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The Sampling of Bodily Sound in Contemporary Composition: towards an embodied analysis

Sewell, Stacey

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The Sampling of Bodily Sound in Contemporary Composition: towards an embodied analysis

by

STACEY DAWN SEWELL

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Stacey Sewell

Abstract

The listener's experience as an embodied subject is at the centre of this work. Embodied experience forms the basis for analyses of three contemporary compositions that sample bodily sound, in order to question how such works represent and mediate the body. The possible applications of this embodied methodology are illustrated through three case studies: *Crackers* by Christof Migone (2001), *A Chance to Cut is a Chance to Cure* by Matmos (2001) and *Ground Techniques* (2009) by Neil Luck. The findings of each analysis are placed within discussion of critical and theoretical concerns related to the (re)presentation, mediation and manipulation of the body both as materiality and as social construct, using, in particular, work by Hansen (2004) and Wegenstein (2006). The sampling practices of these works lead to the fragmentation of the represented bodies, in which margins between bodily interiors and exteriors are frequently crossed, bringing about a reconfiguration of the musical subject. Furthermore, the celebration of the bodily origins of these works complicates notions of recorded sound as disembodied.

The analytical methodology developed in this thesis derives from a consideration of approaches in a number of fields: feminist musicology, music psychology, embodied cognition, phenomenology, music and gesture and new media theory. The sensations and affective responses of the listening body are discussed alongside an examination of how listening is shaped by processes of technological mediation. This thesis attends to both the body that is *listening* and the body that is *listened to*. I argue that it is not adequate to understand the works studied as merely representing the body, but suggest it would be more appropriate to understand the relationship between work and body as multi-faceted, conceptualising the body and recorded sound as mutually framing. This uncovers not only technology as mediation, but also the body as mediation. Finally, the case studies are used to reflect upon the limits of the embodied analysis methodology and its potential for wider application.

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Acknowledgements

Author's Declaration

At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award without prior agreement of the Graduate Committee.

Relevant seminars and conferences were attended at which work was often presented. Two papers were also prepared for publication.

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Can one *make a listening listened to?*
Can I transmit *my* listening, unique
as it is? (Szendy, 2008:5)

[Sounds] penetrate not only through the ears,
but over the skin, not only into the hearing,
but also into certain cavities of the body,
continue in bone courses and other channels,
in order to enter the whole body acoustically
(Bernhard Leitner, quoted in Obadike & Obadike, 2008: 91)

1. Introduction

A Crack in Listening

Introductions – so often written last, but nearly always read first – offer a tangle of writing

positions and states of knowledge. This introduction is both an ending (as I am writing it

towards the end of a research and writing process) and a beginning (both of the reader's

reading, but also insofar as it describes where this research started, and the curiosity that led

to it). So I would like to begin this thesis with a pair of anecdotes.

I started this research because of an unusual physical reaction I had to a piece of music.

Upon first hearing Christof Migone's work *Crackers*, I felt an overtly physical sensation of

disgust as I realised that the sonic materials it was built up from were recordings of people

'cracking' their joints. The sound seemed to resonate in my own joints, and I found myself

tensing, as if to avoid potential pain.

As I finish my research, but begin recounting the tale, I have noticed specific changes in my

bodily experience. My joints crack more (or seem to). As well as gaining knowledge that

changes my understanding of this phenomenon – I now know what causes the cracking sound

– I have also become more aware of it happening. Here the process of analysis not only

changes my understanding of the music, it also alters my understanding of my body.

In order to reflect upon this reaction more closely I ask two key questions:

- How is the body represented and mediated in contemporary compositions, particularly those that sample bodily sound?
- How might the listener's experience as an embodied subject be used in analysis of such compositions, and what does it reveal about these works?

From these initial questions, subsidiary questions arise: How do these compositions affect the

bodily experience of the listener? How does the listener's lived bodily experience determine

her understanding of such compositions? How does the listening body make sense of recorded sound? And how have composers used the potential listening positions or experiences offered by audio technologies to affect the process of hearing the sounds of the body?

My research contributes to the understanding of an emerging area of contemporary arts practice: musical compositions that sample bodily sound. While growing, this practice is by no means defined as a genre, and it includes a diverse range of work. Due to the nature of the works being studied, and the questions I am asking of them, traditional musico-analytical methodologies, with their privileging of visual, score-based analysis and negation of the role of the body in the reception of music, are not necessarily helpful. Therefore, I have attempted to develop a set of inter-linked methodologies that make bodily experience of musical sound a central part of the analysis, drawing on work from musicology, phenomenology, music psychology (particularly embodied cognition) and new media theory. I illustrate their possible applications through three in-depth case studies. Each case study comprises an embodied analysis, along with discussion of critical and theoretical concerns related to the (re)presentation and manipulation of the body in sound.

In conclusion, I argue that it is not adequate to interpret these works as merely representing the body. I suggest it is more appropriate to conceive of the relationship between work and body as multi-faceted, conceptualising the body and sound as mutually framing.

Survey of Practice

A growing number of musical works sample[1] the sounds of the human body.[2] Early works such as the Pierre Schaeffer and Pierre Henry collaboration *Symphonie pour un Homme Seul* (1950) used turntables to piece together music from the extra-musical sounds (whistling, walking, breathing) made by a human subject. More recently, *A Chance to Cut is a Chance to Cure* (2001) by Matmos employed digital technology to sample the sounds of cosmetic surgery and juxtapose them with the sounds of surgical instruments and 'conventional' musical instruments. Such works frequently fall across the boundaries of electroacoustic music, popular music, live performance, and installation art. In the following section I describe a sample of these works; a more comprehensive list is given in Appendix 1.

Works which sample bodily sound but that exist primarily as recorded media (as opposed to performance events or their documentation) include: Matthew Herbert's *Bodily Functions,* which samples 'sounds graciously loaned by his seemingly bizarre circle of friends,' including teeth rattling, bone tapping, and laser eye surgery (Strychalski, n.d.); Jaap Blonk and Radboud Mens' *Bek* (2002), which uses the vocal technique of 'beatboxing' to mimic different styles of electronic dance music, focusing on the mouth as a sound source; Hildegard Westerkamp's *Breathing Room* (1990), a tape piece sampling breathing sounds; and Zoltan Pongracz's *Mariphonica* (1972), a tape composition based on the non-verbal sounds and the physical dimensions of his wife's body.

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[1] The term 'sampling' is used here to refer to the musical practice of reusing extant sonic materials. This is not specific to any given technology and may use analogue or digital, hardware or software tools. I expand on my definition of sampling later in this chapter.

[2] There has also been a recent curatorial interest in such music. The second disc of the two disc set *Music Overheard* (an audio response to the exhibition Super Vision at the Institute of Contemporary Art, Boston MA, which ran from December 10th 2006 to April 29th 2007) focuses on works which use the body's sounds in some way (Krukowski, 2006).

Others have sampled bodily sound within a live performance. An example is the piece

Happiness, in which Laurie Anderson:

> puts on some sunglasses rigged with impulse sensors [contact microphones]. These sunglasses magnify the bodily sounds of Anderson's teeth clicking, the sound of Anderson patting her own head, and the thump of Anderson slapping her shoulder with her hand. Ironically, it's the sunglasses – an accessory for the eyes – that renders these bodily thumps audible. (May, n.d.)

Leta E. Miller describes Cage's *Variations VII* (1966) in which '[a]dditional sound sources

included appliances (fan, blender, *et al.*), body sounds (heart, stomach, clothes, etc.)' (Miller,

2002: 162). Shawn Decker and Jan-Erik Andersson's *Music from the Well Fed Abyss* (1997) is a

live work in which digestive sounds are produced and used in performance. The soundtrack of

Garth Paine's *Escape Velocity* (1998) comprises both electrical sounds and sampled bodily

sounds triggered by the movements of on-stage dancers.

The work of multidisciplinary artist Christof Migone frequently focuses on the body, often

through its presence in sound. Migone uses recording and amplification technologies in such a

way as to explore the body in minute detail, providing a 'sonic topology' of the body and its

organs (LaBelle, 2005: 18). *<<I>>* (2003) is an audio piece composed of the sounds produced

when performer Aleksandr P. Thibaudeau manipulates his eyes (LaBelle, 2005: 79). I return to

Migone's work in Chapter 8, which comprises an in depth discussion of *Crackers* (2001).

Other composers have sought to create an immersive environment in which to present

bodily sounds. The Fennesz, Zeitblom and Rantaša collaboration, *Music for an Isolation Tank*

(1999), is intended to be listened to lying in the dark. Seiko Mikami's *World, Membrane and

the Dismembered Body* (1997) uses computer technology to amplify the sounds of the

listener's internal organs inside an anechoic chamber (Toop, 2004: 11). The sounds of the

heart and lungs, numericised, determine the spatialisation of the played back sounds and

accompanying visual effects (Mikami, n.d.). In George Khut's *Cardiomorphologies* (2005-6),

'[p]articipants hear their breathing and heartbeats transformed into a gentle soundscape of wavelike noises and subsonic impulses' (Khut, n.d.). Other works use psychoacoustic effects to offer the listener an immersive listening environment seemingly located within her own body; examples include Maryanne Amacher's *Sound Characters (Making the Third Ear)* (1999) and Jacob Kierkegaard's *Labyrinthitis* (2007).

Closely related to works which use sampled bodily sound are those measuring some sort of bodily output (which may or may not be sonic) and using this as a basis for creating music, sometimes via a biofeedback loop. Brainwave music such as Alvin Lucier's *Music for Solo Performer* (1965), David Rosenboom's *On Being Invisible II (Hypatia Speaks to Jefferson in a Dream)* (1994-5), and James Fung's *Regenerative Music* (2003) would fall into this category.

Many of these works are informed by historical developments in medical science and the technologies used to listen to the body. Jamie Kassler describes how physicians of the eighteenth and nineteenth centuries developed ways of classifying bodily sounds, obtained through 'examination by striking, and auscultation, or examination by the ear', as a measure of health or disease (Kassler, 1990: 248). Body and sound were intricately bound up in these experiments, both in the likening of the body to a musical instrument and in the attempts of physicians to 'bring about intersubjective agreement' as to the quality of the sounds by reproducing them using musical instruments or 'representing sounds graphically in musical notation for the purpose of analysis' (Kassler, 1990: 250). These physicians held two assumptions: 'first, that physicians required skills similar to those of musicians and, second, that the body is like a musical instrument or group of musical instruments' (Kassler, 1990: 252). These concerns have been picked up on by composers: Douglas Kahn describes Cage (during his famous anechoic chamber experience) and Jakob Kierkegaard (in *Labyrinthitis*) as 'listening to their bodies talk in clinical circumstances' (Kahn, 2008). This is a theme that has been developed more fully by Jonathan Sterne (2003), who argues that the development of

mediate auscultation (stethoscopic listening) led to wider changes in listening practices throughout the nineteenth and early twentieth centuries.

Other works use technology to question the idea of music as disembodied. Pieces may subvert perceived disembodiment by bringing about a particular bodily affect or physical sensation (whether a skin response, muscle tremors or another bodily reaction). As David Toop notes, such works trouble the mind/body dualism and problematise the idea of sound as immaterial substance. Playing out a stark counterargument to the idea that sound is 'absorbed through the ears but perceived mainly through mental processing' (Toop, 2004: 13), these works and listeners' responses to them also challenge notions of perception.

Music that samples the body can also trace its history, at least in part, to developments in twentieth century art, where visual artists began to move both towards using their bodies (in practices variously categorised as performance art, body art or live art) and using sound. Pieces such as Lauren Lesko's *Thirst* (1995) can clearly be seen to combine both these areas of practice. Some works, especially those that employ performative elements, or rely on positioning the listener in some kind of immersive (sonic) environment, show a continuing mutual influence between these two fields, making it difficult to draw distinctions between them.

Rationale

Audio technologies have allowed sound to be separated both spatially and temporally from its source, thus enabling different listening 'positions' in relation to the sound-source, and different listening techniques. Ways of understanding hearing changed significantly between around 1750 and 1925, with hearing 'reconstructed as a physiological process, a kind of receptivity and capacity based on physics, biology, and mechanics' (Sterne, 2003: 2). More

recently there have been changes in how consciousness is understood, and there has been a move away from an entirely mental model towards one that more fully considers the role of the body and embodied processes.

For these reasons it is necessary to understand the listener, or the analyst (doing the embodied analysis), as a historically and culturally situated subject. In a plea for us to consider sound-reproduction technologies (and the listening subject's relationship to them) as socially and historically conditioned, Sterne argues:

> The ways in which the middle ear conducts vibration may seem like a simple mechanical function, something that we feel is without history. But the tympanic function opens out into changing constructions of sound, hearing, and humanity. Sound reproduction is historical all the way down. In acoustics, physiology, and otology, sound became a waveform whose source was essentially irrelevant; hearing became a mechanical function that could be isolated and abstracted from the human body itself. (Sterne, 2003: 23)

My approach aims to acknowledge these factors: the model of embodied analysis explored in this dissertation aims to return the human body, as it exists within certain historical and cultural conditions, to the centre of the interpretation of music. My work attends to sound constructed as a material substance, able to act on the body. The ear, and its function in hearing, is neither abstracted nor a synecdoche for the whole body; the whole body plays a part, a part that cannot be reduced to any one organ or bodily system.

Toop suggests technologically-informed changes in listening practices have also enabled changes in compositional practices and aesthetic decision-making, spawning new genres in response to how particular technologies have shaped everyday experience:

> Much of the sparse, microscopic incident now common in new music, the concentration on resonance, inaudibility, inaccessibility, transparency and process, digital glitches, ghost voices, subverted mechanics and extreme bodily interiority, uncovers phenomena and layered meaning from beneath the hysterical onslaught of information, mediation and consumerism that the world has become. (Toop, 2004: 71)

The three works discussed in the case studies invite the listener to shift her attention and focus onto that which is often denied: a particular bodily mode of engagement. Here the centrality of the body in producing musical sound is emphasised and (self-consciously) put on display. Audio technologies are more often considered to distance the production (and reception) of music from the human body; this will be explored more fully in Chapter 2. But here it is these technologies that grant the listener proximity to the body – both the body she is hearing and, as I will later argue, her own. In order to consider the full impact of these works I propose an embodied method of analysis. This will pull together elements of recent attempts to draw the body, and bodily experience, into music analysis (as discussed in Chapter 3), but also situate this experience as it is shaped by audio technologies.

As I hope will become clear through the case studies, embodied analysis as practiced here differs significantly from the 'audile technique' that Sterne describes as being practiced by physicians and telegraphers – a technique that has come to be a strong influence on modern listening (Sterne, 2003: 93). Unlike audile technique, embodied analysis can take into account sound that occurs outside of what Sterne considers to be the reconfigured auditory space of this type of listening; sounds caused, for example, by bone conduction ('contamination' from the listener that would have hindered diagnosis for the physician) and other types of extraneous sound may be attended to. My model of embodied analysis does not separate hearing from other senses, especially touch.

In *A Chance to Cut is a Chance to Cure*, by Matmos, *Ground Techniques*, by Neil Luck, and *Crackers*, by Christof Migone, the sampled bodily sounds range from the cracking of joints to the exhalation of breath, via the sounds of cosmetic surgery. These works are all produced in recorded form, without the presence of a performing body or the body from which the sounds originated. This common ground between the works allows certain comparisons to be made, and allows me to consider embodied listening as it takes place without the act of seeing.

I do not include vocal sounds in my discussion; neither spoken or sung language, nor unrecognisable vocals or extended vocal techniques.[3] To some extent this marking off of vocal sounds from other sounds produced by the body perpetuates the division of the body into systems and organs.[4] It is also a division that creates an artificial separation between sounds with and without (linguistic) semantic content. However, perhaps the voice is *too much* of the body. It signifies person(ality) and the idea of the subject more than other sounds. The three case studies have been chosen to allow the analyses of both the representation of bodies in the recorded 'texts' and the embodied response to reflect off one another; each is used as a mirror to examine the other.

I focus on sounds that are – mostly – made (more) audible through the use of technology. While some sounds, such as breathing and the heartbeat, may be audible to an individual, there is a limit to their external audibility; to hear these sounds from another body would require very close physical proximity. Other sounds I will include here are audible only through the use of technology.

As I will show, the works discussed in this study illustrate a move towards greater abstraction of the body, towards a piece of the body standing in for the whole; the choice of these particular works, to a certain extent, is arbitrary. This particular group of compositions could be substituted for others employing similar compositional techniques and sonic materials. Therefore, while the findings of the analyses are particular to these three works, the

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3   Neil Luck's *Ground Techniques* features vocal sounds, but these do not form a significant part of my analysis.

4   Much writing on the disembodiment of recorded sound is focused on the voice, or at least takes as its starting point the development of technologies such as the telephone or to a lesser extent the radio and the process by which these technologies allowed the sound to be separated from the body. Here I concentrate on other sounds of the body, which while they also have to leave the body as sound, perhaps retain a stronger connection to the flesh in the process of signification. The choice of sounds is also a form of writing the body: deciding which sounds are admissible, suitable for writing about, and which sounds – for whatever reason – should be left out, adds to the discourse surrounding the construction of the body. The issues surrounding writing the body will be discussed in more detail in Chapter 3.

general orientation of embodied analysis may find a broader application to a wider field of practice that explores questions of the body and embodiment.

Key terms

In the following section I outline three key terms that recur throughout this study: body, embodiment, and sampling. Full consideration of each of these terms is beyond the scope of the current work. However, I offer a brief overview of each term drawn from surveys of relevant fields, and give working definitions that are followed up more thoroughly in subsequent chapters.

Body

In the humanities and social sciences the idea of a natural or originary body no longer holds sway. There has been a move away from 'the body as simply something that we both *have* and *are* towards a perspective focused on what bodies *do*' (Blackman, 2008: 1). For example, phenomenological approaches, such as those of Merleau-Ponty, have paid attention to the 'lived body'.

There has also been significant attention to the idea of the body produced through discourse (such as in the theories of Foucault and Butler) and socio-culturally produced or inscribed bodies; bodies produced through theory and bodies produced through practice. However, as Blackman notes, in order to achieve an adequate analysis of the body we must still take the body's materiality into account, not reducing it to a set of social processes (Blackman, 2008: 3). In light of these critiques, many theorists have moved towards ideas of affectivity, and the role the body can play in resisting social inscription. The body-as-flesh can be viewed as 'a material unit that is in conversation with the forces and environments that help it signify, to assign it a more active role in the production of meaning, to recast it as a

force that answers back and confuses social prescription, technological and biological determinism' (Detsi-Diamanti et al., 2007: 5).

Practices such as body modification, cosmetic surgery and in vitro fertilization have led to a questioning of the body concept and debates about where bodily boundaries are drawn. Technology is deeply implicated in this move beyond a natural or organic idea of the body (see Blackman, 2008: 2). The skin no longer acts as a boundary for the self, leaving the body open to connections with other bodies, practices and technologies (Mol, 2002; Blackman, 2008: 1). This has then been theorised in terms of what it means to be human, leading to the characteristion of posthumanism, featuring the technological manipulation or alteration of the body or the twinning of biotechnological processes with the 'natural' body. Technology may be posited as prosthesis. The body may also be seen as information or code. Overall the destabilising of the boundaries between body and machine, self and other, has far-reaching implications for understanding of both the subject and subjectivity (Haraway, 1991; Hayles, 1999; Wegenstein, 2006). At the same time though, understanding the body as synthetic or molecular, or reducing the body to informational units, tends, as Blackman argues, to erase the complexity of the lived body (Blackman, 2008: 118; see also Stafford, 2007). My work negotiates the terrain between lived, socio-cultural and technologically mediated bodies.

Embodiment

Embodiment as discussed here is the complex interaction between mind and body. It is important to note that this process is not unidirectional: the mind not only determines the actions of the body, but the body also contributes content to the workings of the mind (Hayles, 1999: 245). As Hayles points out, embodiment differs from the (material) body 'in that the body is always normative relative to some set of criteria' (Hayles, 1999: 196). Unlike the flesh,

'embodiment is contextual, enmeshed within the specifics of place, time, physiology, and culture' (Hayles, 1999: 196). Importantly:

> Embodiment never coincides exactly with "the body," however the normalized concept is understood. Whereas the body is an idealized form that gestures toward a Platonic reality, embodiment is the specific instantiation generated from the noise of difference. Relative to the body, embodiment is other and elsewhere, at once excessive and deficient in its infinite variations, particularities, and abnormalities. (Hayles, 1999: 196-7)

However, corporeality, or the materiality of the body, and embodiment can never be wholly separated as corporeality provides the material possibility for embodiment (Pelinski, 2005). For Pelinski, the 'circulation' or flux between these is where rational dualism, as theorised by Descartes, breaks down, creating ambiguity between 'mind and body, subject and object, perceiver and perceived, culture and biology, lived experience and objective knowledge' (Pelinski, 2005).

Additionally, differences between the body, or corporeality, and embodiment can be seen in musical experience. Corporeality determines the 'biopsychic constraints' that the human being must work within (this might include pitch range or the neurocognitive restrictions on discrimination between intervals, for example), while embodiment is more closely tied to the subjective experience of music as it is shaped by underlying bodily experience (Pelinski, 2005). However, it is impossible to draw a clear distinction between the two.

Furthermore, in embodiment theory the body is understood as 'a source of knowledge and subsequently of agency' (Pink, 2009: 24). As Greg Downey has pointed out 'embodied knowledge is not simply "stored information"' (Pink, 2009: 24), but involves biological processes (Downey, 2007: 223). Embodiment in this sense is processual and developed through the organism's being in its environment.

Embodiment, as a theoretical position, offers a means to overcoming the mind/body dualism. For Grosz, this also requires a challenge to the surface/depth notion of subjectivity

(Grosz, 1994: 218, as discussed in Ahmed and Stacey, 2001: 4). Grosz draws on the work of Gilles Deleuze and Felix Guattari to conceptualise embodiment as involving 'the intensity of desires and flows which themselves produce the effect of "depth" or interiority' (Ahmed and Stacey, 2001: 4).

Embodiment is a key notion within both phenomenology and embodied cognition, both of which will be more fully discussed in Chapter 3.

Sampling

Sampling refers to the recording of a sound, musical object, or fragment, and its re-presentation in a new musical context through technological mediation (Fuchs, 2004: 309). However, the term has also taken on variously more and less specific technical meanings as its use has developed.

Musical use of the term originates in technical descriptions of the analysis and/or synthesis of a waveform by measuring its amplitude at fixed points (Davies, 1996: 3). However, the term developed a more widespread, less technical use from the 1970s onwards, coming to refer at first to the method employed by particular hardware and, later, software technologies that recorded external sound in order to play it back (Davies, 1996; Rodgers, 2003). The sampler does not produce sounds of its own, but 'speaks' with the voice of another (Davies, 1996: 3-4).[5] Tara Rodgers defines a sampler as 'a hardware or software device that records an analogue sound signal as digital information, and offers detailed ways of processing and reconfiguring this recorded sound' (Rodgers, 2003: 313). However, sampling involves more than the digitalisation of analogue signals (Feuerstein, 2004: 264), also incorporating a range of aesthetic practices.

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[5] However, it may be more accurate to think of the sampler as not having words of its own, rather than as lacking a voice; individual samplers are known for the 'colour' which they may add to the sampled sounds.

These practices have variously been characterised and conceptualised as recycling, collage, assemblage, appropriation, re-interpretation, recontextualisation, quotation and repetition. Rodgers has argued that the dominant discourse around sampling focuses excessively on sampling as 'a postmodern process of musical appropriation and pastiche, often filtered through modernist conceptions of authorship and authenticity' (Rodgers, 2003: 313). Instead she provides a more nuanced view, considering how samples 'function in a mix, as polysemic sonic bits that can be read for their musical qualities (such as rhythm and texture) as well as for their broader cultural references and implications' (Rodgers, 2003: 313) . Similarly, Feuerstein has argued that sampling may be differentiated from techniques of quotation, collage and appropriation: sampling 'is not about a purposeful transfer of meaning and context', but rather acts as 'a method of fragmentation, de-contextualization and transformation' (Feuerstein, 2004: 269). He writes: 'Only when the single parts, in their combinatory logic, are transformed, made rhythmic, and structured in such a way so that the individual samples do not function as quotes anymore but as generative basic material for a logic going beyond the parts, we speak of sampling' (Feuerstein, 2004: 269). However, I would suggest that, in the works analysed in the case studies below, the samples cannot be completely separated from their original meaning; but rather that this must then be read through the new context in which they are presented. Sampling acts as technological mediation, an idea inherent in all the accounts discussed above. It is this that serves to differentiate sampling from earlier practices such as, for example, the use of variation form in Western art music.

Sampling practices, while similar to musique concrète in their use of recorded sound, often operate under a different aesthetic, choosing to play on the origins of the sounds, rather than disguise them (as in the Shaefferian notion of the acousmatic). However, the pieces I discuss here do not always use one technique or the other. Each of the three works uses the samples

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or recorded bodily sounds in different ways.

To conclude, 'sampling', in this study, refers to the musical re-contextualisation of recorded sounds. While they may refer back to the body from which they originate, the samples also take on a musical role, operating as sonic fragments that contribute to the rhythmic, timbral and structural features of the works discussed.

2. (Dis)Embodying Sound

The first half of this dissertation (Chapters 2 to 5) comprises an overview of the areas of theory from which I piece together my analytical methodology. I draw out the useful elements from, and reflect on the limits of, work from a number of fields, including: musicology (particularly feminist approaches), phenomenology, embodied cognition, gesture-based approaches to music, and music psychology. Chapter 4 considers the role of both the body and technology as mediation, while Chapter 5 begins to pull together ideas from earlier chapters and suggest how the listener-analyst might turn these theoretical insights into analytical strategies. First it is necessary, however, to understand how such an embodied approach relates to theoretical positions regarding the material conditions of the works I will later consider. Therefore the present chapter outlines a range of thought on the presence or absence of the body in recorded and technologically-mediated sound.

Eliminating the Performing Body

Recorded sound has often been theorised as disembodied, due to the possibility of the spatiotemporal separation of a sound from its source. Alongside this run theorisations of machine-made (electronic or synthesized) sound as lacking traces of human presence or expression. In the following section I outline a number of examples that are representative of these theoretical positions.

Theorisations of recorded sound as disembodied often arise with reference to the

separation of the voice from the body (see, for example, Kahn, 2001; Weiss, 2002). The voice

may have a particular bodily resonance, as Douglas Kahn notes, in *Noise Water Meat*:

> the circuit of utterance and audition has more of a body than the bit of
> cheek separating the mouth from the ear. While other people hear a
> person's voice carried through vibrations in the air, the person speaking
> also hears her or his own voice as it is conducted from the throat and
> mouth through bone to the inner regions of the ear. Thus, the voice in its
> production in various regions is propelled through the body, its resonance is
> sensed intercranially. (Kahn, 2001: 7)

However, with the advent of phonography, the voice was no longer confined to the flesh. For

Kahn, this 'deboned' phonographic voice lacked the full presence of the voice-in-the-body. The

immediacy of the body was lost and the voice could be separated from presence. However,

theorists of phonography have paid less attention to the other sounds that may be produced

by the body, taking the voice as a special case due to its significance in subject formation.

Nonetheless, the relationship is replicated in recordings of other sounds of the body: the

sounds of cracking joints have also been 'deboned', separated from the bodily articulation that

produced them, and the squelching sounds of cosmetic surgery have been sucked away from

the flesh.

Computer-based music performance has also been conceptualised as disembodied, due to

a perceived lack of physical interaction in the process of sound production. For Ostertag the

perceptible presence of the human body is necessary to the success of a work of art (Ostertag,

2002: 11). He considers this to be tied to virtuosity, reading music or art as something that

must originate from its creator's muscles, bones and skin (Ostertag, 2002: 11). [6] Ostertag

argues that the body is the missing element in electronic music, suggesting that the lack of

human presence in computer music can be traced to precise, 'mechanical' rhythm or a lack of

tonal and timbral nuance. However, the development of new controllers, that allow the body

to take a more active role in shaping musical sound, mean that this is now much less the case

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[6]   A potentially problematic position, as virtuosity, while associated particularly with manual dexterity,
       to a certain extent also requires the sublimation in sound of the body's effort to make music.

than when Ostertag was writing in 2002. Ultimately his position is not that bodily presence is impossible in machine-made art, but that it is more difficult to achieve.

Linda Dusman has argued that a perceived lack of expression in certain types of composition causes the composer's body to feel remote from the musical experience. Citing in particular the elimination of the performer's body in the performance of tape music[7] and the 'machinelike' qualities of early sound synthesis, Dusman suggests that 'there are many ways in which this music could sound distant as a human expression'. Furthermore, she argues: 'Algorithmic composition, often employed in computer music, involves writing a computer program that selects at least some specific sonic content, making the composer's body one step farther removed' (Dusman, 2000: 339). Lack of audible and visual bodily presence, particularly as might otherwise manifest through expression, enables these theorists to argue for technologically produced or mediated music as disembodied, or as negating the body in some way. However, not all theorists have taken this line.

Countering the idea that recording technologies have disembodied sound, Anthony Enns argues that certain sound recording practices were modelled on bodily phenomena. Using accounts of Phreno-Mesmerism[8] as 'cultural evidence', Enns suggests that the body functions as a recording device, thereby regaining a central location in both the reception and production of sound (Birdsall and Enns, 2008: 4). The use of bodily practices as cultural evidence, rather than empirical understanding of Phreno-Mesmerism and related phenomena,

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[7]   A somewhat problematic position, given the frequent presence of the composer or another musician to diffuse the work.

[8]   Phreno-mesmerism was formed from the drawing together of the eighteenth and nineteenth century sciences of mesmerism and phrenology. Mesmerim involved manipulation of the skull or other parts of the body in order to manipulate a patient's senses. It was based on an understanding of the universe as permeated by an invisible fluid, imbalances in which within the human body might lead to illness. Phrenology comprised tactile contact with the skull, carried out in order to detect particular attributes. The principles of mesmerism were applied to phrenology. Or, as Enns puts it, mesmerists claimed to 'activate particular characteristics or sentiments simply by touching the appropriate phrenological organ' (Enns, 2008: 17). The technique was used in musical performances with, for example, the mesmerist being able to manipulate the subject's vocal chords in order to alter her singing voice according to the preferences of the mesmerist (Enns, 2008: 16-18).

is central to Enns' account.

Enns argues that sound technologies developed as prostheses of the listening or speaking body. He traces the parallel development of sound technologies with the increased understanding of the body in machinic terms.[9] He argues against the idea of the production and reception of sound as a disembodied process, suggesting instead that 'sound technologies did not simply simulate and displace human auditory functions, but rather the body also seemed capable of simulating the functions of sound technologies' (Enns, 2008: 15).

Enns has argued that the cyborgian possibilities offered by "embodied recording" of phreno-mesmerism, 'could similarly be interpreted as an attempt to "recraft" the body by associating individual identity with information rather than physical presence' (Enns, 2008: 24). Highlighting Hayles's reading of information as distinct from embodiment, he returns to an argument about cultural understanding of the body and perception as interrelated. Dualisms between body and machine, interior and exterior, and material and immaterial are broken down in a regime in which the body must mediate between sound and technology. He considers the self to be located neither wholly within the body or the voice; therefore, he argues, 'we have become indivisible from our prostheses. It only remains to be seen whether this dissolution of the subject might not also provide more positive and potentially transgressive ways of reconfiguring social relations' (Enns, 2008: 24).

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[9]   See, for example, Tim Armstrong's discussion of the nervous system coming to be understood as a 'reservoir of energy' concurrently with developments in the study of electricity (Armstrong, 1998: 34), or current popular descriptions of the brain as a computer. Such relationships tend to entail an element of circularity: functions of the body are understood in a particular way, and this then shapes technological developments (particularly in new media), which are then reinscribed in understandings of the body (Otis, 2001: 2).

Listening to Presence

In contrast to these (sometimes extreme) theories positing recorded sound as disembodied, a number of writers have put forward a more nuanced picture of human presence in recorded media. Denise Garcia has argued for the presence of the human body in electroacoustic music through its representation. For Garcia, although electroacoustic music may have 'eliminated the traditional instrumental interpreter' it has not 'excluded the human physical gesture' (Garcia, 2000: 16). Markers of the human body and human presence may be split into six 'gestural representations': instrumental gesture, vocal gesture (speech), other vocal/oral gestures, body movement/displacement, rhythmic gesture/dance evocation, and 'gestures of the intimacy and proximity of the physical body' (Garcia, 2000: 17).

Garcia describes these representions of the body through a lineage of electroacoustic music built on the works of Pierre Schaeffer, Henry, and Varèse (Garcia, 2000: 16). Drawing on Molino, Garcia argues that music is founded on 'rhythms which rest in physiological characteristics of our organism' (Molino, 1998: 13) and that '[the] screens, on which the vibrations of sounds emitted from the loudspeakers are projected, are our bodies' (Garcia 2000:16). Thus our bodies 'contain' 'the perceptive models, the memories, the experiences which will do the readings of this music' (Garcia, 2000: 16); an embodied analysis therefore becomes relevant. However, Garcia's essay is confined to investigating the representation of a 'source' body; though the listening body (its memories, intellectual capacities, emotions and perceptions) is frequently invoked, there is no detailed consideration of how this shapes the listener's understanding of the composition. Furthermore, Garcia does not make any significant attempt to locate – socially, culturally or historically – the bodies she discusses. Additionally, only one work (*Symphone pour un Homme Seul*) is considered in any depth.

Simon Emmerson develops similar ideas in *Living Electronic Music* (2007), seeking 'living

presence' in acousmatic music. Central to Emmerson's thesis is the belief that our descriptions of sound, whether scientific/technical or interpretive/metaphorical are not descriptions of our *experience* of sound. Emmerson argues that the perceiving body, which 'seeks to construct and interpret the [sonic] environment', is 'part of that environment and not a detached observer' (Emmerson, 2007: 2). Taking this listener as a starting point, Emmerson tackles the 'search and response' of perception in three 'simultaneous and interacting' parts. The first is 'physical presence', which includes the listener's potential identification of the source and cause of a sound and the space it occurs in, as well as the presence of other (human or non-human) bodies in the auditory scene. The second, 'psychological presence', covers the perception of will, choice and intention; usually of others, often the composer. Finally, the third of Emmerson's categories is 'personal and social presence', a listening stance that requires that the listener does not 'bracket out' the personality of the performer as it may be manifest within sound, in order to consider questions such as, 'who am I listening with and who is producing the sound?' and issues surrounding liveness.

However, when Emmerson asks whether the human body is sublimated or celebrated in electroacoustic music, he answers by examining the manifestations of the human *personality* (Emmerson, 2007: 61)*.* Emmerson's approach takes into account multiple human presences in the music – relationships between creators (composer, performer) and creators and listeners. However, the materiality of the body, or the performance of its physicality, takes lesser priority. Yet Emmerson considers physical characteristics – heart beat, breath, voice, exchange (such as conversation and interaction), touch and proximity and human movement – as the means by which we learn about our interactions with human personality. Despite describing human body sounds as having 'haunted the soundworld' since the inception of *musique concrète* (Emmerson, 2007: 62), Emmerson's work does not pursue the use of sampled human body sounds in detail or offer analyses of specific pieces that use this technique.

The perceived presence or absence of the body is closely related to issues of liveness.[10]

Paul Sanden argues that musical accounts of liveness are overwhelmingly, if not always

explicitly, founded on the notion of 'live performance as somehow corporeally based'(Sanden,

2009: 9). He explores the idea that sound recording and disembodiment 'are not necessarily

inextricably linked' (Sanden, 2009: 10). Instead, Sanden proposes a more nuanced approach

centred on what the listener perceives rather than on scientifically valid and measurable

states; a sense of presence rather than empirically verifiable presence, wherein perceived live

presence may become indexical for the presence of a living being. He claims that, 'arguably,

the important thing is not whether sound was actually physically *produced* by a living being,

but whether we *perceive* some sort of live presence in those sounds. Liveness is a perception,

guided by the different ways it may be evoked inside cultural discourse and practice' (Sanden,

2009: 8).

While Sanden's approach is undoubtedly useful in understanding how compositions that

sample bodily sound may mediate the body through its perceived liveness, his analysis focuses

on a recording that has a clear link to a performance event.[11] In contrast, compositions built up

from samples – such as those in my case studies – posit a more complex and diverse picture of

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[10]   In his influential text on the subject, Philip Auslander critiques the predominant view that the live is
       outside representation and that the live event is 'real' and mediated (or mediatized) performances
       inferior, or secondary. He argues instead that live forms themselves have become mediatized, with
       'almost all live performances now incorporat[ing] the technology of reproduction, at the very least in
       the use of electric amplification, and sometimes to the point where they are hardly live at all'
       (Auslander, 1999: 158). Auslander sees this as part of a process shaped by cultural and economic
       conditions and the possibilities offered by technology. He argues that television has profoundly
       shaped the concepts of proximity and intimacy that we might apply to our experience of live
       performance. As a result 'the incursion of mediatization into live events can be understood as a
       means of making those events respond to the need for televisiual intimacy, thus fulfilling desires and
       expectations shaped by mediatized representation' (Auslander, 1999: 158-9). From Auslander's point
       of view, seeing live performance and its mediated counterpart as ontologically distinct is
       troublesome. I take a similar view here, focusing on how human presence may be perceived in
       mediated performance, and on the similarities and differences between this and the experience of
       what might nominally be termed 'live'.

[11]   The use of editing in the recording process means that the final audio track may not be a direct
       analogue, or mapping, of one original performance, but may incorporate materials from a number of
       different 'takes'. However, such editing does not seek to highlight the diverse origins of the sonic
       materials but to disguise them.

live origins.

Sue Broadhurst has argued that, due to the nature of digital sampling, it is no longer valid to maintain a distinction between an 'original' recording and its reproduction:

> where a musical performance has been stored on a computer disc, the 'recording' can be made either before or after the 'original' performance, thus disrupting the temporal sequence of events. What is recorded is a set of instructions for recreating the original performance rather than a transcription of that performance. Therefore, the 'recording' is an original performance, it is literally 'produced again' and not 'represented'. This shatters the distinction between 'live' and 'recorded' performance as well as that between 'original' and 'reproduction'(Broadhurst, 1999: 23).

However, the works I am looking at lack the multiplicity of media – and the blurring of boundaries between them – that characterises Broadhurst's notion of the liminal. Unlike in Broadhurst's examples, which are of digitally-borne music that samples other musical performances, these samples are *from* bodies. The source is different: it is not a performance of music, but of a living body. Despite this, these bodies may still possess perceived liveness. So: does the relationship remain the same? For Broadhurst, '[t]he digital as a discourse cannot convert phenomena directly but depends on a preceding production of meaning by non-digital technology' (Broadhurst, 1999: 26). Unless a system of meaning is added to the formal realm of the digital, it remains effectively empty. Therefore, Broadhurst argues, the digital sampler must either 'emulate conventional musical instruments or create new sounds by manipulating sections of music' (Broadhurst, 1999: 26). The works discussed in the case studies below engage with both of these possibilities.

Not only does the sampling of bodily sounds fit within a sampling aesthetic, it also plays with traditional radio and sound production values. Dan Lander has written about this with reference to Artaud's work, arguing that '[t]he lack of bodily sound on mainstream radio signifies a fear of disembodiment, a lack of will to address what is considered taboo: sub-vocal speech, scatological sounds and bodily noise in general' (Lander, 1999). This fear of the body in

sound is not unique to radio, although its signification of a fear of disembodiment may be.

Klára Móricz has pointed out that while scatological references are being increasingly studied

in literature and visual arts they remain 'delicately glossed over by music critics' (Móricz, 2006:

326). She considers that the reason for this 'is not merely the difficulty of locating conspicuous

scatological allusions in music' but also the sentiment that 'music, especially Western classical

music, probably even more than other arts, is considered to be too elevated and too spiritual

to be associated with such [a] filthy bodily subject' (Móricz, 2006: 326).[12]

Yet paradoxically, the production values of the 'authoritative presentation methodology' of

mainstream radio do not approve of the removal of all signs of bodily presence. Silence (or

'dead air', in particular, is problematic:

> The phenomenon of dead air, for instance, will strike fear in the radio
> producer's heart, not because it may signify a deficiency in production
> technique or continuity, but because it allows authority to fall away. Silence
> has plagued the entire history of radiophonic production, as it is believed to
> indicate a nothingness, a space in which the listener is apt to insert his or
> her own idiosyncratic noise and meaning, a space in which the listener's
> own body may constitute a presence. (Lander, 1999)

The problem occurs here not because of a bodily excess, but because of an absence of any

bodily authority, causing the listening body to act as stand in. The sound, lacking the authorial

and authoritative presence of the performer, thus leaves a space where the potentialities of

the listening body come to the fore. Linda Dusman has noted a similar phenomenon. In an

account of the experience of listening to a tape music concert she writes: 'Without a

performer there to instruct my listening via facial expressions, body movements, and the

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[12] Móricz gives examples of where scatological references in music have been used to portray the
functions of the body as 'irrepressible components of man's nature' (Móricz, 2006: 334) and,
conversely, to dehumanize (Móricz, 2006).Móricz cites Maxwell Davies's *Eight Songs for a Mad King*
(1969), Legman's reading of *Till Eulenspiegel* and the low trombone sounds in the 4th movement of
Berlioz's *Symphonie Fantastique* as examples of musical explorations of the scatological. Móricz
herself reads Bartók's parody of Shostakovich's theme in the fourth movement of his *Concerto for
Orchestra* this way. However, these are based on instrumental sonorities (mostly brass instruments or
bassoon) rather than direct recording or sampling of bodily sounds (Móricz, 2006: 326).

shaping of the sound itself – and then to smile at me at the end of the process – I have no idea

whether I have successfully negotiated this sonic terrain' (Dusman 2000: 339). The lack of a

performing body to focus on causes Dusman to become more aware of her own reaction,

leading her to experience a stronger sensation of her position as an embodied subject. The

lack of performance gestures causes a displacement of embodied activity from performer to

listener. The absence of these gestures forces an awareness of the implicit embodied

experience of listening. As Dusman notes, 'with no performer on which to focus one's

attention, no interpreter or mediator stands between the sound of the music itself and the

body of the listener' (Dusman, 2000: 339). This 'coarse imposition' of her own bodily presence

in the act of listening stands in contrast to the more usual transcendental connotations of

music listening. While the performance of this music no longer relies on the body for

mediation, the emphasis is thrown onto listening as mediation, moreover a listening that is a

striking bodily experience. These observations, though from a somewhat different context,

relate closely to my own impetus for conducting this research and desire to understand how

the felt presence of the body within the listening experience shapes musical understanding.

Sound and the Cyborg

The sounds of multiple bodies are combined in the compositions discussed in the case studies.

This may create a 'new' (composite) body or the materials may remain fragmentary, retaining

traces of multiple bodies. Theorisations of similar musical practices often draw on Donna

Haraway's feminist reworking of the cyborg, in which the cybernetic organism is rehabilitated

as a tool for socio-political change. The cyborg, a creature of both social reality and fiction,

embodies 'an effort to build an ironic political myth faithful to feminism, socialism, and

materialism' (Haraway, 1991: 149). In Haraway's account, hi-tech culture is offered as a

challenge to persistent Western dualisms such as self/other, mind/body, culture/nature, male/female, active/passive (Haraway, 1991: 177). Theoretically and materially overcoded, the cyborg is 'a condensed image of both imagination and of material reality, the two joined centres structuring any possibility of historical transformation' (Haraway, 1991: 150). It is 'resolutely committed to partiality, irony, intimacy, and perversity. It is oppositional, utopian, and completely without innocence' (Haraway, 1991: 151). The cyborg no longer possesses any original unity and cannot be fully identified with the 'natural' (Haraway, 1991: 151); in this way it offers the possibility of a new ontology. It breaches the boundaries between human and animal and between animal-human (organism) and machine; it also blurs the boundary between the physical and non-physical. It may be differentiated from the pre-cybernetic 'haunted machine' by a new level of self-propulsion, autopoiesis and autonomy.

Musicological examples of the cyborg can be found in work on diverse areas of practice. Hannah Bosma explores issues of gender representation in electracoustic music, considering a number of compositions which use pre-recorded, manipulated and synthesized voices. She surveys the gender distribution of these voices, finding that a combination of female vocalist and male composer is typical of electroacoustic music. Bosma considers this to conform to stereotypes and entrenched dualisms relating women to body, performance and voice, and men to control and technology. However, Bosma considers the composer-vocalists in this genre to be cyborgs, expressed mainly through vocal identities: 'When comparing the gender pattern of the use of live female vocals in electroacoustic music with the use of electronically pre-recorded or synthesised voices, this last category of 'cyborg voices' is much more varied with respect to gender and voice types. The hybrid combination of voice and music technology stimulates the use of more divergent vocal identities than the classic concert situation. But still, gender patterns are inscribed in these electronic voices' (Bosma, 2003: 14).[13] However,

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[13] Théberge has pointed out the gendering of technology in (visual) advertising material for music

Bosma's study does little to extend the cyborg concept beyond an examination of the gendered politics of music authorship.

Also focusing on gender, Barbara Bradby examines the role of female vocal performance in popular music, particularly dance music. She argues that there has been a technological fragmentation of the female body within this genre. Examining the subsequent exposure of an instance in which one woman's voice is juxtaposed with the body of another in a video (later acknowledged in the credits), she writes: 'This manoeuvre actually challenges the primacy of the *visual* in our everyday imaging of the body (which has been central to the feminist analysis of the representation of women), and the implication that the voice is somehow "disembodied"' (Bradby, 1993: 171). It comes to deconstruct the idea of a singing voice as located in a (visible) body at the same time as locating it in two, simultaneous bodies. This is a valuable theoretical move, allowing as it does for the cyborg to manifest as a purely sonic phenomenon, but in doing so poses the threat of robbing it of its crucial tie to the flesh and to materiality.

Martin Iddon has also encountered a musical cyborg, in this case in Brian Ferneyhough's *Time and Motion Study II* (1973-1976), a piece for vocalising cellist and live electronics (Iddon, 2006). However, unlike the previous examples his is founded in the presence of the flesh of the performer. In this case the cyborg seems to be as much visual as aural, leading to the question of whether it is the performer or musical substance that is the cyborg. Perhaps these cannot be separated: the 'becoming cyborg' is a reflexive process. Ellen Waterman has offered a critique of Iddon's article, arguing that ultimately he ignores some of the key features of Haraway's cyborg (Waterman, 2006: 2).[14]

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technology products (Théberge, 1997: 124).

[14] For Waterman, Iddon fails to address the authoritarian politics behind Ferneyhough's music resisting totalitarian interpretation, thus placing the performer (in a secondary, interpretive role) in oppositional relationship with the composer (as primary creator).

Andra McCartney finds an example of the musical cyborg in Hildegard Westerkamp's *Breathing Room*: 'In "Breathing Room" Westerkamp creates a cyborg body, with her own human breath taking in and singing the world around her, propelled by a mechanical heart. This is not a border skirmish between human and machine or human and environment' (McCartney, 2000: 327). McCartney writes that, 'Westerkamp uses technology to create a body of work that makes audible the breathing connections between inner and outer worlds' (McCartney, 2000: 327). This cyborg's unity as a subject is not natural or original, but suggested by the composer's manipulations and held together by the listener interpreting it as such. There is still room for irony in this cyborg and any move towards hearing its sounds as markers of intimacy tends towards the uncomfortable: as McCartney notes, the combination of organic breath with the mechanical heart leads to a feeling of tension in which listeners 'hear both relaxation and stress ... and those contradictions never resolve' (McCartney, 2000: 327).

From McCartney's account it becomes clear that the compositional strategies deployed are doing as much to structure the listener's embodied experience as simply to refer to an independent nature/cybernetic hybrid. McCartney refers to a physical response to the piece (her own and her student respondents') a number of times during her article, for example pointing out that listeners who enjoyed the breathing sounds in the piece experienced heightened awareness of their own breathing (McCartney, 2000: 326). She writes: 'As I listen to the piece, I find that my feeling of tension is directly related to the pulse's volume and proximity to the foreground. A male composition student commented: "My heart beats seem to get quicker. Feeling very anxious, waiting for something to happen"' (McCartney, 2000: 326).

Despite this, in general little attention is paid to the role of the listener in these examples. Ultimately they neglect the embodiment of the listener and the effect the sound may have on

her bodily experience. Failure to include this as part of the cyborg concept skews Haraway's combination of machine and organism towards disembodied sonic representation. For a being predicated on frequent boundary crossing, the *musicological* cyborg as subject stays within its own boundaries. These boundaries may no longer be circumscribed by the skin, reaching out through technological prostheses, but while the cyborg might touch the listener, it can never subsume her. To move away from the level of mere representation, the explicit experience of the listener must be taken into account. McCartney, for example, cites listening experience but does not draw it into the cyborg concept, despite the fact that in Westerkamp's *Breathing Room* it is the sounds reverberating in the human body that determine this. While acknowledging the flux between materiality and immateriality of the body, the material specificity of the sound is ignored.

What is required, then, is a move away from representational practice, both visual and sonic, towards an experiential position in which the cyborg concept is extended to take into account the role of the listener. As N. Katherine Hayles has pointed out, with reference to posthumanism and cybernetic theory, 'if we acknowledge that the observer *must* be part of the picture, bodies can never be made of information alone, no matter which side of the computer screen they are on' (Hayles, 1999: 246). Following on from this, the (musicological) body no longer occupies a vantage point outside of the sound. In this case the body itself becomes the outside vantage point and source of the new materiality, which no longer affords the possibility of critical distance. But what happens when this point of reference is negotiated between the listening and performing body? Can it still be considered objective? Need it be? While the cyborg concept is a useful starting point for understanding juxtapositions of body and technology, it is more useful for understanding the network of social processes in which the final sonic result is situated rather than understanding the micro-level processes of mediation whereby the connection of bodies, sound and technology come about. In the

following chapter I explore how theories from a number of fields have moved towards

uncovering the role of the body in the experience of music.

3. A Corporeal Shift

In this chapter I turn towards examining the status of the body within a wider range of theoretical perspectives on music. I outline the ways in which a number of fields have attempted to return the body to their methods and objects of study, and consider the potential advantages and shortcomings of such approaches for my own work.

