UNIVERSITY OF CALIFORNIA

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Circumaurality (Listening around Sound):

Representing Spatial and Media Contexts in Sonic Art

A Dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy

in Media Arts and Technology

by

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PUBLICATIONS

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Bakht, Salman. "Noise, Nonsense, and the New Media Soundscape." (Presented at the *Toronto Electroacoustic Symposium 2009*.) *eContact!* 11.4 (2009).

Bakht, Salman, and Clarence Barlow. "PAPAGEI: An Extensible Automatic Accompaniment System for Live Instrumental Improvisation." *Proceedings of the 2009 International Computer Music Conference*. 2009. 521-23.

Bakht, Salman and Clarence Barlow. "PAPAGEI: An Extensible Automatic Accompaniment System with User-Defined Parametric Mapping." *Proceedings of the Workshop on Media Arts, Science, and Technology*. 2009.

Bakht, Salman. "A Comparison of Development Platforms for Social Network Data Visualizations." *Transliteracies Project*. 2009.

Bakht, Salman. "Document Database Integration for the Professional Social Environment (ProSE)." *Transliteracies Project*. 2009.

Bakht, Salman, Pehr Hovey, and Kris McAbee. "MONK Project Research Report." *Transliteracies Project*. 2009.

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Literature.Culture.Media Research Slam, Santa Barbara
Nodes and Passages, 5/21/2010

California Electronic Music Exchange Concert, Berkeley
Nodes and Passages (Fixed Media), 5/2/2010

The Cooper Union, New York
Nodes and Passages (installation), 1/21–2/18/2010

Toronto Electroacoustic Symposium: CEC / NAISA, Toronto
Santa Barbara Soundscape, 8/8/2009

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ABSTRACT

Circumaurality (Listening around Sound):

Representing Spatial and Media Contexts in Sonic Art

by

Salman Bakht

This dissertation examines sonic art works that demonstrate the characteristic ways that sound is affected by its surroundings. Called *contextual representation* herein, this activity is found in soundscape composition and glitch music, as well as Alvin Lucier's music compositions and the sound installations of Robin Minard, Max Neuhaus, and Bill Fontana. This dissertation introduces the basic concepts and terminology necessary to discuss contextual representation as a single category and examines the boundaries of this category, justifying the placement of various works within or outside the category. Additionally, this dissertation describes the works of contextual representation listed above. This dissertation introduces four compositional aspects common to these works – stasis, nonsense, non-action, and juxtaposition – and explains how they are used to demonstrate a context's characteristics. Finally, this dissertation describes and analyzes four of my sonic art works, which provide a practical demonstration of the concepts introduced here.

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Introduction

In the 1979 essay, "Careful Listening Is More Important Than Making Sounds Happen," Alvin Lucier states, "For several hundred years Western music has been based on composition and performance. Most attention has been focused on the conception and generation of sound, very little on its propagation" (430). Although sound conception and generation continue to be of primary interest in sonic art, the exploration and revelation of the characteristics of sound propagation, that is, the ways that sound is transformed as it travels from source to listener, have been a concern of a wide range of works created from the late 1960s onward. Starting with *Chambers* and *Vespers*, both composed in 1968, many of Lucier's works attempt to demonstrate the acoustic characteristics of physical spaces through performance. Also in the late 1960s, the World Soundscape Project, headed by R. Murray Schafer, began to create sonic works, now known as soundscape compositions, using field recordings to reveal the characteristics of various sonic environments, or "soundscapes." While Lucier's works emphasize characteristics of sound propagation that originate in acoustic phenomena, soundscape compositions emphasize characteristics that can be traced back to social and ecological factors. Other sonic art works explore how sound is transformed as it is propagated through media. Many works of glitch music, a genre of popular electronic music that emerged in the mid-1990s, emphasize the characteristic effects that malfunctioning compact disc players and computers have on sound transmission. Earlier works explore the effects of malfunction as it occurs not

only in digital media but also in analogue media such as vinyl records and audio tapes.

Although these works have significantly influenced both sonic art creation and interpretation, they are typically not understood as a single category of artistic activity. The use of recorded sound material is considered separately from the use of live sound material, focus on physical factors is considered separately from focus on social factors, and exploration of spaces is considered separately from exploration of media. As a result, artistic discourse gives attention to the techniques, materials, and aesthetics unique to these categories of works individually instead of techniques and results that are common to all of these categories. An investigation of the artistic techniques and results common to these works could help to explain how these works successfully expose the sonic characteristics of the surroundings to the listener.

This dissertation provides such an investigation and introduces the basic concepts and terminology necessary to describe this artistic activity, thus facilitating interpretation and discussion of these works while providing artists interested in creating similar works with a better understanding of how to achieve similar results in their own works. Three main terms are introduced in Chapter 1 of this dissertation: "context," "contextual representation," and "contextual listening." A *context* is a specific situation that affects sound, described in terms of space, media type, or some other dimension. *Contextual representation* refers to works that demonstrate a context's sonic characteristics by exposing the listener to sound affected by that context. Contextual representation is defined by a minimal set of requirements,

without placing constraints on (or giving preference to) the use of certain techniques, materials, or aesthetic features. The boundaries delineated by these requirements are examined to justify the placement of various sonic art works within or outside the category of contextual representation. Finally, *contextual listening* is the perceptual and cognitive process of determining sonic characteristics of an aurally perceived context. Works of contextual representation often encourage contextual listening as a an active, conscious process.

Chapter 2 of this dissertation introduces several genres and artists whose works qualify as contextual representation. This chapter also defines four compositional aspects common to these works – stasis, nonsense, non-action, and juxtaposition – and explains how the use of these compositional aspects aids in demonstrating a context's sonic characteristics.

Finally, Chapter 3 of this dissertation describes four of my sonic art works, which are included in the dissertation's artistic component. These works are *Santa Barbara Soundscape* (2007, 2008), *Intermission* (2009), *Source:* Diaphonic Trio *by James Tenney from the Compact Disc* Music for Violin & Piano *(via File Hosting Website)* (2009), and *Nodes and Passages* (2010). This chapter also provides an analysis of each these works, explaining why it does or does not qualify as contextual representation and how it uses the four compositional aspects introduced in Chapter 2. The four works included in the artistic component of this dissertation serve as a practical demonstration of the concepts introduced in the dissertation's written component. Conversely, the written component of this dissertation as a whole serves

to draw a path of discourse between generally understood sonic art concepts and my personal artistic approach and realization.

Notes on Terminology

In this dissertation, the term *sonic art* is used broadly "to encompass the arts of organising sound-events in time," as Trevor Wishart states in *On Sonic Art* (4). Music composition and sound installation art are the focus of this dissertation, although the concepts introduced herein apply similarly to other artistic practices for which sound is a significant aspect, such as theater and film. The term *the listener*, also found throughout this dissertation, refers to a person that experiences a work of sonic art or an everyday sonic situation. When referring to the experience of a work of sonic art, "the listener" refers to an idealized audience member who experiences the work in a meaningful way. Whenever possible, this dissertation uses sonic art and sound theory terminology defined in *Handbook for Acoustic Ecology*, edited by Barry Truax, and the *Electroacoustic Resource Site (EARS)* glossary. A glossary is provided at the end of this document.

Chapter 1:
Contextual Representation and Its Boundaries

This chapter introduces the basic concepts and terminology necessary to examine works of art that explore and demonstrate the sonic characteristics of the listener's surroundings. This chapter defines the key features or requirements of this artistic practice, called "contextual representation," and introduces the concepts of context and contextual listening. Finally, this chapter examines the boundaries outlined by the requirements of contextual representation, justifying the placement of various sonic art works within or outside the category.

Defining Context

As used in this dissertation, the term *context* refers to a specific situation that perceptually transforms sound as it travels from source to listener. Although the term "context" has a variety of meanings in artistic discourse, its use herein is constrained in two ways. First, a context must be *specific*. It must be definable in terms that differentiate it from other contexts. For example, a concert hall is a context that may be differentiated from other spaces by its geographic location, its spatial dimensions, or the community that it serves. Context as used here does not refer to a dimension itself or a universal set, such as space or society, nor does it refer to the "total context," the all-encompassing set of factors surrounding a single event. The investigation of specific contexts rather than the total context emphasizes a comparative approach to understanding the impact of contextual factors. One may question, for example, how the choice of a concert hall affects the realization of a

work, in other words, how the sound would be transformed differently if placed in a different context. Second, a context must be *real.* It cannot be fictional, conceptual, or abstract. For example, a room defined virtually in an electroacoustic music composition, an infinitely large room, and a musical score are not contexts. One cannot truly listen to these situations. Therefore, one cannot investigate their perceptual effects and trace these effects back to their causes.

A context may be understood as possessing a set of "sonic characteristics" that define how the context is perceived. These characteristics include both sounds that are heard consistently or frequently within a context and particular ways that sound is transformed by a context. These characteristics may be defined qualitatively or quantitatively, deterministically or non-deterministically (defined by statistics), and as a function of various factors. For example, characteristics of a broadcast radio station may include the presence of white noise or static, bandlimiting, interference from other stations (perhaps as a function of receiver location), the frequency of radio jingles (perhaps as a function of time of day), variations in dynamic range (between music and advertisements), mean song length, and censorship constraints (if they are applied).

Spatial Context, Media Context, Presentation Context

This dissertation focuses on two main categories of contexts: spatial contexts and media contexts. A *spatial context* is the definition of regions of space associated with some real (non-virtual) physical situation. A spatial context may be defined very specifically, for example, ground zero of the atomic bombing of Hiroshima, or very

vaguely, for example, any concert hall. A *media context* is the set of communication media types associated with certain instances of communication. Like a spatial context, a media context may be specific or vague. Additionally, the definition of a media context may include transmission media, storage media, or complex configurations of media elements. Some examples of media contexts are radio, speech, ARPANET, Betamax video cassette players, cellular networks, and the MP3 audio format. Although every spatial and media context may be defined by physical constraints, the sonic characteristics of these context often do not originate exclusively from physical factors. For example, although the spatial context of a concert hall is defined by the physical boundaries of its walls, ceiling, and floor, the sounds produced within are affected not only by acoustics, but also by social and historical factors that define the hall's typical use.

This dissertation particularly focuses on these two categories of contexts for three reasons. First, both media contexts and spatial contexts are relatively easy to define in concrete terms. Media contexts can be defined by the materials used for transmission and storage, while spatial contexts can be defined by spatial boundaries. Additionally, both categories of contexts have been explored separately in theoretical texts and sonic art works, which are described throughout this dissertation. Finally, an investigation of spatial and media contexts has inspired most of the sonic art works I have created over the past several years, including all of the works included in the artistic component of this dissertation.

This dissertation uses the terms "spatial context" and "media context" instead of terms used in previous literature including "soundscape" and "media environment" for several reasons. First, while the terms "soundscape" and "media environment" are used primarily in particular fields, namely, soundscape ecology and media ecology, and have nuanced connotations in those fields, the word "context" is used broadly and does not imply the use of any particular theoretical framework. Likewise, the term "media context" does not imply a metaphorical line of thought in the way the term "media environment" suggests thinking of media types as physical surroundings. Further, explicitly defining spatial context and media context as subsets of context highlights their similar role in sonic art practice. Finally, since spatial context and media context are defined as subsets of context, the reader is invited to consider how additional categories of contexts not discussed in the dissertation may relate to the concepts introduced here.

This dissertation also uses the term *presentation context* to refer to the context or set of contexts involved in the presentation or performance of a sonic art work. "Presentation context" may refer to a spatial context, a media context, or a combined set of contexts surrounding a work's presentation. For example, the presentation context of a symphony may refer to a concert hall in which it is performed or to a compact disc and home stereo system from which it is reproduced. Similarly, the presentation context of a sound installation may refer to the art galleries where the installation has been exhibited, a set of speakers and MP3 players used to generate sound in the installation, or the combination of those spatial and media contexts. A

presentation context may be explicitly defined by a work, as is the case with site-specific installations, or it may vary between individual presentations of a work.

Defining Contextual Representation

Contextual Reference, Re-presentation

Contextual representation lies at the intersection of two categories of sonic art activity, *contextual reference* and *re-presentation*. Works of sonic art that perform contextual reference thematize a context and communicate certain characteristics of that context. Contextual reference is found in soundscape compositions that draw attention to the sounds found in particular spaces, site-specific sound installations that highlight their immediate surroundings, works that thematize social situations or action, and program music compositions that establish settings for their narratives.

Christiane ten Hoopen introduces the concept of "re-presentation" in the article "Issues in Timbre and Perception," describing it as a new possibility available in electroacoustic art through the use of recorded sound material, distinct from the approach of representation and mimicry found in vocal and instrumental music (69). She states:

> The term *re-presentation* refers to sound material which have retained their source credibility and can be considered literally as a presentation of an original. This allows us to make a distinction between sounds which are meant to *resemble* ("it sounds like ...") and sounds which *are* ("... that is the sound of ..."). . . . sound material in question must be *convincingly* identified by consensus, to be labelled as re-presentational. (69–70)

There are two basic requirements for re-presentation. First, sound material from a particular source must be used in a work and, second, the source must be identifiable "by consensus" of most listeners or perhaps most members of the work's intended

audience. Like, contextual reference, re-presentation may be found in a range of sonic art practices including soundscape composition, plunderphonics, acousmatic music, hip-hop, and some subgenres of electronic dance music.

Requirements of Contextual Representation

Combining the two requirements of re-presentation with the requirement of contextual reference (with modifications described below), contextual representation has the following three requirements:

1. Sound material of a context is heard in the work's presentation.
2. This context is recognizable as the origin of this sound material.
3. The work thematizes this context and emphasizes its sonic characteristics.

The first two requirements are derived from the requirements of re-presentation, with the sound material linked to a context instead of a source. However, while the term re-presentation refers only to the presentation of sound material that has been recorded, contextual representation includes both the use of recorded and live sound. This modification of the first requirement allows works that sonically activate their presentation contexts, for example, *Vespers* by Alvin Lucier and the sound installations of Robin Minard, to be regarded as contextual representation. Although there are significant artistic possibilities provided by the use of recorded sound instead of live sound and vice versa, both recorded sound and live sound function similarly in their ability to represent contexts.

For sound material to be "of a context" as stated in requirement 1, it must have originated from, traveled through, or been modified by the context in question.

For example, a microphone placed inside or immediately outside of a spatial context may record the sound of that spatial context. Likewise, the sound of a media context may be accessed by recording the sound at the output of a media device or by connecting the output terminal to a loudspeaker system. In both cases, the context has transformed the sound material allowing the listener to perceive and recognize the context. Sound recorded or heard prior to its transformation by a context does not qualify as being of that context. For example, a microphone capturing the sound of someone speaking into a telephone, that is, at the *input* terminal of the telephone system, is not capturing sound material of the media context of the telephone. Instead, the microphone would have to capture sound coming out of a telephone receiver.

As stated above, a work of contextual reference thematizes a context and communicates that context's characteristics. For a work of contextual representation, however, the sound material by itself communicates the context's characteristics. Therefore, a work of contextual representation merely needs to emphasize this existing communication. Requirement 3 is modified from the definition of contextual reference to reflect this.

By merging the requirements of contextual reference and re-presentation, contextual representation excludes some works in both of these categories. Contextual representation does not include works of contextual reference that do not use sound material of the context of interest. These works, which include many works classified as program music, reference contexts by using sonic symbols (musical notes, timbres, vocalized language, etc.) or imitative sounds, possibly with the aid of

a program note or descriptive title. Additionally, contextual representation does not include works of re-presentation that do not clearly relate their sound material to a particular context, instead relating sound material only to its immediate sources, that is, the objects that generated the sounds heard in the sound material. These works may intentionally obfuscate the contexts related to the sound material. For example, close-mic recordings and artificial reverberation are often used to hinder the recognition of a spatial context so that recordings from multiple spatial contexts may be used together and regarded as originating from a single context. Alternatively, the sound material's context may simply not be significantly highlighted in the sonic art work.

