subject(s) and world(s), as well as of aggregation or dispersal, enclosure or openness, and singularity or plurality in these forms and relations.

20. Emmerson, 'Live Electronic Music', p. 153.

21. Georgina Born, *Rationalizing Culture: IRCAM, Boulez, and the Institutionalization of the Musical Avant-Garde* (Berkeley, CA, and London: University of California Press, 1995).

22. Bruno Latour, *Reassembling the Social: An Introduction to Actor Network Theory* (Oxford: Oxford University Press, 2005), esp. 9.

23. Annemarie Mol, *The Body Multiple: Ontology in Medical Practice* (Durham, NC: Duke Unversity Press, 2002), 44.

24. For similar criticisms see Michael J. Fischer, 'Four Genealogies for a Recombinant Anthropology of Science and Technology', *Cultural Anthropology* 22/4 (2007), 539–615, 561.

25. However, for alternative approaches influenced by actor network theory that attend closely to the performative nature of discourses of the social, the economy and so on see Michel Callon, *The Laws of the Market* (Oxford: Blackwell, 1998), and Andrew Barry, *Political Machines: Governing a Technological Society* (London: Athlone, 2001).

26. George E. Lewis, *A Power Stronger Than Itself: The AACM and American Experimental Music* (Chicago: University of Chicago Press, 2008).

27. George E. Lewis, 'Too Many Notes: Computers, Complexity and Culture

in *Voyager*', *Leonardo Music Journal* 10 (2000), 33–9, 33.

28. Lewis, 'Too Many Notes', p. 33. The general theoretical point that computer software is encultured is made in Born, *Rationalizing Culture*, chapters 7, 8 and 9.
29. Lewis, 'Too Many Notes', pp. 34 and 36.
30. Ibid., pp. 33–34.
31. Ibid., p. 36.
32. Ibid., p. 37.
33. Ibid., p. 38.
34. Ibid., p. 36.
35. Vikki Bell, *Culture and Performance* (Oxford: Berg, 2007), 106 and 105.
36. Ibid., p. 108.
37. Monica Greco, 'On the Vitality of Vitalism', *Theory, Culture & Society* 22/1 (2005), 15–27, 24, emphases added.
38. Bell, *Culture and Performance*, p. 113.
39. Isabelle Stengers, 'Whitehead and the Laws of Nature', paper presented at Goldsmiths' College, University of London, p. 13, cited in Bell, *Culture and Performance*, pp. 113–14.
40. Tim Ingold and Elizabeth Hallam, 'Creativity and Cultural Improvisation: An Introduction', in *eid.* (eds.), *Creativity and Cultural Improvisation* (Oxford: Berg, 2007), 2.
41. Ibid., p. 5 and pp. 2–3.
42. Ibid., p. 47.
43. For an expanded commentary along these lines, see Georgina Born, 'On Tardean Relations: Temporality and Ethnography', in Matei Candea (ed.), *The Social after Gabriel Tarde: Debates and Assessments* (London and New York: Routledge, 2010), especially 244–6.
44. Mariam Fraser, 'Making Music Matter', *Theory, Culture and Society* 22/1 (2005), 173–89, 173.
45. From the account of *Thought Conductor #2* at: www.artemergent.org.uk/tc/tc2.html (accessed 13 August 2010).
46. Fraser, 'Making Music Matter', p. 173.
47. Ibid., p. 184.
48. On the concept of the musical assemblage, see Georgina Born, 'On Musical Mediation: Ontology, Technology and Creativity', *Twentieth Century Music* 2/1 (2005), which draws on Deleuze's reading of Foucault: Gilles Deleuze, *Foucault* (London: Athlone, 1988); and Paul Rabinow, *Anthropos Today* (Princeton, NJ: Princeton University Press, 2003), Chapter 3. For a recent attempt to develop a theory of assemblages, see Manuel DeLanda, *A New Philosophy of Society: Assemblage Theory and Social Complexity* (London and New York: Continuum, 2006). The approach that I advocate here has certain similarities to DeLanda, notably in conceiving of the social as multiple. But it strenuously departs from

DeLanda's attempt to develop a realist social ontology predicated on the analysis of social formations through an "upward movement" (p. 6) of increasing scale and encompassment: from interpersonal networks, through institutional organisations, to cities and nation-states.

49. On the concept of musically imagined community, see Georgina Born, 'Afterword: Music Policy, Aesthetic and Social Difference', in Tony Bennett, Simon Frith, Lawrence Grossberg et al. (eds.), *Rock and Popular Music: Politics, Policies, Institutions* (London: Routledge, 1993), 266–92; 281–8; and Georgina Born, 'IV: Music and the Representation of Sociocultural Identities' (pp. 31–7) and 'V: Techniques of the Musical Imaginary' (pp. 37–47), in 'Introduction: On Difference, Representation and Appropriation in Music', in Georgina Born and David Hesmondhalgh (eds.), *Western Music and Its Others: Difference, Representation and Appropriation in Music* (Berkeley, CA, and London: University of California Press, 2000), 1–58.
50. Alfred Schütz, 'Making Music Together', in *Collected Papers* (The Hague: Nijhoff, 1971), 159–78.
51. Ibid., pp. 161 and 162.
52. Ibid., pp. 172–3.
53. Ibid., p. 175.
54. Ibid., p. 171.
55. Ibid., p. 175.
56. Ibid., p. 176.
57. Dana Villa, *Arendt and Heidegger: The Fate of the Political* (Princeton, NJ: Princeton University Press, 1996), 12.
58. Ibid., p. 11.
59. Ibid., pp. 84–5.
60. Gerhard Eckel, 'Embodied Generative Music', this volume, p. 147.
61. Ibid., p. 148. The quotations that follow all come from comments made by Gerhard Eckel during the discussion of EGM at the BEEM conference.

13 *JND*

An Artistic Experiment in Bodily Experience as Research

Chris Salter

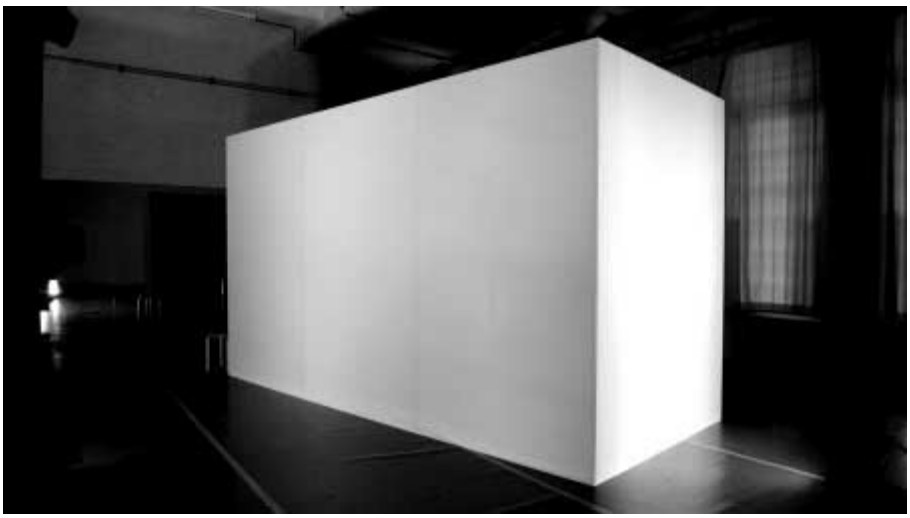
> "The end was almost unbearable but in a really enjoyable way"; "With the intensity of vibration and the light, I suddenly realized there was a space"; "When I first laid down, because it was so, so dark, my eyes were seeing flashes of light"; "I didn't really feel the roundness of my body. It was sort of all laid out like a two dimensional shadow on the floor"; "It felt like my stomach was expanding … it was more like an expansion or leaking of the boundaries of my body."

The above responses derive from interviews conducted with participants who experienced a preliminary experimental prototype of *Just Noticeable Difference* (*JND*), an artistic installation-environment in development between 2009 and 2010 that combines near darkness with sound, tactile vibration and color-changing light operating at different perceptual thresholds. While the title *JND* first evokes Gustav Fechner's nineteenth century invention of and research into psychophysics and, in particular, his experiments aimed at logarithmically quantifying the limens of sensation, the project seeks to explore the *phenomenological* shifts occurring in the embodied experience of self and environment. More specifically, the project researches the process of embodied meaning making taking place inside a physical space in which a variety of cross-modal stimuli operate at varying just noticeable differences of sensory intensity.