The Body in Musicology

Until recently, musicology lacked both the tools and the inclination to consider bodily practices as part of its remit. The role of the body was marginalised within the field (Beard & Gloag, 2005: 32; Williams, 2001: 5; Cusick, 1994; Pelinski 2005; McClary, 1991), perhaps stemming from musicology's preoccupation with the score as text. A focus on structural and formal aspects of music (in the study of Western art music) and on the cultural conditions of the production and reception of music (within popular music studies) has marginalised other aspects of musical experience such as timbre, intensity, and music's 'affect on the body and its ability to give pleasure' (Williams, 2001: 5). The debate surrounding music as 'language' also neglects the corporeal aspects of musical practices (Théberge, 1997: 161). Alastair Williams has argued that bodily topics may have been suppressed within musicology due to the feminine or queer connotations of music within Western societies (Williams, 2001: 5; see also McClary, 1991; Brett et al., 1994). Bodily responses to music were for some time also considered inappropriate for study, both in musicology and in wider academic discourse (Austern, 2002: 6). When the body has been invoked, it has usually been in relation to theories

of emotions: as Linda Austern says, within the wider context of Western thought, at least, music has been positioned 'somewhere in the shifting space between mathematical abstraction and corporeality, between reasoned creation and emotive response' (Austern, 2002: 6).

Further to this, for much of the twentieth century 'musicology and other academic disciplines have insisted that personal identities, of any sort, be kept out of the picture' (Barkin and Hamessley, 1999: xviii). More recently however, a poststructuralist move towards reading multiple voices in a 'text' has allowed subjectivities to be written back in (Williams, 2001). While such topics began to be considered in less mainstream musicological discourses in disciplines such as sociology (particularly with reference to popular music), musicological writing has eventually become increasingly concerned with the (re)turn to the body in the wider humanities from the 1990s onwards. A study from outside the field of musicology that takes the body and music as a primary concern is Tia DeNora's *Music in Everyday Life.* DeNora takes a sociological approach to the relationship between body and music, giving examples of the use of music as a therapeutic medium in neonatology (particularly the use of music in the modification and maintenance of physiological states) and the role of music in supporting physiological and psychological states in response to movement exercises in aerobics classes (DeNora, 2000: 75-108). Ultimately, DeNora positions music as 'a prosthetic device, [able] to provide organizing properties for a range of other embodied experiences and in ways that involve varying degrees of deliberation and conscious awareness on the part of music's conscripts' (DeNora, 2000: 103). While such a theoretical position supports the need for further analysis of how such musical affordances come about, it does not provide a direct method by which this may be achieved.

An increasing amount of work in popular music, opera, and nineteenth-century instrumental music focuses on the body (Beard and Gloag, 2005: 32). Semiotic approaches to

understanding the role of somatic experience in musical understanding have been posited by David Lidov (Lidov, 1987) and developed by Naomi Cumming in her theorisation of the subjectivity of the musical performer (Cumming, 2000). Additionally, a number of approaches have been informed by the writing of Roland Barthes, with a focus on the body as manifested through the voice. Barthes' essay 'The Grain of the Voice' has proved particularly influential in this area; he distinguishes between the linguistic and musical structures of singing, and its material, bodily instantiation (Barthes, 1977).

There have also been attempts to understand the role of the body in music in (primarily) historical contexts. Bruce Holsinger (2001) considers the relationship between music and the body in medieval culture, while Richard Leppert takes a largely visual approach to music and the body during a period covering 1600 to 1900 (Leppert, 1993). Leppert pays particular attention to discourses of power, knowledge and identity, especially as they are inscribed through music and the body. While his study provides a valuable contribution to the field, its historical and visual focus are necessarily limiting for its use in the present study.

In the following sections I examine in more detail how different strands within musicology have sought to re-inscribe the body.

Approaches in Feminist Musicology

Many calls for sustained attention to the role of the body in music-making originate in, or were revived by, approaches loosely grouped within feminist musicology. In *Feminine Endings*, Susan McClary's influential study of gender in music, she argues for the need to understand how music may inscribe social practices and values. While the body is not the central focus in her work, it nevertheless occupies somewhat more than the typical 'absent presence' of much theory insofar as the body acts as the material on which experiences of gender and sexuality

are grounded. McClary argues that academic musicology has avoided questions of bodily

signification as well as issues of the expressive and erotic in music (McClary, 1991: 54). Her

project is strongly linked with feminist practices, which she sees as having demonstrated the

tendency for scholarship to deny the body, instead identifying with mind and disembodied

thought. For McClary, it is therefore not surprising to find that this mind/body dichotomy also

underpins classical music scholarship and its institutions (McClary, 1991: 54).

McClary also attends to the material effects of music on the body (such as the experience

of rhythm), although this is not explored fully. She also draws on Mark Johnson's idea of

metaphor as a means of structuring cognition (this will be explored more fully below). For

McClary, music may act as a tool for the organisation of bodily experience: 'music is a powerful

social and political practice precisely because in drawing on metaphors of physicality it can

cause listeners to experience their bodies in new ways – again, seemingly without mediation'

(McClary, 1991: 25 – McClary gives the example of rock 'n' roll in the 1950s). Of particular

significance here is McClary's highlighting of a common theoretical trope – that music's role as

mediation is apt to disappear: 'Since few listeners know how to explain how [music] creates its

effects, music gives the illusion of operating independently of cultural mediation' (McClary,

1991: 30).

In her influential article 'Feminist Theory, Music Theory, and the Mind/Body Problem,'

Suzanne Cusick argues that 'a feminist music theory must include theorizing about (and

analyzing with great care) the practices of bodies (real ones) as well as the practices of minds'

(Cusick, 1994: 17). Cusick argues for the presence of the body in the production and reception

of instrumental music, something otherwise denied by musicology's focus on 'the intentions

and texts of composers' (Cusick, 1994: 15). Moving beyond the idea of the score as

representing music, Cusick considers music as performative; a process of both creation and

reception. She attempts to move away from music as a 'mind-mind game', seeking to offer

instead a rehabilitation of the role of bodily practices within analytic understanding of the process of creation and reception.

For Cusick, feminist music theory differs from predominant music theory in its partiality for asking questions or offering hypotheses, rather than providing objectively verifiable answers (Cusick, 1994: 17). In an attempt to frame a musicology able to consider the bodily practices that shape music, Cusick posits a series of questions: 'What disciplines are imposed on the bodies which produce the sound? What meanings are ascribed to the public display or the deliberate concealment of those disciplines? When do those meanings constitute gender for the performers? When can they be read as metaphors for gender by an audience?' (Cusick, 1994: 17). She also considers it important to be able to understand how layers of meaning result from 'the display and acknowledged concealment of *a priori* bodily disciplines in the actual performance of a work' (Cusick, 1994: 17). Cusick acknowledges that the power relationships inscribed by music cross over into social performance in the acts of those performing.

Of particular importance to my study are the ways in which such bodily disciplines may also affect the listening body. While Cusick focuses predominantly on the performance of instrumental music, considering the material, bodily act of making music as 'the exact site of an actual solution to the mind/body problem,' she also draws attentive listening into this formulation (Cusick, 1994: 18). The 'mind-mind game' of attentive listening as 'shared tenancy of the composer's subject position' may also be extended to involve the listening body. As will be discussed later, the body plays an active part in the reception of music and the decoding of musical meaning. However, Cusick's argument most readily lends itself to an analysis of embodied performance, despite offering a stronger focus on physical experience than many other accounts focused on listening. Cusick most frequently expresses bodily articulations or results of music that are generally visible and not necessarily audible. Though, as she points

out, what is admissible as 'producing meaning' is dependent on for whom this meaning is intended: listener, composer, or performer.

Andrew Mead develops Cusick's theories, exploring how they might also pertain to the listener or composer. Mead makes the valid point that if we are to consider music as something we do, rather than as merely text or score, then the listening body is implicated along with the performing body. He describes experiencing physical pain during a concert, a phenomenon that is later explained when he realises he is breathing along with the solo oboist who is practising circular breathing; the author is made to 'quite literally run out of breath' (Mead, 1999: 1-2). Mead observes that hearing the physical conditions of the making of musical sound formed, for him, a significant part of musical experience. The possibility of such physical identification with the performer (via musical sound), and the role of such an identification in the subsequent shaping of musical experience, formed a cental part of the impetus for my own research. In the following sections I outline ways in which this bodily response might be attended to prior to being drawn into analysis.

Approaches in Phenomenology

Phenomenology, or 'the study of phenomena', takes experience itself (rather than that which is experienced) as its object of study (Cerbone, 2006:3). Numerous theorists have taken a phenomenological approach to music, including: Batstone (1969), Carpenter (1967), Clifton (1975), Ferrara (1984), Lewin (1986), Lochhead (1980), Pike (1970), and Smith (1976). Phenomenology is particularly useful because it focuses chiefly on the experiencing of sound and offers, to some extent, a way of bridging the gap between theory and practice. The phenomenological approach discourages the imposition of an external, abstractable (for example, formal) structure (Smith, 1979). However, the most useful element of the

phenomenological approach for my purposes here is that it does not separate physical and mental experience and considers hearing to be an active (bodily engaged) process. In this section I outline the work of theorists who have used phenomenology to support embodied understandings of musical experience. I follow this by considering how some of the central themes of musical phenomenology (in particular the understanding of the reception of sound as active rather than passive) have been impacted by the shift towards technologically-mediated sound.

The extent to which phenomenological accounts draw explicitly on bodily experience, making this a central focus, is shaped by their theoretical underpinnings. Many phenomenological studies, following Husserl, focus primarily on the inner experience of time consciousness, while Merleau-Ponty is perhaps the theorist most frequently invoked by those wishing to explore phenomenological perspectives on the role of the performative nature of the lived body in music.[15] This tends to draw on Merleau-Ponty's earlier work, particularly *Phenomenology of Perception* (1962 [1945]). A key feature of Merleau-Ponty's philosophy is that awareness is lived, rooted in being in the world rather than in cognitive representations. Indeed, Merleau-Ponty 'saw himself as evolving towards a new philosophical position which totally abandoned traditional philosophical dualisms of subject and object' (Moran, 2000: 401).

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[15]   For example, a recent phenomenologically-based study, carried out by the Music, Living Body and (E)motion Project, places corporeality at the centre of its investigation. The project's purpose is to 'examine the meaning of the living body in producing and receiving music' (Tarvainen, 2005). The project is based on the hypothesis that 'music has the ability to signify by referring to basic experiences of the embodied human being, and that much of the emotionally expressive power of music emerges distinctly from the domain of the corporeal' (Tarvainen, 2005). The research draws on the active participation of the researcher – using the kinaesthetic body as a tool: using singing, playing and dancing in order to take 'reflective participation in musical activities' as a starting point. Sub-studies explore the relationship between music and dance, early music performance practice, interpretation of singer's expressions (using the researcher's own singing body as a basis for listening strategies involving imitation), and existential interpretations of the musical work concept. However, this study is focused on the *movement* of the listening body (especially through a strong focus on dance as an act of reception) and therefore its methods cannot be directly transferred to my own study.

Subjectivity becomes located in the lived, active body rather than an abstract, cognitive process of the mind. The body provides a synthesizing function with the world, playing a central role in perception. Meaning does not arise as a mind-centred cognitive process, but through the action of the body in its environment. George Fisher and Judith Lochhead have argued that Merleau-Ponty's approach is useful to music because, 'First, the sonic phenomena of music have no explicit link to the specific sort of linguistic rationality that characterized mind-based philosophies of consciousness [...] Second, an understanding of musical significance based in the embodied actions of those who create, perform, and listen finds a secure basis in the performative nature of the musical art itself' (Fisher and Lochhead, 2002: 39). However, while Merleau-Ponty does make some reference to musical practices, his study does not focus explicitly on sound.

This gap has been somewhat filled by Don Ihde, who offers a study of the role of the auditory in everyday experience in *Listening and Voice* (2007). Ihde's work provides a set of phenomenological tools and a terminology with which to describe the auditory field. While there is a strong emphasis on voice, Ihde also covers musical phenomena and environmental sound, as well as auditory imagination. Ihde's work is split into two parts: a 'first phenomenology', guided by Husserl, and a 'second phenomenology' guided by the writings of Heidegger. Ultimately, though, the two phenomenologies belong together: the first forms a 'descriptive ontology', offering the conceptual tools for the description of sonic experience, through which the phenomenologist comes to grasp the second phenomenology, or existential dimension of sonic experience (Ihde, 2007: 20-23).

In the second edition of *Listening and Voice*, Ihde turns toward technological advances, including recording technologies and, in particular, digital technologies that can change the limits of what is audible. He acknowledges that 'by living with electronic instruments our experience of listening itself is being transformed, and included in this transformation are the

ideas we have about the world and ourselves' (Ihde, 2007: 5).[16] In the final chapter of this new

edition, 'Embodiment, Technologies, and Musics', Ihde retains a primarily descriptive

approach, turning towards the 'technological embodiment of music'. He argues that

amplification '"magnifies" sound, but unavoidably [amplification] also transforms it' (Ihde,

2007: 256). Ihde does not consider this to be a change that suddenly came about with the

development of electronic technologies; indeed, he includes a number of traditional (musical)

instruments within this theoretical framework, particularly those with a body that acts as a

resonator. However, while he considers electronic amplification as part of the same trajectory,

he considers that 'electronic possibilities are much more "active" than those of classical echo

or resonance amplification' (Ihde, 2007: 257). He acknowledges a 'move from direct bodily

expressive musics to more instrumentally mediated musics' (Ihde, 2007: 257). Ihde

conceptualises recorded musics, due to their characteristic repeatability and potential for

dissemination, as an extension of qualities of the score. The crucial difference between un-

mediated and technologically mediated musics being that recording materialises a

performance, 'which can then be repeatedly played and perceptually heard' in a way that the

score cannot, except to those possessing relevant levels of (music) literacy (Ihde, 2007: 258).

While I do not dispute Ihde's claim, I would like to offer a different reading, one that is more

firmly based in the materiality of sonic experience and how this is affected by the mediation of

sound. However, before looking at how this works in recordings, it is necessary to return to

how phenomenology has dealt with hearing as an active, rather than passive, process.

   The blurring of the distinction between active and passive reception of sound is a central

tenet of the phenomenological approach. F. Joseph Smith, for example, has drawn on Husserl's

idea of 'passive synthesis', where the sounds of a musical composition are amalgamated in

human perceptive consciousness (thus this process occupies a middle ground between active

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[16] By this, Ihde does not necessarily mean *musical* instruments, but technologies that change what can be heard and where.

and passive). Passive synthesis is intimately linked with the dualism between musical object and listening subject: 'In the mediation between subjective listener and objective sound the subject is drawn into and becomes part of the world of music; he is no longer merely a passive spectator, uninvolved in the total process of music itself' (Smith, 1979: 237). However, Smith describes passive synthesis as taking place in a 'self-structuring' consciousness: 'The listening process is a self-structuring of my consciousness in "active" response to the sounds that give themselves presently to me in perception' (Smith, 1979: 237). Though Smith acknowledges bodily action as a possible response to sound, he does not examine how this response might be mediated. While the implicit return of power to the body and experiential focus of such a theorisation is of value to my study, this must be extended in order to examine processes of technological mediation.

It is for this reason that I turn to the work of Aden Evens, who has offered a phenomenological approach to the technical conditions that underpin the creation of sound, focusing particularly on digitally mediated music. Evens aims to reach an understanding of music as sound, dynamic and realised in time, rather than as a score that can be understood or analysed visually. Sound forms the common denominator in the wide range of musical experience he includes in his study.

For Evens, hearing (as the perception of sound) takes place though a series of contractions of the differences in the sound wave (frequency, shape, amplitude etc.) into pitch, timbre and volume, in which change is perceived as constancy. For example, fluctuations in air pressure become pitch (Evens, 2005: 5). Evens posits 'contraction' as a phenomenological act of perception, a necessary precursor to sense-making: 'what hearing contributes to sound … is a contraction. Hearing takes a series of compressions and rarefactions and contracts them, hears them as a single quality, a sound' (Evens, 2005: 1-2). As in earlier phenomenological approaches, Evens argues that the physicality of the body is crucial in the reception of sound

and particularly in understanding the different temporalities within music. Reception takes place both through bodily actions and reactions, but also in actions more usually associated with mind rather than body, such as thinking and feeling. In addition to compressing fluctuations in air pressure into a single sound, Evens also argues that the body plays an important role in perceiving the different temporalities of music, especially rhythm and form: 'Derived from hearing, the temporalities of sound are things that we *do*, extraordinary powers of perception and the perceptive body. The body must compress time, it draws into a singular moment an interval of difference' (Evens, 2005: 39). This is an active, not a passive, process: 'the compression[17] involved in meaningful hearing does not take place on its own; hearing is an activity, not a passive reception' (Evens, 2005: 39). The (phenomenological) contraction of change into constancy does not, for Evens, take place on its own; each temporality is an act of the body, reliant on acts of bodily contraction or compression, on the ear subsuming difference. Therefore, 'perception is not passive, but affective; in perception the body behaves itself, acting on and reacting to its environment. Perception compresses, and in so doing it makes the difference between one temporality and the other' (Evens, 2005: 41). Having constructed this basis for a phenomenological engagement with sound, Evens turns towards technologically-mediated sound. He argues that, due to the technical limitations of the CD as a playback medium, discriminating listeners claim to have detected an audible shift from analogue to digital reproduction (Evens, 2005: 13-14). This is a contentious position, and there is not space here for a full discussion of the relative merits of digital versus analogue recording and reproduction; I will focus instead on Evens's treatment of the necessity of noise to expression, and the consequences of this for the bodily, phenomenological experience of listening to recordings.

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[17]   Care must be taken to avoid confusing Evens's use of the term 'compression' in this context with other uses of the term that appear in his work (the compression of air in the sonic waveform, and the compression of data in digital storage formats).

Evens sees a lack of what he terms 'implication' as a problem of recorded sound. He argues that noise (conceived as that which cannot be contracted and made sensible) is necessary for the creation of expression. This is achieved via a quality that Evens labels 'implication'. Implication is what drives music. 'It is a force that pushes the music forward without specifying where it must go' (Evens, 2005: 19). Implication is what allows the listener 'to hear where the music is going,' but it is not a conditioned response:

> The feeling of tension before the resolution of a harmonic progression is neither an innate characteristic of human perception nor a learned response to patterns of Western music. The tension is real *in the music*, and not just in the listener, but it is implicated so that the same progression performed without appropriate expression will fail to induce the same tension in the listener. To bring implication to consciousness is to anticipate in the music, but implication is not the same as anticipation. (Evens, 2005: 19)

What is implicated is *already there*; it differs from expectation or anticipation. The recording must incorporate enough noise to be contracted into implication and communicate expression. Implication forms a key part of expression in live performance. Evens argues that implication is something that the performer manipulates unconsciously, a series of responses to a particular context, such as responding to different levels of ambient noise in a concert hall. Implication is therefore always specific to a context or event, an effect that is difficult, if not impossible, to capture in mechanical reproduction. Evens considers the CD to be a special case (because, in his view, it 'does not heed noise'), but that all recorded audio media lack 'an accord with the listening context, a sensitivity to the environment including not just the space but also the listening event' (Evens, 2005: 23). Yet Evens does not consider in any depth the role played by the body in this aspect of his phenomenology; if the perceptive powers of the body are necessary to the compression of temporalities into music, and perhaps even to contracting noise into expression, what is left for the body to do when the material conditions of the listening experience do not call on the body to perform this function to the same degree?

What happens when the powers of the perceptive body are put 'on mute' by a listening context that shows little sensitivity to its environment? If the recordings in the case studies lack implication in their separation from their original noisy, bodily resonance, must the listening body stand in, or is it silenced? I return to these questions thouroughout the case studies.

Approaches in Embodied Cognition

In recent years, cognitive science has focused increasingly upon the role of body-based cognitive representations, often referred to as image schema or schemata, in the mediation of musical experience (Clarke and Davidson, 1998: 75). Image schema play an important role in how we represent our bodies to ourselves, as well as in how we understand musical attributes, such as a sense of motion. These schema may be particularly associated with information (in this case sound) that has a bodily origin, or may suggest an origin in bodily action. Probably among the most influential work on embodied cognition is that of George Lakoff and Mark Johnson (1999), who argue that:

> The embodied mind is part of the living body and is dependent on the body for its existence. The properties of mind are not purely mental: They are shaped in crucial ways by the body and brain and how the body can function on everyday life. The embodied mind is thus very much of this world. Our flesh is inseparable from what Merleau-Ponty called the "flesh of the world" and what David Abram refers to as "the more-than-human world." Our body is intimately tied to what we walk on, sit on, touch, taste, small, see, breathe, and more within. Our corporeality is part of the corporeality of the world …. The mind is not merely corporeal but also passionate, desiring, and social. It has a culture and cannot exist culture-free". (Lakoff and Johnson, cited in Austern, 2002: 3)

Pelinski takes the (often empirically biased) accounts of cognitive science and offers them in a reading that is in keeping with the phenomenological concept of the body and consciousness, particularly that of Merleau-Ponty. Like Aksnes (2002) and Saslaw (1996) (whose work is

discussed below), he aims to demonstrate how the 'pre-conceptuality' and 'pre-rationality' of

perception inform musical practices in the form of body schema and motor/bodily action

habits (Pelinski, 2005). Pelinski takes the working hypothesis that 'musical practices have

primary significations without any need for the linguistic vehicle of rational thought,' and that

subsequently '[t]hese meanings are 'always-already' an actualization of musical experiences of

daily life and are, hence, invested with ontic and epistemic primacy over the production of

theoretic (musicological, scientific, semiotic, culturalist, sociological, etc.) discourses which

aspire to exhibit authenticity, concretion and immediacy' (Pelinski, 2005). Thus while these

meanings may occur on a pre-conceptual or subjective level, they are also open to, and

informed by, the surrounding environment. This is not to say that rationalisation does not also

shape musical experience and processes but, Pelinski argues, the increase in understanding

music in such a way parallels the rise in the need for 'expert' structural listening. However, as

Pelinski points out, and has also been demonstrated by Aksnes and Saslaw, this rationalised

approach to Western music does not preclude the exploration of these aspects of musical

practice: 'Co-implicated in these aspects are sensibility and signification (meaning), experience

and representation, and action and knowledge, in the same way as subject and object,

perceiver and perceived are tied together' (Pelinski, 2005). Pelinski shows that 'the relevance

of musical experience as an unavoidable object of a reflection on embodiment is based upon

its intrinsic connection with perception' (Pelinski, 2005). This is a concern that I aim to retain

within my own analyses.

   At the heart of thinking around embodied cognition is the dissolution of the Cartesian

body/mind paradigm. The structures of bodily experience shape cognitive content, leaving no

clear distinction between bodily experience and its mental representation. Studies of gesture,

with their dual focus on movement (physical displacement) and on the mental activation of

such effects, also allow a crossing of this mind/body dualism (Jensenius et al., 2010: 12).

While much of this work supports a general project of incorporating the body into analytical practice, it does not explicitly deal with the possibilities of hearing another body in sound. As this formed an important part of the impetus for this research, I would like to draw on one study in particular for its use in explaining how the listening body may come to relate to the body it hears in music. The 'mimetic hypothesis', as proposed by Arnie Cox (Cox, 2001; also elaborated in Cox 2006), attempts to explain the 'processes whereby embodied experience becomes relevant to music conceptualization'. Part of the rationale for Cox's study is a need to theorise musical affect by understanding how musical sounds bring about this affective response (Cox, 2001: 204). He argues that this can be traced back to the mimetic hypothesis insofar as emotional states are often connected to muscular states, muscular states being influenced by mimetic participation with the perceived sound: 'The hypothesis suggests that muscular-emotional response to music is not something that occurs occasionally, in certain kinds of music, but that it is instead integral to how we normally perceive and understand music, because we normally imagine (most often unconsciously) what it is like to make the sounds we are hearing' (Cox, 2001: 205).

Cox argues that the listener engages in mimetic participation, ranging from sub-vocalisation of instrumental melodies, to more overt activities such as foot tapping. Cox's hypothesis comprises two parts: firstly that we 'understand human movement and human-made sounds in terms of our own experience of making the same or similar movements and sounds'; secondly 'this process of comparison involves overt and covert imitation of the source and visual and auditory information' (Cox, 2001: 196). Cox supports the hypothesis with evidence from six areas (face-to-face imitation; motor imagery studies; subvocalisation studies; musical imagery studies; studies of speech as gesture; and vocal descriptions of non-vocal music). Recognition of physical gestures of performers also plays a part, but Cox extends this to include the listener's response to gesture, a metaphoric response that is less concrete

than the physically identifiable movements of the performer: 'the concept of melodic gestures reflects a non-specific exertion that is felt as a result of mimetic participation: it is not a vocal "gesture", and it is not a gesture of the limbs, but a more basic feeling of exertion that does not belong to a single mode of physical experience' (Cox, 2001: 204).

Despite this, Cox's hypothesis places most importance on subvocalisation or covert vocal imitation, regardless of the sonic origin of the music experienced (whether vocal or instrumental: he does not consider other forms of music creation, for example electroacoustic composition). However, Cox's focus on *human-made* sounds, while it attends primarily to instrumental music, would not appear to rule out a similar process for the perception of bodily sound. Cox employs a similar turn in order move his hypothesis from being relevant only to musicians with experience of making instrumental sounds, to anyone with experience of making vocal sounds. While not necessarily deliberately produced, the bodily sounds discussed in my cases studies are nevertheless human-made.

As noted in Cox's mimetic hypothesis, a further way in which a listener may understand music is through implicit or explicit 'mirroring' of the movements she hears. As Godøy notes, this imitation usually happens spontaneously and is largely involuntary. Additionally, not only do we imitate movements we can see being made, but also 'the movements that we assume other people are making in cases where we cannot actually see their movements' (Godøy, 2010: 108). This has been supported by recent research in neuroscience, which has shown that there is a neurophysiological basis for this behaviour in the form of mirror neurons (Phillips et al., 2004; Gallese, 2005; Gallese and Lakoff, 2005; Iacoboni et al., 2005. For a particular auditory focus, see Keysers, 2003; Gazzola et al., 2006).

Image schema are not confined to the direct perception of music, but also inform how music is discussed and theorised. Janna Saslaw has argued that the image schemas we use to conceptualise music are also present in the way we describe and theorise it. She illustrates this

by looking at the 'cognitive organization' underlying Hugo Riemann's modulation theory (Saslaw, 1996: 217). Informed by the work of Lakoff and Johnson and also Mark Turner, she traces how body-derived image schemas are manifest in Riemann's work, *Systematische Modulationslehre als Grundlage der Musikalischen Formenlehre*, or *Systematic Study of Modulation as a Foundation for the Study of Musical Form* (1887). Saslaw argues that Riemann's ideas 'show evidence of several kinaesthetic image schemas' (Saslaw, 1996 : 222), arguing that the 'source-path-goal and container schemas are pervasive in this theory, as they are in present day theoretical statements' (Saslaw, 1996: 235). However, Saslaw adds a cautionary remark: 'It should also be possible to trace the use of image schemas in musical utterances, although this activity must be done very carefully so as not to add the metaphors of the analyst into the picture' (Saslaw, 1996: 235-6), something that is in contrast to my own concerns.

In order to construct an embodied analytical method, it is important to understand how I can draw on studies aimed at a general understanding of musical experience and deploy the findings in such a way that they may explain musical experience within a particular work. In other words, how might the findings of such studies be used to support an embodied analysis? One possibility has been put forward by Hallgjerd Aksnes, who examines how image schema operate within music, before drawing on them to inform a set of analytical examples. Like Cox, Aksnes aims to understand how music may lead to affect, or how 'music *moves* us,' (Aksnes, 2002: 101). However, she provides a more detailed model for how this may be drawn into an analytical method, offering a number of analyses that demonstrate how different image schema work within music. Her approach is largely founded on mapping structural or motivic features of the music with different image schema. For example, she cites Knud Jeppesen's work on Palestrina's counterpoint to illustrate how the balance schema manifests in musical sound and how this is related to the bodily experience of having a centre of gravity and the

day-to-day effects of this on movement (Aksnes, 2002: 84).

Aksnes takes another example, the 'Lament' from Purcell's *Dido and Anaeas*, tracing metaphorical mappings of 'vocal expressions of sadness' (Aksnes, 2002: 91). She draws attention to how the 'crying' contour is 'grounded upon sonorous similarities,' but she refers to this as a kind of metaphor (rather than the more often used term "iconicity") 'as the sound source and the musical sound – for example crying and singing in a lamenting way – belong to different cognitive domains' (Aksnes, 2002: 93). She argues that it is likely that 'the conceptual mappings follow the same principles whether they occur within or across sensory modalities' (Aksnes, 2002: 93). These may be shown through how we carry our bodies when sad (for example, adopting a drooping posture). Similarly, Aksnes suggests musical slowness may reflect changes in temporal perception in someone who is experiencing pathological depression, as well as other slowings of the body such as the heartbeat or digestion (Aksnes, 2002: 93). However, while these mappings may be indicative of certain bodily or emotional states, they are not exclusive; musical slowness may also be read in relations to how the body slows during relaxation, thus leading to a very different analytical interpretation. Nevertheless, such an approach is useful for my method of embodied analysis insofar as it provides a bodily grounding for sonic features that may not at first seem to have a bodily origin.

Much current research on music and gesture is founded on principles from embodied cognition. This increasing focus on gesture runs parallel to the conceptual framework of embodied cognition, which is often used to support gesture-based studies. As Godøy and Leman note: 'Under the label of "embodied cognition," we can now better understand the integration of gesture with perception and with thinking in general, including insights on how body movement is both a response to whatever we perceive and an active contribution to our perception of the world' (Godøy and Leman, 2010: 4). In the following section I examine

approaches to music and gesture, particularly those that may prove useful in the construction of my own analytical methodology.

Gesture-based Approaches

All three case study works draw on sounds produced by the physical movement of the body. Where aural traces of this bodily action remain, studies of musical gesture may provide useful tools for identifying and describing physical action, as well as for understanding how it contributes to the construction of musical meaning.

The use of gesture-based approaches to understanding musical meaning is an expanding field of research. Some early work in this area grew out of feminist musicology, based on an impetus to understand music as performative, rather than simply as text (see, for example, Cusick, 1994). More recently there has been significant growth in empirical research into music and gesture. This includes examination of how the empirical subject might understand music in relation to performance gesture. While the study of musical gesture is not necessarily a recent development, the technology now exists (for example more detailed and precise technologies for motion capture) to facilitate a move from more philosophical approaches towards the more systematic (Godøy and Leman, 2010: 3).

Just as there have been varying theories and methodologies in the study of musical gesture, the term 'gesture' itself has come to be used varyingly, incorporating various physical and sonic events (Gritten and King, 2006: xx). However, a primary feature in the identification and definition of gesture is directed motion. Such movements are usually learned, but they may also be spontaneous and may be made by either performers or listeners; in the listener's case they may include foot tapping, swaying, or dancing. Nonetheless, gesture cannot be entirely reduced to movement: it must contain an underlying expression or meaning (Godøy

and Leman, 2010: 5).[18] The 'expressive' content is the means by which gesture references

cultural context or semantic meaning; the listener must know and understand the cultural

context in which the gesture takes place in order to decode or make sense of the gesture. The

link between bodily gestures and sonic gestures is not always straightforward, however: 'body

movements are supposed to encode sound gestures, but once sound is produced it is hard to

identify unambiguously the gesture that is contained in it' (Godøy and Leman, 2010: 7). While

linked, movement gesture and sonic gesture are not coterminous. Sonic gestures, or

movements in sound, however, are produced by the human body and may function as a

suitable starting point for identifying musical gestures (Godøy and Leman, 2010: 6). As Godøy

and Leman suggest, the study of gesture may be undertaken through a primary focus on

extension (the movement of the body in space) and a secondary focus on intention ('namely

that which is imagined or anticipated') (Godøy and Leman, 2010: 5). This focus on intention

not only introduces a 'context-dependent aspect' to the study of gesture (as mentioned

above), but also introduces an element of the listener's subjective response (Godøy and

Leman, 2010: 5).

   There have been a number of debates about how the listener, as an embodied subject, is

implicated in the process of gesture becoming meaningful. Hatten (2003) points out that

gesture is grounded in intermodal perception. Hatten's understanding of gesture is founded on

'gestural competencies,' which '[arise] from physical (i.e. biological and cognitive) and social

(i.e. cultural and multi-stylistic) experience' (Jensenius et al., 2010: 18). This is similar to Cox's

application of his mimetic hypothesis to gesture: listeners experience music in terms of

'patterns of exertion' that they have experience of making. Therefore, in mimetic participation

with the music, the listener feels as though she is 'acting in a way that is more or less

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[18]   Though there is some music-related movement, for example certain instances of dancing, that may
       not have semantic content, in these cases meaning and significance is more likely to be internal (to
       the person making the gesture) (Godøy and Leman, 2010: 5).

isomorphic with the sound producing actions heard (and seen)' (Cox, 2006: 53). Cox considers that one of the most 'straightforward mappings' the listener can make between her own prior exertions and the sound she hears is to map them onto gestures: 'we do not feel only abstract sensations of exertion; we understand these as the intentional, expressive gestures that we have made and have seen made in other domains of experience' (Cox, 2006: 53).

Leman puts forward a similar experience-based approach (the experience of one's own gestures). Taking a second-person perspective, he suggests that: 'gesture appears as a mediator for music-driven social interaction or as the vehicle through which a "me-to-you" relationship is established in space and time, through musical engagement' (Leman, 2010: 142). In this view, gesture is a communicative act that takes place through a process of embodied mirroring: 'This mirroring may ultimately account for the fact that we perceive the (sonic) moving forms of music as gestures, and therefore, that we engage with music as if music was another social being' (Leman, 2010: 143). This offers a way of moving away from the necessity of the visible presence of the performer, while retaining the link between performer and listener that is facilitated through musical gesture.

Given these definitions of gesture, and the potential for the embodied, listening subject to engage with them, how might this knowledge be applied in creating an embodied method of music analysis, especially one that is not founded on empirical methods? Leman considers that while empirical research offers the possibility of understanding the role of physical and biological processes that underlie experience, narrative accounts of gesture, as found in musicological literature, retain the ability to provide insight into the relationship between musical and physical gesture and subjective experience.[19] Such an approach is in-keeping with understanding the listening situation that I wish to study.

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[19]   Leman's approach in *Embodied Music Cognition and Mediation Technology* (2008) also suggests ways of integrating narrative and empirical viewpoints.

A potential model for such a narrative approach to gesture may be found in George Fisher and Judy Lochhead's article 'Analyzing from the Body' (2002). Fisher and Lochhead use their own experience of playing and observing performances of two notated works for clarinet to examine questions of musical meaning (Fisher and Lochhead 2002: 61). Their approach is similar to more traditional modes of music analysis in that it offers a close reading of the musical text. However, rather than focus entirely on the score they turn their attention to embodied performance behaviours, shifting the balance away from the importance of notes on the page (although these are not entirely disregarded) in favour of music as a performative event.

'Within the specific focus of "analyzing from the body,"' they write, 'the analyst constructs arguments by treating the physical movements and sensations of embodied human beings involved in various sorts of music making as primary sources of musical evidence' (Fisher and Lochhead 2002: 44). Bodily movements, experiences and sensations that are outwardly visible and those that are only felt by the performer or listener-analyst (in this case one and the same) can form the object of attention. Fisher and Lochhead also support 'the general project of studying music not only as an embodied activity but also *in* an embodied way' (Fisher and Lochhead 2002: 44): of understanding music as both produced and received by embodied subjects. Fisher and Lochhead's approach is founded largely on gesture as the basic unit from which the performative act is built up, and as 'the specific site where physical action and musical significance merge' (Fisher and Lochhead, 2002: 47).

However, Fisher and Lochhead's analyses, like many other studies of gesture, are highly reliant on 'the strong visual clue' provided by the movement of the performing body, whether through the ability to observe the performer or understand implied movements from looking at a score. The pieces I analyse in the following chapters differ from those analysed by Lochhead and Fisher in that the listener cannot see the bodies producing the sounds: a focus

on the performer rather than the listener is much more difficult when there is no body

standing on the stage. While there remains a strong basis for using a gesture-based approach

to embodied analysis, especially since the mimetic principle does not require the visible

presence of a performer, over-reliance on identification and interpretation of gesture presents

a number of problems. In the absence of a physically present performer, it becomes much

more difficult to map sound onto physical actions or gestures with any degree of certainty.

Additionally, the lack of a visible performer may force the listener's attention back towards her

own body (as noted with reference to Linda Dusman's work, referenced in the previous

chapter). Although an embodied analysis could well be formed from the listener's mimetic

participation in *perceived* gestures, studies of gesture do not, in themselves, account for

physiological experiences that the listener cannot map directly to sound producing movements

made by the performer. Furthermore, not all of the bodily actions that produce sound can be

defined as gesture; this is, for example, the case with the breathing sounds that open *Ground*

Techniques (as I will later explore). On top of this, mediation technologies offer increased

possibilities of disrupting the link between sonic gesture and its physical origin.

Approaches in Music Psychology

The discipline of music psychology has also moved towards an increased focus on embodiment

and the role of the body in the production and reception of musical meaning. Articles such as

'The Body in Performance', by Eric Clarke and Jane Davidson,[20] have sought to adopt a more

corporeal approach to their subject matter than that taken in studies following the previously

dominant influence of cognitive psychology (Clarke and Davidson, 1998: 74). This is part of a

wider trend that began to come to prominence during the 1990s (Clarke and Davidson, 1998:

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[20]   Davidson's work crosses both music psychology and studies of musical gesture.

74). Clarke and Davidson focus on the body in performance and, as such, bodily movement plays a significant role. However, while this turn towards understanding the role of the performing body in the production of musical meaning is important, rather less attention is given to the role of the listening body at the point of reception; Clarke and Davidson follow standard analytical methodologies in the use of an objective ('ideal') listener. In their sample analysis, gesture and expression data is mapped onto structural analysis; the perceiving body does not form a central part of the study. However, their work is useful in that it highlights how body/mind dualities are often played out within such studies:

> in attempting to incorporate a greater recognition of the role of the body and of physical motion in musical performance, care needs to be taken to distinguish between at least three different levels or manifestations of these phenomena: truly physiological factors, cognitive representations, and the more metaphorical use of a physical or bodily language in talking about music. (Clarke and Davidson, 1998: 74)

They conclude that the body is not under the rigid control of an all powerful 'executive controller' (the mind), with movements being no more than the contingent outcome of an abstract cognitive process,' (Clarke and Davidson, 1998: 89); the body plays an active role in determining musical outcome.

While there are some historical studies of the significance of the listening body in music perception, these have tended towards empirical, physiological approaches. Citing research on both external(ly visible) and internal bodily responses to music, Mine Doğantan-Dack points out that '[t]here is ample historical and contemporary research indicating that music also affects the body internally, causing physiological changes ranging from mild to profound in listeners. Changes in heart rate and in muscular tonus are among the most common physiological responses to music' (Doğantan-Dack, 2006: 450). While much contemporary music psychology remains more concerned with the mind's response to music than that of the body, with relatively little attention being paid to the role of the *body proper* and its role in

cognition, a growing number of studies do focus on the body, especially those making reference to body-image schemas. In these studies, 'the shared assumption is that we experience and make sense of musical phenomena by metaphorically mapping the concepts derived from our bodily experience of the physical world onto music' (Doğantan-Dack, 2006: 450); musical understanding is shaped by our everyday experience of physical forces such as inertia and gravity. This disciplinary shift reflects changes in cognitive science more widely, which has moved towards a focus on embodiment as the interaction of body and brain. Jensenius et al. describe this as a paradigm shift within cognitive science, wherein research is increasingly focused on human movement and '[c]oncepts such as embodiment . . . have been proposed as core concepts reflecting the role of the human body in complex processes such as action and perception, and the interaction of mind and physical environment' (Jensenius et al. 2010: 12). Significant proponents of this approach include Varela et al. (1991), Noë (2004), Lakoff and Johnson (1980), Johnson (1987) and Damasio (1996, 2000).

4. Medium, Materiality, Mediation

'One apparent paradox of hearing is that it strikes us as at once intensely corporeal—sound literally moves, shakes, and touches us—and mysteriously immaterial.' (Connor, 2004: 157)

While the methods discussed in the previous chapter offer clues as to how an embodied analytical method may be shaped, and support a rationale for such an approach, this must be combined with an understanding of how technology mediates the (bodily) experience of music in order to answer the research questions posed in Chapter 1. In the following chapter I outline an argument for sound as material mediation, before examining examples of musicological writing that uncover the mediating potential of sound on the body, revealing a physical or haptic basis for engaging with music. I then turn to the work of two new media theorists (Mark Hansen and Bernadette Wegenstein) to begin to explore how this mode of engagement may be re-negotiated within a technological regime. This necessitates an understanding not only of how sonic experience is mediated, but also of the effect of media practices on the contemporary body concept and the consequences for subjectivity.

Due to the invention of recording technologies, the performing body can be reproduced almost anywhere in time and space, changing the bodily practices of performance and reception. While sound recording and 'disembodied' playback are no longer as shocking as they may have been shortly after their invention, technology still mediates the sonic experience. The ways in which audio technologies are used may determine, for example, whether the production of sound can be seen as well as heard, along with more subtle effects such as the perceived proximity of sounds, changes to timbre, and distribution of sound in space. Therefore, my embodied analysis will be inextricably bound up with analysis of the technical means of production of a work.

As Paul Théberge has pointed out, traditional musicology offers little assistance in understanding how technologies have changed the relationship between musicians and their means of producing sound. He asks how it might be possible to conceptualise, study, and interpret the relationships between musical practices, technology, and culture. Additionally, organology, or the 'analytic study of music technologies,' often focuses only on the development of such technologies, or is restricted to classifying musical instruments; questions surrounding the broader musical and cultural context or significance of these technologies (for example their relationship to style and genre) usually lie outside this field (Théberge, 1997: 6).[21] Théberge suggests that '[t]echnology has thus replaced music in the old bourgeois myth of the "universal language." Technology has become transparent, "a form of communication," a "language" itself' (Théberge, 1997: 127).

Contrary to this, Birdsall and Enns have suggested that there has been 'a tendency to fetishise the powers of technology in relation to (listening) subjects' (Birdsall and Enns, 2008: 3). They see theories that characterise sound as 'a passive in-between', or sound as an inactive bridge between audio technologies and the body, as potentially problematic, preferring instead to work with an 'over-arching concept of mediation' (Birdsall and Enns, 2008: 3). This focus acts as a crucial restraint to technological determinism.

Methods for understanding the role of musical sound as (material) mediation rather than 'passive in-between' remain limited outside of empirical studies. Where musicology has addressed the expressive power of music, this has, until recently, been confined 'within a framework of signification'; this is now slowly being supplemented with studies of listening as a physical activity carried out through 'analysis of perception and affect' (Meelberg, 2008: 62). As Meelberg points out, earlier studies frequently understood musical affect as an excitation of the emotions, caused 'as the result of the recognition of musical meaning.' Meaning, here, was

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[21] Théberge points out that such practices have been given attention in ethnomusicology, but this has been restricted in focus, mainly to non-Western, 'traditional' musics (Théberge, 1997: 6).

considered to be 'encoded in the musical phrase' (Meelberg, 2008: 62). Such a theoretical approach resulted in the privileging of intellectual knowledge over bodily knowledge (Meelberg, 2008: 62).

The turn towards the senses in musicology is located within a wider context of increasing attention to the human sensorium. There has been a shift towards the senses in the arts, humanities and social sciences in general, a change that has revealed the senses as socially and historically contingent, and as social and political rather than simply the cognitive and neurobiological processes of the individual subject (Bull et al., 2006: 5). This move has significant repercussions for the relationship between theorist and object: 'the emergent focus on the social life of the senses is rapidly supplanting older paradigms of cultural interpretation (e.g. culture as "texts" or "discourses", as "worldviews" or "pictures"), and challenging conventional theories of representation' (Bull et al. 2006: 5).

The focus on the senses has been used as a way of extending work on embodiment, offering concrete access to the body and bodily ways of knowing and the potential to supplant the reliance on signification that Meelberg critiques. However, there are certain pitfalls that must be avoided in constructing an analytical method from such an approach. Bull et al. have argued that adopting a modal, intermodal, or relational approach to studying bodily faculties will 'disrupt the presumption of the unity of the body (which has simply taken over from the modernist presumption of the unity of the subject),' by exposing the formations of the senses and sensuousness as both multiple and historically and culturally conditioned. If attention to the senses is to be used to avoid recourse to a modernist, holistic notion of the subject then there is a need to avoid synecdochic (re)configurations of the body as 'only one' of its senses. This assumes a differentiated model of the senses. The senses themselves may be thought of as separate and discrete, or interlinked or intermodal, with a move towards the latter becoming more prominent.

Particular theoretical orientations to the body concept frequently underlie this multisensory approach. As Pink illustrates, contrasting Merleau-Ponty's and Gibson's theoretical positions, this tends to be predicated on notions of a body in the world, which is able to engage with its environment. In Merleau-Ponty's work, the body's organs, and through these organs, the body's senses, form a 'synergic system' that is 'linked together in the general action of being in the world' (Merleau-Ponty, quoted in Pink 2009: 27). Gibson's theory of perception, on the other hand, 'not only gives importance to the environment itself in perception but also considers perception by a mobile observer' (Rodaway 1994: 19, quoted in Pink, 2009). This allows the senses to be conceptualised as different aspects of holistic activity rather than discrete activities.

My analyses in this thesis are of music; as such, sound is the primary means of communication, and hearing the primary sense used to understand it. However, in accord with the above studies this sense is not entirely distinguishable from others and, as Sterne has noted, our understanding of sound cannot be disentangled from the perceptual capacities of the human body. He concludes that 'the hearing of the sound is what makes it.' For Sterne, 'human beings reside at the center of any meaningful definition of sound. [...] As part of a larger physical phenomenon of vibration, sound is a product of the human senses and not a thing in the world apart from humans' (Sterne, 2003: 11).

However, as hearing relies on vibration, there is perhaps a special relationship between hearing and touch, insofar as touch is necessary to detect vibration. As Meelberg points out, where sound waves touch the ear drum to make it vibrate, 'the body is literally touched by musical sounds' (Meelberg, 2008: 65). Kassler considers touch and hearing to 'merge

inperceptibly' due to the nature of the ear as a 'highly specialized organ of touch.'[22] She

illustrates this through reference to common musical experiences:

> For example, when listening to the lowest notes of a pipe organ or an
> amplified instrument, we feel the vibration as much as we hear it. As the
> tones get lower in frequency, the air is less sensitive to them and the tones
> must be stronger, with larger vibrations, in order to be heard. And when a
> certain level of intensity is reached, the pressure waves begin to stimulate
> the skin, the linings of our noses and throats, the hairs of our heads, and
> even our bones, joints, and inner organs. (Kassler, 2002: 333)

Thus hearing may involve the whole body and may be experienced as vibration or touch as

well as audition. However, the experience of sound as touch is not confined to the ear, or even

the outer surfaces of the body. Steven Connor has noted that we are 'accustomed to thinking

of touch as focussed on the hand ... [but the] primary association of hearing and touch is

formed, not on the exterior skin, but in the interior skin of the mouth. For it is in the mouth

that we form our first sounds and may at first apprehend sound as a sort of plastic tangibility:

the burring of the lips, the lips, the sibilant puffs of air between teeth and tongue, the uvular

gulps and gurgles. Sound and touch meet, mingle, and part in the mouth' (Connor, 2004: 164).

The relationship between sound and touch in this sense, unlike in the example of sound

'touching' the ear drum, is active and undertaken by an engaged listener. It is these ways of

thinking about sound – as something that the listening body is able to have a material and felt

engagement with – that I would like to draw on in my analyses. The potential of sound-as-

touch forms an important basis for accounting for sensation within the analytical process.

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[22]   Furthermore, the ear itself is capable of producing sound. Otoacoustic emissions are tones emitted
by the inner ear. They may be spontaneous or evoked in response to a stimulus. Recent experiments
have shown that this phenomenon continues for a few seconds after death (Toop, 2004: 68-9).

Sensing Sound

While empirical studies[23] provide valuable insight into physiological responses to the listening experience, the equipment and specialist knowledge required are not generally accessible or suitable for use in the varied contexts in which musical experience takes place. Nor are they necessarily helpful in understanding the senses as culturally conditioned and embedded. Therefore, I wish to draw instead on methods that are readily accessible and that focus on the listening subject's experience of sound and sensation rather than abstract measurement. What follows below are details of research that has used the senses, or a sensation-based approach, in constructing an account of musical works. This survey is not exhaustive, but instead aims to demonstrate a number of potential approaches that may be drawn on in the creation of an explicitly embodied methodology for analysis.

Gascia Ouzounian offers a sensation-based way of understanding of Marianne Amacher's *Music for the Third Ear.* The piece, which creates the psychoacoustic effect of sound appearing to originate from somewhere inside the 'hollow' space of the listener's head, is analysed in terms of the physical effect it has on Ouzounian's body. As a result of her feminist approach, Ouzounian focuses on qualitative description rather than empirical measurement of physiological factors, with the ultimate aim of 're-position[ing] the body as a site of knowledge' (Ouzounian, 2006: 71). While Ouzounian's method goes some way towards reintroducing sensation and the experience of the lived body into musicological discourse, there are nevertheless limitations, at least for its potential application to the questions I seek to answer. The piece she analyses creates a very specific physical effect. The pieces I seek to analyse do not work in quite the same way; here, it is not just the sonic materials themselves that induce the bodily experience, but the listener's recognition of them.

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[23] See, for example, Landreth (1974), Rickard (2004), Grewe et al. (2007). For an overview of the field, see Bartlett (1996).

Andra Mcartney also describes a bodily reaction in her listening to Hildegard

Westerkamp's *Breathing Room* (McCartney, 2000). As described in Chapter 2, this piece splices

together an organic breathing sound with a mechanical, heartbeat-like pulse. McCartney

describes both her own and others' discomfort when listening to this piece, ascribing this to

the sense of proximity to the breathing body that is created by (the experience of listening to)

the recording. It is rare to find oneself so close to another's body, to be in a position where it is

possible to hear their breathing so clearly. Respondents to McCartney's survey imagined the

breathing body as that of a lover or a stalker breathing heavily down the telephone, a

sensation heightened by the fact that the body is audible but not visible. McCartney also

considers whether the discomfort felt by the listener may be caused by the subtle alterations

to our everyday experience of such sounds. While it is possible to find the sound of breathing

relaxing, here the mechanical nature of the pulse is disturbing. Although seemingly like our

own, its absolute inflexibility renders this pulse unnatural, and therefore uncomfortable to

listen to.