Contextual Listening: The Essence of Contextual Representation

Although the three requirements listed above are sufficient for testing whether a work of sonic art qualifies as contextual representation, these requirements do not convey the *essence* of contextual representation, the unique effect that contextual representation has on the listener or the unique opportunity that contextual representation offers the artist. I believe that the essence of contextual representation lies in the approach to listening, or *listening mode*, that contextual representation encourages. I call this listening mode "contextual listening." [1]

Contextual listening is the perceptual and cognitive process of determining sonic characteristics of an aurally perceived context. Contextual listening involves the

[1] The term "contextual listening" has been previously used by Katharine Norman in the paper "Real-World Music as Composed Listening." Norman's use of the term, however, refers to the perception of context in the broader sense, a totality of cultural experience, while the term herein refers to the recognition and comparison of specific contexts.

comparison of the context currently being heard to those heard previously. If the characteristics of the context currently being heard match those of a past listening experience, the listener may be able to identify the context. Otherwise, the listener may still be able to determine the similarities and differences between the context currently being heard and those heard previously and, from this, gain some knowledge about the context.

Contextual listening is not exclusive to the experience of works of contextual representation. On the contrary, contextual listening occurs in everyday life. For example, one engages in contextual listening when determining whether the sound of a doorbell originated from one's own home, a neighbor's home, or a television set. Likewise, even before speaking, one knows to raise their voice to be heard in a room or communication channel with a relatively high level of background noise. The knowledge of background noise level, a characteristic that varies among contexts, is obtained through contextual listening. In everyday life, however, the act of contextual listening is usually passive. Typically, the listener is aware only of the practical implications of the sonic characteristics determined through contextual listening, while being unaware of the characteristics themselves and the process undergone to evaluate those characteristics. For example, someone determining that the sound of a doorbell originated from his or her front door is usually not aware that this knowledge was derived from various characteristics of reverberation and directionality that have modified the sound of the doorbell as it traveled to his or her ears.

In contrast, a work of contextual representation encourages the listener to engage in contextual listening as an active, conscious process, so that the listener is cognizant of the sonic characteristics of the perceived contexts. By doing so, contextual representation is capable of developing the listener's ability to engage in contextual listening, enhancing the listener's future perception of his or her surroundings. A work of contextual representation may improve the listener's ability to engage in contextual listening by revealing characteristics of a context that the listener would not have otherwise noticed. Engaging in contextual listening in the future, the listener may, consciously or unconsciously, recall the listening experience of the work and, as a result, be able to recognize these characteristics in the context currently being heard. Further, by giving the listener practice engaging in contextual listening as an active process, a work of contextual representation may encourage the listener to engage in contextual listening as an active process in the future.

Although not a requirement of contextual representation, the development of the listener's awareness of their surroundings through contextual listening is a unifying aim of many artists that create works of contextual representation. Describing the early works of soundscape composition developed as part of the World Soundscape Project, Barry Truax states, "At first, the intent was to document and represent recordings of various sonic environments to the listener in order to foster awareness of sounds that are often ignored" ("Genres and Techniques" 5). Similarly, Robin Minard states that the aim of his sound installations is "to intensify the public's experience of the chosen space or to provide the public with a new or

enriched perception of their surroundings" ("1. Sound Installation Art"), and describing one his many pieces that explore the properties of acoustic spaces, Alvin Lucier states, "*Vespers* is in part an educational piece. You'd be surprised how many people don't know about echoes . . . They just don't hear the echoes, and I want people to hear those echoes" (76). Soundscape compositions, Minard's sound installations, and Lucier's compositions, described in depth in Chapter 2 of this dissertation, reflect a shared artistic goal of enhancing listeners' awareness of their surroundings.

Another result of the use of contextual listening in contextual representation is that, in a work of contextual representation, the listener derives information about a context directly from the sound material used in the work. In other words, the context communicates directly to the listener through its sound material. The work's artist may define how a context is sonically activated through performance or may act as a mediator, enabling the communication between context and listener using recorded sound material. However, the direct connection between context and listener is maintained. As a result, the artist need not, and in fact cannot, fully define which of the context's characteristics the listener perceives. Instead, control of communication is shared among the listener, the artist, the performers, and the context. In contrast, other types of contextual reference require the artist to choose which of the context's characteristics are to be communicated in the work and then encode this information into the artistic material. This encoding process both limits the type and accuracy of

the characteristics that the work communicates due to the constraints of performance, the compositional process, the artist's perception, and the artist's preferences.

Boundaries of Contextual Representation

Each of the three requirements of contextual representation forms a boundary, dividing works that qualify as contextual representation (assuming the other two requirements are fulfilled) from works that do not. This section examines categories of works near each of the three boundaries, justifying their placement inside or outside of the limits of contextual representation.

Boundary for Requirement 1

Requirement 1 of contextual representation is that sound material of a context is heard in the work's presentation. For most sonic art works, requirement 1 is entirely unambiguous. Requirement 1 is satisfied for a work's performance context. Additionally, any work that projects recorded sound material through a loudspeaker satisfies requirement 1 for the contexts from which the material originates. Ambiguity arises, however, when the sound material of a work is the resynthesis of an analyzed recording, in other words, when the sound material is a recording that has undergone an analysis/synthesis process (also known as an "analysis-based synthesis" or "analysis/resynthesis" process). Such processes involve the analysis of input sound, in this case a recording of the context of interest, followed by a sound synthesis stage based on the data obtained in the analysis stage, possibly after an intermediate transformation stage. Some analysis/synthesis processes, such as those used in digital encoding schemes, serve a purely practical purpose having almost no perceptual

effect. The output of these processes should be regarded as equivalent to the recording being analyzed.

Other analysis/synthesis processes incorporate an intermediate transformation stage in which the analysis data is modified, leading ultimately to a sonic transformation. If an "analysis/transformation/synthesis" process allows for controlled, limited sonic transformation (or no transformation whatsoever) of the input sound, this process acts much like other sonic transformations (such as filtering, synthetic reverberation, and amplification) that may be applied to a recording without disqualifying it from satisfying requirement 1. Such an "analysis/transformation/ synthesis" process should similarly be allowable in the generation of the sound material used in contextual representation. For example, Clarence Barlow's ISIS, described in his paper "ISIS, An Alternative Approach to Sound Waves," is an analysis/synthesis process that may yield an output sound that differs greatly from the input. By using "Stretching," "Shifting," and "Sustaining" transformations, any sound of a few milliseconds may be transformed into a complex sinusoidal melody. However, if no transformation is performed, the output of the ISIS process is perceptually identical to the input sound.

Other analysis/synthesis processes, however, are incapable of resynthesizing an output that is perceptibly the same (or very similar) to the input. For example, Barlow's "Synthrumentation" and "Spectastics" techniques, both described in Barlow's paper "On the Spectral Analysis of Speech for Subsequent Resynthesis by Acoustic Instruments," involve the spectral analysis of input recordings. However,

instead of using Fourier synthesis, which would result in an output identical to the input, the analysis data is used to generate note events that are played by acoustic instruments or a MIDI synthesizer. In both of these cases, performance constraints severely limit the fidelity of the resynthesis.

One may also consider mimicry to be an analysis/synthesis process. Mimicry involves the mental analysis of an input sound followed by a synthesis stage in which a vocal or instrumental performer attempts to recreate the input sound. In the case of mimicry, fidelity is limited both by the constraints of mental capacity in the analysis stage and by performance constraints in the synthesis stage. *On Sonic Art*, by Trevor Wishart, provides two examples of mimicry, Janequin's *Le Chant des Oyseaulx* and Beethoven's *Symphony No. 6 in F Major*, both of which have vocal or instrumental parts that mimic birdcall sounds. The vocal parts in *Le Chant des Oyseaulx* resemble the articulation of birdcalls, but they are constrained by the practical limitations of the singing human voice and the phonetic choices common to the composer and performers. Similarly, the timbres used in Beethoven's *Symphony No. 6* resemble the spectral and transient characteristics of birdcalls but only to the extent possible by the orchestral instruments and performance techniques used at the time. Wishart calls this form of mimicry "association" because the listener forms an association (or analogy) between the sound present in the work and the sound sources or contexts being mimicked (131). Two famous examples of works with association are Vivaldi's *The Four Seasons*, which forms associations with seasonal descriptions found in four

sonnets, and Olivier Messiaen's *Chronochromie*, which contains mimicry of a variety of birdsongs and other nature sounds.

In these imprecise analysis/synthesis processes, the listener considers the output of the analysis/synthesis process to be neither the same as nor a processed version of the input sound recording. Instead, the listener considers the input and output sound to be two associated but distinct entities. Thus, the listener cannot engage in contextual listening in order to receive information about the input recording's context. Therefore, the output of such processes do not satisfy requirement 1 for the input recording's context.

Boundary for Requirement 2

Requirement 2 of contextual representation is that the context heard in the work's sound material is recognizable as the origin of this sound material. For a work that satisfies requirement 1, requirement 2 is typically satisfied unless factors act to obfuscate the origin of the sound. For recorded sound material, this obfuscation may occur through auditory masking, that is, through the presence of other sounds in the performance of the work that make the listener unable to perceive characteristics of the recorded context. Additionally, obfuscation may occur through excessive processing of the recorded sound material or arrangement using very short sound clips, as in granulation. Each of these obfuscating factors may be gradually strengthened (by increasing the level or density of masking sounds, increasing processing parameters, or shortening sound clips) until the point that a particular listener would not be able to recognize the source of the sound. However, this point

differs not only from person to person but also as a function of the attention the listener devotes to the sound material. Thus, in terms of the factors listed above, the boundary for requirement 2 is fuzzy.

A different sort of obfuscation occurs when recorded sound material from a certain context seems to originate from an entirely different context. This type of contextual illusion or simulation occurs when recordings from multiple contexts are mixed in a way that makes them sound like they originate from the same context or when sound material is processed so that it has the characteristics of a different context. For example, sound clips of speech recorded in a studio may sound like they were recorded in a church if they are mixed with a continuous recording of ambient noise from a church or if they are processed with a reverberation effect that simulates the church. This simulation, which is typically intentional on the part of the artist, prevents the listener from recognizing the true context of the sound material, thus disqualifying the work from contextual representation (unless a later part of the work reveals the illusion and portrays the sound material in its unaltered state).

Except perhaps in extreme cases of illusion or sensory deprivation, the spatial context in which a work is presented cannot be entirely hidden from the listener. Thus, every sonic art work satisfies requirement 2 for the spatial context in which it is presented. Likewise, for any electroacoustic work, the media context of the loudspeaker system is recognizable unless the work tricks the listener into believing that the sounds heard are purely acoustic.

Boundary for Requirement 3

Requirement 3 of contextual representation is that the work thematizes the context of the work's sound material and emphasizes its sonic characteristics. Just as the judgment of a work's satisfaction of requirement 2 depends on the listener's perception, the judgment of a work's satisfaction of requirement 3 is subject to interpretation. Whether a context or its characteristics is the subject of a sonic art work or merely an incidental detail is often open to debate. However, since every sonic art work satisfies requirements 1 and 2 for its presentation context, requirement 3 must be applied strictly when considering whether a work represents its presentation context. Otherwise, contextual representation would be too inclusive to be a meaningful classification.

A work does not satisfy requirement 3 purely by defining the context used in the work's presentation. The definition of a work as "chamber music" or "church music," even if taken literally, does not make the spatial context of the chamber or church the theme of the work. Similarly, an electroacoustic work that includes the media context of performance in its title, such as Karlheinz Stockhausen's *Oktophonie* (a piece for eight speakers), does not necessarily thematize that media context. The choice of presentation context often has a profound impact on the decisions made in the work's creation. However, these decisions and their ultimate sonic result typically reflect an overall function other than drawing the listener's attention to the presentation context or its characteristics. For example, church music often contains long rests because the reverberant nature of the performance space acts

to sustain the notes preceding the rests. However, the use of long rests in a work of church music does not make the piece *about* reverberation. A typical work of church music simply contains too large a proportion of compositional details not emphasizing the presence of reverberation for reverberation to be a central theme of the work.

In contrast, *Vespers* by Alvin Lucier is clearly about the phenomenon of echoes, a characteristic of the spatial context in which the piece is performed. This work contains compositional and performance aspects that emphasize the presence of echoes. Echolocation devices are used as the sole sounding instrument in performance and performers are instructed to move and adjust the echolocation device in order to reveal varying echoes present in the performance space. Further, this work has few features that do not thematize the presence of echoes in the presentation context. In fact, the score of the work prohibits the performers from integrating other aesthetic factors into the performance stating:

> Decisions as to speed and direction of outgoing clicks must be made only on the basis of usefulness in the process of echolocation. Any situations that arise from personal preferences based on ideas of texture, density, improvisation, or composition that do not directly serve to articulate the sound personality of the environment should be considered deviations from the task of echolocation. (Lucier 312, 314)

However, not all works lie so unmistakably on one side of the boundary of requirement 3. One type of work lying closer to the boundary of requirement 3 is the "found sound" work (also referred to as a "field recording piece"). Such works present one or more extended recordings in a nearly unaltered fashion. These works typically contain few artistic decisions with which to judge definitively whether the

work thematizes the context of the recorded sound material. The artist's primary decision is the choice of recorded sound material to place in the work, although, if the artist made the recording, this decision is itself the result of a variety of decisions made by the artist in the recording process. The paratext (or "para-sound") of a found sound work, such as the work's title, program or liner notes, and other background information, may also be useful in judging whether a work satisfies requirement 3 since these factors often have a strong impact on how the listener experiences a found sound work.

In some cases, the choice of recording and the work's paratext emphasize the presence of a context and its characteristics to a sufficient extent to satisfy requirement 3. One such work is Hildegard Westerkamp's *New Year's Eve in Vancouver Harbour* found on *Soundscape Vancouver*, a collection of soundscape compositions documenting Vancouver. This work clearly thematizes the spatial context of the Vancouver Harbour on New Year's Eve, highlighting the characteristic sound of boat horns heard every year (World Soundscape Project). In other cases, a found sound work has recorded sound material and paratext that de-emphasize or even obfuscate its context so that the listener experiences the work as non-contextual re-presentation or in an entirely non-referential manner. Finally, a found sound work may be relatively neutral, fundamentally open to the interpretation and perception of the listener. One may argue that such works have no theme. Alternatively, the theme of the work can be considered to be whatever each individual listener hears in the

recorded sound material, thus placing such works on an ambiguous boundary of requirement 3 and thus on the boundary of contextual representation.

Conclusion

This chapter has defined the boundaries of contextual representation, introduced the term "context" to describe the material of the works within this category, and introduced the term "contextual listening," which is both an appropriate process for interpreting these works and the principal artistic goal of many of these works. Thus, this chapter has provided the terminology necessary to explore and discuss how works of contextual representation successfully emphasize the characteristics of contexts and encourage contextual listening. The remainder of this dissertation will initiate this exploration.

Chapter 2:
Compositional Aspects of Contextual Representation

As stated in Chapter 1 of this dissertation, contextual representation occurs when a sonic art work emphasizes the context of the sound material heard in the work. Works of contextual representation possess certain compositional aspects that help to emphasize their represented contexts and the contexts' characteristics, and as a result encourage attentive contextual listening. This chapter introduces and defines four compositional aspects commonly found in works of contextual representation. Additionally, this chapter introduces the artistic practices of soundscape composition and glitch music as well as the works of Alvin Lucier, Robin Minard, Max Neuhaus, and Bill Fontana and explains how they qualify as contextual representation and use the compositional aspects introduced herein.

Stasis, Nonsense, Non-Action, Juxtaposition

A work of contextual representation may possess a variety of aspects that serve to draw attention to a context and its characteristics. Four compositional aspects, referred to herein as *stasis*, *nonsense*, *non-action*, and *juxtaposition*, are common throughout the range of works of contextual representation. *Stasis* is the state of perceived sonic inactivity resulting from limited change of certain sonic properties over an extended time. Works of minimalist music make prominent use of stasis by including continuous sounds (drones) and repeated sonic events (notes, chords, sound clips, etc.). In contextual representation, stasis may result from the repetition of a segment of recorded sound material, the repeated or sustained input of a sound into a

context (for example, clapping repeatedly in a room), or the sustained presentation of the characteristically static sounds of a context. Stasis may be considered as a minimization or reduction of information rate or data flow.

