

The Aural and the Quotidian: Everyday Experience in Listening and Practice

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Declaration

I, Jeremy Keenan, declare that the work presented in this thesis is my own.

Abstract

The research herein comprises an examination of the following question: in what ways do our experiences of the everyday inhere in our experiences of the aural as aesthetic and meaningful? It is not concerned with forging a definition of *everyday sound* as a category of sonic effects, but instead an analysis of the ways that the everyday, aural and otherwise, is interpenetrating with our perceptual capacities and the cultural practices encompassing aural aesthetic production and experience.

This thesis extends extant discourses surrounding the notion that the experience of sound as meaningful and aesthetic is connected to our general experience as embodied beings in the material world. The following analysis encompasses aspects of auditory perception, music aesthetics, and sound art production from the perspective of the body, as it is the locus of the listening subject situated within the domain of everyday experience. This includes an investigation of sound transduction technologies, as the devices that enable aural aesthetic practice are central to its analysis in the context of the everyday. Listening attitudes are transformed through cultural practice, structuring the relationship between the domain of the everyday, the embodied listening subject, sound recordings as cultural artefacts, and the attendant process of transduction.

Discourses that attribute non-material, disembodied understandings to aesthetic experience are examined and challenged. From this, a fundamentally material, embodied approach to auditory experience is proposed, and with it a consideration of the ways that sound art and acousmatic music engage with the process of human understanding and the constitution of meaning in sound. Self-reflexive methodologies in aural aesthetic practice are exemplified, with the aim of promoting an expanded conception of aural context that includes the technological, cultural, and phenomenal aspects of its production.

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Introduction

Before commencing with the following body of text, an overview of the theoretical framework binding the threads of my research and practice is in order. Central to my practice is the development of methodologies that facilitate transformations of everyday perceptual experience with an emphasis on the aural, with the aim of encouraging those experiences to be observed in an aesthetic context, ultimately enabling emancipatory practices of listening through the creation of self-reflexive works. Connected to our experience of the everyday world are the physiological, cultural, and technological domains that shape the actions of the individuals and groups who participate in the activities that compose it. The task of describing the persistently nebulous concept of the everyday, at least in the context of the issues I wish to discuss, is necessary: a central aim of this thesis is to further describe and examine particularities of the term *everyday* as it is used in the context of the aural, particularly regarding the practice of sound art, with an ear towards wider philosophical understandings of the quotidian.

A significant amount of discourse attends the subject of the everyday, and an exhaustive overview of the literature would be impractical to undertake in this thesis. It is necessary, however, to examine in brief some of the dominant perspectives in the service of understanding how different conceptions of the everyday as a general phenomenon occupy interpenetrating conceptual territories with that of the aural, informing and directing how we conceive of the auditory everyday. Philosopher Henri Lefebvre, a seminal thinker on the subject of the quotidian, defines the everyday as “what is left

over” after all distinct, superior, specialised, structured activities have been singled out by analysis’ (Lefebvre, 2008, 97). I would like to examine this definition with the aim of applying it to auditory experience and the everyday. In a manner similar to Lefebvre’s conception of the quotidian, everyday sound could be considered to be ‘what is left over’ after chartered performance and organized musical reception have been considered in and of themselves as distinct realms of experience. This does not exclude musical experience as an aspect of the everyday; instead, the concept of an auditory everyday distinguishes a space whereby a negotiation occurs between the particularities of cultural and personal sonic practice and the auditory world of lived experience.

As Lefebvre notes, the experience of the everyday, while observed in the absence of the fields of knowledge and structures of power that surround it, is always positioned in dynamic relation to them. For this reason, the experience of the auditory everyday is shaped by, and in turn influences, the realms from which it can be categorically separated. In this sense, the everyday can be seen less as a category of exclusion, and more as a region of potential and actual manifestation, ‘a zone of demarcation and junction between the uncontrolled sector and the controlled sector of life’ (Lefebvre, 2008, 32). The liminal space of the everyday, with respect to the auditory, is the region where many critical systems discussed in the literature on sound art emerge; Schaefferian listening, Cagean silence, the soundwalk, all occur as transitional manifestations within the flux of the everyday. An analysis of the interchange between lived aural subjectivity and the advent of technologies that enable mediated aural experience is fundamental to a study of the sonic quotidian, and is a topic that will be covered extensively, manifesting

as well in my practice. The methodologies involved in my practical work utilize technologies that have significant cultural underpinnings; these technologies shape the way we experience, interpret and classify perceptual phenomena. Specifically, I am interested in the experience of mediated sound perception, through sound recording and other means, the aesthetic implications of it, and the ways it has precipitated new forms of sound practice and transformed the production and reception of established ones.

This thesis engages notions of artistic autonomy with regard to music as a cultural practice, in the context of an embodied, human situation, one that is always embedded in the experience and understanding of the material world. To this end, I will confine the main thrust of my exploration to that of the perceptual subjectivities and technical practices of auditory experience as they pertain to sound art, drawing from other streams of examination as they relate to this purpose. With this in mind, the political and economic readings of Attali and Adorno regarding the pervasive effects of music as commodity in market-driven culture, while peripheral to the focus of my research, are not its focus. I will construct a discourse inclusive of cultural readings on sound reproduction, expanding to include constructive appraisals of new artistic forms and reconstructions of established forms enabled by its inception. For example, the distortion of distance perception resulting from the mediation of sonic stimulus in the process of mixing, as noted by Tagg (1990, 112) and Leeuwen (1999, 25), attends a change in its indication as perceived loudness, to one of timbral differentiation (e.g. a recorded scream or whisper at the same amplitude). Simon Emmerson concisely encapsulates this situation: ‘The microphone invented genres’ (2007, 115). This perceptual transformation,

which is as connected to the economic and social practices as it is to the raw phenomena of human audition, can be examined through analysis of its perceptual aspects and methodological possibilities. To this end, the process of recording and reproducing sound will be investigated with an orientation towards the experiential transformation of sound production and listening; that the registration of sound into mediated form simultaneously obstructs and augments artistic process and appreciation is a position from which I will critically examine my own practice and argue this thesis.

Discussion surrounding collaboration and participation in the production of artistic works is intrinsic to the discourse around everyday life and the arts. Theories pertaining to collaborative practice and participatory methodologies are established in the realm of contemporary art, and to a lesser extent in the world of contemporary music and sound art. Though my research is not exclusively focused on participatory methodologies, my practice often utilizes collaborative and participatory methods to promote expository aesthetic transfigurations of everyday auditory experience; particular modes of participation are therefore utilized according to their ability to engender such transformations. With this in mind, it should be noted that the focus of my practice is not relational aesthetics, nor singularly concerned with the politics of the social. Though auditory intersubjectivity penetrates the human experience of sound, the establishment of communal experience through aesthetic means, as is often the aim of participatory artworks, such as those of Rirkrit Tiravanija (2006), is not the focus of my engagement with participatory methodologies. Brecht's concept of the *Lehrstück*, or 'learning play', and its related theory of 'refunctionalisation', is more suited to explain the motivation for

my engagement with participation (Meuller, 1994, 81). Refunctionalisation is the positional reconfiguration of collective relations involved in the production and consumption of the work with the aim of encouraging greater collective understanding and aesthetic experience, towards an active, critical relationship between the work, its producers, and the context from which it emerges. This engenders an overt relationship to the process of cultural production. Through the experience of structure-level engagement, the work becomes a device in which dynamic reflection of its substance is enabled. This is not a passive process, occurring through the democratization of ubiquitous technological access, but an active form of artistic engagement that reconfigures perspectives of authorship without completely ceding structural predefinition by its creators. In the context of academic research, this Brechtian approach to collaboration supports the production of knowledge within the process of creation.

Defining *everyday sound* as a distinct category of aural events presents considerable challenges. To describe all sounds apart from music as everyday sounds, for example, one is burdened with the task of demarcating a specific line of distinction between musical and non-musical sounds. This difficulty is even more apparent when defining *the everyday* itself as a general category. For this reason, it is no surprise that multiple, sometimes contradictory positions on the aural and the quotidian exist. In this spirit, the goal of my research and its corresponding practice is to serve as a unifying narrative to negotiate the multiple discourses of the auditory everyday, and to analyse some of its specificities. There are two domains I bring to bear on auditory experience and the everyday. Firstly, the *Body* as the site of aural subjectivity with regard to sound reception

and sound art production is considered. Central to my research are the ways that the phenomenology of sonic experience and the production of sound based artworks are bound up in the perceptual facets of audition. This level of analysis is fundamental to the understanding of everyday sonic experience, and how the relationships between physical, social, and subjective factors thereof are conceived. Parallel to the fundamental auditory situation of the body in space is an examination of the milieu in which that body is embedded; the practicalities of the aural in its cultural context are inextricable from our experience of sound as aesthetic. With this in mind, the final section of this thesis is an examination of the *Devices* that facilitate the reproduction, transformation, broadcast and analysis of sound in terms of their relation to the field of cultural practices encompassing audition and aural aesthetic production. The use of concrete sound material in composition is situated at the apex of these concerns. The ways that cross-modal sensory influence directs auditory experience and practice, such as the linguistic use of ideophonic expression, or the audiovisual phenomenon of synchresis, introduce subjects of examination concerning the reception of sound art and music. Denis Smalley, Michel Chion, Simon Emmerson and Pierre Schaeffer have launched many lines of inquiry into this phenomenon, of which my contribution to the discourse is significantly involved with and indebted to. It is through these junctures between the phenomenology of sonic experience and the raw materials of sound practice that I focus upon the perceptual facets of auditory experience in my practice and research.

Many perspectives on the definition of *everyday sound* exist, but what commonly comes to mind is ‘non-musical’ auditory experience. Stephen Barrass (1997, 54), encapsulating

James Gibson (1966), has posited an encompassing definition from the perspective of perceptual research:

Everyday sounds are acoustic events generated by physical interactions between objects rubbing and colliding in the environment.

My research will engage with this definition, which implies a schism between our experiences of sound-as-musical and sound-as-everyday. However, in some sense this thesis can be conceived of as an examination of the obverse question: in what ways do our experiences of the everyday inhere in our experiences of the aural as aesthetic and meaningful? In this sense, my research is not concerned with forging a definition of *everyday sound* as a category of sonic effects, and is instead involved with examining the ways that the everyday, aural and otherwise, interpenetrates with our perceptual capacities and the cultural practices encompassing aural aesthetic production and experience. These concerns will be addressed in my theoretical text, and stand as the motivation behind the themes explored in my practical work. The following thesis is focused on the identification of problematic questions about the predominant theoretical discourse on auditory experience, and the investigation of new criteria to apprehend aural aesthetic practice, initiating new methodologies in sound art production and analysis.

1

Bodies

1.1 Overview

The following analysis of the aural and the quotidian will start with an examination of audition, music, and sound art from the perspective of the body, as it is the locus of the listening subject situated within the domain of everyday experience. In doing so, the body will be considered not only as the subject of audition and the site of sound production and aesthetic experience, but with it the examination of a wider possibility: that the essence of musical experience and the appreciation of sound as aesthetic are realms that are necessarily ingrained in the experience of embodied existence. From this, I will examine models that deviate from the dominant conceptions of aural aesthetics which ascribe non-material, disembodied understandings of aesthetic experience. I will argue that although concepts of disinterestedness and distance are still essential to how we experience sound as art and music, the core of our aesthetic experience is ultimately borne from our elementary experience in the everyday. I propose a fundamentally embodied approach to the reception of the auditory, and with it a consideration of the ways that sound art and acousmatic music engage with the process of human understanding and the creation of meaning. The way we view materiality itself, our conception of causality, as well as how we understand the constitution of meaning, are central to a discussion of embodied aural aesthetics.

1.2 Sounding experience

While the dominant approach to musique concrète has emphasized an intentional obfuscation of its source sounds' contextual reference, as normally identified through cultural familiarity or basic causal inquiry, there have been degrees of departure through which other approaches have emerged. Composers such as Gilles Gobeil (1994), in his undisguised use of signifying sound material (such as alarm bells in his *Là Où Vont Les Nuages*), indicate such digressions. Chion usefully identifies what he describes as an ambiguity in Schaeffer's implication that acousmatic presentation of sonic material necessarily engenders reduced listening; that the absence of a correlating visual source often has quite the opposite effect (Chion, 1994, 32). Chion points out that the acousmatic setting removes the aid of sight, potentially focusing more attention on the origin of the sound material than might otherwise be placed upon it. For example, hearing the creaks, clicks and groans of a structure in the dark of night, or the rustling of leaves around a corner might impel us to imagine their cause. With identification of source, Chion suggests, a perhaps natural urge to inquire into the nature of a particular sound may be quelled, in some cases freeing a listener to experience its inherent timbral characteristics. Dennis Smalley expands on these points, noting that acts of listening in an artistic and musical context rarely exist in independent categories of aural attention; rather, a dynamic process provides continual perceptual interplay between the listening modes, or his preferred term, 'relationships' or 'networks', thus indicating their interrelation during the act of listening. On this point, he states:

The sounding materials within a composition cannot be solely or even primarily self-referential. The apprehension of musical content and structure is linked to the world of experience outside

the composition, not only to the wider context of auditory experience but also to non-sounding experience. (Smalley, 1996, 83)

Smalley's concept of *indicative fields* concerns not only the noted instinctual tendency in listening to seek origin and infer meaning, but also examines broader associations between music and everyday experience, auditory or otherwise; his investigations explore the ways that listening, composition, and the natural world inform and reference one another, cohering into what is perceived as a unified listening experience. His examination of the world of everyday experience and its relationship to the creation and reception of music are highly relevant to contemporary thought on the aesthetic implications of embodied cognition put forth by Johnson (1987, 2007), Godøy (2010a, 2010b), Leman (2010) and others. Throughout this text, the view that the creation and reception of sound works are positioned at the junction between 'sounding and non-sounding experience' is a platform to which the following discussion is anchored.

1.3 Bodies and perception

Ecological psychology, originated by James Gibson (1966) and more recently developed by Alva Noë (2005), T.A. Stoffregen (2003) and others (Heft, 1997 and Carello & Turvey, 2005) is applicable to an embodied conception of the aural. Though a review of the extensive literature is outside the margins of this analysis, I will provide a brief summary of some of its central terms. Ecological psychology differs from traditional perceptual theories in some fundamental ways. The most important difference is that perception is an active process which takes place not as an inferential operation on internal representations of the world, but as the activity of an organism in a system

comprised of itself and the environment. These are the grounds by which Gibson and proponents of similar views hold that perception is direct; through interaction with the environment, we perceive structures in the world that indicate events to which our perceptual system is attuned, as opposed to individual ‘channels’ of sensory data upon which internal representations of events are processed. The directness or indirectness of perception is tangential to the current discussion, but some of the ways that directness of perception is argued in the Gibsonian view of perception are applicable. Firstly, the idea that the basic unit of perception is not individual sensation presented by the eyes or ears, but what the perceptual system is primarily attuned to are *events*; events embed within one another, nesting to form what we perceive as our environment as a whole (Gibson, 1986, 10). Another is that of *invariants*: essentially, features present in the energy arrays available to the perceptual system (optical, acoustic) at any given time which persist through changes are information present in the environment, and that the process by which this occurs is an active, embodied one. In other words

the pickup of...environmental information...depends upon the general orienting system of the whole body...[perceptual systems] serve to *explore the information* available in sound, mechanical contact, chemical contact, and light. (Gibson 1966, 58, emphasis added)

Essentially, we perceive events as meaningful through the invariants they present to us.

A related concept is that of *affordances* (Gibson, 1986). Affordances are environmental features that indicate information pertinent to an organism, affording actions and meaningful relationships in response. For a more extensive treatment on Gibson and

affordances in the context of electroacoustic music, see Windsor (1995). In the context of the following discussion, what is most important about ecological psychology is that it places the body as irreducibly embedded within the world as the central perspective from which experience and cognition are considered:

cognition depends on the kinds of experiences that come from having a body with perceptual and motor capabilities that are inseparably linked. (Thelen *et al.*, 2001, 1)

This viewpoint finds resonance in the phenomenology of Maurice Merleau-Ponty, whose influence on the discourse of perceptual theory is deeply ingrained. Merleau-Ponty proposed that the constitution of the self and our understanding of the world only exist in active conjunction:

[t]he world is inseparable from the subject, but from the subject which is nothing but a project of the world, and the world is inseparable from the world, but from a world which the subject itself projects. (Merleau-Ponty, 2002, 499-500)

What is suggested here is an encompassing embodiment wherein the separation of experience from the world in which it is embedded, and the constitution of a meaningfully structured exterior world separate from us as embodied beings are not coherent propositions. It is important to note that Ponty does not deny here the existence of forms of energy and matter independent of human existence, but more that its manifestations of meaningful organization are impossible to extract from our experience as beings within it. The implications of Ponty's claims have relevance to an aural aesthetics of the everyday: formulations which posit 'immaterial' or disinterested relations between aesthetic forms and the experiences they engender ignore this

inseparable link between the aesthetic subject and the environment, without which they could not attain significance.

1.4 Bodies and metaphor

The idea that the experience of sound as aesthetic is interconnected with our ability as humans to engage with abstract cognitive structures in more general terms, such as in the case of metaphorical language, is a well discussed consideration (Zbikowski, 2008 and Cox, 1999). Roger Scruton's assertion is that what is heard in music is 'metaphorical motion' and 'virtual causality', and that this experience requires a radical detachment from materiality (1997). This detached, 'disinterested' conception of aesthetics appears to differ radically to that of an embodied musical meaning developed by Mark Johnson (2007), and expanded in the context of music perception by Leman (2010), Godøy (2010a, 2010b), and Eitan & Granot (2006, 2007). While I accept the ubiquity of metaphor in the experience of music, my position is that it is essentially grounded in a primary relationship between the body and its environmental and social milieu, and is thereby inextricably involved with the material world and the bodies which inhabit it.

The notion of aesthetic disinterestedness, generally associated with Kant ([1790] 2008) has many facets that extend beyond its original usage. While Kant is generally considered to have been concerned with the separation of aesthetic experience from worldly desire, the term 'disinterestedness' has come to be associated with a strong formalism that holds the internal relationships of an artwork to be the exclusive locus of its significance (Kreitman, 2006). Contrary to this formalist conception, Johnson asserts that the criterion

of disinterestedness, and the detachment of art from the realm of everyday embodied experience, is misguided (2007). Still, there is some sense that aesthetic artefacts and the experiences they engender must be held as distinct from the everyday, in order to exist as such, and not be indistinguishable from preexisting entities. For this reason, the notion of abstraction in the analysis of aesthetic works is fundamental. Bullough's concept of 'psychical distance' ([1912] 1989) in aesthetic production captures this:

It is Distance which makes the aesthetic object 'an end in itself'....
Distance becomes one of the distinguishing features of the 'aesthetic consciousness,' of that special mentality or outlook upon experience and life...

For more discussion of Bullough, see Hanfling (2000). Regardless, even distanced, 'detached' aesthetic positions are judged as abstract *in relation to an embodied core situation*. In other words, abstraction is always grounded by its relation to concrete, embodied terms. Emerson puts it so: 'My imagination is part of the living and real world' (2007, 1). In this way, disinterestedness and Scruton's doctrine of source-detachment are reconciled with an aesthetics of embodiment and the everyday. Perhaps Johnson and Larson are closer to the mark when they connect our sense of movement in music to our experience of physical motion in the world: 'our experience of a bit of music shares something with our experience of seeing objects move in physical space' (2003, 70); Smalley also suggests this implicitly (1996, 81). While this formulation could be understood to constitute a disinterested attitude, given it demonstrates a deviation from everyday perception, if our experience of the aesthetic emerges from our basic sensorimotor understanding of the physical world, then that experience is by necessity intimately tied to it.

As Leman notes (2010), some evidence supports the notion that sensorimotor processes which occur at the neural level are integrated with our experience of both music and language. Though much of the literature on neural activity in music focuses on the mechanics of performance, there are experimental results that connect neural motor processes exclusively to listening. One such study by Zattore *et al.* (2007), shows high correlation between neural activity occurring during imagined musical excerpts and brain structures relating to motor processes in non-musicians. This implies that even without musical training, which would ingrain practiced musical motions in memory, there is motor activity in the brain associated with imagining music; therefore, it is not entirely a process based on musical memory, but has a direct relationship to neural motor schemas. This involvement of motor processes in the course of music perception extends to the causality we experience in the relation of physical motion to that which we experience in music. It suggests that although our experience of music might seem removed from the everyday, it is essentially involved with cognitive processes attending our understanding and experience of the material world.

These ideas are encapsulated in the *image schemas* developed by Lakoff and Johnson, (2003), Johnson (1987), and Arnheim (1997). Image schemas are innate patterns of interaction between a perceiving being and its environment that manifest as scalable conceptual mappings between basic embodied relations to space, time, causality and abstract metaphor; one example cited by Lakoff and Johnson is the use of spatial understandings when it is said that we are defending a 'position' in an argument

(2003, 4). An image schema can then be condensed to a pairing between a *source*, in this case spatial orientation, and a *domain*, in this case that of an argument. The idea of scalability in metaphorical mappings can be applied to metaphor in music, in that it is fundamentally related to processes embedded in all aspects of cognition. If the experience of musical motion ‘does not apply to the sounds that we hear, [but] what we hear *in* sequential sounds when we hear them as music’ (Scruton, 2009, 66), then it can also be said that this is not exclusive to music and also present in our basic cognitive schemes; a scale no more descends in physical space than time moves forward rapidly or sluggishly, despite the very palpable feeling of trajectory that inheres in both experiences.

The idea that metaphorical concepts have scalability between different source and domain relationships yields interesting implications for auditory aesthetics. There are some concepts and terms that illustrate the ways that metaphorical concepts are transferable between disparate domains, such as Daniel Stern’s vitality-affect contours (1985). This concept refers to temporal intensity changes in affective states which, pertinently, contain shared histories of intensity over time with other forms of experience having disparate content. One example of the contour formed by a ‘rush’, which shares temporal intensity features between swarms of people, the coming-on of anger, sadness, narcotics, and crescendo demonstrates the concept succinctly (Stern, 1985, 54). Eitan and Granot (2007) demonstrate through experiment that musical gestures not only map to physical motion in a variety of ways, but that what the authors refer to as ‘intensity contours’ are in some ways analogous between changes in different musical parameters such as pitch and tempo. In both of these formulations, the idea of the ‘contour’ as a

higher order entity characterizing intensity changes suggests a substrate upon which metaphorical mappings in music, language, and everyday experience attain mobility between forms. These concepts illuminate another crucial aspect of metaphorical experience in auditory aesthetics: in addition to the spatial and kinetic metaphors which are ingrained in our experiences and descriptions of music, temporal changes in intensity that exhibit commonality in shape are scalable between musical phrases, spectromorphological gestures, the emergence and dissolution of affective states, and any number of intensity changes which occur in environmental energy or subjective states over time.

1.5 Everyday listening

The Schaefferian modes of listening and related schemes (e.g Chion) pertain to elements of my argument in ways that should be clarified. The following discussion can be understood through Chion's simplification of the original modes; what I am primarily concerned with are lesser examined relationships between causal, semantic and reduced listening. Similarly, Scruton's acousmatic thesis, in which the essence of musical experience is conceived of as demanding radical detachment from causal origins and materiality will be examined.

