
Wesleyan University

Department of Music

Handmade Sounds:

The Sonic Arts Union and American Technoculture

By

Andrew Raffo Dewar

Faculty Advisor: Prof. Mark Slobin

*Submitted to the faculty of Wesleyan University in partial fulfillment
of the requirements for the degree of Doctor of Philosophy.*

Middletown, Connecticut

May 2009

©2009

Andrew Raffo Dewar

All Rights Reserved

ABSTRACT

Handmade Sounds: The Sonic Arts Union and American Technoculture

Andrew Raffo Dewar

This dissertation explores the history and technological aesthetics of the Sonic Arts Union (SAU), a seminal electronic music group formed in the United States in 1966 by composers Robert Ashley, David Behrman, Alvin Lucier and Gordon Mumma.

Chapter 1, an overview of the cultural milieu from which the group's work emerged, interrogates their position in an American experimentalist tradition and questions the maintenance of some of the existing historiographical bounds on this subject.

The SAU's use, abuse, construction and recontextualization of technical objects and their role in the formation of a new musical genre, live electronic music, is the subject of Chapter 2. This chapter establishes the roots of the SAU's handmade electronic instruments in a post-WWII American "tinkering" tradition whose more popular forms include activities such as ham radio culture and drag racing. The chapter also considers "folk" qualities and ideas of technological utopianism that may run through their work.

Chapter 3 is a sustained engagement with Alvin Lucier's composition for amplified brainwaves, *Music for Solo Performer* (1965). The piece was a turning point in Lucier's own work, but can also be read as a watershed moment of aesthetic transition between the earlier work of the SAU composers for acoustic instruments and studio

electronics and the live electronics that became a foundation of their musical practice.

A thick descriptive reading of one composition from each SAU composer is the focus of Chapter 4. Works discussed include Robert Ashley's *The Wolfman* (1964), David Behrman's *Wave Train* (1966), Alvin Lucier's *Vespers* (1967) and Gordon Mumma's *Hornpipe* (1967). Each piece is viewed in terms of its engagement and incorporation of the performance site into the work, its operational properties as a cybernetic system, its utilization of technology, and its application of acoustic and structural feedback.

In foregrounding the Sonic Arts Union's exploration of the physical properties of electronic circuitry, I illustrate how they applied a tinkering impulse emanating from their specific historical and cultural location for a subversive form of techno-aesthetic play, and highlight the significance of the social construction of technical objects to the study of electronic music history.

Table Of Contents

List of Figures.....	iv
Preface.....	v
Acknowledgments.....	viii
Introduction.....	1
Chapter 1. Locating the Sonic Arts Union.....	20
Black Mountain College.....	22
New York School and Neo-Dada.....	24
West and Midwest Experiments in Sound and Light.....	25
Happenings.....	27
Chambers Street Series and Avant-Garde Festival.....	30
Fluxus.....	32
Dance Scene as Catalyst.....	33
The ONCE Group.....	36
Experiments in Art and Technology (EAT).....	37
Ant Farm.....	39
Composer/Performer Groups.....	40
From the Individual to the Collective.....	42
The Forging of the Sonic Arts Union.....	48
Continental Shifts.....	54
Revisiting the “Afrological” and “Eurological”.....	71
The Avant-Garde and the SAU.....	80

Conclusions.....	86
Chapter 2. Aesthetics of an American “Tinkering” Technoculture.....	90
Emergence of an Aesthetic – Live Electronic Music.....	92
Two Theories of Analysis.....	100
Live Electronic Music as a “Folk” Practice?.....	102
Bricolage, D.I.Y., American Know-How, and Tinkering.....	111
A Technological Approach to Utopia.....	131
Composition and the Work Concept.....	137
Concepts of Improvisation in Live Electronics.....	141
Cage’s Concept of Indeterminacy and Chance.....	141
Improvisation in Early Live Electronics Groups.....	145
Conclusions.....	149
Chapter 3. Inner Landscapes in Lucier’s <i>Music for Solo Performer 1965</i>.....	151
Live vs. Tape.....	156
Control, Texture, Contrast.....	160
First Performance.....	164
Conclusions.....	167
Chapter 4. Cybersonic Soundings: Feedback and Balance in the SAU.....	169
Sounding Space.....	171
Cage’s “4’33” and Conceptions of Space in Sound Studies.....	176

Alvin Lucier, <i>Vespers</i> (1968).....	184
From Cybernetics to Cybersonics.....	189
Robert Ashley, <i>The Wolfman</i> (1964).....	192
A Systems Aesthetic.....	200
David Behrman, <i>Wave Train</i> (1966).....	202
Gordon Mumma, <i>Hornpipe</i> (1967).....	205
A Conditional Art.....	211
Conclusions.....	214
Closing Thoughts.....	216
Appendix A: Interviews and Archival Sources.....	220
Appendix B: Preliminary Performance Chronology of the SAU.....	222
Bibliography.....	228

List of Figures

Fig. 1.1. Sonic Arts Union publicity shot, circa late 1960s.....	xiii
Fig. 1.2. Mumma, Braxton, Jenkins at Automation House, 1970.....	78
Fig. 2.1. Gordon Mumma, Ann Arbor, Michigan 1962.....	93
Fig. 2.2. David Behrman & Alvin Lucier, Brown University, 1973 (?).....	107
Fig. 2.3. Gordon Mumma, EAT studio, New York, 1969.....	128
Fig. 4.1. Concert poster, Clinton, NY, November 10, 1970.....	168
Fig. 4.2. Robert Ashley, <i>The Wolfman</i> . Ann Arbor, Michigan, 1965.....	191
Fig. 4.3. Performance schematic for <i>The Wolfman</i> (1964).....	192
Fig. 4.4. David Behrman, <i>Wave Train</i> (1966) schematic.....	200
Fig. 4.5. David Behrman, <i>Wave Train</i> (1966) interlocking wave-forms.....	201
Fig. 4.6. Gordon Mumma, <i>Hornpipe</i> (1967). NYC, 1972.....	203

Preface

This project began as the result of a scholarly crisis. My original dissertation proposal was to examine the traditional and experimental music scenes of the Minangkabau in West Sumatra, Indonesia, where I began studying in 1998. In the summer of 2004, I took part in a three-month long creative project in Bali and Java, composing and performing experimental music with a collective of Indonesian and North American composer/performers. During this wonderful experience, I returned to West Sumatra to do some preliminary research in an effort to narrow down the possibilities for my dissertation topic.