In contrast, *nonsense,* as used herein, is the minimization or reduction of meaning within a work. A nonsense technique either generates material that lacks a certain type of meaning or transforms existing material in such a way that its once apparent meaning is obscured. For example, chance operations lacking external control parameters ("stationary processes" in mathematical terminology) are nonsense techniques because they generate material that lacks emotional or narrative meaning. Likewise, the reversal of a segment of speech is a nonsense technique because it hides the meaning of the speech in the segment from the listener.

A third compositional aspect common to works of contextual representation is non-action. The term "non-action" is a common translation of the term *wu wei* found in the *Tao Te Ching*. Derek Lin's annotated translation of the *Tao Te Ching* defines *wu wei* as, "the state where we act without attachments to specific outcomes," and continues, stating, "The principle of *wu wei* is very powerful. By focusing on the process instead of the end result, we allow all things to progress naturally and minimize our tendency to meddle" ("48 Annotations").

Although the concept of *wu wei* has many important nuances, *non-action* may be regarded here as simply the limitation of artistic decisions that either interfere with or are unnecessary for the natural presentation of the work's material. Non-action typically occurs when the artist's exclusive or at least fundamental objective is to

present the work's artistic material clearly and when the artist accepts the sonic result that arises from the material. Many Fluxus works exhibit non-action. Explaining the commonalities of Fluxus works in "Fluxus: Theory and Reception," Dick Higgins states, "In order to state [new artistic] forms in a very concentrated way, a great measure of purity was necessary, so that the nature of the form would be clear. One could not have too many extraneous or diverse elements in a work" (224).

Some process music compositions also exhibit non-action, presenting their processes in a way apparent to the listener with minimum interference from the artist. One such work is *Pendulum Music* by Steve Reich. In this work, multiple microphones are suspended from the ceiling by cables. Each microphone is hung over a speaker to which it is connected. The piece begins as performers pull back the microphones so that they swing, and the piece ends as the microphones come to rest (Reich 32). This work exhibits non-action not because it is compositionally and sonically simple, but rather because most of the work's compositional decisions allow for the clear presentation of its material and because unnecessary decisions have been avoided. For example, the work requires at least two microphone and speaker pairs so that the listener may hear the phenomenon of phasing,[2] an element of the work's material. However, the work does not specify the exact number of microphone-speaker sets. Such a specification is unnecessary for the presentation of phasing. Additionally, the work does not need to define the performance's duration since the work arranges the microphones such that the work ends naturally.

[2] Phasing is the gradual shift in phase between two oscillating or cyclic processes that differ slightly in speed (angular velocity).

Finally, the fourth compositional aspect common to works of contextual representation is juxtaposition. *Juxtaposition* is the proximate placement of two distinct elements for comparison. A work of contextual representation may juxtapose two or more contexts, presenting them simultaneously or in succession.

Works of Alvin Lucier

In 1968, Lucier began to compose works that, in his words, "explore the natural properties of sound and the acoustic characteristics of architectural spaces as musical objectives" (430). The thematization of spatial contexts and their acoustic characteristics is apparent not only in the experience of Lucier's works but also in his essays and the text of his scores. Many of these works present the sound of spatial contexts through the use of a recorded or live performance, using the performance space to demonstrate the acoustic phenomenon of interest. Since these works also maintain the recognizability of the sound material's spatial context, they satisfy the requirements of contextual representation. Lucier has created many works of contextual representation. *Vespers*, created in 1968, and *I Am Sitting in a Room*, created in 1969, are two of the best known of these works.

Vespers (1968), by Alvin Lucier

As stated in the "Boundary for Requirement 3" subsection of Chapter 1, *Vespers* is a work of contextual representation that emphasizes the phenomenon of echoes as observed in the space of performance. The compositional aspects of stasis and non-action are prominent in this work.

The static nature of the work is a result of the use of only a single type of sound generating device, the Sondol, which is an echolocation device that emits fast

clicks at a variably controlled rate. The consistent use of the device throughout the performance, the scanning of the performance space to explore the relationship between outgoing clicks and resulting echoes, along with the gradual movement of the performers further supports the static nature of the work (Lucier 312). The sound of the work does vary through the performance as the performers move, redirect the Sondols, and adjust the rate of the Sondols to discover the variation in echoing in different locations. However, since the work remains in the same state in many perceptually apparent ways, and because the changes that do occur are gradual, the work remains static throughout. The use of stasis in *Vespers* allows the listener as well as the performer to observe the phenomenon of echoing fully, noticing both the constant delay of echoes occurring as the Sondol is fixed and the varying delay of echoes as the Sondol changes direction and location. Neither of these characteristics would be as easily recognizable if the performance were too brief or varied too quickly.

Vespers exhibits non-action because most of the work's compositional and performance decisions support the presentation of its material, which one may considered the phenomenon of echoes due to spatial relationships in general or the characteristic echoing of the performance space. The score of the work consists primarily of instruction on the choice of sound generating device and performance method. The work requires the use of Sondols as a sound generating device primarily because they are tools used in echolocation, allowing careful observation of the characteristic echoes of a space. The score states that if Sondols are unavailable, the

performers may use alternative means or devices of echolocation, listing, "tongue-clicks, finger-snaps, or footsteps . . . hand-held foghorns, toy crickets, portable generators of pulsed sounds, thermal noise, or [ten] kilohertz pure tones" (Lucier 314). This wide range of sound possibilities suggests that Lucier places little importance on the specific timbre of the sound used, instead placing importance solely on the devices function as an echolocation tool.

Rather than providing precise instructions for the movement of the performers, the score merely instructs the performers to undergo the process of echolocation, providing a set of guidelines on how to do so effectively. As stated in Chapter 1, the score of the work prohibits the performers from integrating other aesthetic factors arising from "personal preferences based on ideas of texture, density, improvisation, or composition" into the performance (312). In essence, the score explicitly instructs the performers to exhibit non-action. In *Vespers*, as well as in Lucier's other works of contextual representation, non-action serves to limit distraction from the spatial context represented in the work and its characteristics. This is clearly Lucier's intention as he states in an interview:

> I am satisfied not to compose terribly much but to let the space and the situation take over. In other words, I don't intrude my personality on a space, I don't bring an idea of mine about composition into a space and superimpose it on that space, I just bring a very simple idea about a task that players can do and let the space push the players around. In that way, I always learn something about a space. (78)

I Am Sitting in a Room (1969), by Alvin Lucier

I Am Sitting in a Room is an electroacoustic art work for tape (fixed media). The work's sound material consists of a series of recordings made in a room. The first

recording is of a narration of a short text found in the work's score. This recording is played back over loudspeaker into the same room and recorded again. This process of playback and recording is repeated many times over, and finally, all of the recordings are combined in chronological order (Lucier 322, 324). The original narration, which plainly states the process as well as the sonic result, begins:

> I am sitting in a room different from the one you are in now.
> I am recording the sound of my speaking voice and I am going to play it back into the room again and again until the resonant frequencies of the room reinforce themselves so that any semblance of my speech, with perhaps the exception of rhythm, is destroyed.
> What you will hear, then, are the natural resonant frequencies of the room articulated by speech. (Lucier 322)

As suggested in the narration, *I Am Sitting in a Room* reveals the phenomenon of reverberation, specifically highlighting the characteristic resonant frequencies associated with the room in which the recordings are made.[3]

I Am Sitting in a Room contains all four of the compositional aspects described above. The work begins with the first instance of the narration, which, by itself, is neither static nor nonsensical. The listener's attention is focused on the meaning, and to some extent the "irregularities" of Lucier's speech. At this point, the effects of the reverberant characteristics of the space are unnoticed. Thus, the work provides a purely conceptual form of contextual reference. As the work progresses through multiple iterations of the speech, each of which differs only slightly from

[3] Taken at face value, the final sentence of the narration, "I regard this activity not so much as a demonstration of a physical fact, but more as a way to smooth out any irregularities my speech might have" (Lucier 322), which refers to Lucier's speech impediment, suggests that the piece is not about the physical phenomenon. However, because this statement follows multiple statements emphasizing this physical phenomenon, and because this phenomenon greatly affects the sonic result of the work's realization, this statement may be regarded as a narrative "twist" that adds a layer of complexity to the work on top of its function as contextual representation.

those immediately before and after, the work becomes static. On hearing subsequent iterations of the speech, the listener's attention is drawn towards the process, that is, the difference between iterations resulting from reverberation. Additionally, nonsense occurs as the effects of iterated reverberation mask the speech making it unintelligible, hiding its meaning. Thus, the form of contextual reference found in the beginning of the work, which is conceptual, is replaced entirely with a perceptual form of contextual reference, namely, contextual representation. The work transitions from a conceptual understanding to a perceptual understanding of reverberation and acoustic resonance, a relatively complex progression through relatively simple means with a minimum of decisions and artistic interference. By minimizing the artistic decisions and allowing the material of the work to define the sonic result, the work exhibits non-action.

I Am Sitting in a Room juxtaposes contexts in two ways. First, the work contrasts the room used in the creation of the work with the room of presentation through the first sentence of the narration: "I am sitting in a room different from the one you are in now." Although the work does not make the characteristics of the room of presentation sonically apparent, this statement emphasizes that the reverberation characteristics heard in a realization of the work are specific to the room used in the recording process and that the room the listener is supposedly in has different characteristics. Second, the work's score includes the suggestions to "Make versions [of the work] in which one recorded statement is recycled through many rooms" and "Make versions using one or more speakers of different languages in

different rooms" (Lucier 324), juxtaposing different rooms and their characteristics through multiple realizations of the work. The comparison of these multiple realizations draws the listener's attention to the differences between these realizations and the characteristics from which those differences arise. For example, the room's resonant frequencies would mask the narration more rapidly in a realization made in a room with a relatively long reverberation time.

Soundscape Composition

Soundscape composition is an electroacoustic art practice whose works represent one or more spatial contexts through the presentation of environmental sound recordings. In the *Acoustic Communication*, Barry Truax lists four principles of soundscape composition:

> (a) listener recognizability of the source material is maintained, even if it subsequently undergoes transformation; (b) the listener's knowledge of the environmental and psychological context of the soundscape material is invoked and encouraged to complete the network of meaning ascribed to the music; (c) the composer's knowledge of the environmental and psychological context of the soundscape material is allowed to influence the shape of the composition at every level, and ultimately the composition is inseparable from some or all of those aspects of reality; and ideally, (d) the work enhances our understanding of the world, and its influence carries over into everyday perceptual habits. (240)

These principles place the practice of soundscape composition wholly within the category of contextual representation. The use of recorded environmental sound material, called "source material" in the quote above, satisfies requirement 1 of contextual representation ("sound material of a context is heard in the work's presentation"). Principle "a" above is equivalent to requirement 2 ("this context is

recognizable as the origin of this sound material"), and principles "b" and "c" satisfy requirement 3 ("the work thematizes this context and emphasizes its sonic characteristics"). Finally, principle "d," described as an "ideal" rather than a strict requirement, is the same ideal or goal of contextual representation, as described in the section of Chapter 1 entitled "Contextual Listening: The Essence of Contextual Representation."

Truax describes three categories of approaches found in soundscape composition and differentiates these categories by the type of perspective used within the work. These categories are: "(1) fixed spatial perspective emphasising the flow of time, or a discrete series of fixed perspectives; (2) moving spatial perspective or journey emphasising a smoothly connected space/time flow; (3) variable spatial perspective emphasising a discontinuous space/time flow" ("Genres and Techniques" 8). In the third category, either changes in perspective occur too rapidly to suggest actual movement, mirroring the "nonlinear mental experiences of memory recall, dreams, and free association," or multiple perspectives are presented simultaneously ("Genres and Techniques" 12). As Truax notes, these three perspectives correspond somewhat to the first three *Presque Rien* works by Luc Ferrari ("Genres and Techniques" 8). *Presque Rien, No. 1* (1970) represents a seaside location from a fixed perspective, while *Presque Rien, No. 2* (1977) represents a natural nighttime setting through a tour of the location. Finally, *Presque Rien avec Filles* (1989), the third work in the series, uses a "variable spatial perspective" containing both rapid transitions between spatial contexts and simultaneity of incongruous perspectives.

Soundscape compositions often use stasis, non-action, and juxtaposition, while nonsense is found to a lesser extent. Stasis in soundscape composition is often the result of the extended presentation of recorded sound material from a spatial context that possesses inherently static sonic elements. In soundscape ecology, these static sounds are called "keynote sounds." In *The Tuning of the World* (also published under the title *The Soundscape: Our Sonic Environment and the Tuning of the World*), R. Murray Schafer defines keynote sounds as "those which are heard by a particular society continuously or frequently enough to form a background against which other sounds are perceived" (272). The sources of keynote sounds include ocean waves, meteorological phenomena such as wind and rain, animals, building HVAC systems, traffic, and electric mains. Highlighting the significance of keynote sounds, Schafer states, "Even though keynote sounds may not always be heard consciously, the fact that they are ubiquitously there suggests the possibility of a deep and pervasive influence on our behavior and moods" (9). A soundscape composition cannot properly represent these sounds, or the effect of keynote sounds on other sonic activity, without extended static presentation.

Additionally, repetition is often a characteristic of spatial contexts. These repeated sounds may originate in events that reoccur either at regular intervals (a foghorn sounding every 20 seconds, fireworks occurring every July 4) or with some level of statistic consistency (subway trains arriving *approximately* every 10 minutes, an air conditioner running for two minutes at a time *on average*). If these sounds do not qualify as keynote sounds, they are often "soundmarks," a term that Schafer

defines as, “a community sound which is unique or possesses qualities which make it specially regarded or noticed by people of the community” (10). Fog horns, church bells, and train whistles are examples of soundmarks that are heard repeatedly within a context. While, keynote sounds are significant because of their ubiquity, soundmarks are significant because of their uniqueness. Schafer argues, “Once a soundmark has been identified, it deserves to be protected, for soundmarks make the acoustic life of the community unique” (10). The repetitive characteristic of spatial contexts was of particular interest to Luc Ferrari. In the paper “I Was Running in So Many Different Directions,” he states, “repetition presented for me not so much a process as the observation of the social organisation of time. Thus observed, time organises itself in layers and according to a certain number of points of view – social, political and sentimental” (97).

Soundscape compositions that present multiple perspectives use juxtaposition. Referring to Truax’s categorization of perspective in soundscape composition, multiple perspectives may be presented as a “discrete series of fixed perspectives,” the “smoothly connected space/time flow” found in a moving spatial perspective, or a variable spatial perspective (“Genres and Techniques” 8). Further, because of the use of recorded sound material, all soundscape compositions juxtapose the represented spatial context of the work with the presentation context, that is, the space in which the listener is situated. Although not always consciously recognized by the listener or even the artist, the effect of this juxtaposition significantly enhances the listener’s ability to notice characteristics of the represented spatial context. A keynote sound

that is ubiquitous in the represented spatial context may be rare in the presentation context, thus drawing a level of attention not given to these sounds in their original environment.

Found sound works of soundscape composition, such as Hildegard Westerkamp's *New Year's Eve in Vancouver Harbour*, described in the "Boundary for Requirement 3" subsection of Chapter 1, and *Presque Rien, No. 1*, epitomize non-action. Such works present their sound material in a completely or nearly unaltered fashion, thus limiting the artist's influence on the details of the work. The soundscape composition *Zero Crossing* (2001) by Clarence Barlow relies heavily on both juxtaposition and non-action. This 41-minute work juxtaposes the spatial contexts of 83 field recordings made in more than two dozen cities around the world (Barlow). This work exhibits non-action through its strict adherence to processes for recording, arrangement, fading, and panning. The work introduces a new field recording, which has been edited down to a two-minute sound clip, every 30 seconds in the order that the recordings were made (Barlow). This process limits artistic influence over the specific sound of the piece. Although there is intention in the editing of each recording, Barlow could not highlight recordings that he considered particularly pleasing or exciting by extending their playback time nor could he order the recordings to form an intentional narrative. Further, the time when the recordings were made was strictly defined beforehand, thus limiting the extent to which interesting sound material could be sought out (Barlow). As a result, the work exhibits a level of artistic neutrality that exceeds even many pure found sound works.