The work of William Gaver (1988) on everyday listening represents a culmination of ideas within ecological psychology, embodied cognition and auditory information design. A distinction is made here between what he terms *everyday listening* and *musical listening*. These two ideas can be considered as analogous to causal and reduced

listening, with some interesting implications. Gaver understands the schism between these two types of experience as being related to our involvement with two different aspects of stimuli; when we listen to music, he claims, we are attending to *proximal* stimuli, as opposed to when we experience a sonic event in terms of its cause, in which case we are involved with *distal* stimuli. He further specifies that this dichotomy can be seen as analogous to the difference between *perception* and *sensation*. The second claim has implications about the nature of perception which are beyond the scope of this text, but the distinction between the proximal and the distal is prevalent in the literature on auditory perception, as seen in O’Callaghan (2007), O’ Shaughnessy (2009), and Gaver (1988), and represents a more concrete set of criteria for examining the ways that the aural is actually experienced; however, it will be seen that these categories are not mutually exclusive between the aesthetic and the everyday.

The central concept around which these theories are constructed is that of *source*. For Scruton musical experience is fundamentally acousmatic. We are said to experience music without regard to its source, which is somewhat consistent with Schaeffer’s view that the eradication of source identity enables the possibility of reduced listening. One problem with this assertion is pointed out by Don Ihde, when he notes that most things which sound in the world are the result of two or more bodies inducing vibration in the surrounding medium:

The mute object does not reveal its own voice, it must be given a voice.....there is clearly a complication in this giving of voice, for there is not one voice, but *two*. I hear not once voice, but at least “two” in a duet of things. (Ihde, 2007, 67)

Chion examines this as well (1994, 27-28).

This point is easy to mistake as trivial. After all, most accounts of causal listening consider this interaction to be subsumed under the general category of ‘cause’. Nevertheless, this multiplicity needs to be examined to understand how we conceive of *source* in listening to the cause of sound events. Within the general understanding of causal listening are some degrees of differentiation that constitute distinct aural situations. We often listen for qualities of a source even when we are aware of its identity, or what objects are producing it. Ihde identifies some aspects of listening that are often enacted even when the identity of a sound source is known. By his account we hear *shapes*, whereby the gestural energy of sound generating actions inheres within the spectral and temporal features of sound itself. Similarly, we hear the *surfaces* of sound generating materials, and also afforded by our audition is the ability to listen to their *interiors* (2007, 57-71). Jonathan Sterne addresses similar concerns in his treatment of mediate auscultation, the diagnostic use of the stethoscope in medicine (2003a, 2003b); Smalley recognizes this perceptual tendency in his *object/substance field* (1996, 89).

With this in mind, we can be said to engage in a process of *diagnostic* listening, where information we seek about the source of a sound is not its identity as a physical object, but some quality or situation that it indicates. There is a way that our attendance to the distal and proximal aspects of sound are different between these two facets of causal listening, which problematizes some of the core dichotomies at play in models that posit acousmatic exclusivity in musical audition. When we are trying to identify a sound in

association to a particular object in physical space, we can be understood to be operating upon its distal features; we are attempting to place this object as a particular entity in space relative to the location of our body or some other object in space. When we are interrogating features pertaining to the interior or surface of an object, however, this relationship is more complex. In these cases, we are often operating on a mixture of the proximal and distal aspects of a sound event. One can imagine examples, such as when ascertaining the health of a body, or the operational condition of a machine such as a car; in these cases we are not solely interested in the location or identity of a sounding body. A more complex situation can be appreciated in the human voice; we might attend first to distal features as we determine the identity or gender of the speaker, then proximal qualities to establish the affective import of their words. This will be discussed in depth in my treatment of language and semantic listening.

It is relevant that both elements are utilized in the process of gathering auditory information, as it demonstrates that the proximal and distal are not the exclusive domains of musical and everyday listening respectively. By extension, it indicates that aspects of reduced listening are commonly applied to everyday situations. As Ihde points out

Hearing interiors is a part of the ordinary signification of sound presence and is ordinarily employed when one wishes to penetrate the invisible. *But one may not pay specific attention to this signification as the hearing of interiors unless one turns to a listening “to the things themselves”.* (2007, 71, emphasis added)

The fundamental point here is that there is a basic relationship between causal or diagnostic listening and reduced listening. In concentrating on the proximal qualities of a

sound, we are able to extract information about an auditory event in a ‘diagnostic’ fashion as well as regarding it aesthetically; the attitude distinguishes the experience. The processes engaged in our experience of sound as aesthetic and sound as utilitarian share some elementary functions.

While it is perhaps possible to imagine other functions of listening that can occur in relation to a previously identified (or unidentified) source, it is clear that how we listen is directed by purpose. One relationship we have with sound is utilitarian. This is important as it identifies a difference in attitude between the ‘phenomenologically distinct’ (Gaver, 1988, 3) experiences of hearing sounds as ‘musical’ or ‘everyday’; we apply an aesthetic (musical) attitude towards sounds-as-music, or a utilitarian one. This distinction between utilitarian and aesthetic represents a more valid condition for experiencing the auditory in an aesthetic way than the presence or lack of knowledge, interest, or attendance to a sound’s identity. By extension, while works that encourage attention to the proximal or distal features of the auditory stimulate different experiences, these aspects are not necessarily exclusive to those experiences. In other words, while reduced or acousmatic listening tend to be associated with musical experiences of sound, they are not necessary conditions for it.

Michael Casey (1998) identifies some important ambiguities in theoretical doctrines that posit strong, distinct boundaries between modes of listening, to which my discourse here refers extensively. Casey’s analysis of Warren and Verbrugge’s widely cited experiment (1984), which tested the ability of participants to identify breaking versus bouncing

events (of glass objects) by ear, brings some interesting points to bear on defining the margins of causal and reduced or ‘musical’ listening. Warren & Verbrugge discovered that breaking versus bouncing events were easily identified over a wide range of spectral and temporal variations, and the invariant properties which enabled identification resides in differences in higher order temporal structure between the two sound producing events. This ‘higher order structure’ is the perception and subsequent identification of acoustic events dependent on conglomerations of smaller time-related events, or the ‘timing-onset components of sub-events due to an inherent multiplicity within the sound structure... a multiplicity of particles which exhibit a *massed* behavior’ (Casey, 1998, 32). Higher order structure pervades many aspects of auditory phenomena, from music to language. Casey notes that the recognition of source is improved relative to increasing complexity of structure within sound events, and interestingly that this applies to recognition of musical instruments; a melody played renders its instrument more, not less recognizable as a specific source than a single note (or an extraneous ‘non-musical’ sound), which contradicts the prevalent logic expressed in accounts that equate musicality with the acousmatic attitude (1998, 27). Casey identifies a crucial point about assumed distinctions between everyday (causal) and reduced listening:

The distinction between [them] is mainly in terms of the category assignment of the structural interpretation...it is the relating of this inherent structure to the act of event recognition that we refer to as everyday listening. Thus everyday listening is not distinct from reduced listening, rather it is a higher-level listening experience due to the additional considerations it demands. (1998, 27)

If, by Chion’s description, reduced listening involves attention to the ‘traits of the sound itself...[its] textures, masses, and velocities...independent of [their] cause[s]’ (1994, 32),

then causal listening involves these same activities despite the presence of auditory diagnosis or identification. Both experiences utilize the same basic processes whereby spectral features in conjunction with the higher-order temporal structure of auditory events are analysed. This concurs with Schaeffer and Chion:

A sound anecdote (such as the noise of a marble rolling about on an uneven surface), listened to with the intention of reduced listening, will have a structure homologous to the event-anecdote to which the sound refers: with the same progression, the same shape, the same 'story'. (Chion, 1983, 32)

Conversely, Casey's reconfiguration contradicts Scruton's assertion that musical experience is 'dependent on our ability to detach sounds entirely from their physical cause' (2009, 66). In fact, Casey's suggestion is even more radical than it first appears. Not only are these two categories of listening, which are generally construed as mutually exclusive, understood to be intrinsically associated, but another reversal is inferred: whereas acousmatic listening demands an active dismissal of causal appreciation as a necessary precondition, here we see that causal listening exploits the fundamental analytical framework of reduced listening, and its defining feature is a concern with environmental information in an 'act' of attribution through which we refer to a source or cause. In this way, through the perceptual process sounds are attributed (attached) to their sources, rendering the suggestion that in music 'sounds float free from their sources' (Scruton, 1997, 221) at very least unremarkable. Sounds by their nature are free from their distal sources, and the information about the environment that they afford is attained through the same perceptual framework as musical experience. What occurs in musical listening is not a process of detachment or suppression at all, but an experience which is

parallel to everyday interpretations that emerge from a common source; the structure that exists in sonic events. We attach either an aesthetic or utilitarian interpretation, or both to varying degrees. In other words, both aesthetic and utilitarian attitudes towards sound are different applications of perceptual analysis which can and do coexist in ways that are distinct yet interpenetrating.

The fundamental point here is that this contradicts the notion that aesthetic experience of the aural demands a radical separation from the material. More precisely, despite phenomenologically different manifestations, profound correspondences in their processual mechanisms bind them to the structural constitution, the mechanical vibrations and temporal order present in the physical events from which they emerge. In the following section, I outline a different conception of how both language and music attain their seeming causal transparency, which instead of demanding detachment indicates an intrinsic, intimate relationship between material and experience.

1.6 Music, language, and embodiment

The presence of language-like structures in music has been extensively debated in regard to the expressivity of music, as well as its potential to convey semantic or emotional content (Hanslick, 1974). Smalley considers the vocal origins of spoken language to be an archetypal component of musical experience and creation (1996, 86). Most accounts of ‘music-as-language’ stop short of indicating the conditions which fulfill the criteria necessary to imbue music with semantic meaning, despite having syntactical structure:

Whatever music may “mean”, it is in no sense comparable to linguistic meaning; there are no musical phenomena comparable to sense and reference in language, or to such semantic judgements as synonymy, analyticity, and entailment. (Lerdahl & Jackendoff, 1983, 5)

The use of the term *semantic* in relation to musical experience as meaningful has in some cases been considered so contentious as to warrant its exclusion from the discourse, (Steinbeis, 2008, 28), or necessitating exacting redefinition (Leman, 2010). My own position is that while music may not evoke any more than (inter)subjective associational meaning in the strict *semantic sense*, the tendency of musical experience to stimulate linguistic associations problematizes theories which hold musical significance to be entirely autonomous and self-referential, such as Hanslick (1974) or Stravinsky (1936, 53-54).

An expanded notion of what is conventionally recognized to constitute meaning that looks outside of linguistic, propositional meaning to causal, spatial, embodied and affective forms of significance within music and art, as well as everyday life, changes the context in which meaning can be applied to auditory aesthetics. This point is considered in depth by (Koopman and Davies, 2001) and Johnson (1987, 2007). In this manner, for instance, the way that we encounter and understand physical occurrences in the world can be considered meaningful in terms of their pertinence to us as embodied beings, in that we experience all activities in the world as meaningful or not in relation to us, whether or not those constitute linguistic meaning in the restrictive, propositional sense. Alva Noë points out that when we ascertain whether or not an entity is capable of conceptual thought, what we are generally demanding is *explicit deliberative judgement*, when in

fact meaning and conceptualization can be argued to exist on a more basic level, evidenced by interaction of an agent with its social environment. For example, that monkeys and other animals act within a kinship structure without being aware of the genetic nature of kinship structures: ‘concepts enter into an experience not so much because they are judged, by the possessor of the concept, to apply, but because their possession is a condition on the having of that experience’ (2005, 187). Leman expresses this idea concisely:

Meanings may not be things that exist within the minds of people (or in the brains of people), but instead, things that exist as a mediated relationship between mind and energetic forms. (2010, 56)

The process of meaning creation as central to making and experiencing art is implied by Dewey (1934), and further developed by Bell (2006), and Johnson (1987, 2007). The central view here is that an expanded conception of meaning includes non-linguistic forms of understanding; for example, our spatial and causal understanding of our environment, and more importantly the way that we learn through continual interaction with it, constitutes a process of meaning making which is active and direct. This view is consistent with a phenomenological approach (Merleau Ponty, 2002), as well as views put forth in ecological psychology and embodied cognition, where our understanding of the world develops and meaning is constituted through continual, active engagement between a subject and its environment (Noë, 2005, Leman, 2010, and Gibson, 1966).

With this in mind, meaning can be seen as something that is constituted through a bidirectional process, and is not exclusively the province of reason operating on semantic

forms. Johnson, paraphrasing Dewey, recognizes the creation of art as ‘the exemplary or even paradigmatic case of all human meaning-making’ (2007, 218). This view is parallel to that which I am developing in regard to an auditory aesthetics of the everyday: forms of auditory motion in sound art and music are related to general processes of meaning creation and understanding which operate on various levels of abstraction in relation to those present in the world and the affective states which attend embodied experience.

Natalie Bell expresses this idea when she writes:

What defines music need not be autonomy, but rather a distinction based on its capacity for ‘re-describing’ the first-order of reference that we perceive in reality. (2006, 12)

This idea of ‘redescription’ resonates with Smalley’s concept of surrogacy (1986, 1996), which specifies degrees of distance between gestural action and sound; it is also coherent with the broader notion that the creation of sound art is concerned with fundamental processes at play in our experience of the everyday. For Ihde, it is in the negotiation of this abstraction that the significance of artistic experience resides:

artists and phenomenologists share a certain practice, the practice of exploring the possible and doing it in variant ways...they show us the reversals and deconstruct our metaphors, and in so doing, construct new ones with new perspectives. (2007, 189)

Despite the expanded understanding of meaning to non-linguistic forms, any account of aural aesthetics which examines the function of metaphor must examine language. There are some applicable areas of interest which relate linguistic practice to an evaluation of aural aesthetics centred on embodiment and the everyday. Research exists that indicates a neural relationship between the processing of language in the brain and perception of

music. While it is important to recognize that neurological investigations into aesthetic experience generally favour multiple parallel brain systems (Nadal & Pearce, 2011), there is some evidence that similar neural processes occur in the extraction of linguistic meaning as those that do during music listening (Koelsh *et al.*, 2004). It is worth noting that Koelsh *et al.* are quick to specify that their findings ‘do not imply that music and language have the same semantics’ (2004, 306), but that neural associations between semantic meaning and musical structure are strongly indicated.

One of the ways that music listening exhibits some congruity at the neural level with language is through context violation and fulfillment. In other words, expected conclusions to linguistic and musical phrases, and violations of those expected conclusions vis à vis structures of harmony or semantic meaning evoke similar patterns of neural activity; this confirms general descriptions of musical motion expressed through tension-resolution relationships (Zbikowski, 2008, 2002). Like Koelsh *et al.*, Steinbeis and Koelsch (2008b) note that this neural activity is similar yet not identical between linguistic and musical modes. The authors hypothesize that what differs between them is a domain specific mapping which occurs during the processing of auditory stimuli in speech with direct semantic reference to lexical memory. By contrast, there is the suggestion that no such mapping occurs in the neural processing of musical stimulus. Instead, the authors suggest that aside from common structures at play between linguistic and musical meaning which centre mostly around context violation, musical perception is also processed by structures pertaining to higher order environmental information:

Music is analysed similarly to other types of signals meaningful by virtue of their overall and often specifically biological significance... The present data do not speak on a specific locus of processing music meaning, much rather it appears as if meaning anything other than that expressed by language appears to be processed in a *domain-general fashion, which is dedicated to actions, voices as well as music...* All these stimulus types contain and communicate potentially meaningful information (e.g. voices the presence of a conspecific friend or foe, prosody the emotional state of another agent, biological movement the mental states and intentions of another agent). (2008b, 6, emphasis added)

This conclusion supports the notion that the structures and movements we hear in music are intimately related to cognitive processes involved in our management of material, embodied, quotidian concerns. Furthermore, the 'domain-generality' of non-linguistic meaning processing resonates with ideas that posit aesthetics as emergent from the constitution of human meaning itself.

Another linguistic phenomenon which stands as a practical example indicating relationships between spatial, conceptual and aural practice is that of the ideophone. Ideophones, though sometimes onomatopaeic, use sound to performatively represent sometimes complex, soundless actions or ideas. The existence of ideophones is connected to controversial theories positing some level of universality between sound and semantic meaning, as is seen in universal sound symbolism and its related concept of phonaesthemes, or paired sound/meaning linguistic units; these theories stand in stark opposition to Saussure's 'arbitrariness of the sign' (1983). While evidence suggesting universal connections between sound and meaning are inconclusive, more concrete examples, such as the oft-cited bouba and kiki experiment (Köhler, 1929) demonstrate clear cases where visual, geometric properties are strongly associated with specific

spectral qualities of sound in a linguistic context. Ideophones vary in their frequency and usage between languages, which is somewhat problematic for the view that sound/meaning pairings are innate and universal. However, lack of universality does not preclude the possibility of underlying neural structures which enable sound/meaning pairings; See Ramachandran & Hubbard (2001) and Maurer *et al.* (2006).

One particular instance of ideophonic practice which exemplifies links between sound, space, embodiment and meaning is ‘tak’ in the Quecha language, discussed by Nuckolls (1999a, 1999b). A continuum of meanings for ‘tak’ was catalogued, from basic, sound making contact between objects to silent placement of objects in three dimensional space. What is interesting here is that the ideophone ‘tak’ demonstrates a practical manifestation of Johnson’s assertion that abstract concepts emerge from basic concepts of spatial embodiment (2007). Along with the previously cited neurological evidence, the various applications of ideophones indicate the possibility for strong associations between auditory gestures and meaning. These cases support the above theories which recognize the aesthetic, linguistic and conceptual as interdependent with metaphorical structures emerging from the human subject’s relation to its environment, inextricable from the human body embedded in physical space. If we consider Wittgenstein’s assertion that ‘The use of a word in practice is its meaning’ (2001, 18), then instances of ideophonic expression can be seen as manifestations of ‘sound metaphor’ structures (Hunter and Oumarou, 1998) which develop out of an embeddedness of meaning in practice that is modulated by culture as well as basic action-relations to the body in its physical environment. The fact that, for instance, the bouba and kiki experiment is controverted in

the languages of certain cultures (Rogers & Ross, 1975 and Maurer *et al.*, 2006) confirms Lakoff and Johnson's claim that metaphors are generally self-consistent within the structure of their host language; the existence of sound/meaning pairings are contingent upon many factors including the structure of the language (Lakoff & Johnson, 2003, 183 and Maurer *et al.* 2006).

If we consider Chion's explanation of semantic listening as '[listening that] refers to a code or a language to interpret a message' (1994, 28) it is worth assessing to what extent musical listening engages semantic features. In light of the preceding discussion, it can be seen that musical listening exploits features of semantic processes at work in the neural activities engaged in the reception of both language and music. While it seems that in comparison with clear examples of semantic listening, such as Morse code, music can only be considered as 'weakly' semantic, there is clear evidence of procedural commonalities between both experiences.

Chion identifies a common situation whereby the gestural, affective, and material features of the voice contribute to or change our understanding of semantic content, thereby utilizing what he considers to be causal listening to inform our comprehension of speech (1994, 28). Again, this manifestation of causal listening, while 'concerned with source', is often focused on proximal features of the voice to convey meaning. Steinbeis refers to this *prosodic* aspect of speech, and notes that the affective dimension of speech is directly related to how semantic content is grasped, and is therefore inherently a part of its referential structure; that questions are differentiated from statements with differences

in the tonal performance of speech provides the most obvious example (Steinbeis 2008, 13). In his study on timbre, Steinbeis notes that changes to spectral features in the absence of other movements in musical structure can prime semantic context violation and affirmation in a way similar to unexpected musical transitions (2008, 85-92). This has relevant implications for some forms of music and sound art, the structural narratives of which revolve primarily around the articulation of timbral aspects: it demonstrates the possibility that some of the same cognitive means which associate tonal music with the faculty of language are present in other forms of aural aesthetic production. Furthermore, this also indicates that timbral articulation is one possible substrate through which the previously discussed idea of context violation and tension-resolution could operate in non-tonal forms of aural art.

It is clear that the acquisition of meaning through spoken language arises from dually attended features: on one side, the lexical units extracted from speech are extrinsic to the acoustic energy that produces them. However, it is also the case that modulation of vocal amplitude, 'tone of voice', prosody, rising and falling intonation, and the identity of the speaker, not to mention body language all coalesce to form what we experience as meaning, and serve to provide the context within which it operates. Proximal aspects of spoken language carry semantic meaning, but the bodies from which they emanate and the distal space in which they are embedded form the milieu of transmission and the context of understanding; the statement 'I'm over here' expresses this junction concisely. While language can certainly be condensed to textual form, it would not be correct to say that our ability to communicate requires us to experience linguistic

information as ‘separate’ from its acoustic manifestation. We have seen this claim made by Scruton in regard to music: ‘in the case of music, we hear an order [which is] dependent on our ability to detach sounds entirely from their physical cause’ (2009, 66). This assumption is also central to how reduced listening is generally considered to occur (Chion, 1983, 30-31). I argue that this is not the case on the basis that language and music share some important practical and processual substructures. This prevalent tendency to conclude that attendance to source is necessarily ignored in musical experience can be unravelled with Heidegger’s concept of objects being ‘ready-to-hand’: tools attain transparency through familiarity as a product of our interaction with them, or *withdraw* into the activity (Heidegger, 1962, 103-104 and Dourish, 2001, 109). Hubert Dreyfus’ notion of *absorbed coping* (2003), whereby the skilled intentional actions of an agent render an activity seemingly automatic or unconscious is also apt. A correlate which synthesizes these two concepts can be observed in the apparent *absorption* of sound sources into the activity of listening: through familiarity with methods of sound production and their cultural milieu, our simultaneous attendance to proximal, distal, timbral, tonal, lexical, affective and dynamic components in music and language fuse to present a single experience. This stands in opposition to the idea that in musical and linguistic experience we ‘detach’ the information available in the signal from its source; instead we are involved in a process where a sound source, the world within which it is embedded, and its receiver cohere into an irreducible whole, the individual components of which are intimately conjoined.

Therefore, the order we hear in music is not dependent on a notion of reduced or acousmatic listening that requires ignorance of source-identity, any more than understanding the semantic meaning in sentences requires us to ignore vocal qualities, stop attending to the identity of a person speaking, or to their speaker as a source. Both processes occur in unconscious simultaneity, bidirectionally influencing each other to compose our experience of them; the difference between babble and speech does not lie in our ability to ignore material features of the source. It is more correct to say that what we hear in speech, music, and environmental sound are different forms of higher order structure which are superordinate to the acoustic energy that generates them, but emerge from and are necessarily entwined with it; these structures are categories of events which distinguish each experience, but do not by necessity negate attendance to their sources. This supports the view that an essential, thoroughgoing integration with the material runs through our experience of music and aural aesthetics.

1.7 Bodies, affectivity, and the auditory

Given that the topic of emotion is so deeply embedded in the discourse on musical perception, and indeed in our experience of the aesthetic, the current discussion requires a brief analysis in the context of everyday aural aesthetics. My position is that while we tend to reserve the term *emotion* for the description of specific manifestations of internal states, that the entirety of human experience is imbued with an affective dimension that is inextricable from the thoughts and events in the world which comprise that experience.