I found the rich, variegated music scene I remembered from my previous trips to the area, but I also decided that it was too broad -- and to be honest, too foreign -- a topic for me to handle in the relatively confined time constraints of a dissertation project. I simply did not feel confident enough about my knowledge of that music

culture, even if I had undertaken another lengthy research stay, to do justice to the subject. I have every intention of continuing my research on the music of the Minang, both new and old, but it will be a long-term study, the subject and bounds of which I do not know at this time. As a result, I was in a quandary. Here I was, in a wonderful Ph.D. program, with no research topic.

A colleague of mine, saxophonist/composer Matt Bauder planted the seed for this project. He casually mentioned one day that there were no detailed publications discussing the work of the Sonic Arts Union as a group, and that someone should rectify that situation. Since I was already a fan of the work of the individual composers who constituted the SAU, had already studied with Alvin Lucier and Ron Kuivila as a composition student, and had recently abandoned my original dissertation project on the Minangkabau, it seemed a natural decision. I mentioned my interest to Prof. Lucier, and he responded by placing a copy of a 1998 article he authored for the journal *Leonardo* in my mailbox, that included some information on the Sonic Arts Union's activities. With Lucier's simple gesture of invitation, I was off and running.

In many ways, the methodology I employ in this study is one of synthesis and reconstruction, more so perhaps than the average ethnographic project. Of course, part of this is due to the fact that my ethnographic present is forty years in the past, but it is also because I was limited in my choice of subject matter by the materials I could gather. The enclosed document exists through this combination of present-day interviews and archival materials spread across various collections.

Besides the requisite cultural and historical context-mapping, and the narrative retelling of the formation of the Sonic Arts Union, the central focus of this study is an examination of the artists' relationship to technology, and its implications, both in the realm of music, and in the larger context of a 1960s counterculture. Some questions I considered while completing this project include; why did the SAU composers move into electronics? How did they use the technology, and to what ends? How is their aesthetic related to the broader technoculture of a post-WWII United States?

On the macro level, this story about the "handmade sounds" of the Sonic Arts Union is an important narrative in the historical mosaic of America's relationship to technology in the 1960s, when these artists explored codes and relationships between technical objects and people that prophesied the interconnected world of human-machine fusion we know today. The communities of electronic sound generating devices built by the Sonic Arts Union and their contemporaries illustrate a continuing American technological tradition founded on optimistic, utopian possibilities for the future, explored by free-thinking artists in a relatively open society.

Acknowledgments

I decided to apply to Wesleyan University's graduate program in ethnomusicology in 2002, in part at the urging of my wonderful mentor at the University of Minnesota, the late ethnomusicologist Mirjana Lausevic. Wesleyan's music department encompasses nearly everything that urged me to become a musician and scholar of global music culture. It is a challenging, boundary-breaking intellectual environment headed by visionaries from a number of musical fields.

In the music composition area, Professors Anthony Braxton, Neely Bruce, Ron Kuivila and Alvin Lucier; all of whom I learned from immensely during my six years in residence at Wesleyan. From these artists, I learned the craft of composition, the practice of performance, and the commitment it takes to manifest these skills.

Prof. Anthony Braxton, whom I have had the honor of working closely with, both on and off stage, broadened my horizons to the possibilities of "composite reality"

and the musical arts, and the importance of not only playing and creating music, but also thinking deeply and writing about it in order to function as a creative citizen of this planet.

Prof. Ron Kuivila was an important resource for this research topic because of his deep involvement in and knowledge of the history of electronic music, from his early collaborations with David Tudor and Alvin Lucier, to his own groundbreaking work. I had the pleasure of engaging in wonderful discussions with Prof. Kuivila that pushed my conception, understanding, and articulation of the topic of electronic music and the Sonic Arts Union, and deepened my understanding of its broader implications. I would like to thank Prof. Kuivila for agreeing to be on my committee and for his insightful comments on early drafts of this work.

In the ethnomusicology area, Professors Eric Charry, Mark Slobin, Sumarsam and Su Zheng taught me to reach beyond the bounds of disciplines, to view the world with both critical and curious eyes, and to draw from whatever discourses made the most sense to illuminate my research subjects. I cannot express in words how thankful I am to all of these mentors in my development as a musician and scholar.

Prof. Eric Charry, advisor for my 2004 M.A. thesis on trumpeter/composer Bill Dixon, deserves thanks for agreeing to a second round of committee work on this project. His detailed and thoughtful comments on these writings while in their formative stage were extremely helpful.

Prof. Mark Slobin, my advisor, deserves special mention for his belief in and

support of my work. This project could not have been carried out without his generous spirit in sharing the vast knowledge he has acquired throughout his career. In one of many memorable advising meetings where we discussed the implications of the Sonic Arts Union's engagement with technology, Prof. Slobin said, "there has to be something here with the technology that is beyond these individuals; something to do with the do-it-yourself radio kits from the era, tinkering, something like that." It was this kernel of an idea that blossomed into what I see as one of the contributions this project makes to an understanding of live electronic music from this period. It is a practice and creative impulse emerging from a broader post-WWII American technocultural milieu, and not an ivory tower, or alternately, a fringe practice disconnected from mass culture.

In addition to my professors at Wesleyan, I would like to thank three non-Wesleyan scholars for their support, their helpful critique of my work, and for their own work that has enriched my investigations: Prof. Emeritus John Szwed of Yale University, Associate Prof. Amy Beal at the University of California, Santa Cruz, and Dr. Benjamin Piekut, Lecturer at the University of Southampton, UK.

A number of colleagues and friends throughout my time at Wesleyan enriched my experience by creating an intellectually challenging seminar environment of constructive criticism, as well as an uncanny ability to simply have fun and be creative together. I would like to particularly mention my friendships with Matt Bauder, Taylor Ho Bynum, Jennifer Caputo, Jonathan Chen, Nicholas Hockin, Christopher Miller, Sam Miller, Andrew McGraw, Phillip Schulze, Julie Strand and Charlie Wilmoth.

I would also like to thank the wonderful staff at the various archives I consulted to gather information for this project. I would like to thank the Getty Research Institute for the 2007 library research grant I received to explore David Tudor's fascinating papers, and for being wonderful caretakers of the incredible amount of rare historical items related to my research. I would like to single out Virginia Mokslaveskas for her help in the planning and logistics of my residency at the Getty. The Yale University Oral History American Music project, directed by Vivian Perlis and Libby Van Cleve, was instrumental to this work. The interviews collected by this project with each of the SAU composers are of very high quality, and offered me a rare glimpse into the past thoughts of the artists. I would also like to thank D.J. Hoek and Jennifer Ward of the John Cage correspondence archives at Northwestern University, and Maggie McNeely of the Robert R. Farber archives at Brandeis University, who helped me track down some surprising documents.