Architecturally, the installation consists of a box-like structure 2 meters wide by 5 meters long and 3 meters high. From the outside, this box appears as a clean, bright white minimalist object as conceived for a visual-arts exhibition context. Once inside the architectural shell, visitors to the environment are led to a small door opening onto the inner space of the structure. In near total darkness, they lie on their backs on a custom developed floor whose underside is lined with twelve full-frequency *tactile sound* actuators normally used in commercial or home-cinema seats to deliver low-frequency vibrations. The actuators produce both audible sound and vibrations that vary from the barely perceivable to extremely intense. Ranging from fidgeting to larger motions, the visitors' bodily movements are measured in real time by a wireless network of resistive paper-based sensors

(developed in collaboration with the Input Devices and Music Interaction Laboratory at McGill University) that line the undersurface of the floor.[1] The raw real-time motion data are statistically conditioned and then used to subtly affect the behavior and intensity of a partially scripted composition of vibration, sound and light directly under and around the body. Since each of the actuators is individually addressable, the pressure and motion data from the participants are used to not only affect the overall intensity of the sound and vibration but also to generate specific and distinct spatial patterns, from simple two-channel panning across groups of actuators to more complex, stochastically determined rhythms and motions. The level of vibration, brightness, rate and rhythm of the flicker-based light, frequency and amplitude of the audio in the composition's three-act dramatic structure is thus partially based on the visitors' bodily interaction with the sensor-augmented floor.

Figure 13.1 *JND*'s architectural shell. Photograph © Anke Burger.



This chapter focuses on two different perspectives of the project as it relates to the question of embodied experience: the creative process from the point of view of the installation's authors and the public's encounter with the installation itself. The first part focuses on the artistic processes and techniques of haptic sound design that artist and researcher Dr. Marije Baalman and I experimented with during the project's development cycle.[2] In this, we specifically address the project's unique aesthetics of production in which our own direct bodily experience played a central role in the programming and tuning of the media elements. The second part of the chapter discusses the thornier though no less critical methodological question of what constitutes experience of the installation from the public's point of view. As artists working with perception such as Robert Irwin long have argued, the artistic object is actually embodied experience itself.[3] If this indeed is the case, then how do we make sense of such a continually shifting and costructured participant and environment multimodal research object in both ethnographic as well as aesthetic terms? While this question goes beyond the scope

of the present chapter, we will briefly sketch some preliminary findings based on the set of early prototype sessions for the installation that involved semi-structured interviews with participants in Montreal during January 2010.

BACKGROUND: THE LIMEN AS BASIS FOR EXPERIENCE

The development of *JND* can be traced through four different threads: (1) the continuation of a longer artistic inquiry into threshold states of consciousness arising from the development of *Schwelle*, a multipart evening-length work begun in Berlin in 2003; (2) research into the aborted experiment in perception undertaken by artists James Turrell and Robert Irwin in 1968 for the Los Angeles County Museum of Art's pioneering Art and Technology Program; (3) a detailed study of Francisco Varela's theories of experience, specifically the neurophenomenology of time consciousness as well as Alva Noë's extension of Varela, Rosch and Thompson's concept of 'enactive perception'; (4) research into cross-modal phenomena and multisensory integration.

As a whole, all of these fields of inquiry fuse a broader aesthetic interest combining what the American psychologist Eugene Gendlin calls "felt meaning" with aesthetic-technological research and practice in the development of sensor-augmented, responsive media environments.[4] I began to explore this interest in threshold, or what Arnold Van Gennep defined as 'liminal' states of experience, with the media performance work *Schwelle* and, in particular, Part III, a prototype installation created at the former Berlin cultural center Podewil during 2003–04 and shown at the Transmediale festival in 2004.[5] In that work, a group of participants entered into a small, closed off, pitch-black darkroom housing a series of five 3- by 18-foot enclosed tunnels containing a series of taught, fabric muslin screens that featured progressively larger rectangular openings. Positioned above the rear of the tunnels were cylindrical reflectors, each fitted out with high-powered, blue-colored LEDs. Within the larger room a pair of CO_2 sensors measured the fluctuations of carbon dioxide from the aggregate breath of the five participants, which was then used to steer minute, almost unperceivable changes in the brightness of the LEDs and the amplitude of audio above and below the thresholds of human auditory and visual perception in the environment.

Brought into the tunnel-like spaces individually and shown places on the floor by an attendant, the visitors were told nothing about the technical system in the room—only to keep mindful of their breathing. After all of the participants had entered, the room remained in total darkness for a period of five minutes. A timer in software then increased the LED brightness level from 0 to 20% over the course of the next eight minutes. During this time, the system also polled the rate of change of CO_2 in the room every minute. Small, relative changes of CO_2 during these one-minute intervals yielded relatively minimal effects, while larger changes generated more pronounced results, including raising and lowering the amplitude of almost infrasonic sound continuously, slightly above and below the threshold of hearing and rapidly changing the speed of the brightness intensity of the LEDs. These

brightness changes generated oscillations or pulsing of the light, effectively making the tunnel architecture rapidly appear and disappear for the participants. Over the course of approximately twenty minutes inside the darkened installation, the barely perceivable lit surfaces appeared to the visitors to slowly materialize and then, depending on the overall environment perturbations, just as suddenly vanish. Despite the fact that there was little temporally direct coupling between the changing rate of CO_2 in the room and the resulting effects of the media, participants still projected their perception into the changing space before them, linking the dynamic coupling between the environment's visual and aural fluctuations and their own breathing patterns.

After this experiment, my interest in liminal states of perception resurfaced in an essay for *See This Sound*, a large-scope research project encompassing an exhibition, conference, and Web and print publications produced by the Ludwig Boltzman Institute for Media Art Research in Linz, Austria, during 2008–09. Entitled 'The Question of Thresholds: Immersion, Absorption and Dissolution in the Environments of Audio-Vision', the essay centered on issues of immersion and perception explored by artists who construct sensory-based media environments deploying moving image and audio within specific spatial-architectural configurations.[6] At the core of the essay (and one of the central catalysts for *JND*) is the now almost forgotten Turrell and Irwin experiment developed jointly between the artists and experimental psychologist Edward Wortz for curator Maurice Tuchman's Art and Technology Program at the Los Angeles County Museum of Art (LACMA) in 1968. One of the first art and technology programs in the US, Tuchman's curatorial vision sought to bring together visual artists with researchers from corporations such as IBM, Lockheed, Garrett Aerospace, Rand and Kaiser Steel, among others, to explore new technological possibilities for artistic practice; a program that Tuchman described would "bring together the incredible resources and advanced technology of industry with the equally incredible imagination and talent of the best artists at work today".[7]

In collaboration with Wortz, who was working at the time on extreme environments for astronauts in the life-sciences division of Garrett Aerospace, Turrell and Irwin set out to explore the transformation of consciousness that might occur with the extreme reduction of sensory input in an external environment and, in particular, how one could enhance the potential crosstalk occurring in the brain when it processes image and sound. More of a *Gedankenexperiment* than an actual project, the artists and scientists investigated a range of apparatuses primarily used in perceptual psychology research, including *Ganzfeld* phenomena, alpha-wave conditioning and the anechoic chamber.[8]

In combining the attributes of a *Ganzfeld*, a perceptual environment in which all depth perception is lost, with that of an anechoic chamber, the collaborators sought to conceptualize an acute reduction of the sensory context that could enable new possibilities of perception from a featureless field. More importantly for our purposes, in creating a physical environment with extremely low intensity levels of

sound and light, spectators/participants would be required to "pay attention to the images and sounds of their own perception".[9] This strategy would thus immediately call into question the locus and action of experience itself—where, when and how it takes place. Perception would have to become an active phenomenon, creating its own conditions for it to actually take place. "The experiencing act itself … is the 'thing' or 'object' ".[10]

While Turrell and Irwin's investigation is tinged with 1960s ideas, particularly the experiments with alpha-wave conditioning to catalyze alternative states of consciousness, there are some extremely contemporary ideas relevant to more recent work in enactive perception. With the increased technical possibilities to more fully explore in artistic practice the inhabitant-environment sensorimotor perception loop theorized in the 'embodied mind' work of Francisco Varela, Eleanor Rosch and Evan Thompson[11]—and, later, Alva Noë and Kevin O'Regan's study of sensorimotor contingencies in visual perception[12]—most intriguing was Turrell and Irwin's unrealized concept to make the environment itself 'sense back'—that is, *respond* based on the actions of the participants within the space.[13] Indeed, one of the key characteristics of Noë's description of the 'enactive approach' to cognition is that perception itself is a "kind of skillful bodily activity" directly reliant on "sensorimotor dependencies".[14] Such dependencies describe the ways in which different sensory modalities bring an environment into being for the sensing subject: for example, how the body moving through space changes the appearances or sounds of objects or how active "tactile" exploration such as "probing, prodding, stroking, nibbling, squeezing" gives us a sense of the environment.[15] Noë challenges the idea that perception is solely located in the head as well as in the material essence of objects. Instead, *movement* and specifically, "*self-actuated* movement", is necessary for perception "to *test* and so *learn* the relevant patterns of sensorimotor dependence".[16]

This last statement catalyzes one of *JND*'s central research questions: namely, how do we directly experience our own sense of bodily movement coupled to an environment when such movement takes place at the limen or the threshold of perception? Descriptions of enactive perception are usually extremely active, assuming a locomotive subject performing a set of actions or what Noë calls "skillful looking". How might one sense one's own body movement and use that to activate a direct motor coupling to an environment which itself offers continually fluctuating and changing affordances in terms of image, sound and touch? What would happen to one's own sense of body and, consequently, of self in a sensory environment where perception continually rides on such limens?