Interpretation of the recordings and their relationship to the spatial contexts represented is left to the listener.

Although not a defining aspect of the practice, soundscape compositions also contain nonsense, most notably in the form of the masking of "sound signals," which Schafer defines as "any sound to which attention is particularly directed" (275), either by other sound signals or by particularly loud keynote sounds. The soundscape ecology classification of a "lo-fi" (low fidelity) environment refers specifically to spatial contexts where this form of masking is ubiquitous. Such a lo-fi situation may be undesirable, unhealthy, or dangerous in everyday situations. However, in soundscape composition, the loss of intelligibility of sound signals helps to draw attention to the masking effect that is a characteristic of lo-fi environments.

Glitch Music, Cracked Media, Inframedia Audio

The terms "glitch music," "cracked media," and "inframedia audio" refer to similar, although not entirely overlapping, sets of sonic art works. *Glitch music* (or simply "glitch"), the earliest and most common of the three terms, refers to a genre of electronic music that grew out of the popular electronic music tradition in the mid-1990s. Works of glitch music make frequent use of audible glitches, sonic artifacts of the corruption of digital data or the failure of electronic devices, as artistic material. In his article "The Aesthetics of Failure: 'Post-Digital' Tendencies in Contemporary Computer Music," Kim Cascone associates the genre of glitch music with what he calls the "post-digital aesthetic," a result of being immersed in a system of digital

technology, which appears highly controlled until a perceptible failure, a "glitch," reveals this to be an illusion (13).

Cascone describes the process used by the group Oval, one of the founders of the glitch music genre: "by painting small images on the underside of CDs to make them skip, they were using an aspect of 'failure' in their work that revealed a subtextual layer embedded in the compact disc" (13). The works by Oval that use this process, such those found on the albums *Systemisch* and *94 Diskont*, qualify as contextual representation because they present the listener with sound material originating recognizably from the media context of the compact disc and emphasize this media context and the characteristic "skipping" sound that results from its malfunction.

However, despite Cascone's association of the glitch music genre as a whole with the "post-digital aesthetic," the category of glitch music is not limited to works that present the sound of malfunction. For example, Cascone describes the 1996 album +/- by Ryoji Ikeda as, "one of the first glitch releases to break new ground in the delicate use of high frequencies and short sounds that stab at listeners' ears" ("Aesthetics of Failure" 16). In describing Ikeda's work as a pioneering work of glitch music, Cascone makes no mention of its connection to any form of media malfunction or artefact. Further, the rhythmic precision and controlled subtle variations of the short sounds used in the work and their pairing with pure sine tones suggests that the sounds do not originate from media failure. If the sound material does originate from media failure, the work abstracts the material so that its origin is

not easily perceptible. Ultimately, glitch music is defined by its musical features – timbre, rhythm, and structure – rather than by its referentiality, that is, the linking of sound to media context.

In contrast, the term *cracked media*, introduced in the 2009 book *Cracked Media: The Sound of Malfunction* by Caleb Kelly, places focus on the media context and the process of malfunction or deliberate misuse. Kelly states, "'cracked media' are the tools of media playback expanded beyond their original function as a simple playback device for prerecorded sound or image. 'The crack' is a point of rupture or a place of chance occurrence, where unique events take place that are ripe for exploitation toward new creative possibilities" (4). Kelly further adds, "Cracked medial approaches to production is an active creative strategy that explicitly draws on a critique of media and mediation itself" (29). The use of the term "cracked media" in place of "glitch" allows for an inclusion of non-digital practices such as those using cassette tapes or phonographs in addition to works derived from digital media such as the compact disc.

The article "Inframedia Audio" by Mitchell Whitelaw also attempts to broaden the understanding of the glitch music genre by placing it within a larger artistic practice. Whitelaw states, "The glitch is certainly a salient feature – almost a fetish – but it's only one of a larger repertoire of media-noises, along with tape hiss, digital aliasing (an artefact of low-fidelity sampling), and the sharp clicks caused by discontinuities in a digital waveform (which are in a sense audible edits)" (49). As an alternative to the term "glitch," Whitelaw introduces the term *inframedia audio*: "a

making-audible of [the media] infrastructure; routing it out through the speakers, into the sensorium . . . a process of tapping in, a drawing out and projection of the media substrate" (50).

Although both cracked media and inframedia audio refer to works that thematize the media contexts they use, only inframedia audio explicitly requires a link between the media and the sound material of the work. Inframedia audio works emphasize their media contexts' sonic characteristics, specifically, the characteristic "media-noises," and thus allow the listener to engage in contextual listening. In contrast, the "crack" of a cracked media technique is often so severe that it completely obscures the sonic characteristics of everyday media contexts.

For example, *Cartridge Music* by John Cage, which Kelly states "marks the beginning of cracked media in relation to the phonograph" (116), does not emphasize the sonic characteristics of the phonograph as a media context and thus does not qualify as contextual representation. In performance of this work, phonograph cartridges are modified by replacing their needles with a variety of small objects, such as pipe cleaners, wires, and feathers. Instead of playing phonograph records, these modified cartridges are used to strike or rub various objects, generating the sound of the work (Kelly 114). As Kelly states, "the [phonograph] technology is used to produce sound outside the parameters of conventional hi-fi playback" (116). This unconventional use of technology differs from Oval's use of modified compact discs, which Kelly also includes in the category of cracked media. The works of Oval use compact discs that are modified so that they skip, revealing a phenomenon that

although unwanted is common to everyday use of the medium. In contrast, *Cartridge Music* does not expose the listener to sonic characteristics heard in everyday use of the phonograph.

Works of glitch music, cracked media, or inframedia audio that do qualify as contextual representation often use stasis and nonsense. The audio "skip" common to compact disc, phonograph, and computer audio file playback, naturally results in both stasis and nonsense. In addition to causing an audible click sound or noise burst, skipping causes discontinuous playback of the recording. Often, the playback media repeats a short segment of the source audio many times leading to stasis. Additionally, the discontinuity of playback, whether repetitive or erratic, may obscure the meaning of the source audio resulting in nonsense. Stasis is also the result of the looping of audio samples and gradual changes that are common to popular electronic music. Whitelaw states that inframedia audio "opts for texture over gesture; accumulations of minimal elements; and slow, continuous change over sectional organisation. Repetition is a central device" (49). Additionally, glitch music uses audio effects, such as time-stretching and audio bit depth reduction (Cascone, "Aesthetics of Failure" 15) and the accumulation of communication noise, that act as nonsense techniques by limiting intelligibility. Cascone states in his text "Residualism," "the current creation of post-digital material has become a process of subtracting information (read: signal) until there is nothing left except for a residual layer" ("Residualism"). Whether the result of a malfunction like the audio skip or of a deliberate arrangement or audio processing technique, stasis and nonsense work

together to highlight the "media-noises" through continual or repetitive playback while masking the sound signals that are unimportant in contextual representation.

Sound Installations of Robin Minard, Max Neuhaus, Bill Fontana

In the book *Sound Installation Art*, Robin Minard defines sound installation art as a subcategory of installation art whose works consider "relationships to be expressed between the audio, visual and/or architectural elements of the work and secondly between the sound and the space for which the work is conceived as well as between the sound, the space and the observer." Minard describes his own sound installations in particular, which he has been creating since 1984, as being concerned with "the integration of sound in public environments and therewith the merging of works not only with existing architecture but also with everyday situations and real functioning surroundings." He adds that his works most often aim "to intensify the public's experience of the chosen space [the site of the installation] or to provide the public with a new or enriched perception of their surroundings" ("1. Sound Installation Art").

Some of Minard's sound installations are primarily concerned with non-sonic characteristics of the environment and therefore do not qualify as contextual representation. For example, *Weather Station* emphasizes environmental changes in temperature, humidity, and lighting (Minard "Weather Station"). However, Minard's other installations reflect sonic characteristics of the spatial contexts in which the works are presented and thus qualify as contextual representation. These installations emphasize a wide range of sonic characteristics, combining Lucier's focus on

acoustic phenomena with soundscape composition's focus on the social and ecological.

Minard's sound installation *Soundcatchers* focuses on social factors that influence the spatial context it represents. Created in 1991 for the courtyard of the Wissenschaftszentrum Berlin, the installation consists of a set of speakers distributed around the courtyard, microphones directed at a busy street in front of the building, and a computer-controlled synthesizer. The computer performs spectral analysis on the microphone input and uses that information to control the synthesis of sound projected by the speakers (Minard "Soundcatchers"). This synthesized sound emphasizes the characteristics of the street activity, particularly traffic noise and its variation over time. Thus, the installation encourages the listener to engage in active contextual listening as the listener exits the installation and approaches the street.

The sound installation *Stationen*, created in 1992 for the bell tower of Berlin's Parochial church, emphasizes both the characteristics of the activity on the streets surrounding the church and the acoustic characteristics of the bell tower. Like *Soundcatchers*, *Stationen* uses the spectral analysis of street noises to control the synthesis of sound. *Stationen* combines this synthesized sound with directly reproduced street noises (Minard "Stationen"). Minard describes the placement of speakers and the resulting effect on the sound of the installation:

> A large bass speaker was situated in the cellar directly under the staircase. Sounds from this speaker were reinforced by the reflective cavity of the stone cellar and resonated lightly throughout the entire stairwell from beneath the lower steps. A smaller full-range speaker, also playing low tones, was enclosed within the staircase of the first landing. Here, the deep wooden enclosure of the staircase acted both

> as a resonator for the tones produced, and as a filter for higher frequency components present in the loudspeaker sound. On each of the next two levels, speakers playing mid-range tones were placed behind locked doors which led into the stairwell. These heavy doors also filtered out high frequency components present in the loudspeaker sound, thereby contributing to the non-localisation of the sound source. ("Stationen")

The speakers are placed so that the sounds they generate are noticeably transformed by the nature of the various areas in the bell tower. Thus, the sound generated in the work emphasizes the characteristics of the street area while the placement of speakers through the installation space emphasizes the acoustic or architectural characteristics of the various areas in the bell tower.

In *Sound Installation Art*, Minard defines two methods for working with sound that are common to his sound installations: "conditioning of space" and "articulation of space." Minard describes conditioning of space as, "the creation of a static or uniform spatial state – that is to say the 'colouring' of space or the utilisation of sound masking to dissimulate other (unwanted) sounds" ("The Conditioning of Space"). The conditioning of space contributes both stasis and nonsense to the installation. In Minard's sound installations, stasis is both temporal and spatial. In other words, the sounds that condition the space appear relatively static whether the listener stands in one place or moves throughout the installation space. Minard describes the conditioning of space as a method of influencing the listener's general perception of space. For example, Minard states, "Experience has shown that different types of sounds, when broadcast homogeneously within a space, may cause that space to appear open and voluminous or close and intimate" ("The Conditioning

of Space"). Conditioning of space results in nonsense as it masks sounds present in the space, such as conversation. Minard describes the role of masking in his works stating, "the objective of many of my works has been to create an atmosphere of silence . . . this is often achieved through carefully considering the role which sound masking plays in a particular work" ("The Conditioning of Space").

Minard states that articulation of space is "concerned with the movement of sounds through space or the spatial location of sound elements" ("The Articulation of Space"). *Stationen* articulates space through the placement of speakers playing different tones throughout the bell tower. In this installation, the articulation of space results in a juxtaposition of the characteristics of different areas in the space, each of which may be considered its own spatial context.

Finally, Minard's sound installations exhibit non-action since the sonic result of the works often reflect existing characteristics of the space rather than artistic choices. For example, in *Soundcatchers*, the parameters of sound synthesis are controlled by the characteristics of the street noise instead of direct decisions made by the artist. Similarly, rather than selecting and applying a range of audio effects to the tones used in *Stationen*, Minard used the existing acoustic properties of the space to transform the sound. Describing his artistic approach to a sound installation art, Minard states, "the specific needs of the individual space would guide the creative process . . . in essence 'the artistic component [of the work] would be supportive rather than primary'" ("Sound Installation Art").[4]

[4] In this statement, Minard quotes a letter addressed to him from Barry Truax.

Minard is just one of many sound installation artists whose works qualify as contextual representation. Like Minard's *Soundcatchers* and *Stationen*, Max Neuhaus's *Time Piece* installations draw the listener's attention to the everyday ambient sound found at the site of the work and thus represent the spatial context in which the installation is situated. Ulrich Loocke describes this series of works:

> The sound of a *Time Piece* begins imperceptibly, swells and breaks off a few minutes later. Only in that moment is it actually perceived, as an 'after-image', once it has disappeared, as a moment of unexpected silence. . . . In a single moment of silence we are pulled back into the world of everyday noises, . . . Freed from its mounting presence, they sound as if they have been cleansed.

This swelling and silencing of sound is repeated for the duration of the installation. The length of this cycle varies between different installations in the *Time Piece* series. The length of this cycle in the first installation of the series, *Time Piece 'Archetype'*, created in 1983, is 20 minutes (LaBelle 158), while the length of this cycle in the most recent of these installation, *Time Piece Stommeln*, created in 2007, is one twelfth of the time from sunrise to sunset (Loock). The sound generated by each installation is derived from sound material recorded in or near the installation space. Describing *Time Piece Stommeln*, Neuhaus states, "the sounds I built here are plausible but [I] also transform these ordinary sounds into something else" (*Time Piece Stommeln*).

The "plausibility" of the sound of these installations results from non-action, a limitation of interference with the existing ambient sound. Additionally, each of the *Time Piece* installations use stasis both in the gradual increase in amplification over several minutes and the repetition of this amplification envelope over the duration of the installation. The combination of stasis and non-action in the *Time Piece*

installations results in a type of sonic illusion, or *trompe l'oreille*, which is ultimately broken as the sounds of the installations become amplified beyond what is plausible. In the article "Really Hearing the Thing: An Investigation of the Creative Possibilities of *Trompe l'Oreille* and the Fabrication of Aural Landscapes," Peter Batchelor argues that the use of *trompe l'oreille* is a "means of drawing the listener's ear 'outwards'." He adds, "The very *not-quite-realness* of the imposed sounds and/or the behaviour of those sounds [draw] attention to the realness of the real sounds/sound behaviour elsewhere in the landscape" (10). In other words, *trompe l'oreille* encourages the listener to engage in active contextual listening, to explore the sonic characteristics found in the installation's presentation context.

Like soundscape compositions, the *Time Piece* installations use arrangement, processing, and amplification to emphasize characteristic sounds of the represented spatial context while maintaining the recognizability of the sound material and its context for the listener. Bill Fontana's sound installations, which Fontana calls "sound sculptures," also resemble soundscape compositions in their use of electronically transformed although recognizable sound material to represent a spatial context. However, unlike Neuhaus's *Time Piece* series and Minard's *Soundcatchers* and *Stationen*, Fontana's sound sculptures are often located in spaces completely separate from the spatial context of the sound material. Fontana describes his sound sculptures as "networks of simultaneous listening points that relay real time acoustic data to a common listening zone (sculpture site)" ("Artists Statement"), although some of his works use recording instead of real time transmissions. For example,

Brooklyn Bridge Sound Sculpture (1983) transmits sounds from the Brooklyn Bridge to the facade of One World Trade Center, *Distant Trains* (1984) transmits sound from the main train station in Cologne to the ruins of Berlin's Anhalter Bahnhof, and *River Sounding* (2010) plays recorded sound material from various locations on the River Thames at the Somerset House in London (Fontana). By collecting sound material from one spatial context (the represented context) and playing it back in a different spatial context (the presentation context), Fontana's sound sculptures emphasize juxtaposition, highlighting the contrast between the sonic characteristics of the represented context and presentation context. As a result, they provide the listener with an expanded understanding of both contexts.