Susan C. Cook takes a different approach, following a somewhat novel research method

(for a musicologist, at least). As part of her research into pre-WWI social dancer Irene Castle,[24]

Cook undertakes a specifically embodied method of investigation: she dances. Her aim is to

use Castle to provide 'a set of particulars through which to explore dance as meaningful social

experience, to examine [her] own relation to an "embodied" historical practice, and to

challenge musicology's dismissal of the dancing body and its music'(Cook, 1999: 177). She

discovers that she learns more than was evident from printed documents alone:

> What I found as my expertise and interest grew is that precisely in taking
> part in the experience bodily, by learning the dances Castle exhibited, in

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[24]   Irene Castle, along with her husband, Vernon Castle, was part of a well known and popular dance
team in pre WWI American social dance. This dance style tended to draw its 'lively accompanying
music' from 'African-American sources using the syncopation characteristic of piano and orchestrated
ragtime' (Cook, 1999: 178).

reenacting the etiquette and ritual behavior of the dance events including dressing in vintage drag, I have learned much more about the topic than I would have had I continued my research in a disembodied fashion relying only on printed documentation. My work now partakes of the field work methodology of ethnomusicology and anthropology as I learn from the inside out. (Cook, 1999: 185)

Thus, by taking a physically involved mode of engagement Cook is able to gain an extended knowledge of the object of her study. This includes knowledge of types that could not have been gained from studying documentary evidence alone. Furthermore, she shows that due to the particular nature of embodied research there cannot or should not be any one particular method:

My position as a scholar who, to borrow from Adrienne Rich, "thinks through the body" means embracing three interrelated positions: 1) affirming an autobiographical body," 2) uncovering the historical body and its multiple practices, and 3) keeping in sight a politicized body. (Cook, 1999: 188)

Thinking through the body deals with the concrete rather than the abstract, with the particular rather than the general. The body in Cook's understanding stands in for a complex web of relationships. In many ways she uses her body as a research tool enabling her to answer questions such as, 'Where and under what conditions does music invite bodily response and, similarly, where is such bodily response ruled inappropriate? How does music police the body in either fashion?' (Cook, 1999: 189)

Although Cook writes (through) the experience of her own body, she is keen to point out that this is not the universal experience of all bodies: 'It would be all too easy for me, however, to maintain a kind of centrality of my body that would erase, deny, or exclude the experiences of others whose bodies do not function like mine [...] In the same manner that feminist scholarship has moved past a unitary vision "woman," so too autobiographical research cannot present a unitary position of "body," but must acknowledge the differences between and among bodies and experiences' (Cook, 1999: 188). My own analyses do not aim to construct an 'ideal' or empirical listener, but are based on my own, situated listening experience.

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Another practice-based approach is that undertaken by Elisabeth le Guin; this she terms 'carnal musicology'. Le Guin pursues dual, but concurrent, paths in answering her research question as a musicologist and a musician; she combines textual research with close attention to the sensations and experiences of playing. Central to Le Guin's work is the construction (or attempted deconstruction) of the relationship between performer and composer: '"carnal musicology" bears witness to a genuinely reciprocal relationship between performer and composer—even where the latter is no longer living' (Le Guin, 2006: 3). It is significant that this relationship is constructed as mediated primarily through the body, attempting to explain Boccherini's music through reference to 'the invisible embodied experiences of playing it' (Le Guin, 2006: 5). She writes of Boccherini's music: 'one can count on tiny variations of position, weight, pressure, friction, and muscular distribution having profound structural and affectual consequences. As a path of experience [...] this appeared to lead towards a class of experience the very names of which are unwieldy and unfamiliar: kinaesthesia, propriocepion, tactility' (Le Guin, 2006: 5).

The relationship between listener and composer that Le Guin proposes is one based on shared embodied experience, rather than shared subjectivity. The performer experiences a sense of physical identification with the composer. Le Guin considers this identification to be based in material 'reality', contending:

> first, that the sense of reciprocity in this process of identification is not
> entirely wistful or metaphorical, but functions as real relationship; and
> second, that this relationship is not fantastic, incidental, or inessential to
> musicology. It can and should be a primary source of knowledge about the
> performed work of art (Le Guin, 2006: 14).

LeGuin historicises and contextualises the terms of embodiment, arguing that the associations of sensation are historically and culturally bound. Le Guin's method offers a basis for constructing a detailed analysis; I will pursue this in more depth in Chapter 6.

Perhaps one of the most informative examples for my construction of an embodied

method of analysis is Vincent Meelberg's 'Touched by Music: The Sonic Strokes of *Sur Incises*,' (2008) in which he argues for a sensation-based approach to atonal composition. In his analysis of Boulez's *Sur Incises*, Meelberg coins the term 'sonic strokes' to describe the feeling of sounds resonating within the listener's body. He grounds musical listening in the body as much as the brain, a particularly striking manoeuvre when applied to what may seem to be a more 'cerebral' compositional aesthetic. He draws on Deleuze and Guattari's notion of affect in order to move away from understanding art as 'merely representational', but as expressive because of the affect it brings about through the listener's body (Meelberg, 2008: 62). 'Sonic strokes are sounds that induce intensities or affects—which are bodily phenomena—in the listener ... music can touch the listener by inducing affects, which implies that "musical touch" offers the basis for establishing a physical relation between music and listener' (Meelberg, 2008: 63).

'Sonic strokes' are distinct from gestures. In contrast to Cox, Meelberg does not consider gestures to induce affects in the listener (Meelberg, 2008: 66). Gestures are instead the result of musical affection. The 'sonic strokes' themselves 'can lead to signification, but the stroke itself has no determinate meaning' (Meelberg, 2008: 66). The 'sonic stroke' forms the 'stimulus that motivates the body to process the sounds ... in order to kinaesthetically convert these sounds into gestures' (Meelberg, 2008: 67). The musical qualities and meaning can only be attributed after the sonic stroke is 'internalised and transformed into a musical gesture' (Meelberg, 2008: 66). The sonic stroke may act as the starting point for further reflection and interpretation. However, as Meelberg points out, the sonic stroke is still bodily:

> Although the body is not yet acting as an enframer when the listener has
> encountered a sonic stroke, it is affected by the stroke. A sonic stroke is the
> stimulus that motivates the body to process the sounds of this stroke in
> order to kinaesthetically convert these sounds into gestures. They are felt
> rather than recognised, for recognition implies classification or framing, and
> sonic strokes cannot be framed. A framed sound, or stream of sounds, is a

musical gesture, not a sonic stroke. A sonic stroke is thus literally a meaningless impetus that triggers signification through the enframing function of the body. (Meelberg, 2008: 66-7)

Affect vanishes with the arrival of meaning as the body performs a framing function. Meelberg draws on the work of Mark Hansen in this study, particularly Hansen's reading of Bergson (although he offers only a very brief discussion and no exploration of Hansen's focus on digital or new media, a crucial feature of Hansen's argument). However, Meelberg's work remains useful insofar as it provides a basis for tying gesture to affect. As a tool for analysis, Meelberg's work points towards explaining higher level structures as they are understood through feeling. Furthermore, attending to the bodily resonances of sound in *Sur Incises* allows Meelberg to describe the work in terms of its manipulations of an internal, bodily sense of spatiality. Meelberg's analysis provides a means of theorising the contact between music and listener, from which I can then shift aspects of Hansen's work on the manipulation of interior bodily space in visual art into the field of sonic practices. With this in mind I will provide a more detailed examination of Hansen's thesis below, before attempting to explain its use in a musical context in Chapters 7 and 8.

New Media Theory and Perception

In the final sections of this chapter I turn towards recent research in new media theory in order to consider further the role of the medium. I begin to acknowledge processes of technological mediation and their subsequent effect on bodily experience and technology. The theories I draw on have built on a number of the approaches outlined in previous chapters, particularly those from phenomenology and embodied cognition.

Mark Hansen takes a phenomenological approach to the perception of new media art, particularly the digital image. In *New Philosophy for New Media*, he argues for a new

conceptualisation of both the perception of the digital image and of what constitutes the digital image itself. This is based on an understanding of digital information as fragmented and theoretically accessible through a range of interfaces or media:

> If the digital image is an accumulation of such discontinuous fragments, each of which can be addressed independently of the whole, there is no longer anything materially linking the content of the image with its frame, understood in its Bergsonist-Deleuzean function as cut into the flux of the real. Rather the image becomes a merely contingent configuration of numerical values that can be subjected to "molecular" modification, that lacks any motivated relation to any image-to-follow, and indeed that always already contains all potential images-to-follow as permutations of the set of its "elementary" numerical points. (Hansen, 2004: 9)

Hansen argues that, due to this fragmentation, the body plays a vital role in selecting what is to become the image. He widens his concept of the digital image to include not just the material 'facts', but also this process of selection:

> we must accept that the image, rather than finding instantiation in a privileged technical form (including the computer interface), now demarcates the very process through which the body, in conjunction with the various apparatuses for rendering information perceptible, gives form to or *in-forms* information. In sum, the image can no longer be restricted to the level of surface appearance, but must be extended to encompass the entire process by which information is made perceivable through embodied experience. This is what I propose to call the *digital image.* (Hansen, 2004: 10)

This non-representational experience is caused because the framing 'function of the body gives rise to an affective "supplement" to the act of perceiving the image, that is, a properly haptic domain of sensation and, specifically, the sensory experience of the "warped space" of the body itself' (Hansen, 2004: 12). Thus the experiencing of the image becomes an embodied process.

Hansen's argument is based primarily on Henri Bergson's notion of the affective body. 'On Bergson's account, the body functions as a kind of filter that selects, from among the universe of images circulating around it and according to its own embodied capacities, precisely those that are relevant to it' (Hansen, 2004: 3). The body acts as a 'privileged image among images'

because it is the only image that is known both through external perception, but also 'from within by affections' (Bergson, quoted in Hansen, 2004: 3). However, because the specific characteristics of the digital require this bodily filtering, Hansen argues that digital media bring about a change in the object of aesthetic experience, describing his theory as:

> the story of a fundamental shift in aesthetic experience from a model dominated by the perception of a self-sufficient object to one focused on the intensities of embodied activity. [...] When the body acts to enframe digital information – or, as I put it, to forge the digital image – what it frames is in effect itself: its own affectively experienced sensation of coming into contact with the digital. In this way, the act of framing information can be said to "give body" to digital data – to transform something that is unframed, disembodied, and formless into concrete embodied information intrinsically imbued with (human) meaning. (Hansen, 2004: 13)

In this Hansen sees his work as forming a 'philosophical redemption of Bergson's embodied theory of perception from Deleuze's transformative appropriation' (Hansen, 2004: 14). Hansen criticises Deleuze for removing the centre of indetermination away from the body, and locating it in 'the affection-image'. Deleuze appropriates affectivity as a sub-category of perception, whereas Hansen sees it as a supplement to perception.

Many of Hansen's analyses focus on how the use of time or space within an artwork causes affective bodily experience. Considering Lazzarini's sculptural installation of digitially warped skulls, Hansen argues that the experience is similar to that of VR environments – sensation is focused inward on internal bodily space:

> As the viewer tries to negotiate these odd perceptual objects that, it becomes increasingly clear, are not continuous with the space she occupies, she becomes even more disorientated and disturbed; and as her disorientation mounts, it gradually gives rise to an internal, affective reaction that will ultimately take the place of perception entirely. (Hansen, 2004: 15)

I would like to investigate whether a similar process might take place in the perception of impossible or unlikely spaces portrayed in sound. Through my second and third case studies (chapters 7 and 8) I investigate how Hansen's theory might be applied to music: could a similar

process to Hansen's experiencing of Lazzarini's installation take place through sound? Could incorporating and manipulating (digitally) sampled bodily sound within a composition cause a similar disorientating effect and focus on internal bodily space? I first introduce Hansen's theory in my case study of *A Chance to Cut is a Chance to Cure* by Matmos – where I use it to theorise the disjunction between felt, bodily space and external space – before developing it in an analysis of Christof Migone's *Crackers*.

Hansen states: 'if I can prove my thesis (that the digital image demarcates an embodied processing of information) in the case of the most disembodied register of aesthetic experience, I will, in effect, have proven it for the more embodied registers (e.g., touch and hearing) as well' (Hansen, 2004: 12). Accepting the view that digital information makes distinctions between media (as interface) obsolete, this would appear to be true. However, I find it necessary to investigate further whether the theory holds for 'the more embodied registers'; whether the process Hansen describes for the embodied reception of a digital image also operates when hearing (digitally) mediated sound. Superficially, at least, it does not: the body is involved in a materially different way – sound is perceived with ears instead of eyes (and possibly involves a different model of cognition). Hansen's argument here is dangerously reliant on ideas of digital convergence, a concept which, as Ytreberg (2011) points out, has been criticised as too vague and all-encompassing: a product of media hype. Here I aim to test his hypothesis for works which, while created with digital technologies, have not yet forced obsolescence on the medium as interface. Instead I focus on the role such mediation technologies may play.

New Media Subjectivities

A focus on the senses might enable a move away from modernist notions of the holistic subject. However, such a focus cannot entirely escape the need to operate within the limits of subject formation. In this section I explore further how the contemporary subject and its subjectivity might exist in relation to the senses as mediated through contemporary media technologies. If the construction of subjectivity changes according to historical and cultural context, then it is important to understand the effects on subject formation of the context in which the works in the case studies were created and received. If sampled works do employ a specifically digital or new media sensibility, it is important to understand how this differs from preceding or other subjectivities. In order to investigate this more fully, I draw on the work of new media theorist Bernadette Wegenstein.

Wegenstein's main argument is that the 'logic of new media has infiltrated the contemporary body concept' (Wegenstein, 2006: 160). She highlights a changing body concept as she moves from examining 1990s body art, to the obsolescence of the face in signifying identity, to the body as mediation in new media art and architecture. Following Hansen, Wegenstein argues that during the twentieth-century the body started to fulfil a framing or filtering function, particularly with respect to digital data. She extends this to argue that the logic of new media has:

> literally opened up the body, dematerializing its corporeal layers into
> fragments of information. A body-in-pieces that appears to be fully
> autonomous, having left behind its holistic body notion, has been born out
> of this new configuration (Wegenstein, 2006: 77-8)

As noted earlier, following the shift towards the posthuman the body came to be characterised as fragments of information, and Wegenstein argues that artists have used this in their 'realizations of new bodily configurations' (Wegenstein, 2006: 161). Building on the idea developed by Hansen that there can be no perception without affection, the body as frame

becomes 'coeval with mediation'. For Wegenstein there is an epistemological shift at the point

where the 'flesh of technology' merges with that of the 'interacting viewer-participant', a point

at which the body and its representation cannot be differentiated from the work itself

(Wegenstein, 2006: 158).

Technical and scientific advances and their artistic uses have led to the inner spaces of the

body – the organs, tissues and cells, which were formerly the domain of specialised medical

knowledge – becoming externalised and able to stand in for the body: 'The importance of

outer appearances to the representation of the body has receded as the inner body has come

to be discovered, relevant, and ever more present' (Wegenstein, 2006: 79). Wegenstein argues

that the unique ability of the face to 'overcode' other body parts as a marker of identity is

being eroded: 'under the skin every organ has an (inter)face. Potentially, each organ may stand

in for the whole body' (Wegenstein, 2006: 80). Bodily 'strata' become metaphors for new

spaces, their instantiations found in examples from popular culture (particularly cosmetics

adverts) to 'post-organic' architecture as well as in new media art (Wegenstein, 2006: 150). For

Wegenstein, this move has exceeded even Deleuze and Guattari's 'body without organs': 'the

body at the turn of the millennium has turned into an organ without a body, or into an organ

instead of a body' (Wegenstein, 2006: 80). I will return to this idea in Chapters 7 and 8 in an

examination of how the case studies discussed in those chapters make use of bodily space.

Wegenstein builds on Hansen (2004) to argue for the corporealisation of the medium. As

discussed earlier, this is a theoretical move (founded on aesthetic developments in new media

art) in which the image is no longer circumscribed by the technical frame and instead comes to

require a bodily framing function. Wegenstein argues that the corporealisation of the image

was 'made possible by the oscillation between a fragmented and holistic body concept in a

history of the body that has been tending toward increased mediation ever since early

modernity' (Wegenstein, 2006: 147). 'In other words, far from witnessing a gradual

disembodiment of information and images, the age of new media constitutes the current moment in a process of embodiment or corporealization' (Wegenstein, 2006: 147).

Wegenstein questions however, whether these media are really *new* – whether 'there is indeed a paradigm shift at stake in the age of digital information,' claiming that the answer is, in large part, determined by the object of study, whether this is 'the communication process between user and medium, the medium itself, or the effects and products of the medium' (Wegenstein, 2006: 147). The ontological shift to new media only comes about via a shift to tactile, participatory and interactive strategies. Wegenstein aims to understand how the processes of new media rely on the body 'as *operator*' (Wegenstein, 2006: 148). Thus it is the changing role of the body that is significant, in works that foreground or necessitate and awareness of bodily presence, action, or affection. As a result of artworks that corporealise the medium, the body is no longer a medium for something else and no longer has any internal reality – the surface of the body has collapsed inside and interior and exterior have merged, so that the external surface of the body 'refus[es] to relegate itself to the subservience of one last mediation. The medium, in other words, has become the body' (Wegenstein, 2006: 161). This stands in contrast to McLuhan's idea of media as 'extensions of man' (Wegenstein, 2006: 161).

For Wegenstein, the corporealisation of the image necessitates a coming together of body theory and media theory: 'Body discourse is, in this sense, necessarily a media discourse in that the body, pushing through its frame, has revealed itself layer by layer as *comprising the media that purport to represent it*' (Wegenstein, 2006: 158 – my emphasis). The 'corporealized image' changes theories of both corporeality and mediality, 'reconciling them into one discipline', the outcome being that 'body art, in other words, no longer can be seen as one form of media art, but rather as the necessary expression within the realm of new media' (Wegenstein, 2006: 160).

As the body concept changes in response to the shift from body as 'ready-made' to body as

mediation, notions of the subject and subjectivity change along with it. As the case studies outlined below are reliant on the analyst adopting particular 'subject positions' in negotiation with the music, it is important to understand how this shift towards the corporealisation of the medium may shift and re-shape subjectivity.

Drawing on the work of Amelia Jones, Wegenstein takes a "technophenomenological" view of the body, rather than a constructionist (cultural, contextual) view in which the body is mediated through technology yet is still socially engaged, becoming both subject and object:

> Technology is the body's critical counterpart in these performances that
> break down the distinction between a body's interiority and exteriority,
> between a being in the body and a distance to the body. Technology serves
> as a partner in these often eerie and alienating body performances.
> (Wegenstein, 2006: 67)

This shift between being in the body and a distance to the body is crucial. There is a move towards the agency available to the subject being loose and unstable, with the borders of the subject not only ceasing to be coterminous with the skin, but also no longer limited by the bounds of a rational and autonomous subjectivity founded on the ego. Subjectivity is disrupted and dispersed. Furthermore, Wegenstein argues that this new subjectivity is 'intrinsically related to the logic of new media (Wegenstein, 2006: 77). Drawing on Grosz's model of subjectivity as analogous to the Möbius strip, she argues that 'subjectivity is not the combination of a psychical depth and a corporeal superficiality but a surface whose inscriptions and rotations in three-dimensional space produce all the effects of depth' (Wegenstein, 2006: 77). This is characterised by a process in which 'the external twists itself toward the internal where it merges the two regimes together. As a result, the body starts to matter differently, as a whole and in its fragmentation as mediatic strata' (Wegenstein, 2006: 77). This is the point at which the body takes on its framing function. The holistic body – and the coherent subject – can no longer be achieved through the coming together of organs, tissues and other body parts to form a whole, a unified subject. Instead, each fragment is

authorised to act as interface for the body as a whole, becoming mediation (Wegenstein, 2006: 161-2).

The layers and fragments of information that Wegenstein describes in new media artworks – along with the dispersal of subjectivity – are echoed in the use of sampling techniques, as is their subsequent replacement where a part of the body can stand in for the whole, as I demonstrate through the case studies. However, in considering the body as sound perhaps the first body 'part' that has to be overcome is not the face, the sign of visual recognition, but the voice, the ultimate sonic sign of the self. Just as the face has 'overcoded' other body parts, the voice has overcoded other sound produced by the body. As discussed with reference to the radiophonic voice, it is not the voice *per se* that signifies identity, but its timbral qualities (perhaps acting in conjunction with particular semantic content).

In the case study works the voice-as-self has been replaced by an array of bodily bits, the sound of one part of the body (such as a cracking joint) comes to replace the whole body system in the production of music. Musical developments in sampling practices, in which musical materials could become digitised, fragmented and reassembled, are somewhat analogous to the move towards the body as flow of fragmented information or code. Returning to the notion of sampling as a structure of media cultures (as discussed in the introduction), Wegenstein's theories of the subject are useful. As Bidner and Feurstein have pointed out, sampling raises questions about the perception of reality within media cultures (in a similar manner to the works Wegenstein discusses):

> [Sampling] serves as a central metaphor in our minds as an aesthetic model of culture. With sampling questions are raised concerning the perception, processing and configuring of reality touching on fundamental structures of media culture and continuously gaining in strength and in importance in the course of the networking of electronic memory. (Bidner and Feuerstein, 2004: 13)

Sampling works both as a technology of fragmentation, but also as an aesthetic of recombination. Feuerstein has characterised such an approach as occupying a rationalist position, which places sampling in opposition to the cut:

> The natural sciences' rationalist passion for reality is subject to a double structure within which sampling forms an antagonism to the cut: One side aims for the dissection, fragmentation and even elimination of entities, while the other strives for imitation, doubling and artistic replication, thus again making possible a free combination of corpuscles into bodies, respectively manipulation and sampling in general. (Feueurstein, 2004: 267)

However, this approach does not seem to be borne out in such a dichotomous way in the compositions discussed in the case studies. While free-floating body parts are recombined into sonic bodies through composerly manipulation, this is not wholly oppositional to the fragmentation of entities or subjects. The cut is taken as a tool for recombination rather than separation or negation. Through the process of sampling the sound has not been cut from the matter of the body, but has, as Wegenstein puts it, come to matter differently. Instead, it presents this double articulation as depth.

Sampling has been positioned as appropriating and objectifying the subjects whose sonic materials it 'borrows', but it may also act upon the subject creating the work. Bidner and Feuerstein suggest a possibility of working against this, avoiding becoming a 'determined subject' by becoming a 'slave to the archive', caught up in a loop of compulsive replication and repetition of samples. However, while Bidner and Feurstein advocate pursuing particular structures or algorithms as a new way of processing samples, I would suggest that pursuing Wegenstein's hybrid of body and media theory allows the listening subject to escape entanglement in this web of subjective determination through attention to the body as mediation. Ultimately, while it is important to attend to sampling as both a technical and cultural-aesthetic practice, as Braun states, 'what sampling might achieve, after all, is not so much nomadic insanity or a re-combination fury, but a perpetuation of the unfinished form, a

bastard somewhere between technology and flesh' (Braun, 2004: 290); a form that requires a

bodily framing for its completion.

5. Towards a Methodology

In the following chapter I attempt to sketch out how the processes of bodily framing discussed in the previous chapter might be drawn into musical analysis. I outline some of the limits of formal analysis for this purpose, arguing the case for taking into account culturally and socially located subjective experience. Rather than rely on unanchored subjectivity, however, I consider how music may animate or afford certain subject positions, thus locating subjective experience as existing in negotiation with identifiable musical features. The chapter concludes with an overview of the 'methodological toolkit' available for an embodied analysis. It is important to note that no singular methodology will ever be sufficient for transfer between cases, in order to account for the various effects of different pieces; each analysis must acknowledge the particular materials of, and bodily response to, the music.

Formal modes of analysis often privilege understandings of structural coherence over experiential understanding. As a result of this they may also privilege visual experience of the score over aural experience. This is especially true for score-based methods of analysis, and here the equating of the score with the work concept, positioning it as a fixed, atemporal object privileges the generic and repeatable over the particular. This sight metaphor may go deeper than simply looking at a page: musicology's reliance on sight-metaphors is key to Smith's argument for a phenomenological approach to music (Smith, 1979) and he extends his focus to include the written word (and the spoken word) as forms of visual representation. Others taking a phenomenological approach have put forward similar critiques. Tarvainen writes: 'The paradigmatic mode of study concentrates on fixed transcription rather than on the audible music itself, and listening is regarded at best as an aid to analysis by vision. Formal music analysis ignores the potentiality of the corporeal elements of all music, and particularly music where the gesturing body is in the fore. Methodically, what is yet to be fully

acknowledged, is the potential of the intuitive and internalized knowledge of practical music-making and dancing' (Tarvainen, 2005). Adherence to these traditional approaches has excluded certain forms of knowledge. As Tarvainen writes, 'There seems to be a basic quasi-epistemological division between *knowledge about music* and *music as knowledge*. This has not helped institutionalized music research in finding answers to some seemingly central questions, such as: why do sounds affect?' (Tarvainen, 2005). Similar issues are addressed in Fisher and Lochhead's study, in which they point out that bodily-based notions of meaning within music provide 'fertile ground' for understanding music as implicit or explicit physical movement, which 'finds a secure basis in the performative nature of the musical art itself' (Fisher and Lochhead, 2002: 39).

Thus, the methods of traditional forms of analysis present two limitations for the pursuit of an embodied music analysis: the privileging of visual over aural experience, and a lack of attention to lived bodily experience. In order to answer the research questions posed in the introduction, my analytical methodology must be able to take into account both the music and the reaction it creates. However, Nicholas Cook has argued that analysis is more than the description of experience. Cook asserts that the purpose of analysis 'is to explain what is obvious – the experience of musical unity or whatever – in terms of structures that are not obvious and can only be deduced from analytical study' (Cook 1987: 222). The process of embodied analysis as I present it here aims gradually to reveal (the mediation of) bodies; both the body that is represented and the listening body.

As discussed in Chapter 3, a number of feminist critics have argued against traditional models of analysis on the grounds that they uphold the traditional Western binary distinction between body and mind, instead attempting to provide a transition towards different models. Marion Guck, for example, has suggested that traditional analytical methodology 'seems designed to communicate mastery rather than involvement' (Guck 1994: 36). In a critique of

such approaches, Guck has argued for the incorporation of experience into analysis, in order to prevent the biases and orientations of the analyst from disappearing, and the analyst from holding 'authority beyond observation' (Guck, 1994: 35). Yet while the analyst may declare outside interests and scholarly priorities, it is important also to consider how her position is informed by what she is hearing. The analyst's perspective is made evident, but is not disconnected; this is something I follow up in the methodological explorations of the case studies.

A complimentary approach is taken by Alastair Williams in 'Torn Halves: Structure and Subjectivity in Analysis' (1998). Williams traces New Musicology's origins in post-structuralism and postmodernism, rather than in Adorno's 'sociological decoding of music,' which Williams re-examines as a tool for tracing subjectivity. While Williams offers a critique of structuralist approaches – arguing that 'formalist analysis reduces lived experience to underlying articulation' (Williams, 1998: 284) – he suggests that the implication of Adorno's position is that even the most seemingly empirical or formalist compilation of 'graphs and tables […] represents a mode of subjectivity' (Williams, 1998: 283).

Williams argues that a search for 'underlying invariance' within music analysis, while not removing the subject entirely, has at least suggested a 'meta-subjectivity' (Williams, 1998: 284). Instead, he sees potential for the reinscription of the subject through an Adornian approach rooted in the inclination to 'read nature and structure as history and culture, the embodiments of particular social configurations' (Williams, 1998: 284). Thus there is a sense that the musical object is 'congealed' or encoded subjectivity, and that to experience one is to experience the other: 'to use Adornian terminology, immersion in the object is immersion in subjectivity' (Williams, 1998: 285). The subject-object dichotomy can no longer be upheld, as both can be understood as mutually framing. Furthermore, 'because the subjectivity encountered in music is socially and not entirely individually constituted, there is an implicit

intersubjectivity in Adorno's stance, opening the individual to a world constructed and understood by others, while suggesting that there is more at stake in analysis than the individual relating to a music object' (Williams, 1998: 287).

Despite Adorno's structural approach to listening, there are occasions when Williams finds 'the ideology of structural listening amply breached, with numerous border crossings between the inside and outside of the text' (Williams, 1998: 282-3). In such a way Williams considers Adorno's approach to uncover the misapprehension of 'disinterested observation' (which Guck describes as a position of 'seeing without ever being seen' (Guck, 1994: 35)), while still defending the autonomous musical object, 'since it is within internal configurations that he detects social signification' (Williams, 1998: 282-3). While Williams supports a general project of incorporating subjectivity, including the 'sensuous particular' into analysis, he cautions against the inclusion of subjective content for the sake of fashion. He argues that the strength of formalist analysis lies in its awareness of its own limits and an openness and porosity to other approaches that would allow it to provide a more full representation of a musical object (Williams, 1998: 28).

Running parallel to these developments in feminist musicology and post-structuralist critiques of analytical autonomy are attempts to uncover how music might embody subjectivity. This work is not confined to theorists usually grouped under the auspices of New Musicology, but has also been carried out from sociological perspectives (for example, DeNora, 2000), through empirical research (Watt and Ash, 1998), and from ecological perspectives (Clarke 2005). Many of these approaches support the idea that music can be used to express or afford certain subject positions or subjectivities in the listener. Below, I discuss certain of these perspectives in more detail.

Musical Subject Positions

Lawrence Kramer has been a key proponent of the idea that music may afford or animate subject positions for the listener. In this following section I outline relevant aspects of his work in this area and what he sees as the implications of this for analysis. In 'The Mysteries of Animation,' Kramer provides an account of how the listener's subjectivity may be negotiated through the musical encounter. He distinguishes between the music's subjective content and the listener's own subjectivity as accessed through music, claiming music as 'a site of subjective mobility or negotiation' (Kramer, 2001: 153). However, this site and process of negotiation is culturally conditioned and historically contingent. Indeed, as Kramer points out, at certain historical moments music may have had a determinative force on the cultural construction of subjectivity itself (Kramer, 2001: 157). Kramer's model of subjectivity here is 'both irreducibly dynamic and irreducibly plural: not just [...] socially embedded, but as simultaneously a product, medium and agent of sociocultural practice' (Kramer, 2001: 156).

Kramer pursues a primarily psychoanalytical explanation of how music affords subject positions, drawing primarily on the work of Lacan and Žižek. He argues that music is 'addressed' to a perspective or listening position that the listener attempts to fill:

> The subjectivity of the listener qua listener arises in a process of dialogue in which music acts as the ideal or authoritative subject whose place I, the listener, come to be, whose subjective character I reproduce as my own. (Kramer, 2001: 157)

Kramer adopts Žižek's term for this 'authoritative subject': the 'big Other'. Despite this, Kramer criticises Lacan and Žižek's psychoanalytical approach as ahistorical, instead arguing for the 'big Other' as 'constitutively incomplete' and in need of 'specification before it can be effective in either action or interpretation'. However, the big Other's effectiveness comes about because of this: 'it works primarily by being embodied in representation, and in particular by being personified' (Kramer, 2001: 157).

Musical subject positions must be tied to the concepts of subjectivity available and/or prevalent at the time. Kramer considers music's ability to cultivate inwardness, examining the ways in which in the nineteenth century it became 'a means of sounding out the otherwise inaccessible interior of the self' (Kramer, 2001: 158). To illustrate, he points to Hegel's notion of music as resonating within the body, borrowing the listener's body to compensate for its own lack (Kramer, 2001: 164). While rooted in the Romantic idea of music as beyond language, embodying excess in pleasure and knowledge, Kramer argues that similar processes of subjectivity continue into more recent practices via different mechanisms: 'the association of music as a medium of subjective fluidity and music as a means of overcoming the horror of the commonplace has been basic to its mass-entertainment value from the nineteenth-century virtuoso concert to today's proliferation of MP3 files' (Kramer, 2001: 160).

Kramer's position here shares common ground with Wegenstein's understanding of the body concept and subsequent construction of subjectivity (as discussed in Chapter 4) in the processes at work, although the historical framing of the subject has undergone significant revision. The compositions discussed in the case studies offer a means of sounding out the interior selves of the bodies the sounds originate from, but this interior is no longer inaccessible (it proliferates, with individual organs or tissues overcoding other, more traditional, markers of identity) and no longer relies on a coherent subject bounded by the skin or ego. However, as in Hegel's conception, the music must still borrow the listener's body insofar as this is required to fulfil the framing function discussed earlier. This shares some similarities with Kramer's positing of the need for the subject to turn towards the voice of the big Other:

> The subject's turn to heed the Other's 'voice' is in part an indirection, a
> 'turn' in the sense of riff, 'bit' or 'number', or in the sense of creative
> deviation, a trope (etymologically a turn). The subject heeds, but in so doing
> partly transforms what is heeded. The subject position is in every case a
> modification of the universalising position offered by the big Other. The

> subject must modify the Other as much to heed as to negotiate with it, and
> the character of the Other can be discerned or constructed only by
> inference from the effects of this modification. (Kramer, 2001: 160)

However, the authoritative voice requiring this turn (ultimately the voice of God) is rarely

complied with in practice, thus leading to more resistance and negotiation from the subject.

Therefore the process is 'constitutively unstable,' and subjectivity never 'settles[s] in either the

call or the respondent' (Kramer, 2001: 163). Music therefore plays a role in reinvigorating

subject positions, stopping them from becoming lifeless or 'robotic', 'bridging the gap'

between inflexible constructions of subjectivity and subjectivity as lived (Kramer, 2001: 163).

Furthermore, in Kramer's Hegelian terms, subjectivity becomes the crucial hinge between

embodiment and disembodiment in music. The 'grammar of embodiment' means that music

may animate virtual subjects: immaterial bodies can be heard as subjects (Kramer gives Mickey

Mouse as an example). Thus Kramer considers that music, while not having or being a subject

in itself, nevertheless may 'animate' multiple subjects. However, 'it is the music in the person,

not the person proper, that embodies – or fails to embody – subjective content' (Kramer,

2001: 164). Such virtual subjects never become coterminous with the musical subject itself,

which remains, literally, nobody (Kramer, 2001: 164). This animation of virtual subjects is the

process by which the musicological examples of the cyborg presented in Chapter 2 are able to

present the cyborg as subject despite – in some instances – the lack of a (visible) performing

body. Through this process the listener is able to identify the bodies of the compositions as

virtual subjects, just as she is able to identify the immaterial body of Mickey Mouse as subject.

Technological questions are not completely left out of the picture. As music comes to rely

more and more on a mechanical authority, the Adornian project of upholding a humanistic

tradition of music cannot stem the tide of the perceived dehumanising effects of technology

(and subsequent consequences for subjectivity), and opens up question of 'mechanical

reproduction in the twin sense of recording technology and modes of performance lacking a

'free' subjective element' (Kramer, 2001: 167). In response to this, Kramer posits limits to listening. These are marked by their social conditioning, 'forced particularity', and a concern with the simulation that may result from the blurring of the boundaries between human and machine (Kramer, 2001: 168). This mechanical trope offers a threat that if music is able to simulate subjectivity mechanically, subjectivity itself may be mechanical, leading to the alienation of the subject from organic society (Kramer, 2001: 168). Technology, particularly as it may be used to engender mechanical simulations of subjectivity, poses a threat due to the implication that subjectivity itself may be mechanical, therefore alienating the subject. The works discussed in the case studies operate at the juxtaposition of flesh and machine that might properly be thought of as posthuman. The musical materials must nevertheless take part in the animation of subject positions, a process that is vulnerable to technological influence, playing on anxieties about the (post)human condition. In the case studies I explore further how the technical and technological conditions of each work's making may shape subjectivity.

While Kramer's theorisation is useful because of the way in which it allows the bodies of the compositions to be embodied by subjects, I would now like to move beyond Kramer's psychoanalytic approach to consider ecological models of music perception. Both are founded on the notion of a process of negotiation between listener and listened to, but the ecological perspective draws in the specifically corporeal elements of this. As in Kramer's thinking, the listener's position as a subject is constructed in negotiation with the musical materials; the ecological approach, however, opens the way for attending to a more concrete bodily affect (through its focus on action) and, in Windsor's formulations, an ability to account for the extra-musical associations of the sonic materials used in the case study works.

An Ecological Approach

Like Kramer, Eric Clarke draws on the idea of a 'subject position' within music listening, this time beginning from an ecological model of music perception rather than Kramer's psychoanalytical perspective (Clarke, 2005). In this model the process by which the listener comes to feel a sense of identification with music is not semiotic, but operates on the 'perceptual principle' of "specification", which draws in 'the realism and directness of perception' (Clarke, 2005: 125). One way in which this may occur is through the musical 'specification' of a sense of motion or action:

> Although a listener's relationship with music is primarily an auditory one, it is far from solely auditory. The interdependence between perception and action that is emphasized in ecological theory suggests that every perceptual experience will bear the trace of an action component. In the case of music, these traces are not hard to find—they are displayed overtly in the foot-tapping, head-nodding and body-swaying that are commonly observed in even the constrained circumstances of the Western art music tradition. (Clarke, 2005: 62)

However, this sense of motion does not need to be concrete or explicit (as in the case of foot tapping); the sense of motion may be illusory (Clarke, 2005: 63-4). Listeners may hear themselves acting out the motion perceived in the music, or hear the music as actions: 'as the abstract and metaphorical movements of musical material, or the real movements made by the performing musicians, or the imagined movements of fictional characters'(Clarke, 2005: 64), a theoretical entity that shares some similarities with Kramer's virtual subjects.

The idea of a subject position moves beyond this motion-based identification with music, however. In the subject position proper, the listener 'is both aware of what is going on in the music and what it might mean,' but further she 'also has a sense of ... her own perspective on that meaning' (Clarke, 2005: 91). The subject position, then, is 'an attempt to steer a middle

course between the unconstrained relativism of reader-response theory (crudely put, the idea that perceivers construct their own utterly individual and unpredictable meanings from an aesthetic object) and the determinism (or essentialism as Johnston calls it) of rigid structuralism—the idea that meaning is entirely contained within the objective structures of the work itself' (Clarke, 2005: 93). However, a strict division between subject-position and 'empirical subject' is no longer possible with an ecological approach as 'perception is a reciprocal relationship between perceivers and their environments, cospecified by the attributes of both' (Clarke, 2005: 123). Clarke sees this approach as breaching the impasse between empiricism and hermeneutics, combining interpretation with an 'attempt to ground the analysis in perceptual principles' (Clarke, 2005: 124).

Similarly to Kramer's approach, in Clarke's theory music is not tied to animating (to return to Kramer's term) an 'actual' subject or subject position; music may also 'create a virtual person.' This virtual subject may or may not coincide with the listening subject:

> Watt and Ash (1998) have carried out empirical work demonstrating that listeners identify "person-like" qualities in music more readily than other types of attributes. ... An important component of that subjective engagement with music is its corporeal, proprioceptive, and motional quality, which may on occasion provide listeners with experiences of "impossible worlds" that have some of the same attractions as do other forms of virtual reality ... music affords peculiarly direct insight into a limitless variety of subjective experiences of motion and embodiment—real and virtual. (Clarke, 2005: 89-90)

I argue here that the samples used within the analysed compositions function in such a way as to create a virtual subject, both in terms of the bodily sound standing in for a subject (an organ instead of a body), and in the sounds presenting a potential relationship with the body (such as a listening position that might be identified with that of the cosmetic surgeon); this is drawn out more fully throughout the case studies. However, Clarke's examples are predominantly drawn from Western art and popular music; they do not provide an adequate framework for analysing a work

whose materials are readily identified as extra-musical. Returning to sampling

practices, the use of identifiable samples mediates the subject positions differently to

the apparently autonomous musical sign considered by most musicology. In the

following section I briefly survey analytical methods that have been used within the

study of electroacoustic music, before returning to the ecological approach with

reference to recorded sound.

From Sound to Source

The majority of the analyses discussed in the previous section deal with score-based music.

Analyses of electroacoustic music, while frequently having to deal with music that has no

score, often have recourse to visual, often highly technological, representations, whether

through the use of code (such as Csound files) or spectrograms and other time-domain

representations (see Simoni, 2006 for further examples). However, I would like to move away

from such practices as they do not provide a way of understanding bodily engagement with

sound or offer adequate tools for uncovering the role of technological mediation within the

case study works. Using a mode of analysis focused on the body in order to understand

compositions that draw on it for their material seems particularly appropriate; as Jonathan

Sterne has noted, 'the sounding or listening subject is coterminous with a sounding or listening

body, and that body is itself an object of cultural struggle and historical transformation'

(Sterne 2003: 345-6). An analysis that occupies the ground between sounding body and

listening body, where these are different, allows the relationships between them – what

Sterne would consider the actual process of mediation – to be drawn into the findings.

Rosemary Mountain argues against the idea of electroacoustic music as a discrete field of

practice, arguing that it shares concerns and techniques with other musics and arts practices

(Mountain, 2004). She goes on to question modes of analysis in electroacoustic musics, concluding that they 'could both contribute to, and benefit from, analysis in other areas of music and art' (Mountain, 2004: 15). Mountain has posited gesture as an example of shared ground between electroacoustic music and other areas of musical practice that have suffered from analytical neglect. Furthermore, she argues that aural analysis may incorporate elements that are poorly represented by a score. This fits within Mountain's call for more contextually-sensitive approaches to the analysis of electroacoustic music; a concern I share in this study.

In the case studies below, I wish to attend to the extra-musical origins and associations of the sampled sounds. The ability of the listener to recognise the sounds is significant in my research, in particular whether the musical materials of the composition are readily identified as originating from the body. In some cases the sounds may not be directly derived from the body but are mimeticly related. The extent to which the extra-musical origins of the sounds are taken on will be determined largely by the listening practice adopted, which can vary from acousmatic listening to a practice rooted in identification and classification of the sonic materials.

The potential listening modes available will to an extent be determined by the ways in which the composer has used and presented the sonic material.[25] Sounds may be presented such that they can be identified in terms of their perceived or actual source, the manipulation of the sound considered as a mediation of this representational practice. Emmerson terms this 'mimetic discourse'. Alternatively the sounds can be understood musically, as in Emmerson's 'aural discourse' (Emmerson, 1986b). It is not only the potential to identify particular sounds

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[25] The listening mode is distinct from, but related to, subject position. It encompasses matters such as whether the listener chooses to try to identify the origins of sounds, focus on their timbral qualities or structural configuration, or a combination of these or other factors. As with subject positions, the mode of listening is shaped by processes of technological mediation and the agency of the composer. However, as I note later, the same listening mode need not be employed at the same point in each hearing of a piece: for example, the more I listen to the works in the case studies, the more I tend to find myself listening for their musical qualities rather than trying to identify their origins.

within a composition that is significant, but also the mimetic possibilities latent in how they are arranged within the work. Differentiating between 'aural discourse' and 'mimetic discourse', Emmerson writes: 'we can see a continuum of possibilities between two poles. At one extreme, the mimetic discourse is evidently the dominant aspect of our perception of the work; at the other, our perception remains relatively free of any directly evoked image' (Emmerson, 1986b: 19).[26] On the opposite axis of the grid to aural/mimetic discourse is *syntax*, which Emmerson considers to range between 'abstract syntax' (imposed from outside of the sonic materials) and 'abstracted syntax' (extrapolated, or abstracted, from the sonic materials). In works that forge a balance between these two types of syntax, it is possible that the listener 'is aware that while recognition of the source of many of the sounds is intended, the impressions are welded together in other ways than those based on associative image (Emmerson, 1986b :24). Therefore, Emmerson argues, works of electroacoustic music can be understood as occupying a position within a two dimensional grid: the discourse axis ranges from aural to mimetic, while the syntax may range from ideas derived from the materials to those developed independently.

While this approach is undoubtedly useful in untangling compositional decisions and understanding how the presentation of sonic materials is related to their structuring in a piece, it does not directly account for how these materials may facilitate listening from a particular subject position. In order to consider this, I now return to the ecological model of perception outlined above.

It is possible to employ Clarke's ecological approach in the analysis of electroacoustic music, an area that has been developed particularly by Luke Windsor. In 'Through and Around the Acousmatic,' Windsor critiques the Schaefferian notion of the acousmatic, in which the

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[26] It is important to note that Emmerson's article is aimed at a discussion of 'the choices open to the composer of electroacoustic music, rather than the possible interpretation of those choices by the listener,' though as Emmerson points out, 'the composer must take into account audience response' (Emmerson, 1986b: 18).

attempt to listen for the origin of the sounds is downplayed. As Windsor points out, Schaeffer's theories were primarily meant to drive a new listening orientation for the composer rather than the 'ordinary' listener (Windsor, 2000: 8)[27]; Windsor argues that through a wider examination of listening practices and interpretative strategies it becomes clear 'that for the listener at least, attempts to break through the acousmatic 'screen' in order to ascribe causation to sounds are an important facet of musical interpretation' (Windsor, 2000: 9). Like Clarke, Windsor draws on the work of James Gibson for an ecological model of music perception that considers the relationships between action, perception and meaning. Below I outline some key elements of this approach as Windsor has applied it, as it is particularly useful in accounting for how the (perceived) origins of sounds contribute to the listener's negotiation of meaning.

Following an ecological theoretical model of music perception, it is possible to account for the origins of sonic material as playing a part in the listening experience. The ecological approach does not necessarily rule out understanding the iconic or sociocultural significatory properties of sounds; instead it implies that 'such mediated concepts are unnecessary for sounds to inform us about our environment and that the sources of sounds may be harder to ignore than one might hope' (Windsor, 2000: 17). In Windsor's view, the ecological approach is even more appropriate to acousmatic music than it is to conventional music because of its use of 'non-musical' sounds (Windsor, 2000: 16). While maintaining that an 'everyday level of description' has obvious benefits for 'understanding the use of recorded "concrete" sounds in acousmatic music', Windsor's approach also advances beyond this. The ecological approach

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[27] Schaeffer 'distinguishes between an indexical mode of listening, concerned with the identification of the events that are responsible for the emission of sound (*écouter*), and listening as a symbolic mode, to do with sounds as signs, the relationship of sounds as signifiers to signifieds that are *extra-sonores* (*comprendre)*' (Windsor, 2000: 8). Schaeffer also 'identifies two other modes of listening which do not refer beyond the sound itself; *ouir*, the naïve reception of a sound's occurrence ('I heard something'), and *entendre*, attention to certain qualities of a sound itself, without reference to its source or significance ('it sounded "vibrant"')' (Windsor, 2000: 8).

does not preclude identification of sound-producing gestures, for example, or the perception of the human body as the 'instigator' of these events (Windsor, 2000: 28).

In ecological acoustics, sounds 'are not viewed as being perceived as abstract entities related only one to another, as tone colours or timbres, nor are they perceived as standing for concepts or things, as signs. Instead they are seen as providing unmediated contact between listeners and significant environmental occurrences' (Windsor, 2000: 10). The ability to identify the cause of sounds is reliant on the listener's ability to classify acoustic qualities of the sound. Unlike psychoacoustic research, the ecological approach 'attempts to identify the transformation in acoustic structure which informs the listener of some important change in the environment' (Windsor, 2000: 13). Significant and invariant properties of sounds are related to the physical characteristics and properties of the event that led to the production of the sound: 'it is this lawfulness and predictability which specifies the event for the perceiver' (Windsor, 2000: 14). Windsor gives the example of listeners categorising the sound of hand claps according to perceived gender: the sounds are categorised consistently, but not necessarily accurately, with softer, higher claps being considered female and lower frequencies male. Listeners were not able to predict gender accurately, but were able to make accurate predictions regarding the physical characteristics of the hands.

At the centre of Gibson's theory (used by both Clarke and Winsor) is the notion of 'affordance'. This allows perception to form in the 'dynamic relationship' between an organism and its environment (Windsor, 2000: 11). Elements of the environment (such as events or objects) afford certain active possibilities for the organism. This is a reciprocal relationship between organism and environment, in which the affordance cannot be 'explained purely in terms of the needs of the organism, nor in terms of the objective features of the environment.' Instead, the affordance 'is a relationship between a particular environmental structure and a particular organism's needs and capacities' (Windsor, 2000: 11). Evolutionary and

developmental changes in both organism (or species) and environment are interlinked.

Evolution of environmental structures and the organism's perceptual system occur

concurrently, and therefore the meaning of events within this environment is not determined

by abstract mental representations, but rather is produced by 'structured information that

affords further perception or action' (Windsor, 2000: 12). The key element of the relationship

between sound and source event is the specification of affordance: 'sounds specify events or

objects that *afford*' (Windsor, 2000: 17). Windsor gives an example:

> striking a hollow object may produce a sound that informs the perceiver
> that the object affords 'filling' or 'the carrying of water', just as the
> perception of the elasticity of a bouncing ball allows a catcher to predict
> how high a ball will bounce given a certain input of energy. (Windsor, 2000:
> 15)

Changes in structure or morphology (for example a breaking) lead to changes in its affordance

structure (the broken bottle no longer affords filling with water). These theories also hold true

for synthesized sounds: 'it is the transaction between player and a set of familiar invariant

haptic and auditory structures which forms the link between action and perception' (Windsor,

2000: 17). This approach is important because it breaks down the distinction between listener

and sound object. In positing the composition as 'environment' it becomes apparent that the

case study works might afford or specify certain actions for the listening body.

Furthermore, the ecological perspective provides a distinctive take on technological

mediation. Windsor's musical application of the theory is flexible enough to move beyond

accounting for sounds that remain in their 'natural' state. For example, sounds may be

processed such that their source and environmental cause become ambiguous, leading to the

perception of a 'virtual' event. This may or may not be under the composer's control. For

Windsor, the distinction between real and virtual events in this sense can be determined by

whether or not the listener perceives an event that has actually occurred. Thus, 'in a sense all

the events of an acousmatic piece are virtual, since they do not inform the listener about his or

her real environment' (Windsor, 2000: 17). It is not possible to explore the (acoustic) scene outside of the piece. Windsor also considers that the acousmatic precludes multi/inter-modal perception, cutting out vision, touch, smell, taste etc. However, as will be illustrated in the case studies, I would argue that the haptic is not completely excluded, nor is a sense of implicit felt movement. Windsor also notes that when sounds are understood as emanating from a loudspeaker rather than their original source the listener inhabits a virtual environment as presented through the composition and speakers. This may mean that 'the recorded and diffused acoustic structures may be impoverished to a certain extent'; however, listeners are still able to 'exploit their sensitivity to invariances in the perception of individual sounds or the structural relationships between them' (Windsor, 2000: 18). As Windsor notes, although the differences between the two listening situations are both significant and inescapable, these differences 'should not obscure the importance of event perception' (Windsor, 2000: 18). Although the works I study are recorded, and I consider them in terms of their emanation from loudspeakers or headphones, it is still possible to gain useful analytical information from attending to the perception of events and affordances.