COMPOSING WITH LIMENS

Introduced into the psychology literature in the early nineteenth century and originally appropriated from Leibniz, Johann Friedrich Herbart's concept of the limen designated the zone in which ideas cross from the conscious to the unconscious mind. In seeking to establish a relationship between mental and physical phenomena, the German psychologist Gustav Fechner reappropriated Herbart's concept of the threshold in order to develop a quantifiable magnitude for sensation which he published in his *Elemente der Psychophysik* (1860).[17] Specifically, Fechner quantified Ernst Weber's empirical studies describing the proportional relationship between equal increments of a stimulus and the perceived increments of sensation (i.e., perception) of that stimulus. Using the concept of the 'difference threshold', Fechner's equation (known as the Weber-Fechner law) stated that $g = k \cdot log\ b/b$ (where k is a constant) or, in words:

> The magnitude of the sensation (g) is not proportional to the absolute value of the stimulus (b), but rather to the *logarithm* [my emphasis] of the magnitude of the stimulus, when this last is expressed in terms of its threshold value (b), i.e. that magnitude considered as unit at which the sensation begins and disappears. In short, it [the magnitude of the stimulus] is proportional to the logarithm of the fundamental stimulus value.[18]

Moreover, in his mathematization of Weber's law, Fechner's "measurement formula corresponds to experience … in the cases of the thresholds, where the sensation itself ceases, and where its change becomes either imperceptible or barely perceptible. In the former case, when the sensation reaches its lower threshold; in the latter case, when it becomes so great that a given stimulus increase is barely noticed and in the contrasting cases, between sensations which rise above the threshold of consciousness and those that do not reach it—in short, conscious and unconscious sensations".[19]

In order to avoid confusion, it is important to state at the outset that we use the term 'just noticeable difference' in a *phenomenological* context rather than from Fechner's psychophysical (i.e., stimulus measurement) point of view. First, in psychophysical experiments, JNDs always refer to a reference level of stimuli (s) to which the incremental change (the JND or Δs) is then related. Second, in order to accurately measure the JND, a subject must undergo numerous trials under the exact same conditions of being exposed to the particular stimuli. By contrast, in the installation there is no reference level by which to measure the participants' JNDs nor do the participants undergo more than one session (although they have the option to return to experience the work again). Indeed, there is no psychophysical

measurement going on whatsoever with the participants. Perhaps it goes without saying that despite the fact that the work utilizes the concept of the JND in a direct and felt manner (not as metaphor), it utilizes neither of the above-discussed methods of measurement within very specified laboratory conditions and therefore cannot (and should not) remotely be described as *scientific* research or, worse, as 'art science'.

Similarly, like Turrell and Irwin's use of the instruments of the *Ganzfeld*, alpha conditioning and anechoic chamber, *JND* also appears, at least at first, to utilize an experimental psychology apparatus (an enclosed, light, tight space with threshold levels of carefully determined and applied stimuli) to test whether or not the visitors indeed can experience changing limens across three different media: sound, haptic phenomena and light. Unlike the controlled conditions of a psychology laboratory in which phenomena such as cross-modal perception are analyzed by holding all variables constant, *ceteris paribus*, in order to examine perceptual response to a single stimulus under critical conditions (listening, seeing, touching, etc.), our intentions were to explore a changing and potentially interfering set of JNDs without the need for *measurable* repeatability across many subjects. More importantly, we wished to explore how different experiences might arise if such thresholds were actually perceived as dynamic—that is, they would evolve over time.

Since this essay is contextualized within the framework of sound in general, and electronic music in particular, we want to explore the sonic and tactile design strategies employed during the making of the work between the summer of 2009 and the winter of 2010. Although it uses principles of haptic sound design, *JND* distinguishes itself from other artistic 'tactile audio' projects such as Lynn Pook and Julien Claus' "audio tactile simulations" or Kaffe Matthews' 'Sonic Bed', among others, through its focus on interactive (i.e., partially participant-influenced) composition models that exploit the medium of haptic experience as *one of many sensory modalities* with sufficiently different perceptual thresholds taking place in the environment.

SEPARATION VERSUS CONTINUITY

In order to work between the two distinctive modalities of the acoustic and the haptic, we needed to devise a technological apparatus that could combine both phenomena within a single framework. We were particularly inspired by the research of McGill University engineering doctoral researcher Yon Visell, who is examining the situation of interactive walking through the design of a tile-based floor system in which tactile stimuli are delivered to the soles of the feet.[20] While Visell's work in haptic interaction departs significantly from our artistic interests and intent, we employed on his suggestion one of the central technologies utilized in his experimentation—twelve Clark Synthesis tactile sound vibrotactile transducers. Essentially used as bass shakers for the LFE (low-frequency effects) channel of 5.1 home spatialization systems as well as for delivering low-frequency vibrations to theater cinema seats, the Clark Synthesis actuators are interesting from a sonic-aesthetic point of view since they can be used as normal speakers and, depending on the amount of amplitude, can also be turned into acoustic transducers. Because of this dual feature, we could work with sound sources across a wide frequency range that could then transition, either gradually or suddenly, to vibration.

Borrowing and adapting Visell's use of the tile system to isolate the vibrations of the actuators into individual spaces in order to reduce the potential for both acoustic as well as structural (material) resonance, we devised a floor unit housing twelve individually isolated tiles with the actuators suspended under them, combined with a foam mat over the top on which the visitor lies. The floor is slightly raised and covered so that none of this apparatus is visible. What is also worthy to note is the fact that each of the tiles is individually addressable in terms of positioning audio signals, as in a multichannel speaker array, enabling the possibility of many types of spatialization models with both audio and vibration.

SPATIALIZED TOUCH

How does one go about designing sound that functions both at the audible and the tactile level? Already this question suggests some notion of synesthetic experience in which one sense modality commingles or contaminates another.[21] In strategizing a compositional structure for the installation that would easily enable an exploration of sound and tactility and give the possibility of merging both, we tried at first to separate sound and touch in order to emphasize the unique qualities of each. Compositionally, we structured the work to begin with slowly panning, wave-like sounds (essentially filtered pink noise that would pan from the head to the feet) that would gradually transition from audible to purely haptic sensations with no residue of perceivable audio. Mainly due to the limitations of the Clark Synthesis speaker technologies, this idea was quickly abandoned during early testing after much difficulty in trying to achieve vibrations with few or no audible components. In other words, most of the 'tactile sounds' we tested failed to convey the singular sense modality of touch because they essentially kept leaking into the audible range.

In designing sound structures that were interesting from both a sonic as well as tactile perspective, we then set out to work with material that was not easily representational (i.e., referring to something else) and, at the same time, created a strong visual as well as aural sense of space. Tantamount to this was using sound to give the impression of different spaces that would shift from one moment to the next; something particularly important given that any common visual experience of space would essentially be thwarted due to the extreme darkness encountered in the environment. This 'sense of space' carried over in the creation of specific tactile sensations, specifically the manner in which visitors could feel different tactile patterns on the body and how such spatial patterns could be modulated from clearly perceivable to essentially noise.

As visitors to the installation would be lying on their backs where the body itself tends to fall into a relaxed state, the touch receptors in the feet and back would primarily be activated due to the vibrotactile actuators installed under the floor. In referring to the haptic sense, noise here designates the fact that the signal amplitude is too low for the touch receptors to recognize an external input as well as an indistinguishable pattern based on the manner in which the haptic sound is spatialized across different regions of the body (i.e., the resolution of individual vibrations is not clear enough to distinguish different regions of the body). These differences between spatialized sound (sound that moves between specific point sources) and spatialized tactility (vibrations that change from one bodily position to another) constitute a central tension and conceptual framework for our work.

SOUND AS FELT SENSATION

In exploring the continuum from audition to tactility, we designed sounds utilizing three distinct categories of sound synthesis techniques developed in the SuperCollider real-time audio software: (1) percussive models featuring impulses or transients, (2) continuous models constructed of multiple oscillators to investigate techniques such as beat frequencies, roughness in the critical bandwidth of hearing and so on, and (3) noisy (i.e. dust), impulse-triggered models constructed of inharmonic spectra. Early on in the development process, however, the sound/touch design was challenging due to the continued presence of audible sounds that lacked haptic intensity. We thus began exploring techniques of sampling beyond synthesis as well as working with richer harmonic spectra in the synthesis models that could convey a certain timbral density and complexity, and, through filtering techniques, be harmonically adjusted to also function in the tactile realm. With a range of different sound models, we could thus operate in the auditory range under one set of parameters and, when adjusted, in the haptic range with others.