On this point, Merleau-Ponty is helpful:

Emotion is not a psychic, internal fact but rather a variation in our relations with others and the world which is expressed in our bodily attitude. (1964, 53)

Similarly, William James' assertion that even the rudimentary aspects of thought are necessarily attended by *feeling* is relevant here (2007, 245); that even the word *if* engages the basic experience of *possibility* is taken up and further analysed by Johnson (2007), and can be seen to imply a pervasive affectivity which inheres in the world. What we commonly describe as *emotions*, then, are specifiable instances of affective intensity, and not, as is conventionally understood, the diametrical opposite of reason. In this way, similar to the expanded formulation of *meaning* that I have outlined, an understanding of affective experience which finds feeling intertwined with the flow of the everyday can help us to examine how both conventional as well as timbrally-focused forms of aural aesthetic production are meaningful: if we view the affective dimension of experience as essential to the constitution of our awareness, then it can be seen that *structure itself* is imbued with affectivity. If, either through intersubjective cultural reference or innate human tendency, the structure in forms of music can be experienced as instigating clearly defined emotional responses, such as *joy* or *sadness*, then with this expanded understanding of affect we can also include the 'submerged continent' (Johnson, 2007, 97) of affective experience which gives way to qualities of feeling that, though perhaps of more ambiguous identity, are embedded in subtle ways within the structure of non-tonal aural forms.

1.8 The global array

One notion that has emerged from current research in perception is that of the *global array*, developed by Stoffregen and Bardy (2001). In part indebted to Gibson, their approach differs in that for them, the information present in the environment is not simply common between different forms of ambient energy (acoustic, optical), but exclusively exists in patterns which occur between all forms of energy. The global array is a pattern of relationships between all forms of energy present in the environment, that structures the information available to us through perception, consisting of ‘information that exists in irreducible patterns across different forms of energy’ (2001, 196). It is further specified that

The global array can be represented as an n-dimensional space. The number of dimensions is the sum of dimensions of the different forms of energy, minus those dimensions that are common across all forms of energy. The dimensions of space (i.e., position) and time are common across all forms of energy, while other dimensions are peculiar to individual forms of energy. The structure of the global array is influenced by all events, objects, and surfaces that influence the structure of single-energy arrays. (2001, 206)

Stoffregen and Bardy argue from a position whereby the information gathered by the perceptual system is considered to be *specified* by ambient energy in our physical environment. The concept of specification is a frequently debated topic in contemporary cognitive science, the core of the argument revolving around to what extent and by what process perception is either direct (specified by ambient energy), or emerges from inferential processes working upon internal representations of our environment; this is a central aspect of the debate between cognitivist and embodied theories of cognition

(Shapiro, 2007). For the purposes of this text, and in terms of the theories of aesthetic understanding outlined here, this debate is peripheral. The concept of the global array could be adapted to function within a paradigm of inferential perception; to the extent that information relevant to the observer can emerge in perception, so inferential processes could still have the ultimate goal of inferring a global representation of environmental energy that consists of interrelated, relevant patterns of information.

If all differences in energy within the environment can be considered as events, it is easier to concretize the notion of the global array as the information or meaning that exists in different events. In Gaver's treatment of the *event* as an object of perception, we see that ambiguities between sound considered as a property of objects and sound as an event or object in and of itself can be resolved if we consider the properties of objects as being subordinate to events:

Events incorporate things and their properties...The length of a vibrating bar and the sound it produces are thus parts of the same event. (1988, 18)

Extending this further, we can even conceive of stationary objects as 'stable events, or stable patterns in interactive perceptual and motor processes' (Johnson, 2007, 47).

Gaver's view confirms this: 'there are [only] the beginning of events, *ongoing events*, and the endings of events' (1988, 18). It is important to clarify that the event as an individual occurrence is a temporally perspectival unit, and that in the flow of experience events conglomerate, simultaneously and sequentially, to create complexes of meaning:

Events occur over different time periods and are nested in both time and space.. cutting a blade of grass with a lawnmower is an event. But so is cutting all the grass that extends along the blade at the same moment, and so is cutting the whole lawn over time. (Gaver, 1988, 18)

As such, information perceived in the global array is subject to orders of relation which occur over different scales of time and between different events.

It is important to realize that the concept of the global array does not deny the existence of individual ambient arrays, or forms of energy that present themselves as acoustic, haptic, or optical respectively, but that the forms of information which are relevant to our perceptual system reside in events specified by structures that exist as the environmental invariants which describe them. The claim put forth by Stoffregen and Bardy is that these invariants are not specific to any given mode; a variety of theories on this notion exist in the ecological psychology literature as to the modal specificity of invariants, as well as their context specificity (Coello and Rossetti, 2001). Despite the presence of ambiguities in the specific mechanics of the global array, the concept stands as an important model in understanding how our perceptual system obtains information in environmental events, and provides a more comprehensive and correct picture of perception than a primarily top-down synthesis of separate sensations; it also illuminates connections between everyday experience and musical perception.

While experimental research that verifies the specifics of the global array is still sparse, there are some convincing results from studies on intermodality in perception. One such example is Stoffregen & Bardy's own interpretation of the well known McGurk effect

(McGurk & MacDonald, 1976), where conflicting auditory and visual information in the form of speech leads to the perception of information which is non-veridical in regard to either sense modality. Dominant interpretations of the McGurk effect focus primarily on speech perception (Boersma, 2006 and Green *et al.*, 1991). Stoffregen & Bardy's interpretation, which is potentially inclusive of speech perception processes that are involved in the McGurk effect, is that it is the result of higher order pattern recognition innate to the perceptual system and its active engagement with the environment:

multiple perceptual systems are stimulated simultaneously...the stimulation has a single source (i.e., a speaker)... we do not assume that observers are separately sensitive to structures in the optic and acoustic arrays but, rather, propose that observers are directly sensitive to patterns that extend across these arrays, that is, to patterns in the global array. (2001, 211)

Though many accounts of intermodality posit an exclusively audiovisual association, there is also evidence supporting similar linkages between tactile, visual and auditory stimuli. Interestingly, many of these studies indicate interchangeability between cross modal connections; for example, time synchronous influence between tactile and visual information seems to function bidirectionally (Hötting and Röder, 2004 and Watanabe, 2001). The literature on intermodal associations supports the idea that what is intrinsic in all perceptual acts is the recovery of higher order relations in the environment. That these experiences can be experimentally manipulated has relevance to a conception of embodied aesthetics. It indicates that our experience of objects and occurrences in the world have some sort of general structure outside of the sensations that are involved with them, and that the human capacity for abstraction, including that found in music, are

related to basic cognitive structures involved in the apprehension of environmental information.

More essentially, the concept of the global array has great applicability to an embodied understanding of aural aesthetics as it relates to our experience of sound art and music, as well as environmental sound and everyday listening. If the primary mechanism by which the perceptual system structures our experience of the world exists in recognising patterns which are superordinate to any given modality, audition is linked with a general sensitivity to higher order flows which are embedded in the relationship between the listening subject and its environment. Godøy (2010a, 112) suggests that we are directly sensitive to *energy schemata* in musical movement as a result of our attunement to gestural features of events in the world; by extension, these events are grounded in our sensorimotor understanding of motion and space in a way that emerges from our basic embodied experience. Image schemas, as ‘dynamic, recurring pattern[s] of organism-environment interaction’ (Johnson, 2007, 136) can be understood as a system of bodily relations to the global array, and their scalability regarding abstraction from basic physical aspects with respect to metaphor in language integrates well with the general concept. In this sense, we can understand the body as being situated at the centre of both aesthetic and everyday experience at many levels of abstraction.

If our perceptual systems are attuned to grasping patterns of information structured by events, and not comprised of a synthesis of separate modal sensations, patterns of bodily and environmental change, such as vitality-affect contours, the motion trajectory of

objects, and the metaphorical ‘movement’ in sound and visual art, as well as the more general metaphors present in language reside in the mechanism by which we perceive relevant environmental patterns in relation to our physical bodies.

1.9 Timbre

Gaver identifies a relevant ambiguity in the perception of timbre with regard to its status as either a sensation, thereby independent of its source, or a perception, in which case it can be understood as the identifiable characteristic of a particular source or agglomeration of sources.

In the end, timbre presents two faces to those who study it. One is that of a sensation, with varying phenomenal characteristics that are described by such adjectives as rough or smooth, bright or dull. The other is that of a perception of the source of sound. (Gaver, 1988, 9)

He goes on to further distinguish the classification of musical timbre in opposition to that which engenders everyday listening. He concedes that this distinction is not entirely justified, given the potential for commonalities in timbre between musical instruments and everyday sound sources, and is careful to define aspects of timbre according to how we usually experience them, as opposed to their spectral content or how we *could* potentially attend to them; Scruton is similarly astute in distinguishing musical from non-musical listening (1997, 79). While much of this ambiguity is bound up in an overstated distinction between musical and everyday listening, Gaver is correct when he states ‘It may be that one of the powers of a physically realizable timbre is that listeners' attention fluctuates between its sensory qualities and the information it provides about the world’

(1988, 9). It seems that the rupture between an account of timbre that favours sensation versus one that holds timbre as a property of source is somewhat inconsistent with that put forth in Gaver's own text, where events are seen as higher order structures that encompass both properties and their causes. Thus, the question he cites by Strawn (1983), 'Is the timbre of an instrument played in a large room the same as that of the instrument played in a small room?' is resolved by the conclusion that if sound is considered with regard to an event-based model, it is not the same timbre at all; the event is the playing of the instrument in a given space, and the timbre is the spectro-temporal history of that particular event at a given point in space. That we recognize a particular physical object as its mechanical source is not identical with the measure or perception of that timbre.

There is a certain sense where these distinctions are terminological, and that in practice, instrumental timbre has a functional meaning in general musical terminology. Still, it seems this distinction is overstated as being somehow ontological; my treatment of reception-centred and production-centred accounts of audition later in this text will clarify this further. It makes more sense to say that we recognize timbral similarities in the higher order temporal structures of particular sound events within various thresholds that afford their identification as particular sources; we can recognize many different timbres as being generated by a single source. A more accurate description of the inherent duality in aesthetic auditory perception is Don Ihde's 'double spatial presence of sound': sound in music is 'both directional and atmospheric' (Ihde, 2007, 187). It seems that this phenomenon presents itself to greater or lesser degrees in all our experiences of sound, and not exclusively music, with incidence increasing as our attention to aesthetic

or significant aspects; that the human voice can simultaneously present lexical, sonorous, directional and enveloping features illustrates these coexisting facets.

Gaver implies that the key activity within auditory perception that defines our experience of sound as musical or otherwise is attention. This may seem an obvious outcome of thinking within the context of reduced and causal listening, but there are some key points regarding auditory attention that are generally overlooked by Schaefferian approaches. Particularly, his suggestion that attentional aspects of auditory perception *fluctuate* between listening modes deserves consideration. Ihde's application of perceptual *multistability* to the auditory is relevant here (2007, 187-190); that our attention can fluctuate between various interpretations of a visual figure, with attendance to figure vs. ground, through which different presentations of a scene occur. Visually, an abundance of examples abound, such as the Necker Cube (Necker, 1832). The verbal transformation effect, where the repetition of recorded speech gives way to radically different lexical interpretations, provides a concrete experimental demonstration of auditory multistability (Warren, 1961).

Though perceptual multistability is generally understood as an automatic process, Ihde's usage indicates that attendance to multiple variations can be modulated by attention as well as spontaneous perceptual processes. This is supported by investigations into the role of attention in auditory scene analysis. While the specific ways that attention directs the formation of streams in auditory cognition are not yet entirely determined, research suggests a series of interactions between top-down selection, learned recognition, and

bottom-up salience (Fritz *et al.*, 2007). This implies the existence of complex cognitive processes underlying the fluctuations of attention to which Gaver refers, and supports conceptions of embodied cognition and ecological psychology, where patterns of salience are recovered from the environment as a whole.

If we revisit the discussion of the McGurk effect in the context of the global array, we can see that selection of attention to a particular modality results in not only a different interpretation of information, but also a different experience *within the same event*. If the perceptual information relevant to a given event lies in patterns which exist outside the forms of energy which structure it, then constraining attention to single modalities, or to particular features within a single modality, will alter how we experience that event. This is consistent with an understanding of causal listening as a type of feature extraction which functions through temporal grouping in auditory perception, and the claims put forth by Casey which I have extended; namely, the emergence of what is experienced as reduced or musical listening from perceptual mechanisms that determine the cause of a sound through analysis of its timbral properties. As such, we can infer that the timbral properties of a sound and its cause are intrinsically linked, and to experience them musically or not is to *select within* the auditory scene as an event field, regardless of what ambient arrays are stimulated by that event. In this way, timbre can be seen as one particular axis around which our attention is pulled between distal, source-orientated facets, and sensation-focused, proximal facets of our auditory experience. Therefore, timbre is not split irreconcilably between casual, utilitarian considerations and aesthetic,

musical experience, but is the source from which both our experience of sound-as-music and sound-as-source emerge.

The more fundamental ambiguity in the categorization of timbre seems to lie in two particular aspects. Firstly, timbre is interdependent with changes in frequency and amplitude that occur over time. Secondly, if many of the event structures to which we attribute both ‘qualities’ of sound as well as their event-sources, such as ‘graininess’ or ‘breaking’ are the result of higher order structures existing between smaller events over time, then it may be difficult to determine the temporal boundaries between separate sound events, and what window of time to ascribe timbral qualities. Recall Emerson’s observation that mimetic forms in composition can be of two sorts:

There are two types of mimesis: ‘timbral’ mimesis is a direct imitation of the timbre (‘colour’) of the natural sound, while syntactic mimesis may imitate the relationships between natural events. (1986, 18)

In other words, what we perceive as the ‘quality’ of a given sound may be both a result of spectral measure of a continuous sound over time and the temporal interrelation between related but separate sound events. As such, it may be that what is so often indistinct when discussing timbre is that it is the application of a fixed description which is formed over the course of time, and that the window of time to which it is applied is difficult to precisely measure or define. Even so, our application of timbre has a reasonably clear definition if it can be allowed to act over a range of contexts.

There still remains the intuition that, despite the connection between everyday experience and the aesthetic auditory outlined here, certain configurations of auditory material are more musical, or at least have a greater tendency to encourage musical experience. It is necessary therefore to specify that the claim being made is not that musical material and the experiences it engenders are qualitatively identical. It is more that if, as Gaver concedes, 'it seems possible to listen to the world as music', then his rejection of the obverse condition, that the sounds which comprise music can be listened to as 'separable events in the world', is untenable (1988, 3). This can be exemplified very simply if we think of how we generally regard music with which we are not actively involved in *listening to*, or is obscured through the walls of an adjacent room. Though sounds intentionally structured as music (and as I have argued, sound art) encourage a particular type of aesthetic experience, that experience is subject to different possible interpretations which are modulated by attention, memory and a variety of top-down and bottom-up processes, as well as the milieu of cultural production within which they are embedded. In this way, my purpose in analysing timbre is to reject the claim that timbre is marred by a conceptual schism between its indication of source versus its sensational qualities. This is important, as the assertion made by Gaver and generally supported by dominant conceptions of musical analysis is that this schism also necessarily attends an irreconcilable difference between music and noise, between the experience of sound-as-aesthetic and sound-as-everyday. I reject this on the basis for which I have argued an inseparable relation between musical or reduced listening and its fundamental association with causal listening and our experience of the everyday.

1.10 Causality and embodiment

The concept of ‘chimeric sound’ is significant to the discussion surrounding causality in auditory aesthetics. Sound chimeras refer to a situation where, particularly in music, multiple simultaneous sound sources form to create a temporally cohesive sound object which seems to have no direct causal relation to the sources which created it, and ‘does not belong to any single environmental object’ (Bregman, 1999, 460). This intuitively familiar situation is often cited as a distinguishing criterion for musical experience (Scruton, 2009, 62), and is the perceptual tendency to which Gaver attributes our experience of fusion between timbrally related harmonic sounds as chords (1988, 10). Leman explains this phenomenon with the claim that we experience musical complexes of sound, such as Bregman’s (1999, 459-460) description ‘the simultaneous roll of the drum, clash of the cymbal, and brief pulse of noise from the woodwinds’, as having a virtual agent that brings them into being:

[we experience] musical sounds [as being] caused by the *activity of an agent*. For example, if we hear a bell, we are inclined to think that an agent strikes the bell with a hammer. Slightly more abstract, but not less realistic, is that we hear a whole orchestra playing as if it is set into action by a (virtual) agent. (Leman, 2010, 51)

This is convergent with Scruton’s view of metaphorical causality in music, with one distinction: Leman claims that the ‘virtual agent’ which is perceived in musical structure emerges from the experience of causal agents and the materials they interact with in the environment, that they are

rooted in the listener’s proper action-oriented ontology, that is, the set of things that exist for a subject from the viewpoint of her/his action-oriented bias to the physical environment. (Leman, 2010, 52)

Aspects of sound chimeras and causal agency are relevant here. Leman's proposition that we understand and experience these events as having a cause, or deriving from active agency, whether or not that cause has a one to one relationship with an existing physical object, has some implications for the model of aesthetic listening which emerges from our experience of the everyday that I have been developing. Essentially, the suggestion that our experience of musical structure is one within which inheres an innate attendance to causality as a general phenomenon is supportive of the claim that the highly specialized act of hearing music within sound is linked to our basic ability to extract causal relations from events in the world; again, that all types of listening and the levels of attention they engender emerge from the basic structure of causal listening. See Leman's (2010) discussion of causal semantics in music for further analysis.

If we examine the concept of musical sound chimeras in the context of our ability to identify auditory structures as events, it can be understood that the parsing of higher order temporal structure which occurs in the identification of environmental sounds as events comprised of smaller, discrete, subordinate events, also underpins our ability to parse musical structures such as chords as irreducibly coherent events. If we identify an event, for instance, as the collapsing of a building through a recognition of energy patterns present in its acoustic distribution over a particular period of time, we recognize higher order structures in music in much the same way. It should be noted that this claim is not that both experiences are identical, but that they share basic processes which are applicable to the general experience of audition.

Though there is a paucity of research on the cognitive and perceptual aspects of causality, some experimental evidence exists supporting the claim that our perceptual system is innately attuned towards the recovery of causal relationships, which is in some cases a direct, bottom-up process. Studies on this predisposition for parsing causal relations even in experimentally simulated circumstances, defined as *phenomenal causality*, (Michotte, 1963) indicate some pertinent results. Sekuler *et al.* (1997) present research in which concurrent auditory stimuli influence the causal interpretation of a visual animation in the form of two dots moving towards each other along the same path. The visual interpretation could either be that of two dots colliding and bouncing off each other, or simply moving through or past each other. When the animation is presented with a synchronous auditory component, the interpretation is skewed towards that of a collision event. This result was corroborated by Watanabe (2001) and Watanabe & Shimojo (2001) in similar studies. Early studies by Zeitz and Werner (1927) show auditory stimulus imbuing visual animations with perceived motion, which were otherwise perceived as static. M Sinico *et al.* (1998) have demonstrated that the frequency envelope of sounds over the course of a visual event can consistently influence the subjective perception of time. These results support the notion that our perceptual system is inherently sensitive to the recovery of events which occur across multiple forms of environmental energy.

Additionally, this research demonstrates that our ability to extract causal relationships from existing patterns of energy in a way that does not necessarily provide veridical information about the environment is not a feature exclusive to musical listening, or even

aesthetic experience. In other words, the ‘virtual causality’ that is heard in music can be experimentally simulated, and the ‘metaphorical motion’ that we experience is a subset of basic processes that occur in our perceptual system when we extract causal relationships from patterns of ambient energy. Ultimately, this suggests that the perceptual mechanics which underlie our recovery of causal relationships in the world, through our ability to predict and imagine situations in what Merleau-Ponty refers to as our ability to ‘reckon with the possible’ (2002, 125 and Romdenh-Romuluc, 2007) are brought to bear on our most abstract experiences, from conceptualization to aesthetic forms within sound.

2

Bodies in Practice

2.1 Overview

One piece that exemplifies my research into the relationship between bodies, the everyday environment in which they are embedded, and the human experience of the auditory in the context of aesthetic aural production is entitled *Strings*. This work is a collaboration between myself and textile artist Myrto Karanika. *Strings* is an immersive, interactive sound work utilizing a custom designed touch sensitive textile, diffusing audio in 4 channels. The textile was designed by Myrto Karanika, and consists of a 512 point conductive thread matrix, hand embroidered fabric, and a microcontroller programme enabling serial data connection between the textile and the sound generation software. My role in the production of this work was as software programmer, sound artist, and interaction designer; for this purpose, I created the software for *Strings* with a combination of Max/MSP and Csound.

2.2 Structure

The piece was conceived with the aim of avoiding an instrumental paradigm, where particular types of gestural technique elicit distinct performance practices; similarly, schemes resembling gaming situations where skillful understanding of rule-based interactions produce hierarchically ‘successful’ results were rejected. Instead, the aim of *Strings* is to encourage a mode of interaction that immerses the participant in a

perpetually shifting, fully embodied aesthetic situation with which they are structurally integrated. With this in mind, I conceived of an interaction scheme which engages the relationship between energetic activity, bodily motion, and aural output at different temporal scales. The mechanical design of the textile presented some challenges in this regard. Despite having accurate sensitivity to touch across the length of the cloth, the conductive thread provides a matrixed mesh of binary connections; no pressure sensitivity or continuous control, only off or on. To extract the speed, force, and trajectory of gestural activity, I constructed a series of measurement functions in Max/MSP to calculate features such as the length of time that nodes of the matrix are held down, the time between node on/off events, the amount of activity in different quadrants of the textile, and the spatial distance between note events. This data is analysed, averaged, and combined in different ways and mapped to different synthesis parameters which affect the aural output of the piece. The relevant data are classified according to particular temporal scales and applied in ways that change interdependently according to the status of other data; this thwarts predictable, linear mappings in favour of relationships that change over the course of time, while affording a level of immediate feedback. The synthesis engine for *Strings* is based around the granulation of a single string sample in Csound, processed through tuned comb filters. For a detailed chart of the mappings between the textile and sound engine, see appendix I. Documentation is available on the DVD labeled *Strings 5.1 DVD*, and the accompanying data CD containing photographs of the work and the Csound and Max/MSP implementation.



Figure 1. *Strings* installed, Goldsmiths College, 2009



Figure 2. *Strings* installed closeup, Goldsmiths College, 2009

2.3 Context

Strings integrates themes in embodiment, perception, and aesthetics by facilitating unfamiliar relationships between bodily gesture, architectural space, and the aesthetic experience of the aural. Thoroughly concerned with the propagation of sound in space, the ‘double spatial presence of sound’ as ‘both directional and atmospheric’ is intrinsic; with *Strings*, the participant is situated at the centre of this conjunction. The immediate tonal and timbral changes associated with proximal listening and instrumental performance also result in immediate changes in diffusion over the 4 loudspeakers. Through tactile engagement, the correlation between sound and space becomes a tangible, independently manipulable aesthetic feature of the work. Temporally, the relatedness of causal and reduced listening manifests in the tension between sound resulting from immediate bodily action and the long term spectral transformation of the work. The piece presents the experience of a continuously changing relationship between metaphorical movement in sound and gestural motion in space, initiating a perspectival metamorphosis in the experience of source/domain metaphor mappings existing in conventional listening practices.

Smalley’s surrogacy, and its concern with the temporality of movement in bodily and sonic gesture is relevant to the work. *Strings*, in the unfolding of multiple, simultaneous, interdependent temporal frames unifies the immediate, first-order surrogacy of specialized gesture with the second-order and remote surrogacy of increasingly ambiguous energetic forms. This is congruent with the pan-modality of the global array, where aesthetic experience exploits innate sensitivity to higher order patterns of change

which are embedded in the relationship between the listening subject and its environment; as Smalley notes, more remote gestures open onto wider associational networks between flows of environmental energy and aural structures (1996, 82-84). If we recall, with Bell, that music demonstrates a ‘capacity for “re-describing” the first-order of reference that we perceive in reality’, in *Strings* this process is transparent and plastic, engendering a play of movement between orders of gestural reference. The title of the piece itself, outside an obvious association between textiles and music, indicates its central aspiration: to situate the core of the work within a magnified network of relationships between the embodied listening subject and the tactile, environmental, and aesthetic domains of experience. In this manner, the work evokes the imagination of interconnected, partially tangible ‘strings’, which metaphorically link everyday experience and embodiment with the experience of space and the aural as aesthetic.