I would like to thank each of the Sonic Arts Union members; Robert Ashley, David Behrman, Alvin Lucier, and Gordon Mumma, for opening their homes and studios for me to conduct interviews on a subject they have long put behind them. Alvin Lucier's positive comments on an earlier draft of this document came just in time. I would like to especially thank Gordon Mumma and Michelle Fillion for two wonderful days of hospitality in Victoria, British Columbia, and Gordon's sharing of his fastidiously compiled and annotated SAU archival materials that were crucial for generating the project's momentum and a critical mass of information to work with. Gordon Mumma

and Alvin Lucier went above and beyond in giving the final draft of this document a thorough critical review that helped immensely in the final days of completion.

My new colleagues in the New College and Music departments at the University of Alabama are to be thanked for a warm Southern welcome and for their supportive and positive attitude while I completed this manuscript.

My parents deserve thanks for their unwavering support and for their steady stream of weekly handwritten letters - I may not have replied every week, but reading them gave me a much-needed sense of support, and the strength to continue on with my work.

Last, but certainly not least, I would like to thank my lovely wife and fellow ethnomusicologist Jennifer Caputo, for putting up with the absence of her husband for most of the first eight months of our marriage while I spent an enormous amount of time with a computer screen and keyboard, and for her keen eye to detail in editing and improving the clarity of this document.



Fig. 1.1. Sonic Arts Union publicity shot, late 1960s. Courtesy of Gordon Mumma.

Introduction

The topic of this dissertation is a historical ethnography of the Sonic Arts Union (SAU); an American experimental electronic music group formed in 1966 by composers Robert Ashley, Gordon Mumma, David Behrman and Alvin Lucier. The genesis of the SAU resulted, in part, from the intermedia explorations and collaborations by the Ann Arbor, Michigan based ONCE Group, but resides within the greater historical timeframe of the 1960s, which gave rise to contemporaneous work by their colleagues John Cage and David Tudor, the multi-disciplinary Fluxus art movement and the live electronic music group Musica Elettronica Viva. The present study discusses the cultural and historical background of the Sonic Arts Union, the aesthetic tools they operate with, their complex relationship to the European Art Music tradition, their identities as American composers, and their connection to an identifiably American "tinkering"

technoculture of do-it-yourself ingenuity through their construction and transformation of various forms of electronic equipment.

The Union's music was performed live (in contrast to the many studio-based electronic works of the time) with homemade or modified electronic instruments built from cast-off military and consumer circuitry, and scientific equipment repurposed for musical use. As pivotal members in a burgeoning scene of composers and electronic instrument builders active in the 1960s and 70s, their invention and innovation exists as part of both the standard narrative of 20th century avant-garde musical practice, and a grassroots network of "solder-head" workbench outsiders, trading ideas, schematics and materials as they create their music from society's technological detritus.

This study limits its scope to work created during the time the SAU has been considered "active" by its members (roughly 1966-1976), but focuses primarily on the formative period of the group, from 1966-1972, when they engaged in the greatest number of concert tours as a unit.

Why Ethnomusicology?

I locate this analysis of the Sonic Arts Union at the confluence of several emerging trends in ethnomusicology -- the study of experimentalism, a resurgence of interest in historical ethnography, and musical technoculture studies.

The ethnomusicological study of experimentalism is still in its infancy, but seems

to be on the verge of greater exploration.¹ Work by Novak (1999, 2006), Tenzer (2003), McGraw (2005, 2009), Dewar (2004), Lewis (2008), Plourde (2008), Bernstein (2008), and Adlington, et.al. (2009) are recent examples of ethnographic approaches to musical experimentalism. However, a subject like the Sonic Arts Union -- a Euro-American group with deep ties to Western art music -- still appears to be a disciplinary rarity. Georgina Born's (1995) seminal ethnography of the French electronic music research institute IRCAM and Rogalsky's (1995) discussion of the music of the Merce Cunningham dance company are earlier touchstones in terms of subject matter and approach. Whereas earlier studies of experimental music were focused on technical analysis, these recent works illustrate a turn in the discourse toward a valuation and examination of the cultural context within which these technical achievements exist, the communities that created them, and their role in a broader global cultural tapestry.

Historical approaches in ethnomusicology are not new, by any means (cf. Nettl 1958, Shelemey 1980, Slobin 1982 & 1989, Bohlman 1997) but for many years, in both ethnomusicology and anthropology, the "ethnographic present" has seemed to overtake the broad view of history that has in the past two decades gradually come to the fore.² There appears to be a growing interest in ethnomusicologically-based historical work.

¹ I employ the term "experimentalism" in the sense of a self-conscious creative praxis that functions in antipathy to artistic "normalcy" (or hegemony) in a given culture, partly connected to the commonly accepted conception of the avant-garde. Of course, culture itself, in all forms and expressions, is produced through varying degrees of "experiment."

² What is meant by this is the fact that the majority of ethnomusicological studies prior to this recent period used "history" to set up an ethnographic analysis of the present, instead of making history itself the subject of study.

Within the past few years, an historical ethnomusicology interest group has formed within the Society for Ethnomusicology, and recent work by Averill (2003), Veal (2007), Carr (2006) as well as other forthcoming projects illustrate a revival in studying the past with the tools of ethnomusicology.³

The third emerging area of study in ethnomusicology this work engages is one Kiri Miller has called "technomusicology," a neologic fusion of musicology, ethnomusicology and technocultural studies. The latter is a term likely derived from Penley and Ross's 1991 volume of the same name. Lysloff and Gay's edited volume, *Music and Technoculture* (2003) is probably the most clearly articulated early expression of this emerging "ethnomusicology of technoculture," which Lysloff defines as the "ethnographic study of musical culture with emphasis placed on technological impact and change" (2003:1). Lysloff further describes the importance of looking at the use of technology from this perspective as a way to "keep the discipline relevant in a changing world," where "the ethnographic Other is now fully plugged in" (2003:2).

Tracing the conceptual roots of this stream of ethnomusicology, Lysloff mentions Charles Keil's (1984) study of mediated music in Japan, Wallis and Malm's (1984) study of the recording industries in small countries, and Manuel's (1993) writings on cassette culture in India. Lysloff's states that "it is at the intersection of *use* of technology that meaning is found, and that it is at this intersection of human agency and

³ Of course, history will always be an important aspect of the present, but in this case I am referring to research that is centered around a historical subject.

the technological artifact that meaning is also contested" (2003:18). This statement is one of the issues of central import to this study of the Sonic Arts Union, whose use (and abuse) of technological artifacts influenced not only their aesthetic exploration, but was part of a national (and to some degree, transnational) subcultural affinity group driven to build new sounds from the ground up by engineering new contexts for existing technologies, as well as creating new hybrids from post-WWII technological detritus.