Furthermore, when the body is the environment from which sounds originate, traces of this persist in the listening experience, even if the sounds are (re)presented through loudspeakers or headphones. And, as Windsor points out, 'it is sometimes all too easy to confuse the sounds of an acousmatic piece with the 'accidental' sounds that often intrude into listening environment' (Windsor, 2000: 18). Sounds that signify everyday events may be the most familiar aspects of the piece. Furthermore, 'since such familiar events may be directly specified, it follows that any longer term sequence of sounds is liable to be perceived in terms of these events' (Windsor, 2000: 18). This is particularly likely to happen for the 'naïve' listener who lacks the ability to identify the technical processes at work. Windsor invokes Gibson's example of what the organism may do when faced with inadequate or insufficient information:

it hunts. The organism may gather further information to supplement that provided by the initial stimulus, in this case the sound: 'in the case of a sound or sequence of sounds which fails to specify clearly an event, the human listener attempts nonetheless to make sense of these sounds in relation to the environment' (Windsor, 2000: 21).

One benefit of an analysis based on this approach is that meaning is produced by a reflexive process between the listener and the music: 'the 'work' is not seen as an object but as a *relationship* between listener and the environment – a relationship which is dynamic, yet open to analysis' (Windsor, 2000: 26-7, italics in original). Sources of information may include the score or CD liner notes, as well as information available only to a particular listener. Yet absolute relativism is avoided as it is – in Windsor's opinion – necessary for the analyst to identify the contexts informing and limiting her reading. Some sources may be considered to have more stability or wider applicability, but none needs be considered irrelevant. Interpretation may also be used actively to *construct* affordances where they are previously indistinct (Windsor, 2000: 27). Thus the lack of visual information in my case studies does not necessarily obscure the sources of sounds, but may 'be seen to intensify our search for intelligible sources, for likely causal events' (Windsor, 2000: 31).

This is echoed by Rolf Inge Godøy's exploration of the gestural affordances of musical sound, which, like Windsor's theory, relies on the 'assumption that musical sound is a transducer of *source-information*.' This includes 'both the actions that go into producing the sound, e.g. hitting, stroking, blowing, bowing, and the material properties of the sound source e.g. plates, strings, tubes, membranes' (Godøy, 2010: 106). The listener gains this knowledge through continued exposure to sound sources and musical performances. Due to this bank of ecological knowledge, the listener is able to supply an associated physical or other sound-producing gesture even when this is no longer visible: 'the listeners may mentally recreate the choreography of sound-producing gestures. The re-creation will vary among listeners and will

depend on their intentional focus at any given time' (Godøy, 2010: 106). Therefore the capabilities of listeners to identify such gestures will be shaped by their previous experience and expertise.

However, Godøy retains the possibility of representation through image schemata. Giving examples of musical gestures that may be understood in terms of other similar non-musical gestures, Godøy suggests that these may play a role in the listener's ability to provide gestural affordances for synthesized sound: 'several instances of similar types of gestures with similar sensations of effort may be generalized into more generic types, or schemata. These schemata may in turn be used in the perception of a novel musical sound, i.e. be projected onto "new," even synthetic, previously unheard sounds, as long as the dynamic envelope or shape of the sounds are similar' (Godøy, 2010: 107). Citing evidence that auditory-motor couplings have a privileged role in behaviour, Godøy suggests that 'our capacity for spontaneous and robust associations of sound and movement extends from very basic neurophsyiological predispositions to more learning-based associations, making sound-movement relationships solid but also variable' (Godøy, 2010: 107). Therefore there is no one correct mode of linking sound with assumed gesture:

> in listening, we see a whole range of relationships between sound and
> assumed sound producing gestures, ranging from the immediate and
> synchronous (and probably hard-wired) coupling of sound-event to action-
> event, and even to the projection of non-existent action-events into sound-
> events. (Godøy, 2010: 107)

In Godøy's approach the most pertinent features of the musical sound are characteristics that may be understood as 'gesturally rendered' shapes. These may include: onsets, pulses, cyclical patterns, pitch contours, trimbral contours, among other features (Godøy, 2010: 115). Unlike in Windsor's approach, where the sound represents an object that affords a particular action, for Godøy the sound affords a particular gesture: for example, the shape of a hand on the keyboard might relate to a certain sound (Godøy, 2010: 115). Physiological states such as

muscular tension may also be involved. I draw on both Windsor and Godøy's approaches in my own analytical listening. Windsor's perspective provides a generic basis from which to proceed with tracking sonic affordances in technologically-mediated work; while Godøy's perspective on the listener's ability to supply an associated physical gesture, even when its source is not visible, is invaluable in the analysis of recorded media.

Following an ecological approach allows for perceptions based on sound qualities and perceived sources to shape the analysis. It provides a means of revealing the corporeal underpinning of the case study compositions. It is therefore a particularly useful way of dealing with sound within an embodied analysis. In the following section I draw together elements from the theories discussed in Chapters 3 and 4 to outline how they may be understood alongside different modes of listening in the formation of an embodied analysis.

Towards an Embodied Analysis

Embodied analysis as I construct it here focuses on both performing and listening bodies, and on the space of exchange between them. The analysis of sensation and gesture is used to gain an understanding of the role of the performing body in the creation of music and how the listening body constructs meaning. Gestural and sensual approaches may be paired with an exploration of formal or structural elements of the work since these may contribute to the particular physical responses of the listener (see Grewe et al., 2007). However, I am wary of placing too much emphasis on structure, and more traditional methods of analysis. Analysis is also a process that contributes to the construction the work; as Alistair Williams argues:

> Analysis does not just describe an event, it performatively helps to bring it into being; and it brings into being a view of music that is based on the unity of internal relationships; that prioritizes certain events over others;

and that seeks structural coherence rather than social meaning. (Williams, 2001: 52)

However, an analysis that moves beyond reifying structural coherence can help to escape this and return to uncovering social and cultural inscription that takes place within the music. An approach based on an assumption of a musical work as a stable object with fixed meanings would negate the possibility of an analysis predicated on understanding of the process by which it brings about meaning in negotiation with and as embodied knowledge. As Dell'Antonio points out, adopting more 'fluid process[es] of assessment' outside of the possibilities offered by structural listening, 'opens possibilities for new parameters in the aesthetic and cultural/social validation of music' (Dell'Antonio, 2004: 10).

The very process of analysis may profoundly affect the relationship the analyst has with the music, and hence the role the music may play in subject formation. In terms of an embodied analysis of music this may involve understanding how individual sonic materials are assembled to lead to a particular bodily affect. This form of analytical listening shifts the focus to the body as object of attention rather than the music. In which case, is the information gained most revealing with regard to the music or the listening body? Perhaps this is only a problem when music is conceived of as being autonomous from the process of its being heard. As Lochhead writes in her analysis of Berg's opera *Lulu*:

> How I hear the music cannot be separated from what the music *is.* All affective and structural features of music are contingent upon the perspective of listeners as individuals and as part of an interpretive community . . . [M]y hearing cannot be separated from the confluence of ideas and concerns that define me as a woman living in the United States during the twentieth century . . . While the meanings of *Lulu* inhere in its sounding presence, that perceptual presence is wedded to the variabilities of its historical and social context. (Lochhead, 1999: 252)

As Lochhead also points out, what the listener hears is strongly influenced by the circumstances in which she listens. In this way the analyst can offer only a situated account, speaking only for her body, rather than all bodies. In addition to this, I argue for the reflexivity

inherent in Lochhead's approach; we need to understand how 'how I hear' and 'what the music is' as a process of becoming that travels in both directions.

In my embodied analysis I do not adopt a single, overarching method, but aim to 'experiment with incoherence, discontinuity, situatedness, alienation and subjectivity as features of the listening experience' (Dell'Antonio, 2004: 10). I also aim to carry these features over into the written account and question how they may offer insight to an analytical perspective. Embodied analysis challenges musical autonomy. In effect, embodied analysis refuses to acknowledge its own autonomy (it has none), or the potential autonomy of the composer or musical work. Instead, it weaves a web of subjectivities and blurs the distinction between body as subject and body as object, and the distinctions between separate bodies.

Embodied analysis avoids the typical analytical dualism of body and mind, instead using insights from embodied cognition to understand them as continuous. It is neither objective nor wholly subjective, instead seeking to dismantle such oppositions and to operate in the gaps. It is based primarily on listening, but may incorporate a number of modes of listening; it is not restricted to what is normally understood by 'listening' alone, paying attention to bodily responses, affects and sensations. Insofar as these sensations may respond to an imagined or implicit movement or body, then it is also visual. The object of the analyst's attention may shift between the sound and her body, and may at times get stuck in the impossible task of untangling the two.

Thus, embodied analysis as a 'method' may include some, or all, of the following:

- A deliberate attempt to 'listen for the body' in sound

- Identification of sonic gesture, and exploration of why this is understood as such

- Consideration of whether and how this maps on to identifiable physical gesture in the creation and reception of the music

- Identification of any sensation and notable physical experiences in listening, followed by an examination of how these relate to the musical materials

- Identification of the (perceived) origin of sounds used to make each piece (via listening and other sources of information, including written documents and interviews with the composers)

- Identification of how sounds are organised within the piece, and how this relates to bodily experience

- Placing both represented and listening bodies within a cultural context

- A reflexive process of situating listening and the listening body

- Identifying the role of the body in the processes of analysis; using the body to 'do' research

The pieces under discussion vary in their presentation and manipulation of musical materials. I therefore draw from the above approaches what is appropriate to each work. Each case study also presents a number of heterogeneous – though complementary – ways of listening and analysing that combine to create a wider method. Different modes of listening may be used in each analysis, or even within one analysis. In each case study the listening modes are described and explained in relation to features in the work (for example, compositional or technological). Analytical insights gained via each mode of listening are used both to support and critique the others.

While the adoption of an embodied approach and the breaking down of distinctions between doing and knowing resolves the dualisms of body/brain and sensation/intellect for the practice of this analysis, what are the implications for the written production of the analysis? How can the analytical findings be written about without negating the embodied experience? If embodied analysis is seen as a strategy for moving away from representational practices – those forms of analysis that rely on a textual account of the object – how can the analyst then communicate her experience?

As Pink has asked: 'if we locate all meaningful knowledge in processes of active participation and engagement, the conundrum we are faced with is of how we might extract them to represent them as academic knowledge: how might we use them to contribute to

academic scholarship?' (Pink, 2009: 41) Thinking and writing are fundamental within a modern

Western academic context. Julia Carozzi critiques the process by which scholarly activity comes

to be disembodied, arguing that there is a lack of awareness of the bodily involvement in

reading, writing and other commonplace scholarly activities, and that therefore the body is

excluded from the production and reception of discourse(s): 'To affirm that there is an

embodied knowledge that is radically different from another objective knowledge – the

knowledge of writers and readers – seems to reproduce the disembodiment of the discursive

activity in which we, as academics, are involved and which continues to appear as extra-

corporeal' (Carozzi, 2005: 26).

For Pink the solution is to understand thought and writing as 'emplaced practice', a

solution to Pink's ethnographic project. Although my field is somewhat different, Pink's

observation that the texts are written by a subject with material and sensory experience is

significant:

> We might abstract, isolate or rationalise embodied knowing into written
> description through theoretical frames. Yet we remain embodied beings
> interacting with environments that might include discursive, sensory,
> material and social strands. We do not simply retreat into our minds to
> write theoretical texts, but we create discourses and narratives that are
> themselves entangled with the materiality and sensoriality of the moment
> and of memories and imaginaries. (Pink, 2009: 41)

The analyst's presence within the text is a significant first step towards preserving traces of the

body in the analysis. As Marion Guck has argued, analysis derives from personal experience of

music and therefore benefits from 'the overt representation of the analyst in the text' (Guck

1994: 29). Guck achieves this through the inclusion of 'highlight[ing] involvement, usually by

integrating vivid, response-depicting language with more traditional, analytical language'

(Guck, 1994: 37). This is something I have attempted to replicate in the analyses that follow.

Not only must the case studies communicate, as text, a state of embodied knowledge, they must also communicate the *process* of embodied knowledge. A first hearing of a piece and a tenth hearing of a piece are likely to be subtly or even significantly different. As Mark Harris has pointed out, knowledge is not only situated, but takes place within movement: a person does not '*stop* in order to know: she continues' (quoted in Pink, 2009: 41). Like the listener's engagements with the music, knowledge, or rather, a process of knowing, is continuous. My knowledge and understanding of the pieces changes and develops as much in the writing, reading and thinking about it (in both implicit and more obvious ways) as it does in listening alone. To return to the anecdote with which I opened this dissertation: my first encounter with the sonic materials of *Crackers* led to an experience of disgust, but through the process of listening to the piece and conducting background research both the way in which I understood the music and the way in which I experienced my own embodiment changed. This was due as much to the more 'intellectual' aspects of the process as it was to the purely bodily sensation. I do not attempt to separate these as distinct phases of knowledge, but instead offer through each case study an account that incorporates the process of arriving at that point. For example, in Chapter 6 I note how my experience of the work changed subsequent to interviewing the composer and finding out more about the sonic materials. I do not attempt to 'overwrite' the earlier experience with the latter, but leave them both present within my text, just as one might retain a memory of an imagined place alongside knowledge of that actual place once it has been seen.

Furthermore, there are advantages to bringing embodied knowledge into an environment where it can be written and reflected on. While it is not my aim to uphold any distinction between body and brain that might be inherent in the sensation/intellect binary, it is nevertheless important to be able to record the findings of the analysis in such a way that they

remain open to bodily experience while becoming open to critical scrutiny. As Belinda Barnet

has noted in a critique of Mark Hansen's work:

> if we go too far in the direction of non-reflexive experiential immediacy, we
> end up with a subject who exists outside of discourse: an embodied,
> engaged and sensual position to be sure, but also a non-critical one. The
> prelinguistic subject is mute. (Barnet, 2003)

Language plays an important role in the construction of the body, and the notion of the

discursive body is a recurring one. Placing embodied knowledge and the results of an

embodied analysis within a written framework that exposes them to critical scrutiny allows for

reflection on how the processes of discourse inscribe a material, fully experienced body.

6. Ground Techniques

My first case study is of Neil Luck's *Ground Techniques*, a work pieced together from

recordings of performance actions, which was released in September 2010. I accessed the

track online, downloading it as an mp3.[28] *Ground Techniques* features performers from the

ARCO collective (an experimental string ensemble founded by Luck) and the Oxford

Improvisers. The 'cover' artwork for the track (see figure 1 overleaf) shows a black and white

photograph of a head, what looks like a section of torso, and an arm. The separate sections do

not line up precisely – like a Picasso painting – and the image appears pixelated and slightly

distorted. This body has been taken apart and put back together again. The eyes are obscured

by a black rectangle containing the composer's name, while the name of the work is shown in

a similar black rectangle across the arm and torso sections. The end of a tangled audio cable

emerges from the figure's mouth, as if the body is about to be plugged in and begin emitting

sound – indeed with a mouth full of cable, the body can no longer speak and can only produce

sound via electronic mediation.

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[28]   The work as a whole exists only as the recording, and not in a live form.

Figure 1 : Cover art for *Ground Techniques*

[Permission to reproduce this image has been granted by Neil Luck]

Describing himself as inhabiting the multiple roles of composer, performer, and curator, London-based Luck's compositions focus 'on various approaches to non-standard notations, in particular those which implicate either the composer's own body/movement in construction, or directly engage with the physiology of performance techniques themselves'[29] (Squib Box, n.d.).

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[29] Luck studied composition at the University of Surrey and at the Royal College of Music.

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 From ARCO collective and beyond:

Neil Luck – Body sounds
Adam de la Cour – Guitar
Ben McDaid Wren – Drums
Fiona Bevan –  Vocals and Guitar
Greta Pistaceci – Theremin
Lawrence Tatnall – Trombone
Matthew Lee Knowles – Piano
Oli Whitworth – Sound Engineer
Richard Thomas – Sound Engineer, Cello, Office furniture

from the Oxford Improvisers:

Bob Nichol – Tenor Sax
Chris Brown – Guitar
Chris Hills – Percussion
David Stent – Guitar
Dominic Lash – Double bass
Jill Eliot –  Viola
Julian Faultless – Horn
Martin Hackett - Melodicas
Trisha Elphinstone - Soprano Sax
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Figure 2 : Instrumentation of *Ground Techniques*

Luck says of the piece: '*Ground Techniques* was primarily an attempt to document a type of

compositional strategy that I'd been exploring throughout the year. I was interested in directly

exploiting the inherent physicality of performance practice, either through asking the players

to follow physical (as opposed to musical) trajectories during a piece of music, or more

prominently here, using my own body as a kind of 'score'.[30] Luck writes: 'There aren't really

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[30] Luck also describes the inspiration behind the work: 'As far as inspiration goes, I'm not too sure. I
 suppose there's a strong link with 'body artists' and conceptual artists such as Acconci (mainly),
 Abramovic, Nauman, Barney et al. Definitely a lot of connection with group Ongaku and Gutai art
 from Japan. Also a strong link with John Zorn's approach, and sonically I suppose with Mike
 Patton's more experimental vocal music. A very big influence on this project and my work in
 general is also the NYC based avant garde theatre director Richard Foreman who deals with
 staging disparate fragments of material all the time. The general character of his work is similarly

any scores for the pieces, all were devised as systems. Most of the players involved were improvisers in a sense, and the pieces were all conceived for [sic] those particular players in mind … I described my body as a score primarily because I use it as a tool for communicating with instrumental musicians. [See figure 1 for details of the instrumentation of *Ground Techniques.*] This either requires them to listen to my body, watch it, or both. I suppose it does also function as an instrument in those pieces too, although it's not the musical or conceptual starting point' (Luck, personal communication, 22 April, 2010). The body acts as the impetus for many of the sections that make up the piece: 'Most of the small units, or modules in *Ground Techniques* take as their starting point a physical process which I put my own body though. This might be a completely pre-recorded event, or alternatively a direct interaction with live players … The units were written over a long period, and some were devised on the days of recording. They all rely quite heavily on improvisation and so the musicians also had a lot of creative input' (Luck, personal communication, 22 April 2010).

Different processes of mediation are evident throughout *Ground Techniques*. *Ground Techniques* also poses ontological questions through its continually twisting relationship to liveness, the relationship between the visual and aural, and the work concept: while it makes use of performance techniques to generate materials (something Luck refers to when discussing the work) this performance was not meant to be seen, it existed only as a means for making materials for the work that would reach its final form as a recording. Luck notes: 'The work *Ground Techniques* as a whole exists only as a recording. Parts of it have however been performed live. Many parts of it (including section 1) can only really exist in recorded format' (Luck, personal communication, 22 April 2010). Each of the sections that form the piece was

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bizarre, absurd, conceptual, and frivolous. Since the project, and through a residency with Milton Keynes Art Gallery, I've become very interested in Marcus Coates' work which I also see as dealing with a lot of similar issues' (Luck, personal communication, 22 April 2010).

The list below shows Luck's description of the sections of *Ground Techniques*:

1. Six consecutive breath holds overlaid. Players listened on Dictaphones imitating the guttural plosives. Final breath intakes also mimicked.[31]

2. Ensemble improvise, I mask the recording mic with torso as much as possible.

3. I deepthroat a microphone increasingly rapidly, singer restarts chord sequence etc at every retake.

4. Pianist performs Chopin, I introduce my feet under his hands half way through (there's a video on YouTube of this somewhere...)

5. I attempt to imitate Japanese tongue twisters on 3 Dictaphones. Players listen over headphones and interject where I stumble.

6. I have a mic taped to my leg. Two people wrestle me towards an amplifier which feedbacks more and more as I approach. Guitarist and Drummer simply follow the dynamic contour. I overlaid 4 independent takes here.

7. I connect a tube and mouthpiece to a trombone. I'm singing 'Dem Bones' through the mouthpiece whilst the trombonist players ascending and descending scales on the same instrument.

8. A series of body noises imitated by an ensemble – kissing, urinating, belching, sneezing, breathing out.

9. I hit record on 6 Dictaphones and scattered them around my living room. I then blindfolded myself an attempted to find them and shut them off as quickly as possible. Players listened over headphones and imitated/responded to any sounds.

10. Players improvise and I mask recording mic with my mouth.

11. Singer cycles through melody of 'I'm forever blowing bubbles'. I drink coke as quickly as possible and belch accordingly. Dynamic of belching informs the singer's presence.

12. Cracking knuckles are imitated.

13. This piece begins at end of 11. Drummer gradually accelerates. I try and keep pace with push-ups, counting as I go. Rest of the ensemble imitates either breath patterns or guttural sounds. At the beginning there's the sound of me taping a mic into my mouth.

(Luck, personal communication, 11 July 2010)

Figure 3 : The sections of *Ground Techniques*

recorded separately, with Luck then using these to compose the finished work (see figure 2 for

a description of the separate sections).[32] He writes, '*Ground Techniques* attempts to map the

artist's body using a variety of performance and compositional techniques' (Squib Box, n.d.).

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[31] 'The players listened to the sounds during the recording. They didn't hear the sounds beforehand' (personal communication, 11 July, 2010).

[32] 'Each section was recorded separately then knitted together. There were three separate recording sessions – one with the Oxford Improvisers, one with ARCO collective, and one with Fiona Bevan. Some of the 'body' sounds were prepared by myself beforehand. The breath sounds in section 1 were recorded prior to the recording sessions' (Luck, personal communication, 11 July, 2010).

The bodily sounds that can be heard on the track are Luck's, but numerous other bodies also leave aural traces in their production of instrumental gesture. In this chapter I explore how perception of these sounds troubles the live/recorded binary and how such bodily presence and gesture may contribute to an analysis of the work.

Performing Analysis

In the following section I begin to construct an analysis of *Ground Techniques.* The section roughly follows the trajectory of my first analytical engagement with the work, and begins to sketch out the limits of a performative, processual listening, a listening that implicates past and present bodily experience in the moment of trying to make sense of what is heard. It further considers the possibility of employing this mode in listening to recorded, rather than live, performances.

The piece opens with an 'explosive' sonic gesture (0.00 – 0.05) that I soon come to identify as human breathing. This opening sonic gesture has a particular bodily resonance. It comes as a slight shock, a sensation that is exacerbated by the lack of visual clues to warn me that this sound is about to happen. It seems to comprise a mass of separate instrumental gestures, and does not seem to 'aim' anywhere, but acts as a spreading out of sounds. I have a sense that some stored energy has suddenly been released, but at this stage there is no clue as to what may have caused this. This overload of sound crystallizes into a clarinet figure that stands out more than the others, perhaps because this is an instrument I play. Less clearly identifiable is what may be a muted trumpet or cornet. Underlying this is a squelching sound that gradually resolves into a clearly audible intake of breath (at 0.12).

On hearing this intake of breath, it becomes difficult not to 'breathe along'. Andrew Mead describes a similar reaction in his essay 'Bodily Hearing: Physiological Metaphors and Musical

Understanding' (1999). He reports finding himself in intense pain when listening to a live

performance of an oboe concerto. He found he had been breathing along with the soloist,

who, unknown to him, had been employing circular breathing techniques. Mead uses this

anecdote to consider how the sound of music is 'an embodiment of [its] making, and that

hearing that making in the sound had much to do with [his] understanding of the music' (Mead

1999: 2). Even if I don't explicitly breathe along, I find it hard to separate hearing the sound

from my own physical experience of making it. The intake of breath (which is not followed by

an immediate exhalation of breath) causes me to feel – or imagine I feel – the sensation of

discomfort caused by taking a deep breath and holding it.[33] There are five held breaths in total,

gradually growing closer together.

My listening here is founded on an implicit association between myself (as listener) and

the composerly or performing body I am hearing. This association is formed through layers of

implicit and explicit mimetic participation, binding my listening to the bodily act of musical

creation. Yet my analytical methodology must move beyond simple mimicry if it is to consider

the way in which sound creates affordance within a musical or aesthetic structure. Despite

their use of distinct practitioner groups, there is much common ground between performers

and listeners (and also composers) in Fisher and Lochhead's article 'Analyzing from the Body'

(described in Chapter 3). Indeed, the ability to blur the distinction between the two is

necessary to their analysis. They underpin this by drawing on Peggy Phelan's notion of

performativity. They write: '[Phelan's] claim that "seeing" involves a bodily enactment of

aesthetic meaning allows her to link spectators with makers in the same artistic enterprise. In

an analogous way, we claim that hearing entails a bodily enactment of musical meaning that

links listeners, performers, and creators in the same musical enterprise. Phelan's assumption

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[33]   As noted in Chapter 2, Andra McCartney also describes a piece that uses breathing sounds –
       Hildegard Westerkamp's Breathing Room – in terms of the physical and emotional sensations it
       engenders in the listener.

that "all seeing is performative" thus becomes transformed into "all hearing is performative" and bolsters the position that the study of one practitioner group can lead to knowledge that is general in scope' (Fisher and Lochhead, 2002: 46). This is a useful concept insofar as it positions aesthetic or musical meaning in reciprocal bodily enactment. However, Fisher and Lochhead's reliance on Phelan's work leaves important questions to be answered for my analysis, drawing as it does on recorded works.

Phelan's central thesis is that 'performance's only life is in the present. Performance cannot be saved, recorded, documented, or otherwise participate in the circulation of representations of representations: once it does so, it becomes something other than performance. To the degree that performance attempts to enter the economy of reproduction it betrays and lessens the promise of its own ontology. Performance's being ... becomes itself through disappearance' (Phelan, 1996 [1993]: 146). For Phelan, the document is a 'spur to memory', rather than performance in itself. However, in her discussion of Sophie Calle's work, Phelan points out that 'the interaction between the art object and the spectator is, essentially, performative – and therefore resistant to the claims of validity and accuracy endemic to the discourse of reproduction' (Phelan, 1996 [1993]: 147). Phelan writes of Calle's gathering descriptions of stolen paintings, that the art object itself is forgotten, instead to be reconstituted performatively within 'the subject's own set of personal meanings and associations'. The 'descriptive recovering' of the work mobilised in Calle's practice does not *reproduce* the object, but *restages* the 'effort to remember what is lost' (Phelan, 1996 [1993]: 147). For Phelan, this helps to demonstrate the performative quality of seeing. However, this might be translated to musical understanding, with the art object replaced in this description by the live performance of the musical work. In listening to *Ground Techniques* my listening body struggles to restage the effort to remember what is lost. But what is lost? The bodily sounds are presented in such a way that they retain a link to their gestural origin. The bodily

effort to reconstruct the gesturing body restages a performative and bodily diffuse mode of listening. Similarly, Fisher and Lochhead translate Phelan's theory to understand listening to music as performative. Thus embodied analysis is similarly performative, restaging and restating the bodily process of framing (as music) what is heard. Music analysis in general may be considered a restaging rather than a reproduction of the score, an understanding of the process of becoming music. Embodied analysis aims to unravel the bodily framing of the work.[34] Similar to Calle's restaging of the work, Fisher and Lochhead's analyses – which do not take place at the moment of the performance itself – are founded on a restaging (in this case by the performer as listener, or as someone who remembers the work). Through analysis, the work is 're-staged' and recovered.

Central to this theoretical position, however, is a clearly locatable and definable work concept. A crucial question therefore, is where does performance take place within the works I am considering? The work concept within music has been much debated and there is not space here to provide a complete overview of this complex area. However, while these recordings may document an original moment of sound production, potentially even a performative act, they do not constitute a document of a musical performance as such, the music only comes into existence as it is on the fixed media.

While the works discussed here do not operate within the same musical aesthetic, they do share a reliance on a fixed medium rather than the score. *Ground Techniques*, out of the three case studies, perhaps has the most complex relationship between medium and score. Luck's

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[34] Writing up the analysis, however, is another matter. The textual description of the results of embodied analysis fall more squarely into Phelan's notion of the document(ary): 'To attempt to write about the undocumentable event of performance is to invoke the rules of the written document and thereby alter the event itself' (Phelan, 1996 [1993]: 148). Phelan acknowledges that to simply refuse to write about performance would not be adequate. Phelan's proposed solution to this impasse is to change the mode or purpose of the writing: 'The challenge raised by the ontological claims of performance for writing is to re-mark again the performative possibilities of writing itself. The act of writing toward disappearance, rather than the act of writing toward preservation, must remember that the after-effect of disappearance is the experience of subjectivity itself' (Phelan, 1996 [1993]: 148).

metaphorical appropriation of the term in his description of using the body as score highlights similarities with live performance, in which the body may play a role in the reinterpretation of the score and thus the realisation of the work. In this sense the body acts as double medium: it is what directs and determines the actions of performance and also what carries them out, enabling the production of sound. Yet Luck considers *Ground Techniques* to exist only as a recording, and in this sense it occupies the troubled ground between the fixed (digital) medium of its storage and the body as medium.

The material conditions of the work – existing only as a recording – also imply the possibility of repetition. In Phelan's definition of performance the presence of living bodies and the subsequent implication of the real means that there is an element of consumption: 'there are no left-overs, the gazing spectator must try to take everything in' (Phelan, 1996 [1993]: 148). Here, although the body on the recording is being performed, it can be repeated. However, embodied analysis as located in and practiced by a listening body is not so easily revisited – as I work through my listening and analyses performing them afresh each time (if analyses are 'productive' as argued by Lochhead (2010: 185)), I must also try to take everything in.

It is not only the breathing sounds of *Ground Techniques* that I experience bodily; the instrumental imitations are also highly visceral. These sonic gestures on wind instruments underlie the breathing sounds. My understanding of the opening section is not restricted to understanding the presence of the performing body through its direct bodily sounds. I am able to form links between these and the more conventional instrumental musical materials. I also hear the breathing as informing the instrumental possibilities – even before my correspondence with Luck elucidates the extent of this relationship.[35] As someone who plays a woodwind instrument, my understanding of structure and phrasing grew through a process of

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[35] The instrumentalists imitate the recorded breathing sounds.

playing out the changing limits of my breathing.[36] The limits of the body are explored through

the series of breath holdings. Through my listening I inscribe a body in the space between

these. I am continually aware of Luck's decision to use the body to create, direct and

determine the musical sounds, and my sense of musical phrasing is disrupted by this physical

sensation, shaping my understanding of the structural features of the piece.

Elisabeth Le Guin's approach offers a way into exploring the interplay between body,

instrument and music at a finer level of detail. I draw here particularly from Chapter 1 (Cello-

and-Bow Thinking), in which Le Guin works 'at the granular level of translation from sensation

to concept' (Le Guin, 2006: 14). Starting from a reading of the score, Le Guin offers a

hermeneutic interpretation of Boccherini's cello music based on her embodied performance

decisions and associated sensations. Le Guin's analysis here follows the process of a performer

starting to engage with a piece; from a first look at the score (and the associated experience of

beginning to change visual information into musical shape) through to the physical processes

and movements involved in realising the work (Le Guin, 2006: 15-16). She charts the decision

making process undertaken by the performer learning the work. Crucial to Le Guin's

theorisation (though not necessarily to extensions of it) is that Boccherini – the composer –

was himself a cellist, and so there is potentially a clear case for a shared bodily element.

Below, I explore how Le Guin's work might be of particular use to a listener. As discussed

above, when listening to *Ground Techniques* I experience a sense of mimetic participation; in

the following paragraphs I attempt to work through how this shapes my musical understanding

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[36]   A similar mode of understanding may also be possible for a listener who has no such instrumental
experience. Returning to Arnie Cox's mimetic hypothesis, particularly his 2006 explication of this
theory in relation to gesture, the listener may understand sound via 'an amodal, visceral imitation of
the exertion dynamic evident in the sound' (Cox, 2006: 50). This amodal, or intra-modal, imitation
varies according to experience, so someone who has never played a woodwind instrument will have
a different experience to that which I note. Yet this experience does not become disembodied or
abstracted because, as Cox notes, 'even having never played the same instrument, or any instrument
at all, we will automatically have *some* idea of what it must feel like to move one's fingers and arms
in a certain way' (Cox, 2006: 50). Where the sound production is founded on *breathing* (or blowing),
as in *Ground Techniques*, it seems perhaps more likely that non-instrumentalists will be able to relate
to the sound based on their everyday experience.

of the work.

From my point of view as a listener, the process of first engaging with the work through to knowing it more intimately shares both similarities and differences with the process of instrumental learning that Le Guin describes. While there is less imperative to engage in a physical manner, or less covert, outwardly visible physical action, the process of analysis – of gradually becoming aware of different elements within the music – is similar. The inescapably physical 'anticipatory kinaesthesia' that Le Guin describes in response to looking ahead through the score is echoed in my listening reactions; I know, for example, that an intake of breath of a certain size would be necessary to produce the clarinet tones of the particular loudness and duration I hear. I am able to anticipate approximately the degree of muscular tension that would be required to produce notes of that pitch. These possibilities shape my musical understanding. I comprehend the music in terms of the physical patterns that seem to be necessary for its production. As Le Guin points out, these operate within a particular frame of reference, the body (Le Guin, 2006: 17). This possibility of embodied identification also informs understanding of the performance as an embodied act more generally. As Le Guin illustrates through reference to the cellist-body, some physical playing positions are excluded but others are mandatory. Similarly, with these clarinet tones, it is likely that the clarinettist is standing or sitting, rather than reclining.

Aside from this overarching physical decision of playing stance – how the body will hold the cello or clarinet, or any of the other instruments deployed in *Ground Techniques* – there are more detailed considerations to be made, and these smaller movements can contain meaning. For Le Guin this enables the analyst-performer to offer a hermeneutic reading based in physical action, supported by musical, sonic/timbral, or technical justifications given for particular physical actions. Take, for example, the following interpretation:

> If we combine the physical experience of the passage with its topical/gestural significations, we get a complicated little picture: retreat and subsiding manifest as desirable. Gratification is associated with a withdrawing motion. (Le Guin, 2006: 18-19).

Similarly, Le Guin writes of another passage: 'This plays out as physical calmness, since making such a sound involves a greater submission to gravity, less effort by the arm and shoulder muscles' (Le Guin, 2006: 21). There is an attempt to show causation or correlation between topical readings, musical intention, and physical action. Thus a hermeneutic reading of the music (such as considering the harmony to retreat) may coincide or contrast with, an interpretive reading of the physical actions necessary to produce that sounding phenomenon. If the listener experiences mimetic participation with the sounds heard it seems likely that she may also experience this tension or convergence between the two sets of meaning. Le Guin herself points out that the listening experience may share similarities: 'In a live performance (and to some extent in a recorded one) not only will the performer feel things such as those I have described, but the listener-observer will feel them too, or will at least feel that the performer feels them, through the subtle physical identification that comes with proximity and close attention to another human being' (Le Guin, 2006: 24). Thus mimetic participation in embodied action allows the listener-analyst to undertake a similar approach.

In my listening to the opening section of *Ground Techniques* it is possible to trace similar micro- and macro- levels of meaning. The tension felt due to my mimetic participation with the breathing sounds is at odds with that felt in response to the clarinet and (to a lesser extent) other instrumental sounds. The intake of breath is larger than would be required to produce these sounds, and is produced in a noisy manner that in a standard classical performance would be unconventional at best. For the trained clarinet-body, to take this breath before producing the surrounding tones would be likely to cause discomfort. Furthermore, the two sounds cannot be temporally mapped onto each other with any degree of precision. Despite the breath sounds acting to direct the instrumental tones, a feeling of bodily slippage occurs in

the interval between. This reverberates within the wider structure of the section which, while not allowing for the types of reading of tonal harmony that Le Guin practices, nevertheless occupies a structural influence within the piece. The lack of connection between cause and effect, or breath and instrumental sound, echoes the feeling I have of not yet knowing where the music is 'going'.

Gesture and the Non-Visual

The held breaths give way to a section in which the clarity of the sound seems to have been lost (0.25 to 0.37). In this section I can feel my ears trying to peel back the distortion in the sound to work out what it may have originally been. There is also a sense of distance – of hearing in a space different to the one I am actually in. I can attempt to 're-create' or imagine the performing bodies from a combination of prior knowledge and the 'affordance' of the sounds I hear; again, a good example is the particular clarinet sounds that, due to the constraints of the human body, do not afford the possibility of having been produced by a performer laying horizontally. However, it is important to avoid overwriting audible bodily presence with the visible absence of the body.

Is it possible to move away from visually-based analyses of the body in sound? Paul Sanden notes that much theorising of recorded music as disembodied sound is based on visual lack. Sanden writes:

> for many musicologists concerned with reconstituting the value of corporeality in accounts of Western music, their arguments about disembodied sound [...] nonetheless revolve around a *lack* of a certain kind of visual information in a given musical experience. In these cases, perception of performing bodies is equated with *seeing* those bodies (or at least with constructing mental images of those bodies) (Sanden, 2009: 17).

In other words, it would be easy to construct an analysis based on a mental image of the sounding body, rather than one that makes the hearing of the body and its actions the central focus. However, both the ecological approach and working with the mimetic hypothesis would seem to subvert this. When I read Fisher and Lochhead's article, particularly their excerpts of scores, as a clarinettist myself I do not imagine seeing another clarinettist play the works, but 'hear' and feel myself playing them, even though I have no instrument to hand. This feeling, a kind of proprioception, is one way in which the signs of the mediated body might be gathered by the listener/analyst. This highlights that there are two modes of identification of the body being heard: for the listener to substitute her own body, to imagine or feel her own body as the sound source; or to have some kind of (perhaps pleasurable) experience of another body through its sounds. Regardless of whether perception of the sounding body could ever be completely aural, with no recourse to a visual image (real or imagined), I would like to follow a course in which the aural is privileged over the visual.

This is a position that Sanden also takes. His analysis of the visual allows him to present a critique of recordings as disembodied. Citing Sterne's argument that technological listening practices were techniques of the body before they became technologies, he suggests that recordings (or 'mediatized music') can offer the listener the opposite: a potentially increased engagement with corporeality (Sanden, 2009: 17). Thus, Sanden separates aural and visual mediating effects of recording technology: 'To assume that sound technologies interrupt the corporeal significance of sounds simply because they remove these sounds from their *visual* sources is thus to ignore corporeally sensitive techniques of listening that have little if anything to do with sight' (Sanden, 2009: 17). Removing the need for a visual element allows more focus to be placed on listening and bodily involvement and, although this is not developed in Sanden's work, is in keeping with tropes of sound as vibration with access to a bodily interior (in contrast with the outward looking of vision).

Sanden draws on work on embodied cognition in music, and phenomenology (Cox 2001, Leman 2008, Mead 1999) – as I have done here (see Chapter 3) – to support a methodological move towards accounting for the performing body and drawing on the listener's prior embodied experiences (which may or may not be musical and related directly to the production of the sound). Furthermore, it is mediatisation that allows the body to come to the fore, albeit in a different manner to that which would be possible in conventionally live performance. The Glenn Gould recordings that Sanden discusses highlight, however unintentionally, the sounds of body movement – for example the creaking of the piano stool – which would not be audible in a concert situation. Such sounds must come to stand in for more visual modes of identifying body movement.

This echoes Susan McClary's thinking on the role of recording technology as mitigating against Western culture's discomfort with the bodily basis of performance. McClary argues that 'the advent of recording has been a Platonic dream come true, for with a disk one can have the pleasure of the sound without the troubling reminder of the bodies producing it' (McClary, 1991:136). As Tracy McMullen has noted, 'such observations highlight the view that recording changes music from an ephemeral and embodied evocation to just another signifier in the play of signification: a disembodied, interchangeable commodity awaiting its turn on the CD player' (McMullen, 2006: 62).

Like Sanden, McMullen argues that music's strength is that it is experienced aurally and is not dependent on sight, allowing for it to disrupt the authority of vision, allowing subversion of visually understood norms (McMullen, 2006: 63). In particular, McMullen points out the role that recording may play in disrupting the possibility of positioning a body as 'Other'. She focuses predominantly on instrumental performance, examining how visual experience positions Othered bodies (particularly gendered or racialised bodies, noting how this supports or opposes cultural expectations), and the way that certain musicians (for example female jazz

players) have used recording as a way of circumventing or avoiding these culturally-conditioned embodied norms and resulting prejudices (McMullen, 2006: 63). There is a point of non-continuation or non-contact, then, between an approach that is founded on aural identification of, and association with, bodies and exploiting the limits of this approach in order to criticise visually experienced norms. I employ this strategy within my analysis of *Ground Techniques*, but there are points at which it wavers and weakens.

Voices, perhaps the most significant sonic marker of gender, recur throughout *Ground Techniques*. While I do not aim to offer a full reading of the vocal parts, the relationship of the voice to the subject, or any analysis of the lyrical content, it seems important to note the role of the voice in acting to mark the bodies performing the work as 'of' particular genders. Furthermore, the body may be expressed through the voice through giving some detail as to the lips, teeth, tongue and throat positions that would be necessary to produce various syllables.

At 0.38 a female voice enters. A blues style held note forms the backdrop for the narrated text; 'you veil your eyes from my light, cover your ears against my words.' The first syllable is also doubled by a male voice, but I am uncertain. In contrast to the relatively 'free' sounding sung note, the speaking voice sounds mechanical or computer-generated, with the emphasis falling strangely.

The sung note outlasts the text, but fades into what sounds like mouth sounds at approximately 0.51. This is followed by strummed guitar chords, and more spoken text, 'you whose brain I try to enter.' Again, the spoken text is underplayed with a sung melismatic note, followed by more spoken text and another melismatic 'you.' These sung phrases and mechanical recited phrases form the basis of a longer section that also features guitar chords. A male voice reinforces certain syllables. Then the spoken voice starts to 'glitch' and become more electronic sounding, the focus of my listening shifts until I hear the rhythmic features of

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the glitching rather than the meaning of the words. The 'natural' voice continues underneath, but begins to sound increasingly frantic. Meanwhile the fragments of male voice sound more and more 'out of breath'. From approximately 2.11 the singing voice starts to sound calmer, and the fragments of male voice appear to be breathing more easily. This section describes an 'arc' of exertion. There seems to be a break with the next section with 2 seconds of silence from 2.16 to 2.18. This is followed by a more melodic section on (out of tune) piano. Again, I feel at a distance from the source of the sound, and sense that the sound is in a more reverberant space than the one I am listening in. At 2.38 the piano sound is overlaid with speech (this time in a foreign language). There is a male voice and one, or possibly two, voices that I hear as female. Where the voice tends towards an electronic timbre it becomes more difficult to assign gender.

To apply McMullen's thinking on this presents both problems and opportunities for an embodied analysis: separation from the 'embodied', live context can bring freedom from normative assumptions within particular areas of cultural practice, yet it may also provide a space for them to be reinscribed. McMullen highlights the difficulty (or even impossibility) of deciding gender from recorded instrumental performance alone, and seeks to present this 'slippage' between disembodiment (from lack of knowledge) as a 'counterhegemonic practice of listening' (McMullen, 2006: 64). She highlights some of the potential pitfalls of tracking the embodiment of musicianly subjects from recordings: 'Although the aurality of recorded music can interrupt hegemonic visual cues, such disruption is often attenuated when stereotypes are simply reinscribed retroactively after discovering the musician's identity. When aurality is understood in terms of its visceral power *in* the body, however, I believe the rewriting of subjectivities can be more radical and abiding' (McMullen, 2006: 68). However, I do not have the possibility here of analysing from the performer's sensuous body, and must make do with the listener's sentient body. McMullen suggests that attending to the physical sensations of

sound also disrupts the primacy of vision: 'Moving within the body, sound complicates our usual vision-based epistemologies and draws attention to our resonating bodies as sites of reconfiguration' (McMullen, 2006: 68). Such a focus is also inherent in Sanden's account, in which a lack of outward, visual focus makes space for an inward focus on the effects of the resonance of sound as material vibration.

Returning to the visceral experience of the instrumental gestures, Meelberg's route to theorising sounds that operate outside of signification is particularly useful. For Meelberg, such affect is not directly generated by the gesture, but by the 'stimulus that motivates the body to process the sounds of this stroke in order to kinaesthetically convert these sounds into gestures' (Meelberg, 2008: 67). It is only when the sound is framed by the body that it becomes able to be recognised and open to becoming gesture; the sonic stroke itself cannot be framed. This fits within the broader project of understanding sounds as material mediation rather than as 'passive in-between' (see Chapter 4), while simultaneously understanding the process whereby these sounds become gestures.

My listening continues to be informed by the perceived bodily actions afforded by what I hear. In the remainder of this section I outline the various (bodily) presences as I hear them in the rest of the piece before considering, in the following section, how these heard gestures and actions might be understood to constitute a subject, or subjects.

The voices at 2.38 lead the transition into the next section with drum patterns and electric guitar beginning around 3.08. I begin to hear a feedback tone around 3.13-3.15. As the cymbals enter I am able to construct a visual image of this as a drum kit. The music is not following a conventional rock or pop beat (despite the instrumentation potentially setting up the expectation that this may happen); on my first few hearings of the piece the drum beat sounds like senseless bashing. There are moments (such as at 3.35) where the drumming almost resolves into a rhythmic and regular beat. These drum patterns seem to be a result of

the improvisatory origin of the material, rather than a result of editing decisions (that is, they do not sound processed) beyond a choice to include this particular material.[37] Around 3.40 the texture becomes dominated by feedback, alongside which the drum texture also becomes denser. The feedback tones sound similar to the high pitched clarinet gestures near the beginning of the piece, more effort is needed to listen to them, but I have no embodied sense of the physical effort required to produce the guitar feedback[38] (or rather, I have a sense of it requiring distinctly less effort as it is the result of machinic, rather than bodily, action). Around 4.45 the feedback sounds gradually lower in pitch and loudness and give way again to the piano.

From around 4.50 the section takes on a 'circus' feel. Someone recites (perhaps through something, as the voice feels unclear and distorted) the rhyme 'the knee bone's connected to the leg bone,' possibly highlighting Luck's drawing on physical processes in the genesis of the work. This continues to be accompanied by the piano, with the harmony moving upwards chromatically. The words are unclear and the singer-speaker has to go through a few phrases before I can make out what is being said, and even then I cannot be certain whether I am filling in words from memory or simply assuming I hear something that may not be the correct text. This ends at approximately 5.32. Between then and 5.30 a group of voices vocalise a rising pitch. I feel a sympathetic rise in tension and pressure as I hear this phrase, as if I were attempting to push my own voice higher and higher. This adds to a feeling of growing tension within this section, only to descend back where it came from into the 'silly' sounding circus style and a repetition of the knee bone – leg bone lyric. The voice here is further distorted and

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[37] Later, after carrying out my initial analysis, my correspondence with Luck revealed that these sounds are not processed beyond editing for clarity: 'There's no treatment of the sounds in section 1 other than general EQ'ing, volume adjustments and panning – all just to make the different sound sources as clear as possible. This is all pretty run-of-the-mill in terms of production' (Luck, personal communication, 10 July 2010).

[38] Anecdotally, other listeners have suggested that this feedback may be the result of a 'no-input' feedback loop, in which feedback is generated within an electronic circuit.

difficult to understand and sounds as though it may be spoken through a kazoo or similar. It is reminiscent of a poorly played brass instrument, fitting in with the circus feel. This is overlaid with a more prominent vocal kissing sound.

Around 5.58 these kissing and squeaking sounds become the dominant focus. Following their initial introduction, however, I am no longer sure that they are all bodily in origin. Some sound as if they are made by plastic or rubber objects. This develops into what sounds like a similar material object being breathed through before a brief pause between 6.27 – 6.35.

A new section begins at 6.35. This opens with the sound of something, perhaps paper, being scrunched up, implying certain actions of the hands. There are instrumental sounds in the background, but these are fragmentary and disjointed. There also appears to be a certain amount of 'ambient' sound, or the sound of the scuffing of the paper sounds like it may be the musicians moving, perhaps the fabric of their clothes rubbing together – reminiscent of the recorded traces that Sanden uses to track embodiment in Glenn Gould's recordings. The instrumental texture becomes denser and the fragments begin to get longer. I wonder if the instrumental sounds are responding to the scrunching sounds in some way. The texture then thins out again around 7.43, before a visceral, unexpected loud sound at 7.47. It is hard to identify the sound; it begins like a foghorn, but as it dies away it has some of the sonic qualities of a scream. The overall shape of the sound resembles a scream but with a less 'human' beginning. This fades into a near-silent moment interspersed with quiet tapping sounds, until 8.16 when I hear what sounds like someone belching.

This is followed by a further section featuring sung vocals. A female voice sings, 'nearly reach the sky and [?].' While I am unable to make out the final words of the phrase, this vocal is much less obscured than previous vocals and is a 'natural', rather than machinic, voice. There are then more belching noises followed by more singing, but this time the words are unintelligible or nonsensical. It would be easy to read this as the mundane functions of a body,

the role of which is later denied in the production of 'beautiful' music, but the temporal arrangement of sounds, as well as the gender associations of their pitch and timbral characteristics, mean that they appear to come from two different vocalist-bodies. There is some shuffling around in the background, but the location in space of the singing voice does not seem to change. Because of the relative loudness and clarity of the two sounds, the belching person seems to be much closer.

The texture between around 9.00 and 9.20 is very sparse. A 'trumpeting' sound in this section is repeated at decreasing temporal intervals. Between there and 10.03 the tapping in the background coalesces into rhythmic figures played on the drum kit. The texture and the tempo gradually build. I have a sense that there is a vocal sound, but this seems to be a vocal sound hybridised with a brass instrument. This and the drum gradually accelerate giving the feeling of becoming more chaotic to around 11.24. From there to the end (11.52) the work becomes quieter and the texture less dense. The feedback sound recurs.

It can be seen from this account of my listening that, even in the (visual) absence of performing bodies, bodily actions and gestures feature strongly in what I hear. They play a key part in shaping my musical understanding. In the following section I consider whether these actions may be heard as constituting a subject, and the extent to which the listening body may experience a relationship with the heard body despite, or even because of, the process of mediation at work.

Hearing the Subject

Of the three works discussed in the case studies, *Ground Techniques* has perhaps the most obvious and simultaneously the most complicated relationship with presence and liveness. It exists only as a recording; there was no live performance of the work as a whole. However, the

final work is dependent on the outcomes of live performance actions to produce its materials in a way that the following two case studies are not. While all three works feature recordings of live events, Luck's piece involved a process of devising the work based on the use of his body as a score. Creating the work in such a way leads to a scenario in which the body becomes a prompt for action. This has implications for how the idea of the 'score' may be understood; rather than a fixed and atemporal object, the score now becomes spatially and temporally diffuse, and inherently performative.