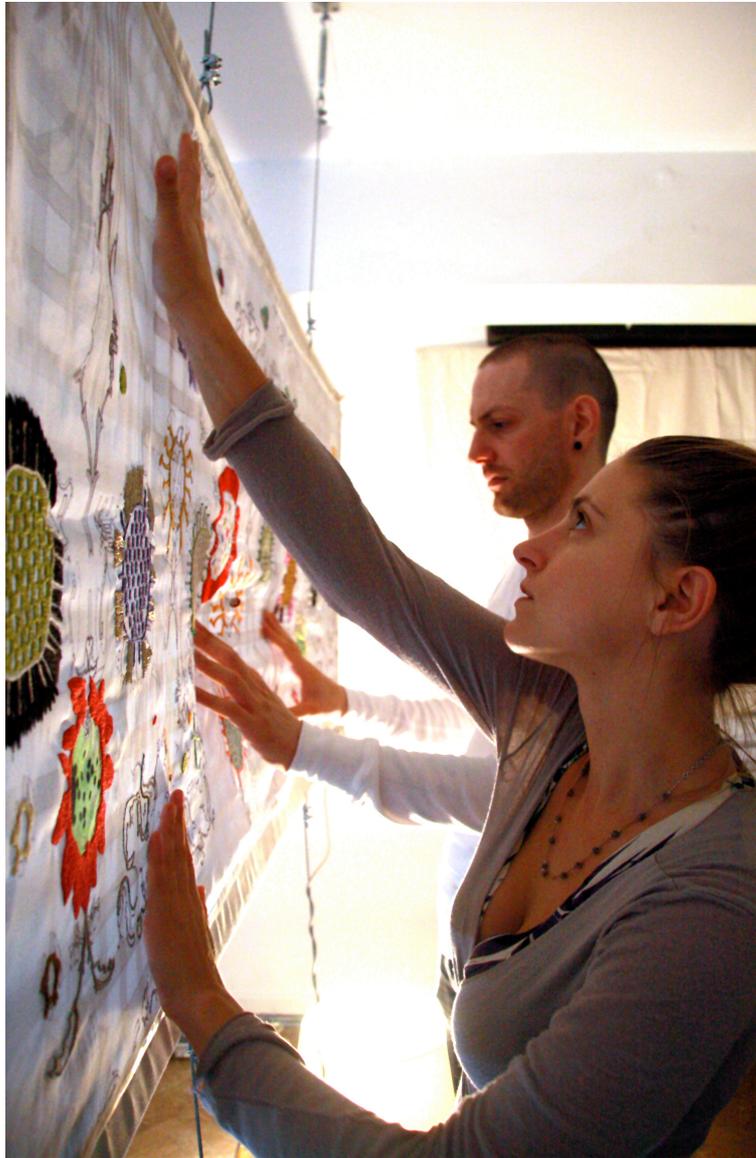


Figure 3. *Strings*, Premio Vallcelina, Maniago, Italy, 2010

3

Devices

3.1 Overview

The devices attending aural aesthetic practice are fundamental to an analysis of those practices in the context of the everyday. Any discussion of sound reproduction devices will find itself engaged with discourses surrounding the function of media as a means of representation. This involves the aesthetic theories that inform strategic methods of sound reproduction with regard to its representation of the auditory, and to the sonic events the medium registers. The aesthetic forms and practices which have emerged with the possibility of mechanical sound reproduction are as widespread and numerous as the theories which surround them. Distinctions between the local, 'auratic' (Benjamin, [1936] 2008), non-reproducible work on one hand, and ubiquitously accessible, mass-reproduced work on the other, often parallel to discussions of authenticity, are central to prevalent discourses on the social and aesthetic implications of mediated perception.

3.2 Discourse

Through the readings of Adorno (2001, 2004), Benjamin, and Attali (1985), in line with the critical stance on mass production of culture, the concept of *mediation* as it relates to phenomenal experience, and the processual linkage to the mechanisms of cultural domination, has been mired in connotations of aesthetic degeneration, the degradation of aesthetic liberty, and the reification of human experience. As Hamilton interprets:

the decline of the musical aura is the 'regressive listening', which according to Adorno is encouraged by recording – Benjamin prefers the more neutral term 'distracted listening'. (Hamilton, 2003, 346)

In contradiction to this idea, I would like to present a case for the construction of critical distance, consciously initiated as a method of aesthetic production, that is enabled by the possibility of mediated experience. Adorno touches on the critical role of art and music in the face of music's transformation to commodity form, implying an obligation for composers and artists to resist the commodification of culture, and the social forms that attend it, as a core function of the work. He hints towards inherent possibilities in the process of production, with an eye towards exposing the systemic falsification inherent in the conventional process of mediated aural production:

The progressive intertwining of art and technique is not necessarily to be accepted as irrevocable; indeed, it contains the potential of a more positive development...Perhaps help lies only in ruthless reflection of the process upon itself, a technical examination of technique even in those instances where it offers itself to the self-critical ear as a wall without either cracks or handholds. Mediation through the subject can succeed only in objective terms, as criticism of the technical context in itself. (Adorno, 2004, 88)

In dealing with the subject of mediated sonic experience, there are some ways that my analysis expands upon this view, and in other ways deviates from it. Clearly, the phenomenal world is prone to the influence of representation, and sound mediation technologies are manifestly involved with this process. However, the self-reflexivity of a recorded or otherwise mediated work, and by extension its resistance or adherence to inherent falsifying factors that arise from its mediation, are to a large extent bound up in the parameters surrounding the technical approach to production, and the intentional

frameworks which shape them; those of representational authenticity, transparency, mimesis of movement and space, and to what extent they are methodologically concealed, manipulated, and distorted. As such, I will modify Adorno's assertion by stating that in order for a work of mediated sound to resist falsifying representations, while a self-reflexive recognition of its mediated nature is necessary, its valid artistic concerns are not merely bound to critical expositions of technical or methodological process; the mediated perceptual distance itself can be utilized as an expository device on the level of aural experience itself. An obvious example is in the acousmatic reduction of Schaefferian 'reduced listening'. This critical feature of mediated sonic experience has been considered in the context of music performance: Francisco Lopez notes this inherent possibility in his assessment of amplified musical performance as having what he sees as an auditory falsification of space brought about by the difference in perception necessitated by the split between stage and audience, as a result of mixing, microphone technique, amplification and diffusion practices:

One of the beautiful advantages of electronic music is that it allows the reunification of these two sonic spaces and of these two personas. Turning the spatial electronic separation between generative action and sound source into an advantage instead of a constraint. (Lopez, 2004)

Similarly, Windsor notes that "'musical" sounds are easily identifiable as originating within a specialized cultural domain' (1995, 119), and suggests that the more ambiguous identity of sounds in acousmatic composition are a defining facet of its status as a valid form of aesthetic production:

The aesthetic nature of the acousmatic piece lies in its position between the demands of everyday perception and its contradiction of the specificity which provides for a structured and relatively unambiguous relationship with the world. (1995, 116-117)

While negative critiques of aural mediation are bound up in the mechanics of the medium and the perceptual experiences it engenders, there are implications beyond an exclusive critique of the technical process; self-reflexive, mediated sonic experience allows both readings to co-exist at variable levels of focus. Perceptual emancipations can occur as a result of social, technical, phenomenal, locational, and attentional focus, through the implementation of self-reflexive mediatory interventions (see commentary pertaining to my pieces *Ear to Mouth*, *ACHz*, and *Light Loop*, for example). The state of perceptual emancipation brought about by a conscious application of perceptual distance, as described by Lopez, Windsor and Schaeffer, does not require that the process of that transformation be its sole focus. Rather, it is better conceived to be its processual axis; not the transparent medium of perfect fidelity, but a component in a system of relationships composing the process of mediated sound production. Through this medium, the raw substance of sonic perception is heard in the context of its own explicit internal structure, in relation to the whole of the work, as well as in the context of its creation, and the associational framework that entails. This distance is not assumed to eliminate all signification on an entirely rarefied plane of aural consideration; instead, the attentional processes encompassing the ways that this associational framework defines the morphology of the sound work are made explicit. It is with this premise that this text is concerned with the technical process of sound recording and other forms of mediation, and the motivation for engaging in the theoretical discourse surrounding it.

3.3 Original and copy

One of the most ingrained assumptions about the act of registering acoustic energy onto a storage medium is the supposition that the sound which precedes the act of registration is an ‘original’, whereas the playback is a ‘copy’. This account of sound recording as a cultural practice is usually extended with the implication that the process is one which results in a debasement of some properties of the ‘original’ sound. One well established line of thought supporting this model is R. Murray Schafer’s *schizophonia*, which posits a theory of sound recording as a separation of sound from its original context or ‘natural socket’ (Schafer, 1993, 90), with the supposition that this is an inherently negative and corrupting process. Schafer’s fundamental ideas about the nature of sound support this conviction. However, as I will subsequently argue, they are not entirely correct.

Walter Benjamin’s conception of the auratic work ([1936] 2008) is pertinent to an original/copy model of sound reproduction, and is sometimes understood to support the notion that mediated works are necessarily debased representations of a unique events or experiences. Jonathan Sterne, in his extensive argument on the discourse of the copy and the original, notes that Benjamin’s argument is often taken out of context; an important, overlooked aspect contained in his idea of the aura is that it is only ever coherent in relation to the act of mediation or reproduction itself. As Sterne states,

The very nature of originality and authenticity is transformed in the context of reproducibility...reproduction does not really separate copies from originals but instead results in the creation of a distinctive form of originality: the possibility of reproduction transforms the practice of production...insofar as it is a possibility at all, reproduction precedes originality. (Sterne, 2003a, 220)

That the whole prospect of an original sound is only relevant through the very existence of the mechanisms enabling its reproduction in the first place is a strong argument against *schizophonia* itself, as well as the ingrained cultural assumptions that underlie it. That the coherence of the original/copy model breaks down when not applied retroactively is perhaps most succinctly demonstrated in the tautological language of Schafer himself: ‘Originally, all sounds were originals’ (1993, 90). While I believe that Schafer was justifiably attempting to describe the nature of negative impacts in contemporary auditory practice and experience in the sonic environment of the post-industrial age, with the aim of constructing an understanding of the implications that technological practice has on listening at large, these concerns evince problems at the core of his assertions.

My own concern in critiquing the account of separation in Schafer’s *schizophonia*, and the entire account of debasement at large, is with more fundamentally problematic ideas regarding essential properties of sound itself. George Lewis, in refuting the assertion that a recorded improvisation ceases to be an improvisation upon playback, argues that the view ‘reduces experienced immediacy on the part of both listeners and improvisers to an infinitely small “now”...excluding both the past and the future’ (2004, 279). Schafer’s position extends a similarly restrictive and ultimately incorrect notion to sound.

According to his account, sounds before the advent of the telephone and the phonograph respectively were tied to ‘their original point in space’ and ‘their original point in time’ (1993, 90). It is on this basis, and on the assertion that sound recording exclusively constitutes a ‘separation’ of sound from its source that the premise of *schizophonia* is incorrect. While ‘point source’ terminology exists to describe the characteristics of some

sound emitting materials, it does so as a practical description of sources that in actuality require a volume of space in which to propagate; the idea of a single point in space and time is incoherent with regard to the physical reality of mechanical vibration through space and over time. Sound, in the presence or absence of a transducer, is always separating from its sources. As soon as a sound is detectable, by human ear or otherwise, it has escaped from the area of space in which the vibration that initially caused it had occurred. Additionally, it is only by our ability to attend to the development of acoustic vibrations over space and time in a manner which regards the past and anticipates the future that sounds have any meaning at all; a single point in space and time is not a coherent entity with which to describe the transmission of a phenomenon whose very substance is flux, in which movement and multiplicity are intrinsic. In this way, sound can be understood as a phenomenon that requires temporal and spatial separation in order to exist.

3.4 Multiplicity

The practical yet reductive notion of a single sound source represents an idealized conception of sound analysis that privileges the production and emission of sound over its reception, while conceiving of it as discrete and singular and neglecting its multiplicity. This tendency stands in relation to established syntaxes of sound production; at its most basic level, the human faculty of speech and language exemplifies a sound production scheme that constitutes a common system of sound emission and signification. Similarly, Pierre Schaeffer's *solfège*, standard musical notation, and graphic scores all provide a set of instructions for the production and identification of

discrete sound events. Murray Schafer's soundscape studies offer a functional system of transcription with the aim of describing individual sound events outside of a production model. As a functional scheme for the scheduled production and analysis of sounds, these systems demonstrate clear efficacy and sophistication. Their essential failure at describing the actual content of audition is due to this functional bias towards a practical model of *discrete* sonic emission. A single note, once emitted, not only separates irrevocably from its source; it ceases to maintain unity at all. It is reflected, refracted, diffused, obscured, and ultimately heard by at least two ears, if any at all. It vibrates at different points within the body that emits it and the body that receives it. Francisco Lopez's comment that the sound attributed to wind could similarly be attributed to plants, or other objects which interact with the movement of air, even the pinnae of our ears themselves (2004, 83), demonstrates a case where the location of a single source becomes a less than straightforward prospect. Jonathan Sterne draws a connection between the singularity of the voice as the focus of auditory essence and political ethos, going so far as to note 'a distinctly authoritarian preference for the voice of the one over the noise of the many' (Sterne, 2003, 343), citing Schafer's reference to Plato's Republic (1993, 215). It is perhaps tempting to argue that, despite the problematic dichotomy of original and copy, Schafer's description of sound as emanating from a particular 'point' in space and time, while utilizing sound terminology inconsistent with its essential properties, was still referring to some genuine loss of context or essence. After all, a series of magnetic domains on tape converted to mechanical vibrations when played back at 15 inches per second is not a piano, a voice, or waves crashing. Indeed, under a limited delineation, through the transduction of acoustic energy into electrical energy, auditory context is

irrevocably changed. Under the wider conditions of a more comprehensive definition of auditory context, however, it maintains only one position in a more inclusive framework. This reductive account I refer to is an *emmission-centred* understanding of sound context, as inheres in *schizophonia* and the original/copy dialectic. An emmission-centred account of aural context conceptually privileges the sound producing object, while diminishing the importance of intermediary stages in transmission and audition; in doing so it exclusively attributes essential properties to sound producing objects which are in actuality properties of those objects within a more complex system of relations. It is in this system of relationships situated between sound emmission and reception that a more comprehensive idea of aural context is located.

The central problematic in this discussion involves the idea of structural covariation: the transformation of sound's material existence as a form of energetic variation over time through different physical states is transmitted by a similarity in variation common between these states. The process through which changes in air pressure are converted to electrical fluctuations is a clear case of structural covariation, with the primary morphological similarity being the frequency and amplitude of covariation. Accounts of degradation in sound media that focus on a sonic degradation of the auditory, as opposed to a social degeneration of sound practice, often posit this transformation as the locus of degradation. This position ignores, however, the structural covariance that penetrates the entire process of sound emmission and audition itself. If a physical transformation occurs between air and microphone that involves a structural covariation between physical states, then what occurs, for instance, as a bell comes into contact with its tongue? The

morphological resemblance lies in the covariation between vibration on the body of the bell and the movements it induces within the volume of air surrounding it. It stands, of course, that electricity is different than the mechanical vibrations of a bell. Importantly, this difference is not ontological with regard to sound considered as a contextual whole. The human auditory system itself involves the transmission of electrical impulses, for example. Lightning produces sound electrically; although this is a special case of sonic emission, it does show that the presence of electricity covarying with air pressure changes is not exclusive to sound reproduction systems, and does not necessitate degradation by its presence in the context of audition.

With this understanding, sound recording becomes one possible form of transformation, which can be described as degenerative only in exclusive relation to the sound emitting object; when the context of sound is considered as a comprehensive system of relations, an electrical transformation does not necessitate a more abstract level of covariation than that which occurs between the ear and the brain, for example. Sound recording may be considered as a *particular* transformation with particular features, some of which may be assigned aesthetic valuations. As James Lastra writes, ‘the relationship of copy to original is only *one possible concern* we could have about a representation [of sound]’ (1992, 72 emphasis added). That the discourse of fidelity and degradation in sound recording seems based on a perceived difference between mediated and unmediated auditory experience lies to some extent in the technical reality of sound reproduction, but more importantly in the expectations of outcome resulting from notions of originality and context that only describe one particular relationship within a more complex process of production and a

more inclusive understanding of auditory context; it is this expanded account of auditory context that will be developed throughout this text.

This stands in opposition to a discourse that developed in response to radical changes in contemporary aural environments and practices. It would be difficult to argue that the encroachment of physiologically damaging sound amplitudes in our urban centres has anything but a negative impact. Correspondingly, changes to the aesthetic reception of sound in the context of art and nature have undergone practical transformations, elements of which could be considered degenerative. The advent of sound recording, while not directly responsible for these changes, is certainly related to them. While Adorno and others have argued extensively for the existence of degrading influences in auditory practice within the context of musical reception brought about by the reproducibility of sound, a large portion of this discourse on reproducible media is aimed more at the detriments pertaining to the possibility of mass consumption and the auditory practices it enables than the mechanics of transduction itself. Still, the sense that a recorded sound event is somehow fundamentally different from an unmediated sound event, in a way more significant than that of listening to that same event in two different spatial positions, for example, persists.

This is bound up not only in expectations engendered by a false conception of origination, but also in fundamental transformations of auditory practice and schema emerging with the possibility of sound mediation. Casey O'Callaghan argues convincingly for an account of impoverishment in mediated sound experience from the

position that recorded sound lacks veridicality with regard to the necessary conditions attending an act of perception, focusing on the causal, temporal, and spatial features of recorded sound he claims are indicative of perceptual and aesthetic degradation in mediated auditory reception (2009, 141-162). In criticizing mediated sound, he limits the context of his judgements on its veridicality to a comparison between sound as a discrete 'event' or an 'original' performance and its mediated output. In doing so, he ignores the possibility that a veridicality of process, namely the technological, social, and methodological process of recording, with its necessarily transformative practices, inheres and persists in the reception of mediated sound works. It may help to clarify here that in detailing what I have described as fundamental transformations of auditory practice, that it is the *effect* of sound reproduction on established social frameworks surrounding the aesthetic reception of the auditory which are transformed; as I have argued, sound reproduction does not change the human experience of auditory reception ontologically, nor are mediated sounds ontologically different than unmediated ones. In response to the claim that only the 'original context' can truly contain the essence of phenomenal ephemerality in sound, it must be understood that this is certainly a practical concern, but not, as it stands, a necessary outcome of sound reproduction or other forms of mediation. The practice of live broadcast, though able to be captured through recording, is no more so than a 'live' event is, therefore allowing the possibility of unrepeatability in both cases. Correspondingly, though practical repeatability has undeniable effects on sonic practice, even recorded sound events suffer from eventual physical decay. Though this is a threshold that is becoming increasingly negligible, it is still true that the assumption of perpetuity in sound recording media is based on a

conception of permanence that is antithetical to materiality itself, and again cannot be a feature of sound recordings that casts them as ontologically distinct. Similarly, the material conditions of the playback system can never be precisely the same, nor, as it were, can be the subjective space of its listening subjects. Auslander notes analogously with visual media that

Repetition is not an ontological characteristic of film or video that determines the experiences these media can provide, but a historically contingent effect of their culturally determined uses. (2008, 51)

In response to Schafer's claim that it is 'physically impossible for [human beings] to reproduce a single phoneme in [their] own name twice in exactly the same manner' (1993, 90), the repeatability of sound media can be seen as something which is perceptibly true and practically important, but primarily with regard to the cultural practice of sound production, and not, as Schafer posits, a necessary outcome of sound transduction.

3.5 Homogenization

What, then, are the types of changes in auditory practice resulting from the possibility of transduction and registration of sound phenomena on media? The fundamental change in auditory practice that recording media has engendered is a paradigmatic shift from a focus on the emission of sound to its reception, and from discrete singularity to multiplicity. This has occurred through the homogenization of source as the physical substrate of the medium itself and the production processes that regulate its usage. While an orchestra or a busy shopping centre offers a multiplicity comprised of unique sound

sources, an audio media system emits a multiplicity of sound comprised of a single unified mechanical structure; the use of multi-channel speaker systems aside, the systems that enable mediated sound emission function as singular entities, at least with regard to their mechanical production of sound. Another defining characteristic of mediated sound production is that structural covariation is linked between the data contained on the storage medium and the emission of sound waves in the air, through at least an output transducer, and most often with some degree of input transduction through the use of microphones or direct input.

Therein lies an important characteristic of mediated sound: in the process of sound recording, the structural covariation between changes in air pressure that result from a sum totality of all emissions reaching the point in space where a microphone is placed is only directly covariant in relation to the excursion of sound in the air, and not the physical actions which result in those sounds being registered. This is a core facet of aural mediation: the homogenization of source has a unifying effect that privileges the reception of sound while rendering singular its source of emission. Even before the possibility of tape recording, the tendency of radio was noted to engender a state of magnified receptivity: 'Since many people feel compelled to broadcast, one finds oneself in a state of permanent receptivity' (Kracauer, 1995, 331-4). Pierre Schaeffer observes that the repeatability of recording media increases the tendency towards a consideration of timbre as a listening technique (Chion, 1983, 12) . Distortion of both perceived distance and amplitude through amplification and mixing also encourages an attendance to timbre as a means to convey attributes about the ostensible character of a sound source.

The discrete boosting and attenuating of amplitude so intrinsic to mediated sound production means that a derivation of the causal attributes for a given sound resides primarily in the auditory analysis of its timbre, with amplitude being relegated to giving information about source only in relation to the level other sounds in a 'mix'; amplitude and timbre in a sound media system are 'uncoupled...independent semiotic variables' (Leeuwen, 1999, 25).

3.6 Emission and reception

Works that utilize output transduction exclusively still manifest this process of homogenization, and in fact exemplify it; the multitude of sonic output is constructed immediately, as in the case of material synthesized to disk as sound data. Sound mediation, as it transforms our aesthetic practices and our understanding of originality, also comes to transform our expectations of causality and source with regard to sound. Rationales that hold the mediated version of a work to be the final and definitive expression of its content are in opposition to those that consider the unmediated sound event as authentic and superior, such as the emission-centred assertions of mediated degradation and its concept of origination. In *musique concrète* we see this principle of reception idealized as a self-reflexive doctrine of practice, a conscious, formal reorientation of 'source' that radicalizes aesthetic sound production. Though ideologies that centre on sound recordings as definitive or even 'original' are not often explicitly formulated as lending authority to recorded forms, the function of sound recordings in the cultural milieu of popular music demonstrates the conditions of an aesthetic reception that is 'organized around recordings' (Auslander, 2008, 75). In these cultural modalities,

whose primary methodologies and means of dissemination are concentrated on recorded sound material, a *reception-centered* scheme of audition is promoted; what is referred to in a sound recording is the physical variation of air pressure in a particular area of space over a given period of time. Sounds on tape represent the existence of particular sources, but only through signification. Conceptually, the causal centre of a recorded work is a specific site or multiple instances of reception, and if anything is actually reproduced, not merely represented (Altman, 1992, 40), it is a perspective or a multiply tracked agglomeration of perspectives which chronicle this reception.