Timothy Taylor's *Strange Sounds* (2001) is another example of the relatively recent emergence of ethnomusicological studies in technoculture. Like Lysloff, Taylor also sees the cultural context of technology as a social, practice-based existence: "Whatever music technology is, it is not one thing alone. It is not separate from the social groups that use it; it is not separate from the individuals who invented it, tested it, marketed it, distributed it, sold it, repaired it, listened to it, bought it, or revived it...[it] is not simply an artifact...is always bound up in a social system" (2001:7). Other work that illustrates a growing interest in an ethnomusicology of technology includes Greene and Porcello's (2005) edited volume of global recording technoculture, Mark Katz's (2004) monograph *Capturing Sound* (though he is technically a musicologist), Micheal Veal's work on Jamaican Dub music (2007) and Kiri Miller's emerging work on the use of music in video games, including *Grand Theft Auto* (cf. Miller 2007) and *Rock Band*.⁴

Although this dissertation is lodged within the disciplinary framework of

⁴ For more information on Miller's forthcoming work with *Rock Band*, see <http://guitarheroresearch.blogspot.com/>.

ethnomusicology, at the confluence of several emerging streams of that field, I have also drawn on two non-ethnomusicological discourses throughout this study: the field of sound studies, and the seemingly perpetually controversial (at least among some sociologists and historians of technology) field of SCOT theory that emerged in the mid-1980s and was pioneered by Trevor Pinch and Wiebe Bijker.

Social Construction of Technology (SCOT) Theory

Though the discipline of ethnomusicology has historically been omnivorously interdisciplinary, and has recently been ahead of the curve in terms of new approaches to the discussion of global culture, drawing from whatever discourses made the most sense, the relatively recent interest of technoculture in ethnomusicology is an interesting case of the discipline playing conceptual "catch-up."

In 1984, Trevor Pinch and Wiebe Bijker co-authored an article entitled, "The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other." In this work, Pinch and Bijker sought to develop a social constructivist approach to technology studies that takes into account the *use* and social invention of technological artifacts, as well as questions the idea that only "successful" applications of technologies are worthy of study and analysis. Pinch and Bijker put forth a "multi-directional model" for the social construction of technology that proposes "that the 'successful' stages in development are not the only possible ones" (1984:411). The present study aligns itself with these issues, as the Sonic

Arts Union, though certainly part of a larger scene of technological tinkerers, were not mass-producing their technology in hopes of success, but rather were socially developing individualized reappropriations and recontextualizations of existing technological artifacts.

One aspect of the specific case of the Sonic Arts Union that differs from the model Pinch and Bijker advance is each SAU artist individually determined their success and failure, with little overlap and larger adoption within the larger cultural scene. Therefore, although a multidirectional model of technological development is in play here, it is on a micro-level, in contrast to broader mass-culture technological developments like Pinch and Bijker's example of the bicycle.

Even SCOT theory has its conceptual roots in earlier approaches to technological development, particularly that of Lewis Mumford, who in 1934 wrote that a good history of technology would "not merely...explain the existence of...new mechanical instruments: one must explain the culture that was ready to use them and profit by them so extensively" (1934:4). Mumford goes on to talk about "internalist" and "externalist" approaches to the study of technology. In the field's current usage of the terms, "internal" and "external" have become reversed from the way Mumford used them in *Technics and Civilization*. Today an "internalist" approach refers to a study focused on the design and workings of a particular machine, while an "externalist" approach is one that emphasizes the social context shaping the design and workings of a machine. Unlike the SCOT approach, however, Mumford was not especially interested in an externalist

approach, and was more interested in the individual mind than in social organization or negotiation of the use of technological artifacts.

The Sonic Arts Union was a small social unit within a larger milieu of artists that played with technology; groups like Hugh Davies and Gentle Fire in the UK, the San Francisco Tape Music Center, and many others, some of which are discussed in Chapter One. One of their important innovations was to take Duchamp's idea of the readymade into the realm of electronic technologies -- in particular the many early works of Alvin Lucier that used recontextualized scientific equipment. In addition, the SAU and their associated networks extended the readymade concept through a social technological practice of bricolage and assemblage based on auto-didacticism mixed with the the 1960s egalitarian ethos that skills and knowledge should be shared to create new sounds and instruments.

Sound Studies

A currently emerging interdisciplinary field, sound studies exists at the intersection of investigations that put sound in the foreground. Among the field's goals is a broadening of the study of music to evaluate sound phenomenology, support technologies, and what had previously been considered "non-musical" sound objects as being equally vital as the music that results from or is related to them. Sound studies attempts to answer James Clifford's question, "what of the ethnographic ear?" (1986:12) by re-examining history and culture through the ear, as an intervention into the historical

primacy of the visual in ethnography. Sound studies attempts to engage with the issue that "in the hierarchy of the senses, the epistemological status of hearing has come a poor second to that of vision" (Bull & Back 2003:1); and to provide a counterweight to this "ocularcentrism" (Schmidt 2003:41). That said, these scholars are also "skeptical of a counter-monopoly of the ear, not only because it makes scientific sense to conceive of the senses as an integrated and flexible network but also...because arguments over the hierarchy of the senses are always also arguments over cultural and political agendas" (Erlmann 2004:4).

Post facto, sound studies incorporates the work of earlier scholars who gestured towards this approach to the study of sound, such as R. Murray Schafer (1977), Steven Feld (1982), Jacques Attali (1985), and Corbin (1998). Edited sound studies volumes by Bull & Back (2003), Smith (2004) and Erlmann (2004) include a wide breadth of subject matter (much of it not music-related at all), and illustrate a swiftly developing body of scholarship from this emerging field. Monographs by Emily Thompson (2002) on architectural acoustics and the "culture of listening" in America, Michael Bull's (2000) study of personal stereo culture, and Jonathan Sterne's (2003) monumental cultural history of sound reproduction will likely soon be seen as canonical works in this area, if they are not already.

In the context of this study, I use sound studies as more of a conceptual departure point, or perhaps a horizon, for the somewhat unconventional musical analyses that encompass Chapters Three and Four.

History, Memory and the Ethnographic Past

This study focuses on a specific time period in the past, mainly the years 1966-72, when the Sonic Arts Union were most active as a performing group. As a work of ethnography, this is a challenge, since the "ethnographic present" is, obviously, in the past. As a researcher, I have therefore had to excavate snapshots of the SAU composers' thoughts on the issues and time period discussed in these pages from a variety of sources spread across forty (or in some cases, more) years. Though I conducted present-day interviews with all of the principal members of the SAU, in the course of my research I discovered first-hand some of the interesting perils of historical ethnography, specifically the wonder of memory and the reinforcing nature of narratives told repeatedly over long periods of time.