Given the issues of sound spatialization and haptic resolution outlined above, we encountered a similar set of obstacles when attempting to localize and then move (i.e., pan) two different kinds of signals with different perceptual affects (sound versus vibration). In the audible realm, spatialization involved: (1) whole-body effects (all speakers/actuators on at the same level), (2) sequential, localized excitation (one region of the body, such as the head or feet) and (3) parallel, random phase excitation (similar signals are used in pairs of speakers but are out of phase with one another, giving a particularly strange bodily effect in terms of both the spatial and tactile localization of the signals).

Perhaps these spatial effects found their strongest realization in the manner in which bodily movement from the visitors would be monitored through the pressure-sensing techniques so as to influence the perceived sensation of sound and vibration in different regions of the body. One model employed coupled movement of a certain area of the body with direct tactile feedback. For example, movement of the left foot might produce a direct vibration based on the intensity of the movement or, in sensing terms, the variance of the movement over time picked up by the sensors underneath the foot. A second model worked with sound/vibration spatialization in a slightly more counterintuitive way. Overall movement of the body would be statistically averaged and affect the amplitude of a vibration that was already in the process of panning from the head to the feet, thus resulting in the experience of feeling a sudden moving vibration at a different part of the body from the original area in which movement took place—a tactile yet nonetheless nonlocalized stimulus.

EXPERIENCE AND POIESIS: AUTHORS

As already stated, the expressed artistic goal of *JND* is to enable different sensory registers of experience to take place—experience that arises from the gradual building up of a world in an embodied manner, with the limen as a starting base for the experience. By now it should be clear from the description that *JND*'s research questions cannot be adequately addressed from a purely psychophysical—that is, measurement—perspective. Even though the pressure-sensing techniques register extremely small movements in the visitor's body and we can use those movements to influence the intensity of vibration (or sound) does not mean that the visitor has a conscious perception of what movements (particularly small ones) they are making or, more importantly, how they directly influence the system's behavior over time.

What is most interesting about the actual process of creating *JND* is the elimination of distance between the installation (the art object) and the creators (the artists). Similar to Robert Irwin's realization in the mid-1960s that the event of perception is the artwork itself, *JND* collapses the distance between work and artist by resituating the process of making directly in the authors' bodies. In other words, in order to get feedback from the instrument/apparatus during the development process itself, the creators had to directly rely on their own bodily perception to test and tune the effectiveness of the various sound-haptic synthesis models rather than sit back and listen/watch at a distance.

The same goes for the manner in which the creators dealt with previous research in the field of haptic sensing such as the *Cutaneous Grooves* project,[22] and Rovan and Hayward's influential discussion of timbre in association with touch.[23] While both of these studies serve as landmarks in the still sparse research field of haptic sensing in relationship to sound, they were both completed under extremely precise laboratory conditions of measurement and not directly focused on artistic intentions. Perhaps again this distance between examination and experience is what distinguishes the use of such haptic phenomena in measurement contexts compared to the experiential framework of *JND*.

In *Art as Experience*, John Dewey discusses the relationship in artistic practice between doing and undergoing: "So marked is the active or 'doing' phase of art, that the dictionaries usually define it in terms of skilled action, ability in execution".[24] According to Dewey, undergoing is traditionally seen in the realm of the *aesthetic* as an issue of reception and perception outside of the maker and implies experience that is distinct from the act of *poiesis*. Yet Dewey also argues that perceptual experience is that which unites the poietic and the aesthetic.

> The act of producing that is directed by intent to produce something that is enjoyed in the immediate experience of perceiving has qualities that a

> spontaneous or uncontrolled activity does not have. The artist embodies in himself that attitude of the perceiver while he works.[25]

Dewey locates the shift from mere reception of what is being made to direct, intense perception of the artistic process in the "felt action of order and fulfillment of the maker"—that is, the corporeal experience of the maker across all sensory modalities.[26] Direct knowledge—or, more appropriately, *knowing*—emerges through this felt sensation of how a particular object that is being shaped feels or how a particular process unfolds over time, changing our affective relationship to it.

The process of constructing *JND* in many ways directly embodies Dewey's collapsing of the distinction between artistic *poiesis* and passive reception. Indeed, working with such sensory stimuli at differing thresholds during the development sessions made us acutely aware of the degree of concentration and attention required to move back and forth between the acts of experiencing, analysis and aesthetic judgment (does it work or not) and the composing and programming of the system (how it comes into existence). Making and perceiving merged into one during long development/rehearsal sessions where we would move between the 'analytic' area of the computer in the studio to lying on the surface of the floor to directly experience in the body what had just been programmed. In the almost self-imposed sensory-reduction environment of LabXmodal where the piece was built, working sessions lasted for undefined (and sometimes unknown) durations.[27]

Early on in the piece's development, the flow of our working sessions consisted of quickly sketching conceptual ideas in code (what we termed 'modules') and then testing these without direct regard at first to how such modules could be sequenced in time. This process quickly led to a certain impasse and frustration because we desired immediately 'felt' results to validate conceptual ideas. Akin to learning how to play a musical instrument or the first attempts at meditation, we quickly realized that another type of attentiveness/awareness would indeed be required—one that would not necessitate producing or experiencing immediate results but only gradually reveal itself (and its underlying stimuli) over a longer time window. Indeed, this slowing down of making and perceiving led to long periods where little got composed or programmed.

Moreover, the necessity for us to acutely experience stimuli below the borders of everyday perception led to a suspension of our own perceptual habits, particularly those oriented within the constraints of clock time. This realization helped further justify our interest in the visitor experiencing a direct loss of externally regulated time and, instead, in providing them with the possibility of locating movement and duration directly in the internal time consciousness of the body itself.

EXPERIENCE AND *POIESIS*: PUBLIC

An analysis of the complete process of development, composition and construction of *JND* goes beyond the scope of this chapter but we hope to have given a brief sense of how the process of creating the installation reinforces the idea that experienced knowledge cannot so easily be split between the production of a work and its external reception or 'consumption'. Instead, making should be seen as an active process of bringing something unknown into tangible form by way of direct bodily experience. If making and experiencing remove the traditional distinction between the aesthetic object and the experience, however, then how do we understand this experience undergone by those truly outside of the process of making—the audience or public? Is there an adequate way to describe in language (spoken, written and bodily) an experience that is primarily nonlinguistic, nonrepresentational, somatic and phenomenal? How can such an experience be understood *a posteriori*—that is, after the actual bodily perceptions undergone in the environment itself?

Francisco Varela and Jonathan Shear have discussed the necessity of first-person methods, or what they label 'phenomenal data', to complement third-person methods in understanding the workings of consciousness: "By first person events we mean the lived experience associated with cognitive and mental events".[28] While third-person accounts "concern the descriptive experiences associated with the study of other natural phenomena", first-person methods deal with subjective experience that "refers to the level of the *user* of one's own cognitions, of intentions and doings, in everyday practices".[29] Although Varela and Shear's argument seeks to bring such questions of phenomenality (the experience of appearances) into cognitive-science debates on consciousness, there has also been increased interest in utilizing and analyzing first-person, qualitative data in artistic practice, particularly in the context of interactive media art works.[30]

To begin to scratch this vast surface of the complex question of what constitutes the visitors' somatic experience in the case of *JND*, we decided at the start of the project that a series of user testing sessions would be a necessary and invaluable as part of the prototyping process of the piece. Held in the LabXmodal studio site during the last two weeks of January 2010, the test sessions were designed not only to elicit feedback on whether or not the compositional design choices were interesting but also to explore how visitors described their experiences and whether or not similar patterns of description would arise across the sample group. In this discussion, we again need to articulate that the testing sessions were very preliminary and, most importantly, we did not subject the data gathered in the form of audio-video recorded semistructured interviews to statistical analysis for scientific validation.

Given the sensitive nature of the sessions, we developed a full protocol including the use of qualitative methods of semistructured verbal interviews that were then recorded along with standard consent and release forms that gave the participants an overall sense of the process as well as the ability to opt out of the experiment. Titled "experimental prototyping session for interactive experience", the test sessions involved a sample of thirty people all of whom were from the Montreal area, spanned in age from early 20s all the way to the mid-50s and represented a wide range of professions, from students and researchers to yoga teachers and artists. The order of events in the prototype sessions began with welcoming the participants outside of the studio space. The participants then signed a consent/release form and received a short verbal description of the structure of the session from Brett Bergmann, one of the members of our creative team, who also ran the interview sessions. While the participants were told that the experience would last no longer than fifteen minutes, there was no direct indication of the time frame of the test (twelve minutes was the actual duration), nor any description of what the participants should do during the session.