Conclusion: Database, Narrative, Context

Although works of contextual representation implement and exhibit non-action, nonsense, juxtaposition, and stasis in a variety of ways, the use of these compositional aspects has a relatively small, cohesive set of results. As is the case in many soundscape compositions and glitch music (or cracked media, or inframedia audio) works, the use of stasis and nonsense often reflect sonic characteristics of the represented context. Additionally, stasis, as found in Lucier's *Vespers* and many soundscape compositions, provides the time necessary to observe the subtle variations that define the characteristics of a context. Further, the combination of stasis with nonsense – found in Lucier's *I Am Sitting in a Room*, Minard's sound installation, and many glitch music works – acts as a filter, emphasizing some of the represented contexts' sonic characteristics while masking or deemphasizing other, often transient,

aspects. Contextual juxtaposition, found in *I Am Sitting in a Room*, Minard's *Stationen*, Fontana's sound sculptures, and soundscape compositions with multiple perspectives, emphasizes the differences and partial similarities in sonic characteristics between distinct contexts. Non-action, found in Lucier's compositions, Neuhaus's *Time Piece* series, Minard's sound installations, and found sound works, limits distractions from contextual representation and contextual listening while allowing the listener to discover and interpret sonic characteristics reflected by a sonic art work.

Combined, the use of these compositional aspects differentiates contextual representation from other sonic art activity. Particularly, the use of the compositional aspects of stasis and nonsense places contextual representation in opposition to narrative, the communication of ordered non-abstract events and their connections. Stasis and nonsense serve to limit the ability to convey narrative meaning. This opposition does not imply that narrative cannot exist in a work of contextual representation. *Presque Rien, No. 2*, in which Ferrari inserts an overt spoken narrative, disproves this notion. Instead, contextual representation opposes the artistic communication of narrative in the same way that Lev Manovich places database representation and narrative expression in opposition. In *The Language of New Media*, Manovich states:

> As a cultural form, database represents the world as a list of items, and it refuses to order this list. In contrast, a narrative creates a cause-and-effect trajectory of seemingly unordered items (events). Therefore, database and narrative are natural enemies. Competing for the same territory of human culture, each claims an exclusive right to make meaning out of the world. (225)

Manovich argues that database and narrative are "natural enemies" because they describe the world in incompatible ways. Contextual representation and the concept of context as a whole are similarly incompatible with narrative. Narrative describes the world as a trajectory of linked events. In contrast, context describes the world as a set of characteristics. The unique positioning of an event or sound in a narrative is insignificant to the definition of context. Instead, an event or sound is only significant as it points to everyday activity and general tendencies. In other words, while narrative reflects what *happened,* context reflects what *happens*.

Manovich uses the term "database" to refer to a collection of media elements (images, videos, sounds, texts, etc.) contained within a new media object such as a website or CD-ROM (219–220). He argues, "Regardless of whether new media objects present themselves as linear narratives, interactive narratives, databases, or something else, underneath, on the level of material organization, they are all databases" (228). A context may be considered a database of sonic events that one could potentially observe within a certain situation, in other words, a database constrained by the context's characteristics. A work of contextual representation is then an "interface" to a context's database of potential sounds. Within the limited duration of the listener's experience of a work of contextual representation, only a small set of sounds from this database is presented to the listener. The recorded sound material presented in a soundscape composition, for example, is only a sample of the sound that one may hear in a soundscape. A successful work of contextual representation presents its sound material such that it points to the context's

underlying database of potential sounds. It directs the listener towards its own incompleteness, its inability to represent a context fully. Thus, the experience of the work is placed within the continuum of the everyday contextual listening experience.

Chapter 3:
Works, 2007 – 2010

This chapter describes the four sonic art works that make up the artistic component of this dissertation. Three of these works represent one or more spatial or media contexts while the fourth, *Nodes and Passages*, explores media contexts with a method that does not qualify as contextual representation. For each of these works, I provide a brief overview of the work, a more in depth description of the work and its creation, and my analysis of the work, in subsections titled "Overview," "Composition/ Realization," and "Analysis," respectively. The "Overview" and "Composition/ Realization" subsections do not refer to any of the concepts introduced earlier in the written component of this dissertation and hence function as stand-alone descriptions of the dissertation's artistic component. In contrast, the "Analysis" subsections link each work with the concept of contextual representation, either describing how the work effectively represents a context or explaining the ways in which the work does not fit the definition of contextual representation provided by this dissertation. For the works that do qualify as contextual representation, the "Analysis" subsections describe how each work uses the compositional aspects described in Chapter 2 and combines contextual representation with narration, association, and musical abstraction.

Santa Barbara Soundscape (2007, 2008)

Overview

Santa Barbara Soundscape is a composition in two movements. The first movement, titled *Santa Barbara Etude*, is a soundscape composition based on recordings of a nature walk through Ellwood Mesa near Santa Barbara, California. This work presents the listener with a seemingly accurate representation of the sonic environment: the sound of waves mixes with the sound of cars driving by and planes flying overhead; the constant song of birds is paired with the fragments of conversation from those walking by. But upon closer listening, one may realize that many of the birdcalls heard are in fact transformed samples of human speech. Likewise, the realistic soundscape presentation is intertwined with musical constructions: birds repeat rhythmically while a clarinet duo plays nearly imperceptibly.

The second movement, *rough4radio3*, uses a small set of radio noise samples, each a few seconds in length, as its primary sonic material. These noise samples are arranged automatically into continuous streams of sound that in some ways mimic the soundscape presented in the work's first movement. These streams of noise play through an array of eight speakers for the duration of the work. An additional sound source containing some form of communicative sound signal (a recording of music, speech, instrumental performance, etc.) is projected within this fabricated sound environment.

Composition/Realization (Santa Barbara Etude)

The primary sonic material used in *Santa Barbara Etude* is derived from a field recording made during a nature walk through Ellwood Mesa that occurred on Thanksgiving 2007. This field recording was edited into a collection of samples of individual sound sources including birdcalls, conversation from people walking by, ocean waves, cars driving on a nearby road, planes flying overhead, and a fog horn as well as samples of ambient noise. These samples were arranged manually in Pro Tools, a multitrack digital audio workstation (DAW), as shown in Figure 1.

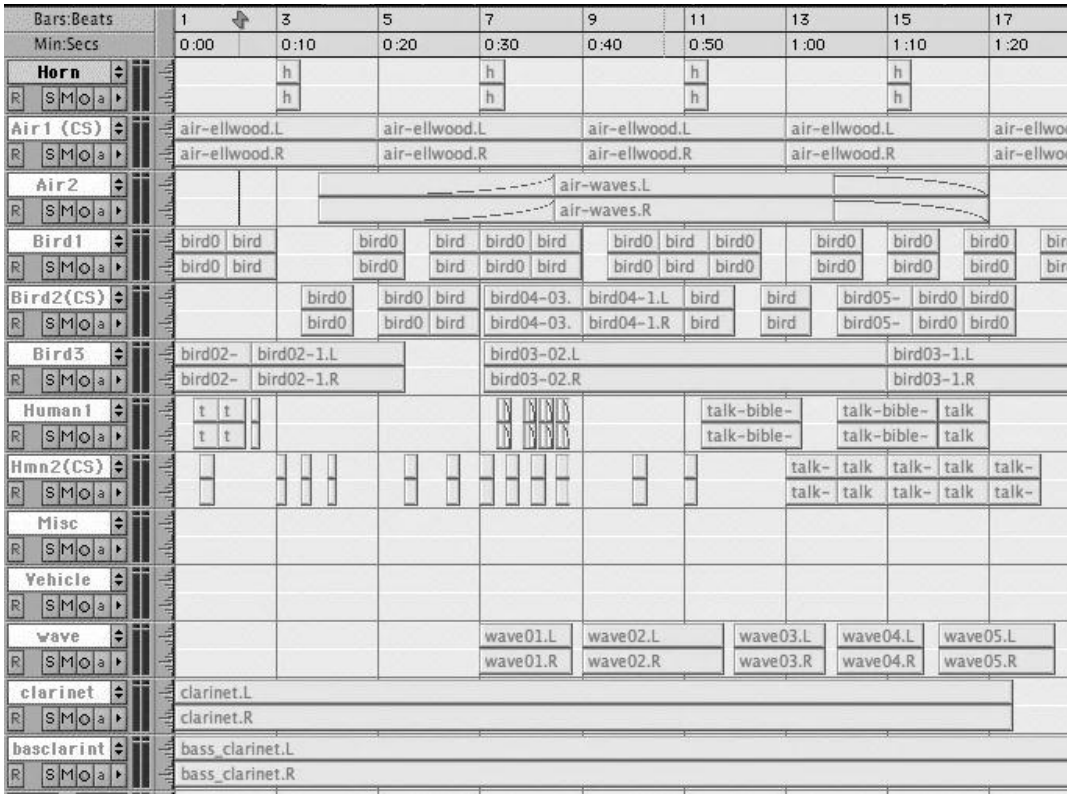

Figure 1: The multitrack DAW used in creating *Santa Barbara Etude*.

This arrangement in some ways emulates the soundscape found as one walks through the Ellwood Mesa area. Throughout the area, one hears constant bird

vocalization and the occasional fragment of human conversation. Walking along the paths that connect roads to the beach, one hears both ocean waves and cars gradually swelling and receding in sound level. A distant foghorn is heard every 20 seconds, and the attentive listener can follow the path of planes flying overhead for miles.

However, *Santa Barbara Soundscape* differs from the real sonic environment in three ways. First, The birdcall samples are arranged in an unnaturally regular rhythm. Additionally, several of the sounds that resemble birdcalls are actually speech samples that are band-pass filtered and pitch shifted upward. These processed samples are juxtaposed with the unprocessed speech samples to highlight their relation. Finally, to further emphasize the musical abstraction of the presented sound material, the natural sound is paired with a synthesized clarinet duo. The pitches that the clarinets play and the level of pitch shifting of the speech samples both correspond to the same musical scale.[5] The clarinets are played very quietly so that at times they are nearly imperceptible.

Analysis (Santa Barbara Etude)

Santa Barbara Etude represents the spatial context of the footpaths of the Ellwood Mesa area. Some compositional aspects of the work reflect the intention to represent this context. Other aspects reflect the narrative and the abstract musical intention of the work, in some ways undermining the effectiveness of the intended contextual representation.

[5] This non-octave-repeating, twelve-tone equal-tempered scale consists of alternating whole-step and minor third intervals, the pitches within the set (in semitones): { . . . -5, -3, 0, 2, 5, 7, 10, 12, 15 . . . }.

As stated in the "Composition/Realization" subsection above, the samples in *Santa Barbara Etude* are arranged to emulate the soundscape of the Ellwood Mesa in many ways. The faithfulness of the arrangement, aided by information provided in the work's title and program notes, allows the listener to recognize what is heard in the work as a realistic depiction of a spatial context. This recognizability of context is an essential element of contextual representation because it allows the listener to observe characteristics of the context through the listening experience and relate these observations to past and future listening experiences in the same or related contexts. While a sufficient level of recognizability would be achieved simply by presenting an unaltered field recording to the listener, a multitrack arrangement of short samples allows an artist to emphasize characteristics of the represented context that might not be apparent in a single continuous recording. *Santa Barbara Etude* emphasizes the presence of the communicative sounds of human speech and birdcalls through an increase in the density and sound level of these sounds. The work also emphasizes the spectral and rhythmic similarities between the natural sound of ocean waves and the human-made sounds of car and airplane noise by juxtaposing samples of these sources. In addition to juxtaposing sources, the arrangement of samples juxtaposes the spatial context found in the proximity of the major road with the spatial context found in proximity to the beach.

However, many other compositional aspects in *Santa Barbara Etude* reflect goals other than contextual representation. The strict metrical rhythm of sample repetition and the use of an equal-tempered musical scale are abstract musical aspects

of the work that do not reflect the context's characteristics. With the exception of the repetition of the foghorn, which emulates a true characteristic of the spatial context, the use of these abstract musical constructs in *rough4radio3* not only diverts the listener's attention from the aspects of the work that support contextual representation but also hide the spatial context's characteristics. For example, the actual rhythm of birdcall repetition heard within the Ellwood Mesa area cannot be observed in the work. The sonic transformation of human speech into birdcalls is another aspect of the work that extends beyond the goal of contextual representation. This transformation might be interpreted narratively, as the sound of a fantastical metamorphosis from human into bird or a metaphorical connection between humans and nature, or acousmatically, as the emphasis of similarities in the sonic characteristics of the human speech and birdcall samples.

Although *Santa Barbara Etude* differs from a pure field recording in many ways, these differences are subtle enough that the listener would probably not notice them until part way through the first listening experience. The use of long unaltered samples of ambient noise helps to hide rhythmic and repetitive nature of the playback of birdcall and speech samples, and the clarinets are played very quietly so the listener may not immediately notice their presence. Consequently, at the beginning of the piece, the listener is likely to believe that what they are hearing is a realistic representation of the spatial context. This deceptive quality of the piece simultaneously supports and undermines the goal of contextual representation. The perceived realism in the work may encourage the listener to engage in contextual

listening and observe the contextual characteristics present in the piece. On the other hand, the listener may not be able to differentiate between the realistic and artificial aspects of the piece and, as a result, derive little knowledge of the spatial context represented in the piece.

Composition/Realization (rough4radio3)

Figure 2: Software used to arrange samples in *rough4radio3*.

While *Santa Barbara Etude* is derived from a field recording of the physical space of Ellwood Mesa, *rough4radio3* is derived from a recording of communication media, specifically a portable radio whose radio dial was turned at a constant rate through the AM broadcast band. This recording was split regularly into three-second-long samples. Samples that contained a strong audible broadcast signal (where speech

could be understood or music could be detected) were discarded, leaving only samples of radio noise.

While the samples in *Santa Barbara Etude* are arranged manually in a multitrack DAW, the samples of radio noise used in *rough4radio3* are arranged automatically by software. This software, which I created specifically for this work, is shown in Figure 2. The software generates eight random streams of noise samples in real time. Each stream is output to its own audio channel. These eight channels are referred to as sources A through H herein. Each source is played through one speaker of an 8-channel speaker array positioned as shown in Figure 3.

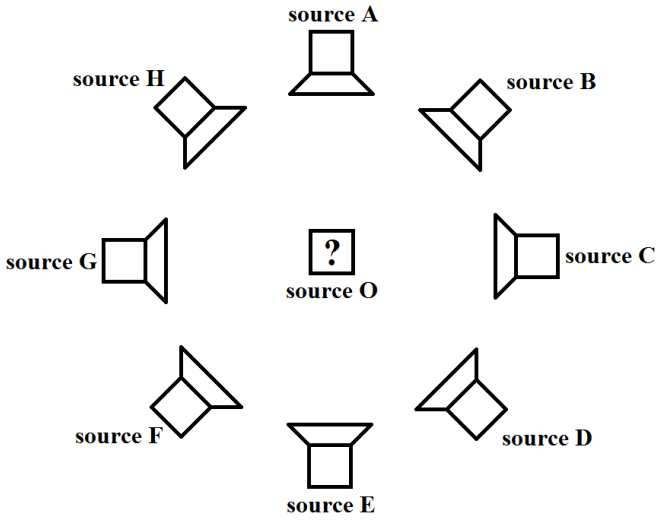

Figure 3: Placement of sources in *rough4radio3*.

These eight sources are divided into four categories. The first category, consisting of sources A, C, E, and G, resemble background ambient noise. For each of these sources, a noise sample chosen randomly from the entire collection of samples (with a uniform distribution) is played every 0.1 seconds on average. Thus,

each of these sources has a dense layering of a few dozen samples at all times. However, these samples are all played very quietly, resulting in an overall quiet background noise coming from all directions.

The second category consists of sources B and F. These sources, which resemble the cars and ocean waves heard in *Santa Barbara Etude*, are generated similarly to the sources in the first category except that the loudness of the samples is varied to create amplitude envelopes with gradual fading in and out. The timing, length, and loudness of these envelopes are generated randomly by the software. At their peak, the sources in this category are much louder than those in the first category.