Each of the SAU composers have had (and continue to have) long and fruitful careers post-Sonic Arts Union and have been interviewed on a multitude of occasions over the years (which has served me well as I attempt to weave these stories spread through time together), often being asked similar questions. It is natural that a busy artist, especially one focused on the future and not the past as these artists are, would develop a kind of shorthand for answering questions and retelling stories, tinged variously by any number of issues. Naturally, over time, this shorthand becomes the

predominant narrative, reinforced through repetition. Of course, this phenomenon is not limited to this particular context -- it could just as easily be someone recounting the story of meeting their first love for the thousandth time, forty years after the event occurred.

Philip Bohlman addresses a number of the above questions in his remarks that "the ethnomusicological past is not one past, but many" (1997:141). Bohlman describes how the construction of narratives, and the "fragmentary nature of memory" combine to constantly shape both present and past (1997:143). Bohlman's multivalent interpretation of historical narratives, the roles of history in the performance of the present, and the reconstructive role of the ethnographic fieldworker dealing with both past and present coincides conceptually with aspects of Benjamin (1988) and Foucault (1984).

Benjamin constructs a concept of "historical materialism" through the image of "the angel of history" with his back turned to the future. Benjamin continues, "where we perceive a chain of events, [the angel] sees one single catastrophe which keeps piling wreckage upon wreckage...but a storm...irresistibly propels him into the future to which his back is turned, while the pile of debris before him grows skyward" (1988:257-258). While these pieces of history piled haphazardly around us force us perpetually into the future, they also give us the agency to actively reconstruct them into an order that makes sense for a given present-day view of that past. This view of the past is not based on teleology, or causality. Benjamin discounts the very concept of a historical cause because "it became historical post-humously...through events that may be separated from it by thousands of years," instead asking the materialist historian to "stop telling the sequence

of events like the beads of a rosary" (1988:263).

This study does occasionally lapse into the recitation of a rosary (particularly in Chapter One), but it attempts to organize more around issues and ideas than chronology, partly because, at least with the music, and to some degree the principals' voices, we can hear into the past through period recordings, writings and interviews.

Foucault begins his exploration of Nietzsche and deconstruction of teleological time and lineage by describing genealogy as operating "on a field of entangled and confused parchments...that have been scratched over and recopied many times" (1984:76). The historian, in Foucault's view, is on "the search for descent," which he opines "is not the erecting of foundations: on the contrary, it disturbs what was previously considered immobile; it fragments what was thought unified; it shows the heterogeneity of what was imagined consistent with itself" (1984:82).

Again, like my engagement with Benjamin, I try to take the middle way, (an unholy mix of Buddhism and Continental philosophy) disturbing and fragmenting those things that it makes sense to disturb or fragment, yet always attempting to find a new way through this snapshot of a historical moment that allows for future re-imaginings, but is "consistent with itself."

Structure of the Study

The basic methodology of this work is to bring together the words and thoughts of the artists with archival materials and relevant interdisciplinary scholarship. The study

is structured to place the individual composers as a group of like-minded creative artists in dialogue with the questions and ideas posited within, in an attempt to draw a picture of the group's significance to a history of experimentalism, their thoughts on their work as a particularly "American" form of expression, and their relationship to (and play with) technology in an aesthetic context. Rather than doing a more traditional composer-by-composer biography, the work draws individual contributions into a multivoiced dialogue around the issues outlined below.

Historical Background

In order to place the work of the Sonic Arts Union in context, Chapter One, "Locating the Sonic Arts Union" briefly outlines the historical time period of the 1960s and contemporaneous social, musical and art groups that contributed to the aesthetic area the SAU inhabits. This includes the 1960s surge of interest in collectives and communes (Case & Taylor 1979), Happenings (Hansen 1965, Kirby 1965, Kostelanetz 1968, Sandford 1995), the Fluxus movement (Armstrong 1993, Friedman 1998, Smith 1998), the work and philosophies of John Cage and David Tudor, as well as the other music collectives formed during this time such as Michigan's ONCE group (Mumma 1967, James 1987, Miller 2003), the San Francisco Tape Music Center (Bernstein 2008), Britain's AMM and Musica Elettronica Viva (MEV), which formed in Rome around the same time as the SAU.

After describing something of the artistic milieu that resulted in the formation of

the SAU, the story of their first performance and subsequent incorporation is related. Except for one short dedicated article (Cox 2002), writings by members of the group (cf. Mumma 1975, Lucier 1998) and mentions of varying length in overviews of electronic music (cf. Nyman 1999, Holmes 2008), the Sonic Arts Union has not been the subject of a monograph until this study. The details of their formation, parts of which are sprinkled throughout numerous interviews across a period of forty years, and illuminated by recent interviews conducted by the author, has not appeared in a multivoiced narrative form until this study.

Re-examining the Cartography of Tradition and Sonic Nationalism

Chapter One also briefly engages with the questions of tradition and place in the musical practice of the SAU. Do they consider themselves part of a tradition, and if so, what is it? Is the music they generate sonically identifiable as "American?" What does that mean? Although this section of Chapter One critically engages with the problematic concepts of genre cartography and sonic nationalism, it also illustrates that the artists (for the most part) have a clear idea of their identity -- where they belong in each of these forms of taxonomy. What does it mean that the artists can place themselves clearly in these cartographies, despite the fact that they are "imagined communities," to borrow from Benedict Anderson (2008)?

The SAU composers obviously do not see their work as a jingoistic celebration of an idealized "America" per se, but they do see it as an aesthetic delineation that does,

in their eyes, seem to more or less match up with the oft-discussed divide between "America" and "Europe." A number of authors have written about an American aesthetic identity in experimental music (Cameron 1996, Heintze 1999, Karolyi 1996, Levy 1983, McCue 1977, Tawa 1984, Tischler 1986, Von Glahn 2003, Yates 1990), constructing a framework for the discussion of the sound of nationality that the case of the Sonic Arts Union can be compared to.

Looking at the Sonic Arts Union's individual histories, formative experiences, and the group's many deep connections to Europe, both personally and aesthetically, is instructive and illustrates the multilayered complexity of these questions. Alvin Lucier's time in Italy on a Fulbright; Gordon Mumma and Robert Ashley actively corresponding with Italian composer Luigi Nono; David Behrman, born in Salzburg, and studying in the Darmstadt summer courses. These histories tell a more complex story than a simple set of geographic parameters perceived to fall in line with aesthetic practices.