Sanden's alternative definition of liveness is particularly useful here. In this reading liveness is more subtle than the simple absence of electronic mediation: 'liveness [should] be understood as a designation of a trace of that which could be live, even within a mediatized musical context. In any given set of circumstances, this trace may be manifest in a number of ways' (Sanden, 2009: 9). Given this definition, both the bodily sound in *Ground Techniques*, and the instrumental gestures retain some connection with liveness. Of particular importance in Sanden's typology of liveness is 'corporeal liveness': defined as 'liveness invoked by music's connection to an acoustic sounding body, usually that of a human performer' (Sanden, 2009: 9).

As noted earlier, Sanden observes that technologies of mediation may in fact increase the communication of corporeal significance, a point which he eventually uses to trouble the live/recorded binary. Ultimately, he argues that by hearing the corporeality inherent in the sound, we hear the liveness of Gould's performance. However, *Ground Techniques* (and the works discussed in the following chapters) has a much more complicated relationship with the mediatized/liveness debate.

This situation is further complicated due to my analytical goal of building a relationship, through my listening, with the body I hear. Here I would like to draw on the work of Amelia Jones, who discusses the ability to witness a performing body 'second-hand' via its

documentation (Jones, 1997). Jones considers that the problems raised by experiencing performance via its photographic, textual or recorded traces are 'largely logistical rather than ethical or hermeneutic' (Jones, 2007: 11). While the two experiences are different, Jones considers that 'neither has a privileged relationship to the historical "truth" of the performance' (Jones, 2007: 11).

Jones argues that 'there is no possibility of an unmediated relationship to any kind of cultural product, including body art' (Jones, 1997: 12); acknowledging that involvement with the live presence of performance and documentation will embody specific, differing knowledges, Jones argues that one should not be privileged over the other. She suggests that the 'phenomenological relations of flesh-to-flesh engagement' of live performance produces a more intersubjective relationship than that engendered through the viewing of performance documents. The audience member at the live performance may not necessarily have access to a greater degree of knowledge; while she may be in the live presence of the performer this does not confer awareness of the intention of the performance or knowledge about the performer. The viewer of the performance document, on the other hand, is granted the gift of hindsight and an increased potential for knowledge of the sociocultural contexts surrounding the work. In short, body art offers no guarantee of presence, and therefore has no more access to the truth of the subject than the documentation.

The implication of this for my analytical project is that there is much knowledge of bodies (and bodily knowledge) to be gained from the recordings and other associated documentation, such as the CD liner notes, journal articles, and my interviews with the composers. It is of particular importance to note that in presenting a construction of the body or subjectivity through the art work, the possibility for an audience to access the truth of the subject becomes problematical. This is particularly useful observation in this context, as all three works discussed in these case studies contest the idea of an authentic body and holistic

subject. While *Ground Techniques* does not necessarily present or perform an artist's subjectivity in the same manner as the body art performances Jones discusses, it nevertheless presents a re-worked relationship between the creative self of the artist as 'other' in its (literal) incorporation of the body as a score. *Ground Techniques* performs, at best, a composite subjectivity, despite being based on elements of Luck's embodied actions.

Jones discusses Carolee Schneemann's *Interior Scroll* in which the female subject becomes more than the static, objectified body of traditional representational art. Instead, in this work, the body of the artist offers 'a deeply constituted (and never fully coherent) subjectivity in the phenomenological sense, dynamically articulated in relation to others' (Jones, 1997: 13). *Ground Techniques* also presents a 'never fully coherent', fragmented subject. This is both the case if I imagine the subject as constituted by actual performing bodies, the musical materials coalescing to provide some sort of cyborg subjectivity (a hybrid of the performer's subjectivity with its mechanical simulation), or the music itself as representing subjectivity and subject position. For Jones, Schneemann performs an 'oscillatory exchange' between subject and object in the way that she both *makes* and *is* the object, due to her use of the body. She embodies both the traditional female position of static, represented object, and the masculine position of creating (and objectifying) that object. This is tied to claims made about (early) performance art that it is 'the only art form to guarantee the presence of the artist' (Jones, 1997: 13). Music presenting the subjectivity of the performer or composer might be said to occupy a similar dynamic, while the general status of the work concept in music and its connection to the score means that the physical presence of the composer in the performance of the music has been subject to less scholarly attention. It would seem a step too far to argue that Luck is trying to present himself within *Ground Techniques*; nevertheless, through physical action that leads to sound he presents particular modes of embodiment or bodily experiences and processes. Jones rejects the thesis that performance art is about the 'real life' presence of

the artist, and thus allows unmediated access to her (whether as body or as self) (Jones, 1997: 13). She points to the dependence on documents to 'attain symbolic status within the realm of culture' (Jones, 1997: 13), using this to highlight how body performance cannot attain 'full knowledge of the self through bodily proximity.' The body and its performance must be documentable, open to dissemination and preservation in time in order to reach a stage of becoming fully graspable. She returns to Phelan's notion of performance emphasising the body's framing of a lack of being, of performance marking the body as loss. Therefore the performed body of body art relies on 'a receptive context in which the interpreter or viewer may interact with this body,' (Jones, 1997: 14) therefore necessitating an intersubjective exchange between performer and viewer.

In the works I discuss, the moment of bodily action was not intended as the work itself, only as providing sonic materials, but as Fisher and Lochhead have demonstrated, there remains space for an 'intersubjective exchange' between performer and listener. Is what is being performed or highlighted about the body in these works necessarily less accessible via a recording than via actual bodily presence? Arguably, if these works were live performances rather than recordings their particular take on embodiment might disappear into the visibility of the body: it is only in their recorded state, where I do not expect bodily presence, that their very physical origins begin to stand out.

The possibility of re-hearing the 'performance' due to the repeatability of the recording plays a significant role in enabling the construction of a more detailed analysis. However, this also presents problems. As knowledge of the work increases, its bodily framing may differ. Despite this, inserting a need for distance into an analysis that is based initially on pre-linguistic and pre-reflexive bodily experience allows the analysis to take both into account, as long as this use of distance and hindsight (and textual and discursive reflection) is not used to erase its bodily origin, though I find, as a musically trained listener, that as my familiarity with the work

grows, my listening shifts towards understanding the work more in terms of its 'musical'

qualities. However, I need to be explicit and self-conscious about my shifting between modes

of listening, using the possibilities afforded.

In summary, it is possible to hear bodily presence provisionally in a number of ways in

Ground Techniques. The voice is perhaps the most problematic of these. The first voice heard

has a mechanical, perhaps computer-generated sound and does not seem to originate in an

organic body. Yet it is superimposed with a singing voice that sounds 'natural'. This is

reminiscent of McCartney's cyborg reading of Westerkamp's piece (as discussed in Chapter 2)

– the juxtaposition of the 'natural', or organic, with the mechanical.

Just as Le Guin's analysis allows her to experience differences and similarities between the

composer's embodiment and her own, as I listen I experience differences between the

performer's embodied experience and my own. As Andrew Mead's anecdote shows, the

identification with breathing along is a strong feeling that may become particularly

uncomfortable when my physical actions and capabilities do not match those of the

performing body I hear.

In this chapter I have proposed a performative mode of analysis that echoes, and is able to

account for, the performative nature of the *Ground Techniques*. Due to its reliance on bodily

action to determine musical outcomes, this work cannot exist as a fixed, atemporal object. The

piece is founded on performers carrying out actions that they must understand by listening to,

or watching, Luck's body and the actions he carries out. Aural traces of these actions become

the basis for analysis. The analysis attempts to identify the physical gestures that led to sound

creation and reads these in conjunction with sensual or affective responses to the music. The

past, embodied experience of the analyst is drawn on to support this. The possibilities for

engaging with the heard body are considered, as is the possibility for engaging with the

multiple subjectivities embodied within the work, something that is explored further in the

following two chapters.

The current chapter also begins to consider the way in which experiencing the work as a recording shapes and delimits analytical possibilities, both in terms of the fixed and repeatable nature of the music, and in terms of the visual absence of the performing body. While proposing a way of engaging with the body without becoming reliant on its visual presence, the methodological tools of this chapter do not explicitly deal with the processes of mediation at work within *Ground Techniques* beyond the basic level of the sound being split from its original source. The transformative potential of practices of technological mediation are discussed in more detail in Chapters 7 and 8.

7. A Chance to Cut is a Chance to Cure

In this chapter I consider how elements of the methodological concerns proposed so far might be developed in an 'embodied analysis' of the Matmos album *A Chance to Cut is a Chance to Cure* (2001). The experimental electronic duo, known for their idiosyncratic use of samples, has been described as 'digital-age surrealists' (Alternative Press, quoted in Matador Records, n.d.). The idiosyncratic samples featured on *A Chance to Cut is a Chance to Cure* include an extensive array of sounds from medical procedures, and the album and track names point the listener toward understanding the sounds in relation to this context (see figure 3 for a full track listing). This chapter begins with considering the embodied listening or subject positions that the listener is able to inhabit and how these relate to aesthetic and historical ideas about medical listening. I then move on to consider the material practices behind the composition of the work (the digital editing of sound) in light of Bernadette Wegenstein's writing on the body in new media and Mark Hansen's ideas about the involvement of the perceiving body in framing the digital. In addition to this 'embodied analysis', which takes the listening body as its centre-point, this chapter also considers existing literature on *A Chance to Cut is A Chance to Cure*. I explore ideas of cutting and splicing sound and the body and consider the agency of the surgical patient, medical discourse and its practitioners against that of the listening body (especially as it coincides with the active, affect-producing body as proposed by Hansen).

As I begin listening to *A Chance to Cut is a Chance to Cure*, it is difficult not to hear the 'squelching' sounds as bodily. Reviews inform me that the album features the sounds of cosmetic surgery, audiological testing and laser eye surgery. Closer inspection of the liner notes reveals further information, including the 'instrumentation' of each track,

[Figure has been removed due to copyright restrictions]

Figure 4 : Track listing and 'instrumentation' for *A Chance to Cut is a Chance to Cure*

providing some surprisingly precise details about the medical equipment used, and a dedication: 'Dedicated to our fathers: Dr. Werner Felix Schmidt and Dr. Rollin Kimball Daniel'.

The duo's decision to record their own sounds rather than buy pre-recorded sounds or sample pre-existing music is perhaps significant. However, not all the sounds are of medical procedures: mixed in are 'conventional' musical instrumental sounds, speech and the sounds of water being sucked through a straw; it seems likely that the composers intended the latter to be heard as 'slurpy', perhaps as a more-real-than-real imitation of the sounds of liposuction.

Traditions of medical science form a central theme in A *Chance to Cut is a Chance to Cure*, with the duo professing a focus on the objects of medical knowledge, whether bodily or not: 'Our album was about "the sounds of medical technology", conceived in the broadest possible way. This meant, for us, that any object that is used to create medical knowledge is fair game: skulls, human blood, the bodies of rats and the cages used to restrict their movement are all part of medical experimentation, so they were used. We used non-Western medical equipment utilized in acupuncture, and we used the sounds of procedures like LASIK too' (Daniel, personal communication, 6 July 2011).

However, the use of the sound samples leads to a situation in which this positing of the body as an object of knowledge is problematised, as I will demonstrate throughout this chapter. Furthermore, this use of samples (and their relationship to bodies, composers, listeners) makes tracing subjectivities extremely difficult, as Tara Rodgers writes: 'especially in

the work of artists who do not use previously recorded music as the foundation of their compositions, it can become extremely difficult to unpack the layers of agency and subjectivity within the 'community' of performances that constitutes a sample' (Rodgers, 2003: 318).

How might these 'layers of agency and subjectivity' be uncovered? I begin by suggesting how this might take place for the listener, examining how the listening experience coincides, but does not exactly overlap with, subjectivities of listening provided by the medical perspective.

Medical Listening and Subject Position

Listening to the CD, at various points I shift from experiencing a tense feeling of anticipation at the thought that it might be my body being cut, to a no less squeamish but slightly less physical response to the idea that I could be hearing from the position of the surgeon the sounds to be produced; to a musicalised experience, almost devoid of reference to the sounds' extra-musical meaning, in which I feel I could tap along to the beat. How can I account for this and draw it into my analysis?

In the examples below I adopt different subject positions in relation to my listening. These are largely determined by what I hear in the musical materials. As was discussed in Chapter 5 the adoption of these subject positions may be theorised from a number of directions, from the socio-historical and psychoanalytical approach as exemplified by Kramer through to the approaches based on ecological psychology put forward by Clarke and Windsor. In the former the listener negotiates her own subject formation in relation to a subjectivity heard in the music, which Kramer posits as the big Other. The ecological model, on the other hand, offers an account of how this may come about insofar as it considers perception to be circumscribed by the material properties of its object, therefore 'specifying' a mode of interaction rather

than presenting a representational model of subjectivity. This is closely related to theories

such as Cox's mimetic hypothesis, in which sound may have particular gestural affordances

(Godøy, 2010), which can 'transport' the listener into identifiying with the making of that

sound. The subject positions I cover in this chapter include those influenced by medical

listening (including listening positions that are broadly identified with those of doctor and

patient). Alongside this are listening positions that may be more strongly characterised as

those of an outside observer; myself as analyst. However, due to the analytical method being

explored here, the space of the body frequently reasserts itself as a meeting place for the body

as acted on, and the active, perceiving body.

Crucial to my experience of the work is the role of recording and sound reproduction

technology. A historical account of such technologies has been provided by Jonathan Sterne

(Sterne, 2003). Central to Sterne's argument is the idea of listening as a technique

(terminology he derives from Mauss's techniques of the body); he considers *technologies* of

listening to emerge from particular *techniques* of listening (Sterne, 2003: 92). Sterne's concept

of 'audile technique' highlights common 'orientations' between medicine, telegraphy and

other sound reproduction technologies. These comprise: listening as a technical skill; listening

as discrete activity, separated from the other senses; listening as the transformation of

acoustic space; listening as a means of extracting meaning; and listening as 'based in and

described through a language of mediation' (Sterne, 2003: 93-4). Attainment of these listening

techniques – whether by physicians or telegraphers – granted symbolic currency and

distinction: 'both doctors and sound telegraphers used representations of listening as part of

their professional mystique' (Sterne, 2003: 94).

While much has been written about the gaze in objectifying the body, for Sterne, listening

– particularly a specific technique of listening – was a precursor to this:

> If medicine was one of the first sites where the conceptual tools of rationality and empiricism were combined with techniques of investigation to make the human body an object of knowledge, then it turns out that a technique of listening was instrumental to reconstructing the living body as an object of knowledge. Listening was one of the central modalities through which modern medical ways of knowing were developed and enacted. Before the insides of living human bodies could be subjected to the modern gaze, they were subjected to physicians' techniques of listening. (Sterne, 2003: 99)

The level and clarity of the sampled sounds gives the impression of bodily proximity. The apparent transparency of the medium facilitates a particular orientation in my listening. As a listener I am allowed access to a space where access is normally forbidden or institutionalised; the interior of the body is normally closed off to all except the subject individual, and access to it via surgery is highly regulated. Additionally, access to the hospital space in which the surgery takes place is likely to be restricted. The increased access is granted to the individual physicians operating the technology, but is also mediated by the technologies themselves. Added to this is another layer of access and mediation: Matmos's presence at the (normally closed) cosmetic surgery procedures, and the mediation caused by sound recording and reproduction technologies.

I hear these surgery sounds as occupying a space. They are often in the foreground of the tracks, despite being abstracted and musicalised. In *A Chance to Cut is a Chance to Cure*, individual samples are presented in place of more conventional musical sounds; for example, the squelching sounds may be positioned within a musical figure that a listener would normally expect to be played on a drum kit, or via synthesized sounds which imitate this. This presenting of the samples within the overall musical texture affects the way in which I listen, causing me to shift perspectives between listening to the sounds in terms of their origins and their relationship to the body, and listening to the sounds as part of a relatively conventional dance music texture, in which their bodily association is somewhat different. This creates a contradiction, or tension, in the available subject positions. If some of these sounds were

being heard for medical purposes they would be the focus of attention, not for the qualities of

the sounds as sounds but for what they might signify – or the diagnoses they might allow. The

'instrumentation' of the tracks positions this body as being located within a relatively small

space (there are few sounds that sound 'distant'), but this musical space is not coterminous

with the space of the operating theatre – there are items present that would not be allowed

(for example, musical instruments – though there are anecdotes of surgeons listening to music

while they work[39]). The listener is positioned in an unlikely space. I experience this particularly

strongly when listening to track 7, 'california rhinoplasty'. A recurring motif in this track is the

gradual transformation of the beeping of medical instruments into musical patterns that would

not feel out of place in any number of electronica tracks. Also prominent in the track are

repeated melodic figures played on the nose flute. The track mixes sounds that are highly

unlikely to be heard together in the real spaces they are associated with, and creates fictional

spaces that gradually fade into each other (i.e. slipping from hospital to nightclub). This

strategy of taking a sound and presenting it as relatively unprocessed – still tied to its 'real

world' origin or connotations – and gradually altering it so that it is heard for its musical

qualities is used throughout *A Chance to Cut is a Chance to Cure*.

Does the placing of the subject position remain stable within this space, or are multiple

listening positions available? Is this subject still, or is it sometimes in motion? What are the

implications of offering a listening position that is fixed in space? Like the body being operated

on, the listening body or subject position is only able to shift its position when the person

wielding the scalpel (or digital editing tool) determines it may do so. Instead of being able to

experience the gradual changes that would be associated with 'natural' physical movement of

the listener in relation to the sound source, the subject position comprises a series of spliced

together listening locations, a montage. The fragmentation of the body is matched by the

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[39]   See, for example, Jon Henley's 'Music for Surgery,' (2011).

fragmentation of experience in the available subject positions.

Despite the notional bodily proximity offered by the clarity of the sounds, the music does not offer an air of intimacy. The medical origins of the sounds go some way towards explaining this; the musical surface mimics the professional distance between doctor and patient. The historical development of stethoscope listening, or mediate auscultation, formed the basis of what Sterne terms 'audile technique'. *Mediate* auscultation offered a number of potential benefits over *immediate* auscultation (in which the ear was placed directly on the patient's body): stopping other parts of the physician's body (especially the face) conducting sound and thus introducing errors in diagnosis; allowing the ear to reach areas of the body that it would not otherwise have access to, due to either physical or social constraints; minimising extraneous sounds, particularly those caused by the physician's contact with the patient; and altering auditory space in order to emphasise certain sounds or make them clearer (Sterne, 2003: 106-7).[40]

Audile technique plays a role in determining some of the available subject positions. As Sterne notes: 'audile diagnosis shifted from a basis in intersubjective speech between doctor and patient to the objectification of the patient's sounds—in mediate auscultation patient's voices existed in relation to other sounds made by their bodies, rather than in a privileged relation to them. Speaking patients with mute bodies gave way to increasingly silent patients with sounding bodies. This marks a significant shift in medical epistemology and heralds the rising importance of physiology in medical knowledge' (Sterne, 2003: 117). The development of diagnosis by hearing allows the listener to occupy a position of seeker-of-knowledge in relation to a body-as-object. But to what extent can a listener who lacks medical training really occupy this position, and is it even possible in the absence of the corporeal body and the medical listening device? Is this not, in fact, more likely to make the listener occupy or identify

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[40]   See also Nicolson (2004), Kassler (1990) and Rice (2008) on the development and role of auscultation.

with the position of the *listened to* body, something she is more likely to have experienced? Additionally, *A Chance to Cut is a Chance to Cure* does not always reproduce or imitate stethoscope listening despite the fact that the listener may still employ audile technique. While this 'technique' of listening is still referenced in the production of the work, the sounds used are – from a medical, rather than musical, point of view – by-products: they confer no diagnostic information (with the exception of track 3, in which the sounds of audiological testing are not bodily in themselves, but are meant to elicit information that may be used for diagnostic purposes).

One might then be drawn to occupy the subject position of the body undergoing cosmetic surgery. However, this too is problematic. The body from which these (bodily) sounds originate is, presumably, unconscious and anaesthetised. The listening body must act as stand in. So it would seem that the range of subject positions (whose subjectivities the music might communicate) notably exclude one figure: the subject whose body is subject to the cosmetic procedures. While the listener might also hear the standard subject positions associated with music: those of the composer (the assumption that we are invited to share a way of hearing these sounds with the album's creators, who selected and arranged them into musical form) and the instrumental performers who feature on some of the tracks. Is the listener invited to occupy a position inside the body being operated on? To hear a sound that I could associate with pain is to experience a visceral, embodied response. The music and surrounding narratives (from the CD cover to reviews and academic articles) prompt me to imagine the scalpel cutting my skin and the pain that would result – a pain that the body undergoing the procedure does not feel, at least not at the time the cut is being made. Again there is tension in understanding this as the music offering agency through a 'virtual' subject position.

Interestingly, track 5, 'for felix (and all the rats)', does not derive any of its sounds from the body, but it is one of the tracks to which I have the strongest, or most noticeable, physical

response. At points in the track there is a sound that is reminiscent of finger nails scraping down a blackboard, and I experience this cringing sensation that is so often associated with that sound (most strongly at around 5.48). Rather than allowing me to occupy a 'virtual' subject position, this sound turns my attention back towards my own body and the discomfort I feel. Similarly my experience of listening to track 3, 'spondee', reminds me of my own physiology, though in a more complex and less visceral way. As I hear the series of rising sine tones (presumably those produced for testing hearing aids, as mentioned in the liner notes) I strain my ears to follow them. The tones seem to disappear, but I am unaware whether this is because they are no longer present in the track or whether they have risen above audible frequency. As the upper range of hearing varies slightly from individual to individual this makes my 'hearing' of this track particular (though not unique) to me.[41] This inability to hear any sounds that may be present above this point may be a weakness of my model of embodied analysis, but it may also be a strength insofar as it can draw on this particularity; it exposes what has been referred to by Haraway and other feminist writers as the 'situatedness' of knowledge. There are also two further modes of listening at play in this situated hearing. The first is analytical – I am required to hear everything in the track in order to offer a complete account that is sufficiently rigorous within the academic context I am working in. Secondly, there is what I might call my musical listening, influenced by the specifics of my background as a musician more familiar with some musical practices than others, and perhaps inclined to render a series of rising pitches more 'meaningful' than many other sounds on the recording.

Additionally significant in terms of the range of listening positions is the fact that many of the sounds used are produced by medical equipment and not specifically listened for by the physician. In the development of medical listening techniques, such sounds were not only not attended to, but were consciously blocked out as part of a process of sonic framing that arose

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[41] This will also be affected by the constraints of the medium and of the playback system, which may not extend to the thresholds of human hearing.

with mediate auscultation: 'In addition to separating hearing from the other senses, mediate auscultation demanded a particular kind of framing of sound. It put a frame around some of the sounds audible through the stethoscope, rendering some sounds as interior and others as exterior noise. Only sounds inside the frame were to be analyzed or considered for diagnosis. The sounds of the apparatus itself, and the other sounds accompanying auscultation were to be ignored' (Sterne, 2003: 111). Much of *A Chance to Cut is a Chance to Cure* foregrounds these extraneous sounds, drawing attention to their musical qualities. Here the duo are no longer playing with the idea of the stethoscope as frame, but putting that framing into question in order to interrogate notions of interior and exterior, exploring what is interior and exterior to the body in which the sounds originate and for the body in which they resonate: that of the listener. This emphasises the fact that although the stethoscope is an instrument of rationality and empiricism, it nevertheless transfers, through its earpiece(s), sound to the acoustic space of the physician's head. As Sterne has described, this audile technique later influenced other forms and contexts of listening – including headphone listening.

From Stethoscope Listening to Headphone Listening

Due to working in a shared office space, I find myself carrying out much of this analysis by listening to the recording through headphones. This causes me to hear many of the sounds of the tracks as located within the space of my head. This phenomenon has been discussed by sound artist Charles Stankievech in his article 'From Stethoscopes to Headphones: An Acoustic Spatialization of Subjectivity' (2007). Stankievech draws on Sterne's work and uses a phenomenological method to explore 'the role of headphones in shaping our acoustic perception of the world and the resulting spatial organization of our subjectivity' (Stankievech, 2007: 55). Stankievech positions the interiority of headphone listening within developments in

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neuroscience and philosophy, coming to consider interiority as topological concept.

Stankievech writes: 'A modern technological prosthetic, headphones are quite literally a bracketing of the world for a precise analysis of sound, allowing for a focused investigation into a "phenomenology of interiority"' (Stankievech, 2007: 55). Headphones continue a technique of listening that started with the stethoscope, but present further layers to unravel in tracking interior sounds: 'First, we can determine the difference between *listening to* an interior space of the body and *creating* an interior space in the body' (Stankievech, 2007: 56); whereas stethoscopes facilitated the former, headphones allow the latter. Stethoscopes were also implicated in the creation of an internal listening space:

> The binaural stethoscope provided the first means of "inhead" acoustic imaging. I refer not to listening to the interior of the patient's body (which is actually the old practice of auscultation, dating back to Hippocrates) but rather to the reconstruction of the doctor's psychological image of his own body and his resulting consciousness. With the use of the binaural stethoscope (and subsequently with headphones) a sound field can be virtually located within the head. More accurately, *space is created within the mass of the body where sound masses float in an impossible space*. (Stankievech, 2007: 56)

In this individuated body of the subject is the shadow of another. The interior space of the patient's body is mapped onto that of the physician's body, but not directly: for example, the (patient's) heart chamber comes to coincide with the (doctor's) cranial cavity. This causes an overlapping of the two different 'interiorities', and 'in this newly created space organs float in the abyss dissected by auditory exploration' (Stankievech, 2007: 56).

Stankievech reads the act of listening to bodily sounds via a stethoscope as transferring the space of the body to the interior space of the head: 'We can read Linda Montano's *Heart Murmur* as a performative example of this transposition of interior space. In 1975, the American performance artist taped a stethoscope to her heart for 3 days. As much self-reflection as remapping, *Heart Murmur* is perhaps a play on the phrase "hole in the head." For Montano, the head is emptied, or rather the space between the ears is pounded out to create

a space for another interior space: the heart. One organ is remapped onto another organ, one instrument onto another, one space into another space' (Stankievech, 2007: 56). Underlying this, though, is the question of whether experiencing these sounds as located in the head is reliant on previous experience of producing these sounds as an embodied subject.

I listen to track 4, 'ur tchun tan tse qi', using headphones, and in doing so I have a much better awareness of the spatialisation of the sounds. I can hear sounds as originating more clearly to the left or the right. The sound is located with reference to the location of my body in space. Perhaps I have the volume turned too high, but certain sounds seem to stay on the surface of my ears, skimming round. I hear a hollow 'knocking' sound that seems to resonate in my head, which, like in Stankievech's example, suddenly seems that it must be hollow in order to produce such resonance. A held tone towards the end of the track (approximately 4.18-4.24) does not 'match' in both ears, refusing to die away equally on both sides, and there is a loss of balance in the sound that I try to fix by shifting my head slightly. However, unlike the majority of the works Stankievech discusses, *A Chance to Cut is a Chance to Cure* is not primarily designed for headphone listening – headphones may be used for convenience or privacy, but they are not an integral part of the artistic formation of the work. The use of headphones contributes significantly to the nature of my embodied experience and so I am impelled to note the impact of listening in this way. Nevertheless, the use of headphones is not integral to the experience of *A Chance to Cut is a Chance to Cure*, and listening without headphones, while different, would be equally valid.

Cut and Splice

The title of the work encourages me to understand it in a particular way, and yet this is ambiguous, potentially referring to either the cutting and subsequent improvement of the

body, or the cutting and reassembling of sound, as can be seen in Daniel's comments about the urge to make sounds 'quantized, tight, [and] on [the] beat.' The role of the cutting of the body in *A Chance to Cut is a Chance to Cure* is paralleled by the role of the cut in electroacoustic music. However, there are two divergent ways in which this cut may be understood, revealing an inherent tension. Prior to the cut that allows Matmos's particular brand of electronic music to become tight and 'on the beat' is another cut; the cut that removes sound from source. For Chion, with particular reference to Pierre Schaeffer's practice, electroacoustic music is 'music founded on the cutting' (quoted in Garcia, 2000: 18). It is significant to note that this is not just a cutting up, but a separation. For Chion, then, this separation causes a loss of unity which he likens to a wound. However, in the history of electroacoustic music the practicalities of cutting tape to edit sound have influenced aesthetics, the traces of which are still felt in Daniel's description of Matmos's work. Philosophies of splicing prized the silent cut, in which the two ends of the tape were cut cleanly and spliced in such a way that there was no audible 'pop' when the tape was played (Holmes, 2002: 79).

A Chance to Cut is a Chance to Cure can be understood as playing with these notions of the change between analogue and digital materialities and practices – the use of digital editing is acknowledged on each track, while, as Toop notes, the image of the scalpel on the cover references not just the origin of the sampled sounds, but also a tradition of sound editing:

> Despite its alleged origins in the excrescent fat of California's surgical reinvention laboratories, *A Chance to Cut is a Chance to Cure* is a lyrical, if viscous, exploration of the ways in which compositional narrative can be dissected and reconstructed into unpredictable sequences of barely related material through computer surgery. In the days of analogue tape, the scalpel blade shown on the front cover would once have served as the tool with which precise edits could be cut into magnetic audio tape. Now these edits are made with the computer cursor, often clicking on the visual representation of a pair of scissors: the scalpel returns to its original job of cutting into the human body, a (sharp) reminder of solid objects and penetrable surfaces in the increasingly virtual world of audio production. (Toop, 2004: 224-5)

The cutting of tape to edit music has shifted in favour of digital editing, and with it the physical involvement of those putting together the work has changed. For Greg Hainge, tape 'allows the composer to work directly on the matter of which his art is forged – sound – without a visual interface (such as that which is integral to computer music composition) interfering with or "colouring" the sound with a sensibility that ultimately has nothing to do with the specificity of the medium in which the composer is working' (Hainge, 2007: 3-4). Additionally, whereas with the tape there was little visual information about the sounds, the computer and digital editing returns a visual element to the composition process. However, Hainge is perhaps erroneous in positing computer editing as an immaterial opposition to tape. Both media require physical interaction and a certain level of physical skill. Nonetheless, as Tara Rodgers points out with reference to the move from hardware to software samplers, changes in technology impact the range of working practices that are available to musicians, for example, offering a less tactile approach to composition, or changing the way in which tactility is deployed (see Rodgers, 2003: 314). The sampler itself also changes in its relationship to other studio tools: 'with the increasing convergence of tools in software studios, as well as with synthesizer manufacturers' continual development of multi-functional hardware instruments, it is often difficult to isolate the sampler as a discrete object in the studio' (Rodgers, 2003: 314). Rodgers also points out that, despite these technological developments, the editing of samples remains 'one of the most time-consuming (and thus, central) aspects of electronic music production' (Rodgers, 2003: 314). Samples may be edited and extensively refined before being placed into the final composition. This is in keeping with the work processes that went into the creation of *A Chance to Cut is a Chance to Cure*:

> we do research to acquire objects, make connections, and get to know
> people who can put us in touch with the sounds, objects, places or actions
> that will generate raw field recordings. We take those home to our studio
> and we digitize them, chop them up into sampled kits of percussive noises,
> build those into tiny riffs and patterns, then we play different objects along

with the patterns (like a "solo" played by bowing a human skull with a violin bow, for example). Then we play instruments (both synthesizers and acoustic instruments) which seem appropriate as supplements to the raw musique concrète noises of the objects and the sampled riffs. Gradually, songs emerge, and genres emerge. Every song for us is different. We never start with a commitment to a particular style – we wait for the tone, grain, tempo of a strong cluster of sampled noises from actions or objects (such as the sucking rhythm of liposuction or the tone of a beep from a surgical operation) to assert itself. Our song forms like a pearl around a bit of sampled grit that sticks out from what we have gathered (Daniel, personal communication, 7 July 2011)

This attention to the grain of the sound is significant. The 'grain' of an individual sample sits within a larger texture comprising compositional decisions surrounding the putting together of these smaller fragments, a process which might also be considered as giving the music 'grain'. Rodgers has argued – borrowing from Barthes – that 'the "grain" of a sample might be thought of literally as the producer's "body in the music" – the audible result of decisions regarding sound design made during the recording process and embodied in musical gesture' (Rodgers, 2003: 317). She argues that the grain of the sample, 'reveals the tactility and pleasurability of the recording process, and, in the case of much groove-based electronic music, it often reflects a producer's attempt to create a texturally nuanced sound that will elicit physical response from a dancefloor' (Rodgers, 2003: 317). The samples in *A Chance to Cut is a Chance to Cure* fit within a pattern of other sounds, both synthesized and instrumental, to provide musical impetus. The point at which physicality is emphasised changes subtly, belying a shift from creation to reception.

To what extent does this cutting and reassembling of musical materials inform the embodied experience of the listener? How does the listener respond to the 'grain'? Greg Hainge compares a bodily experience of film to that of musique concrète,[42] finding precedent

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[42] Hainge draws on an anecdote in which an observer of Grandieux's film *Sombre* (1999) experienced a physical sensation of falling. This bodily response to what is seen, in which the viewer experiences sensations as though she were in the film scenario, shares a number of similarities to the physical response to music that Cox attempts to explain through his mimetic hypothesis.

for this in the naming of the genre itself: 'if Schaeffer qualified his music with this adjective, it is also because the effect produced by this music was experienced as a bodily, sensual (as opposed to emotive) event whose transmission to the listener was direct and material as opposed to cerebral and abstract' (Hainge, 2007: 3). This might seem to contradict Shaeffer's assertion that the sounds of musique concrète should be considered without reference to their source, but this approach to listening is part of the reason for their bodily resonance in Hainge's view. For Hainge, the idea that 'i) the body is everything, and ii) the story is nothing' (Hainge, 2007: 8) might apply equally to either art form: 'the "back story" or origins of Schaeffer's sounds is immaterial, it is only in their material realization and effect on perception that they come to be musically significant' (Hainge, 2007: 23). This shares similarities with my experience of listening to the Matmos tracks, particularly my mimetic participation with some of the sound materials. The particularly rhythmic nature of much of the album also elicits a bodily resonance, if one that is somewhat different to that described by Hainge. Contrary to Hainge's theory I find that it is the combination of sounds with and without their 'back story', and the ability to shift between listening in both ways, that adds to my embodied experience.

Hainge also argues that in musique concrète material precedes structure, acting as the starting point for the work. For this reason, along with the necessity of the physical manipulation and cutting of the tape, Hainge considers musique concrète to be *more material* than other musics (Hainge, 2007: 3). In the Matmos tracks – in certain instances of my listening, at least – sound has become once again subservient to form, with the concrete sounds being positioned within a more conventional musical structure, taking the place of (and alongside) traditional instruments.

Any reading of *A Chance to Cut is a Chance to Cure* will be heavily influenced by how it is considered in relation to genre. Understood from the perspective of musique concrète, the sounds become disassociated from their origin. But understood within 'traditions' of popular

music and sampling practices (whose musical forms Matmos seem to draw on) the use of bodily sounds can be understood differently, and sounds can be 'read' in terms of both their origin and their wider cultural connotations.[43] However, samples may be used without reference to their origins, as sound without reference, or 'extremely aestheticised bits of sound' (Taylor, 2001: 150). I suggest that *A Chance to Cut is a Chance to Cure* occupies a contradictory position within these two poles: the sounds are – to some extent – meant to be identified as having bodily origins (or misidentified in the case of the straw and water), but they are also arranged within a musical structure that renders their origin somewhat ambiguous and liable to get lost in abstract listening. This is reflected in my listening: the more I listen, the more I hear the musical qualities of the sounds unless I make a conscious effort to listen for their source.

Does this, then, imply a tendency towards a disembodied practice? I would argue instead that there is a shift towards an emphasis on materiality. The use of sampled sounds in *A Chance to Cut is a Chance to Cure* is best understood less as a process of disembodiment than as a shift between multiple materialities: the materiality of the bodies from which the sounds originate, the 'materiality' of the digital editing process, the materiality of the body that comes to hear the finished work. Below I return to questions of how the materiality of the listening body might come into play through a close reading of the opening of the first track from the album, 'lipostudio (and so on)'.

Reconfiguring the Subject

Much writing on cosmetic surgery is concerned with its role in creating or reconfiguring the subject. Following Foucault, Sander Gilman understands aesthetic cosmetic surgery as

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[43]   Sampling itself draws, among others, on the traditions of musique concrète (see Rodgers, 2003: 313).

foregrounding the body as artificial or a simulacrum (Gilman, 1999); such surgery is no longer

simply a 'cure' in the medical sense. The current prevalence of cosmetic surgery and body

modification can be read as part of a wider trend of technologised body-based practices that

are often wrapped in discourses of beauty and health. Surgical practices play a role in the

inscription of an embodied sense of self, acting as mediation between the body and self (Doyle

and Roen, 2008: 5). Cosmetic surgery therefore contributes to the negotiation of embodied

subjectivity. However, this is not a neutral process: surgical discourses and practices may also

re-enact power relationships and operate in the production of normative and non-normative

bodies (Doyle and Roen, 2008: 5).

Rodgers has proposed this as a theme within *A Chance to Cut is a Chance to Cure*, finding

conceptual linkage between the power relationships inherent in cosmetic surgery and the

musical practices that Matmos employ:

> The precision of Matmos's beat programming, particularly in 'l. a. s. i. k.'
> and in the opening minutes of 'California Rhinoplasty', creates an
> atmosphere of high-tech efficiency and provides a musical parallel to the
> precision of surgery. But there is an uncomfortable disconnect between
> perceived violative acts of surgery and the catchy rhythms and melodies of
> Matmos's music. While the 'sampled' patients likely consented to use of
> noises from their surgeries, Matmos's extensive digital tweaking of these
> samples essentially reproduces, in the music studio, the power dynamic
> between surgeon and patient – whereby sonoric 'bodies' are reconfigured
> by the electronic music producer. (Rodgers, 2003: 319)[44]

If the 'cut' of the title refers to the cutting of the body and the editing of sound, then the use

of 'cure' in the naming of the work similarly applies to both bodies and sounds. Daniel also

finds parallels between the impetus toward cosmetic surgery, with the aim of 'improving'

physical appearance, and digital editing as a process of composition: 'In a broader way, you

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[44]   In making the work the duo were well aware of role of cosmetic surgery in discourses surrounding
beauty, as well as the perceptions towards those who had undertaken cosmetic surgery. Drew Daniel
told me: 'The sounds of cosmetic surgery were [an important] source for that album […]. They are
associated with many easy and cheap satirical targets (people love to feel superior to other people)
and we didn't want to just simplistically mock any and every person who ever had cosmetic surgery,
though we aren't going to whitewash the racial politics of beauty either' (Daniel, personal
communication, 7 July, 2011).

could say that the perfectionist impulse behind electronic music is rather like a perfectionist impulse behind cosmetic surgery itself. The urge to make things smooth, tight, glossy and "beautiful" is rather like the urge to make things quantized, tight, on beat, full, "warm" and harmonious in electronic music practice' (Daniel, personal communication, 7 July 2011).

However, the bodies represented in *A Chance to Cut is a Chance to Cure* are never presented as 'whole', or tight or glossy; they remain trapped in a state of openness, subject to the possibility of multiple revisions. Reminiscent of presentations of the body in numerous body art performances, these sonic bodies are in a state of constant revision, trying to unite a particular vision of the flesh with an unreachable self and ungraspable subjectivity. The subject is here decentred and fragmented, always in the process of being sewn together by an outside force. Unlike in Wegenstein's formulation of the postmodern subject of body art (Wegenstein, 2006: 62), this subject is not questioning, but rather is mute and objectified.

Running parallel to this is the role played by developments in sound technologies, and especially the discourse surrounding the splitting of sound production and hearing from the body. Compare the above account of the fragmented subject with Sterne's critique of the notion of the acousmatic or schizophonic, wherein: 'at some time prior to the invention of sound-reproduction technologies, the body was whole, undamaged, and phenomenologically coherent. By extension, this is to argue that all modern life is disorienting, that the only subject that is whole or at peace with itself is one that is not mediated or fragmented by technology' (Sterne, 2003: 21). *A Chance to Cut is a Chance to Cure* highlights the lack of a unified sonic subject at the same time as positioning sound as able to implicate the body. Similar bodily fragmentation within new media artworks has also been influential in relation to discourses surrounding the body and associated subjectivities. The body becomes both subject and object; to borrow Amelia Jones's terminology it becomes a hymenal body/self, reversible between two poles.

The 'subjects' presented in *A Chance to Cut is a Chance to Cure* are often represented only by a fragment of the body, a focus on the sound (itself used as representation) of a particular organ. In this way part of the body can come to stand in for the holistic body concept and also mark out an individual subject. As Wegenstein reminds us: 'Once the denizens of a dark continent of highly specialized medical knowledge, organs, tissues, cells, and blood have recently come into circulation as markers of individual and group identity' (Wegenstein, 2006: 79). For Wegenstein this is how body-related discourse has 'gotten increasingly *under the skin*' (Wegenstein, 2006: 79); the subject is no longer described or determined by the borders of its skin. In a neat reversal of Deleuze and Guattari's 'Body Without Organs', Wegenstein argues that body discourse has now resulted in 'an organ without a body, or […] an organ instead of a body' (Wegenstein, 2006: 80). To an extent, this is what *A Chance to Cut is a Chance to Cure* offers up for consumption – the interior of the body made exterior, a subject revealed through the cutting of the skin to what lies inside.

Technology is crucial to the construction of the body in this work, as is often the case in performances that 'break down the distinctions between a body's interiority and exteriority, between a being in the body and a distance to the body' (Wegenstein, 2006: 67). What follows from this, for Wegenstein, is a lack of a 'graspable subjectivity' brought about by the 'body-in-pieces' being subject and object at the same time as it is trying to "see" itself as objectified' (Wegenstein, 2006: 67). However, crucial to Wegenstein's argument is the phenomenological position she occupies here, drawing on Merleau-Ponty to suggest that the "seeing" creates a distance, which in turn leads to objectification (Wegenstein, 2006: 67).

In shifting this theory back towards listening, this distance is diminished. Following on from the techno-phenomenological readings of Evens (and to an extent, Hansen) and building on work from the previous chapter in which I suggested a move away from the visual as a marker of presence, it can be argued that there are a number of ways in which listening and seeing

differ in their relationship to the object. Whether the point of contact between listener and sound is considered as vibratory, neuro-mimetic (implicit or explicit participation triggered by mirror neurons), or as digitally-induced hapticity (following Hansen), it would seem that there is a material basis, at the very least, for considering listening as less distanced compared to seeing. However, listening also remains consciously directed activity, and it is here that space remains for objectification to creep in. As I listened to *A Chance to Cut is a Chance to Cure* my attention shifted between engaged, subjective listening and attempts at more objective modes, somewhat reminiscent of conventional analysis. These shifts, however, were not always consciously directed; on occasion they were prompted by the musical materials I was hearing. This led to the affordance of different subject positions, which occupy different relationships with my sensations of interiority and exteriority and hence my subjective experience. This dissolves not only my sense of the boundary between bodily interior and exterior, but also erodes the boundary between self and other. Or, as Stankievech puts it: 'Moving through a dynamic space that blurs the exterior with the interior via the topology of a Möbius loop or better yet, a Klein bottle, the subject listens; or shall I say the outside is on the inside of the listener? The difference between *contained* and *container* dissolves, as does the difference between you and me' (Stankievech, 2007: 59). However, this lack of difference between self and other is ultimately frustrated, as the fragmentary sonic subject (the other, or the 'you' of Stankievech's argument) has no graspable subjectivity in which I can share.

This uncertainty between interior and exterior has strong implications for my listening experience, confusing the subject positions I am able to listen from, contaminating them with my own bodily presence. In the following section I offer a more detailed analysis of this intertwining of interior and exterior, subject positions and analytical alterity, as it played out in my first experiences of listening to *A Chance to Cut is a Chance to Cure*.

Listening in the Space of the Body

In this section I examine in more detail how bodily affect may be brought about, invoking one aspect of Mark Hansen's theory and considering how it might be applied to a musical work. I offer another way of framing the complex relationship between interior and exterior caused by the collision of the surgical sound materials and their musical use, with the aim of moving towards an understanding of the work's affective impact. This begins to draw together my different listening experiences.

In *New Philosophy for New Media*, Hansen deals with the shift from perception to affectivity. In this chapter I focus particularly on the part of the theory in which Hansen discusses changes in the spatial regime. Here he describes how the 'affective experience facilitates a corporeal registering of a deformed spatial regime that comprises something like a human equivalent of the alien "space" of the digital' (Hansen, 2004: 15). Hansen's examination of this phenomenon is elucidated primarily through a discussion of the experience of viewing Robert Lazzarini's installation, *skulls* (2000), which were formed from the three-dimensional imaging of real human skulls that were digitally manipulated before being recast in bone. Hansen describes how, whichever way the viewer approaches the skulls, they seem 'warped in a way that doesn't quite feel right, that just doesn't mesh with [the viewer's] ingrained perspectival self' (Hansen, 2004: 197-8). The viewing body must contort in order to try to align itself with the points of view of the skulls. Hansen writes: 'Lazzarini's work functions by catalyzing a perspectival crisis, confronting us as it does with "the disorienting ambiguities of digital space" – with what would seem to be *indices* from a world wholly alien to our habitual perceptual expectations and capacities' (Hansen, 2004: 200). Ultimately, the viewer is unable to resolve this, and the resulting frustration of visual mastery segues into 'affective bodily response' (Hansen, 2004: 202).

Like Lazzarini's skulls, the material of *A Chance to Cut is a Chance to Cure* digitally realigns the 'real', in this case the sounds of the body, and sounds made via the actions of the bodies using musical instruments. As discussed earlier, ironically the use of digital editing technology highlights how, despite its extensive drawing on sounds of the body, much of what we hear in these tracks is no longer tied to human physical capabilities. There is a disjunction between what the computer can do, and what the human can do and therefore perceive, and this leads to an affective bodily response.

The opening of 'lipostudio (and so on)' offers a mixture of the musically familiar and unfamiliar. It begins with a strong sense of rhythm, in which the squelching sounds of surgery are juxtaposed with an almost machine-like regularity against the sounds of the conventional instruments. It is all too easy to imagine the (embarrassing) occasions when my own body has made similar sounds. Without thinking, I seem to identify the sound with the small, private, barely audible sound that is sometime made when rubbing my eyelid. It is a sound I could easily imagine making with my mouth: I am drawn into mimetic participation with the sounds I hear. At the same time, another pre-cognitive response to the music occurs: I feel that this is dance music and want to move, and on one or two occasions have tapped my feet to its rhythm. Characteristic of many recordings made and reproduced using digital technologies (Ihde, 2007: 259), the sounds are almost clinically 'clean', stripped of any background noise, yet they are composed from both 'incidental' noise of the body as well as intentional instrumental sound.

As I listen I become more and more aware that I cannot place these sounds as either clearly interior or exterior to the body. While the sounds from 'lipostudio' do not originate in my body and are no longer in the presence of their bodily source, I nevertheless understand them as having an inner resonance. In order to consider this more fully I would like to return to Wegenstein's development of Hansen's work in her study of the body in performance art and

new media. The blurring of interiority and exteriority, or the exterior as the 'transmutability of interior' (Wegenstein 2006: 103), forms a recurring theme in Wegenstein's writing. She discusses Aziz + Cucher's *Interiors* (1999 – 2002), an example which, I suggest, has some similarities with *A Chance to Cut is a Chance to Cure*. In this work the artists use digital technologies to 'reconstruct the texture and general appearance of the skin,' using it as a 'wallpaper' to cover an internal, architectural and highly geometric surface (Wegenstein 2006: 105). For Wegenstein, this fusing of interior and exterior has close links with a second dichotomy, that of natural/artificial, which again might be mapped onto the sound sources of 'lipostudio'; the 'natural' sounds of the body, and the synthesized sounds. In both cases it is the process of technological reconstruction that is significant. Yet the artists' choice of the body as material is also crucial. The interior/exterior divide is further blurred by the choice of a seemingly external material – the skin – causing the exteriority to merge into interiority (Wegenstein, 2006: 107).

In *A Chance to Cut is a Chance to Cure* Matmos also work with ideas of interiority and exteriority. The sampling of the sounds of surgery uses sound to bring the action of the interior of the body to the outside. The external anchor of these sounds – the action of the body, or the action of the surgeon on the body – is missing, subsumed only into the movement of the music. To an extent Matmos reverses the process at work in *Interiors*, by taking the interior of the body and revealing it as external by using it as a sound source. Following Hansen, Wegenstein emphasises the role of interior/exterior within the digital realm. The merging of interiority and exteriority is not only brought about by digital technologies, it is a quality of them:

> The body in other words, adopts the function of the mirror: since there is
> no exterior to the digital environment – because it is always an "inside"
> within a set frame – it is only through the body that the digital image can
> function and fully adopt its purpose of affection. (Wegenstein, 2006: 107).

In Hansen's terms the digital artworks act as 'triggers for affect' by offering 'a suture between disjunctive formal dimensions' (Hansen, 2004: 202), a meeting point between the perceptual ratios and capacities of the human body and the space of computer-processed form. The impossibility of entering into these perceptual spaces at a molecular, physical and real-time level causes us to experience them 'via an affective "analogy" produced by our bodily response to it and whose "content" is a warped space felt within the body' (Hansen, 2004: 202-3).

The perspective offered to me as a listener by the digitally manipulated combination of instrumental and bodily sound works similarly. The track simultaneously 'places' the listener in different spatial relationships between composed bodies as well as in an actual physical listening location. The internal bodily sounds are externalised – heard and felt mimetically rather than due to their origination in the body – but turn back towards feeling and affectivity. Barry Truax argues that musical experience without visual presence leads to the experience taking place in more than one sonic environment concurrently; one in the 'natural' world and one in 'the media world' with the two 'superimposed in what could be referred to as a "schizophonic split"' (Corness, 2008: 22). However, Corness has offered a critique of this position, suggesting that while the listener occupies the world created by the (audio) media, she remains physically, and to some extent sensually, located within the 'natural' world through the effects of certain stimuli (Corness, 2008: 22). Corness argues that this situation, considered through the lens of embodiment, allows us to 'maintain that we are still, through perception and self-awareness, part of a single sonic environment', one that includes 'sounds and sensations from both the mediated environment and the acoustic environment' (Corness, 2008: 22).