The third category consists solely of source D, which resembles the foghorn heard in *Santa Barbara Etude*. Since the foghorn is sounded identically every 20 seconds, this source consists of a single noise sample played every 20 seconds. The noise sample played by source D possesses characteristics similar to those of the foghorn, such as its recognizable and relatively steady pitch. Source D is played much louder than the first two categories, preferably at an uncomfortably loud level. The final category consists of source H, which is a silent audio channel, playing none of the noise samples.

rough4radio3 also includes a ninth sound source, source O, which does not play the noise samples used in the other sources. Instead, source O contains some form of communicative sound signal (speech, an instrumental performance, a recording of music, etc.) and functions in a way similar to the birdcalls and

conversations heard in *Santa Barbara Etude*. Source O may be a live sonic performance or the projection of an audio recording. If source O is a live performance, it should be independent of the sound generated by sources A through H. Source O should not react in any way to changes in the characteristics of sources A through H. If a recording is used, it should be a piece of "found sound." It should not be processed with any musical intention nor should the sound level be varied throughout the performance (except perhaps very briefly at start and end of the recording to avoid discontinuities). Source O should be played through a speaker and playback device that differs, preferably both visually and aurally, from the eight speakers used for sources A through H. In the first public realization of *rough4radio3*, source O was an excerpt of the radio play *Embers* by Samuel Beckett played through a boombox.

In contrast with sources A through H, which are played through the duration of the performance, source O should be played for a shorter duration, with some amount of silence at the beginning and end of the performance. Source O should be played at a sound level such that the signal is very difficult but not always impossible to decode. With speech, for example, one should be able to make out some words with concentration. With music, one would have to concentrate equally hard to follow a melody, harmonic progression, or other streams of information sonically encoded in the performance. To allow for greater variation in the perceived sound level of source O over the course of the performance, the performance space may be arranged to

encourage movement of the audience, or source O itself may move through the performance space.

Analysis (rough4radio3)

rough4radio3 was created as an exploration of approaches to contextual reference within a concert piece, and thus it uses various methods to reference three different contexts: the spatial context of the Ellwood Mesa area, the media context of broadcast radio, and the electroacoustic media context used in the presentation of the piece. This subsection describes the method used in *rough4radio3* to reference each of these contexts and examines whether each of these method qualifies as contextual representation as defined within this dissertation.

By imitating the sounds present in *Santa Barbra Etude*, *rough4radio3* references the spatial context of the Ellwood Mesa area. However, the use of this context does not qualify as contextual representation as defined within this dissertation because this context is not heard live in the presentation of *rough4radio3* or through audio recordings (unless source O contains recordings from this area). Thus, the use of the Ellwood Mesa context in *rough4radio3* does not satisfy requirement 1 of contextual representation. Since the context cannot be directly perceived by the listener, contextual information in the work is limited to that which is defined by choices made in the composition or realization of the work. For example, the work conveys the repetition of the foghorn in the Ellwood Mesa area because it requires that source D plays the same sample every 20 seconds. However, it does not convey the pitch of the foghorn nor does it convey the characteristic

reverberation and filtering of the foghorn that result from the environment. Although *rough4radio3* is a computer music composition that uses software to trigger sound samples randomly, the work's imitation of the Ellwood Mesa functions similarly to the instrumental and vocal mimicry often found in program music. As described in the "Boundary for Requirement 1" subsection of Chapter 1, the accuracy of the mimicry is limited by practical and stylistic constraints. Likewise, the loudness, sample density, and sample selection algorithms used in *rough4radio3* generate sounds that are much simpler than the sounds that are being imitated.

rough4radio3 also references the media context of broadcast radio. Unlike the spatial context of the Ellwood Mesa area, the broadcast radio context is heard in the presentation of the piece through the playback of radio noise samples. However, the use of audio recordings does not by itself qualify the work as contextual representation. The listener must be able to recognize the context of the recording, and the work must draw attention to this context and its sonic characteristics. The use of the media context of broadcast radio in *rough4radio3* satisfies both of these requirements as well and thus satisfies the definition of contextual representation. The samples used in *rough4radio3* contain radio noise, which is heard in all analogue radio transmissions and thus is a defining characteristic of broadcast radio. Although some form of noise may be heard in many transmission media, the AM radio noise (the noise picked up by an AM radio receiver) is distinct and may be differentiated

from, for example, pure white noise.[6] The context of broadcast radio is emphasized by the movement's title, a reference to the radio plays *Rough for Radio* and *Rough for Radio II* by Samuel Beckett, in addition to the exclusive use of these radio noise samples by sources A through H. Additionally, although source O is not necessarily an instance of broadcast radio transmission, the relation between source O and sources A through H is analogous to the relationship between radio broadcasts and radio noise. The first realization of *rough4radio3* further emphasizes the broadcast radio context by using an excerpt of a radio play as the sonic material of source O and by playing source O through a boombox, which may also act as a radio receiver.

rough4radio3 emphasizes the sonic characteristic of radio noise through the use of nonsense and stasis. Nonsense is found in the work as the sound of source O is masked by the radio noise in the sources A through H, hiding the meaning of the sound of source O. Stasis is found in sources A through H, each of which follows a static algorithm for arrangement throughout the work's duration. This use of stasis reflects the nature of radio noise, which acts as a keynote sound for the medium, constantly influencing the listener's perception of sound signals.

Finally, the work references the media context or contexts used in the presentation of the work. The sample playback device (typically a computer) and the array of eight speakers used for sources A through H form one media context presented in the work. Another media context may be used for source O. For

[6] AM radio noise originates from both environmental conditions and electronic noise caused by the radio receiver. The samples used in *rough4radio3* are derived from a cheap pocket radio and thus the noise heard is in part representative of the sonic characteristics of such a device.

example, the boombox used for source O in the first realization of the work is a media context referenced by the work. Since these media contexts are heard in the work and their origin is recognizable, the piece satisfies requirements 1 and 2 of contextual representation. As stated in the "Boundary for Requirement 2" subsection of Chapter 1, these two requirements are satisfied for the media contexts used in the presentation of most electroacoustic works. However, unlike most electroacoustic works, *rough4radio3* also draws attention to its presentation context and its characteristics thus qualifying the use of this context in *rough4radio3* as contextual representation.

rough4radio3 highlights this context by juxtaposing its use in sources A through H with source O. This juxtaposition is most effective when source O also uses a loudspeaker, as is the case in the first realization of the work. The score for *rough4radio3* indicates that if speakers are used for source O, they should differ sonically and visually from the speakers used for sources A through H. The characteristics that differ between these two sets of speakers are emphasized by juxtaposition. For example, in the first realization of the work, the boombox, a relatively low fidelity device, is juxtaposed with the high fidelity concert speakers. Thus the characteristic of fidelity (the accuracy of sonic reproduction), which is typically assumed in an electroacoustic concert setting, is emphasized by this realization of the work.

Intermission (2009)

Overview

Figure 4: *Intermission*, outside the UC Santa Barbara Music Building.

Intermission is a site-specific, event-specific sound installation created for exhibition during the intermission of a concert held in the UCSB Music Building. The installation was located outside the building, adjacent to the concert venue. Four CD boomboxes were distributed around this space. Each boombox played a different CD, which repeated for the duration of the installation. The audio for the CDs was derived from recordings of two of the building's exhaust fans, a noisy outdoor light bulb, and a sample of a sustained chord from Charles Ives's *The Unanswered Question*, a piece performed earlier in the festival where the installation was exhibited. These four

recordings were looped to create steady drone sounds. Each CD played one of the drones for several seconds before crossfading to another drone. Thus, at certain times the four boomboxes played the same drone, while at other times each boombox played a different drone. Additionally, the drones shifted slowly in pitch up to half a semitone so that the sound of the four boomboxes varied between moments of relative consonance and dissonance.

Composition/Realization

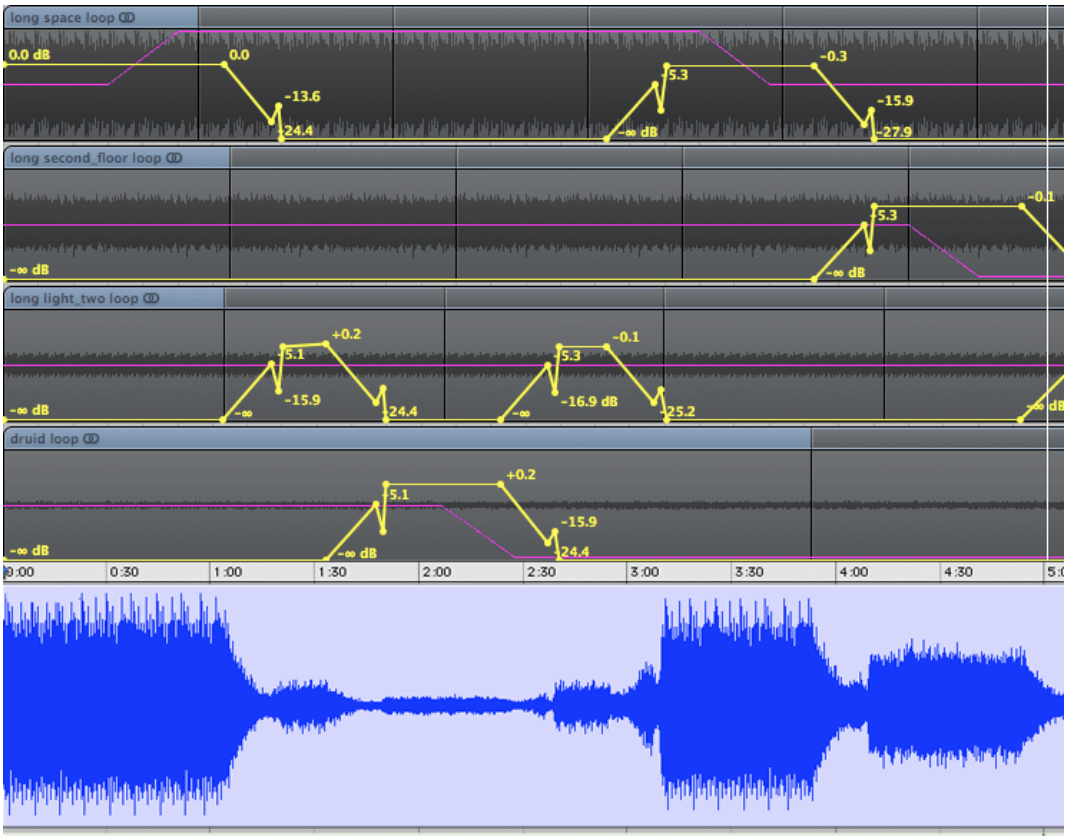

Figure 5: The multitrack DAW used in creating the audio for *Intermission*.

The audio contained on each of the four CDs was created in Apple Logic, a multitrack digital audio workstation. A screenshot of this software with a segment of

the audio on one of the CDs is shown in Figure 5. First, the audio files of the four drone loops were placed in four separate audio tracks (shown at the top of Figure 5). Next, volume envelopes (shown as yellow lines in Figure 5) and pitch shift envelopes (shown as purple lines) were drawn on the four audio tracks. Finally, these four tracks were mixed down to a single waveform (shown at the bottom of Figure 5) and burned to a CD.

The volume envelopes were drawn so that a single drone plays at a fixed volume (shown as approximately 0.0 dB in Figure 5) for several seconds before being crossfaded with another drone. Although the crossfades were drawn by hand and thus varied slightly, each of the crossfades was drawn with the same gesture – a gradual fade followed by a quicker fade in the reverse direction and then an abrupt fade in the forward direction. The ordering of the drones and the exact duration between crossfades is indeterminate, although the duration is of a sufficient length to provide the proper density of crossfades over all four CDs.

At times other than when a crossfade occurs, the drone playing may be gradually shifted a quarter tone (50 cents) or gradually un-shifted if it is currently in its shifted state. The light bulb drone and one of the fan drones are only pitch shifted up from their un-shifted states while the *Unanswered Question* drone and the other fan drone are only pitch shifted down from their un-shifted states. Thus, excluding transitions, each drone only has two states: shifted and un-shifted. A pitch shift of a quarter tone was chosen because of the relationship between the pitch content of the light bulb drone and the *Unanswered Question* drone. Due to mains hum, the light

bulb drone has a pitch of 60 Hz, approximately a quarter tone below B two octaves below middle C. The *Unanswered Question* drone is a continuous G-major triad, which contains a B as its third, played by the string section of an orchestra. Therefore, when the pitch shifted light bulb drone plays at the same time as the un-shifted *Unanswered Question* drone or vice versa, the two drones are consonant. Otherwise, the two drones are dissonant.

The difference in the loudness of the four drones also plays a major role in the nature of the work. Notably, the drone derived from Ives's *The Unanswered Question* is much quieter than the drones derived from building noise. Since the four boomboxes are positioned near each other, a louder drone masks a quieter drone when both play simultaneously. Thus, the quieter drones are only noticed at instances when no louder drone is played or when the listener intentionally moves very close to a boombox playing a quieter drone.

Analysis

Intermission is designed to emphasize two characteristics of the building noise present in the spatial context of the space surrounding the UCSB Music Building. The auditory masking effect of building noise is one of these characteristics. Auditory masking occurs when the presence of one sound makes other sounds difficult or impossible to hear. In *Intermission*, the loud drones derived from recordings of building noise mask the sound of the quiet drone derived from Ives' *The Unanswered Question* much like the sound of the exhaust fans present around the building mask other sounds such as speech and musical performance. However, the conditions of the

installation vary the extent of masking in two ways. First, the different combinations of drones played at any instance result in variation in the extent of masking over time. Second, the positioning of the boomboxes within the space allows the listener to move towards one of the boomboxes and away from the others, making the effect of masking a function of spatial position.

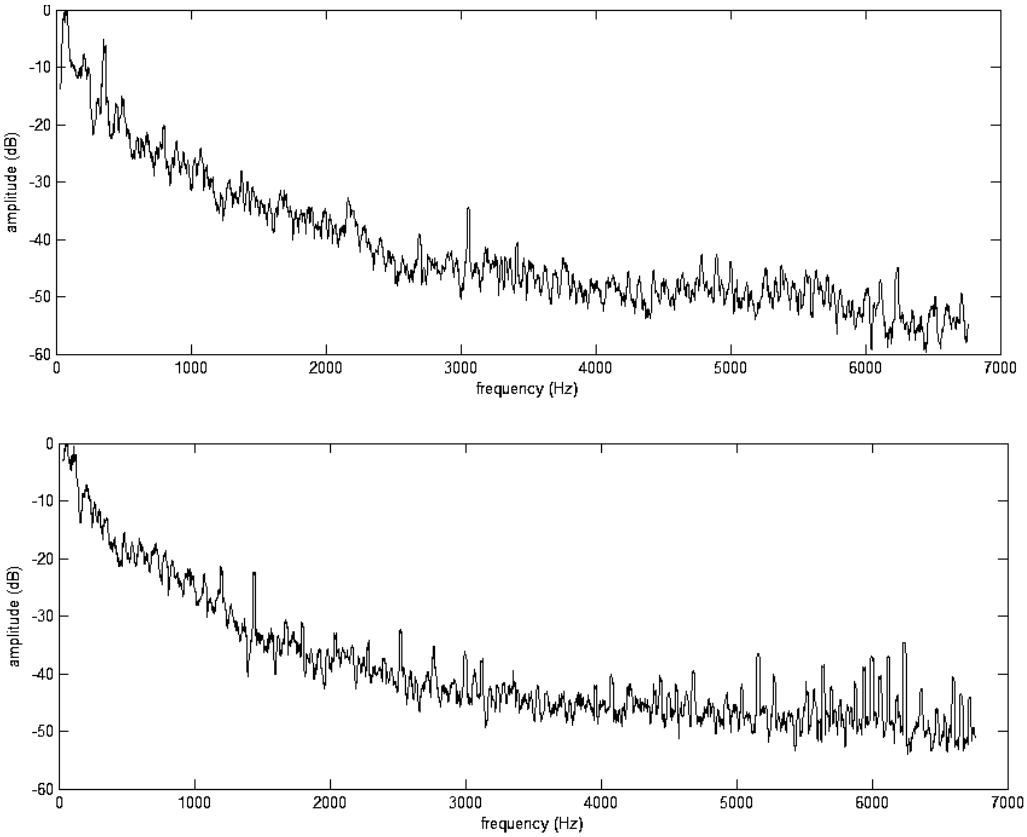

Figure 6: Spectra of exhaust fan (top) and light bulb (bottom) in *Intermission*.