Neither position in this emission/reception dialectic fully encompasses the context of sound from which auditory experience emerges. The everyday, as a zone in which the substance of lived sound experience manifests, is a synthesis between the source-privileging accounts of Murray Schafer and the reception-centered ethos of mediated sound and 'music production'. If it is in the space between these positions of emission and reception that the material presence of the audible unfolds, then an inclusive paradigm of auditory context necessarily contains this interstitial region, as well as its polarities. By extension, the object of audition does not reside exclusively in the physical interactions that generate vibrations in an elastic medium, and does not exist only within that medium itself. The totality of aural subjectivity is not reducible to the ears as the physical point of reception. 'Listening requires hearing, but it is not simply reducible to hearing' (Sterne, 2003a, 19). As Eco paraphrases Sartre, 'the existent object can never be reduced to a given series of manifestations, because each of these is bound to stand in relationship with a continuously altering subject' (Eco, 1989, 16). The context of sound

emerges as an interaction between sites of emission, points of reception, and the bodies, devices, and structures through which ‘what is heard’ is transformed and comes into being: the context of the auditory everyday. It is within this milieu that the auditory subject and object are immersed, and within which these negotiations of auditory experience occur. If sound recording transforms this process, it does so not fundamentally or unilaterally, but in conjunction with other physical, social, cognitive and casual elements that attend the experience of audition.

3.7 Source as context

Throughout this text, the conventional understanding of *source* has been called into question. In its place, a systemic, integrative fusion between the methodologies of aural aesthetic production and the aesthetic experience of sound-as-music has been posited. The notion of a single source, while being a necessary and sensible convenience, is not an ontologically coherent understanding of the aural, and instead a complex of events that occurs between physical objects and physical beings comprises our experience of sound. Clarke correctly sees this as related to the fact that cultural entities and activities are often considered, in his view erroneously, as fundamentally non-material. He notes a

resistance to the idea that cultures, social practices, emotional states, and ideological allegiances could be conceived as “sources” because they have been regarded as too abstract, too nonmaterial. This is unnecessarily restrictive: cultures, emotions, and ideologies are not *only* material, but they are all necessarily manifest in material forms of one sort or another, among which there are the sounds of those phenomena...These cultures and subcultures (and instruments, bodies, emotions, social practices) are the *sources* of those sounds, since they constitute the conditions and circumstances that gave rise to the music. (Clarke, 2005, 190)

Clarke sees this argument further supported by Gibson:

Symbols are taken to be profoundly different from things. But let us be clear about this. There have to be modes of stimulation, or ways of conveying information, for any individual to perceive anything, however abstract. He must be sensitive to stimuli no matter how universal or fine-spun the thing he apprehends. No symbol exists except as it is realized in sound, projected light, mechanical contact, or the like. (Gibson, 1966, 26)

It is interesting that Scruton, in his assertion that musical experience is resolutely detached from the physical world, not only rejects phenomenological explanations of musical motion and its connection to theories which relate it to features of embodiment, but the relevance of phenomenology in general (1997, 96). Regardless of any outcomes concerning largely contentious and inconclusive debates on materialism, if we take the Gibsonian view that cultures and cultural practices are innately material systems which are considered to be the *sources* of aesthetic cultural production, the claim that in successful aural art we experience ‘an idealized form of human life, in touch with the soil and with the natural world’ (Scruton, 2007, 252) is incompatible with the claim that in music notes ‘float free from their causes’ (1997, 221). Instead, the *source* responsible for our experience of the aural as music and sound as art is the complex integration of an entire system, including the agents that produce it, human beings in conjunction with material tools, and is inseparable from its auditors and the cultural environments within which they are embedded.

3.8 Archive

Considered from the perspective of sound recording as an archival practice, this dialectical relationship between the subject and object of registration is exhibited in the everyday ‘zone of demarcation’ (Lefebvre, 2008, 32) as a milieu of desire, control, and a site of continual synthesis between them. If the registration of sound is viewed in relation to the written word, practical differences notwithstanding, the process of recording can be seen as analogous to that of making an entry into an archive, in terms of its effects on representation, as

...a combined operation that both [represses] the culture that [is] supposed to be ‘conserved’ by the archive and [inscribes] there a desire of it’s own [...] attending to the everyday will also mean attempting to rescue the traces, the remainders of the overflowing unmanageability of the everyday that erupt within representation (Highmore, 2002, 26)

In the context of audition, the process of recording, considered as historical artefact, conceals, idealizes, and reconfigures the representation of culture as an aspect of its process. The interface between a portable listening device and its auditor, for instance, while being an intentional act of self-curated musical reception (Thibaud, 2003), occurs in the space between systems of organization and the realm of lived experience that simultaneously evinces the results of those systems while providing a medium of possibility for the subversion of their influence, and more importantly, the possibility to critically engage them in the first place. It is in this space of negotiation that the transitory, fluctuating nature of the everyday comes to bear on the human experience of the aural. Ultimately, sound attains its significance in the subjective and intersubjective space of its auditors.

3.9 Transparency

While discussions pertaining to the relationship between a given sound event and its mediation are fraught with conflicting categorizations and sometimes ambiguous lines of distinction, two distinct rationales can be seen to dominate the practice of audio production, which at least remain clearly defined in the case of recording performed music. Firstly, the exclusive role of sound recording as a performance documentation practice is posited by proponents of a rationale insisting that the primary role of sound recording should be the utmost possible accurate representation of the sound events composing a particular performance, and not subjected to interpretive interventions. This form of purism has been espoused by Boulez (1986), and demands a naturalistic reproduction of a given performance. The second position holds that creative intervention is preferable to upholding an ideal of fidelity that while not entirely false, is largely based on expectations that precede and are informed by the development of media forms as a product of social relations, in addition to their continual technological evolution.

This dialectic is succinctly noted by Andy Hamilton (2003) regarding the aesthetic implications of these two methodological positions on sound recording; the first position he describes as *imperfectionists*, the second as *perfectionists*. He identifies degrees of purism within the first camp, specifically those that do and do not recognize the necessity of intervention in the service of maintaining the perceived fidelity and authenticity of performance, given the practical non-transparency of sound reproduction. This calls into question the methods by which 'faithful' reproduction and the notion of fidelity are measured; a realistic reproduction of a given performance demands, to as great an extent

as possible, that the medium, and the process of registration and transduction to and from that medium, maintain a modicum of *transparency*. Given that due to the technological limitations attending the process of sound encoding and decoding (a microphone is not an ear, a speaker is not a space), that this transparency is arrived at through and indeed often necessitates *intervention*, thereby interpretation, somewhat convolutes this viewpoint. To a large extent, the idea of imperfection-as-doctrine itself becomes somewhat problematic, at least in terms of its nomenclature, considering that what is really being strived for is simply a different concept of perfection, a theory of transparency-as-perfection held over one which rejects notions of original performance and authenticity in favour of interventional liberty. This dichotomy breaks down further in the face of sound works which either intentionally, or through characteristics inherent in their structure, deviate from the conventional conception of musical performance. The existence of such works indicates the need for new ways of understanding the various elements of strategy at play in the production of mediated sound. A work that has been generated entirely within the medium of production, for example, has no reference by which to measure ‘perfection’ with regard to a particular performance; it has effectively been obviated from judgements of fidelity through an inherent fact of its production process. Special cases of performance practice illuminate indefinite distinctions between the ‘live’ and the mediated. The use of ‘tape backing’, ‘live broadcast’, pre-composed sound synthesis elements, and pitch correction confound absolute definitions of ‘liveness’, and by extension doctrines of representational realism; see Wurtzler (1992, 87) for an example in the context of popular music.

3.10 Binaries and continuums

Contrasting with Varèse's proposal of a distinct aural art involving recorded sounds (Varèse & Alcopley, 1968), separate from and challenging the role of music as the sole art of the auditory, Hamilton suggests a continuum between musical and non-musical sound art based on the preponderance of tonal relations in the work (2007, 40-65). In the categorization of works whose prime method of transfer is recording; this seems a very sensible position, albeit one which demands the recognition of a non-musical sound art as legitimate; the legitimacy of this category is argued extensively by Hamilton (2007, 40-65), Kahn (1999) and Cage (1968). In addition to this synthesis I propose, for the purpose of constructing a system of analysis with which to evaluate mediated sound works, some of the continuums that account for some common strategies and techniques utilized in the creation of mediated music and sound art:

Intervention: interventional/non-interventional

Representation: metaphorical/literal

Timbre: articulated/non-articulated

Tonality: tonal/non-tonal

In delimiting the realm of mediation from its absence, some clarification is needed to define the scope of the following analysis. Philip Auslander distinguishes between *mediation*, in which a unidirectional transformation occurs (the use of ancient Greek theatre masks as megaphones being his example), and *mediatization*, in which an entire system of relations is mobilized between a technology and its social, perceptual, and

representational aspects (Auslander, 2008, 58). The mediate/mediate distinction remains unnecessary for the scope of this text, and is more suited to Auslander's performance practice-centred discussion. Regardless, I will consider, as both Auslander and Sterne do (2003a, 22) the *process of transduction* to be the transformation which differentiates technologies of reproduction from others that act upon properties of sound to amplify, attenuate, or contain it. At some levels of practice, both transducing and non-transducing sound amplification devices offer nearly identical local outcomes, but it is the act of transduction which is a unifying feature of sound reproduction systems, as it is the process of transduction that constitutes an actual reproducibility of sound in signal form, encoded as data and decoded as sound. This distinction is not intended to fundamentally separate transduction from other forms of sonic transformation, only to distinguish it as the factor that enables the particular perceptual, aesthetic, and social reconfigurations attributable to it.

3.11 Intervention

Firstly, I posit a continuous polarity between works that encompass interventional, exactly wrought, post-mediated structural techniques at one pole, and representational, documentary, non-interventionist techniques on the other. At the extreme 'interventional' pole of this continuum, works created directly within the medium of production lose external reference. There is no space between the event to which the recording refers and that medium available to facilitate interpretation, in some cases not even a 'recording' as such. In these cases, the intervention occurs at the level of mediation itself; interventional

technique is radicalized to the extent that the sound data are constructed directly within the system of mediation.

By *post-mediated*, I am referring to techniques which occur *post-transduction*, *post performance*, if a *pre-transduction* performance occurred at all; I make this distinction between the stages of performance and production to separate timbral technique as a particular form of sound articulation, regardless of which stage it occurs within the process of mediated sound production. In light of the previous discussion on strategies of concealment in representational modes of recording, works which adhere to a non-interventional scheme can still be self-reflexive, and need not rely on the concealment of their mediation; instead, the consciously mediated nature of these works can be the very thing which inheres in them the aesthetic experience that they engender.

Essentially, this category is concerned with the degree that a given work is the result of performed action or environmentally occurring sound, in opposition to the extent that it is the product of transformations which are applied after the sound is transduced. This statement requires further specificity, as it is possible to imagine complex situations arising even in familiar circumstances. A key point of transformation in the chain of intervention is the *registration* of transduced sound to a storage and playback medium. Unproblematically, post-mediated, *post-registration* control such as ‘dub mixing’, or performed automation is considered to be an intervention by this definition. A more complex example might be a delay effect modulated by hand during performance; while the delay itself is post transduction, it is still to some extent the result of a performance

practice that is in a documentary or representational relationship with regard to the final, intended audible output of the work. The solution to this dilemma is that the degree of intervention is determined by two factors: Firstly, consider the aforementioned relation of performed action to audible output. In comparing, for example, the application of pitch correction and a 'wah-wah' guitar, pitch correction displays a greater degree of intervention, as it is less the result of a performed action, and more the application of an automated, intermediary process. Secondly, the distance from initial transduction of the particular transformation applied is considered along with the number of transformation stages. This second aspect is important because it allows for an evaluation of the work according to the degree of mediatory transition it has undergone. As such, each stage of transduction (microphone, A/D conversion, etc) indicates a stronger presence of intervention; for example, the use of a public address system is considered to be a low-level form of intervention. In this way, works that utilize a high degree of timbral articulation can also be minimally interventional in their approach to production, such as recordings of timbrally various live electronics performance, or recordings of some unamplified improvisational work.

A non-exclusive relationship existing between acousmatic and non-acousmatic modes of auditory experience has been examined with regard to the reduced listening of Schaeffer by way of Smalley, Chion and Scruton earlier in this text. I will now revisit my treatment of Scruton and Schaeffer in the context of the current discussion. Scruton's account of the acousmatic deviates from the Schaefferian in the claim that music is primarily or solely experienced as metaphorical, a set of tonal and rhythmic relations that exist outside their

physical causes, and such an experience is a necessary precondition for a given work to be considered legitimately musical (Scruton, 1997, 221). Scruton's claim implies that our ability to perceive the aural as aesthetic necessitates that attention be exclusively acousmatic, and that a literal experience of aural attention, such as attendance to spatial or timbral aspects, is superfluous, lesser, and essentially unmusical. While his assessment of musical experience allows for timbral variation to be considered as a secondary part of musical organization, he offers an account which is inherently non-material. Andy Hamilton refutes this claim by arguing that a 'twofoldness' of musical perception, where causal, non-acousmatic elements of aural aesthetic experience are considered viable aspects of aesthetic consideration, bound together in a single act of attention which attends to both metaphorical and literal aspects simultaneously (Hamilton, 2007 108-111); it is with this second understanding in mind that my use of the terms metaphorical and literal come to be descriptive categorizations, not aesthetic value judgements.

The existence of psychoacoustic effects such as beating, combination tones, masking, and the replacement of missing fundamentals indicate aspects of musical perception that are necessarily non-metaphorical. These are emergent sensory phenomena which occur in response to elements of musical structure, but do not occur as patterns of interference in air; their emergence is entirely psychoacoustic. This category of perceptual effects represents a problem for an entirely acousmatic experience of music. It is important here to recognize another important sense in which Scruton's conception of the acousmatic differs from that of the Schaefferian. The Schaefferian acousmatic promotes the perceptual divorce of a sound from its causal source, to more fully apprehend its material

properties. Scruton's acousmatic involves the separation of music not only from the physical sources of its construction, but from materiality itself, 'distinguishing acoustical experience of sounds...from musical experience of tones' (Hamilton, 2007, 97). While it is true that tonal organization could be considered to be a feature of musical experience that extends beyond being solely a property of its mechanical source, perceptual events such as beating and masking are secondary forms of interference brought forth by features in the physiology of the human ear that are both a byproduct of tonal relationships and physical properties of our auditory apparatus. It is also true that one can experience masking, beating, and combination tones without attending to their causes. It is, however, a more fundamental aspect of Scruton's account of the acousmatic which I believe is problematized by their existence, specifically the claim that musical apprehension involves hearing the sounds apart from 'the material world' (Scruton, 1997, 221). If the intentional object of musical experience is the harmonic and temporal relationship between tones, these psychophysical effects necessarily attend it, which renders the concept of an exclusive musical immateriality untenable. As such, these effects provide an example of non-metaphorical structures that are directly related to the tonal organization of music, a necessary aspect of its aesthetic reception, and ultimately are literal, material features of musical experience.

It is worth deviating momentarily to consider some implications that arise with the notion of musical autonomy from the material and the everyday, the various facets of which have been argued by Hanslick, Adorno, and Scruton. In the context of the current discussion, I will focus on the notion of autonomy put forth by Scruton, which is

significantly influenced by Hanslick. Adorno's conception of musical autonomy is more complex, and lies outside the boundaries of my investigation; see Windsor (1995, 2000) for a detailed critical assessment. It would be misinterpreting Scruton to imply that he is espousing a musical autonomy entirely free from extrinsic influence: 'In responding to a piece of music we are being led through a series of gestures which gain their significance from the intimation of community' (1997, 357). Thus, his viewpoint represents a departure from Hanslick's assertion that 'Music consists of successions and forms of sound, and these alone constitute the subject' (1974, 162). Specifically, it is Scruton's claim about the non-material essence of musical form that is worth examining: 'The person who listens to sounds, and hears them as music...is hearing the sounds *apart* from the material world' (Scruton, 1997, 221). As pointed out by Hamilton (2007, 95 -118) and Bell (2006), there is significant ambiguity in an assessment of musical perception that divorces music from the material while simultaneously admitting that the significance of musical experience resides in its actuality as an act of cultural production. It could be argued that, despite this, what is being claimed is more that 'the kind of streaming that goes on in musical hearing is [not] the same as the streaming of ordinary sound perception...since it is shaped by spatial metaphors that are the product of a musical imagination' (Scruton, 2009, 64). While this claim has been addressed to a large extent in the previous section, there is one particular nuance to Scruton's assertion with which I have not yet engaged: that 'Dynamic properties [of sound] such as attack and crescendo lead to streamings that seem entirely internal to the world of sound, bearing no relation to the real sequences that produce them. It seems we have an inherent tendency to group sound events as 'auditory figures' without making bridges to the physical world'

(2009, 63). While it is not entirely clear from the context whether he is referring exclusively to musical experience, there is some experimental evidence that bears light on the idea that the phenomenal forms we experience in music emerge in part from interrelations amongst different physical aspects of sound production.

Eitan and Granot's recent study indicates that different properties of musical structure consistently affect our experience of other properties: 'isomorphisms of intensity direction in different musical parameters (e.g., a crescendo and an accelerando) indeed affect the perceived similarity between musical figures' (2007, 61). For example, changes in pitch contour are seen to influence perception of loudness in musical passages; the authors continue to illustrate perceptual linkages between note event density, pitch, and changes in perceived amplitude intensity, among other correlations. To some extent, this confirms the notion that intensity contours in sound events lead to the perception of structures that are unrelated to the physical circumstances of their production. However, there are some further considerations which indicate that, though a direct relationship between the production of sounds and the experiences they engender can not be concluded, a complex of physical associations that frame the cultural practice of music making in bodily terms show some bond between our basic experience of the material world and music are at least indirectly correlated. Eitan and Granot catalogue some prevailing theories surrounding their examination of inter-parametric musical perception that indicate some interesting possibilities. With regard to the perceived association between inter-note temporal density and amplitude, it is noted that this correlates with the more general experience of physical exertion, where the expenditure of energy often

increases in relation to the speed of action, in both corporeal and environmental contexts. This is grounded in studies of musical performance practice, where increases in tempo are experimentally indicated to occur in conjunction with tempo changes and the spatial projection of physical gestures (Palmer & Dalla Bella, 2004). Similarly, it is noted that perceptual correlations between musical pitch and amplitude intensity could be explained by similar associations between the intensity of vocal projection and rising pitch, attended by increases of physiological tension in the vocal apparatus (Cox, 1999, Titze, 1989). Associations between wider ranges of pitch interval and musical intensity are also indicated, the correlation connected to increased effort in the generation of vocal utterance in conjunction with wide ranges of pitch difference under conditions of emotive vocal expression as well as musical performance (Paeschke & Sendlmeier, 2000). As Eitan suggests

...the main source of analogies of intensity contours is not music-specific experience and training, but general, extra-musical factors – either “natural”, everyday auditory experience, or innate determinants. (2007, 148)

The issue of whether or not our experiences of sound and music are immaterial is somewhat bound up in how we understand the constitution of mental events, to which a vast amount of philosophical investigation has been dedicated (Baruss, 2008 and Dennett, 1988); the position implicit in this text is generally consistent with Norbert Wiener’s assertion that information is an aspect of materiality (1961, 132). Regardless, these studies imply that at least in our perception of music, Scruton’s claim that our capacity for auditory event streaming groups aural structures ‘without making bridges to the physical world’ (2009, 63) is questionable. Though our experience of musical structure

may reside in cognitive mechanisms, it emerges from interrelations between physical, acoustic events that occur in the world; it is likely that there are also strong bodily associations that bind our experiences of the aural as aesthetic to the material. Finally, it seems that these ‘bridges to the physical world’, within which culture and the body are situated, removed from first-order direct reference, are not only present, but the central site of negotiation where aural aesthetic production is situated in its cultural context and in everyday, embodied experience. In other words, contrary to positions that advance a radical autonomy of music from the everyday, the human experience of music-in-sound is very much related to the circumstances of its production, and it is the relationship of this experience to the situation that it is embedded through which sound acquires aesthetic significance.

3.12 Representation

Concerning a categorical analysis of sound mediation, the polar continuum between *metaphorical* and *literal* accounts of mediated aural production has some particularities that differentiate it from a purely aesthetic discussion of the acousmatic. In a mediated work, the metaphorical takes on a distinct yet related aspect. Primarily, this is the conveyance of a structure that has exteriority with regard to the internal organization of the source, compared with works whose structural features convey or focus on an intentionally clear or extended account of their component sound material. While this category is often coextensive with degrees of technical intervention, it is not necessary that, for example, a recording which involves a minimal level of intervention results in the production of a sound work that contains a high level of metaphorical structure; the

recordings of acoustic ecology provide examples of mediated sound which are highly literal, yet also without heavily applied schemes of intervention. Similarly, highly interventional productions, or ones which do not involve any input transduction at all, such as those using entirely synthesized timbres, while often identified with a high level of inherent metaphorical structure, can also attend works which are intentionally literal; pieces that exploit psychoacoustic effects as a primary feature, such as beating, are experienced literally as manifest sensory phenomena.

3.13 Timbre

The amount of timbral articulation, considered independently of its part in the production chain, is placed in opposition to its absence. There are some ways that the category of transformations which fall under that of intervention have some considerable overlap with what could be described as timbral articulation. This is necessarily the case, given the fact that many interventions are achieved through timbral means; it is no mistake that these two categories of analysis are interpenetrating. However, there are some fundamental ways that these two categories differ. It should be clarified that by timbral articulation, we are including only those transformations which are the intentional outcome of technical application; the insertion of a guitar effect pedal into a signal chain is a low-level articulation, while scheduled transformation of multiple DSP parameters exemplifies a high-level of timbral articulation. By extension, for a transformation to be included in this category it should be made with the *intention that it is to be audibly detected*; in this way, processes such as corrective equalization, pitch correction, and dynamics processing which are applied with the intention of preserving or augmenting a

signal without noticeably transforming it are not considered to be acts of timbral articulation. Works of *Musique Concrète*, the primary concern of which is with the aesthetic manipulation of timbre, and acoustic piano recordings, for example, can be considered to be polarized on either end of this continuum. In a similar fashion to the other polarities I have discussed, there are general tendencies within different types of work to correlate levels of variation between different analytical categories; for example, a piece of *Musique Concrète* shows a high degree of timbral manipulation, as well as a high degree of intervention by design. By contrast, a recording of an acoustic instrumental performance can often tend towards a low degree of both intervention and timbral articulation.

3.14 Tonality

This category is simply concerned with the extent that a work is engaged with tonality as a primary feature of its aesthetic structure. Specifically, this denotes a relationship between the fundamental frequency of discrete sound events, the temperament or tuning of which is not taken into account. As with the other categories outlined here, there are conventional tendencies that find degrees of tonality to exist inversely with other categories; works which extensively utilize timbral transformations, for example, often present as tonally ambiguous, though this is not a necessary or ubiquitous condition.

It is likely to be evident that this system of classification is similar in aim and analytical method to Emerson's *Syntax/Discourse grid*, and indeed, my approach is inevitably informed by the thinking applied in *the Relation of Language to Materials* (1986). The

intention is to provide some additional parameters for analysis, but also a perspective which runs parallel to and is essentially compatible with Emmerson's. For this reason, there is some overlap of focus between my categorical distinction of metaphorical versus literal representation in sound works and that of mimetic versus aural discourse and abstract versus abstracted syntax. The fundamental difference between the two approaches can be seen in my integration of material and structure, which has been made with the purpose of clarifying my categorical perspective, which is broader in scope and less specific than the syntax/discourse grid, and not with the claim that the two are identical in extent.