As I listen to the Matmos extracts, I hear the bodily sound (from the sonic, media environment) while experiencing bodily sensations in response to this and other sensations in response to stimuli in the 'natural' environment. These extracts and my response to them form

a sonic environment that warps internal bodily space and affect with the external: the hearing

of both another body and musical materials. Just as the viewer of *skulls* exhibit is unable to

resolve her view, *A Chance to Cut is a Chance to Cure* offers a similar experience, projecting a

space that is 'non-human and necessarily uninhabitable' (Hansen, 2004: 215). Affection is

introduced to it from outside, via the body. In stark contrast to the myth of disembodied

presence that has surrounded digital recordings (Théberge, 1997: 214), works such as *A

Chance to Cut is a Chance to Cure* reveal the impossibility of disembodiment. Lacking the

presence of the thing producing the sound, or a 'materially mimetic' replica, the listening body

is called upon to fill the gap.

This sensation is also emphasised by the changes in subject position that the musical

materials prompt in my listening. As Eric Clarke has pointed out, identifying with shifting

subject positions while listening to music causes a shift between subject and object that is

reminiscent of some forms of computer-mediated virtual reality:

> the player in a skateboarding computer game, for example, is commonly
> both subject (he or she is controlling the board, and the environment is
> frequently visualized from the perspective of the board) and object (the
> skateboard and rider will appear as an object in the scene) in a manner that
> the users of such videogames find intuitively convincing and unproblematic.
> (Clarke, 2005: 86-7).

Interestingly, although he likens this musical experience to one caused by new

media, Clarke's position differs from that of Hansen in that the change of

perspectives is unproblematic. I would argue that in Clarke's example the shifting of

subject positions lacks a feeling of discomfort or affective response because he is not

considering the disjunction between spatial regimes, only the shift between subject

and object without reference to their being embedded in further contexts. In

listening to these extracts I do not find myself shifting between these two subject

positions, but occupying both simultaneously, and this brings about a richness of

embodied experience.

In this chapter I began to explore how the notion of subject positions might be used to situate an embodied analysis in relation to identifiable features of the music. I considered how listening from particular subject positions may draw on techniques of listening that cannot be divorced from their cultural and historical connotations. Building on ideas surrounding the presence of the audible body presented in the previous chapter, I explored questions of proximity and intimacy between the body that is listening and the body that is heard. This was followed by a more in-depth reading of the material and technical conditions of the manipulation of sound within the composition process, and the consequences of this for subsequent readings of mediation within the work. I considered, in particular, how the cutting and splicing of sound related to the processes of cosmetic surgery from which many of the sounds originate. This was contextualised in relation to the idea of the subject as represented by the work and the subjectivities that might be ascribed to it. The chapter also considered how the sound reproduction equipment used to listen alters the level of bodily engagement with the work, comparing the experience of listening through headphones to the experience of listening using loudspeakers. Finally, the methodology developed in this chapter begins to consider the implications of mediation, drawing on the work of Mark Hansen to consider the affective responses of the listening body to processes of mediation. The relationships between sonic and listening bodies are explored further in Chapter 8, in my analysis of Christof Migone's *Crackers*, which considers in more depth the presence of the composer's subjectivity within a work, and how this may support or displace other subjectivities within the piece.

8. Crackers

Like the compositions discussed in previous chapters, Christof Migone's *Crackers* offers a

peculiar scenario. The physical actions that led to the production of its sonic materials are no

longer visible, they are retained in sound. It was my first hearing of this piece, and my startling

bodily reaction to it, that caused me to pursue this research. Composed in 2001, *Crackers*

draws on the sounds of cracking joints, recorded from participants Migone recruited via a

newspaper advertisement. The CD produced as a result of the project comprises nine tracks of

varying lengths, which feature either what I will term 'documentary' recordings (an assumed

direct representation of the recording sessions, featuring speech) or musical presentations of

the cracking sounds. The tracks are not named. Migone describes *Crackers* as:

> a portrait of a city through the cracking bones of its citizens. This is a
> specific form of soundscape, it is a crackerscape. [It] is part I of a series of
> portraits of cities from the perspective of its inhabitants ... the portraits
> feature forms of behavior that navigate nervously between the controllable
> and the uncontrollable. ... I crack because otherwise I can't move. These are
> everyday occurrences, banal decisions, little manias. Nevertheless, their
> cumulation provides a kind of map of the internal ... The cracker recordings
> were done as part of a residency at Gallery 101 in Ottawa, Canada which
> took place in October 1997. The Crackers were solicited via radio ads,
> classified ad in the weekly paper, and via the Gallery's membership. The
> recording sessions consisted of an interview succeeded by a cracking
> session ... (Migone, 1999: 91-92)

The project, seemingly, is the product of compulsive action, irresistible movement. Migone

states that, 'a crack is the locale where bones articulate a tension. They cannot be ignored,

either you crack them or they crack themselves. Once a joint cracks, there's no turning back.

Crackers and joints themselves are compulsive about the release of that tension. I am

crackable everywhere ... to obtain some cracks, I contort into impossible geometries, my

body's sole purpose becomes the emission of the crack' (Migone, 1999: 92). Is this

momentum, the build up and release of tension, echoed in sonic gesture?

In an article in *Site of Sound: of Architecture and the Ear*, Migone gives excerpts of the conversations that took place during the recording of the sonic materials for *Crackers*. Comments include: 'You tell me which areas you crack and I'll try to place my mic the best I can ... I'll do my fingers first, those are easy ... for the toes I have to stand ... those were good cracks ... I can sometimes do my back but I won't be able to do it today because it's in pain' (Migone, 1999: 89). A lack of sound, the absence of a particular crack, betrays a fallible body that through illness or pain is unable to perform, unable to contribute a particular sound to the music. The composer's attention (via his microphone) is focused on specific areas of the body. The body parts that participants choose – or are able – to crack produce different cracking sounds: one 'cracker' suggests, 'try my neck ... you have to get closer ... that was a good one! I tried not to do it all day ... knuckles ... one at a time? ... that might be it for the knuckles ... let's try my elbow, you might get a little tiny one, that's usually a crunchy one ... see I told [you] that's a crunchy one!' (Migone, 1999: 89). 'In the case of crackers, there's a lexicon of cracks, an endless vocabulary of tearing aparts,' writes Migone (Migone, 1999: 91-92). This vocabulary of cracks and tears – is it like musical syntax, does it become one?

In this chapter I return to the analytical method proposed by George Fisher and Judy Lochhead that I have previously discussed in Chapters 6 and 7 in order to consider in more depth the role of embodiment in the production and reception of *Crackers*. As Fisher and Lochhead describe, 'the metaphors of musical movement, the directionality of that movement, and the notion of tension and release achieve their significance from bodily experiences of moving, of spatial orientation, and of muscular feeling' (Fisher and Lochhead, 2002: 41). Is it possible to trace the physical gestures that were once performed in order to produce the piece? And how do these gestures impact on my embodied reception of the work? What happens when the metaphors of musical movement are turned back on the listening body?

Sampling Gesture

I begin here with an analysis of an approximately four-minute excerpt from the work given on a compilation of Migone's works (Migone, 2005); this is where I first encountered *Crackers*. The excerpt I analyse is preceded by a shorter track, in which one of the participants describes how he produces the cracking sounds. The cracking sounds can also be heard in their original form. There is a surprisingly large variation in the sounds produced. Interestingly, the 'cracker' describes the movements he makes in order to produce the sounds – perhaps analogous to Fisher and Lochhead's performance gestures – enabling me to envisage them. Hearing this leaves me with little choice but to hear the sounds in the following excerpt as tied to the physical movement that produced them. Their extra-musical significance spills over into my listening. Strangely though, they do not sound quite as I expect.

When listening to the track I experience a strange sensation, almost as if the pops and crackles are inside my mouth, as if I'm eating popping candy. While the track does not have a steady beat in the traditional sense, the momentum and rhythmic qualities of the cracks drive it forwards. As Migone writes, 'I crack because otherwise I can't move.' So does the music. Rhythmic figures emerge (one that sounds very much like a quaver followed by a crotchet). These rhythmic figures are formed from the relative loudness of the cracks: I find myself mentally grouping the louder gaps into rhythms, even when they do not quite fit, and even though this seems counter-intuitive within the context of the piece. The cracks stand out against the background of high frequency sounds. This almost-rhythm is embodied in the sense that not only does it derive from an embodied action – physical gesture – but it is experienced bodily by the analyst. I tap my foot, but any attempts to keep in time are broken off before they really get going. Migone is exploring the rhythmic possibilities of these sounds,

but never quite arranges them in an obvious pattern. Rhythm provides the link between listening body (analyst) and music, 'simultaneously dissolving their solid organisations and re-modelling their fluid exchanges' (Portanova 2005). In a discussion of musical rhythm and dance, Stamatia Portanova attempts to break free from the Platonic concept of rhythm as a series of distinct units, and conceives it instead as a flow. She examines both its ontological status and its physical and material manifestation, especially in the dancing body. In order to do this Portanova reconfigures rhythm as a virus, operating at a cellular level. As I listen to *Crackers* I feel myself catching something. This contagion – a lack of control over the body and an inability to police its boundaries – ironically comes about because of Migone's *control* of bodily sound, his precise arrangements of the sounds of the body into (almost) regular rhythm.

This is a result of Migone's particular working methods. After recording the sounds on a portable DAT recorder, Migone set about editing them in ProTools:

> [When] editing on ProTools, [I was] basically listening through the
> recordings and isolating the cracks that sounded good. I didn't expect the
> mic to be able to capture such dry hollow sounds, but I was pleasantly
> surprized by the results. […]. In the transformation of the sounds […] I made
> extensive use of EQ (specifically one of the Wave plug-ins on ProTools). For
> instance, repeatedly using the same EQ setting on a sample often leads to
> abstraction and digital artifacts. This simple technique was used more
> radically on my following CD project, *South Winds*. The other main
> technique I used was pitch shifting. Those two forms of DSP (digital signal
> processing) plus tight, obsessive editing and layering (multi-tracking) were
> the tools I used to compose the CD. (Migone, personal communication, 29
> April 2011)

However, despite Migone's obsessive editing and drawing out of musical detail, the track is also remarkably static. There is no real development of the way the sounds are used (at least on a superficial level), with the majority of the musical tracks sounding like an amorphous cloud of cracks. This is caused partially by Migone's decision to use only a limited range of sounds:

I prefer to limit my palette from the onset, I find this keeps me close to the source of the sounds, and more often than not I prefer to retain some element of referentiality in the final piece. With *Crackers*, I approached each track as an opportunity to stay on a single tack or course, so each track has a kind of monochromatic, or monotonic feel. I'm not interested in crescendos here or development (be it narrative, melodically, or otherwise). In some ways, this is a proto-percussive record, soma drums, skeletal snaps. (Migone, personal communication, 29 April, 2011)

However, while Migone retains the reference to the bodily origins of these sounds, the clicks and cracks move so fast that if they were all coming from a live performing body it would be difficult to imagine its movements. If this were performance gesture it would signify perhaps a lack of direction or an excess of movement, a body so intent on the release of its own tensions to be incapable of moving forwards.

Towards the end of the excerpt the texture becomes less dense; the rate at which the cracks occur decreases and they begin to sound more like the familiar sound of someone cracking their knuckles. I can't resist positioning myself as some kind of audio detective, trying to guess which crack may have come from which part of the body. 'A crack is incontinent. A cracker too,' says Migone (Migone, 1999: 92). It is my listening body that soaks up the leak. *Crackers* is always referring outside of itself – the unfamiliarity of its musical materials, combined with the familiarity of them, also making a strange combination.

Further work is needed to try to untangle the ways in which technology is implicated in this process. Taking a step back from this detailed analysis of part of one track, I next ask how processes of technological mediation impact upon the body, and question once again how this affects the listening positions the listener may take up. However, it is important not to position any processes of mediation as unique to current technological practice. Tara Rodgers has critiqued the argument that samplers and other forms of electronic music creation have had a negative effect on the relationship between sound production and gesture[45], pointing out the

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[45]   Rodgers cites, in particular, Goodwin (1990) and Scherman (2001).

mythologising of a 'pre-digital era when "technology" supposedly did not intervene in musical process, despite the fact that musical instruments and music-making have always evolved in tandem with technological developments' (Rodgers, 2003: 315). Nevertheless, the editing and layering of sound allows the cracking sounds to exist in a spatiotemporal domain that would be very difficult to recreate outside of the format of recorded sound. The use of pitchshifting and the introduction of digital artefacts also introduce particular mediations that are inherent to the use of this medium.

The Sounding Body

The 'crack' originates in the body, and is the result of specific physiological actions. The precise sound of the crack can be influenced by a number of factors. Raymond Brodeur describes in detail how the crack is produced, and so I quote him at length:

> [Extract has been removed due to copyright restrictions][46]

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[46] See also Kimbrough (1999) and Brodeur (1995).

Crackers does not only feature the joints that are the easiest to crack: I hear mention of neck, back and feet in the recording. However, the body presented in *Crackers* is still a composite body, made up from a collection of (particular) joints. From Brodeur's writing it is clear that for physiological reasons the same joint cannot be cracked repeatedly in close succession, yet this is what the body would be doing – if I accept what I hear in the composition as constituting a body. The body appears to crack one or more joints rapidly and repeatedly for anything up to fourteen and a half minutes (in track 1).

As Brodeur points out, the pops and cracks are not only caused in this manner. Other popping and cracking sounds, particularly those associated with the knees and ankles, come from the shifting of tendons and ligaments: 'Tendons must cross at least one joint in order to cause motion. But when a joint moves, the tendon's position with respect to the joint is forced to change. It is not uncommon for a tendon to shift to a slightly different position, followed by a sudden snap as the tendon returns to its original location with respect to the joint. These noises are often heard in the knee and ankle joints when standing up from a seated position or when walking up or down the stairs' (Brodeur, 1999). I find it impossible to tell from the musical tracks – where there is no linguistic clue – which sounds may originate in which joints and therefore which physical gesture may have produced them. However, this forces me to substitute my own body: I notice that as I listen I imagine my own joints cracking (the origin of the particular physical reaction I describe in the introduction), and my 'imagining' is focused on those of my joints that tend to make a cracking sound in my day-to-day life. There is no direct mapping of the heard body to my own.

The most significant role played by technological mediation, apart from the editing of

sounds so that they occur closer together than they could 'in real life', is the change in relative

loudness of the sounds. The popping and cracking sounds themselves seem significantly louder

than they should, considering their origin in a tiny quantity of gas. Brodeur points out that

scientific research has not yet reached a conclusive position on why this should be. However,

some information about sound production from joint cracking is known:

> Researchers have estimated the energy levels of the sound by using
> accelerometers to measure the vibrations caused during joint popping. The
> amounts of energy involved are very small, on the order of 0.1 milli-joule
> per cubic millimeter. Studies have also shown that there are two sound
> peaks during knuckle cracking, but the causes of these peaks are unknown.
> It is likely that the first sound is related to the gas dissolving out of solution,
> whereas the second sound is caused by the capsule reaching its length limit.
> (Brodeur, 1999)

Related to the audibility of these sounds, recording technologies allow them to be separated

from the body in which they originate. However, because these sounds are not normally

audible at a significant physical distance from that body, hearing them may create a feeling of

physical proximity or intimacy. I discuss this further, in relation to listening positions, below.

However, first I look at the ways in which the tracks on *Crackers* can be considered to 'be' or

represent a body with which the listener may then have some form of interaction.

Performing Presence: An Intimacy of Hearing

Bodily presence and its messy problematics are central to Migone's practice. LaBelle has

theorised Migone's work largely as relating to presence, frequently with reference to the

subject as constructed via its speaking voice:

> The use of the body does not remain bound to individual biography, or self-
> centred constructions. For Migone, presence is always complicated,

undermined, and completed as much by its displacement as its placement, by always remaining bound to more than itself. (LaBelle, 2005: 18, referring to 'Undo' by Migone with Alexander St-Onge)

Similar to the body in Wegenstein's formulations, subjectivity is no longer coterminous with either the skin or ego envelopes. The possibility of self-centred constructions becomes subsumed by the body as mediation. This dispersed subjectivity is intrinsically related to the logic of new media, while being founded on the practices of the old – particularly radio, and theories of the radiophonic body and voice, which have been particularly influential in Migone's wider work.

In *Crackers* the body is broken down into pieces, reduced to the articulation of its joints. If such work is able to re-embody sound then it does so only through selected parts of the body, causing the body to become fragmented. The sound produced by the cracked articulation of one joint comes to stand in for the gesture of that part of the body. In turn, because each gestural movement is anchored to the rest, a series of joints or articulations come to stand in for the whole body. This plays out the corporealisation of the medium in the fluctuation between fragmentary and holistic body concepts, and highlighting a shift towards corporeality becoming equivalent to mediality. Like in Wegenstein's theory, in which the face no longer signifies identity but the body might be signified by any of its constituent parts, LaBelle considers that the artist can reside within fragmentation and joints:

for Migone, it is not so much a question of retrieving oneself from modern fragmentation, recovering some whole lost to the splitting of presence. Rather, by presupposing that such fragmentation is always already given, the artist finds home within the fragmented part, the sonic joint, the hole of the whole, and inside radiophonic dreamland. (LaBelle, 2005: 24)

The body-subject resides in the gaps between the cracks in its joints, and in sound rather than flesh. In *Crackers* Migone plays with this sound as both originating in the body and estranged from it. This adds a layer of abstraction between its original conditions which, while originating in the body, must always escape it – and does so naturally – in order to be heard.

This is played out within a context in which the body is traditionally prone to disappearance. Lander (1999) has positioned radiophonic transmission as portending an illusion of intimacy, which further, through its 'conscious corporeal assertion', allows for 'diverse references of bodily signification' (Lander, 1999). He draws on Migone's own writing to suggest that 'the temporal and spatial disjunction' that accompanies such radiophonic presence (or its lack) creates a space in which identity can reside without being able to recognise itself as such. The radiophonic voice is 'stripped ... of any corporeal references' (Lander, 1999).

For both Lander and Migone the audible presence of the body may lead to an increased sensuality, while at the same time increasing the distance between listener and listened to: 'Microphones necessarily multiply the body by emphasizing its location, as corporeal intensity, while displacing it, throwing it beyond the here and now, toward other centers, adding to the "unbounding generating process" electrical amplification and subsequent volumetric multiplications' (LaBelle, 2005: 13). And yet, when I listen I hear the body as if it is close to and, due to the physical reaction I have to the sounds, perhaps even partially merged with my own. This leads to a feeling of intimacy, of bodily closeness, that results from the mediation of these sounds.

However, Migone's precise control of the sounds negates an element of their bodily origin. The impossibility of such an array of cracking sounds originating in the natural body raises the possibility of the body as machine, or the body as controlled by a machine. It invokes the prospect of a body that is not controlled by its naturally accompanying subjectivity, but by a ghost in the machine, the flesh subjected to its will. As Simon Emmerson has pointed out, the possibilities for hearing presence within acousmatic music occupies a continuum ranging from physical to psychological (Emmerson, 2007). Up to this point my analyses have concentrated mainly on the audible presence of the physical body, but here, given Migone's shaping of the

musical materials, I would like to extend this to consider the detectable role of the composer within the compositional material. For Emmerson, psychological presence may cover the perception of will, choice and intention within the music. In listening to *Crackers* I have a clear sense of multiple psychological presences; the composerly presence, arranging the materials into bodily impossible combinations, and the psychological presence of the 'crackers' in the documentary sections, fleshy human beings manipulating their bodies' production of sound at will.

Furthermore, the resonance of these sounds within my own body is disrupted by their precise manipulation. I find listening to the documentary tracks far more discomforting than listening to the musical tracks, due to the greater sense of bodily identification I experience. The closer the sounds are to the state of their original production, the more they resonate within my own body. In my listening I am forced to navigate between awareness of these different presences (which, in Emmerson's theory, take place within my own personal and social presence as listener). Agency shifts between the tracks, from cracker to composer. In the following paragraphs I explore how these different senses of agency and presence inform the different subject positions present in my listening.

The available subject positions in *Crackers* are more limited than those in *A Chance to Cut is a Chance to Cure*. I am restricted to only three or four options: being in the place of the recordist, being in the place of the person producing the cracking sounds, or being myself listening to music. The fourth, quasi-position comes about through the mapping of the actions of the 'cracker' onto my own body. The feeling of discomfort I experience when the male voice on the recording explains how the crack is made, before going on to produce the cracking sound, may be caused by vicarious identification with him, but the bodily response I feel is almost entirely a result of my own embodied experiences and subjectivity.

In track 4 the participant talks the recordist (Migone), and therefore the listener, through

the physical, embodied positions needed to record the cracks: 'toes … so you're going to have to be right on the floor for this. Oh, no, I can do it here.' However, listening alone it is not enough to build up a complete picture of this interaction – the 'here' where the cracker eventually positions himself (or is already positioned) remains unspecified. The 'cracker' addresses the recordist directly: 'if you stay in one place …': through this direct second person address, the listener is placed mentally – but with bodily understanding – in (t)his position.

The microphone offers the listener a sense of proximity to the body. Closeness – as mediated by the microphone – is a central feature of much of Migone's work, as LaBelle points out: 'Migone defines a language of intimacy according to the close-up and the proximate, or the too-proximate, the insides of the innards … though exposed as sonic detail, microphonic spittle, and invasive amplifications' (LaBelle, 2005: 24). As discussed above, the audibility of the cracking sounds presents the possibility of intimate presence. However, the body the listener is brought closer to is not Migone's, but a multiplicity of bodies belonging to the participants in the project. Furthermore, while the listener is offered this proximity to another body, it is not necessarily a pleasurable intimacy. This is perhaps down to the abject nature of these particular bodily sounds.

The Leaking Body

> The body is a noisy place. It emits and transmits, it cannot contain itself, it has no built in muffler. Its only silence is willed … the orchestral renderings of our innards are rarely appreciated for their musicality. (Migone, quoted in LaBelle, 2005: 24)

While the sonic materials of *Crackers* are perhaps not as abject as those of Migone's composition *South Winds* (2002), which is composed from recorded farting sounds, they

nevertheless betray a body with permeable boundaries. [47] LaBelle describes this difference: 'Where *South Winds* catches corporeal leakage … *Crackers* creates an inventory of individual portraits through skeletal idiosyncrasy' (LaBelle, 2005: 17). However, what LaBelle fails to note is that *Crackers* also portrays a leak from the body and still functions as a reminder of body as permeable, and therefore abject. This is doubly so when considered in conjunction with the physical response of the listening body. Not only might the body leak, but as a sonic object it is not constrained by any visible boundaries, and may be taken apart and reassembled according to compositional will. Just as the sounding body has permeable boundaries, so does the listening body. This is necessarily true of all listening bodies, with the sound reaching the ear and the body 'absorbing' sound felt as vibration. However, *Crackers* presents an especially intriguing case in the physical response it elicits.

The sound of the crack has here been presented as a 'leak'. The idea of the leaky body, a body that overspills or is not contained by its boundaries, has been theorised by writers in feminist theory. Robyn Longhurst (2001) has examined the leaks and flows that occur across bodily boundaries and how these are experienced within social space. Part of her project has been to re-write an embodied subject into the discourse of geography – to break down or merge the distinction between discursive and material bodies (Longhurst, 2001: 1-2). Her discussions range across 'the shape, depth, biology, insides, outsides and boundaries placed in particular temporal and spatial contexts' (Longhurst, 2001: 2), factors that have been equally denied and avoided within musicology, except in the most abstracted and empirical forms of investigation. Longhurst points out that while identity – as a part of the discursively constructed body – has been constructed as fluid, the fluidity of the material body has been relatively neglected. The idea of a body with a messy, literally fluid, inside rarely occurs in music scholarship (see Móricz, 2006, and related discussion in Chapter 4), perhaps due to the

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[47] The bodily origins of the sounds from *South Winds*, curiously, are not as obvious from the recording alone – partially because there are no 'documentary' tracks to explain their origin.

fact that little music has engaged with or invoked such matters. If, however, the musical

soundworld continues to expand, it seems likely that such musical materials will feature more

often and musicology will need to develop theoretical tools to approach this practice.

How might the idea of bodily sound as 'leak' be drawn into an embodied analytical

methodology? While methods such as Le Guin's take into account the materiality of the

performing body, it is more difficult to uncover the materiality of listening. At this point,

turning attention to the sensual experiences of the listening body is particularly useful. The

physical reaction I experience in response to the cracking sounds is caused by a feeling of

disgust. Disgust plays an important role in the maintenance of a particular state for the

embodied subject. It is also experienced in a particularly bodily way:

> Disgust is a powerful, visceral emotion. It is rooted so deeply in bodily
> responses that some theorists have hesitated even to classify it as an
> emotion in the fullest sense, considering it more akin to involuntary
> reactions such as nausea, retching, and the startle recoil. But for all of its
> engagement of bodily responses, disgust is also an emotion that is at work
> in creating and sustaining our social and cultural reality. (Kolnai et al, 2004,
> 1).

Disgust may be biologically grounded and genetically determined, but is also culturally

conditioned. As Naomi Rokotnitz notes, moral emotions relating to disgust may take on

different forms and cause different affective bodily responses to strictly sensory stimuli

(Rokotnitz, 2008: 409). Nevertheless, sensory and moral disgust may overlap.

Rather than pursuing a psychoanalytical perspective on disgust, I explore how it has been

conceptualised as aesthetic process within an artwork. I am less concerned with theorising

why this visceral feeling of disgust comes about than in understanding its repercussions for my

listening and how it both affects and affords different subject positions. Rokotnitz pursues this

area in relation to the film version of Stephen Jeffreys' play *The Libertine*. She argues that the

playwright manipulates the audience's embodied sensation of disgust to arouse aversion

towards the film's protagonist. Rokotnitz bases her understanding of embodied reaction on

recent research into mirror neurons. She considers how 'preconscious neurological, visual, auditory, and motor circuits may be accessed and influenced in order to provoke both the sensation of physical disgust and the moral judgments of indignation and rejection' within the context of viewing the film (Rokotnitz, 2008: 399). Following Jorge Moll et al. (2005), Rokotnitz distinguishes between 'basic disgust' (a pre-conscious, perceptual response[48]) and 'moral disgust'. She argues that the film's creators (Stephen Jeffreys and Lawrence Dunmore) encourage the audience to feel disgust towards the protagonist (Rochester) through manipulation of these response mechanisms, arousing basic disgust in order to incite moral disgust for the character.

Rokotnitz uses concept of 'tactile empathy', based on the role of activation of mirror neurons in response to the sight of touch. This is based on neuro-physiological research and is similar to the musical response described by Cox (2001), although Rokotnitz's focus is visual. Research into the role and functioning of mirror neurons 'implies that at least part of our ability to interpret the actions of others rests upon our shared motor schemata: we share a bodily knowledge of them' (Rokotnitz, 2008: 411). Other research has inferred that the same is true for sound and hearing. Rokotnitz notes that: 'Identifying the sound as action automatically activates in the listener the very motor systems responsible for executing that action' (Rokotnitz, 2008:413; see also: Gazzola et al., 2006; Corness, 2008).

Additionally, following the ecological approach to listening outlined earlier, this process may be implicated in the identification of a subject within the music and the formation of a listening position in relation to it:

> our innate matching system is also responsible for our readiness to engage
> with fictional agents. If simulation involves "incorporating an attempt to
> replicate, mimic, or impersonate the mental life of the target agent," then

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[48] Rokotnitz draws on fMRI studies that 'confirm that automatic body-based emotional responses can occur in the absence of verbal report, meaning that embodied simulation can take place without affecting conscious thought' (Rokotnitz, 2008: 414).

its study through the interaction of audiences with actor-characters in performance becomes all the more pertinent. (Rokotnitz, 2008: 415).

Such mirror neuron firing may be central to the manipulation of an embodied experience of subject position within music listening. Like music, film may also afford certain subject positions.

Rokotnitz considers how the film differs from the play and how this has been used to increase the viewer's feelings of disgust. For example, Rokotnitz describes how a scene from the play has been adapted in the film: 'The "quality of nightmare" of Jeffreys' scene 5 is here extended to imply a hellish pandemonium. Rochester walks straight through this nightmare, keeping his gaze upon us, the viewers. This sets him apart from the action and implicates us in its debauchery—for we are watching it' (Rokotnitz, 2008: 403). While the film directors in Rokotnitz's article create disgust through this sensuous identification, using it to move from pleasure (sex) to disgust (gutter water and rodents) without entirely disentangling the two, but introducing a shock at the transition, the subject positions in *Crackers* might be understood in a similar manner. In *The Libertine*, subtle, perhaps pre-conscious, disgust is a precursor to more overt abjection: 'Before mercilessly vulgar scenes in the play literally turn audiences' stomachs, Jeffreys and Dunmore have already secured their audiences' antipathy to their protagonist' (Rokotnitz, 2008: 415). Similarly, the changing subject positions in *Crackers* mediate and manipulate disgust, but differently. The periodic return of the 'documentary' tracks brings about a stronger physical sensation of disgust. This strengthens and wanes in the 'musical' tracks as my awareness of the origins of the sounds changes, and as the leaky nature of the cracking sound is offset by Migone's precise control of the musical materials. As a listener I identify with both the cracking body and the recordist who is 'listening in'. However, unlike Rokotnitz's experience of viewing *The Libertine*, I find that the feeling of disgust (which in my listening is focused on my own body as well as the 'body' I am hearing) dissipates as I listen. The initial knowledge of the sound's origin gives way to a subject position focused less

on the body and more on the creative and musical possibilities offered by the materials. This is largely determined by the sense of proximity granted by recording technologies. To return to the idea of listening closely to the body via the stethoscope, this requires a physical proximity – more so than listening to a recording, but less so than medical listening may require. Sterne describes the stethoscope as mediating physical distance between doctor and patient's body and embodying 'the ever-receding threshold of disgust' (Sterne, 2003: 117). However, in this case the stethoscope is replaced with a microphone. This is the subject position I experience as I listen to the documentary tracks, which then recedes during the musical tracks. Both *Crackers* and *A Chance to Cut is a Chance to Cure* mediate disgust or revulsion toward the body. In the Matmos work there is both the disgust at the thought of the surgical procedures, but also in many cases an assumption of an underlying dissatisfaction or disgust towards the body in order that it must be 'cut' and 'cured'. *Crackers*, however, offers no such reprieve: the body cracks away to the end of the CD.

Glitch and Failure

As I listened to *Crackers* further, and my bodily reaction to it receded from the centre of my reflections, it became clear to me that it reminded me of something I had heard before. I might say that at this point, the subject position I occupied shifted back towards being 'my self': an aspiring musicologist pursuing research examining a particular methodological approach to a musical practice (electroacoustic composition) not that of her primary musical background. In the early stages of my research I was struggling to relate what I heard to what I had read about different styles, genres and techniques of electroacoustic composition. The pops and crackles sounded like glitch music, or indeed, the pops and crackles of vinyl on a turntable.

While neither of these relates to the origin of these sounds, the musical materials of *Crackers* nonetheless result from an action of the body that might be considered to be a glitch in the normal smooth functioning of the joints. Indeed Migone's own thinking about his work implies the possibility of thinking of these sounds as the result of a less than ideal bodily functioning:

> I've placed emphasis on the body, stressing its propensity for making mistakes, encouraging the production of saliva sounds, stuttering, mumbling ... all these form part of the envelope for the words that we emit. So this notion of disembodied voice implies that a voice could be stripped of the fleshy mouth that produces it. ... The leaking body permeates. (Migone, quoted in Spinelli, 2005: 69)

Migone expresses his interest in the body as making 'mistakes' that result in the emission of sound. The idea of a malfunctioning or glitching medium for sound (re)production has a long tradition within experimental music and sound art practices. Caleb Kelly has written about artists who use malfunctioning sound mediation technologies as the object of their work, theorising their extended techniques as a 'crack':

> The practice utilizes cracks inherent in the media themselves—we cannot play a vinyl record without causing some damage to the surface of the disc—and leads to a creative practice that drives playback tools into territory where undesired elements of the media become the focus of the practice. (Kelly, 2009: 4).

Kelly's work looks predominantly at pre-digital practices, demonstrating that this is not a purely or inherently digital phenomenon but rather a particular relation or working practice towards media in which the process of mediation is highlighted through moments of failure. The strong embodied response I have to hearing the cracking body both highlights and obfuscates this: mediation seemingly vanishes as I experience this physical reaction to another body, but it is also ever-present due to the frequent reminders offered via the 'narrative', descriptive tracks. In *Crackers*, however, the audio technology is used in the conventional sense. The body is the medium and the crack occurs at the point of origin rather than in

playback. Nevertheless, just as for Kelly the crack (or pop on the record for example) causes a reduction in the 'transparency' of the media (Kelly, 2009: 35), Migone applies a similar technique to the body, drawing the listener back towards the opacity and materiality of embodiment.

Kelly points out that there are a range of positions that artists and composers may take towards pushing the 'cracked' technology to breaking point (Kelly, 2009:32-3). Significantly, Migone does not pursue (or at least synthesize) the destruction of the body. The bodies here are not being pushed to destruction, unlike some of the audio technologies described. Unlike with digital glitch music the sound is not the result of a system being overloaded and nor is it, as is the case with the popping sound on vinyl, the sound of the wearing out of the system. However, the joint cracking sound may be considered as a 'failure' within the normalised or idealised workings of the human body. Digital glitch music originated in an attempt to work against the clinically clean digital sound (Kelly, 2009: 8). This is echoed in Migone's use of digital artefacts within the work.

From Grain to Affect

Despite the spoken interludes, the majority of the material on *Crackers* comprises a musical presentation of the cracking sounds; an exploration of their rhythmic and timbral qualities. It is possible to understand the cracking sound as the presence, or grain, of the body in sound. However, as noted above, the cracking sounds themselves have a fragmented, grainy quality and their agglomeration produces a timbre reminiscent of granular synthesis. In the following section I consider what it might mean to introduce such a bodily association into the machine world of the digital.

As discussed in Chapter 7, Tara Rodgers has adapted Barthes's notion of the grain of the

voice in order to theorise bodily involvement in electroacoustic music. However, the

application of Barthes's theory to electroacoustic composition requires further examination.

For Rodgers, the grain is the presence (for the listener) of particular elements of embodiment

within the sound – and the pleasurable bodily experience of being able to hear this. While this

is an almost exact echo of Barthes writing, it presumes that this embodiment is somehow

communicable in sounds that do not themselves have a bodily origin (although Rodgers

considers the editing and composition of the piece to be a bodily process, so this may be more

important to consider than the origins of the sounds themselves). The sounds of such

electronic tracks may be synthesized. However, in Barthes's original essay the physicality of

the body producing the sound is crucial: 'The "grain" is the body in the voice as it sings, the

hand as it writes, the limb as it performs' (Barthes, 1977: 188).

Simply put, the grain is the audible presence of the body in musical sound. However, in

Barthes' account this is inextricably linked to language: the grain is 'the materiality of the body

speaking its mother tongue' (Barthes, 1977: 182). He takes the Kristevan notion of pheno-text

and geno-text, 'transposing' them to become 'pheno-song' and geno-song'. 'Pheno-song'

contains the structural and stylistic elements of music, 'in short, everything in the performance

which is in the service of communication, representation, expression, everything which it is

customary to talk about, which forms the tissue of cultural values' (Barthes, 1977: 182). In

contrast the geno-song is 'the volume of the singing and speaking voice, the space where

significations germinate "from within language and in its very materiality"; it forms a signifying

play having nothing to do with communication, representation (of feelings), expression'

(Barthes, 1977: 182). Barthes' own simplified explanation of the term is to label it 'diction'. In

Crackers, it might be found in the materiality of the crack, the point at which the joint meets

and moves, and the point at which the listening body resonates and produces meaning. While

Barthes remarkes that: 'With [Fischer-Dieskau], I seem only to hear the lungs, never the

tongue, the glottis, the teeth, the mucous membranes, the nose' (Barthes, 1977: 183), in

Migone's work these 'other' things are almost all that is left for the listener. There are striking

similarities between Barthes' formulation and Migone's stated aims for his works; his

disavowing of the possibility of the voice being 'stripped of the fleshy mouth that produces it'

(Spinelli, 2005: 69). Similarly, with *Crackers*, the performance delivers body rather than soul.

Unlike Rodgers, Barthes' considers grain to be something in excess of 'mere' timbre; only

the role of the body in producing the geno-song leads to jouissance. Grain comes about

through a friction between music and something else, which in Barthes's *lied* examples, and

Migone's voice-based work, is language: 'The 'grain' of the voice is not – or is not merely – its

timbre; the *significance* it opens cannot better be defined, indeed, than by the very friction

between the music and something else, which something else is the particular language (and

nowise the message)' (Barthes, 1977: 185). This leads, for Barthes, to the production of writing

(in song): effectively, 'the emergence of the text in the work' (Barthes, 1977: 188). To apply

this to a system of production where music and language are not being concurrently produced,

some adjustments are required. It is significant to note that Barthes's original theory

problematises the idea that grain arises simply from the presence of any bodily trace in the

music: breathing sounds, with their association to the lungs, do not contribute to jouissance. It

is only the role of the body in diction, or geno-song, that does. However, Barthes admits the

possibility of the presence of grain in instrumental music:

> What is more, leaving aside the voice, the 'grain' – or the lack of it – persists
> in instrumental music; if the latter no longer has language to lay open
> *significance* in all its volume, at least there is the performer's body which
> again forces me to evaluation. I shall not judge a performance according to
> the rules of interpretation, the constraints of style (anyway highly illusory),
> which almost all belong to the pheno-song […], but according to the image
> of the body (the figure) given me. I can hear with certainty – the certainty
> of the body, of thrill – that the harpsichord playing of Wanda Landowska
> comes from her inner body and not from the petty digital scramble of so
> many harpsichordists (so much so that it is a different instrument).
> (Barthes, 1977: 188-9)

Despite Migone's editorial mediations, the sounds of the cracks become nothing but the presence of the body in the geno-song. Additionally, the concept of grain also serves partially to account for a particularly bodily response to listening to music. Barthes describes 'an individual thrill' that he experiences when listening to singing (Barthes, 1977: 181). This underpins a particular orientation in listening which, similarly to Le Guin, allows him to posit a bodily, erotic relationship with the musician producing the sound: 'I am determined to listen to my relation with the body of the man or woman singing or playing and that relation is erotic – but in no way 'subjective' (it is not the psychological 'subject' in me who is listening; the climactic pleasure hoped for is not going to reinforce – to express – that subject but, on the contrary, to lose it.)' (Barthes, 1977: 188). Yet my sense of jouissance – or of a bodily relationship – in *Crackers* is hardly erotic. If the sense of being a subject is lost, it is lost in the fever of contagion, of being moved by a psyche that is not mine, and by the ever present concern that the subjectivity I am invited to share is machinic, rather than human.

While *A Chance to Cut is a Chance to Cure* samples sounds of the body, it places these sounds within an almost standard dance music context, alongside sounds with less direct bodily origins. Although the work does explore the timbres of the sampled sounds, attention to this is often subsumed within larger musical structures and patterns. Migone's approach in *Crackers* is somewhat different, focusing primarily on sounds of just one type and offering an exploration of their rhythmic and timbral qualities. The bodily grain of the crack becomes a fragment to be manipulated by the computer. Migone uses precise, manual editing techniques to create an effect strongly reminiscent of granular synthesis, a technique frequently used in microsound composition. This approach makes use of a perceptual level not normally available without technological mediation:

> Beneath the level of the note lies the realm of microsound, of sound
> particles. Microsound particles remained invisible for centuries. Recent

> technological advances let us probe and explore the beauties of this
> formerly unseen world. (Roads, 2001: vii)

These microsounds are 'on a time scale that extends down to the threshold of auditory perception (measured in thousandths of a second or milliseconds)' (Roads, 2001: 4). Microsound composition may also exploit the bringing together of sound grains to form a particular timbre or texture, making grains that would not be noticeable in themselves part of a perceptual event. Roads cites rain drops and cicadas as examples of this. Migone creates a similar effect in *Crackers*, drawing together the separate grains or cracks and presenting them as texture, timbre, and rhythm.

Returning to Evens's phenomenological approach, in which hearing becomes activity rather than passive reception, different temporalities within music (such as pitch, rhythm and form) require different bodily framings, and different bodily responses mark different temporalities, the thresholds between them 'index[ing] powers of perception' (Evens, 2005: 36). The temporalities and percepts are inexplicably related: 'Each temporality compresses percepts into a complex knot of relations, not only drawing strands of time into continuous durations but tying them together in an unstable tangle' (Evens, 2005: 58). As noted in Chapter 3, the temporalities of sound are powers of the perceptive body: 'The body must compress time, it draws into a singular moment an interval of difference . . . To feel a rhythm means to feel the entirety of a beat all at once, even while anticipating the next beat' (Evens, 2005: 39). Similarly, other temporalities require 'an act of the body'. Perception of timbre or sonic texture requires a bodily compression of the sound in order to hear it as timbre, rather than as an agglomeration of different pitches. Furthermore, the body plays a role in the compression of form, 'viscerally expecting, for example, the resolution of a dissonance or the triumphant return of the theme' (Evens, 2005: 39). Thus *Crackers* can be seen to work across a number of different embodiments of time.

Hansen has written of the way in which certain digital artworks play with 'the confrontation of potentially incompatible embodiments of time: the lived affective temporality of human experience and the "intensive" time of machine processing' (Hansen, 2004: 235). Crucial to this distinction between temporalities is the idea that 'the former temporality centers around the fusion interval of the "now," which, neuroscience has recently informed us, lasts approximately 0.3 seconds.' Machine time, however, is '"beyond experience," that is, beneath the 0.3-second threshold' (Hansen, 2004: 235). The digital works with which Hansen is concerned extend perception, 'enlarg[ing] the window of the 'now'; and they do so, specifically, by drawing our perceptual attention to more fine-grained levels of stimuli' (Hansen, 2004: 235). The key feature is that they draw to consciousness 'microfluctuations' that were 'smoothed over, averaged over, hidden by the older perception and knowledge processes' (Strickland, quoted in Hansen, 2004: 235). The arrangement of materials in *Crackers* is also such that the differences between temporalities are explored. The embodied experience of hearing the cracking sounds and the felt, bodily mimetic resonance occupy divergent timescales. In presenting the cracks so they gather as 'lumps' of sound, Migone forces the cracking sound to cross the perceptual boundary between different temporalities.

Negotiating the differences between temporalities brings about an affective response. Hansen draws a link between the phenomenological notion of affectivity and the temporality of neuroprocessing, using Francisco Varela's work to provide a neural correlate of Husserl's account of internal time consciousness:

> Varela's account furnished the mechanism for machine time to affect time-consciousness: as constitutive elements of what we might call the microphysical temporal object, the elementary events [...] of a machine event, which are sub-perceptual, can trigger neural processes at this same microphysical scale, which are themselves likewise subperceptual. Yet rather than yielding a *direct* inscription of the microphysical temporal object, this process serves to trigger an endogenous response that Varela ... likens to a process of framing. (Hansen, 2004: 251)

A consequence of this is that the 'now' 'must be accorded a lived quality that makes it more than a mere point or temporal location through which an object passes, and indeed, [it becomes] more like a space in which we dwell' (Hansen, 2004: 251). For Hansen, in certain cases, machine time enlarges the frame of the now itself. This leads to machine time contaminating the 'now' with inhuman elements (Hansen, 2004: 252).

Hansen illustrates this 'technical contamination' through reference to *Quintet of the Astonished*, from Bill Viola's *Passions* series. In this work, Viola uses a particular technical capacity – the ability to shoot video at high speed – to slow down the image, 'enlarging the frame of the now', and making the visual manifestations of emotions more discernible.

> by presenting what psychoanalyst Daniel Stern has called "vitality affects" ...—that is, normally imperceptible facial cues that signal the very fact of the body's aliveness—the affective shifts on the faces of the represented figures trigger richly nuanced resonances in the body of the viewer. These resonances can be understood as a kind of embodied correlate of the microphysical stimuli themselves (i.e. the machinic registration of temporal phenomena). (Hansen, 2004: 261)

The physical manifestations of the emotions, which normally occur on a timescale below that which can be consciously recognised – are slowed down, in turn causing an embodied response in the viewer. Viola's *Quintet of the Astonished* disrupts the temporal link (or, as Hansen puts it, the perceptual coincidence) between the rate of film and the 'rate' of consciousness, due to its being 'oversaturated'. The link between the two time frames gives way instead to 'an affective contagion'. Consciousness is faced with 'what it cannot properly perceive' but that is the 'the condition out of which the perceivable emerges'. This causes a shift from perception to affection: 'In this incredibly intense experience, consciousness is made to live through (affectively, not perceptually) the very process through which it continually emerges, from moment to moment, as the selection from a nonlived strictly contemporaneous with it' (Hansen, 2004: 265). Likewise, in its focusing in on the grains of bodily and sonic popping, *Crackers* posits both a rate of consciousness and a mode of physical being in the body

that exist outside of the lived now.

Digital technology has not created its own unique 'listening position', but has influenced and extended those already available in a process that cannot be disentangled from its origins in particular techniques of listening. Through the use of recording technologies, the sounds of the body can be separated from their source and re-presented in a musical context, complicating the idea of a disembodied electronic music.

The shift to explicitly digital works presents the listener with a 'contamination' of the now with machine time. For Hansen, this leads to a bodily enframing of the digital image. In Hansen's theory, the digital image is no longer coterminous with the technical image, but with the 'affection image', or the embodied response engendered in the viewer. These 'affection images' 'cannot be identified with technical images' (Hansen, 2004: 269). For Hansen, this highlights a move beyond a cinematic framework' into what he terms 'the radicality of new media art' (Hansen, 2004: 269). Ultimately, 'affectivity names the capacity for the body to be radically creative, that is, to be the agent of a framing of digital information that generates images independently of all pre-existent technical forms' (Hansen, 2004: 266).

Despite Hansen's claim that if his theory holds true for vision then it must also apply to more bodily modes of sense perception such as hearing, works produced using digital audio technologies have only mirrored this move to a certain extent. However, digital audio technologies that allow the isolation and manipulation of sound grains potentially open up music and sound art made in such a way to creating a similar, affective response. From my listening to *Crackers* it seems certain that the accumulations of the grains of the cracking joints cause a bodily response, but this affect is felt most strongly in response to the documentary-style tracks, when I am still able to associate the sound I hear with a particular bodily action via (implicit) mimetic participation. Once the link between the bodily action and the timescale in which it is ordinarily experienced is severed, this leads to a shift in affect. In conclusion, the

work once again offers a simultaneous presentation of body-as-object and body-as-subject, but the distinction must necessarily become blurred.

In this chapter I further developed an analysis based on (assumed) gesture and its reflection via the felt, mimetic participation of the listener, a move that grounds the analysis in the materiality of the performing and listening bodies. Such a method allows movement and sound and their qualities (for example, of tension and release) to be mapped. However, attending to larger-scale, structural elements of the work, something which happens as my listening shifts beyond identification of (and with) the cracking sound, this method becomes less useful. Here a return to examining compositional technique – particularly Migone's use of precise editing to explore both rhythmic and timbral qualities of the sound – proved useful. This was enhanced by understanding the role played by technical, and technological, factors. The analytical methodology was expanded further, to include a range of responses to stimuli other than gesture. This proved particularly significant in understanding how my experience of disgust was brought about and manipulated by the composer's treatment of the sonic materials. Incorporating such responses into analysis provides an experientially- and analytically-grounded basis from which to address the cultural practices that influence its reception. Basing the analytical method in listening incorporates the potential for mis-hearing or mis-identifying sounds, yet still allows this understanding to contribute to the account, understanding these 'mistakes' in terms of what they afford. Finally, drawing on new media theory (particularly the work of Mark Hansen) allows the role of the affective response of the body to be brought into analysis. This facilitates a focus on the role of the body in framing sound and on the affective consequences that arise from this process.

9. Conclusions

In the preceding three chapters I have offered case studies focused on my listening to three works which sample bodily sound: *Ground Techniques*, *A Chance to Cut is A Chance to Cure*, and *Crackers*. In order to shape and structure these case studies, and ground my listening in technical and musical features of the works, I adopted a number of listening or subject positions and found various methods of attending to gestures, sensations and affective responses. Adopting a range of different listening practices and perspectives has allowed for attention to both sonic and listening bodies, as well as to the technologically mediated practices that inform these.

Contrary to the notion of recorded sound as disembodied, the analyses of these works have shown that bodily presence in recordings may be much more complex and nuanced than simply configured as lack or as a cut. Human presence may be detected in gesture, in the direct presentation of the sounds of bodily presence, or through audible traces of will and intention. The absence of visible performers changes the ways in which the listener may identify presence, leading to a stronger reliance on audio information. The works analysed show a more complex pattern of presence and absence of the body than might be accounted for by simply mapping presence/absence onto a live/recorded binary. None of the works analysed could be presented live in their existing formats: all are reliant on technologies and processes that would be difficult or impossible to achieve in realtime. These analyses have also shown that we need to attend to the presence of the listening body in relation to musical experience.

Representations and Mediations of the Body

I return now to the first of the two research questions posed in the introduction: How is the body represented and mediated in contemporary compositions, particularly those that sample bodily sound?

As can be seen from the case studies, the (re)presentation of bodily sounds as musical materials, or as musicalised, does not necessarily negate their bodily origins. Within the context of these particular works the bodily origins of the sounds are celebrated, and treated as a central point of interest. Different bodies are presented together, all coming to stand in for the notion of *the* body. At the same time, there is constant shifting between different bodies and presences.

Use of the body as a sound source plays on ideas of sound recording as disembodied and of electronic sound as having no direct bodily origin. The splitting of sound from the body is set as a figure against the ground of bodily unity, a socio-cultural, historically informed position. A diverse range of bodily sounds are available to composers, and this range is widened further by adding medical and audio technologies as a supplement to the unaided ear. The compositions discussed here all draw frequently on sounds that might be expected to provoke disgust and engender a particular set of attitudes towards the body that can then be played with artistically. This is not necessarily representative of all compositions sampling the sounds of the body, however. For example Westerkamp's *Breathing Room*, as McCartney notes, may arouse feelings of calm or fear.