Another sonic characteristic emphasized by *Intermission* is the presence of spectral peaks in building noise found outside of the UCSB Music Building.[7] Figure 6

[7] Herein, the term "spectral peak" refers to a local maximum in the spectral envelope of a sound that is persistent over long time spans. Thus, transient local maxima, such as those that would be found in any short window of white noise, are not considered to be spectral peaks.

shows the spectrums of two of the recordings of building noise used in *Intermission*. The first shows the spectrum of one of the recordings of an exhaust fan, which has prominent spectral peaks centered near 70 Hz, 360 Hz, and 3050 Hz and smaller peaks at other frequencies. The second graph, showing the spectrum of the recording of an outdoor light bulb, has many smaller spectral peaks found at frequencies that are integer multiples of 60 Hz. These peaks are the result of electric mains hum, which has a fundamental frequency of 60 Hz in the United States. Although these spectral peaks may not seem very significant in the graphs, the auditory result is quite noticeable.

Intermission emphasizes this presence of spectral peaks in building noise by pitch shifting the building noise drones and juxtaposing these drones with the drone derived from Ives's *The Unanswered Question*, which contains the pitches of a G-major triad as described earlier in this section. For noise lacking spectral peaks, such as white noise, pink noise, and Brownian noise, a shift in pitch of a quarter tone is inaudible. In contrast, this shift in pitch is noticeable for all the drones heard in *Intermission* due to the presence of spectral peaks.

Like many sound installations, *Intermission* represents the spatial context within which it is exhibited. By playing back sound material recorded near the exhibition space, the listener is likely to notice similar environmental sounds present outside the installation, focusing particularly on the sonic characteristics of the spatial context emphasized by the installation. Thus, the listener is drawn not only to the auditory masking effect and the spectral peaks present in *Intermission*¸ but also to

those characteristics as found in the space surrounding the UCSB music building. Further, since they are common to many areas outside buildings, the listener may be more likely to notice these characteristics in other spatial contexts after hearing the installation, relating the level of auditory masking and variation in spectral peaks found in different spatial contexts.

Stasis, nonsense, juxtaposition, and non-action are all found in this installation, and each of these compositional aspects supports contextual representation. Stasis is found in the use of continuous drone sounds as well as the overall lack of development. Like the radio noise in *rough4radio3*, the use of stasis reflects the nature of the represented contexts while facilitating exploration of the sonic material as it is played in different combinations and as the listener moves through the installation space. Also as in *rough4radio3*, nonsense is found through the use of auditory masking. As stated above, this masking effect of building noises is a sonic characteristic of the spatial context represented in this work. By juxtaposing the drone sounds, the work also juxtaposes the three spaces in which the building noise drones were recorded, highlighting the sonic differences between the spaces. Finally, non-action is shown by the fact that the decisions made in the work's construction primarily serve to reveal the work's material, the represented spatial context, while other decisions have been avoided.

Source: *Diaphonic Trio* by James Tenney . . . (2009)

Overview

Source: Diaphonic Trio *by James Tenney from the Compact Disc* Music for Violin & Piano *(via File Hosting Website)*[8] is a "found sound" piece consisting solely of an MP3 audio encoding of a CD track of a recording of the piece *Diaphonic Trio* by James Tenney, performed by Marc Sabat (violin) and Stephen Clarke (piano). I did not process the audio file. However, the CD ripping and MP3 encoding processes have affected the resulting work.

Composition/Realization

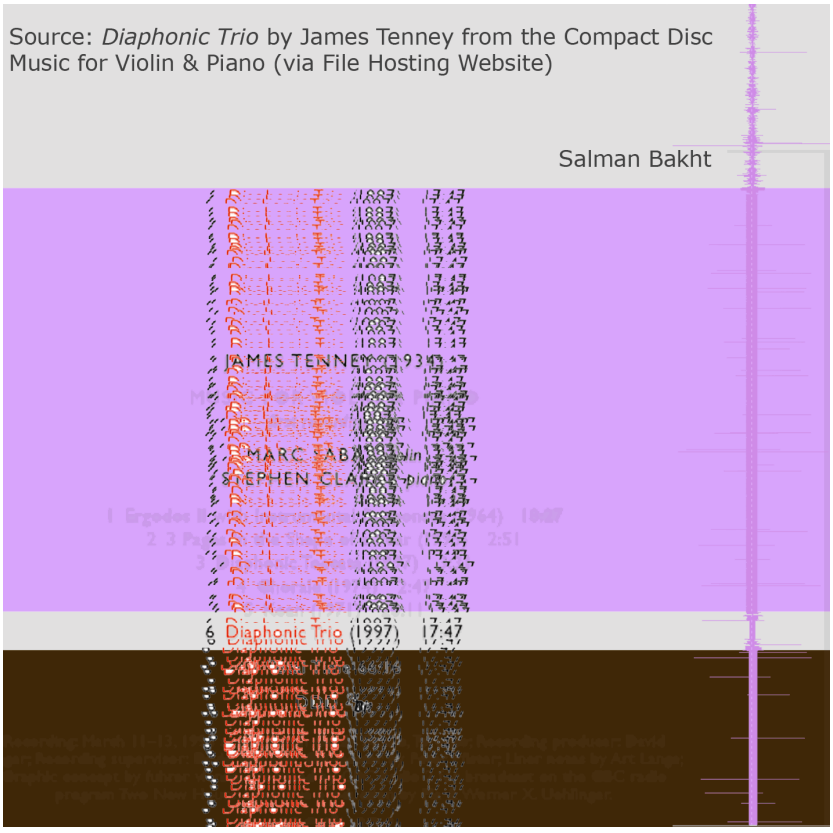

Figure 7: Album art for *SDTbJTftCDMfV&PvFHW*

[8] Abbreviated as *SDTbJTftCDMfV&PvFHW* herein.

As stated above, the work is a found sound piece, a sonic art readymade. Thus, I did not modify the sonic material of the work from its found form. The CD album *Music for Violin & Piano* was downloaded in MP3 format. Upon listening to the album, I discovered that *Diaphonic Trio*, the final track of the CD, had been improperly ripped, possibly because of scratches on the CD. This malfunction went seemingly unnoticed by the person that encoded and uploaded the album, along with any intermediary file sharers. The work's title highlights this multi-stage communication process, which ultimately led to the creation of the piece.

Made available online as an MP3 (the originally downloaded file with a modified ID3 tag), *SDTbJTftCDMfV&PvFHW* is primarily intended for *distracted listening*: the listener is expected to play this piece, preferably over headphones, while engaging in another activity. However, the piece was also presented in concert. In this performance, the sonic material was burnt to a CD and played from a CD player.

Analysis

The CD skip, a prevalent feature of glitch music works such as Yasunao Tone's *Solo for Wounded CD* and Oval's album *Systemisch*, is heard throughout *SDTbJTftCDMfV&PvFHW*. The CD skip is a malfunction in the reading of a compact disc that results in discontinuous playback of the disc's audio. In this work, the CD skips result in the repetition of short segments of the original CD audio paired with distinctive audible clicks. By highlighting this familiar aspect of CD playback, *SDTbJTftCDMfV&PvFHW* represents the media context of the compact disc.

However, the title of the work places the media context of the CD within a more complex network of communication that resulted in the creation of the piece.

As a found sound work, *SDTbJTftCDMfV&PvFHW* exhibits non-action through the complete lack of artistic interference with the sound of the work. Because of this lack of artistic interference, the listener can be sure that the CD skips heard are purely a result of the communication process rather than a compositionally imposed effect. The ease of recognizing and understanding the phenomenon of the CD skip is further helped by the simplicity and timbral familiarity of the material prior to CD playback, that of a violin and piano performance. In contrast, the audible results of the CD skips are much more difficult to recognize in Tone's *Solo for Wounded CD*, which uses Tone's CD *Musica Iconologos*, a complex electronic work with unfamiliar timbres, as its sonic material (Tone).

Stasis and nonsense are also both found in this work. Stasis is a result of the CD skip causing repetition of short segments of the original audio. This repetition both reflects a characteristic of CD skipping and allows the listener to hear many iterations of the glitch sound thus drawing attention to its general sonic effect rather than a single instance. The CD skipping also results in nonsense since the meaning of the original signal is obscured through its discontinuous and incomplete playback.

In addition to its function in representing media contexts, I was drawn to the recording used in *SDTbJTftCDMfV&PvFHW* because of its abstract musical qualities, particularly its structure, which consists of four sections. This four section structure is indicated in the work's album artwork, shown in Figure 7, as four horizontal bars of

color (gray, lavender, gray again, and brown), which match up with the waveform of the recording used in the work, shown along the right side of Figure 7.

The first section of the recording (from 0′ 00″ to 4′ 11″) begins by faithfully reproducing Tenney's *Diaphonic Trio*. However, the audible effects of playback malfunction are gradually introduced, beginning with a click noise about one minute into the recording and the repetition of audio segments beginning at approximately 3′ 30″. In the second section (from 4′ 11″ to 13′ 12″), the CD seems to become indefinitely stuck as a single 0.2 second long audio segment repeats for nine minutes, approximately half of the length of the entire piece. This extended duration allows the listener to lose track of how long the audio segment has repeated so that, even after hearing the piece multiple times, the listener is unsure when the section will end. The length of this section also allows the listener to hear the variation in subsequent repetitions of the short audio segment. Click noises of varying loudness and panning are heard. Also, short pauses between repetitions of the audio segment result in subtle random rhythmic variation. Finally, since the repeated segment lies fully within a single two note chord, the CD skipping acts to sustain this chord. The chord is a major third played on piano.

Unexpectedly, the CD eventually becomes unstuck, beginning the piece's third section (from 13′ 12″ to 14′ 02″). This section proceeds much like the end of section one with several repetitions of short segments of audio. However, after hearing section two, the listener tends to expect that the CD will again become stuck for an extended period of time. And, soon, it does, beginning the fourth and final

section (from 14′ 02″ to 17′ 47″). Although section four resembles section two, containing hundreds of repetitions of a short segment of audio, the sustained sound is much more dissonant than section two's major third dyad. Additionally, this segment of audio contains the sound of the violin and a low frequency noise in addition to piano, resulting in a much harsher, more complex sound than that heard in section two. The piece ends abruptly at 17′ 47″, the length of the original CD track of *Diaphonic Trio*.

Nodes and Passages (2010)

Overview

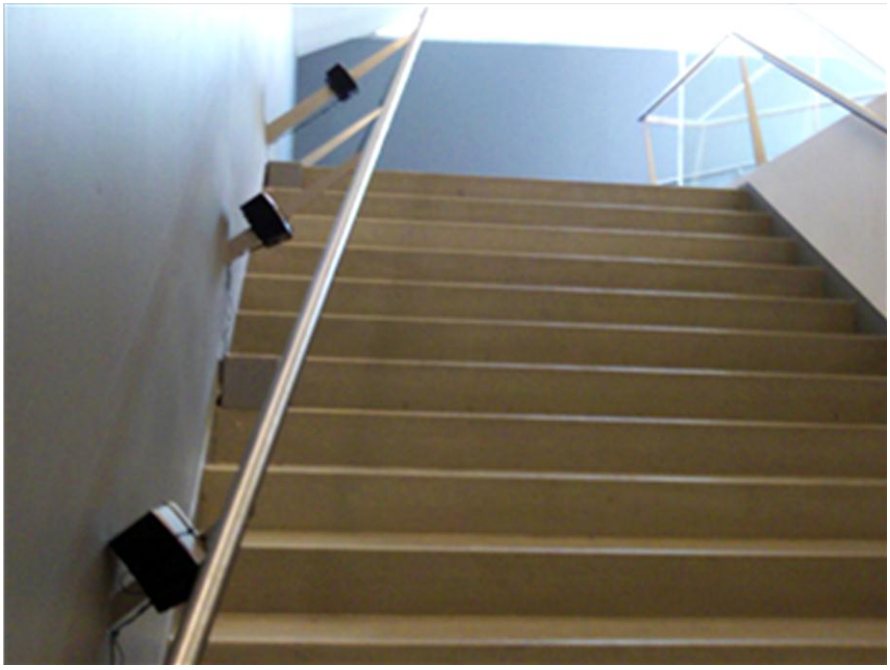

Figure 8: *Nodes and Passages* sound installation at The Cooper Union in New York

Nodes and Passages is a sonic art work that presents sounds associated with artistic creation in various visual media, from brushstrokes to mouse clicks and electric hum. Three versions of the work have been created and publicly presented: a sound installation, a concert piece, and an extended piece for distracted listening. Originally designed for a staircase leading to an art gallery at The Cooper Union (see Figure 8), the sound installation version of the work contains an array of speakers distributed along a walkway or public space with each speaker (or stereo pair) introducing a new artistic medium through the introduction of audio recordings associated with the respective medium. For example, audio recordings representing the artistic medium

of drawing were made by placing a contact microphone on a piece of paper that was drawn on with pen. Similarly, collage is represented by recordings of paper being cut and ripped. However, rather than representing each artistic medium individually, the various audio recordings presented accumulate and transform through audio processing and arrangement techniques representative of the newly introduced medium. These arranged and processed audio recordings, paired with the sound of the human voice (vocals by Katherine Saxon), are organized into continuous looped audio streams, referred to as *elements* herein. Each element is played through speakers that are placed such that the elements transition gradually as the audience walks through the installation space. The work in this form was first exhibited under the title *Cooper Union: Nodes and Passages* as part of the "Rites of Passage" exhibition at The Cooper Union from January 21 – February 11, 2010.

Nodes and Passages, Fixed Media is a four-channel fixed-media concert piece derived from the installation. While the sound installation distributes the eight elements of the work spatially through an array of speakers, *Nodes and Passages, Fixed Media* distributes these elements temporally, with an approximately one-minute-long section of the piece for each element. Compared with the installation, the concert piece allows the listener to devote greater attention to each of the elements. Further, the concert piece makes use of the four-channel speaker system to provide the audience with the illusion of being within or moving through the various artistic materials presented. *Nodes and Passages, Fixed Media* was first presented in its

entirety at UC Berkeley as part of the California Electronic Music Exchange Concert (CEMEC) Series.

A third version of the work, *Nodes and Passages, Long-play/Walk-through*, is intended for a "distracted listening" situation where the listener is expected to devote a relatively low level of attention to the piece. The piece is to be played over a personal audio device or home stereo system. Lacking the time limitation present in a concert setting, this version of the work is over 30 minutes long, with some elements lasting for several minutes.

Composition/Realization

element	sound source	transfor-mation	phonetics	dynamics	guidelines
1. (Voice)	--	--	(only vowels)	pp-p	continuous, slow, with gradual glissandi
2. Painting	brushstrokes	connected events	sh	pp-p	more discontinuous, less slow; connect pitched notes with "sh"
3. Drawing	pen strokes	connected events	s	pp-mp	more discontinuous, less slow; connect pitched notes with "s"
4. Sculpture	hitting, scraping	distinct events	kr-, k, ch-	mp	quick, separated notes / sforzando
5. Collage	ripping, cutting	audio montage	r, dr-, br-, fr-, gr-	mp	"stepwise" motion in pitch set; "r"s may be rolled
6. Electronics, Analog	light bulb	band-pass filter	p, b	f	sustained, crescendo (pp–f); gliss. in A#–B ranges, F steady
7. Electronics, Digital	mouse clicks	granulation	t, k, d	f	rapid groups of staccato notes
8. (Voice)	--	--	(all of the above)	p-mf	varied

Table 1. *Nodes and Passages* element summary

Nodes and Passages consists of a series of eight distinct elements as shown in Table 1. These elements are distributed spatially in the sound installation version of the work and temporally in the two other versions of the work. Besides the first and last

element, each element introduces the artistic medium indicated in the first column of Table 1 by arranging a set of audio recordings of the sound sources listed in the second column of Table 1. Additionally, each element integrates the audio recordings introduced in the preceding elements.