Although there is clearly something "American" in what the SAU did, and a cohesive and identifiable network of other actors, there did exist other contemporaneous kindred tinkering technological spirits globally that were outside the SAU's perspective or scene. If that is the case, how does this complicate this idea of "American-ness?"

Following this discussion, George Lewis's important 1998 exploration of "eurological" and "afrological" approaches to experimentalism is re-evaluated in light of the above analysis of "American-ness," and underlying intersections between Lewis's two strategies are proposed.

After this re-evaluation of Lewis's work, there is a brief critical overview of avant garde theory (cf. Bürger 1984, Kaufman 2001, Krauss 1985, Kuspit 2000, Poggioli 1971, Timms & Collier 1988, Williams 1989) as it applies to the Union's work and outlook, and their location in relation to mass cultural trends.

Aesthetics of an American "Tinkering" Technoculture

After establishing the location of the Sonic Arts Union's music in Chapter One, Chapter Two examines the historical emergence of "live" electronic music before focusing on the techno-aesthetics of the SAU and outline their relationship to improvisation and traditional musical work concepts.

Beginning with a brief history of "live" electronic music, the chapter moves into a discussion of the unique aesthetic tools the SAU operated with, and their relationship to the technology they employed in their work. Gordon Mumma's "folk" conception of the *bricolage* that artists in this milieu practiced is discussed. The SAU's aesthetic stance celebrated the quirks and defects of the circuits they pieced together, uniting Cageian indeterminacy with a markedly American "can-do" tinkering tradition. Drawing upon Claude Levi-Strauss's conception of the bricoleur and engineer, I place the Sonic Arts Union's work somewhere between the "devious means" and handcraft skills of the bricoleur and the engineer's attempt to "make his way out of and go beyond the constraints imposed by a particular state of civilization" (1966:19). The instruments and audio equipment used for generating and diffusing the compositions were for the most

part built by the group's members, chiefly Gordon Mumma and David Behrman. This was initially a result of the fact that the equipment needed was not commercially available, but later it became a compositional and aesthetic choice for the sounds that they desired to be constructed from the ground up, so to speak, and not prefabricated.

The traditional composer/work concept is examined in relation to the SAU's practice, as well as differing interpretations of the ideas of composition and improvisation. In many ways, for the Sonic Arts Union, the electronic instruments themselves became the pieces (Mumma 2005) or, "the system is the composition itself," as Maggie Payne (2000) has written. The sounding result could vary greatly from performance to performance, due to the foregrounding of process in the compositional act and directed improvisation in the carrying out of the work, such as in Mumma's composition *Hornpipe* (1967) or Ashley's *The Wolfman* (1964), both of which are discussed in detail in Chapter Four.

Hearing the Sonic Arts Union

Chapters Three and Four are the music analysis chapters of the study, and discuss several works by the Sonic Arts Union composers from the early period of the group. This portion of the project takes into account previous analyses and discussion of SAU members' work (cf. Delio 1984, Lucier 1995, Mumma 1990, Sabatini 2002 & 2005), while also putting discussion of the pieces in dialogue with other relevant discourses such as cybernetics, sound studies, and scholarship on the relationship between sound

and space.

Chapter three, "Traversing Inner Landscapes," focuses on Alvin Lucier's groundbreaking *Music for Solo Performer* (1965), a turning point in his own work, but also a harbinger of the kinds of pieces the Sonic Arts Union would create and perform. In addition to being the first musical composition making use of brainwaves for sound generation, Lucier's struggle in developing the piece is illustrative of the many aesthetic boundaries the SAU composers made a choice to transgress. The relinquishing of control, the decision to perform with electronics live instead of through the use of tape - - these were difficult decisions that contributed to the unique compositional output of the SAU.

Chapter Four, "Cybersonic Soundings of Space: Feedback and Balance in the Music of the Sonic Arts Union" analyzes one piece from each SAU composer through three lenses, and incorporates a wide range of theoretical materials from cybernetics and sound studies. First is a discussion the use of space (both physical and conceptual) in generating and interacting with the composition. Second, there is the exploration of feedback systems and resonance in each work. Finally, the man/machine relationship employed in each compositional system is examined in relation to cybernetic concepts. By utilizing cybernetic analytical tools, I read each of the works as social propositions for man/machine relations as well as aesthetic objects. This takes Gordon Mumma's description of "building communities" of electronic and human instruments to its logical utopian conclusion.

The story of the Sonic Arts Union is polyphonic, as are the solo creative activities of each composer during the time of the group's existence. There is an enormous amount of overlapping with the ONCE Group and ONCE festivals, Ashley's move to California to teach at Mills College, Mumma and Behrman going on tour with the Cunningham Dance Company and their subsequent work at UC Santa Cruz and Mills College, Lucier beginning to teach at Wesleyan University and his work with the Viola Farber Dance Company. All of these elements are important stories spanning more than a decade that will hopefully be fully explored in future scholarship.

Like a rock face made up of a variety of striations and veins, the SAU composers' creative lives inhabited a number of layers simultaneously. In the context of this study it is therefore somewhat artificial to isolate the SAU as I do here. In addition, there are multiple cases of synecdoche committed throughout the following pages in using individuals to speak for the group, and vice-versa. I accept both problematic issues because this collaborative union is the least documented aspect of this period in these composers' work, although the fragments of the story of the Sonic Arts Union are strewn across forty years of interviews, scholarship, and archival documents. These many pieces are examined for the first time here as a whole in an attempt to shape some of the shards into a narrative of the formative years of the group.

Chapter 1. Locating the Sonic Arts Union

*Art, instead of being made by one person, is a process set in motion by a group of people. - John Cage*¹

Beginning in the early 1960s, there was a surge in artist-initiated organizations, collectives, festivals, performance spaces, and intermedia events in the United States and Europe that helped to nourish the groundbreaking artistic work of that historic era. Groups of like-minded artists banded together to form performance groups, including the composer/performer collectives Musica Elettronica Viva in Rome, AMM in Britain, and the Sonic Arts Union in the United States. Festivals of creative new music such as the ONCE festivals in Michigan and the annual Judson Theater Festival of the Avant-Garde introduced the public to a new generation of experimentalists. Artist-run concert venues and galleries bloomed and aesthetic and ideological trends coalesced into clusters

¹ Qtd. in Kostelanetz 1996:8.

such as the one we now know as Fluxus. This "rhetoric of community" that is, according to Banes (1993), "potentially nostalgic" nonetheless aligns the era with "the modernist project of recuperating the loss of wholeness" (Banes 1993:36).