In all three case studies the body is something that can be cut up, dismantled, taken apart; and then, to a certain extent, put back together again. It is in the cutting that these bodies become musical and this is played off against the listening body that cannot fragment itself and therefore struggles to re-insert a bodily holism. Sampling practices within these pieces lead to the body as a collection of fragments – sonic and material – and actions. Like in

Wegenstein's theory, the use of samples in the case studies represents a shift in the body concept. Through the three case studies there is a move away from the holistic body, though at the same time, smaller and smaller fragments are able to stand in for it. The body here is represented through samples or fragments of sound, whereas a more traditional understanding of the body's role in shaping musical sound might be centered around the production of more continuous materials: flowing melodic lines, repeated or developing rhythms, or gradually shifting harmonies.

Any notion of bodily boundaries is quickly broken down in the constant traversing of the bodily margin between interior and exterior. This takes places not only through the representation of the *listened to* body – whose internal sounds are not only now made external, but now also mediated and rendered even more beyond the subject's control – but also the listening body, the inside of which resonates in response.

The represented and mediated bodies vary in their agency. The performing body comes to the fore in *Ground Techniques* and appears to have a significant role in shaping the musical outcome, even though ultimately it is the composer(ly body) that stitches the patches of performance together and creates the overarching structure of the work. However, Luck's verbal elucidation of the piece makes it hard for me to separate the two roles, even if as processes they remain distinct. At the opposite end of the spectrum are the bodies undergoing surgery on *A Chance to Cut is a Chance to Cure*. These tracks are all about the agency or power relation of one body over another. There is also one further level of mediation at work: while it is the surgeon who holds power over the patients' bodies, the results of the surgeon's actions are then ultimately chopped up by the composers. *Crackers* operates in the middle ground: while Migone retains the ultimate compositional control over the material (as highlighted by his editing techniques), the bodies documented in his work play an important, consciously active role in the initial production of the sound. However, perceived agency seems to be in

some way reliant not only on the role of the original body in producing the sound, but also on the amount of work that is required of, or done by, the composer in turning it into a musical work. Thus, for example, the performing bodies in Luck's piece are already producing musical sound, while the crackers are producing 'notes' and timbres but have no say over structure. In the latter two case studies especially, the body is subject to a high level of (technologically mediated) precision and control. Luck, however, because of his focus on the body as action rather than sound object, achieves a lesser degree of compositional control over the sounding bodies.

The use of sampling practices to reconfigure the musical subject shares analogies with the surgical re-configuration of the subject. This would seem obvious in the case of *A Chance to Cut is a Chance to Cure*, but also applies to the other works. Furthermore surgery, as has been noted, plays a role in the production of normative ideas of the body. This is set against the potential power of recorded sound to obscure non-normative bodies, forcing them to be heard as normative. Such distinctions are difficult to trace through sound, perhaps because so much of the cultural work that goes into the production of these categories is visual. However, sound is not completely divorced from these concerns, as Matmos's use of material from hearing tests demonstrates. Sounds can betray a fallible or leaking body as in *Crackers*, and in the art of medical diagnosis at least, sound can be used to identify non-normative or sick bodies (for example heart arrhythmias) in need of correction and cure. Similarly then, the recording and manipulation of sound can play out a power relationship. Further, in some cases the bodies are separated from their identities – either for confidentiality or because this information simply cannot be conveyed through sound alone. However, the analytical method proposed here nevertheless allows for an understanding of the representation of bodies without the visual context. The presence of the performing body is inferred aurally.

Just as the works analysed in the case studies renegotiate the physical makeup of the

subject, they also play a role in the negotiation of embodied subjectivity. The three provide different perspectives on the notion of the subject, enacting (or performing) dispersed subjectivities. The body in pieces lacks a graspable subjectivity as it is both subject and object at the same time as trying to see itself objectified. However, the subject is no longer contained by the borders of the skin or ego. This is replaced by a move beyond the fragmentation of the body-subject, towards the body as mediation.

These subjectivities are traced partly through attention to markers of subjective presence, as given through sonic evidence of corporeal liveness, over and above what Emmerson has termed 'psychological presence' (though this is also pursued in my analyses). The use of samples, insofar as they may contain traces of another subjectivity, complicate the possibility of hearing a work solely as the instantiation of the composer's own subjectivity, insofar as the samples come to embody a 'community' of performances. Furthermore, mediation technologies may increase the potential for detecting corporeal presence in sound. The possibilities of engaging with this live corporeal presence as representing a subject – and therefore engaging, as listener, with another subjective presence – is more complex. The corporeal presence must somehow be mapped onto, and squared with, the psychological presence. However, this is not necessarily reliant on the actual physical presence of either represented body or composer. In addition to the sense of bodily engagement, the process of analysis also allows for the possibility of distance, further reflection, hindsight and extended information gathering. Exploration of these psychological and intentional presences is aided by the adoption of subject positions within my listening.

It goes without saying that technology is strongly implicated in the mediation of the body. However, this is not restricted to the creation and reproduction of representations of the body (via sound), but is also implicated in the listening positions the analyst may adopt. While care must be taken to avoid a situation of technological determinism, audio technologies (and the

ways in which they are employed by composers), both shape the mediation of the represented body and influence the practices of the listening body, in turn (circuitously) shaping how the represented body is mediated. Moreover, medical technologies are used within the works directly to mediate knowledge about the body, invoking notions of the body as object. This was explored especially in my analysis of *A Chance to Cut is a Chance to Cure*, where the objects used to create medical knowledge themselves become objectified in musical sound. However, as the listening or subject positions can never coincide exactly with those of the physician or seeker of medical knowledge, this objectification is somewhat undermined.

While the bodies mediated through the compositions may conform to Wegenstein's tracing of the shift in the body concept from holism to fragmentation, the listening body might at first appear to remain strangely holistic, an ahistorical entity separated from and unaffected by the forces of mediation it seeks to trace. However, listening as a bodily practice is, to a certain extent, separated from the body in its technological extensions – a recursion and proliferation of the idea of audio technologies as bodily prostheses. Nevertheless, to consider them as prostheses is not enough. Audio technologies may alter listening practices and possibilities for occupying particular subject positions in relation to the material heard. In turn they alter the accompanying notion of subjectivity and the concept of the subject, playing out Wegenstein's view of the blurring of interior and exterior. Furthermore, when such works call for the listener to take note of her own body and subject position in relation to the work, as happens in Hansen's working through of affect, there is no longer any external subjectivity that may be referred to.

Listening in the Mirror

I turn now to the second of the research questions: How might the listener's experience as an

embodied subject be used in analysis of compositions which sample bodily sound, and what does it reveal about such works?

The various uses of gesture have proved a valuable analytical tool. This focus has allowed musical features to be grounded in the actions of a performing body, as well as enabling a space of musical exchange between the heard body and the listening body. Both bodies leave resonant traces in the production and framing of sonic gesture. The tracking of both sonic and implied physical gesture was far more useful as a tool than attempts to trace the origins of sounds, although the assumed bodily origin of many of the sonic materials formed a central part of my analyses. This is particularly relevant in the analysis of *A Chance to Cut is a Chance to Cure*, where I found it impossible to distinguish between the sounds of surgery and their imitation by the (more real than real) sounds of a straw and a glass of water.

The works analysed also offer different perspectives on the role and definition of gesture. As I argue in my analysis of *Crackers*, the piece derives quite explicitly from hundreds of distinct physical gestures, but these gestures are not combined in a way that leads to conventional musical motion. The piece remains fairly static in terms of the development of materials and dynamic range. Gesture, as discussed in relation to Western classical music, has generally been considered in units too small for the detection of harmonic structure. However, the theme of tension and release remains inherent in the sonic and physical materials of *Crackers* – and it is difficult to separate the two.

There are some points of contact between gesture and musical structure. For example, in *Ground Techniques* the players are following physical trajectories; gestures here are a structuring device rather than something that is meant to be seen or that might aid the clarification of musical understanding. Further pairing of gesture with attention to sensation and affect can lead to a more nuanced reading and show where these may support opposing meanings or be complimentary; an example of this is my response to a feeling of tension at the

breathing sounds in *Ground Techniques*, set against the release of tension that comes about through the (sonic) instrumental gestures.

There is a link between sound and the movement that accompanies or frames it – even if these are not gestures in the sense outlined in Chapter 3. A particularly striking example of this is Luck's use of breathing sounds. The traces of action and movement that are communicated by the sound have resonance within the listening body, offering a structuring of bodily experience as well as of the music. Further, there is a relationship between these bodily sounds and related actions and the (visceral experience of) instrumental gesture; this is especially so in *Ground Techniques,* where Luck has used a compositional technique that allows one to shape the other. The bodily sounds and their associated actions then come to overlap in the listening experience, i.e. the breathing informs the instrumental possibilities.

Personal and background experience are implicated throughout the process of analysis, from my cracking of my joints to my experience as a clarinettist. This in turn implicates embodied analysis as part of a larger, ongoing process of embodiment and of being a body in an environment. This is highlighted at various points within the text, from the anecdote about my cracking wrist joints given in the introduction, to the recalling of the embodied process through which I learned the relationship between breathing and sound production on the clarinet. Embodied analysis draws on past experience in an exploration of bodily differences and similarities in the space between listening and listened to bodies; as my analysis of *Ground Techniques* shows, I was brought to physical awareness of the differences between my bodily capacities and those of the performer when I found myself experiencing discomfort as a result of subconsciously trying to breathe along – effectively with the capacity of another's lungs.

The possibility of analysing gesture through mimetic participation offers a route to approaching recorded performance as embodied without recourse to the visual. It also opens the way to re-thinking presence and liveness. Sometimes, however, mimetic participations

might be disrupted or displaced as when, in my Matmos listening, I associate the sound with rubbing my eye or understand it as a sound I could make with my mouth; sounds and gestures can be mapped onto the wrong parts of the body. Embodied analysis must move beyond a simple mirroring or mimicry at either a physiological or musical level. Furthermore, in the pieces discussed here, at least, gesture must be considered in light of its technological mediation. As I noted in Chapter 6, the process of mapping sonic gesture with physical gesture may be disrupted through the use of electronic technologies. This is closely tied to the idea of recorded sound as disembodied; it is the recording technology that allows the sound to be stored and then played back at a time and location separate from the body that originally produced the sound.

In addition, technologically-facilitated aesthetic processes such as sampling have an impact on the listener's understanding of gesture. Sampling cuts up gesture, either isolating it or disrupting it. This act has the potential to sever gesture from the physical capabilities of the body. Bodily movements can in this way be altered so much that they portray a different (and possibly conflicting) action: for example, the cracking in *Crackers* is too fast, or the cracks too close together, to be located in one human body occupying the same temporal and spatial orientation as the listener. Sampled gestures (either sonic or physical) may also be aestheticised, musicalised and used to drive musical motion in a way that has no connection to the original movement that shaped the sound.

Attending to the sensations of the listening body has also proved useful as a research tool, particularly in supporting gesture-based readings of these works. It has proved valuable in writing the materiality of the listening body into the analyses. In addition to the sensations arising from a mimetic response (such as the breath-related tension, or feelings of disgust), they may arise, following Meelberg, due the affective effect of framing sound as gesture or, following Hansen, due to spatio-temporal changes offered by the medium.

Hansen's focus on affectivity returns a power to the body that it has perhaps lost under the surgeon's knife, and in much of the critical discourse surrounding cosmetic surgery. However, Hansen's theories have been criticised for their lack of attention to the social (Dyson, 2009: 128) and to the practices that inscribe the body. Despite these limitations, using these aspects of new media theory to approach digitally-mediated composition can open up a more nuanced approach to disembodiment in electronic music and provide a way into theorising the listening experience. This affective presence of the body is played out against a ground in which phonography is understood to have separated audible presence from physical experience – or to have 'deboned' the voice as Kahn puts it – and in which the aesthetics of media practices such as radio are seen to have excised all traces of the body in sound, as if to de-flesh the sonic presence.

The reconfiguring of formal and spatial dimensions may also cause an affective supplement, as shown through the application of Hansen's theory to *A Chance to Cut is a Chance to Cure*. This is exemplified by the possibility of the listener being placed in different spatial relationships among composed bodies, an experience that also takes place within the actual space of the body and the listening location.

Similarly, the perception of grain leads to a bodily, sensual, perhaps pleasurable experience for the listener through its material affect on perception. Pursuing this idea of 'grain' as the object of study allows reflection between listening body and composing body, although the works discussed here do not permit a full exploration of this, but developing this approach further would, for example, provide a materially grounded starting point for claims such as those put forward by Rodgers about the grain of the composer's body and the implication of the composer's physicality in the composition process being communicated. Additionally, examining sensation and gesture alongside more structural elements of the pieces allows for understanding of where hermeneutic readings of each may coincide or

contradict, as for example in *Crackers*, where the release of tension contained in the crack is not reflected in the wider structuring of the musical tracks. The tracing of gesture in recordings and the subsequent mimetic response of the listening body also complicates notions of presence and absence. Ultimately the 'body' of embodied analysis can never be fully the one or the other – listener or listened to – but exists in a state of negotiation founded on listening.

It is important that both gestures and sensations are explored within a framework that allows attention to be paid to the cultural conditions in which they come to have meaning. As Le Guin notes: 'In the end what a bodily sensation *is*, as an experience, can only be approached through what it *means* within the culture that introduced that body to itself in the first place' (Le Guin, 2006: 6). I have attempted to include this, combining attention to gesture and sensation with the locating of my listening in, or as, certain subject positions. While these subject positions are afforded by the musical materials, they also are subject to wider cultural conditions.

Taking the subject positions afforded by the music as a centre around which to weave the analytical methodology allows me to take in the wider affects of the sound beyond the physical, but also to understand musical outcomes in terms of the interactions of the physical affects with each other and with emotional or conscious responses. Where the subject position afforded overlaps with the subjectivity of the listener, this provides fertile ground for further analysis of how music and embodiment mutually intertwine.

The position the listener listens from is strongly shaped by audio technologies. For example, my analysis of *A Chance to Cut is a Chance to Cure* shows how the subject positions available are somewhat determined by audile technique. Matmos play with the objectifying mode of listening developed by medical practitioners. Lacking the requisite medical knowledge, the listener can never occupy the same subject position as the physician. However, the subject positions are not wholly subject to technological determination. The different

subject positions manipulate the possibility of the sample as 'aestheticized bits of sound', or in terms of a wider referentiality. Even where the origin of a sample is unclear, all three works are surrounded by contextual information presented in such a way that a bodily origin will likely be inferred.

A Final Audit

This thesis charts a reflexive process of listening to the body, reflecting the body that is heard via that body that hears. To a certain extent, both are constructed through the process of listening – a process that is itself shaped and informed by the adoption of the focus on embodied analysis – and listening itself becomes an act of mediation. The body is not only reflected in the mirror, it is also the mirror's frame, as my development of Hansen and Wegenstein's work begins to suggest.

Through the case studies I propose a set of tools with which to begin untangling processes and practices of embodiment in technologically mediated music. The primary emphasis of this particular orientation is on listening; most particularly on listening as irreducible to score or structure and as located in a body that is not reduced to the ear or cognitive processes. The methodological tools here sketch a path towards incorporating bodily experience into analysis in a manner that is potentially intersubjective and can also be mapped onto both features in the sound and technological processes of mediation. My analytical methodology enables a reading that takes both the listening body and other musical or sonic bodies into account. However, the work does not – and cannot – offer a precise and repeatable method, as it is tied to the material conditions of the individual works under consideration. Instead it offers an orientation that might suggest particular approaches to the analysis of other works and provides a selection of 'tools' that may be transformed for use in the new context. It has been

necessary to draw on a range of perspectives (including feminist musicology, studies of music and gesture, embodied cognition, music psychology, and new media theory) in order to provide a broader perspective than could have been offered by any one method alone, and to avoid reducing the body to one physical process or theoretical position.

Embodied analysis has allowed for attention to be paid to sound as a material phenomena and the material, particularly bodily, affects it causes. Embodied analysis, taken as a process – the results of which can be open to further reflection at any stage – does not seek to offer a final, comprehensive reading of the works, but to allow for a reading of different perspectives along the route of listening. While it is not necessarily inconsistent with acting as a supplement to structural analysis (which is, to a certain extent, what is achieved in Fisher & Lochhead's and Aksnes's analyses, which show how bodily experiences inform structural elements of the score at the levels of creation and reception) it is also able to act as an analysis of the process of perception and understanding. In this way it is able to take into account materialities and sensations and yet leave them tied to the musical listening experience. This is in contrast to more empirical methods, which can account in some detail for particular responses to music but rarely seem to take into account the musical nature of the response itself.

Embodied analysis as described here is also highly reliant on the possibility of its own performativity. For Phelan, performance comes into being through its disappearance, and thus a performative embodied analysis is always writing its existence at the moment it disappears; a writing that problematises its very self-notion of being performed. In re-stating and re-staging the bodily framing of what is heard *as music*, something is always lost between bodies and texts. Contrary to this, the possibilities for re-playing the recording, for re-listening and hearing what was not heard in previous listenings, allows for a more complete picture of the body to be built up. It also affords multiple (re)inscriptions of the listening body. It is tempting to fall into the trap of assuming that later listening, informed by further supplementary

information such as interviews with the composer or the writings of other theorists, occupies a superior position, a stronger claim to objective truth. This need not necessarily be the case with embodied analysis.

In many ways, these methodological explorations have posed more questions than they have answered. Certainly there is more work to be done. While Hansen's theories proved a useful way to explore the disjunction of internal and external space, further work is needed to explore how affect arises in digitally mediated musical (rather than visual) experience, and how it may be incorporated into analysis. This might best be achieved by returning to the first principles of Hansen's study, and considering them in relation to Bergson's notion of the sonic image. This concept, as Rawes notes, is 'composed of the movement from the perceptible to imperceptible perception of changes in sonic events, vibrations and frequencies, together with the gradual sedimentation of memories and feelings, into perceptible durational images of spatio-temporal relations' (Rawes, 2008: 66). Rawes's notion of sonic envelopes (which are generated out of 'a concatenation of past, present and future durations' (Rawes, 2008: 73)) may be useful. Such a study would necessarily be a lengthy one, and for that reason is not attempted in detail here.

Another productive further study would be to test the applicability of this collection of theoretical tools to other musics. There remains further scope for developing a link between music and the work of the new media theorists drawn on here. In particular, this should consider theories that posit new materialities, hapticities or modes of bodily engagement, especially with reference to more inherently digital musics such as those utilising microsound techniques or granular synthesis, for example. The methodological tools proposed here may be particularly appropriate in the analysis of interactive, immersive or installed sound works that sample the sounds of the body.

This thesis has proposed some tentative answers to the research questions posed in the

introduction, uncovering how the body is represented and mediated through the sampling of

bodily sound, and how the listener's embodied experience can be used as a tool for analysis. It

offers suggestions as to how the role of the listening body and subject as constituted in

relation to the three analysed pieces may be explored. It further develops work on listening

from particular subject positions, exploring these in light of changing notions of the subject

and subjectivity, as positioned in the lens of new media theory. This has also offered a way of

tracking changes in the body concept as manifested in music. Finally, this thesis adds to the

literature on *Ground Techniques*, *A Chance to Cut is a Chance to Cure*, and *Crackers*, providing

readings that are, I believe, in keeping with the artists' concerns with the body. It plays out

what an embodied analytical method might look like and what it may *feel* like. It lends an ear

to the body.

Appendix 1

The following table gives an indication of the field of practice from which the case study works are drawn; it cannot be exhaustive, but rather aims to demonstrate the range of work in this area. In addition to pieces that make direct use of phonographic recordings of the body, the list also includes works that incorporate other forms of recording and sonification of the body and its physiological processes. Dates of composition (or release) and further details are given where known.

1950	Pierre Schaeffer and Pierre Henry	*Symphonie pour un Homme Seul*	Turntable work featuring the sounds of man-as-instrument (e.g. footsteps, breathing, groaning).
1965	Alvin Lucier	*Music for Solo Performer*	For amplified brainwaves and percussion.
1966	John Cage	*Variations VII*	Features sounds from the heart and stomach.
1968	Stockhausen	*Verbindung*	Requires a violinist to play 'vibrations' in the rhythms of the body, heart and breathing, among others.
1972	Zoltan Pongracz	*Mariphonica*	A tape work based on non-verbal body sounds and the physical dimensions of the body of the composer's wife.
1975	Linda Montano	*Heart Murmur*	Performance art piece in which the performer taped a stethoscope to her chest for three days.
1984	John Cousins	*Membrane*	7-hour performance piece in which the artist urinates onto rubber membranes, producing percussive sounds.

1985	Vinko Globokar	*Corporel*	The performer's body is used as a percussion instrument.
1990	Hildegard Westerkamp	*Breathing Room*	Samples breathing sounds.
1994-5	David Rosenboom	*On Being Invisible*	A multimedia performance work using brainwaves.
1995	Lauren Lesko	*Thirst*	Sound work in which the artist uses a contact microphone to amplify the sounds of the inside of her vagina.
1997	Aube	*Throb in Manic Red/ Sigh in Depressive Blue/ Vas in Euthymic Violet*	Three albums made using only the sounds of the human heart, lungs and vascular system. (Praxis Dr Bearmann TH26A / TH26B/TH26C)
1997	Shawn Decker and Jan-Erik Andersson	*Music from the Well-Fed Abyss*	Live performance sampling digestive sounds.
1997	Seiko Mikami	*World, Membrane, and the Dismembered Body*	Installation. Sounds of the listener's internal organs are amplified.
1998	Ryoji Ikeda	'C7 Continuum' from *0°*	The sound of an organic heartbeat underpins the sounds of high-frequency mechanical pulses.
1998	Garth Paine	*Escape Velocity*	A soundtrack comprising both electrical sounds and sampled bodily sounds. Interactive piece with dancers – sounds triggered by movement.
1999	Maryanne Amacher	*Sound Characters (Making the Third Ear)*	Creates the psychoacoustic illusion that the sounds originate inside the listener's head.

1999	Fennesz / Zeitblom / Rantaša	*Music for an Isolation Tank*	Samples bodily sound. Intended to be listened to lying in the dark. (Rhiz CD RHIZ007)
2000	Bruce Gilchrist and Jonny Bradley	*Thought Conductor #2*	EEG and string quartet. Uses biofeedback.
2001	Laurie Anderson	*Happiness*	Sunglasses fitted with impulse sensors amplify the sound of Anderson's teeth clicking, and the sound of her hitting her shoulder with her hand.
2001	Herbert	*Bodily Functions*	Includes the sounds of teeth rattling and laser eye surgery.
2001	Miya Masaoka	*Thinking Sounds*	An interactive piece that uses live and pre-recorded brainwaves.
2001	Miya Masaoka	*What is the Sound of Ten Naked Asian Men?*	A performance which draws on medical equipment including EKG, EEG, and fetal heart monitors.
2001	Christof Migone	*Crackers*	Composed from the sounds of cracking joints.
2001	Matmos	*A Chance to Cut is a Chance to Cure*	Samples the sounds of cosmetic surgery, among others.
2002	Jaap Blonk and Radboud Mens	*Bek*	An album that uses the fleshy mouth as a sound source. Uses beat-boxing to imitate electronic dance music.
2002	Thomas Fitzgerald	'Inside Tears' from *Seeming Insanity of Forgiveness*.	An installation that incorporates the sounds of dripping blood and tears – samples of both internal and external sounds of the body.

2003	James Fung	*Regenerative Music*	A computer is used to measure physiological signals (heart beat, respiration, brain waves) from the performer. These are then used to influence the behaviour of the musical instrument.
2003	Christof Migone	*<<I>>*	Made from sounds produced by the physical manipulation of the eyeball.
2004	Julian Weaver	*Respirer*	Sound work and installation. An audience member undergoes a medical examination and the sounds of his/her lungs are amplified.
2005-6	George Khut	*Cardiomorphologies*	The sounds of breathing and heartbeats are transformed into a 'gentle soundscape'.
2007	Various	*Music Overheard*	Compilation CD. Disc 2 takes the sounding body as its central theme.
2007	Harry Neve, Anna Orliac and Thomas Michalak	*Sonic Body*	Multi-sensory installation. Touching replica organs within the installation leads to playack of various (pre-recorded) bodily sounds.
2008	Camille	*Music Hole*	An example of the use of body percussion in pop music.
2010	Neil Luck	*Ground Techn iques*	Pieced together from recorded performance actions, determined by the composer's use of his body as a 'score'.
2011	Anna Meredith	*HandsFree*	An 'orchestral' piece featuring body percussion and beatboxing.

Bibliography

Abbate, Carolyn (2004). 'Music—Drastic or Gnostic?' *Critical Inquiry* 30/3: 505-536.

Adshead-Lansdale, Janet (2002). 'Siren Sensualities in Physical Theatre,' in *Music, Sensation, and Sensuality* edited by Linda Phyllis Austern. New York: Routledge, 121-136.

Ahmed, Sara and Jackie Stacey (eds.) (2001). *Thinking Through the Skin.* London: Routledge.

Aksnes, Hallgjerd (2002). 'Music and its Resonating Body,' *Dansk Arbog for Musikforskning* 29 : 81-101.

Al-Mohammad, Hayder (2011). 'Less Methodology More Epistemology Please: the Body, Metaphysics and 'Certainty,' *Critique of Anthropology* 31/2: 121-138.

Altman, Rick (ed.) (1992). *Sound Theory, Sound Practice*. New York: Routledge.

Alvarez, Javier (1989). 'Rhythm as Motion Discovered,' *Contemporary Music Review* 22/1: 203-231.

Andean, James (2011). 'Ecological Psychology and the Electroacoustic Concert Context,' *Organised Sound*: 16/2: 125-133.

Armstrong, Tim (1998). *Modernism, Technology and the Body: A Cultural Study*. Cambridge: Cambridge University Press.

Atkinson, Michael (2008). 'Exploring Male Femininity in the 'Crisis': Men and Cosmetic Surgery,' *Body & Society* 14: 67-87.

Attali, Jacques (1985). *Noise: The Political Economy of Music*. Translated by Brian Massumi. Mineapolis: University of Minnesota Press.

Attinello, Paul (2004). 'Passion/Mirrors (A Passion for the Violent Ineffable: Modernist Music and the Angel / In the Hall of Mirrors),' in *Beyond Structural Listening? Postmodern Modes of Hearing*, edited by Andrew Dell'Antonio. Berkeley and Los Angeles: University of California Press, 154-172.

Auslander, Philip (1999). *Liveness: Performance in a Mediatized Culture*. London and New York: Routledge.

Austern, Linda Phyllis (ed.) (2002). *Music, Sensation, and Sensuality.* New York: Routledge.

Ayrey, Craig and Mark Everist (eds.) (2004). *Analytical Strategies and Musical Interpretation: Essays on Nineteenth- and Twentieth-Century Music.* Cambridge: Cambridge University Press.

Bahn, Curtis, Tomie Hahn, Dan Trueman (2001). 'Physicality and Feedback: A Focus on the Body in the Performance of Electronic Music,' *Proceedings of the International Computer Music Conference*: 44-51.

Barkin, Elaine and Lydia Hamessley (eds.) (1999). *Audible Traces: Gender, Identity, and Music.* Zürich and Los Angeles: Carciofoli Verlagshaus.

Barreiro, Daniel L. (2010). 'Sonic Image and Acousmatic Listening,' *Organised Sound* 15/1: 35-42.

Barthes, Roland (1977). 'The Grain of the Voice,' in *Image Music Text*. Essays selected and translated by Stephen Heath. London: Fontana Press, 179-189.

Bartlett, D. L. (1996). 'Physiological Responses to Music and Sound Stimuli,' in *Handbook of Music Psychology,* edited by D. A. Hodges. St Louis, MO: MMB Music, 343-385.

Batstone, Philip (1969). 'Musical Analysis as Phenomenology,' *Perspectives of New Music* 7/2: 94-110.

Baumann, Max-Peter, and Linda Fujie (eds.)(1999). *Hearing and Listening in Cultural Contexts: The World of Music* 41/1.

Beard, David and Kenneth Gloag (2005). *Musicology: the Key Concepts*. London: Routledge.

Berger, Harris M. (1999). *Metal, Rock, and Jazz : Perception and the Phenomenology of Musical Experience*. Middletown, CT: Wesleyan University Press of New England.

Berghaus, Günter (2005). *Avant-Garde Performance: Live Events and Electronic Technologies*. Basingstoke: Palgrave Macmillan.

Bermúdez, José (2003). *Thinking Without Words*. Oxford: Oxford University Press.

Bermúdez, José Luis, Anthony Marcel and Naomi Eilan (1998). *The Body and the Self*. Cambridge, MA: MIT Press.

Bidner, Stefan and Thomas Feuerstein (eds.) (2004). S*ample Minds: Materials on Sampling Culture*. Cologne: Verlag Walter König.

Bigwood, Carol (1998). 'Renaturalizing the Body (with the Help of Merleau-Ponty),' in *Body and Flesh: A Philosophical Reader,* edited by Donn Welton. Malden, MA.: Blackwell, 99-114.

Birdsall, Carolyn and Anthony Enns (eds.)(2008). *Sonic Mediations: Body, Sound, Technology*. Newcastle: Cambridge Scholars Press.

Blackman, Lisa (2008). *The Body: the Key Concepts*. Oxford: Berg.

Blackman, Lisa and Couze Venn (2010). 'Affect,' *Body & Society* 16/1: 7-28.

Blackman, Lisa (2010). 'Bodily Integrity,' *Body & Society* 16/1: 1-9.

Bogdan, D. (2001). 'Musical Listening and Performance as Embodied Dialogism,' *Philosophy of Music Education Review* 9/1: 3-22.

Bolter, Jay David and Richard Grusin (1999). *Remediation: Understanding New Media*. Cambridge, MA: MIT Press.

Born, Georgina (2005). 'On Musical Mediation: Ontology, Technology and Creativity,' *Twentieth-Century Music* 2/1: 7-36.

Bosma, Hannah (2003). 'Bodies of Evidence: Singing Cyborgs, and Other Gender Issues in Electrovocal Music,' *Organised Sound* 8/1: 5-17.

Bosma, Hannah (2006). 'Musical Washing Machines, Composer-Performers, and other Blurring Boundaries: how Women make a Difference in Electroacoustic Music,' *Intersections: Canadian Journal of Music* 26/2: 97-117.

Bossis, Bruno (2004). 'Reflections on the Analysis of Artificial Vocality: Representations, Tools and Prospective,' *Organised Sound* 9/1: 91-98.

Bossis, Bruno (2006). 'The Analysis of Electroacoustic Music: from Sources to Invariants,' *Organised Sound* 11/2: 101-112.

Bradby, Barbara (1993). 'Sampling Sexuality: Gender, Technology and the Body in Dance Music,' *Popular Music* 12/2: 155-176.

Braun, Hans-Joachim (ed.) (2000). *'I Sing the Body Electric': Music and Technology in the 20th Century.* Hofheim: Wolke.

Braun, Reinhard (2004). 'Re-Cycling, Re-Formating, Re-Morphing, Re-Sampling,' in S*ample Minds: Materials on Sampling Culture*, edited by Stefan Bidner and Thomas Feuerstein. Cologne: Verlag Walter König, 284-290.

Brent, Gillespie (1999). 'Haptics,' in *Music, Cognition, and Computerized Sound: An Introduction to Psychoacoustics*, edited by Perry R. Cook. Cambridge, MA: MIT Press, 229-245.

Brett, Philip (1997). 'Piano Four-Hands: Schubert and the Performance of Gay Male Desire,' *19-Century Music* 21/2: 149-176.

Brett, Philip, Elizabeth Wood, and Gary C. Thomas (eds.) (1994). *Queering The Pitch: The New Gay and Lesbian Musicology*. New York and London: Routledge.

Bridger, Michael (1989). 'An Approach to the Analysis of Electroacoustic Music Derived from Empirical Investigation and Critical Methodologies of Other Disciplines,' *Contemporary Music Review* 3/1: 145-160.

Broadhurst, Susan (1999). 'The (Im)mediate Body: A Transvaluation of Corporeality,' *Body & Society* 5/1: 17-29.

Broadhurst, Susan (2007). *Performance and Technology: Practices of Virtual Embodiment and Interactivity*. Basingstoke: Palgrave.

Brodeur, Raymond (1995). 'The Audible Release Associated with Joint Manipulation,' *Journal of Manipulative and Physiological Therapeutics* 18/3: 155-164.

Brophy, Jessica E. (2010). 'Developing a Corporeal Cyberfeminism: beyond cyberutopia,' *New Media & Society* 12/6: 929-945.

Browne, Richard (1729). *Medicina Musica: A Mechanical Essay on Singing, Music and Dancing. Containing Their Uses and Abuses, and Demonstrating by Clear and Evident Reasons, the Alterations They Produce in a Human Body.* London.

Buchanan, Ian (1997). 'The Problem of the Body in Deleuze and Guattari, Or, What Can a Body Do?' *Body and Society* 3/3: 73-91.

Buchanon, Thomas (1825). *Illustrations of Acoustic Surgery*. London: Longman, Hurst & Co.

Bull, Michael and Les Black (eds.) (2003). *The Auditory Culture Reader.* Oxford: Berg.

Bull, Michael, Paul Gilroy, David Howes and Douglas Kahn (2006) 'Introducing Sensory Studies,' *Senses & Society* 1/1: 5-8

Butler, Judith (1988). 'Performative Acts and Gender Constitution: An Essay in Phenomenology and Feminist Theory,' *Theatre Journal* 40/4: 519-531.

Butler, Judith (1990). *Gender Trouble: Feminism and the Subversion of Identity.* London and New York: Routledge.

Butler, Judith (1993). *Bodies That Matter: On the Discursive Limits of "Sex".* New York and London: Routledge.

Cain, Nick (2007). 'Concussion Discussion,' *The Wire* 285: 14-15.

Camilleri, Lelio, and Denis Smalley (1998). 'The Analysis of Electroacoustic Music: Introduction,' *Journal of New Music Research* 27/1-2: 3-12.

Carman, Taylor (1999). 'The Body in Husserl and Merleau-Ponty,' *Philosophical Topics* 27: 205-226.

Carozzi, Maria Julia (2005). 'Talking Minds: The Scholastic Construction of Incorporeal Discourse,' *Body & Society* 11: 25-39.

Carpenter, Patricia (1967). 'The Musical Object', *Current Musicology* V: 56-87.

Cascone, Kim (2003). 'Grain, Sequence, System: Three Levels of Reception in the Performance of Laptop Music,' *Contemporary Music Review* 22/4: 101-104.

Castellano, Ginevra, Marcello Mortillaro, Antonio Camurri, Gualtiero Volpe, and Klaus Scherer (2008). 'Automated Analysis of Body Movement in Emotionally Expressive Piano Performances,' *Music Perception* 26/2: 103-119.

Castellanos, Jorge and David Axelrod (1990). 'Effect of Habitual Knuckle Cracking on Hand Function,' *Annals of the Rheumatic Diseases* 49: 308-309.

Castañeda, Claudia (2001). 'Robotic Skin: the Future of Touch?' in *Thinking Through the Skin,* edited by Sara Ahmed and Jackie Stacey. London: Routledge, 223-237.

Causey, Matthew (2009). 'Digital Practices: Aesthetic and Neuroesthetic Approaches to Performance and Technology [review],' *Contemporary Theatre Review* 19/2: 237-239.

Cerbone, David (2006). *Understanding Phenomenology*. Durham: Acumen.

Chagas, Paulo (2006). 'The Blindness Paradigm: the Visibility and Invisibility of the Body,' *Contemporary Music Review* 25: 119-130.

Chion, Michel (1990). 'Seul,' in *Pierre Schaeffer – l'oeuvre musicale.* Paris: Librairie Seguier, 17-18.

Clarke, Eric and Nicholas Cook (eds.) (2004). *Empirical Musicology: Aims, Methods, Prospects*. Oxford: Oxford University Press.

Clarke, Eric and Jane W. Davidson (1998). 'The Body in Performance,' in *Composition, Performance, Reception: Studies in the Creative Process*, edited by Thomas Wyndham. Aldershot: Ashgate, 74-92.

Clarke, Eric (2005). *Ways of Listening: an Ecological Approach to the Perception of Musical Meaning*. Oxford: Oxford University Press.

Clarke, Eric F. (2007). 'The Impact of Recording on Listening,' *Twentieth-Century Music* 4/1: 47-70.

Clifton, Thomas (1973.) 'Music and the A Priori,' *Journal of Music Theory* 17: 66-85.

Clifton, Thomas (1975). 'Some Comparisons between Intuitive and Scientific Descriptions of Music,' *Journal of Music Theory* 19/1: 66-110.

Clifton, Thomas (1976a). 'Music as Constituted Object,' *Music and Man* 11: 73-98.

Clifton, Thomas (1976b). 'The Poetics of Musical Silence,' *Musical Quarterly* 62/2: 163-81.

Clifton, Thomas (1983). *Music as Heard: A Study in Applied Phenomenology*. New Haven: Yale University Press.

Conboy, Katie, Nadia Medina, and Sarah Stanbury (eds.) (1997). *Writing on the Body: Female Embodiment and Feminist Theory*. New York: Columbia University Press.

Concannon, Kevin (1990). 'Cut and Paste: Collage and the Art of Sound,' in *Sound by Artists,* edited by Micah Lexier and Dan Lander. Toronto and Banff: Art Metropole and Walter Philips Gallery, 161-182.

Connor, Steven (1997). 'Feel the Noise: Excess, Affect and the Acoustic,' in *Emotion in Postmodernism*, edited by Gerhard Hoffmann and Alfred Hornung. Heidelberg: Universitätsverlag Carl Winter, 147-162.

Connor, Steven (2004). 'Edison's Teeth: Touching Hearing,' in *Hearing Cultures: Essays on Sound, Listening, and Modernity*, edited by Veit Erlmann. Oxford and New York: Berg, 153-172.

Cook, Nicholas (1987). *A Guide to Musical Analysis*. Oxford: Oxford University Press.

Cook, Nicholas (1998). *Analysing Musical Multimedia*. Oxford: Oxford University Press.

Cook, Nicholas (1983). 'Review of *Music as Heard: A Study in Applied Phenomenology* by Thomas Clifton,' *Music Analysis* 2/3: 291-294.

Cook, Susan C. (1999). 'Watching Our Step: Embodying Research, Telling Stories,' in *Audible Traces: Gender, Identity and Music,* edited by Elaine Barkin and Lydia Hammessley. Zürich and Los Angeles: Carciofoli Verlagshaus, 177-212.

Corbett, John and Terri Kapsalis (1996). 'Aural Sex: The Female Orgasm in Popular Sound,' *TDR* 40/3: 102-111.

Corness, Greg (2008). 'The Musical Experience through the Lens of Embodiment,' *Leonardo Music Journal* 18: 21-24.

Counsell, Colin and Laurie Wolf (eds.) (2001). *Performance Analysis: An Introductory Coursebook*. London: Routledge.

Cox, Arnie (2001). 'The Mimetic Hypothesis and Embodied Musical Meaning,' *Musica Scientiae: The Journal of the European Society for the Cognitive Sciences of Music 5*/2: 195-212.

Cox, Arnie (2006). 'Hearing, Feeling, Grasping Gestures,' in *Music and Gesture,* edited by Anthony Gritten and Elaine King. Aldershot: Ashgate, 45-60.

Croft, John (2007). 'Theses on Liveness,' *Organised Sound* 12/1: 59-66.

Cruz, Gabriela (2007) 'How Musical is Gesture? [review of Mary Ann Smart. 2004. *Mimomania: Music and Gesture in Nineteenth-Century Opera*. Berkeley and Los Angeles: University of California Press.]' *Current Musicology* 84: 127-137.

Csordas, Thomas J. (ed.) (1994). *Embodiment and Experience.* Cambridge: Cambridge University Press.

Csordas, Thomas J. (1999). 'Embodiment and Cultural Phenomenology,' in *Perspectives on Embodiment,* edited by G. Weiss, and H. Haber. New York and London: Routledge, 143-162.

Cumming, Naomi (2000). *The Sonic Self: Musical Subjectivity and Signification*. Bloomington: Indiana University Press.

Cusick, Suzanne (1994). 'Music Theory and the Mind/Body Problem,' *Perspectives of New Music* 32/1: 8-27.

Dack, John (2002). 'Abstract and Concrete,' *Journal of Electroacoustic Music* 14: 2-7.

Damasio, Antonio (1996). *Descartes' Error: Emotion, Reason and the Human Brain*. London and Basingstoke: Papermac.

Damasio, Antonio (2000). *The Feeling of What Happens: Body, Emotion and the Making of Consciousness.* London: Vintage.

Davidson, Jane (2001). 'The Role of the Body in the Production and Perception of Solo Vocal Performance: A Case Study of Annie Lennox,' *Musica Scientia: The Journal of the European Society for the Cognitive Sciences of Music* 5/2: 235-256.

Davies, Hugh (1996). 'A History of Sampling,' *Organised Sound* 1/1: 3-11.

Debellis, Mark (1995). *Music and Conceptualization*. Cambridge: Cambridge University Press.

Dell'Antonio, Andrew (ed.) (2004). *Beyond Structural Listening? Postmodern Modes of Hearing*. Berkeley and Los Angeles: University of California Press.

DeNora, Tia (1997). 'Music and Erotic Agency – Sonic Resources and Social-Sexual Action,' *Body & Society* 3/2: 43-65.

DeNora, Tia (2000). *Music in Everyday Life*. Cambridge: Cambridge University Press.

Detsi-Diamanti, Zoe, Katerina Kitsē-Mytakou and Effie Yiannopoulou (2007). *The Flesh Made Text Made Flesh: Cultural and Theoretical Returns to the Body.* New York: Peter Lang.

Dibben, Nicola (2006). 'Subjectivity and the Construction of Emotion in the Music of Björk,' *Music Analysis* 25/1-2: 171-197.

Diederichsen, Diedrich (2004). 'A Dialectic of Clicks & Cuts – Or: Is Electronic Music Pop Music?' in S*ample Minds: Materials on Sampling Culture,* edited by Stefan Bidner and Thomas Feuerstein. Cologne: Verlag Walter König, 342-357.

Doati, Roberto (1991). 'György Ligeti's *Glissandi*: An Analysis,' *Interface – Journal of New Music Research* 20/2: 79-87.

Doğantan-Dack, Mine (2006). 'The Body Behind Music: Precedents and Prospects,' *Psychology of Music* 34/4: 449-464.

Downey, Greg (2002). 'Listening to Capoeira: Phenomenology , Embodiment, and the Materiality of Music,' *Ethnomusicology* 46/3: 487-509.

Downey, Greg (2007). 'Seeing with a "Sideways Glance": Visuomotor "Knowing" and the Plasticity of Perception,' in *Ways of Knowing*, edited by Mark Harris. London: Berghahn, 222-244.

Doyle, Julie (2008). 'The Spectre of the Scalpel: the Historical Role of Surgery and Anatomy in Conceptions of Embodiment,' *Body & Society* 14: 9-30.

Doyle, Julie and Katrina Roen (2008). 'Surgery and Embodiment: Carving Out Subjects,' *Body & Society* 14: 1-7.

Duncan, Michelle (2004). 'The Operatic Scandal of the Singing Body: Voice, Presence, Performativity,' *Cambridge Opera Journal* 16/3: 283-306.

Dunn, Barney D. et al. (2010). 'Listening to Your Heart: How Interoception Shapes Emotion Experience and Intuitive Decision Making,' *Psychological Science* 21/12: 1835-1844.

Dunn, Leslie C. and Nancy A. Jones (eds.) (1994). *Embodied Voices: Representing Female Vocality in Western Culture*. Cambridge: Cambridge University Press.

Dusman, Linda (2000). 'No Bodies There: Absence and Presence in Acousmatic Performance,' in *Music and Gender*, edited by Pirkko Moisala and Beverley Diamond. Urbana and Chicago: University of Illinois Press, 336-345.

Dyson, Frances (2005). 'Wireless Affections: Embodiment and Emotions in New Media Theory and Art,' *Convergence* 11/4: 85-105.

Dyson, Frances (2009). *Sounding New Media: Immersion and Embodiment in the Arts and Culture*. Berkeley, CA: University of California Press.

Echard, William (2006). 'Sensible Virtual Selves: Bodies, Instruments and the Becoming Concrete of Music,' *Contemporary Music Review* 25/1-2: 7-10.

Ediger, Jeffrey (1993). *A Phenomenology of the Listening Body*. Unpublished PhD dissertation: University of Illinois.

Eisenberg, Evan (2005). *The Recording Angel: Explorations in Phonography*. New Haven, CT: Yale University Press.

Eitan, Zohar and Inbar Rothschild (2011). 'How Music Touches: Musical Parameters and Listeners' Audiotactile Metaphorical Mappings,' *Music Psychology* 39: 449-467.

Eitan, Zohar and R. Y. Granot (2006). 'How Music Moves,' *Music Perception: An Interdisciplinary Journal* 23/3: 221-248.

Emmerson, Simon (1986a). *The Language of Electroacoustic Music.* Basingstoke: Palgrave Macmillan.

Emmerson, Simon (1986b). 'The Relation of Language to Materials' in *The Language of Electroacoustic Music*. Basingstoke: Palgrave Macmillan, 17-39.

Emmerson, Simon (1999). '"Body and Soul": Two Meditations on the 50th Birthday of Musique Concrete,' *Proceedings of the Académie Internationale de Musique Electroacoustique* (Volume 4)*: Bourges: Mnémosyne. 198-200,

Emmerson, Simon (ed.) (2000). *Music, Electronic Media and Culture*. Aldershot: Ashgate.

Emmerson, Simon (2007). *Living Electronic Music*. Aldershot: Ashgate.

Engh, Barbara (1994). 'Adorno and the Sirens: tele-phono-graphic bodies,' in *Embodied Voices: Representing Female Vocality in Western Culture*, edited by Leslie Dunn and Nancy Jones. Cambridge: Cambridge University Press, 120-138.

Enns, Anthony (2008). 'The Phonographic Body: Phreno-Mesmerism, Brain Mapping and Embodied Recording,' in *Sonic Mediations: Body, Sound, Technology,* edited by Carolyn Birdsall and Anthony Enns. Newcastle: Cambridge Scholars Press, 13-26.

Erlmann, Veit (ed.) (2004). *Hearing Cultures: Essays on Sound, Listening and Modernity.* Oxford and New York: Berg.

D'Escriván, Julio (2010). '[review of] Jøran Rudi (ed.), Absorption and Resonance – Sound and Meaning. Oslo: NOTAM, 2009,' *Organised Sound* 15/2: 178-179.

Eubanks, Virginia (1996). 'Zones of Dither: Writing the Postmodern Body,' *Body & Society* 2/3: 73-88.

Evens, Aden (2005). *Sound Ideas: Music, Machines and Experience.* Minneapolis: University of Minnesota Press.

Farnell, Ross (1999). 'In Dialogue with 'Posthuman' Bodies: Interview with Stelarc,' *Body & Society* 5/2-3: 129-147.

Featherstone, Mike and Roger Burrows (1995). 'Cultures of Technological Embodiment: An Introduction,' *Body & Society* 1/3-4: 1-19.

Ferrara, Lawrence (1984). 'Phenomenology as a Tool for Music Analysis.' *Musical Quarterly* 70/3: 355-73.

Ferrara, Lawrence (1991). *Philosophy and the Analysis of Music: Bridges to Musical Sound, Form and Reference.* Westport: Greenwood Press.

Ferreira, Giselle Martins dos Santos (1997). 'A Perceptual Approach to the Analysis of J. C. Risset's *Sud*: Sound, Structure and Symbol,' *Organised Sound* 2/2: 97-106.

Feuerstein, Thomas (2004). 'Sample Minds,' in S*ample Minds: Materials on Sampling Culture*, edited by Stefan Bidner and Thomas Feuerstein. Cologne: Verlag Walter König, 271-276.

Filimowicz, Michael and Jack Stockholm (2010). 'Towards a Phenomenology of the Acoustic Image,' *Organised Sound* 15/1: 5-12

Fisher, George and Judy Lochhead (2002). 'Analyzing from the Body,' *Theory and Practice: Journal of the Music Theory Society of New York State* 27: 37-67.

Fitzgerald, Thomas A. (2004). *New Music Composition for Live Performance and Interactive Multimedia*. Unpublished Doctoral Thesis, University of Wollongong.

Foster, Gwendolyn A. (2000). *Troping the Body: Gender, Etiquette and Performance*. Carbondale: South Illinois University Press.

François, Jean-Charles (1992). 'Writing Without Representation, and Unreadable Notation,' *Perspectives of New Music* 30/1: 6-20.

Fraser, Mariam (2005). 'Making Music Matter,' *Theory, Culture & Society* 22/1: 173-189.

Frizzell, Dwight and Jay Mandeville (1996). 'Inaudible "Postscript": A Silent Coda on the Disembodied Voice and the Subsequent Unwriting of History,' *TDR* 40/3: 88-95.

Fuchs, Mathias (2004). 'Monster, 'in S*ample Minds: Materials on Sampling Culture*, edited by Stefan Bidner and Thomas Feuerstein. Cologne: Verlag Walter König, 309-315.

Gabrielsson, A. (1991). 'Experiencing Music,' *Canadian Journal of Research in Music Education* 33: 21-26.

Gallagher, Shaun and Jonathan Cole (1998). 'Body Image and Body Schema in a Deafferented Subject ,' in *Body and Flesh. A Philosophical Reader,* edited by Don Welton. Oxford: Blackwell, 131-147.

Gallese, Vittorio (2005). 'The Intentional Attunement Hypothesis, the Mirror Neuron System and its Role in Interpersonal Relations,' *Biomimetic Neural Learning for Intelligent Robots*, edited by Stefan Wermter. Berlin: Springer, 19-30.

Gallese, Vittorio and George Lakoff (2005). 'The Brain's Concepts: The Role of the Sensory Motor System in Conceptual Knowledge,' *Cognitive Neuropsychology* 21/0: 455-479.

Garcia, Denise (2000). 'Body Representations in Electroacoustic Music.' *Proceedings of the 2000 International Computer Music Conference*. San Francisco, CA: ICMA: 16-19.

Gazzola, Valeria, Lisa Aziz-Zadeh and Christian Keysers (2006). 'Empathy and the Somatotopic Auditory Mirror System in Humans,' *Current Biology* 16: 1824-1829.

Geurts, Kathryn Linn (2002). *Culture and the Senses: Bodily Ways of Knowing in an African Community*. Berkeley: University of California Press.

Gibson, James (1979). *The Ecological Approach to Visual Perception*. Boston: Houghton Mifflin.

Gil, José (1998). *Metamorphoses of the Body.* Translated by Stephen Muecke. Minneapolis: University of Minnesota Press.

Gilman, Sander L. (1999). *Making the Body Beautiful: A Cultural History of Aesthetic Surgery*. Princeton, NJ: Princeton University Press.