Through the categorical definitions I have defined here, works can be analysed systematically in a manner which accounts for aspects of tonality, metaphorical intention, timbral articulation, and methodologies of mediated intervention. This system of continuums can be seen as a functionally interrelated network; for example, the addition of reverb in the mixing process can be considered as a literal implication of physical space, a post-mediated intervention, and a low-level timbral articulation all at once. This analytical framework can be utilized to extend and clarify the classification of primary interpenetrating elements that constitute mediated sound works, and to facilitate their creation. In the subsequent analysis of my practical work, the structural features outlined here will be exemplified in the context of their applicability to the examination of structural process in sound art production.

3.15 Sociality

This text has been extensively involved with a critique of viewpoints that posit a perceived degeneration of compositional practices and social values pertaining to aural aesthetic experience that are considered to emerge from technological changes in the means of production. Gordon Graham represents this view when he writes:

composition which deploys digital technology has no need to [use notation as a means to instruct performers]. More tellingly, there is no *place* for it, because the composition and its realization are one and the same...there is no gap [of the sort] that there is between a musical score and its realization...by eliminating performance, electro-sonic art eliminates interpretation. What this means is that electro-sonic art is more limited than music in the opportunities it offers for active engagement. (Graham, 2007, 223)

While Graham admits that he is privileging performance as the standard by which engagement is to be measured, there are some unavoidable problems in his view. Firstly, it entirely overlooks improvised music, acoustic or otherwise; whether or not he would share Adorno's negative assessment of improvised music is unclear (2004, 99).

Regardless, the lack of interpretive space between a written score and a given performance is not something exclusive to technologically mediated works. Similarly, the presence of interpretation is far from being a universally lauded feature of musical performance by composers, at worst being regarded an unfortunate necessity (Newlin, 1980). I have argued that although mediatory processes in musical production do not constitute essential changes in sound reception as a human phenomena, contemporary developments in the means of aural aesthetic production transform the cultural practices surrounding them; it is unnecessarily limiting to measure the quality and degree of social engagement only in terms of a relationship between a work as score and its realization.

Some particular examples of interpretive relationships come to mind: in popular music, the role of ‘producer’ or engineer provides an active engagement between the creators of musical work and its manifestation; this is especially relevant when considering Auslander’s analysis of the relationship between recording and performance in popular music, with the primacy of definitive authenticity placed on the former. Furthermore, the privileging of interpretive agency in performance and the denial of its presence in mediated forms ignores an even more essential facet of technological mediated production, one which is particularly relevant in academic communities: the relationship between the creators of software tools and those who utilize them. In the context of large-scale software tools this relationship can be criticized as purely a commercially driven exchange, based on the development of desirable ‘features’, serving only to solidify static, hierarchical relations between the users of software and its authors. However, in the development and utilization of open-source, or ‘free’ sound software, as well as other tools developed outside the commercial sector, the potential for non-hierarchic modes of aesthetic production are realized. Here, engagement can be seen as shifting from performative interpretation to an active participation in a distinctly adaptable means of production; at its best, a dynamic, communal relationship exists between composers and the creators of software, to the extent that their roles as such are often coextensive to varying degrees. Not only are the means of production fluid and accessible, but a role for structural interpretation and reinterpretation is enabled through the public availability of shared code, as can be seen in the practice of many software communities such as SuperCollider, Pure Data, and Max/MSP; similar potential exists in open-source hardware communities such as the Arduino platform. ‘Network music’ performance

groups such as The Hub (Gresham-Lancaster, 1998) have crafted unique solutions that place the activity of engagement within the process of performance and improvisation itself. Nascent as they are, the forms of practice enabled by these processes have the potential to yield aesthetically valid, socially engaging, self-reflexive aural works, providing abundant ground for the development of meaningful relationships inherent in their methodologies. Additionally, these types of interaction provide an illustration of how the more inclusive and complex notion of *source* can be conceived of as a relational system binding aesthetic production to social relationships in the milieu of the everyday.

4

Devices in Practice

4.1 Overview

An example from my portfolio of practical work is apt to contextualize the preceding analysis. The piece *Ear to Mouth* reconfigures normative relationships between familiar, primary structural elements present in mediated sound systems, and thereby subverts the processes associated with mediated aural production, with the aim of enabling emancipatory listening experiences through the application of self-reflexive methodology. *Ear to Mouth* is a generative sound installation which functions in a state of perpetual recursion. The use of audio feedback places it in the perspective of an extensively explored field of electroacoustic music and sound art, as well as popular music; works ranging from David Tudor's *Microphone* (1973), *Pendulum Music* by Steve Reich (1974), and of course Alvin Lucier's *I am Sitting in a Room* (1969) utilize audio feedback as a primary compositional element. While exploiting audio feedback as its singular aural substance, *Ear to Mouth* differs from these works in that the entirety of its sound-generating process resides in a recursive network of related structural elements. Another contemporary precedent for *Ear to Mouth* is the work *Siren* by Ray Lee (2004), described by the artist as consisting of "thirty spinning sirens that rotate, emitting pulsing electronic tones". It is through its presentation of sound as fundamentally spatial and essentially motive that *Siren* is the primary source of inspiration for enacting physical motion in normally static sound devices.

4.2 Structure

The piece centres around a single 4" speaker mounted on two servomotors in a pan/tilt configuration, enabling a 180° hemisphere of motion. The servomotors are connected to a microcontroller, which provides power and enables positional control via serial communication. Four electret microphones are hung in a square above the speaker, which is itself placed on a tripod. The input from each microphone is plugged into an audio interface, where it is connected to three destinations: Firstly, the audio input is analysed for frequency and amplitude content. Secondly, the input is recorded into four audio buffers. Finally, the audio is routed back into the amplifier that drives the speaker, enabling audio feedback to occur. For expediency, I constructed a hardware kit to facilitate the connection between devices, as well as stabilising the supply of electricity to the amplifier and microphones; see the simplified schematic in appendix II, the diagram in *Figure 8* and the audiovisual documentation labelled *Ear to Mouth 5.1 DVD* for more details.



Figure 4. *Ear to Mouth* servo and speaker mounting

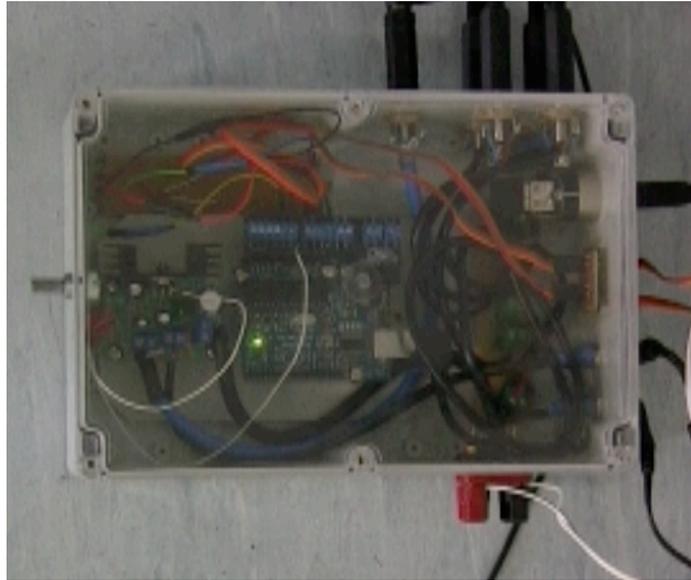


Figure 5. *Ear to Mouth* control and amplification box

The fundamental relationship initiating generative recursion in *Ear to Mouth* is a bidirectional influence between the position of the motor (which specifies the direction of the speaker, thereby the amplitude and frequency of the audio feedback) and the level of the feedback (which in turn specifies the direction of the speaker). This has the effect of producing a field of audio feedback from the speaker that is continuously shifting in amplitude, frequency, and timbre. In the process of experimenting with mapping the audio analysis parameters of the microphone input to the position of the servomotors, a significant consequence occurred: after a period of producing intermittent bursts of feedback, the system would reach homeostasis, either maintaining a position that generated constant feedback or tending to stabilize to silence. This is generally consistent with cybernetic theory on feedback systems, in particular the work of Norbert Wiener (1961). In order to maintain a dynamic system, a deterministic element was added in the

form of slow, constant, periodic modulation of the servomotors merged with the mapped control; this eliminated the tendency towards homeostasis entirely. I created the software for *Ear to Mouth* in SuperCollider, which provides the analysis functionality and control of the servomotors, and manages the mapping between them. The software also facilitates a second layer of sonic output: the recorded input from each of the four microphones is played back using granular synthesis and diffused through four loudspeakers placed in a lateral row, with the moving speaker in the centre. Here, another order of recursion occurs: the parameters of each playback synthesis engine are defined by the analysis of each microphone input, the sound of which enters the microphones and further influences the involution of the unfolding sound. For further details regarding the software implementation, see the included media for this work.



Figure 6. *Ear to Mouth* setup, Goldsmiths College, 2010



Figure 7. *Ear to Mouth* setup, Goldsmiths College, 2010

4.3 Context

Utilizing the analytical criteria outlined in the preceding section, *Ear to Mouth* occupies a unique place within the delineated categories that warrants discussion. In terms of intervention, this work represents an exemplary case: any ‘reference event’ to which the work could be tied is subsumed by the structure of the work to the extent that the recording environment itself is a part of the process that both generates and mediates the sonic output. *Ear to Mouth* is distinctly non-metaphorical in its approach, and presents a literal exposition of its mediatory process. In terms of its engagement with timbral transformation, the work contains a low degree of timbral articulation. While the granular processes transform the timbral characteristics of the primary sound source, they remain largely unarticulated timbrally, and for the most part simply alter the time and frequency of the recorded sound. Finally, *Ear to Mouth* presents a degree of tonality as a core element of its structure. The frequency parameters of granular playback mechanism in conjunction with the analytical functionality of the piece promote emergent tonal

relationships; while the primary interest of the piece lies in its interventional process, it can be experienced at least partially in terms of its tonal interest.

The use of audio feedback in sound art and music has relevant implications when considering its status as aural detritus in the process of conventional music production. In the context of everyday studies and in relation to the ideal of the autonomous work, the tendency of an audio system to feedback becomes a kind of gravitational pull against the idealized conception of aesthetic autonomy and towards the everyday reality of mediated audio systems: the entropy of decay towards noise, hum, and feedback against which the organized practice of ‘audio engineering’ is aligned. To some extent, this relationship evinces an aspect of autonomous idealism unique to the production of mediated sound works: if we recall the previous discussion of *strategies of concealment* in the production of mediated sound works, it can be seen that these strategies (equalization, close microphone technique) represent an attempt to bracket out the everyday in favour of a ‘transparent’ work which deletes the social and technological traces of its own production, enforcing a hierarchy of values subject to historically contingent definitions of signal against noise; the previously avoided inclusion of distortion in guitar amplifiers or ‘pumping’ compression in dance music demonstrate this fluidity. The exposition of this process, which can be seen as an outcome of the interdependent technological and social mechanics of audio production, is the focus of self-reflexivity with which *Ear to Mouth* is concerned. In this regard, it finds much common ground conceptually with the work of composer and sound artist Agostino Di Scipio. In particular, the application of expository self-reflexivity is brought to bear upon the ‘notion that the [audio] technology

[is] there to 'neutrally' represent and convey musical signals, as if the tools and their idiosyncrasies [are] not part of the experience' (2010). Another aspect present in Di Scipio's work, and an intended consequence of *Ear to Mouth*, is the exposition of acoustical properties of architectural and environmental structures as an essential facet of aural experience. A common purpose inherent in strategies of concealment employed through conventional audio production techniques is the neutralization and control of the acoustic features of space; the utilization of acoustically 'dead' production rooms, artificial reverb, baffling, and dynamics processes serve to construct an idealized form of acoustical space. Audio feedback, which in common cases can be reduced to an interaction between the input and output of an audio system in the milieu of acoustical space is demonstrative of these concerns. Di Scipio's composition for instrumental ensemble and electronics also engenders this intent:

The electronics intervene to alter the instrumental sound, making a larger sound texture dynamically depending on the peculiar resonance of the surrounding space, thus emphasizing the active, or pro-active role of the room acoustics in the gathering of the ensemble community. (2010)

Ear to Mouth synthesizes emission-centred and reception-centered accounts of aurality, integrating everyday processes as essential to its aesthetic realization; the distortion of the relationship between acoustic space and sounding bodies inherent in conventional audio production is experienced as aesthetic and disclosed.

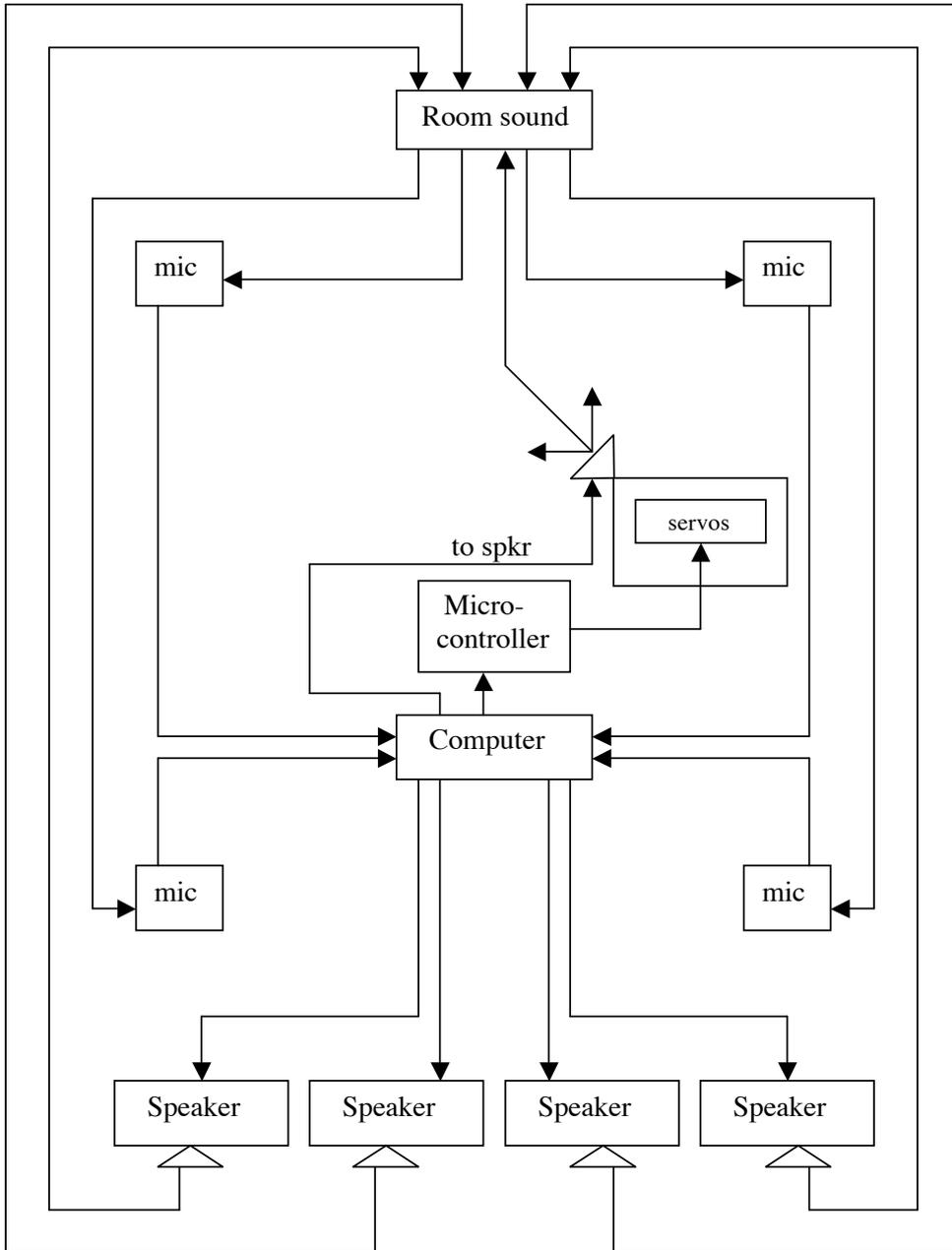


Figure 8. *Ear to Mouth* structural diagram

5

Everyday Practices

5.1 ACHz

ACHz is a 4-channel piece based around generative techniques involving a feedback system similar to that utilized in my piece *Ear to Mouth*. Instead of audio feedback, the work is constructed around the electromagnetic emissions of devices involved in its composition: the internal electric and mechanical activity of the laptop, audio interface, and power supply were captured using magnetic coil pickups. These recordings were then processed using DSP operations in SuperCollider. I created a programme that applies granular synthesis to sound files, enabling detailed control of grain playback parameters not implemented in standard SuperCollider grain generators. These include grain-wise pitch enveloping, amplitude and frequency modulation, as well as a more generally flexible definition of grain parameter changes over time. To facilitate the dynamic transformation of sound material, I created a series of programmes comprising a DSP environment that applies patterns of modulation to transformation parameters of processes such as various FFT techniques, basic filtering, phasing, and feedback delay lines, and records the processed version to a new sound file. The unique feature of this DSP environment is the ability to dynamically alter the routing order of multiple running transformations in an explicit and scheduled manner, enabling complex, time based changes in serial processing; each effect has its own dedicated pattern that defines its order in the chain, allowing, for example, an FFT pitch shift to be placed before and after

multiple pitched comb filters in rapid or gradual succession, with controllable cross-fading of wet/dry mix and variable time-ramping on all parameters. For further implementation details, see the files *GrainScheduler*, *GrainProcessor*, and *RecordAutomator* on the included media for this work.

ACHz involves a generative playback engine programmed in SuperCollider, which structures the development of the piece over time, initiating changes in amplitude, pitch, filtering, and diffusion in the playback of the original and processed recordings. The sound generation architecture of the work consists of 5 playback functions, separated into different categories by timbre, frequency and length, including low frequency, mid frequency processed, mid frequency unprocessed, high frequency, and short length sounds. Each playback engine has multiple variable inputs that enable continuous transformation of long and short-term structure as the work develops. The length of time between the playback of sound files allows for variation in the density of presence in a given sound category. The sound file playback frequency, filter frequency, q , amplitude attack and overall amplitude are also subject to variation. As all sound files were recorded in stereo, both channels of a given file are variably diffused over 4 channels, again determined by parametric input.

These parameters are continuously modified through a feedback process based around the use of 4 magnetic coil pickups placed near the tweeter of each loudspeaker used in the playback of the work, and connected to the audio interface. When the programme is started, the playback of the audio files is initialized from a random state, starting the

composition. The amplitude at each loudspeaker is continuously analysed, and each value is mapped into a range between 0-1. These 4 values are subsequently applied to the parameter inputs of the playback functions and re-mapped according to appropriate value ranges per input. The sonic properties of each playback function are defined by these values each time a new sound file is selected and played. As the piece develops, the amplitude measurement at each loudspeaker changes in response to these shifting playback parameters, facilitating a feedback system that results in a continually reorganizing sound composition. *Figure 9* displays the central structural features of the generative framework in *ACHz*; for details of the SuperCollider implementation, see the file *ACHzGen* on the included media for this work.

ACHz reconfigures everyday structural elements to produce a work that reveals obscured material dimensions in sound. The work encompasses many of the research concerns examined in the preceding text. To a large extent, it is inspired by the notion of self-reflexivity in systems of sound mediation that has been discussed with regard to my piece *Ear to Mouth*. The use of sound material collected from the devices that attend the production of the work itself indicates this, in addition to a generative scheme that places it in a state of constant self-reference. *ACHz* presents a synthesized formation of the emission and reception dialectic concerning sound transduction outlined in the preceding text. The sound events to which the source recordings refer are generated by the electro-mechanical process produced by the recording of those selfsame events; these recordings consist of their own attendant, normally suppressed by-products. This facilitates a situation whereby original/copy and emission/reception distinctions are conjoined in a

manner that condenses the work to a conceptual distillation of the comprehensive relational network constituting audition; the aural properties of sounding objects in *ACHz* are extracted simultaneously from the points of emission and reception. This metaphor is extended in the generative scheme of the work, where emission and reception are positioned as dynamically interdependent features, irreducible to distinct, autonomous entities.

ACHz was partially inspired by the works of Christina Kubisch, through her use of magnetic coil pickups to render normally imperceptible environmental energy as audible, in works such as *Magnetic Nets* (2006). I employed the use of this technique with Ihde's analysis of audition in mind, in particular his notion of *listening to interiors* (2007, 57-71). Visual and procedural similarities between the use of magnetic coil pickups to render the interior processes of electrical devices audible, and the use of the stethoscope for mediate auscultation in medicine are a clear association here, and in this sense Sterne's writing on this topic is an influence on my thinking around this work (2003a, 2003b). With regard to my analysis of common perceptual features at work in the different experiences of listening, *ACHz* is a study in resistance to strict divisions between modes of listening, and plays upon the common processes shared between causal and reduced listening. If we recall my discussion of the connection between these two modes, we see in this work a focus on these common factors: the appreciation of timbral qualities amplified by the magnetic coils, with an interest in penetrating the causal properties of these objects for the purpose of presenting them in an aesthetic listening context. The reduced, proximal qualities are brought forth in a way that encourages a causally

motivated interest in the nature of the sound material to coexist with the experience of it as an object of aesthetic consideration. In this way, *ACHz* grounds the experience of sound as art in the context of everyday audition.

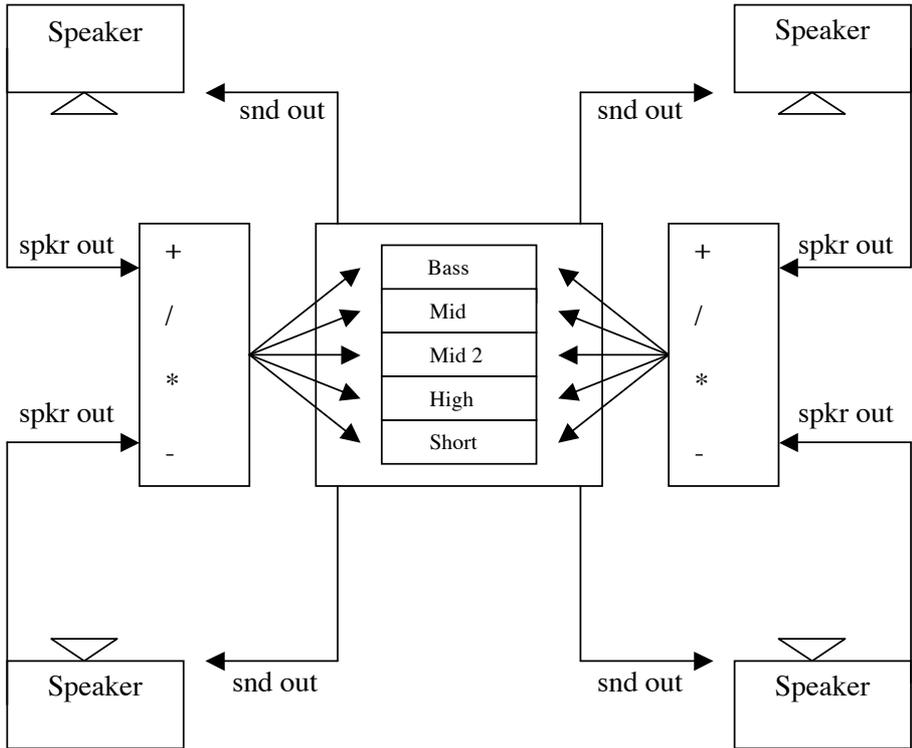


Figure 9. *ACHz* structural diagram



Figure 10. ACH_z speaker configuration with magnetic coil pickups

5.2 Light Loop

Light Loop is the third in a series of works, including *ACHz* and *Ear to Mouth*, which are based around feedback processes. The exclusive sound material in *Light Loop* is guitar amplifier feedback affected by the light emitted from a microcontroller-operated DMX moving-head light. As with *Ear to Mouth*, the work of Ray Lee (2004), is a central influence in my use of actuation to facilitate the generative structure present in *Light Loop*. I created a dynamically variable means of controlling audio feedback by fashioning 16 guitar pickups soldered with light dependent resistors and connected to standard 1/4" jack outputs (see figure 13). The use of light dependent resistors as a control element in the creation and modification of sound generating devices is an established technique, and well documented by authors such as Nick Collins (2006, 85). These guitar pickup/LDR constructs are plugged into 16 guitar amplifiers, with the pickups facing the speaker cone in close proximity. When light from the moving DMX lamp shines on one of the LDRs, resistance to the audio signal voltage from the guitar pickup is reduced, creating audio feedback.