Judit Frigyesi's (1998) study of the intellectual and artistic milieu of turn-of-the-century Budapest, and its impact on the development of composer Bela Bartók vividly illustrates the importance of understanding the backdrop to an artist's work. "As long as we attempt to explain Bartók's innovations merely from within the study of music, some of the most striking aspects of his art remain inexplicable" (Frigyesi 1998:10). The strength of Frigyesi's study is that she examines Bartók as "a person who confronted the problems of a specific place and time" (ibid.:11). The following pages examine a different place and time -- the United States in the 1960s -- in an attempt to give a detailed view not only of the specific elements of the history and practice of the Sonic Arts Union composers, but also some of the network of histories, technologies, artists, communities, cultures and ideas that nurtured them in their artistic growth.

The organizations and groups that helped spur the 1960s explosion in the expressive arts were not bound by strict disciplinary lines. Judson Dance, the Living Theatre, and Merce Cunningham's troupe freely worked and shared ideas and approaches with the producers of this new music. The ONCE group itself was a kaleidoscope of media and disciplines.

This chapter, organized for the most part chronologically, outlines some of these formative developments, focusing on those that took place in the United States from the

late 1950s to the early 1970s², and how they contributed to the cultural landscape that surrounded the Sonic Arts Union of Robert Ashley, David Behrman, Alvin Lucier, and Gordon Mumma.

Following this discussion of the countercultural milieu that framed the Sonic Arts Union, I discuss the group's ideas regarding feeling a part of an "American" tradition, and their relationship to "Europe." This is followed by a reconsideration of George Lewis's seminal (1996) study of the "afrological" and "eurological" streams of new music and their relationships to improvisation. Finally, I engage in a brief discussion of extant avant-garde theory and how it might be applied to the SAU's work.

Black Mountain College

As with other pivotal moments in the development of an art, there is a period of formation and growth before artistic fruits emerge. In the case of the development of the Sonic Arts Union and related events, the experimental Black Mountain College (BMC) near Asheville, North Carolina served as one hot house. Founded in 1933 by John Andrew Rice, Black Mountain College was designed to be an ideal school combining a progressive academic education (no grades or requirements) with practical skills like agriculture and construction, as part of its community-based approach.³ An

² For information on experimental artists groups in Europe during a similar timeframe, see Hillings 2002.

³ BMC has come under renewed study of late (cf. Harris 1987 Lane 1990, Patterson 1996, Katz 2002), though Duberman's (1972) study remains the canonical work on the subject.

unusually large number of important artists passed through BMC as both students and faculty (Joseph Albers, Robert Creeley, Buckminster Fuller, Lou Harrison, Ernst Krenek, Robert Rauschenberg, Edward Steuermann, Stefan Wolpe, and a good percentage of the artists in the "New York School" of Abstract Expressionist painting). The focus here is on the visits by John Cage and Merce Cunningham, who began with a short stay of several days (April 3-8) in the spring of 1948 (Harris 1987:146), a subject covered in great depth by David Patterson (1996). Joseph Albers was sufficiently impressed with Cage and Cunningham's work to invite them back for the summer session in 1948. That summer, Cage premiered his recently completed *Sonatas and Interludes for Prepared Piano* and also put on a festival of Erik Satie's music, which culminated in a performance of Satie's *Le Piège de Meduse*, featuring Buckminster Fuller in the role of the wealthy rentier Baron Medusa.

Most solvent for this discussion is the visit to Black Mountain College by Cage, David Tudor, and Cunningham in the summer of 1952, a touchstone for the later developments examined below. As Patterson clearly illustrates, the Cage of 1952 was a quite different artist than the one who had visited BMC in 1948. In a concert given by Tudor on August 19th 1952, he performed a veritable overview of "New York School" music: works by Morton Feldman, Christian Wolff, Stefan Wolpe, and Cage's own *Music of Changes* (Part 1), the first piece Cage created using "chance operations" with the *I Ching*, which would influence the conceptual and methodological course of several developing composers in the 1960s and beyond. That summer culminated with Cage's *Black*

Mountain Piece (also titled *Theatre Piece No.1*), widely regarded as the prototypical Happening,⁴ but which in turn was also clearly influenced by Cage's engagement with the earlier philosophies and writings of Antonin Artaud, specifically the 1938 *Theatre and Its Double* (Patterson 1996:225-230). Shortly after this last visit to BMC in 1954, Cage moved into the Gate Hill Cooperative Community in Stony Point, NY founded by BMC alum and visual artist Vera Williams.

"New York School" and Neo-Dada

Throughout the 1950s, the "New York School" artists were evolving their work. A "loose confederation of painters, sculptors, dancers, composers, poets and critics based in New York" (Johnson & Mattis 2006:1), as well as artists mentioned above in relation to BMC, was connected internally through friendships and collaborations, yet the label was more or less placed externally upon their collective work by art historians and musicologists; it was not an artist-initiated designation. Another such labeling/clustering of work during this time, Neo-Dada, was coined "in the late 1950s as a pejorative slap, was never applied consistently, and quickly became the principal term used to describe art made between Abstract Expressionism and Pop Art" (Hapgood and Rittner 1995:63). This label emerged in part as a result of a perceived gap between two iconic periods in art, and also because of an increasing interest in Dadaism (at least in

⁴ The characterization of Cage's piece as being both a "culminating" event of that summer session, and the earliest Happening, is disputed by Patterson (1996:232).

New York circles) as the 1960s approached. This was fueled in part by the volume Robert Motherwell edited, *The Dada Painters and Poets*, published in 1951. Increased interest in Dada around this time has also been attributed to Cage's teachings in his music composition course at the New School in New York⁵ (cf. Hapgood and Rittner 1995:64). In 1959, George Brecht, one of Cage's students, produced one of the early intermedia text/performance/music artworks, *Time-Table Music*; setting the stage for what would be an explosion in cross-disciplinary work just a few years later (Flynt 1996:48).

The West and Midwest Experiments in Sound and Light

Parallel developments in intermedia sound and light experimentation emerged in the West and Midwest, including other benchmarks in the formation of the Sonic Arts Union. For example, the Vortex sound/light events and San Francisco Tape Music Center in the Bay Area, Milton Cohen's Space Theatre, and the Cooperative Studio for Electronic Music in Ann Arbor, Michigan, founded by Robert Ashley and Gordon Mumma, all of which occurred in the latter half of the 1950s. The first Vortex performance was May 28, 1957 at the Morrison Planetarium in San Francisco and directly influenced Milton Cohen in the formulation of his Space Theatre project in Ann Arbor (James 1987:363), for which Gordon Mumma and Robert Ashley provided the

⁵ The New School at this time was another important educational institution for the art under discussion here.

music and which marked their first collaboration. As a result of this collaboration, Mumma and Ashley created the Cooperative Studio for Electronic Music in 1958 (Miller 2003:22). Cohen also "enlisted the help architect Harold Borkin...who designed structures to hold Cohen's projectors and mirrors, and to support the large fabric screens, which were arranged into a twenty-sided hemisphere" (Miller 2003:25). Filmmaker George Manupelli was also active in this project, contributing works that were projected on the screens.