After the participants had signed the release form, the interviewer led them into the darkened studio space (approximately 10 by 9 meters, with a ceiling 3 meters high) where the installation had been set up. As the originally conceived solid box-like structure was not yet ready for the prototyping sessions, we substituted heavy black theatrical curtains ('drops') for the walls of the space and focused on the floor unit. Additionally, we constructed the lighting elements for the installation by suspending a thin wooden dowel at the height of the ceiling directly over the floor structure and beamed light onto the surface of this floating stick using two color-changing LED fixtures mounted on both sides of the curtained-off space, and masked off so as not to reveal the source of the light. This makeshift apparatus served both to hide the lighting system and to confuse the visitor's visual perception in terms of what source was emitting the light. Thus, participants entered into an environment in which they had little spatial or architectural orientation due to the absence of light. We then requested the visitors to remove their shoes and coats and gently crawl on hands and knees a short distance into the curtained-off space that had been architected directly in the center of the room. As the interior curtained space was extremely dark, we also asked the participants to orient their body along the long axis of the floor structure housing the actuators by way of a small piece of phosphor tape (glow tape) attached to the floor and which provided the sole illumination in the space.

Once participants were inside the space, the test session began. After the numerous hours of developing individual compositional modules, we devised a three-part compositional structure lasting approximately twelve minutes, part of which would be open to participant intervention based on their small movements against the surface of the floor. We designed the compositional structure to introduce each separate media element (sound, vibration and light) on its own and then to gradually combine them. Lasting approximately six minutes, the first

movement consisted of continuous and panning sounds, vibrations and light barely at the thresholds of perception.

Combining slowly panning structures (like filtered white noise) together with precise but low-intensity jabs of threshold vibrations, high-frequency (+ 10 kHz) tones and lower (30 Hz) rumbling and resonating timbres, the second movement (three minutes) abruptly shifted the barely perceivable quality of the first movement towards a more noticeable set of transient percussive patterns that pulsed in different sequences and tempos underneath the participants' backs, building in intensity. Finally, the third movement (lasting around two minutes) featured a dense timbre comprising multiple partials, gradually modulated by slow attack/decay envelopes and distributed across all twelve of the actuators. While the temporal distance between the onset of each vibration grew over time, the sheer intensity of the steady state, rising and falling time constant of these end vibrations led several of the participants to describe their bodies as continuing to tingle or be 'actuated' after the actual vibration had stopped. After this final vibration, the end of the piece included a silent pause of thirty seconds.

After the test session, the interviewer brought each participant out of the curtained-off space and sat them down at the interview table. To avoid unnecessary attention, we positioned the recording video camera some distance away from the table and turned it on a few minutes prior to the end of the test session. Using the set of interview questions, we sought to gather information about the clarity and cohesiveness of the narrative/dramaturgical structure (Did the participants detect any kind of overall composition structure? What happened during the different movements? etc.) as well as more experiential responses (What does and did your body feel like? Describe the quality of the space. Did you feel at any time the desire to move? Did you feel that your actions changed the quality of the space?).

While it is difficult to summarize the wide range of responses, we want to conclude with a few experiential observations on the nature of the prototype sessions. What is critical to mention here is that the sessions directly reinformed design decisions. Indeed, after the first week of tests and participant responses, the team changed elements of the sequencing and transitions between movements as well as timing and brightness of lighting sequences, and clarified the interactive elements of the installation. Interestingly enough, participants during the second week had similar experiences as those from the first week, despite the changes.

We broke the interview questions down into several categories: questions concerning direct bodily experience, specific spatial and temporal phenomena, information about compositional structure and recognition of interactive or responsive (environmental) elements. In responding directly to bodily experience while inside the room, most participants vividly described particular sensations and feelings and how those sensations changed over the course of the experience. The first question "How do you feel?" directly addressed the issue of eliciting descriptions (in language) about a bodily experience that had just immediately passed. One respondent focused on shifting experiences of bodily weight ("I felt

incredibly heavy, like sinking into the floor") while others described feelings of pleasure ("wonderful", "never felt that before", "I feel great", "really nice, I could stay in there a long time", "soothed … quite a sweet experience"), fear, disorientation and trepidation ("sensorially discombobulated", "I feel like jelly", "dizzy", "that is pretty creepy"). While it appeared challenging to do, some participants attempted to directly articulate bodily sensations ("I'm tingling", "it's warm", "relaxed but not relaxed", "vibrating") by using a wide range of hand gestures and other gesticulations and pointing to various limbs and appendages where the sensation had taken place.

Questions dealing with spatial-temporal information aimed at understanding how participants experienced the space through their bodies. For example, the question concerning the visitors' initial impressions of the curtained-off space resulted in replies describing feelings of complete disorientation, lack of spatial awareness, different sense impressions of the surface that participants lay on and the like. Likewise, participants described how the sound and barely perceivable light altered the relationship between their own body and the room's scale. For example, some visitors argued that they had to crawl into a tunnel or cave or that the room was much smaller or more claustrophobic than in actuality. Moreover, a great majority of the visitors described a radical shift in the first to the second movement due not only to the more aggressive nature of the tactile sequences but also because the sudden flashes of light revealed an entirely different-sized space in dimension and material than originally thought ("the space suddenly opened up").

What is particularly noteworthy of this shift in lighting was the manner in which some participants described radically different *proprioceptive* experiences. One visitor asserted that, as the light appeared, she suddenly felt "space" above her body—a feeling accentuated by her "moving hands in front of her" to discover that her body was actually in a larger volume. Another visitor reported losing the sense of his body and "floating in a void of black space with sounds" that was not located anywhere. Additionally, many visitors also claimed that sound was coming from above and from the walls of the structure itself—certainly an impossibility given the fact that the walls of the structure were curtains and that the sound sources were located under the raised floor.

Not surprisingly, another common pattern revealed the onset of visual and aural illusions and, occasionally, hallucinations due to the lack of sufficient light and the disorienting motion, position, amplitude and timbre of the sounds. While many participants recounted experiences attributable to the occurrence of idioretinal light (light occurring in the eye in the absence of a visual stimulus) and other hypnagogic hallucinations (aural and visual hallucinations taking place between being awake and asleep), other impressions ranged from one visitor hearing his own tinnitus amplified to experiences of the physical space shifting due to the change of timbres and rhythms.

Participants also articulated strong temporal impressions of the experience, indicating that they understood the preplanned, compositional structure. While many

described the loss of chronological time as expected, a few of the participants felt anxious and bored because of the inability to distinguish one moment from the next —that of perceptible change within the individual sections. Many also clearly indicated the exact breakdown of the various sections of the piece and even precisely stated the exact number of sections and how the transitions between them functioned. What is most intriguing is the way in which visitors elucidated the relationship between the temporal flow of the environment and the influence of this on their somatic experience. Some participants, for example, recounted the impression of sharpening attention based at first on the perceptual thresholds of the media and then, later, on the changes in their intensity. While some discussed heightened sensory awareness through the ability to differentiate the sounds inside the curtained-off space from environmental sounds outside of the space or, indeed, outside of the studio-lab space, others reported that temporal shifts in the media, particularly the light, were extremely jarring, interrupted direct bodily sensations and called needless attention to the mechanisms of the compositional structure.

Finally, perhaps the most provocative responses emerged when we directly asked participants whether they detected a sensorimotor loop between their bodily movement on the floor and the responding vibrations. Among the thirty testers, very few described the need to (consciously) move while lying down. Similar responses ensued when visitors were asked the questions "Did you feel the need to move?" and "Did you think your movement changed anything or was the experience responsive in any way?" Indeed, many of the visitors paused to recollect what actually had transpired between themselves and the environment, leading to several arguing that they were responsive to the environment and not vice versa. While the answers of some visitors led the interviewer to believe that they had experienced a direct link between their own sensorimotor actions and the environment, others made no link between action and perception and, in fact, answered that they enjoyed not having "to do anything" except wait for the different planned sequences of the composition to occur.

Moreover, many participants chose to remain still the entire time, making the possibility of any direct felt coupling between movement and reacting vibrations even more difficult to perceive precisely because the intensity of the vibration was dependent on the amount of change in the movement taking place. The inability for participants to somatically detect and recognize how such micromovements affect one's experience led the creative team to significantly revise the interactive elements of the composition for the first public showing in March 2010, making the relationship between movement and sonic and tactile response far more coupled and legible (if not still fluctuating around the threshold of perceptibility).

CONCLUSION: *JND*—FROM LAB TO PUBLIC

This chapter has attempted to describe the conceptual, technical and artistic development and early participant testing phase of *Just Noticeable Difference*, a new multisensorial installation that premiered to the general public at the new Experimental Media and Performing Arts Center (EMPAC) at Rensselaer Polytechnic Institute in Troy, New York, in early March 2010 and subsequently toured internationally during 2010–11. From the visitors' point of view, the installation explores somatic, felt experience and the phenomenal sense of change that takes place inside a space in which sensory intensity is initially reduced and only builds itself up through a complex set of interactions among the body, technology and environment. More specifically, the installation investigates how the perception of incremental change, the just noticeable difference, reinforces or destabilizes not only our experience of sensory perception but, perhaps more radically, our experience of self.