These amplifier/pickup units are placed in an alternating diagonal pattern surrounding the DMX lamp at the centre of the room (see Figure 11 and 12). A second order of feedback is enabled through the use of 4 amplitude sensors connected to the microcontroller that defines the direction of the moving-head lamp. The sensors face 0°, 90°, 180°, and 270° in relation to the lamp, to measure the feedback amplitude level from four sectors in the room. For this purpose, I created a simple algorithm that maps the input from the sensors to the direction of the DMX lamp. In the following code, the 4 sensor inputs labeled *inl-*

in4 are converted from a value range of 80-800 into a range of 0-255, in order to conform to the requirements of the DMX standard.

```
map1 = map(in1, 80, 800, 0, 255);  
map2 = map(in2, 80, 800, 0, 255);  
map3 = map(in3, 80, 800, 0, 255);  
map4 = map(in4, 80, 800, 0, 255);
```

These values are combined to form the output mappings that define the pan and tilt positions of the lamp, as well as the speed of the strobe.

```
pan = (map1 + map4)/2;  
tilt = (map2 + map3)/2;  
strobe = (map3 + map1 + map2 + map4)/4;
```

Absolute value conversion of these numbers is necessary to protect against out-of-range values.

```
pan = abs(pan);  
tilt = abs(tilt);  
strobe = abs(strobe);
```

These values are then sent to the output of the DMX controller. The colour of the lamp is controlled through a combination of the pan and tilt values, as it subtly affects the intensity of the feedback due to differences in brightness. A system wide delay is variable according to a combination of the pan, tilt, and strobe values, which causes the lamp to pause at its current position, strobe speed, and colour for the specified length of time.

```
DmxSimple.write(1,pan); //pan  
DmxSimple.write(2,tilt); // tilt  
DmxSimple.write(3,(pan+tilt/2)); // colour value  
DmxSimple.write(4,strobe); // strobe value  
delay((pan+tilt+strobe) * 8); //global delay
```

The result of this mapping scheme is that as the direction of the lamp changes to illuminate the LDRs, the input from the sensors in turn influences the direction and colour of the lamp, as well as the speed of the strobe, creating a self-generating, emergent

pattern of immersive audio feedback. Depending on the direction and colour of the lamp, the size of the amplifier, and the speed of the strobe, the sonic output of *Light Loop* varies between long, slowly decaying drones, short blips, and quickly decaying blasts of feedback. This is further varied by the EQ settings of the amplifiers, which define the frequency range of the feedback, and built-in effects, such as distortion, phasing and feedback delay. These processes, aside from providing timbral variety, serve an important purpose in the generative structure of the work: by causing external variation of the audio feedback behaviour, the tendency of feedback systems to stabilize in a static state, as discussed in the commentary for *Ear to Mouth*, is thwarted. Given that it was necessary to set the amplifiers at levels unsafe for human hearing in order to cause feedback, ear protection must be worn when listening to the work, and this is reflected in the engineering of the documentation through the attenuation of high frequency content. A multi-channel demonstration of the work is found on the DVD labeled *Light Loop 5.1 DVD*, and the accompanying data CD contains photographic documentation and the microcontroller code described above.

Light Loop is conceptually orientated towards concerns with sound media systems, acoustic space, the perceptual pickup of pan-modal ambient energy patterns, and the emergence of meaning in aural aesthetics. In this sense, the work is a culmination of my research into the aural and the quotidian, more fully encapsulating the themes in this text than any other work I have submitted, and is the last to be created chronologically.

One of the primary conceptual methods employed in this text is the analysis of binary categorizations, with the aim of identifying dialectical relationships and problematic distinctions present in conventional understandings of aural experience. *Light Loop* is a practical application of this process, and presents many of the previously analysed dialectics as aesthetically manifest conceptual features. The notion of an ‘original’ sound and the radical separation from source described by schizophonia are reconfigured as irreducible, coextensive aspects. The use of audio feedback exemplifies a mode of transduction in which the origin of the existent sound is quite simply its own reproduction. Similarly, the causal origin of the sound considered as a mechanical interaction between energy and matter is indivisible from its subsequent effect; they constantly replace and define the existence of one another. This practically demonstrates a mediated aural situation where the notion of original and copy is problematic to the extent that it is non-applicable. Additionally, it demonstrates inherent problems I have identified in notions that posit a simplistic, one-to-one relationship between source and sound, exhibiting the possibility for multiplicity of source even when cultural factors are bracketed out. In other words, the structural connections between causal origin and resultant sound are inextricable to the extent that a one-to-one cause/effect relationship is inadequate to describe the series of interactions between vibrating bodies and forms of environmental energy involved in the aural experience of the work.

Light Loop constitutes a work at play with the proximal and distal aspects of aural perception. Though this tension is often present in the experience of the aural as aesthetic, here it has a peculiar relationship not commonly present: the distal facet of the work is

represented as a pan-modal phenomenon, split between forms of ambient energy and locations in space. The bidirectional association between the emergent patterns of light and the emergent structures in sound form a contextual whole, fusing the distal experience of causality between agents in space with the local perception of sound as proximal. As with the original/copy dialectic, this indicates a situation where these distinctions become inadequate to describe the system of correlations the work sets in motion. This recalls discussions of the global array and related theories of aural aesthetics discussed earlier in this text; in a literal sense, the generative substrate of *Light Loop* consists of changing intensities over time, existing in temporal forms of difference outside of individual energetic forms, yet fundamentally material in composition and manifestation.

Most importantly, *Light Loop* concerns the listening subject as an entity embodied in phenomenal space, and situates the body within a network of interpenetrating facets from which the experience and production of the work are constructed. The presence of a listening, moving body in the installation space, exploring and responding to the emerging organization of the work, becomes a primary component of that organization. This arrangement evokes interactions between the ‘organism and environment’ that form the basis for metaphorical perception, thus exemplifying the relationship between aesthetic experience and everyday embodiment at the core of the work.

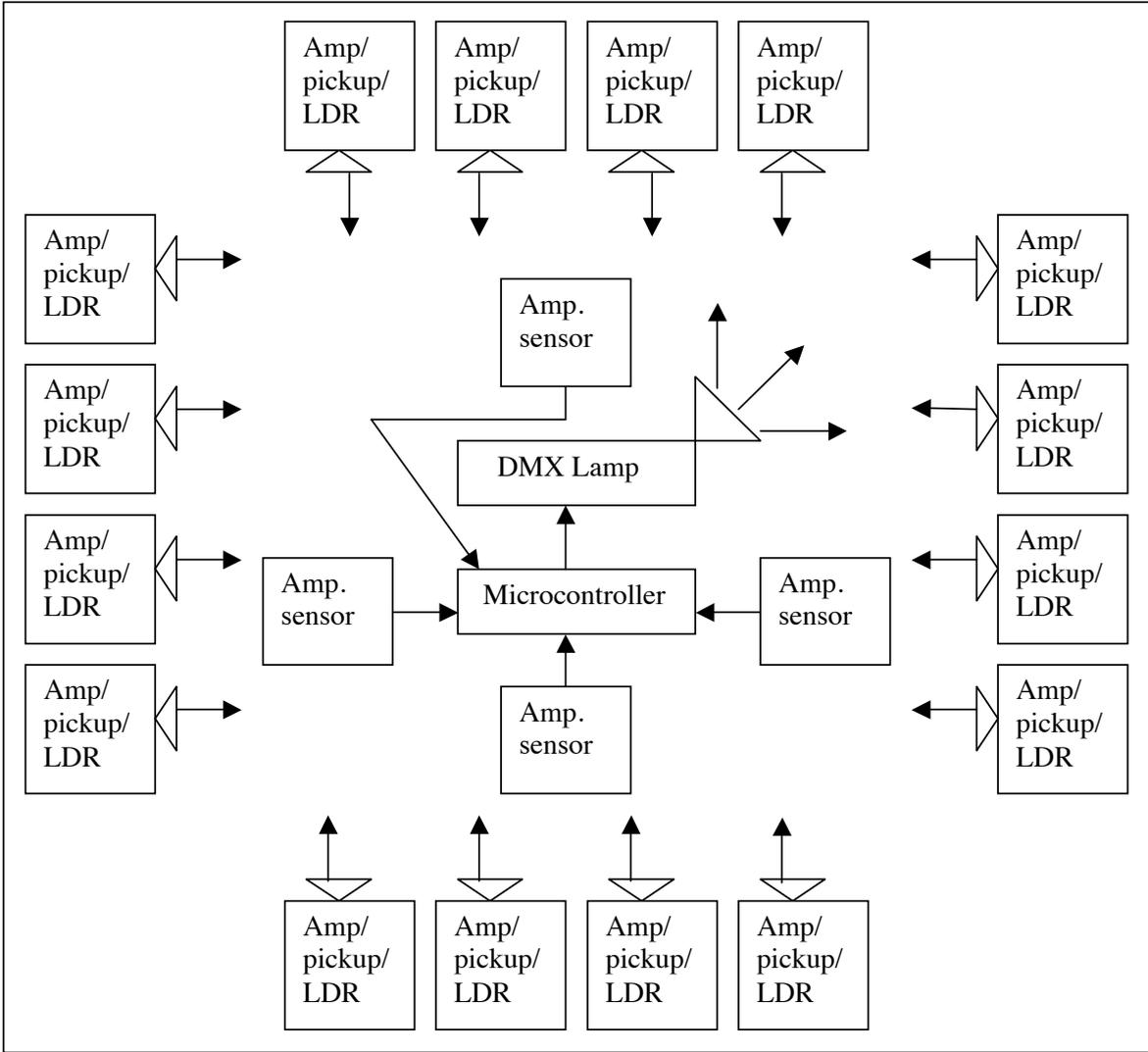


Figure 11. *Light Loop* structural diagram



Figure 12. *Light Loop* setup, 2011



Figure 13. *Light Loop* pickup/LDR

5.3 Exposing Traces

Exposing Traces is an installation work centering on relationships between sound, the motion of bodies in space, and the intersubjective experience of the auditory everyday as influenced by architectural aspects. Conceived in collaboration with choreographer Helene Cooper, the work concerns the phenomenal experience of the everyday in enclosed, domestic environments. It evokes an obscured commonality between unseen human activities that often occur in close proximity to one another in urban dwellings, and the structural barriers by which they are either perceptually distorted or concealed. Sonically, it reveals the audible features of human habitations, as experienced directly by their inhabitants, and as transformed or obscured by structural barriers, spatial distance, and environmental sound. *Exposing Traces* is a participatory work that exposes the hidden world of internal spaces through immersive experience; disparate yet familiar sonic, tactile, and visual environments are connected through a mediated interactive system in which the participant is an embedded subject.

Wireless transmission of instructions to live performers as a means to facilitate an open system of predetermined possibilities presents a range of artistic potential, and indeed has been explored in past ventures. Choreographer Yvonne Rainer specifically used choreographic instructions transmitted during live performance via handheld radio. In her 1966 piece *Carriage Discreteness*, Rainer selected movements and arrangements and issued them to the dancers over the course of the performance, enabling an environment permissive of directorial caprice (Dixon, 2007, 97). More recently, in his 1995 dance performance *Eidos: Telos*, choreographer William Forsythe used monitors concealed

from audience view that displayed algorithmically selected instructions to dancers on stage (Dixon, 2007, 200).

Another precedent for *Exposing Traces* is *Variations V* (Cunningham et al., 1990 [1966]), an ambitious collaboration between John Cage, James Tenney, David Tudor, Robert Moog, Nam June Paik, Merce Cunningham, and Max Matthews, among others. The piece centres on an interplay between elements of live movement, intermittent sound, and recorded video. In *Variations V*, Cage organized a flexible system of auditory possibility through the use of sensor elements. A distribution of photocells, as well a series of modified theremin antennae were placed as triggers to initiate oscillators, recorded tape, and shortwave radios, with projected visual events occurring throughout the indeterminate length of the piece. In *Exposing Traces*, as in *Variations V*, an open system of mediation between the immediate and the mediate, the linear and the emergent, encourages a transformational sensory environment. Nick Kaye describes the piece as

... comprised in the operation of elements *there* and *here*, simultaneously present to distinct works, even inside and outside the 'field' itself... *Variations V* deploys technology and mediation to interrupt, divert and so amplify the spontaneity and ephemerality of 'live' activity. (2007, 52)

With this in mind, it can be seen that *Exposing Traces* engages with the notion of sound source as context outlined in the previous chapter. The work consists of an interactivity that encompasses sound generating agents, embodied auditors, systems of mediation, and the everyday aural environment, facilitating a scheme that conceives of 'sound source' as an interaction between material processes. This context allows a type of expository

experience to emerge through a structured set of relationships that bind the everyday to the aesthetic. The work positions the audience within a system that integrates disparate aspects involved in the production of the work, maintaining a self-reflexivity aimed at manifesting a comprehensive understanding of relationships involved in the conception of the piece, and the general experience of sound as aesthetic.

As its sound material, *Exposing Traces* utilizes small fragments recorded from the daily lives of 4 dancers. Each section recreates the actual movements of that dancer in their home environment on a particular day; all actions performed were functional in nature, and related to tasks culled from a daily journal of activity for each dancer (e.g. *turn on light, grab keys, open door*). Once the arrangement of events was solidified, each dancer, while wearing in-ear microphones and a portable audio recorder to capture the audible ‘traces’ of their actions, performed the series of actions associated with their particular physical path. In most cases, this involved the manipulation of various functional objects, or simply traversing the space to reach different parts of the home. This resulted in audio recordings of each dancer’s domestic environment. Each series of actions was further separated into 16 different sections of various lengths, and the sound files were cut in accordance with those demarcations. Names and classifications according to the individual who performed each sound fragment were defined with regard to their associated actions, and each of these were assigned numbers to simplify the naming convention for programming purposes. Once the sound files were edited and organized into groups representing the physical movements of each dancer, a series of vocal choreographic instructions correlating with each sonic event were recorded, in

accordance with the selected series of movements. For full details of choreographic instructions, see Appendix III. To hear the original sound recordings and audio instructions, see the folder *ExposingTracesMax/Trace Scapes* and *ExposingTracesMax/Trace Instructions* on the media included for this work.

I programmed the sound generation logic and scheme of interactivity for *Exposing Traces* in Max/MSP/Jitter. Motion sensing through camera tracking is the method of interaction utilized. With a camera mounted on the ceiling facing downwards and connected to a computer running the software, the space is divided into 64 different spatial regions, and each region assigned to trigger a pre-recorded sound fragment and its associated choreographic instruction. These instructions are then sent to wireless headsets worn by the dancers who perform them. One consideration in designing a functional scheme of interaction in *Exposing Traces* was the time of execution required to complete the associated movement of each sound fragment. If many sounds associated with a particular dancer are overlapping, the instructions associated with those sounds can never be completed in full, and any cohesion between a triggered sound and its correlate is lost. For this reason, the system was designed to allow only one sound to play at a time, so that a participant walking through the space does not trigger a flurry of overlapping sounds. Instead, after the initial trigger of a single sound, subsequent movement to different sections of the space changes both the routing of the currently playing sound into various DSP transformations and controls the intensity of those processes, by the location of the participant and her intensity of motion respectively. As with *Strings*, it was my intention to avoid strategies related to computer gaming, which place a particular expectation upon

the participant such as that of a set goal or task, and the mastery of a particular virtual environment. Similarly, I wanted discourage those who experienced the piece from treating the interaction as a sort of musical instrument or compositional environment, and the connotations of mastery, virtuosity, expression, and performance bound up in that modality; the use of active participation within the piece is not intended to imbue an audience member with aesthetic or compositional command of the piece. For more programming details, see the Max/MSP patch *ExposingTraces* in the included media for this work.

Why then was *Exposing Traces* presented as an interactive piece, as opposed to being generative or fixed? The rationale behind the participatory nature of *Exposing Traces* lies at the core of its artistic and investigative intention. As stated in my initial description, the piece concerns itself with the potential for simultaneous experience between people whose commonality is usually obscured or concealed via architectural, visual, or sonic disruptions. Fundamental to this is the idea of sensory ‘traces’: the physical paths of moving bodies through different spaces have similar and disparate sensory experiences, and through coincident motion those commonalities and differences are *exposed*. The experience of initial movement by the participant and the consequent movement of the dancer, followed by its auditory correlate, is the culmination of this process. As such, a fixed or algorithmic presentation would neglect the intrinsic focus of the work: *commonality* of the kind that might (or might not) occur unknowingly between two neighbours with an adjacent wall. While participants in *Exposing Traces* are not instructed to perform the choreographic instructions, through their confluent motion and

the metaphor of an overlapping space, the potential for event synchrony between two or more bodies in motion is implied. The relationship between bodies in motion and sound as aesthetic presented in the work are particularly relevant to various topics in the preceding text. Bodily movement as form of environmental energy and the phenomenal experience of embodiment are the basis upon which *Exposing Traces* engages these ideas. Concern with relational mappings between disparate energetic forms surrounds some of the previously discussed theoretical notions that have inspired this work. Image schemas, intensity contours, and indicative fields all describe schemes of organization within forms of meaning creation, and indicate a fundamentally embodied notion of abstraction with which this piece engages. As with other works described herein, the pan-modal domain of the global array can be conceived as the substrate through which these relationships occur; the patterns of energy connecting the different forms of experience present in the work are superordinate to the kinds of stimulus in which they are encoded. In this way, the metaphorical experience attending the formation of significance in everyday and aesthetic contexts exist in *Exposing Traces* as dynamic variables at play, a practical engagement with the inseparability of the imagination from the ‘living and real world’ of embodied experience.

Exposing Traces takes place sequentially over three separate rooms. In the first room, the participant is presented with three projections of four dancers. A camera mounted on the ceiling tracks motion through the room. As the participant moves, her movements trigger the recorded sounds, continuously altering their assigned DSP transformation type, transformation parameter values, playback pitch, direction, and amplitude. In the second

room, the dancers wear wireless headphones, their images displayed on projectors in the first room via camera feed. With each triggered sound, a single choreographic instruction is sent to its associated dancer through the headphones, instructing them to perform an action or series of actions, and causing them to move in relation to the path of movement made by participants through the first space. This second room is experienced as an intermediary step, where the embodiment of the dancers becomes concrete. The recorded sounds come through the speakers without transformation, and as the participant moves from the first space to the second, their journey traverses the abstract to the concrete. The abstraction from the immediate which characterizes the first space is replaced with the immediate presence of the dancers; the space traversed in the first instance could have been that on which the dancers now tread. In the third room, the participant performs the instructions themselves, blindfolded, with one of the dancers guiding them through the choreographies with the use of tactile props, and they experience the piece without the aid of sight, as a tactile abstraction of the choreographic movements. For audiovisual documentation, see the files *ETperformance.mov* and *ETrehearsalDemo.mov* in the included media for this work. See figure 14 for a diagrammatic representation of this process.

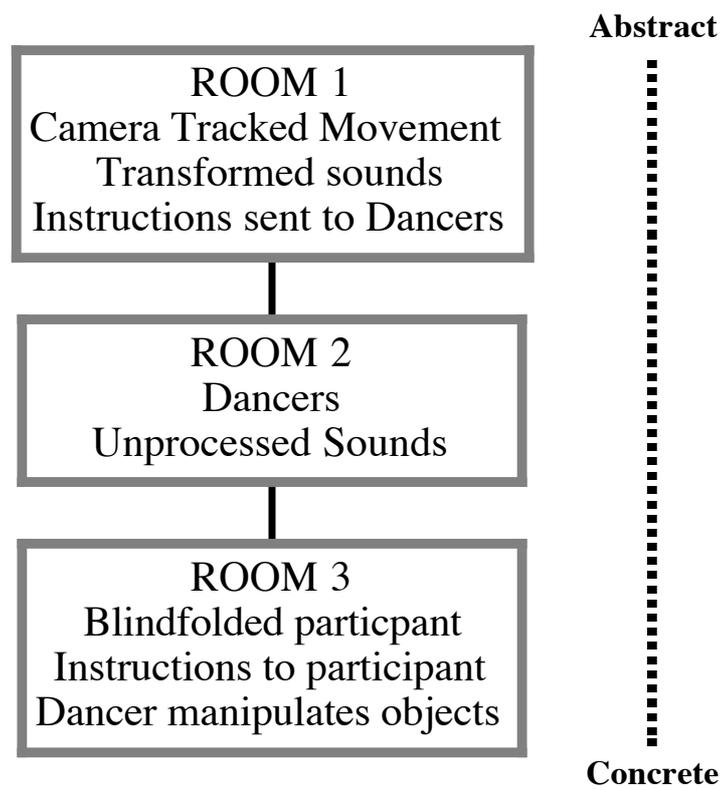


Figure 14. Conceptual Structure of *Exposing Traces*



Figure 15. *Exposing Traces*, Shunt Lounge, London, 2008



Figure 16. *Exposing Traces*, Shunt Lounge, 2008

5.4 River Lee Navigation/North Sea Crossing

River Lee Navigation (duration 15.29) and *North Sea Crossing* (duration 19.04) are two pieces based around sound recordings of boat journeys on the London River Lee Navigation and the North Sea respectively. Both works are presented as 8 channel and 2 channel versions, with only diffusion parameters differing between each. The recordings were treated in Csound (with a Max GUI) using granular techniques, FFT transformation, phasing, frequency shifting, and comb filtering, then structured according to their own spectromorphology, as well as through the interpretation of abstract external reference to elements such as the changing velocity of the craft, the perceived turbulence of the water,

and the opening and closing of locks on the river. These compositional decisions were made freely, mostly with regard to my own memory of each journey. For example, the interspersions of percussive interruptions throughout *River Lee Navigation* at 0.00, 1.20, 3.19, 3.55, and 7.55 correspond with the opening and closing of locks over the course of the journey. For details of the Csound processes used, see the files in folder *Csound/MaxMSP* on the media for *North Sea Crossing*.