Gimlin, Debra (2010). 'Imagining the Other in Cosmetic Surgery,' *Body & Society* 16/4: 57-76.

Godøy, Rolf Inge (2006). 'Gestural-Sonorous Objects: Embodied Extensions of Schaeffer's Conceptual Apparatus,' *Organised Sound* 11/2: 149-157.

Godøy, Rolf Inge (2010). 'Gestural Affordances of Musical Sound,'in *Musical Gestures: Sound, Movement, and Meaning*, edited by Rolf Inge Godøy and Marc Leman London: Taylor & Francis: 103-125.

Godøy, Rolf Inge and Marc Leman (eds.)(2010). *Musical Gestures: Sound, Movement, and Meaning*. London: Taylor & Francis.

Goodman, Steve (2008). 'Audio Virology: On the Sonic Mnemonics of Preemptive Power,' in Sonic Mediations, edited by Carolyn Birdsall and Anthony Enns. Newcastle: Cambridge Scholars Publishing, 27-42.

Goodwin, Andrew (1990). 'Sample and Hold: Pop Music in the Digital Age of Reproduction,' in *On Record: Rock, Pop, and the Written Word*, edited by Simon Frith and Andrew Goodwin. New York: Pantheon Books, 220-234.

Graziano, Amy B. (2002). 'An Historical Perspective on the Study of Music Perception,' in *Music, Sensation, and Sensuality,* edited by Linda Phyllis Austern. New York: Routledge, 336-342.

Grewe, Oliver, Frederik Nagel, Reinhard Kopiez and Eckart Altenmüller (2007). 'Listening to Music as a Re-Creative Process: Physiological, Psychological and Psychoacoustical Correlates of Chills and Strong Emotions,' *Music Perception* 24/3: 297-314.

Grewe, Oliver, Reinhard Kopiez and Eckart Altenmüller (2009). 'The Chill Parameter: Goose Bumps and Shivers as Promising Measures in Emotion Research,' *Music Perception* 27/1: 61-74

Gritten, Anthony (2006). 'Drift,' in *Music and Gesture*, edited by Anthony Gritten and Elaine King. Aldershot: Ashgate, 104-125.

Gritten, Anthony (2008). 'Sound Ideas: Music, Machines, and Experience [Review],' *Music & Letters* 89/2: 293-298.

Gritten, Anthony and Elaine King (eds)(2006). *Music and Gesture*. Aldershot: Ashgate.

Gritten, Anthony and Elaine King (eds) (2011). *New Perspectives on Music and Gesture*. Aldershot: Ashgate.

Grosz, Elizabeth (1994). *Volatile Bodies: Toward A Corporeal Feminism*. Bloomington and Indianapolis: Indiana University Press.

Guck, Marion A. (1994). 'A Woman's (Theoretical) Work,' *Perspectives of New Music* 32/1: 28-43.

Guck, Marion A. (1997). 'Music Loving, or the Relationship with the Piece,' *The Journal of Musicology* 15/3: 343-352.

Guck, Marion A. (2006). 'Analysis as Interpretation: Interaction, Intentionality, Invention.' *Music Theory Spectrum* 28/2: 191-209.

Guhn, Martin, Alfons Hamm and Marcel Zentner (2007). 'Physiological and Musico-Acoustic Correlates of the Chill Response,' *Music Perception* 24/5: 473-484.

Gunther, Eric (2003). 'Cutaneous Grooves: Composing for the Sense of Touch,' *Journal of New Music Research* 32/4: 369-381.

Hainge, Greg (2007). '*Le Corps concret*: Of Bodily and Filmic Material Excess in Philippe Grandrieux's Cinema,' *Australian Journal of French Studies* 44/2: 153-171.

Handel, Stephen (1995). *Listening: An Introduction to the Perception of Auditory Events.* Cambridge, MA: MIT Press.

Hansen, Mark (2004). *New Philosophy for New Media.* Cambridge, MA and London: MIT Press.

Haraway, Donna (1991). 'A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century,' in *Simians, Cyborgs and Women: The Reinvention of Nature*. New York: Routledge, 149-181.

Haraway, Donna (2004). *The Haraway Reader.* New York and London: Routledge.

Harris, Mark (ed.)(2007). *Ways of Knowing: New Approaches in the Anthropology of Experience and Learning*. Oxford: Berghahn.

Hatten, Robert (2004). *Interpreting Musical Gestures, Topics, and Tropes: Mozart, Beethoven, Schubert.* Bloomington: Indiana University Press.

Hatten, Robert (2006). 'A Theory of Musical Gesture and its Application to Beethoven and Schubert,' in *Music and Gesture,* edited by Anthony Gritten and Elaine King. Aldershot: Ashgate, 1-23.

Hayles, N. Katherine (1999). *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics.* Chicago, IL: University of Chicago Press.

Haynes, J. (2001). 'Matmos,' *The Wire* 206: 26-29.

Heddon, Deidre (2010). 'The Horizon of Sound: Soliciting the Earwitness,' *Performance Research* 15/3: 36-42.

Hinkle-Turner, Elizabeth (2006). *Women Composers and Music Technology in the United States: Crossing the Line.* Burlington, VT: Ashgate.

Hofer, Sonya (2006). 'I Am They: Technological Mediation, Shifting Conceptions of Identity and Techno Music,' *Convergence* 12/3: 307-324.

Holmes, Thom (2002). *Electronic and Experimental Music: Pioneers in Technology and Composition*. London: Routledge.

Holsinger, Bruce W. (2001). *Music, Body and Desire in Medieval Culture: Hildegard of Bingen to Chaucer.* Palo Alto: Stanford University Press.

Hoopen, Christiane ten (1997). *Perceptions of Sound: Source, Cause and Human Presence in Electroacoustic Music.* Unpublished PhD Dissertation, Universiteit van Amsterdam.

Howell, Anthony (1999). *The Analysis of Performance Art: A Guide to its Theory and Practice*. London and New York: Routledge.

Howes, David (ed.) (1991). *The Varieties of Sensory Experiences.* Toronto: University of Toronto Press.

Howes, David (2003). *Sensual Relations: Engaging the Senses in Culture and Social Theory.* Ann Arbor: University of Michigan Press.

Iacoboni, Marco et al. (2005). 'Grasping the Intentions of Others with One's Own Mirror Neuron System,' *PLoS Biology* 3/3: 529-535.

Iddon, Martin (2006). 'On the Entropy Circuit: Brian Ferneyhough's *Time and Motion Study II*,' *Contemporary Music Review* 25/1-2: 93-105.

Ihde, Don (2007). *Listening and Voice: Phenomenologies of Sound* [Second Edition]. Albany, NY: SUNY Press.

Iyer, Vijay (2002). 'Embodied Mind, Situated Cognition, and Expressive Microtiming in African-American Music,' *Music Perception* 19/3: 387-414.

Iyer, Vijay (2004). 'Improvisation, Temporality and Embodied Experience,' *Journal of Consciousness Studies*, 11/3-4: 159-173.

Jensenius, Alexander Refsum, Marcelo Wanderley, Rolf Inge Godøy and Marc Leman (2010). 'Musical Gestures: Concepts and Methods in Research,' in *Musical Gestures: Sound, Movement, and Meaning*, edited by Rolf Inge Godøy and Marc Leman London: Taylor & Francis, 12-35.

Johnson, Mark (1987). *The Body in the Mind: The Bodily Basis of Meaning, Imagination and Reason.* Chicago, IL: University of Chicago Press.

Johnson, Mark (1998). 'Embodied Musical Meaning,' *Theory and Practice* 22-23: 95-102.

Johnston, Keith (1981). 'Musical Essence and Perception,' *Perspectives of New Music* XIX: 333-350.

Jones, Amelia (1997). '"Presence" in Absentia: Experiencing Performance as Documentation,' *Art Journal* 56/4: 11-18.

Jones, Amelia (1998). *Body Art: Performing the Subject.* Minneapolis: University of Minnesota Press.

Juntunen, Marja Leena (2004). 'Embodiment in Musical Knowing: How Body Movement Facilitates Learning with Dalcroze Eurythmics,' *British Journal of Music Education* 21 /2: 199-214.

Kahn, Douglas and Gregory Whitehead (eds.) (1992). *Wireless Imagination: Sound, Radio, and the Avant-Garde.* Cambridge, MA: MIT Press.

Kahn, Douglas (1990). 'Editorial: An Unheard-of Organology,' *Leonardo Music Journal* 5: 1-3.

Kahn, Douglas (2001 [1999]). *Noise Water Meat: A History of Sound in the Arts*. Cambridge, MA: MIT Press.

Kassler, Jamie. C. (1990). 'Body "Music": An Essay on the Medical Semiology of Sounds,' *Occasional Papers on the Medical History of Australia* 4: 247-255.

Kassler, Jamie. C. (2002) 'Musicology and the Problem of Sonic Abuse,' in *Music, Sensation, and Sensuality* edited by Linda Phyllis Austern. New York: Routledge, 321-333.

Katz, Mark (2004). *Capturing Sound: How Technology Has Changed Music.* Berkeley, CA: University of California Press.

Keil, Charles (1994). 'Motion and Feeling through Music,' in *Music Grooves*, edited by Charles Keil and Steven Feld. Chicago and London: University of Chicago Press, 53-76.

Keller, Peter E. and Petr Janata (2009). 'Book Review: *Embodied Music Cognition and Mediation Technology* by Marc Leman . Cambridge, MA: MIT Press, 2007,' *Music Perception* 26: 289-282.

Kelly, Caleb (2009). *Cracked Media*. Cambridge, MA: MIT Press.

Keysers, Christian et al. (2003). 'Audiovisual Mirror Neurons and Action Recognition,' *Experimental Brain Research* 153: 628-636.

Kielian-Gilbert, Marianne and Marion A. Guck (1984). 'Reflections on Music Theory,' *Perspectives of New Music* 22/1-2: 560-630.

Kim, Jin Hyun and Uwe Seifert (2006). 'Embodiment: The Body in Algorithmic Sound Generation,' *Contemporary Music Review*: 25/1-2: 139-149.

Kim, Jin Hyun and Uwe Seifert (2007). 'Embodiment and Agency: Towards an Aesthetics of Interactive Performativity,' *Proceedings of the 4th Sound and Music Computing Conference*, July 2007, Lefkada, Greece, 230 -237.

Kim, Suk-Jun (2008). *Listeners and Imagination: a Quaternary Framework for Electroacoustic Music Listening and Acousmatic Reasoning*. Unpublished PhD Thesis, University of Florida.

Kim, Suk-Jun (2010). 'Imaginal Listening: a Quaternary Framework for Listening to Electroacoustic Music and Phenomena of Sound-images,' *Organised Sound* 15/1: 43-53.

Kimbrough, Doris R. (1999). 'Henry's Law and Noisy Knuckles,' *Journal of Chemical Education* 76/11: 1509-1510.

Kirkup, Gill, Linda Janes, Kath Woodward, Fiona Hovenden (eds.) (2000). *The Gendered Cyborg: A Reader.* New York and London: Routledge.

Kivy, Peter (1989). *Sound and Sentiment.* Philadelphia: Temple University Press.

Klein, Jennie (2009). 'Self/Image: Technology, Representation, and the Contemporary Subject,' *Contemporary Theatre Review*, 19/2: 234-236.

Kolnai, Aurel, Carolyn Korsmeyer and Barry Smith (2004). *On Disgust*. Peru, Illinois: Open Court Publishing.

Kramer, Lawrence (2001). 'The Mysteries of Animation: History, Analysis and Musical Subjectivity,' *Music Analysis* 20/2: 153-178.

Kramer, Lawrence (2004). 'Analysis Worldly and Unworldly,' *The Musical Quarterly* 87/1: 119-139.

Kuchler, Susanne (2008). 'Technological Materiality: Beyond the Dualist Paradigm,' *Theory Culture Society* 25: 101-120.

Kusek, David and Gerd Leonhard (2005). *The Future of Music: Manifesto for the Digital Music Revolution.* London: Omnibus Press.

LaBelle, Brandon (2005). 'Word of Mouth: Christof Migone's Little Manias,' in *Christof Migone - Sound Voice Perform*, edited by Brandon LaBelle et al. Los Angeles: Errant Bodies, 8-25.

LaBelle, Brandon, Martin Spinelli and Allen S. Weiss (2005). *Christof Migone – Sound Voice Perform*. Los Angeles: Errant Bodies.

Lakoff, George and Mark Johnson (1980). *Metaphors We Live By.* Chicago, IL: University of Chicago Press.

Lakoff, George and Mark Johnson (1999). *Philosophy in the Flesh: the Embodied Mind and its Challenge to Western Thought.* New York: Basic Books.

Landreth, Janet and Hobart Landreth (1974). 'Effects of Music on Physiological Response,' *Journal of Research in Music Education* 22/1: 4-12.

Landy, Leigh (2003). 'Electroacoustic Music: Analytical Perspectives (review),' *Notes* 60/1: 162-163.

Le Guin, Elisabeth (2006). *Boccherini's Body: an Essay in Carnal Musicology.* Los Angeles: University of California Press.

Leman, Marc (2008). *Embodied Music Cognition and Mediation Technology*. Cambridge, MA: MIT Press.

Leman, Marc (2010). 'Music, Gesture, and the Formation of Embodied Meaning,' in *Musical Gestures: Sound, Movement, and Meaning,* edited by Rolf Inge Godøy and Marc Leman. London: Taylor & Francis, 126-153.

Leman, Marc, Frank Desmet, Frederik Styns, Leon van Noorden and Dirk Moelants (2009). 'Sharing Musical Expression through Embodied Listening: A Case Study Based on Chinese Guqin Music,' *Music Perception* 26/3: 263-278.

Lenoir, Timothy (2002). 'Makeover: Writing the Body into the Posthuman Technoscape: Part Two: Corporeal Axiomatics,' *Configurations* 10/3: 373-385.

Leppert, Richard (1993). *The Sight of Sound: Music, Representation, and the History of the Body*. Berkeley: University of California Press.

Levin, David Michael (1989). *The Listening Self: Personal Growth, Social Change and the Closure of Metaphysics.* New York: Routledge.

Levin, David Michael (1993). *Modernity and the Hegemony of Vision.* Berkeley: University of California Press.

Levin, Thomas Y. (1990). 'For the Record: Adorno on Music in the Age of its Technological Reproducibility,' *October* 55: 23-47.

Lewin, David (1986). 'Music Theory, Phenomenology, and Modes of Perception,' *Music Perception* 3/4: 327-392.

Lidov, David (1987). 'Mind and Body in Music,' *Semiotica* 66/1: 69-97.

Lindström, Erik, Antonio Camurri, Anders Friberg, Gualtiero Volpe and Marie-Louise Rinman (2005). 'Affect, Attitude and Evaluation of Multisensory Performances,' *Journal of New Music Research* 34/1: 69-86.

Lochhead, Judy (1980). 'Some Musical Applications of Phenomenology,' *Indiana Theory Review* 3/3: 18-27.

Lochhead, Judy (1990). 'The Metaphor of Musical Motion: Is there an Alternative?' *Theory and Practice* 14-15: 83-103.

Lochhead, Judy (1995). 'Hearing New Music: Pedagogy from a Phenomenological Perspective,' *Philosophy of Music Education Review* 3/1: 34-42.

Lochhead, Judy (1999). 'Hearing "Lulu",' in *Audible Traces: Gender, Identity, and Music,* edited by Elaine Barkin and Lydia Hamessley. Zürich and Los Angeles: Carciofoli Verlagshaus, 231-256.

Lochhead, Judy (2006). '"How Does It Work?": Challenges to Analytic Explanation,' *Music Theory Spectrum* 28/2: 283-254.

Lochhead, Judith (2010). 'Logic of Edge: Wolfgang Rihm's *Am Horizont,*' in *Sounding the Virtual: Gilles Deleuze and the Theory and Philosophy of Music*, edited by Brian Hulse and Nick Nesbitt. Aldershot: Ashgate, 181-198.

Lochhead, Judy and Joseph Auner (eds.) (2002). *Postmodern Music / Postmodern Thought.* London and New York: Routledge.

Longhurst, Robyn (2001). *Bodies: Exploring Fluid Boundaries*. London: Routledge.

Lowenstein, Oliver and Rolf Gelhaar (2000). 'Return to the Body,' *Musicworks: Explorations in Sound* 76: 19-24.

Lubken, Deborah (2009). 'Book Review: Paul D. Miller (ed.) *Sound Unbound: Sampling Digital Music and Culture,*' *New Media and Society* 11: 453-455.

Lucier, Alvin (1976). 'Statement on: *Music for Solo Performer*' in *Biofeedback and the Arts: results of early experiments*, edited by David Rosenboom. Vancouver: ARC Publications, 60-61.

Lucier, Alvin and Simon Douglas (1980). *Chambers*. Middletown, CT: Wesleyan University Press.

Lysloff, Rene T. A. and Leslie C. Gay (eds.) (2003). *Music and Technoculture.* Middletown, CT: Wesleyan University Press.

Madison, Guy (2006). 'Experiencing Groove Induced by Music: Consistency and Phenomenology,' *Music Perception* 24/2: 209-222.

Magnusson, T. and E. Hurtado Mendieta (2007). 'The Acoustic, the Digital and the Body: A Survey on Musical Instruments,' in *Proceedings of the 7th International Conference on New Interfaces for Musical Expression.* New York: ACM.

Manning, Peter (2003). 'The Influence of Recording Technologies on the Early Development of Electroacoustic Music,' *Leonardo Music Journal* 13: 5-10.

Martinelli, Dario (ed.) (2006). *Music, Senses, Body: Proceedings of the International Congress of Musical Signification,* Rome.

Massumi, Brian (2002). *Parables for the Virtual: Movement, Affect, Sensation*. Durham and London: Duke University Press.

Mauk, Frederick (1986). 'Review of *Music as Heard: A Study in Applied Phenomenology* by Thomas Clifton,' *Journal of the American Musicological Society* 39/1: 205-209.

McAdams, Stephen and Emmanuel Bigand (eds.) (1993). *Thinking in Sound: The Cognitive Psychology of Human Audition.* Oxford: Oxford University Press.

McCartney, Andra (1995). 'Inventing Images: Constructing and Contesting Gender in Thinking About Electroacoustic Music,' *Leonardo Music Journal* 5: 57-66.

McCartney, Andra (2000). 'Cyborg Experiences: Contradictions and Tensions of Technology, Nature, and the Body in Hildegard Westerkamp's "Breathing Room"', in *Music and Gender,* edited by Pirkko Moisala and Beverley Diamond. Urbana and Chicago: University of Illinois Press, 317-335.

McClary, Susan (1991). *Feminine Endings: Music, Gender, and Sexuality*. Minneapolis, Minnesota: University of Minnesota Press.

McClary, Susan and Robert Walser (1994). 'Theorizing the Body in African-American Music,' in *Black Music Research Journal*, 14/1: 75-84.

McMullen, Tracy (2006). 'Corpo-Realities: Keepin' It Real in "Music and Embodiment" Scholarship,' *Current Musicology*, 82: 61-80.

Mead, Andrew (1999). 'Bodily Hearing: Physiological Metaphors and Musical Understanding,' *Journal of Music Theory* 43/1: 1-19.

Meelberg, Vincent (2008). 'Touched by Music: the Sonic Strokes of *Sur Incises,'* in *Sonic Mediations: Body, Sound, Technology*, edited by Carolyn Birdsall and Anthony Enns. Newcastle: Cambridge Scholars Press, 61-74.

Merleau-Ponty, Maurice (1962 [1945]). *The Phenomenology of Perception.* Translated by Colin Smith. London: Routledge.

Migone, Christof (1999). 'Crackers,' in *Site of Sound: Of Architecture and the Ear*, edited by Brandon LaBelle and Steve Roden. Berlin: Errant Bodies, 88-92.

Mikic, Vesna (2002). '<Vriskric.exe>: A Techno-Music Metaphor of a Subject/Body,' *New Sound International Magazine for Music* 19: 71-74.

Miller, Leta E. (2002). 'Cage's Collaborations,' in *The Cambridge Companion to John Cage*, edited by David Nicholls. Cambridge: Cambridge University Press, 151-168.

Miller, Paul D. (ed.)(2008). *Sound Unbound: Sampling Digital Music and Culture*. Cambridge, MA: MIT Press.

Mills, David and Mette Louise Berg (2010). 'Gender, Disembodiment and Vocation: Exploring the Unmentionables of British Academic Life,' *Critique of Anthropology* 30/4: 331-353.

Mockus, Martha (1999). 'Lesbian Skin and Musical Fascination,' in *Audible Traces: Gender, Identity and Music*, edited by Elaine Barkin and Lydia Hamessley. Zürich and Los Angeles: Carciofoli Verlagshaus, 50-69.

Moisala, Pirkko and Beverley Diamond (eds.) (2000). *Music and Gender*. Urbana and Chicago: University of Illinois Press.

Mol, Annemarie (2002). *The Body Multiple: Ontology in Medical Practice.* London and New York: Duke University Press.

Moll, Jorge et al. (2005). 'The Moral Affiliations of Disgust: A Functional MRI Study,' *Cognitive Behavioral Neurology* 18/1: 68-78,

Molino, Jean (1998). 'La Musique et le Geste: Prolégomènes à une Anthropologie de la Musique,' *Anályse Musical* 10: 8 -15.

Moran, Dermot (2000). *Introduction to Phenomenology*. London: Routledge.

Móricz, Klára (2006). 'The Untouchable: Bartók and the Scatological,' *Studia Musicologica Academiae Scientiarum Hungaricae* 47/3–4: 321-336.

Morris, Adalaide (ed.) (1997). *Sound States: Innovative Poetics and Acoustical Technologies*. Chapel Hill and London: The University of North Carolina Press.

Morrow, Guy (2006). 'Book Review: *Capturing Sound: How Technology has Changed Music,*' *Convergence* 12/1: 101-103.

Mountain, Rosemary (2004). 'Theories Market: Open for Trading,' *Organised Sound* 9/1: 15-26.

Mowitt, John (1987). 'The Sound of Music in the Era of its Electronic Reproducibility,' in *Music and Society*, edited by Richard Leppert and Susan McClary. Cambridge: Cambridge University Press, 173-197.

Nancy, Jean-Luc (2007 [2002]). *Listening.* Translated by Charlotte Mandell. New York: Fordham University Press.

Nagashima, Yoichi (2003). 'Bio-Sensing Systems and Bio-Feedback Systems for Interactive Media Arts,' *Proceedings of the 2003 Conference on New Interfaces for Musical Expression (NIME-03)*. Montreal, Canada: 48-53.

Nelson, Peter (2009). '[Review of] Marc Leman, Embodied Music Cognition and Mediation Technology,' *Organised Sound* 14/1: 115-117.

Ness, Sally Ann (1995). 'Dancing in the Field: Notes from Memory,' in *Corporealities: Dancing Knowledge, Culture and Power*, edited by Susan Leigh Foster. London and New York: Routledge, 129-154.

Nicholas, Lucy (2007). 'Book Review: Bernadette Wegenstein. *Getting Under the Skin: Body and Media Theory*,' *Convergence* 13/3: 325-326.

Nicolson, Malcolm (2004). 'Having the Doctor's Ear in Nineteenth-Century Edinburgh,' in *Hearing History: a Reader*, edited by Mark M. Smith. Athens, Georgia: University of Georgia Press, 151-168.

Noë, Alva (2000). 'Experience and Experiment in Art,' *Journal of Consciousness Studies*, 7/8-9: 123-35.

Noë, Alva (2004). *Action in Perception*. Cambridge, MA: MIT Press.

Norman, Katharine (2000). 'Stepping Outside for a Moment: Narrative Space in Two Works for Sound Alone,' in *Music, Electronic Media and Culture*, edited by Simon Emmerson. Aldershot: Ashgate, 217-244.

Nusseck, Manfred and Marcelo M. Wanderley (2009). 'Music and Motion: How Music-Related Ancillary Body Movements Contribute to the Experience of Music,' *Music Perception* 26: 335-353.

Obadike, Keith and Mendi Obadike (2008). 'Freaking the Machine: A Discussion about Keith Obadike's Sexmachines,' in *Sound Unbound*, edited by Paul D. Miller. Cambridge, MA: MIT Press, 91-96.

Orden, Kate van (2002). 'Descartes on Musical Training and the Body,' in *Music, Sensation, and Sensuality*, edited by Linda Phyllis Austern. New York: Routledge, 17-38.

Ostertag, Bob (2002). 'Human Bodies, Computer Music,' *Leonardo Music Journal* 12: 11-14.

Otis, Laura (2001). *Networking: Communicating with Bodies and Machines in the Nineteeenth Century*. Ann Arbor: University of Michigan Press.

Ouzounian, Gascia (2006). 'Embodied Sound: Aural Architectures and the Body,' *Contemporary Music Review* 25/1-2: 69-79.

Ouzounian, Gascia (2009). 'Impure Thinking Practices and Clinical Acts: The Sonorous Becomings of Heidi Fast,' *Organised Sound* 14/1: 75-81.

Palisca, Claude V. (2000). 'Moving the Affections through Music: Pre-Cartesian Psycho-Physiological Theories,' in *Number to Sound: The Musical Way to the Scientific Revolution*, edited by Paolo Gozza. Dordrecht: Kluwer, 289-308.

Paradiso, Joseph A. (1999). 'The Brain Opera Technology: New Instruments and Gestural Sensors for Musical Interaction and Performance,' *Journal of New Music Research* 28/2: 130-149.

Parker-Starbuck, Jennifer (2009). 'Closer: Performance, Technologies, Phenomenology,' *Contemporary Theatre Review*, 19/2: 239-240.

Payne, John (2010). 'So Percussion and Matmos: on the Poetics of Processing,' *EQ Mag* (August): 13.

Pearson, Tina and Andrew Warshaw (1982). 'Bodysounds: Andrew Warshaw in Conversation,' *Musicworks* 20: 16.

Pelinski, Ramón (1997). 'The Body in the Music,' *Interdisciplinary Studies in Musicology*. Poznañ: Poznanskie Towarzystwo Przyjaciól Nauk 6: 185-201.

Penny, Simon (2010). 'Introduction to the Special Issue DAC09: After Media: Embodiment and Context,' *Digital Creativity* 21/1: 1-3.

Phelan, Peggy (1996 [1993]). *Unmarked: The Politics of Performance*. London: Routledge.

Phillips, Mary et al. (2004). 'Differential Neural Responses to Overt and Covert Presentations of Facial Expressions of Fear and Disgust,' *NeuroImage* 21: 1484–1496.

Pike, Alfred (1970). *A Phenomenological Analysis of Musical Experience and Other Related Essays*. New York: St. John's University Press.

Pink, Sarah (2009). *Doing Sensory Ethnography*. London: SAGE Publications Ltd.

Plant, Sadie (1997). *Zeros and Ones: Digital Women and the New Technoculture.* New York: Doubleday.

Pollock, Della (2007). 'The Performative "I",' *Cultural Studies <=> Critical Methodologies* 7/3: 239-255.

Prinz, Jessica (2002). '"It's Such a Relief Not to Be Myself": Laurie Anderson's *Stories from the Nerve Bible,'* in *Interfaces: Women / Autobiography / Image / Performance,* edited by Sidonie Smith and Julia Watson. Ann Arbor: The University of Michigan Press, 385-405.

Protapapas, Marina G. and Tyler Cymet (2002). 'Joint Cracking and Popping: Understanding Noises that Accompany Articular Release,' *Journal of the American Osteopathic Association* 102/5: 283-287.

Raes, Godfried-Willem (1992). 'A Personal Story of Music and Technologies,' *Leonardo Music Journal* 2/1: 29-35.

Rawes, Peg (2008). 'Sonic Envelopes,' *The Senses and Society* 3/1: 61-76.

Reiser, Michaela (2010). 'Listening to the Body's Excitations,' *Performance Research* 15/3: 55-59.

Reyes, Ian (2010). 'To Know Beyond Listening: Monitoring Digital Music,' *Senses & Society* 5/3: 322-338.

Rice, Tom (2008). '"Beautiful Murmurs": Stethoscopic Listening and Acoustic Objectification,' *The Senses and Society* 3/3: 293-306.

Richards, John (2008). 'Getting the Hands Dirty,' *Leonardo Music Journal* 18: 25-31.

Rickard, Nikki (2004). 'Intense Emotional Responses to Music: a Test of the Physiological Arousal Hypothesis,' *Psychology of Music* 32/4: 371-388.

Riikonen, Taina (2005). 'Shared Sounds in Detached Movements: Flautist Identities Inside the 'Local-Field' Spaces,' *Organised Sound* 9/3: 233-242.

Riikonen, Taina (2008). 'Producing Microscopic Embodied Spaces: the Flautist's Mouth, Reverberation Effects and Kaija Saariaho's Lichtbogen,' in *Sonic Mediations: Body, Sound, Technology*, edited by Carolyn Birdsall and Anthony Enns. Newcastle: Cambridge Scholars Press, 143-159.

Roads, Curtis (2001). *Microsound*. Cambridge, MA: MIT Press.

Rocchesso, Davide (2004). 'Physically-based Sound Objects, as we Develop them Today.' *Journal of New Music Research* 33/3: 305-313.

Rodaway, Paul (1994). *Sensuous Geographies: Body, Sense and Place.* London: Routledge.

Rodgers, Tara (2003). 'On the Process and Aesthetics of Sampling in Electronic Music Production,' *Organised Sound* 8/3: 313-320.

Rokotnitz, Naomi (2010). '"Too far gone in disgust": Mirror Neurons and the Manipulation of Embodied Responses in *The Libertine*,' *Configurations* 16:399-426.

Rosenboom, David (ed.) (1976). *Biofeedback and the Arts: Results of Early Experiments.* Vancouver: ARC Publications.

Rosenboom, David (1997). 'Extended Musical Interface with the Human Nervous System,' *Leonardo Monagraph I*. San Francisco: ISAST.

Rozin, Alexander, Paul Rozin and Emily Roseberg (2004). 'The Feeling of Music Past: How Listeners Remember Musical Affect,' *Music Perception* 22/1: 15-39.

Rudy, Paul (2007). 'Timbral Praxis: When a Tree Falls in the Forest is it Music?' *Organised Sound* 12/1: 5-13.

Sanden, Paul (2009). 'Hearing Glenn Gould's Body: Corporeal Liveness in Recorded Music,' *Current Musicology* 88: 7-34.

Sandywell, Barry and Beer, David (2005). 'Stylistic Morphing: Notes on the Digitisation of Contemporary Music Culture,' *Convergence* 11/4: 106-121.

Sapir, Sylviane (2002). 'Gestural Control of Digital Audio Environments,' *Journal of New Musical Research* 31/2: 119-129.

Saslaw, Janna (1996). 'Forces, Containers, and Paths: The Role of Body-Derived Image Schemas in the Conceptualization of Music,' *Journal of Music Theory* 40/2: 217-243.

Savage, Kelly (2009). '*Boccherini's Body: An Essay in Carnal Musicology* [Review],' *Women and Music: A Journal of Gender and Culture* 13: 90-95.

Scherman, Tony (2001). 'Strike the Band: Pop Music without Musicians,' *New York Times*. 11 February.

Schick, Lea and Lone Malmborg (2010). 'Bodies, Embodiment and Ubiquitous Computing,' *Digital Creativity* 21/1: 63-69.

Scott, Derek B. (ed.) (2000). *Music, Culture, and Society.* Oxford: Oxford University Press.

Schafer, R. Murray (1977). *The Tuning of the World.* New York: Knopf.

Schneider, Rebecca (1997). *The Explicit Body in Performance*. London and New York: Routledge.

Schroeder, Franziska (2006). 'Bodily Instruments and Instrumental Bodies: Critical Views on the Relation of Body and Instrument in Technologically Informed Performance Environments,' *Contemporary Music Review* 25/1-2: 1-5.

Schwartz, David (1997). *Listening Subjects: Music, Psychoanalysis, Culture.* Durham, NC: Duke University Press.

Sedlmeier, Peter, Oliver Weigelt and Eva Walther (2011). 'Music is in the Muscle: How Embodied Cognition may Influence Music Preferences,' *Music Perception* 28/3: 297-305.

Sharp, Willoughby (1970). 'Body Works: A Pre-critical, Non-definitive Survey of Very Recent Works using the Body or Parts Thereof,' *Avalanche* 1: 1-4.

Shepherd, John and Peter Wicke (1997). *Music and Cultural Theory*. Cambridge: Polity Press.

Sherburne, Philip and Genevieve Letarte (2002). 'Sound Art/Sound Bodies: Electronic Music's Anatomy Lessons,' *Parachute: Contemporary Art Magazine*. June 1.

Shildrick, Margrit (2008). 'Corporeal Cuts: Surgery and the Psycho-social,' *Body & Society* 14/1: 31-46.

Shilling, Chris (2005). *The Body in Culture, Technology and Society*. London, Newbury Park and New Delhi: Sage Press.

Simoni, Mary (ed.)(2006). *Analytical Methods of Electroacoustic Music.* New York: Routledge.

Slichter, Annette (2011). 'Do Voices Matter? Vocality, Materiality, Gender Performativity,' *Body & Society* 17/1: 31-52.

Small, Christopher (1998). *Musicking: the Meaning of Performing and Listening*. Middletown, CT: Wesleyan University Press.

Smalley, Denis (1992). 'The Listening Imagination: Listening in the Electroacoustic Era,' in *Companion to Contemporary Musical Thought*, edited by Paynter et el. London: Routledge, 514-554.

Smith, F. Joseph (1979). *The Experiencing of Musical Sound: Prelude to a Phenomenology of Music.* New York: Gordon and Breach.

Smith, F. Joseph. (1989). *Understanding the Musical Experience.* New York: Routledge.

Smith, Mick and Joyce Davidson (2006). '"It Makes My Skin Crawl . . .'": The Embodiment of Disgust in Phobias of "Nature",' *Body & Society* 12/1: 43-67.

Smith, Sidonie and Julia Watson (eds.) (2002). *Interfaces: Women / Autobiography / Image / Performance*. Ann Arbor: The University of Michigan Press.

Sokolowski, Robert (2000). *Introduction to Phenomenology*. Cambridge: Cambridge University Press.

Solie, Ruth (ed.) (1993). *Musicology and Difference: Gender and Sexuality in Music Scholarship*. Berkeley and London: University of California Press.

Spackman, Helen (2000). 'Minding the Matter of Representation: Staging the Body (Politic),' *Contemporary Theatre Review* 10/3: 5-22.

Spinelli, Martin (2005). 'Sound Holes: Interview with Christof Migone,' in *Christof Migone - Sound Voice Perform*, edited by Brandon LaBelle et al. Los Angeles: Errant Bodies, 60-69.

Stafford, Barbara (2007). 'Self-Eugenics: The Creeping Illusionising of Identity from Neurobiology to Newgenics,' *New Formations* 60: 102-111.

Stankievech, Charles (2007). 'From Stethoscopes to Headphones: An Acoustic Spatialization of Subjectivity,' *Leonardo Music Journal* 17: 55-59.

Stansbie, Adam (2010). 'Through Thick and Thin: The Ontology of Tape Music,' *JMM: The Journal of Music and Meaning* 9.

Stelarc (1990). 'Event for Amplified Body, Laser Eyes and Third Hand,' in *Sound by Artists* edited by Micah Lexier and Dan Lander. Toronto and Banff: Art Metropole and Walter Philips Gallery, 284-288.

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

Sweeney-Turner, S. (1994). *The Sonorous Body: Music, Enlightenment and Deconstruction*. Unpublished PhD Thesis, University of Edinburgh.

Szendy, Peter (2008 [2001]). *Listen: a History of our Ears*. Translated by Charlotte Mandell. New York: Fordham University Press.

Taussig, Michael (1993). *Mimesis and Alterity: A Particular History of the Senses.* New York: Routledge.

Taylor, Millie (2006). 'Exploring the Grain: the Sound of the Voice in Bruce Nauman's *Raw Materials*,' *Studies in Theatre and Performance* 26/3: 289.

Taylor, Timothy (2001). *Strange Sounds: Music, Technology, and Culture.* London: Routledge.

Théberge, Paul (1997). *Any Sound You Can Imagine: Making Music / Consuming Technology.* Middletown, CT: Wesleyan University Press.

Thompson, Emily Ann (2001). '*"I Sing the Body Electric": Music and Technology in the Twentieth Century* (review)*,' Technology and Culture* 42/4: 800-801.

Throsby, Karen (2008). 'Happy Re-birthday: Weight Loss Surgery and the "New Me",' *Body & Society* 14: 117-133.

Tolbert, Elizabeth (2002). 'Untying the Music/Language Knot,' in *Music, Sensation, and Sensuality*, edited by Linda Phyllis Austern*.* New York: Routledge, 77-96.

Toop, David (2004). *Haunted Weather: Music, Silence and Weather*. London: Serpent's Tail.

Tucker, Ian (2011). 'Sense and the Limits of Knowledge: Bodily Connections in the Work of Serres,' *Theory, Culture & Society* 28/1: 149-160.

Turner, Bryan S. (2005). 'Introduction – Bodily Performance: On Aura and Reproducibility,' *Body & Society* 11/4: 1.

Varela, Francisco, Evan Thompson and Eleanor Rosch (1991). *The Embodied Mind: Cognitive Science and Human Experience*. Cambridge, MA: MIT Press.

Vasseleu, Cathryn (1998). *Textures of Light: Vision and Touch in Irigaray, Levinas, and Merleau-Ponty*. London: Routledge.

Vergine, Lea (2005). *Body Art and Performance: The Body as Language*. Milan: Skira Editore.

Waldby, Catherine (1997). 'Revenants: The Visible Human Project and the Digital Uncanny,' *Body & Society* 3/1: 1-16.

Walker, Margaret (2000). 'Movement and Metaphor: Towards an Embodied Theory of Music Cognition and Hermeneutics,' *Bulletin of the Council for Research in Music Education*: 27-42.

Wallach, Jeremy (2003). 'The Poetics of Electrosonic Presence: Recorded Music and the Materiality of Sound,' *Journal of Popular Music Studies* 15/1: 34-64.

Walser, Robert (1991). 'The Body in the Music: Epistemology and Musical Semiotics,' *College Music Symposium* 31: 117-126.

Watt, Roger and R.L. Ash (1998). 'A Psychological Investigation of Meaning in Music,' *Musicae Scientiae* 1: 33-53.

Wegenstein, Bernadette (2006). *Getting Under the Skin: The Body and Media Theory.* Cambridge, MA and London: MIT Press.

Weiss, Allen S. (2002). *Breathless: Sound Recording, Disembodiment, and the Transformation of Lyrical Nostalgia*. Middletown, CT: Wesleyan University Press.

Weiss, Gail and Honi Fern Haber (eds.) (1999). *Perspectives on Embodiment*: *the Intersections of Nature and Culture*. New York and London: Routledge.

Welton, Donn. (ed.) (1998). *Body and Flesh: a Philosophical Reader*. Malden, MA: Blackwell.

Welton, Martin (2010). 'Listening-as-Touch: Paying Attention to Rosemary Lee's *Common Dance*,' *Performance Research* 15/3: 47-54.

Williams, Alastair (1998). 'Torn Halves: Structure and Subjectivity in Analysis,' *Music Analysis* 17/3: 281-293.

Williams, Alastair (2001). *Constructing Musicology*. Aldershot: Ashgate.

Wilcox, Helen (ed.) (1990). *The Body and the Text: Hélène Cixous, Reading and Teaching*. Hemel Hempstead: Harvester Wheatsheaf.

Windsor, Luke (2000). 'Through and Around the Acousmatic: the Interpretation of Electroacoustic Sounds,' in *Music, Electronic Media and Culture,* edited by Simon Emmerson. Aldershot: Ashgate, 7-35.

Wolfe, Cary (1998). Critical Environments: *Postmodern Theory and the Pragmatics of the "Outside"*. Minneapolis: University of Minnesota Press.

Wolfe, Cary (2009). *What is Posthumanism?* Minneapolis: University of Minnesota Press.

Wood, Elizabeth (1994). 'Sapphonics,' in *Queering the Pitch: The New Gay and Lesbian Musicology*, edited by Philip Brett et al. New York and London: Routledge, 27-66.

Ytreberg, Espen (2011). 'Review article: Convergence: Essentially confused? : Tim Dwyer, Media Convergence,'*New Media & Society* 13/3: 502-508.

Zattra, Laura (2006). 'The Identity of the Work: Agents and Processes of Electroacoustic Music,' *Organised Sound* 11/2: 113-118.

Zurbrugg, Nicholas (1999a). *Critical Vices: Myths of Postmodern Theory.* London: Routledge.

Zurbrugg, Nicholas (1999b). 'Marinetti, Chopin, Stelarc and the Auratic Intensities of the Postmodern Techno-Body,' *Body & Society* 5: 93-115.

Online Resources

[n.a.] (n.d.) 'Sampling,' *EARS: ElectroAcoustic Resource Site* <http://www.ears.dmu.ac.uk/spip.php?rubrique292> (accessed 13 July 2011).

Aguilar, Ananay (n.d.). 'The Role of Structuring Processes in the Analysis of Electroacoustic Music,' <http://sussurro.musica.ufrj.br/abcde/a/aguilarananay/structuring.pdf > (accessed 24 October 2010).

Barnet, Belinda (2003). 'The Erasure of Technology in Cultural Critique,' *Fibreculture* 1 <http://journal.fibreculture.org/issue1/issue1_barnet.html> (accessed 1 October 2006).

Brodeur, Raymond (1999). 'What causes the noises we hear when we crack our knuckles or pop other joints,' *Scientific American*, October 21. <http://www.scientificamerican.com/article.cfm?id=what-causes-the-noise-we> (accessed 15 February 2011).

Connor, Steven (2001). 'Edison's Teeth: Touching Hearing,' <http://www.stevenconnor.com/edsteeth/> (accessed 23 September 2009).

Cox, Arnie (2011). 'Embodying Music: Principles of the Mimetic Hypothesis,' *Music Theory Online* 17/2 <http://www.mtosmt.org/issues/mto.11.17.2/mto.11.17.2.cox.html> (accessed 1 October 2011).

Culatti, Valentina (n.d.). 'Cardiomorphologies: the Body as an Instrument,' <https://www.neural.it/art/2006/08/cardiomorphologies_the_body_as.phtml> (accessed 6 October 2006).

Decker, Shawn (n.d.). 'Shawn Decker and Jan-Erik Andersson – Music From the Well-Fed Abyss,' <http://www.shawndecker.com/perf/well-fed.html> (accessed 1 October 2006).

Fricke, Stefan (2008). 'I hear with my knee better than with my calf' <http://www.bernhardleitner.com/texts/indexLoadItem/28?CAKEPHP=87b4776aed2609732a89feac053a6c5a> (accessed 17 April 2011).

Goldsmith, Kenneth (2004). 'Bit, Baud, Byte: Entertainment, Technology, and the Body,' *NewMusicBox* <http://www.newmusicbox.org/article.nmbx?id=2433> (accessed 18 October 2005).

Henley, Jon (2011). 'Music for Surgery,' *The Guardian*. <http://www.guardian.co.uk/lifeandstyle/2011/sep/26/music-for-surgery?INTCMP=SRCH > (accessed September 29 2011).

Kahn, Douglas (2008). 'Active Hearing: Jacob Kierkegaard's Labyrinthitis,' <http://fonik.dk/works/labyrinthitis-kahn.html> (accessed 11 December 2009).

Khut, George (n.d.). 'Cardiomorphologies,' <http://www.georgekhut.com/cardiomorphologies/> (accessed 1 October 2006).

Krukowski, Damon (ed.) (2006). 'Music Overheard,' <http://www.ubu.com/sound/mo.html> (accessed 23 October 2009).

Lander, Dan (1999). 'Radiocasting: Musings on Radio and Art,' *eContact 2/3* <http://cec.concordia.ca/econtact/Radiophonic/Radiocasting.htm> (accessed 20 December 2010).

Matador Records (n.d.). 'Matmos,' <www.matadorrecords.com/matmos/biography.html> (accessed 25 August 2010).

May, Krista (n.d.). 'Laurie Anderson: Some Thoughts on Happiness,' <https://www.popmatters.com/music/concerts/a/anderson-laurie-020511.shtml> (accessed 20 October 2006).

McKinnon, Dugal (2010). 'Awkward Ecologies: Sound-based music,' *eContact!* 13/3 <http://cec.sonus.ca/econtact/13_3/mckinnon_ecologies.html> (accessed 24 June 2011).

Mikami, Seiko (n.d.). 'Seiko Mikami: Artworks,' <http://www.idd.tamabi.ac.jp/~mikami/artworks/> (accessed 21 August 2011)

Mikic, Vesna (2004). 'Technoculture: Subjectivity in the Net of Music,' *Spacesofidentity.net* 4/1. <https://pi.library.yorku.ca/ojs/index.php/soi/article/view/8014/7174> (accessed 1 October 2006).

Morita, Satoshi (2010). 'Bodily Listening,' *eContact!* 13/3 <http://cec.sonus.ca/econtact/13_3/morita_bodily.html> (accessed 24 June 2011).

Pelinski, Ramón (2005). 'Embodiment and Musical Experience,' *Revista Transcultural de Música Transcultural Music Review* 9 <http://www.sibetrans.com/trans/a178/embodiment-and-musical-experience> (accessed 25 March 2007).

Portanova, Stamatia (2005). 'Rhythmic Parasites: A Virological Analysis of Sound and Dance,' *FibreCulture* 4 <http://journal.fibreculture.org/issue4/issue4_portanova.html> (accessed 13 April 2008).

Reybrouk, Mark (2005). 'Body, Mind and Music: Musical Semantics between Experiential Cognition and Cognitive Economy,' *Transcultural Music Review 9* <http://www.sibetrans.com/trans/a180/body-mind-and-music-musical-semantics-between-experiential-cognition-and-cognitive-economy> (accessed 25 March 2007).

Riikonen, Taina and Antti Sakari Saario (2011). 'Listening to the Replayed Touch: A Strata-aural Manifesto,' *Body, Space & Technology* 10/1 <http://people.brunel.ac.uk/bst/vol1001/home.html> (accessed 6 September 2011).

Robjohns, Hugh (2008). 'Digital Problems, Practical Solutions,' *Sound on Sound* <http://www.soundonsound.com/sos/feb08/articles/digitalaudio.htm> (accessed 10 August 2011).

Samsonow, Elisabeth von (2008). 'Panaudition. All-Frequency and WholeBodyEar,' <http://www.bernhardleitner.com/texts> (accessed 17 April 2011).

Schulz, Bernd and Bernhard Leitner (2002). 'The Whole Corporeality of Hearing: A Conversation between Bernd Schulz and Bernhard Leitner,' <http://www.bernhardleitner.com/texts/indexLoadItem/17?CAKEPHP=87b4776aed2609732a89feac053a6c5a> (accessed 17 April 2011).

Sky, Hellen (2005). 'Making Light of Gravity,' *Extensions: The Online Journal of Embodied Technology* 2 <http://www.wac.ucla.edu/extensionsjournal/v2/sky.htm> (accessed 28 October 2006).

Squib Box (n.d.). 'Neil Luck,' <http://www.squib-box.com/artists/neil-luck/> (accessed 5 January 2011).

Strachan, Robert (2010). 'Uncanny Space: Theory, Experience and Affect in Contemporary Electronic Music,' *Revista Transcultural de Música Transcultural Music Review* 14 <http://www.sibetrans.com/trans/a14/uncanny-space-theory-experience-and-affect-in-contemporary-electronic-music> (accessed 24 January 2011).

Strickland, Stephanie (2001). 'Dalí Clocks: Time Dimensions of Hypermedia,' *ebr* 11, <http://altx.com/ebr/ebr11/11str.htm> (accessed 28 September 2011).

Strychalski, Kevin (2001). 'Herbert: Bodily Functions,' <https://www.popmatters.com/music/reviews/h/herbert-bodily.shtml> (accessed 20 October 2006).

Tarvainen, Anne (2005). 'Music, Living Body and (E)motion,' <http://uta.fi/laitokset/mustut/mkbe/about.html> (accessed 4 January 2008).

Tarvainen, Anne (2008). 'Empathetic Listening: Toward a Bodily-Based Understanding of a Singer's Vocal Interpretation,' <http://www.runko.net/dokumentit/empathetic-listening.pdf> (accessed 21 February 2011).

V2_ (2006). 'Electromagnetic Bodies,' <http://www.v2.nl/events/electromagnetic-bodies> (accessed 28 October 2006).

Waldby, Catherine (1998). 'Circuits of Desire: Internet Erotics and the Problem of Bodily Location,' <http://wwwmcc.murdoch.edu.au/ReadingRoom/VID/Circuits3.html> (accessed 28 October 2010).

Waterman, Ellen (2006). 'Revisiting Haraway's Cyborg: the Non-innocent Music of Ellen Waterman,' *Vague Terrain* 4 <http://www.vagueterrain.net/content/archives/journal04/waterman01.html> (accessed 31 October 2006).

Weisbard, Eric (2000). 'Playback's a Bitch,' *Village Voice* June 20 45/24: 140 <http://www.villagevoice.com/2000-06-13/music/playback-s-a-bitch/> (accessed 3 September 2011).

Recordings

Amacher, Marianne (1999). *Sound Characters (Making the Third Ear).* Tzadik CD # 7043.

Herbert, Matthew (2001). *Bodily Functions.* CD, Soundslike, !K7097CD.

Luck, Neil. *Ground Techniques* MP3 (available to download from <http://www.last.fm/music/Neil+Luck>)

Matmos (2001). *A Chance to Cut is a Chance to Cure.* CD, Matador Recordings, OLE4892.

Migone, Christof (2004). *Crackers*. CD, Locust 00014623.

Other Materials

Daniel, Drew. Personal communication (via email), 6 July 2011.

Daniel, Drew. Personal communication (via email), 7 July 2011.

Luck, Neil. Personal communication (via email), 22 April 2010.Luck, Neil. Personal communication (via email), 11 July 2010.

Migone, Christof. Personal communication (via email), 29 April 2011.

Published Articles

1. Sewell, Stacey (2010). 'Listening Inside Out: Notes on an embodied analysis,', *Performance Research*, 15/3: 60-65.

2. Sewell, Stacey (2011). 'Between Body and Sound: Listening to the digitized body,' *Body, Space & Technology* 10/01 <http://people.brunel.ac.uk/bst/vol1001home.html>

Listening Inside Out: Notes on an embodied analysis
Stacey Sewell

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