We have also argued that *JND* collapses the traditional differentiation between artistic making and aesthetic perception and reception due to the manner in which the creators themselves have been directly implicated from their own corporeal point of view in composing for an environment which moves through several sensory modalities including touch, audition and sight. More interesting are the ways in which such bodily experience relates to how visitors make sense of a changing environment which is partially scripted and partially based on the sensorimotor links between movement and sense impressions—a link which, at times, operates at the limen of conscious perception. As the installation moves into the broader public realm, we plan to use more extensive ethnographic techniques to understand what actually takes place in the felt experience of the visitors as they navigate a cross-modal world which, due to its unstable sensory nature, is continually on the verge of slipping away.

NOTES

1. www.idmil.org (accessed March 24, 2011).
2. We use the term 'haptic sound design' to designate the process of designing sound that will generate tactile responses. In the research project 'Cutaneous Grooves' (O'Modhrain, 2003), the term 'tactile composition' is coined, which refers specifically to composing with only touch modalities generated by acoustic transducers.
3. See Lawrence Weschler, *Seeing Is Forgetting the Name of the Thing One Sees: Over Thirty Years of Conversations with Robert Irwin* (Berkeley: University of California Press, 2009).
4. "Besides the logical dimension and the operational dimension of knowledge, there is also a directly felt, experiential dimension. Meaning is not only about things and it is not only a certain logic structure, but it also involves *felt experiencing*. Any concept, thing or behavior is meaningful only as some noise, thing, or event interacts with felt experiencing. Meanings are formed and had through an interaction between experiencing and symbols or things". See Eugene Gendlin, *Experience and the Creation of Meaning: A Philosophical and Psychological Approach to the Subjective* (New York: Macmillan, 1962), 1.
5. See Arnold van Gennep, *Rites of Passage* (rev. edn, London: Routledge, 2004 [1977]), 11.
6. Christopher Salter, 'The Question of Thresholds: Immersion, Absorption and Dissolution in the Environments of Audio-Vision', in *See This Sound: Audiovisuology: Volume II* (Cologne: Walter König, 2010).
7. Maurice Tuchman, *A Report on the Art and Technology Program of the Los Angeles County Museum of Art, 1967–1971* (Los Angeles: Los Angeles County Museum of Art, 1971), 4.
8. "Alpha is the designation given to certain measurable cycles of brain waves which have for some time been known to occur strongly during states of meditation. Sustained alpha rhythms of between twelve and eight cycles per second can be induced by putting oneself in a meditative state. One can test one's own ability to produce alpha with the use of an electroencephalograph machine, hooked up to some kind of audile or visual sensor which tells the subject when alpha is occurring. Dr. Wortz contrived a device which worked extremely well for himself, Irwin and Turrell. He attached a small light to a pair of glasses worn by the subject while sitting, relaxed, in a comfortable chair; the subject would close his eyes, and see through his eyelids the light, which would come on only when the EEG registered alpha rhythms of twelve cycles per second or lower". Ibid., p. 132.

9. Ibid.
10. Ibid.
11. Francisco Varela, Evan Thompson and Eleanor Rosch, *The Embodied Mind: Cognitive Science and Human Experience* (Cambridge, MA: MIT Press, 2001).
12. J. Kevin O'Regan and Alva Noë, 'A Sensorimotor Account of Vision and Visual Consciousness', *Behavioral and Brain Sciences* 24 (2001), 939–1031.
13. See Varela et al., *The Embodied Mind*, and O'Regan and Noë, 'A Sensorimotor Account'.
14. Alva Noë, *Action in Perception* (Cambridge, MA: MIT Press, 2004), 2.
15. Ibid., pp. 14–15.
16. Ibid., p. 13.
17. Gustav Fechner, *Elements of Psychophysics*, trans. H. E. Adler (New York: Holt Rinehart, 1966).
18. Ibid., p. 562.
19. Ibid., p. 562.
20. See Yon Visell, Alvin Law and Jeremy R. Cooperstock, 'Touch is Everywhere: Floor Surfaces as Ambient Haptic Interfaces', *IEEE Transactions on Haptics* 2/3 (July–September, 2009).
21. In using the word 'synesthesia', we want to suggest its nonmedical understanding of a cultural mingling or mixing of two different sensorially distinguished stimuli that then get fused in perception.
22. Eric Gunther and Sile O'Modhrain, 'Cutaneous Grooves: Composing for the Sense of Touch', *Journal of New Music Research* 32/4 (December 2003), 369–81.
23. Joseph Rovan and Vincent Hayward, 'Typology of Tactile Sounds and their Synthesis in Gesture-Driven Computer Music Performance', in Marcelo M. Wanderley and Marc Battier (eds.), *Trends in Gestural Control of Music* (Paris: Editions IRCAM, 2000).
24. John Dewey, *Art as Experience* (New York: Perigree/Penguin, 2005 [1934]), 49.
25. Ibid., p. 50.
26. Ibid., p. 51.
27. See http://xmodal.hexagram.ca (accessed March 24, 2011).
28. Francisco Varela and Jonathan Shear, *The View from Within: First-Person Approaches to the Study of Consciousness* (London: Imprint Academic, 1999), 1.
29. Ibid., p. 4.
30. See Ernest Edmonds, Lizzie Muller and Deborah Turnbull (eds.), *Engage: Interaction, Art and Audience Experience. Proceedings of the Engage Symposium, November 2006* (Sydney: Creativity and Cognition Studios Press, 2006).

Contributors

Georgina Born (BSc Hons First Class and PhD Anthropology, University College London) is Professor of Music and Anthropology at the University of Oxford and Honorary Professor of Anthropology at University College London. She was formerly Professor of Sociology, Anthropology and Music at the University of Cambridge (2006–10) and Professorial Fellow of Girton College Cambridge, as well as Official Fellow of Emmanuel College Cambridge (1998–2006), and Senior Research Fellow of King's College Cambridge (1997–8). In 2014 she will be the Ernest Bloch Distinguished Visiting Professor at the University of California, Berkeley, and in 2007 she was awarded the Dent Medal of the Royal Musical Association. Her specialism is the ethnographic study of contemporary cultural and media production, often in institutional form, and her research has encompassed music, interdisciplinarity, art-science and television. She also engages in theoretical and conceptual work. Professor Born is on the advisory or editorial boards of several journals including *Studien zur Wertungsforschung, Cultural Sociology, Anthropological Theory*, and *New Media and Society*. Her books are *Rationalizing Culture: IRCAM, Boulez and the Institutionalization of the Musical Avant-Garde* (California, 1995), *Western Music and Its Others: Difference, Representation, and Appropriation in Music* (California, 2000, edited with David Hesmondhalgh) and *Uncertain Vision: Birt, Dyke and the Reinvention of the BBC* (Vintage, 2005). Since October 2010 she has been leading the five-year research programme 'Music, Digitization, Mediation: Towards Interdisciplinary Music Studies', funded by the European Research Council. Two edited books—*Music, Sound, and the Transformations of Public and Private Space* (Cambridge) and *Interdisciplinarity: Reconfigurations of the Social and Natural Sciences* (Routledge)—are forthcoming.

Federico Celestini studied Musicology, Literature and Aesthetics at the University 'La Sapienza' in Rome, Italy, before completing his PhD and Habilitation in Musicology at the Karl Franzens University in Graz, Austria. From 1999 to 2005 he was coordinator of the musicology division of the interdisciplinary research project *Moderne—Wien und Zentraleuropa um 1900* at the Karl Franzens University in Graz.

Celestini has received several fellowships and visiting professorships, e.g., from the British Academy (University of Oxford), the Riemenschneider Bach Institute (Cleveland), and the Alexander von Humboldt Foundation (Freie Universität Berlin). In 2010 Celestini was a European Mellon Scholar and Visiting Professor at the University of Chicago. He was on the staff at the Institute for Music Aesthetics, University for Music and Performing Arts in Graz, Austria from 2008 to 2011. Since October 2011 he is Professor of Musicology at the Leopold Franzens University in Innsbruck, Austria. In his research, Celestini combines interests in music, philosophy, and in social and cultural history. His books include *Die frühen Klaviersonaten von Joseph Haydn. Eine vergleichende Studie*, Schneider, Tutzing 2004 (Studien zur Musikwissenschaft. Beihefte der Denkmäler der Tonkunst in Österreich, 52); *Die Unordnung der Dinge. Das musikalische Groteske in der Wiener Moderne (1885–1914)*, Franz Steiner Verlag, Stuttgart 2006 (Archiv für Musikwissenschaft—Beihefte, 56) and *Friedrich Nietzsche. Musik am Ende der Metaphysik* (forthcoming). Among his articles are 'The Acoustic Proximity of Temporal Distance. Auratic Sonority in Mahler's *Lieder eines fahrenden Gesellen*', in *Music as Social and Cultural Practice. Essays in Honour of Reinhard Strohm*, ed. by Melania Bucciarelli and Berta Joncus (Woodbridge: Boydell & Brewer, 2007), 355–73; 'Aspekte des Erhabenen in Haydns Spätwerk', in *Basler Jahrbuch für historische Musikpraxis* 30 (2006 [2008]), 79–98 and 'Ferruccio Busonis "Sezession". Zum Klavierkonzert mit Männerchor op. 39', *Archiv für Musikwissenschaft* 65/4 (2008), 272–88. A collection of articles on music aesthetics are reprinted in *Arbeit am Kanon. Ästhetische Studien zur Musik von Haydn bis Webern* (Studien zur Wertungsforschung 51, with Andreas Dorschel. Wien; London; New York: Universal Edition, 2010). Celestini is co-editor of the journal *Acta Musicologica*.