The theme of vehicular transportation as a topic in philosophies of the quotidian is a particular influence motivating these works. Certeau's description of the distortion of phenomenal space and embodiment occurring in train journeys is especially close to the experience of travel inspiring both pieces. Between the confined, static space of the train and its hyper-mobile exterior, there resounds

a sort of rubbing together of spaces at the vanishing points of their frontier. These junctions have no place...they can only be heard as a single stream of sounds, so continuous is the tearing off that annihilates the points through which it passes. (Certeau, 1984, 113)

North Sea Crossing and *River Lee Navigation* are involved with central topics in my research on the aural and the quotidian. Negotiating the territory between 'sounding and non-sounding experience', both works employ some general strategies in musique concrète, with a particular concern placed upon the inclusion of everyday experience as a primary feature of their aesthetic significance. The associational liberty I have taken here in making compositional decisions is motivated by the imagination of correspondences between the phenomenal experiences of time, space, and kinetic energy, employing the practical application of abstraction in Emerson's (1986, 20-22) sense: the long-term

temporal development of each work is abstracted from audible and non-audible events occurring over the course of each journey, resulting in a play of metaphorical narratives constructed around temporal/spatial relationships and the affectively significant events that occur through them. Again, Certeau is relevant here, in noting that

In modern Athens, the vehicles of mass transportation are called *metaphorai*. To go to work or come home, one takes a “metaphor” --- a bus or a train. Stories could also take this noble name: every day, they traverse and organize places; they select and link them together; they make sentences and itineraries out of them. They are spatial trajectories. In this respect, narrative structures have the status of spatial syntaxes. (Certeau, 1984, 115)

This parallels my interest in *phenomenal causality*: by constructing purposeful associations between general events and aural figures, an innate connection between the perceptual recovery of high-order structure over time in both everyday and aesthetic experience is implied, enabled through a general human faculty for the extraction of causal relationships in the world. Conceptually, these works fall neatly into Smalley’s *energy/motion* field (1996, 88), with a particular focus on common phenomenal features existing within proprioception and the experience of motion as a generalized perceptual category. This explicitly recognizes, with Smalley, the connection between bodily and environmental energy, promoting a conception of gesture and contour as a history of energetic change over time (Godøy, 2010a, Leman, 2010, and Eitan & Granot, 2006, 2007), and emphasizing the nature of the body as embedded within the everyday environment and the aesthetic context of the work.

5.5 Liquid and Light

Liquid and Light (duration 23.05) is a sound work spanning six separate movements. Each section is an individual improvisation based around the sonic properties of hand-held objects (e.g. keys/coins/tape, rock/paper/scissors, portable radio). All sections were created using my Max/MSP performance environment, *Gestex*, and subsequently processed using DSP transformations, such as FFT and comb filtering, in Csound.

Gestex is a gesture controlled granular synthesis environment based on camera tracking and live audio input. Gesture is mapped to parameters according to the amount of activity present across the range of the camera. The pitch, buffer position, DSP process, envelope, and amplitude of the granular engine change according to the trajectory and intensity of the gesture. *Gestex* is designed to process acoustic sources, and its input can be extracted from 'live' microphones or pre-recorded sound material. The current pool of recorded sound at a given time is played back according to the position of a hand, or any other moving object, in the field of the camera. While the sound of an object is being recorded, its position within the visual field and the resultant gestural shape combine to form the sonic output of the patch. A dynamically controllable routing matrix enables the independent processing of each sound gesture, allowing the patch to produce rapidly changing sonic output, each fragment or continuous texture being transformed by a different DSP process at a given time. The intensity of a currently routed DSP process is increased by the amount of activity the camera senses in the motion-tracking field.

Performed gestures are recorded into 8 separate buffers which play back the material at variable pitch and time scales, allowing for abstractions of the original gestures to unfold over time. *Gestex* utilizes dynamically variable phrase lengths to create sounds ranging from rhythms, textures, short discrete events, and pitched tones. The playback length of these phrases can be independently multiplied, allowing the range of possible lengths to be extended. The effect of this relationship is such that each phrase can be ‘tuned’ accordingly. This manifests as pitched tones at one end of the spectrum, as the length of the phrases are shortened to oscillate at discrete fundamentals, and non-pitched rhythmic or textural phrases as their length is reduced to sub-audible cycles. These can be arranged in chordal relationships by interposing the correct time lengths between the phrases, which are definable on a note-by-note basis to form different combinations. For further details regarding the implementation of the patch, see the folder labeled *Gestex* on the included media for this work. The *Csound* processes utilized are identical to those available on the media for *North Sea Crossing*.

Liquid and Light is a practical application of my interest in associations between bodily gesture and environmental energy, and the aesthetic relationship connecting proximity and distance in orders of abstraction. If, as I have argued, abstraction is necessarily grounded in embodiment, this work plays upon the particularities of that grounding. The ‘re-description’ of first-order gestural reference, constituted through tracking and mapping of the sound-generating action, is an explicitly presented feature in the software architecture of *Gestex*, with levels of perceptual abstraction from bodily energy-figures available as variable parameters.

Like other works I have described in this text, *Liquid and Light* enacts methods inspired by the discourse on gesture and motion in aural aesthetics. The work stands in opposition to notions of radical source-detachment in the aesthetic experience of sound, demonstrating some connective possibilities linking bodily gesture and aural form. It implies a methodology focused on the integration of compositional sound material with its gestural source, involving the kind of coherence that occurs between aural aesthetic experience and physical motion. This work demonstrates some ways that this connection can exist in the absence of identifiable mechanical sound sources, substantiating the issues I have recognized with regard to the position that causal listening precludes the aesthetic experience of sound.

The non-exclusivity of listening modes discussed in the preceding text, as it pertains to the perceptual extraction of high-order structure in aesthetic, linguistic, and source-identity listening contexts is significant here. In *Liquid and Light*, a link between the raw materials of the piece, the gestures that produce them, and their subsequent sonic transformation occurs through the application of an explicit, common structure inherent in the functionality of *Gestex*. Instead of promoting a discourse that demands radical detachment between source and sound as a prerequisite for aesthetic listening, *Liquid and Light* presents the embodied, everyday nature of gestural motion and the materiality of sound as a manifest aesthetic characteristic.

Conclusions

The themes examined within this text have involved central ideas in the discourse on sound art, acousmatic music, perceptual theory and the broader study of aural aesthetics. Throughout, the argument for an essential, necessarily embodied materiality which grounds even our most transcendent and ecstatic aesthetic experiences in the world of the everyday has been supported extensively. This research has been applied with the purpose of answering the question posed in the introduction to this thesis: in what ways do our experiences of the everyday inhere in our experiences of the aural as aesthetic and meaningful?

If we assert that the everyday and the aesthetic are intrinsically associated, we are confronted with a related question: If aural aesthetic significance is not entirely self-referential or radically autonomous, and is always embedded within the material, cultural environment of the everyday, how then does the experience of music and sound art as meaningful inhere within sound as a general phenomena? It would be a vast overstatement to purport having concluded this central question with ultimate finality. However, throughout this text many suggestions have been examined and supported. The experience of music and other forms of aural aesthetic production gain significance in the context of cultural practice, and offer a perspectival illumination of the relationship between embodied experience and everyday cultural life. The everyday, then, is the channel through which cultural activity is dialectically bound to sensation and immediate experience. With this in mind, a new conception of meaningfulness has been examined,

which is attended by an affective dimension, inclusive of the non-linguistic and situated in the context of embodied existence.

Parallel to the discourse on aesthetic autonomy, the relationship between ‘specialised, structured activities’, such as music, and the everyday life that is ‘left over’ when they are bracketed out is far from unanimous; the question of ‘what is left over’ is in fact the central problematic of everyday studies. The view of *the everyday* presented in this text rejects a radical separation between the higher activities and experiences of human life from the domain of the everyday. Instead, it supports a conception in which the everyday contains the capacity for its own transformation through distinct and organized ‘non-everyday’ activities, and that those activities are both emergent from the everyday, but also validated within the everyday; they influence and transform each other in dialectical interdependence. If we revisit the aim expressed in the introduction to this thesis of initiating a practice that enables emancipatory modes of aural experience, it is by a self-reflexive involvement with the interpenetrating network of dynamic connections between the organized activity of aesthetic production, intersubjective social relationships, mechanical processes, and everyday embodied experience that the locus of this emancipation occurs.

One pervasive tenet which has been challenged in this thesis is that radical experiential detachment of sound from its material source is a requisite criterion for the legitimate aesthetic experience of the aural, the assumption upon which both Schaeffer and Scruton have based their theories of the acousmatic to very different conclusions. While it is true

that the doctrine of requisite detachment exists in substantial tension with an embodied, quotidian understanding of aural aesthetics, it should be stated that this thesis does not constitute an indiscriminate rejection of Schaefferian thinking, or the value of reduced listening as a practiced form of aesthetic reception. Instead, it is the notion that exclusively through ignoring the worldly, material sources of sound that the aesthetic experiences we have are able to occur that is rejected. Instead of radical detachment, I have proposed that the human experience of sound as aesthetic is a special sort of engagement that involves an intimate connection with the material circumstances of its production, including the cultural, social, and technological aspects present. As a result, this rejection of radical detachment dismantles strict divisions between the kind of listening that occurs in everyday situations and that which attends our experience of sound as aesthetic.

In particular, it has been demonstrated in this text that our different experiences of listening have interpenetrating features; what we refer to as ‘reduced’ or ‘musical’ listening shares core perceptual means with ‘everyday’ or ‘causal’ listening. While I have discussed some of the ways that existing theoretical writing intimates this to varying degrees, the connectedness of the listening modes is a rarely considered aspect of the extant theoretical framework. With this in mind, I have examined some of the ways that functional commonalities in neural activity link our faculties of language, spatial awareness, and motion with musical reception, indicating a thorough interconnectedness between different facets of our auditory capacities with our material being and its basic inseparability from the environment. This concurs with the model of perception put forth

in ecological psychology, to which I have also attended in the context of the aural. If we understand musical or reduced listening as the result not of casual separation, but as an experience which emerges from an integrated system of relations between cultural practice, environment, and acoustic energy, then the success or failure of sound art and acousmatic music exists not in the type of sound material which it utilizes, but in the ability of given works to enable the kind of integrative relationship that results in an aesthetic work engaged in dynamic play between the environmental milieu, human culture, and embodied experience.

The notion that our experience of sound-as-aesthetic relies upon metaphorical perception, particularly the experience of metaphorical motion in imagined space, is a central facet in many theories of musical aesthetics I have discussed herein. In this thesis, I have examined research surrounding the use of metaphor in both aesthetic production and everyday situations. From this research, I have concluded that while metaphorical perception in music has distinct experiential facets, it is by no means exclusive to musical experience, but attends a wide array of human experiences. Aside from the obvious case of metaphorical language, I have explored some ways that metaphorical perception applies to basic embodied experience. This non-exclusivity means that the presence of metaphor in music does not necessitate an immateriality that would not be present in other phenomenal experiences, such as the change of affective states or the passing of time. Similarly, I have demonstrated that although perceived causal associations and the perception of motion in music exist independently of the need to confirm veridical relationships in the realm of the everyday, this non-veridical experience can be

experimentally manipulated in contexts outside of aesthetic production. For this reason, instead of a radical separation between metaphor and causality in everyday situations and musical experience, I have argued that the presence of metaphorical structure in various aspects of human cognition is an essential substrate through which music and sound art are experienced as significant, connecting the abstract and transcendent in sound as aesthetic with the domain of the everyday.

The use of mediation technologies in the context of sound art and music production has been examined in this thesis. I have problematized the predominant discourse concerning degeneration within the process of sound recording that posits a radical schism between ‘original’ sounds and mediated ones. I have demonstrated that despite significant changes in cultural practice initiated by sound reproduction technology, no exclusive ontological separation exists between mediated and unmediated aural experience. The notion of an ‘original’ sound, as proposed by Murray Schafer and perpetuated by common assumption, has been challenged. In particular, the idea that sound recording constitutes an irredeemable separation between sound and source has been shown to be non-exclusive to mediated sound situations, and as such is a primary characteristic of sound itself. Similarly, the idea of singularity in the ontological constitution of the aural has been called into question, and examined as controversial with regard to the nature of its physical propagation. I have argued that despite commonsense, convenient understandings of sound and sound source that connect a single sound with a fixed physical source, multiplicity and separation lie underneath common assumptions at the heart of the aural.

From this transformed conception of sonic ontology, I have investigated cultural practices in the mediated production of music and sound art, outlining the strategic focus utilized to various self-reflexive degrees in the process of their creation. Strategies of technical intervention, representational content, timbral articulation, and the tonal-centred nature of mediated sound works have been explained and defined with the aim of being applied as a general analytical framework for the critical examination and construction of sound art and music in the context of mediated aural production. I have demonstrated some ways that, contrary to positions that argue for the exclusive existence of degraded social relationships brought forth by the advent of mediated sound production, new and emancipatory modes of social engagement within the aesthetic process have been enabled. In this way, a particularly advantageous aspect of mediated sound works exists in augmenting the possibility to explore self-reflexive modes of aesthetic aural production. Importantly, this self-reflexivity is not limited to an exposition of the technological nature of mediation, but a structural illumination of the relationships involved in the entire process of production, finding aesthetic value and affective significance in the play between familiar experience and mediated transformation, involving an intersubjective aural context that includes the technological, cultural, and phenomenal features of its creation. This possibility, in addition to the analytical categories I have outlined, contradicts the conventional assumption that forms of sonic production primarily concerned with tonal relationships constitute the sole valid aesthetic practice in sound.

These concerns are reflected in my practical portfolio. In various ways, all of my pieces evidence the sort of self-reflexivity described herein, facilitating the development of emancipatory relationships in the experience of the aural-as-aesthetic. In works such as *Ear to Mouth*, *ACHz*, and *Light Loop*, I have explored structural reconfigurations of familiar mediation systems, in ways that demonstrate an application of my research into the methodological particularities of mediated sound production. In *Strings* and *Exposing Traces*, informed collaborative practice is applied to a kind of interactivity that focuses on the relationship between embodied experience and the aural, engaging with the experience of sound as a fundamentally spatial phenomenon in a social context. In *North Sea Crossing* and *River Lee Navigation*, I explore notions of abstraction in sound composition, with a considered focus on perceptual research into pan-modal connections between phenomenal aspects of everyday experience and aural aesthetics. *Liquid and Light* examines similar concerns with a special consideration of bodily gesture and the perception of formal structures as abstractions of environmental energy patterns in the aesthetic experience of sound works. In line with the stated aims of my practice, these works are emancipatory in the sense that they deconstruct conventional relationships in cultural practice that restrict or negate aesthetic possibilities in the experience of aural works. This notion of aesthetic emancipation is paralleled with my discussion of embodiment and perception, problematizing restrictive conceptions of human aesthetic capacity, while proposing new understandings and possibilities for the theoretical examination of sound, perception, and aesthetics.

The research I have undertaken here suggests future avenues of exploration. As a matter of course, the thematic and methodological focus of my practical work has increased considerably over the course of this PhD, and to represent this development I have presented my list of works in chronological order in appendix IV. Some synthesis of the two domains of examination outlined in the preceding text, *Bodies* and *Devices*, has been a natural outcome of my research. My final piece, *Light Loop*, exemplifies this, through its concern with pan-modal abstraction in embodied perception, and the deconstruction of sound media systems as cultural artefacts involved in that perception. However, in subsequent research I aim to further explicate relationships existing between these two domains. While I have identified many of the elements at play in the notion of aural aesthetic experience as a complex involving sensation, cognition, and culture, a more detailed analysis of these structural relationships is in order. Similarly, my proposal of an integrative fusion between aural aesthetic experience and materiality, contravening notions of detachment and autonomy, suggests the need to further elaborate the details of this relationship, especially within the context of embodied cognition. By extension, my future research will involve the production of practical work that encompasses these areas of inquiry. In particular, I am interested in creating works that incorporate perceptual links between patterns of environmental energy and aural aesthetic experience, expanding the concept of self-reflexive methodology with regard not only to technological features of the work, but the network of social, perceptual, and technological relationships involved in the creation and reception of aural aesthetic forms.

Appendix I

Strings Source/Destination Chart

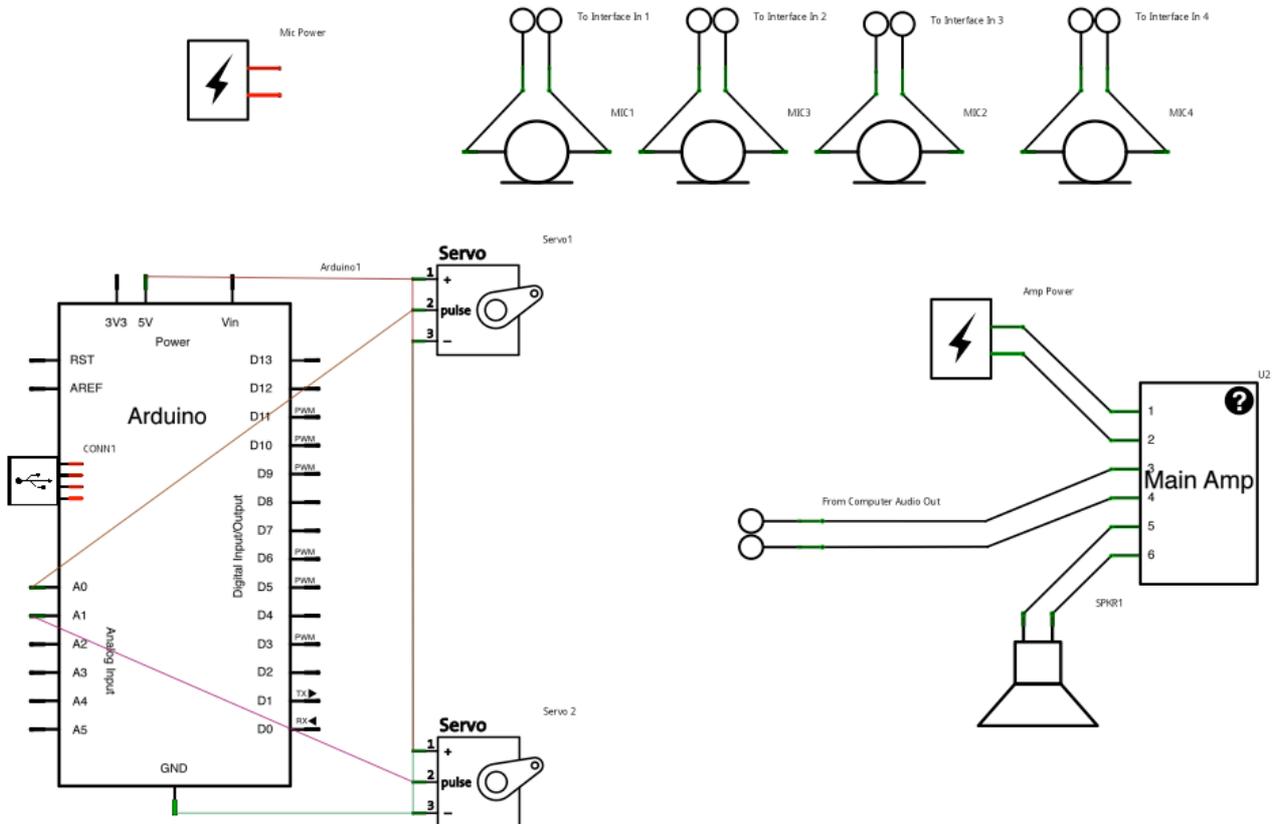
SOURCES	DESTINATIONS	TIMESCALE	TIMESCALES
Individually triggered cross-section	String root note	Immediate	Immediate: 0 - 15 seconds Intermediate: 30 seconds - 1 minute Long term: 1 minute and over
Dependent on node pressed (space mapping) and time between nodes	Amp modulation 1	Immediate	Wave levels: / waveforms change over 1 minute
Dependent on distance between nodes pressed (space) and how long the node is being pressed (time)	Amp modulation 2	Immediate	Speed of grains: fixed length of 17 seconds
Continuously modified by node presses over time	Table of gain masks	Long term	Chord type: fixed length of 30 seconds
Continuously modified by distances over time	Table of channel masks	Long term	Pitches: fixed length of 30 seconds
Average amount of activity per quadrant 1	Wave level 1	Intermediate	
Average amount of activity per quadrant 2	Wave level 2	Intermediate	

Average amount of activity per quadrant 3	Wave level 3	Intermediate	
Average amount of activity per quadrant 4	Wave level 4	Intermediate	
Time between presses and how long nodes have been pressed	Rate of grains	Intermediate	
Average time of node presses and the average time between node changes	Size of grains	Intermediate	
Interface divided into an upper and a lower sections, each one assigned to a given chord type. If the amount of nodes pressed and the average node length in one section are greater than in the other section then change chord types.	Chord type	Intermediate	
Determine which node is pressed in quadrant 1, the time between node events and the length of a node being pressed	Sample displacement 1	Immediate	
Same as above but for quadrant 2	Sample displacement 2	Immediate	
Same as above but for quadrant 3	Sample displacement 3	Immediate	
Same as above but for quadrant 4	Sample displacement 4	Immediate	

Determine if the amount of activity per quadrant is higher than the rest, if so target this quadrant. Change: if average length of the node events in the interface is greater than the average time between node events, then pitch down, else pitch up. When: if the average time between node events is greater than 15 seconds and the average distance between nodes is greater than a given value.	Pitch 1	Intermediate	
See above	Pitch 2	Intermediate	
See above	Pitch 3	Intermediate	
See above	Pitch 4	Intermediate	

Appendix II

Ear to Mouth simplified schematic



Appendix III

Exposing Traces choreographic instruction set

Henrietta

1. Get up
2. Pick up butter
3. Sit down, then get up
4. Put pita in toaster
5. Place butter down
6. Get food from fridge
7. Place pita on plate
8. Pick up plate
9. Cut sandwich stuff
10. Sit down to eat
11. Get plate
12. Get pita and bread
13. Replace butter
14. Put sandwich down
15. Tear lettuce stuff
16. From fridge, place food down

Emily

1. Wash hands
2. Close bathroom door
3. Walk around housemate's room
4. Walk to bedroom
5. Walk to kitchen
6. Turn tap off
7. Turn tap on
8. Close housemate's door
9. Open housemate's door
10. Pick up bag
11. Push open bathroom
12. Turn light off
13. Dry hands
14. Put down bag
15. Turn on light
16. Open bedroom door

Cat

1. Fob door
2. Unlock flat door
3. Put bag down
4. Walk to kitchen
5. Bend down start sweeping
6. Take dustpan out
7. Put dust in bin
8. Pull door open
9. Close flat door
10. Take out mug
11. Walk through front door
12. Flick kettle switch on
13. Put dustpan away
14. Walk to bedroom
15. Walk through flat door
16. Walk upstairs

Rosie

1. Walk to kitchen
2. Pick up phone
3. Take out hairclips
4. Take out elastic
5. Get chocolate from cupboard
6. Turn to dressing table
7. Open front door
8. Sit on bed
9. Lie down on bed
10. Open bag, take out phone
11. Put phone on bedside table
12. Put chocolate back
13. Put handbag on hanger
14. Sit up again on bed
15. Stand up
16. Take off rucksack

Appendix IV

Works submitted in chronological order

Liquid and Light 2007

- Data DVD containing Pro Tools Session, 2 channel mix, MaxMSP patch.

Exposing Traces 2008

- Data DVD containing demonstration video, performance documentation video, Max/MSP patch with audio files, photographs.

Strings 2009

- Authored DVD in 5.1.
- Data CD with photographs, MaxMSP patch, and Csound code.

North Sea Crossing 2010

- Data DVD containing 2 channel mix, 8 channel stems, Csound/MaxMSP code.

River Lee Navigation 2010

- Data DVD containing 2 channel mix, 8 channel stems.

Ear to Mouth 2010

- Authored DVD in 5.1.
- Data CD with SuperCollider code.

ACHz 2011

- Data DVD containing 2 channel mix, 8 channel stems, SuperCollider code.

Light Loop 2011

- Authored DVD in 5.1.
- Data CD containing photographs and Arduino code.

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