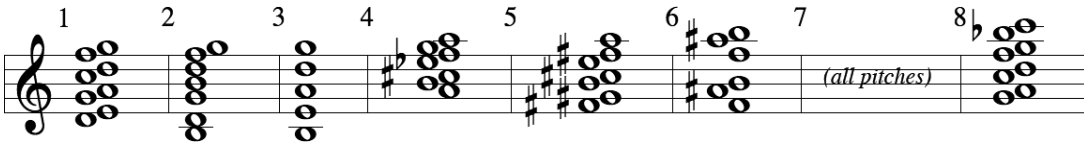

Figure 9: Vocal pitch sets for each element in *Nodes and Passages*

The vocal part for each element is derived from vocal improvisations performed and recorded in the studio. The improvisations for each element are constrained in terms of phonetics, dynamics, and pitch. Brief textual guidelines are also provided. This is summarized in columns 4 through 6 of Table 1 and Figure 9. These constraints along with the explicit suggestion to mimic the sound source associated with each element result in a strong sonic relationship between the recordings of media and vocals. Many of the constraints placed on the vocal improvisations, including the phonetic constraints and the textual guidelines related to rhythm, are chosen in imitation of the sound source associated with each element. Phonetic choices are constrained by the set of consonant sounds that may be sung and their positioning at either the beginning or end of syllables. For example, in element 4, "Sculpture," the consonant sounds "kr" and "ch" may be used at the beginning of syllables (indicated by the hyphen following the letters) while the "k" sound may be used at either the end or beginning of syllables (indicated by the lack of a hyphen). These phonetic constraints combined with the guideline to perform "quick, separated

events" result in a stream of vocal sounds that resemble the hitting and scraping sounds that occur during the creation of a sculpture.

Generally, the constraints related to pitch serve abstract musical goals. The pitch sets differentiate the elements and form a harmonic progression with a general increase in tension leading to the resolution in element 8, which has a pitch set similar to element 1. In addition to functioning in an abstract musical fashion, the pitch set of element 6, "Electronics, Analog," approximates some of the partials of the sound of a light bulb running on AC power, which generates a 60 Hz hum in the United States. The vocal dynamics also have an abstract musical function, increasing in loudness over the first seven elements leading to a relatively quiet resolution in element 8. In the sound installation version of the work, this increase in loudness causes the later elements to drown out the sound of the preceding elements.

The audio recordings of the sound sources are arranged and processed through a variety of methods that help to emphasize each element's relationship to its respective visual arts medium. (Unless otherwise noted, all processing and arrangement were performed in Pro Tools.) In element 2, "Painting," audio clips are arranged to form continuous unending streams of paintbrush sound, giving the illusion that one or more painters continue to paint slowly for the duration of the listening experience. Element 3, "Drawing," is arranged similarly, although the pace of pen strokes is noticeably faster than the brushstrokes of element 2.

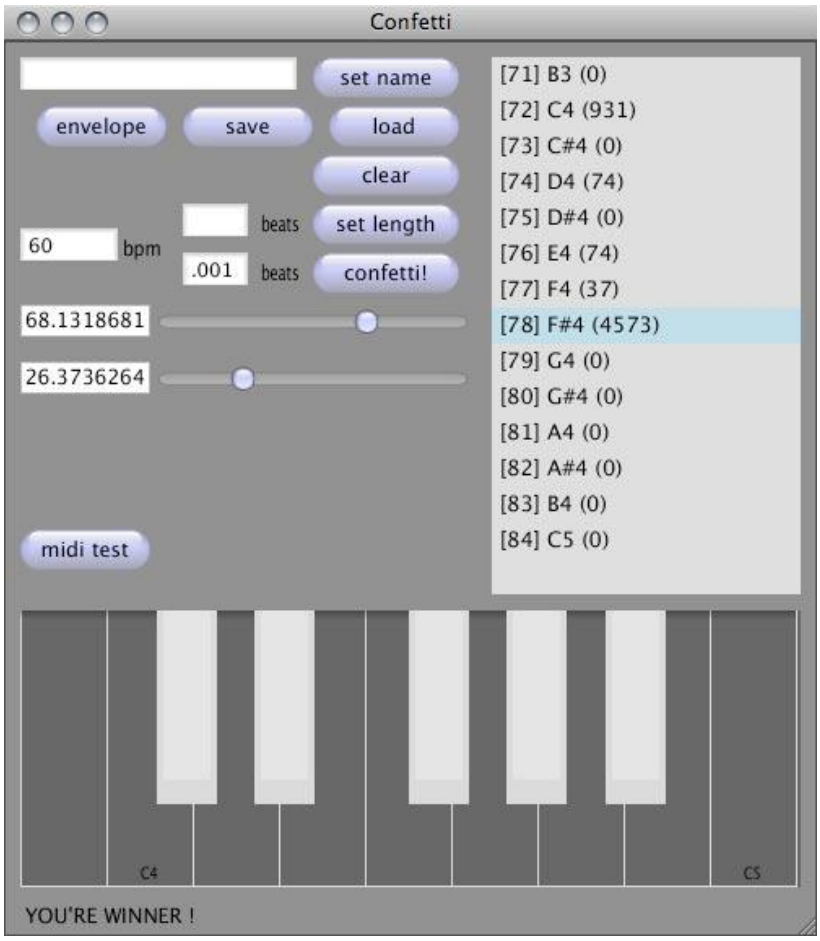

Figure 10. CONFETTI, a program used in the creation of *Nodes and Passages*

Element 4, "Sculpture," continues to provide the illusion of a number of artists working, with each placed spatially using varying sound levels and amounts of reverberation, but this illusion is broken by the occasional integration of short segments of brushstroke and pen stroke sounds. The brushstroke, pen stroke, and sculpture audio recordings as well as the vocal recordings for this element were automatically segmented in Audacity and then arranged using the program CONFETTI, which I developed in C++. As used in element 4, CONFETTI plays a single sound clip chosen randomly from a bank of sound clips assigned to a MIDI key

each time that key is pressed. Several keys were assigned segments of each of the audio recordings, and then these keys were triggered repeatedly to form longer audio streams that were then arranged in Pro Tools.

Element 5, "Collage," is arranged in the form of an audio montage where long segments of sound from elements 2 through 4 in addition to newly introduced sounds of cutting and ripping are arranged in temporal succession. A sudden loud ripping sound is placed at the transition between sound clips, suggesting that each medium is torn away to reveal another.

Element 6, "Electronics, Analog," is composed in a manner different from the other elements. Since element 6 is based primarily around pitch, the frequency-based process of band-pass filtering is used. Band-pass filtering was also used because of the possibilities for the filtering of visual (and sonic) materials made possible by analog electronics. A bank of narrow bandwidth (high Q) filters with center frequencies at integer multiples of 60 Hz are applied to the audio recordings from elements 2 through 5.

Element 7, "Electronics, Digital," resembles element 4 and, again, makes use of CONFETTI. However, the program is used slightly different here. In this case, CONFETTI performs the segmentation of all the audio recordings with a much shorter time span. Further, rather than triggering a single random sound clip with each MIDI key press, the software is set to generate a continuous stream of events at a very rapid rate. Thus, sounds and artistic media are arranged at a rate only possible through the use of digital electronics.

Analysis

Nodes and Passages references the media contexts of various visual art forms by presenting the sound of artistic creation in those media. Although these media contexts are clearly a theme of the work, this work does not qualify as contextual representation. As stated in the "Requirements of Contextual Representation" subsection of Chapter 1 of this dissertation, one requirement of contextual representation is that the context in question must be heard in the presentation of the work. The listener must be given access to the *received signal* of a media context, that is, the signal after it has traveled through the media context's communication channel and been colored by the media context's characteristics. The received signals of the media contexts referenced in *Nodes and Passages* would be the works of visual art themselves, not recordings of artistic creation as heard in the *Nodes and Passages*.

Nodes and Passages also references the spatial contexts where artistic creation occurs. This reference is particularly noticeable in *Nodes and Passages, Fixed Media* since many of the elements are spatialized so that they resemble certain spaces. At certain times in the concert piece, the sounds are distributed to suggest the placement of several artists positioned around a studio. At other times, single brushstrokes, pen strokes, rips, and cuts move across the spatial field, suggesting that the listener is positioned very close to or even within a single work of art as it is being made. However, the recordings were not made in the spaces suggested in the work. Instead, the recordings were made using close-miking techniques and then spaces were fabricated using audio effects such as panning and reverberation. The actual space in

which the recordings were made is not recognizable in the work, nor is that space thematized by the work. As a result, the work also does not qualify as contextual representation of any spatial context.

Overall, the compositional choices of *Nodes and Passages* reflect the intention to combine contextual reference with abstract musical properties. As stated in the "Composition/Analysis" subsection above, the work defines the phonemes used in the vocals to imitate the sounds of artistic creation while the pitches are chosen to define a harmonic progression, which is an abstract musical property. Likewise, the arrangement of vocal and non-vocal recordings in elements 2 through 5 resembles the density and rhythm of sounds heard in artistic creation while also supporting abstract musical goal of rhythmic variation between elements. The arrangement of samples in elements 6 and 7 has very little relation to any actual instance of artistic creation instead having a more symbolic relation to the artistic media that are referenced. Finally, the vocal samples in elements 1 and 8 are arranged to form contrapuntal melodic lines, purely an abstract musical decision.

Glossary

Context: A specific situation that perceptually transforms sound as it travels from source to listener.

Contextual Listening: The perceptual and cognitive process of determining sonic characteristics of an aurally perceived context through the comparison of that context to those heard previously.

Contextual Reference: In a work of sonic art, the thematization of a context and communication of certain characteristics of that context.

Contextual Representation: In a work of sonic art, the revelation of sonic characteristics of a context by exposing the listener to sound that has been affected by that context. Contextual representation has the following three requirements: 1. Sound material of a context is heard in the work's presentation. 2. This context is recognizable as the origin of this sound material. 3. The work thematizes this context and emphasizes its sonic characteristics.

Cracked Media: "[T]he tools of media playback expanded beyond their original function as a simple playback device for prerecorded sound or image. 'The crack' is a point of rupture or a place of chance occurrence, where unique events take place that are ripe for exploitation toward new creative possibilities" (Kelly 4).

Electroacoustic Music: "Music in which electronic technology, now primarily computer-based, is used to access, generate, explore and configure sound materials, and in which loudspeakers are the prime medium of transmission" or "any music in which electricity has had some involvement in sound registration and/or production other than that of simple microphone recording or amplification" ("EARS: Glossary" "Electroacoustic Music").

Glitch Music: A genre of electronic music that grew out of the popular electronic music tradition in the mid-1990s. Works of glitch music make frequent use of audible "glitches," sonic artifacts of the corruption of digital data or the failure of electronic devices, as artistic material.

Inframedia Audio: "[A] making-audible of [the media] infrastructure; routing it out through the speakers, into the sensorium . . . a process of tapping in, a drawing out and projection of the media substrate" (Whitelaw 50).

Juxtaposition: The proximate placement of two distinct elements for comparison.

Keynote Sound: A sound that is "heard by a particular society continuously or frequently enough to form a background against which other sounds are perceived" (Schafer 272).

Listening Mode: A perceptual and cognitive approach to listening to sound. Examples of listening modes are background listening, distracted listening, and acousmatic listening, in addition to contextual listening, introduced here.

(Auditory) Masking: "The effect one sound has on another by making it harder or impossible to hear" (Truax, *Handbook for Acoustic Ecology* "Mask").

Media Context: The set of communication media types associated with certain instances of communication.

Media Ecology: A field of study that "looks into the matter of how media of communication affect human perception, understanding, feeling, and value . . . The word ecology implies the study of environments: their structure, content, and impact on people" (Postman 161).

Non-Action: The limitation of artistic decisions that either interfere with or are unnecessary for the natural presentation of the work's material.

Nonsense: The generation of material that lacks a certain type of meaning or the transformation of existing material in such a way that its once apparent meaning is obscured.

Presentation Context: The context or set of contexts involved in the presentation or performance of a sonic art work.

Program Music: Musical compositions that depict external events or situations.

Re-presentation: "[S]ound material which have retained their source credibility and can be considered literally as a presentation of an original" (Ten Hoopen 69).

Sound Installation Art: A subcategory of installation art whose works consider "relationships to be expressed between the audio, visual and/or architectural elements of the work and secondly between the sound and the space for which the work is conceived as well as between the sound, the space and the observer" (Minard "1. Sound Installation Art").

Sound Material: The sound heard in the experience of a sonic art work. Sound material includes audio recordings that are played back during the work's presentation (in a processed or unaltered form), sounds synthesized or performed for the work's presentation, and sounds that occur naturally within the presentation context.

Sound Signal: "[A]ny sound or message which is meant to be listened to, measured or stored" (Truax, *Handbook for Acoustic Ecology* "Sound Signal").

Soundmark: "A term derived from 'landmark' used in soundscape studies to refer to a community sound which is unique, or possesses qualities which make it specially regarded or noticed by the people in that community" (Truax, *Handbook for Acoustic Ecology* "Soundmark").

Soundscape Composition: An electroacoustic music work in which "environmental sound recordings form both the source material and also inform the work at all its structural levels in the sense that the original context and associations of the material play a significant role in its creation and reception" ("EARS: Glossary" "Soundscape Composition").

Soundscape Ecology: "[T]he study of the effects of the acoustic environment, or soundscape, on the physical responses or behavioural characteristics of those living within it" (Truax, *Handbook for Acoustic Ecology* "Soundscape Ecology"). Also called "acoustic ecology."

Spatial Context: The definition of regions of space associated with some real (non-virtual) physical situation.

Spectral Analysis: The determination of the spectrum of a signal. The Fourier transform (or one of its specific forms such as the discrete Fourier transform (DFT)) is a mathematical operation often used in spectral analysis.

Spectrum: "The frequency content of a sound or audio signal, often displayed as a graphic representation of amplitude (or intensity level) against frequency. Three-dimensional displays of a spectrum add the time variation on the third axis . . . The spectrum of a sound is a primary determinant of its perceived timbre" (Truax, *Handbook for Acoustic Ecology* "Spectrum").

Stasis: The state of perceived sonic inactivity resulting from limited change of certain sonic properties over an extended time.

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Appendix A:
Artistic Component

The dissertation's artistic component is attached as an audio CD and is located at:

<http://www.circumaurality.info>.

track	title	length
1-2	*Santa Barbara Soundscape*	
	I. *Santa Barbara Etude*	4′ 28″
	II. *rough4radio3*	10′ 00″
3	*Intermission* (excerpt)	8′ 00″
4	*Source:* Diaphonic Trio *by James Tenney from the Compact Disc* Music for Violin & Piano *(via File Hosting Website)*	17′ 47″
5	*Nodes and Passages, Fixed Media*	9′ 20″
	total	49′ 35″

Appendix B:
Dissertation Defenestration:
Juxtaposition, Non-action, Nonsense, Stasis

Salman Bakht
November 2011

Present the document "Circumaurality (Listening around Sound): Representing Spatial and Media Contexts in Sonic Art" by Salman Bakht in some or all of these forms simultaneously:

- Playback of the artistic component (portfolio) of the dissertation
- Playback, recreation, or initial presentation of the dissertation defense speech
- Presentation of dissertation defense slides or a video recording of the defense
- Reading aloud of the Introduction and Chapter 1 of the written component of the dissertation
- Reading aloud of Chapter 2 of the written component of the dissertation
- Reading aloud of Chapter 3 of the written component of the dissertation
- Silent reading and/or skimming of the written component of the dissertation
- Visual presentation of each page of the written component of the dissertation in order (one page every 30 seconds)
- Defenestration of the written component of the dissertation (one page every 30 seconds or all at once at any point in the performance)
- Defenestration of the storage medium containing the artistic component (portfolio) of the dissertation (at any point in the performance or gradually for the duration of the performance)

Any other form of presentation may be used. Any other dissertation, thesis, or similar document may be used.