Andreas Dorschel, MA (Frankfurt), Dr. phil. (Frankfurt), habilitation (Berne), has been head of the Institute of Music Aesthetics at the University of Arts Graz (Austria) since 2002. Before taking up that position, he taught philosophy at universities in Germany, Switzerland and the UK. He was Visiting Professor at Emory University (1995) and at Stanford University (2006). Since 2008, Dorschel has been a board member of the Austrian Fund for the Sciences and Humanities (FWF). His monographs include a philosophical study of prejudice: *Nachdenken über Vorurteile* (Hamburg: Felix Meiner, 2001), an aesthetics of product design: *Gestaltung—Zur Ästhetik des Brauchbaren*, 2nd ed. (Heidelberg: Universitätsverlag Winter, 2003), a history of the idea of metamorphosis: *Verwandlung. Mythologische Ansichten, technologische Absichten*

(Neue Studien zur Philosophie 22, ed. Konrad Cramer, Jürgen Stolzenberg and Reiner Wiehl. Göttingen: Vandenhoeck & Ruprecht, 2009), and an enquiry into the methods of the history of ideas: *Ideengeschichte* (Göttingen: Vandenhoeck & Ruprecht, 2010). Together with Elisabeth Kappel, he re-edited the major text of expressivism in 19th century music aesthetics: Friedrich von Hausegger, *Musik als Ausdruck* (Vienna; London; New York: Universal Edition, 2010). Among Dorschel's music-related articles are 'Utopie und Resignation. Schuberts Deutungen des Sehnsuchtsliedes aus Goethes *Wilhelm Meister* von 1826', *Oxford German Studies* XXVI (1997), 132−64, 'The Paradox of Opera', *The Cambridge Quarterly* XXX/4 (2001), 283−306, and 'Music and Pain', in Jane Fulcher (ed.), *The Oxford Handbook of the New Cultural History of Music* (Oxford; New York: Oxford University Press, 2011), 68−79.

Gerhard Eckel is Professor of Computer Music and Multimedia at the Institute of Electronic Music and Acoustics (IEM), University of Music and Performing Arts in Graz, Austria. Eckel holds a PhD in musicology from the University of Vienna and studied composition of electroacoustic music as well as sound engineering at the University of Music and Dramatic Arts Vienna. In the past Eckel worked at IRCAM, the computer music department of the Pompidou Centre in Paris and at the Fraunhofer Institute for Media Communication IMK in St. Augustin, Germany. Eckel takes both an artistic and scientific interest in matters of sound. His scientific research topics range from psychoacoustics, over sound analysis, visualization, processing, spatial rendering and synthesis to virtual and augmented reality systems. His artistic work focuses on the possibilities of installations to convey formal openness to the audience in a tangible way. He creates sound and music installations for real and virtual spaces, which are presented at international festivals, conferences and trade fairs. He initiated and coordinated the EU-IST-project LISTEN, which defined and explored immersive audio-augmented environments from a scientific and artistic perspective. During the last years Eckel focused on artistic research in the field of interactive sound art and performative computer music. In a recent artistic and scholarly research project he developed a new form of intermedial expression called embodied generative music. His latest artistic research project (The Choreography of Sound), funded by the Program for Arts-based Research (PEEK) of the Austrian Science Fund FWF, explores the spatial in electroacoustic music composition. Currently he works as a guest professor at the Music Acoustics Group of the KTH Royal Institute of Technology in Stockholm.

Simon Emmerson studied natural sciences and music education at Cambridge before completing a PhD in electronic music at City University, London, where he established and directed the electroacoustic music studios from 1975. In 2004 he moved to become Professor of Music, Technology and Innovation at De Montfort University, Leicester. As a composer he works mostly with live electronics; recent commissions include works for the Smith Quartet, Philip Sheppard (electric cello), Philip Mead (piano) with the Royal Northern College of Music Brass Quintet and Darragh Morgan (violin). He has also completed purely electroacoustic commissions from the IMEB (Bourges), the GRM (Paris) and the Inventionen Festival (Berlin). He is currently at work on commissions for Keynote+ (Jane Chapman and Kate Ryder—harpsichord and piano), Katrin Zenz (flute) and Sond'Arte (Lisbon). CDs of his works have been issued by Continuum (1993) and Sargasso ('Spaces and Places' [2007], 'Points and Pathways' [2008]). He contributed to and edited *The Language of Electroacoustic Music* in 1986 (Macmillan, still in print) and *Music, Electronic Media and Culture* (Ashgate, 2000). His book *Living Electronic Music* was published by Ashgate in 2007. He has contributed to *Organised Sound, Computer Music Journal, Contemporary Music Review* and *Journal of New Music Research* as well as a chapter for *The Oxford Handbook of Computer Music* and co-authoring the 'Electroacoustic Music' entry to New Grove. He was founder Secretary of EMAS (The Electroacoustic Music Association of Great Britain) in 1979, and served on the Board of Sonic Arts Network from its inception until 2004. In 2009–10 he was DAAD Edgar Varese Visiting Professor at the Technische Universität, Berlin.

Professor **Sondra Fraleigh** is an international leader in the study of movement and dance. She is professor emeritus of the State University of New York, College at Brockport, where she chaired the Department of Dance. Her innovative choreography has been seen on tour in America, Germany, India, and Japan. She served as president of the Congress on Research in Dance, and as a Faculty Exchange Scholar for the State University of New York. Her articles have been published in texts on dance and movement, philosophy, and developmental psychology. She is the author of seven books: *Butoh: Metamorphic Dance and Global Alchemy* (2010), *Land to Water Yoga* (2009), *Hijikata Tatsumi & Ohno Kazuo* (2006), *Dancing Identity: Metaphysics in Motion* (2004), *Dancing into Darkness: Butoh, Zen and Japan* (1999), *Researching Dance* (1999), and *Dance and the Lived Body* (1987). She has also published many articles and book chapters, including 'Freedom, Gravity, and Grace' in the *Somatics Journal of the Mind/Body Arts and Sciences* 22/3 (Fall/Winter 1999/2000), and she received the 'Outstanding Service

to Dance Research Award' from the Congress on Research in Dance in 2003. Professor Fraleigh lives in the beautiful red-rock country of St. George, Utah, and is often a guest teacher of dance and somatic studies in the United States and other countries. She believes that the living body of the earth and our human body are interwoven, and that healing the earth and ourselves will be the major work of the twenty-first century. Professor Fraleigh teaches international workshops through her *East-west Institute for Dance and Movement Studies*: www.eastwestsomatics.com.

Susan Kozel is a dancer, choreographer and philosopher who has published widely and performed internationally. With a PhD in phenomenology from the Philosophy Department of the University of Essex (UK), she has taught for a range of university programs in the UK and North America (dance, philosophy, interactive arts, digital media). She is currently a Professor of New Media with the MEDEA Collaborative Media Initiative at Malmö University, Sweden. She is a member of the Scientific Advisory Board for the Humanities Art and Technology Centre in Poznan, Poland, and the Quality Advisory Board of the Swedish National Research School in the Arts (Konstnärliga Forskarskolan). She balances her academic life with professional artistic practice at the convergence of dance and digital technologies. She is the director of Mesh Performance Practices (http://www.meshperformance.org), a collaborative interdisciplinary arts organization dedicated to exploring embodied and creative uses of a wide range of digital technologies. Her collaborative performances and installations include the *Technologies of Inner Spaces* series (*immanence* 2005, *Other Stories* 2007 and *The Yellow Memory* 2009), *whisper[s]* wearable computing 2002–2005, and *trajets* 2000–2007. Current research considers Social Choreographies and Social Aesthetics using applications for social networking and augmented reality. Her writing includes the sole authored book *Closer: Performance, Technologies, Phenomenology* (MIT Press, 2007), and book chapters: 'The Virtual and the Physical: A Phenomenological Approach to Performance Research', in Michael Biggs and Henrik Karlsson (eds.), *Arts Research: A Critical Introduction* (Routledge, 2010); 'Sinews of Ubiquity: A Corporeal Ethics for Ubiquitous Computing', in Ulrik Ekman (ed.), *Throughout: Art and Culture Emerging with Ubiquitous Computing* (MIT Press, forthcoming); 'Devices of Existence: Dance Improvisation and Social Networking', in Georgina Born and Eric Lewis (eds.), *Improvisation and Social Aesthetics* (Wesleyan University Press), forthcoming 2011. In her collaboration with Leena Rouhiainen and Mia Keinänen on the Intuition in Creative Processes initiative based at the Theatre Academy in

Helsinki, she is experimenting with social networking applications for improvised performance (the *IntuiTweet* project) and expanding an embodied methodological basis for artistic research.

Alva Noë is Professor of Philosophy at the University of California in Berkeley, where he is also a member of the Institute for Cognitive and Brain Sciences as well as the Center for New Media. For the last decade or so his philosophical practice has concerned perception and consciousness. Alva is the author of *Action in Perception* (MIT Press, 2004), *Out of Our Heads: Why You Are Not Your Brain and Other Lessons from the Biology of Consciousness* (Hill and Wang/Farrar Straus and Giroux, 2009) and *Varieties of Presence* (Harvard University Press, forthcoming). He is now at work on a book about art and human nature. Before coming to Berkeley in 2003, Alva taught in the department of philosophy at UC Santa Cruz. He received a PhD in philosophy from Harvard University in 1995; he has a BA from Columbia (1986) and a BPhil from Oxford Universiy (1986). He has been a fellow of the Wissenschaftskolleg zu Berlin (2007–2008). He is a research associate of the CNRS laboratory Institut Jean-Nicod in Paris. In the spring of 2003 he was a fellow of the Oxford Centre for Cognitive Neuroscience and in the 1995–1996 academic year he was a research fellow of the Center for Cognitive Studies at Tufts University. Alva is from New York City; he lives in Berkeley, California, with the artist Miriam Dym and their two children August and Ulysses.

Jaana Parviainen has a PhD in philosophy from the University of Tampere. Her philosophical interests include the phenomenology of body, epistemology, aesthetics and the philosophy of movement. One of her recent books is *Meduusan liike: Mobiiliajan tiedonmuodostuksen filosofiaa* 2006 (*The Motion of Medusa: Knowledge Formation in the Era of Mobility*). The book addresses the cognitive, emotional and social meanings of kinaesthesia in the ubiquitous society. In the research project Embodied Generative Music she has examined dancers' learning processes in improvising with the EGM instrument.

Deniz Peters is both a musicologist and an improvising musican. He graduated with first-class honours in classical piano performance at Monash University, Melbourne, Australia, where he also gained his master's degree in musicology. Peters's doctoral dissertation was on the aesthetics of Alexander Scriabin's late œuvre, and combines music analysis with philosophy. Ever since, his particular research interest lies on interdisciplinary musicological work joining topics in the philosophy of music with artistic research. On the artistic side, his work includes

collaborative improvisations with dancers. Peters was main researcher in the Embodied Generative Music project until 2010, as part of which he conceived and organised the Bodily Expression in Electronic Music symposium with Gerhard Eckel and Andreas Dorschel. Based in Graz, he is currently pursuing independent research on musical expression, interpretation and improvisation. Peters has published in German and English, on the aesthetics of Alexander Scriabin and on the concepts of gesture and embodiment. His most recent publications are 'Enactment in Listening: Intermedial Dance in EGM Sonic Scenarios and the Listening Body', in *Performance Research* 15/3 (September 2010) and an article on sonic resistances forthcoming in *Contemporary Music Review*.

Dr. Chris Salter is an artist, Associate Professor of Design and Computation Arts at Concordia University in Montreal and Director of the Hexagram Concordia Institute for Research-Creation in Media Arts and Technologies. Salter studied economics and philosophy at Emory University and received his PhD in the areas of theater and computer-generated sound at Stanford University, where he worked with former Brecht assistant Carl Weber as well as pioneers of digital synthesis John Chowning, Max Matthews and Chris Chafe at the Center for Research in Computer Music and Acoustics (CCRMA). He was visiting professor in music, graduate studies and digital media at Brown University and the Rhode Island School of Design (RISD) as well as Guest Professor at the KHM in Cologne in 2010. His artistic and research interests revolve around the development and production of real-time, computationally augmented responsive performance environments fusing space, sound, image, architectural material and sensor-based technologies. Such projects range from small- and large-scale, public-driven installations where the line between spectators and performers is blurred to traditional performance environments with trained performers that are augmented with computational and media systems. After collaborating with Peter Sellars and William Forsythe/Ballett Frankfurt, he co-founded the art and research organization Sponge, whose works have stretched between the arenas of performance, installation, scientific research and publications and have toured internationally to festivals, exhibitions and venues. His artistic research with Sponge as well as solo projects have been seen at major international exhibitions and presentation venues in over a dozen countries. Salter's works have been written about in the *New York Times, ID Magazine, Leonardo and Decouvrir* and received major grants from SSHRC, FQRSC, Hexagram, the Rockefeller Foundation, the Daniel Langlois Foundation, the Creative Work Fund/San Francisco and the LEF Foundation, among others. He is a regular presenter at national and international conferences, has given invited

talks at universities and festivals worldwide and has sat on numerous juries including NIME, ISEA and the Prix Ars Electronica. In addition to his artistic production, Salter is the author of numerous publications in the areas of technology and performance, real-time responsive environments, mobile real-time media and cultural politics. His book *Entangled: Technology and the Transformation of Performance* was published by MIT Press in 2010.

Christian Utz was born in Munich, Germany, and studied composition, piano, music theory and musicology in Vienna and Karlsruhe. Since 2003 he has been Professor for Music Theory and Music Analysis at the University of Music and Performing Arts in Graz, Austria. He was visiting professor at the National Chiao-Tung University (Xinzhu/Taiwan, 2007), at the University of Tokyo, Graduate Institute for Arts and Sciences (2008), the Alpen-Adria University Klagenfurt (2011) and the University of Heidelberg (2011, as part of the research project 'Creative Dissonances. Music in a Global Context', within the cluster of excellence 'Asia and Europe'). He is currently project leader of the research project 'A Context-Sensitive Theory of Post-tonal Sound Organization [CT·PSO]. Perception and Categorization of 20th- and 21st-Century Instrumental Music' at the University of Music and Dramatic Arts in Graz. In 2000, Utz received a PhD degree at the Institute for Musicology of Vienna University with a thesis on *New Music and Interculturality. From John Cage to Tan Dun* (published in 2002 by Franz Steiner Verlag, Stuttgart, Germany). He has been guest editor of 'Traditional Music and Composition', an issue of the journal *The World of Music* (Vol. 45/2, 2003), co-editor of the *Lexikon der Systematischen Musikwissenschaft* (Laaber-Verlag 2010), and is editor of the book series Musik. Theorien der Gegenwart [Contemporary Music Theories]. His research fields include theory, analysis and history of eighteenth- to twenty-first-century music, timbre-pitch relationships in twentieth- and twenty-first-century music, music perception, intercultural history of composition and new music in East Asia. In 1998, Utz founded AsianCultureLink to enhance intercultural exchange between European and Asian countries and presented a series of projects featuring leading Asian and Western composers and musicians from 1999 to 2007. Utz has organized a number of international conferences including the large-scale congress of the GMTH (Society for Music Theory, Germany, Austria, Switzerland) in Graz 2008 on Music Theory and Interdisciplinarity and an international symposium on Sound and Perception in 20th- and 21st-Century Music in Graz 2011. His compositions have been performed by leading ensembles and musicians worldwide. Two CDs with his music for Asian and Western instruments and voices have been released in 2002 (*Site*,

Composers' Art Label) and 2008 (*transformed*, Spektral-Records). http://www.christianutz.net.

Kendall L. Walton is the Charles L. Stevenson Collegiate Professor of Philosophy, and Professor in the School of Art and Design, at the University of Michigan. He turned to philosophy as an undergraduate at the University of California, Berkeley, after considering a career in music. He received his PhD from Cornell University in 1967, and has taught at the University of Michigan since then. Walton's work explores connections between theoretical questions about the arts and issues of philosophy of mind, metaphysics, and philosophy of language. He has written on the nature of fiction, emotional responses to fiction, the ontological status of fictional entities, pictorial representation, photography, aesthetic value, relations between aesthetic and moral value, metaphor, imagination, empathy, and the aesthetics of music, including musical expressiveness, musical representation, and listeners' experiences. His publications include *Mimesis as Make-Believe: On the Foundations of the Representational Arts* (Harvard, 1990), *Marvelous Images: On Values and the Arts* (Oxford, 2008) and In *Other Shoes: Music, Metaphor, Empathy, Existence* (Oxford, forthcoming). Walton is past president of the American Society for Aesthetics, and a Fellow of the American Academy of Arts and Sciences. In 2005 he was awarded an honorary doctorate by the University of Nottingham.

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