Composers Ramon Sender and Morton Subotnik founded the San Francisco Tape Music Center (SFTMC) in 1960, and opened its doors at 321 Divisadero Street in San Francisco the following year. Over the next three years many composers worked there, including Loren Rush, Terry Riley and Pauline Oliveros. Tony Martin joined the group as its visual artist in charge of light projections for the performances. In 1966 the studio moved to Mills College in Oakland, with Oliveros becoming its first director⁶ (Stone 1981:2). The new Mills-based SFTMC changed the dynamic of the studio, and "the organizational problems of being part of a large institution soon took their toll on the original core members of the SFTMC" (Holmes 1985:75). As a result, "by 1967, all of the [original] SFTMC people had departed" (ibid.). When Robert Ashley took over in 1969 as director of what was now called the Mills College Center for Contemporary Music (CCM), it "took the form of a public-access music and media facility that was

⁶ The SF Tape Music Center was moved out of necessity to accept a large grant (Stone 1981:2).

highly innovative but always dependent on the financial generosity of both the university and the granting foundation" (ibid.).⁷

Happenings

The disciplinary cross-pollination that characterizes this era makes it difficult to categorize some of the creative work that was produced, both in terms of the medium and the chronology. The intermedia phenomena of Happenings are a good example. As one author has put it, this moment in American art was a kind of "critical mass."

If enough people communicate with each other about a topic or idea, the whole exceeds the sum of its parts and a chain reaction ensues, spitting out new ideas and influencing more and more people" (Mac Low 2003:2).

Although Allan Kaprow has long received credit for jumpstarting the Happening movement with his piece *18 Happenings in 6 Parts*, it is only recently that the scene around Rutgers University in New Jersey, where he was an instructor in the art department, has been discussed as an equal partner in the genesis of the Happening (cf. Marter 1999, Hendricks 2003). Perhaps not surprisingly, the Rutgers art faculty

regularly cited the example of Black Mountain College in their insistence on interdisciplinary approaches to the arts, advocacy of innovation in the studio, and their non-authoritarian ideas about art education (Marter 1999:2).

The Douglass campus art instructors Bob Watts and Geoff Hendricks also shared this

⁷ For more information on this topic, see the recently published volume (Bernstein 2008) on the San Francisco Tape Center and other Bay Area countercultural experiments.

approach.⁸ Other influential Rutgers-based artists at the time included Lucas Samaras and George Segal. Kaprow began building environmental works that he called "Action Collages" in 1957, which presaged his development of the Happening concept by combining his interests in collage, theatre and assemblage.

I thought how much better it would be if you could just go out of doors and float an Environment into the rest of life...I immediately saw that every visitor to the Environment was part of it....So I gave him occupations like moving something, turning switches on--just a few things. Increasingly, this suggested a more 'scored' responsibility for the visitor. I offered him more and more to do until there developed the Happening (Kaprow 1965:46).

He began attending Cage's composition classes at the New School for Social Research in the winter of 1957 or spring 1958⁹ (Marter 1999:8) to explore the use of the random noise that was developing in his work, and then, from October 4-9, 1959, Kaprow staged his historic *18 Happenings in 6 Parts* at the Reuben Gallery on Fourth Avenue. As is the case with historic events, there are many versions of the story. There was also a proto-Happening prior to the Reuben show, "a demonstration," (Higgins 1976:268) at Rutgers on April 22, 1958 (Higgins 1976:268 and Marter 1999:8). Kaprow's piece "...caused a sensation in the art world, and the form was widely imitated by such diverse artists as Jen-Jacques Lebel in France, Wolf Vostell and Joseph Beuys in Germany, and T. Kubo

⁸ In 1957, Watts developed an art seminar project called the Experimental Workshop, which he began teaching at Rutgers University in 1965, and then moved to the University of California at Santa Cruz in 1968 (for more on this, see Miller & Seagull 2003:20-28).

⁹ There are some discrepancies with these dates – it has previously been stated that Kaprow attended Cage's courses beginning in 1956 (cf. Kirby 1965:32).

in Japan" (Higgins 1976:268).¹⁰

It is not easy to define what a Happening actually is, as such an enormous range of activity falls under its rubric. One possible definition is a "purposefully composed form of theatre in which diverse alogical elements, including nonmatrixed performing, are organized in a compartmented structure" (Kirby 1965:21).¹¹ Or, as Claes Oldenberg simply stated, "the Happening is one or another method of using objects in motion, and this I take to include people, both in themselves and as agents of object motion" (Oldenberg 1965:200). In some ways, its intent to make a "non-matrixed" theater out of (in some cases) the minutiae of everyday living, and to present a collaborative art without a product parallels some of Cage's philosophical intentions with his composition 4'33".¹² Darko Suvin (1970) created a useful taxonomy of Happenings that divides them into four sub-categories – Events, Aleatoric Scenes, Happenings Proper, and Action Theatre, though he discounts the latter as not truly related to the spirit of Happenings, since it is a matrixed form. In attempting to define Happenings, Al Hansen wrote that they

have a reputation for being a crazy theater, an ultra-experimental situation. Actually, the Happening is a rather unique art form which, simply because it holds a great deal of energy and promise, has been misunderstood and misinterpreted in wonderful ways...giving us a much broader range of...exciting, experimentally rich theater than would have been available had there not been this confusion as to what a Happening was (Hansen 1965:7).

¹⁰ For more on Happenings in Europe, see Berghaus 1993.

¹¹ "Non-matrixed" performing is a situation in which the performers are not "acting" but simply physically taking part in an event in their "role" as themselves.

¹² See Drucker 1993 for an excellent discussion of this point.

Regardless of what it was, the Happening was without a doubt presage of the 1960s, when the critical mass of the 1950s exploded into an historic outpouring of creativity.

The Chambers Street Series and the Avant-Garde Festival

The years 1960-63 in New York were significant for the development of new venues for the widely varying forms of emergent art and music, and would be crucial to the development of Fluxus. In his very informative 1996 article on La Monte Young, Henry Flynt gives an insider's view of the developing scene. Young arrived in New York from California in October 1960, and immediately set about producing a concert series at Yoko Ono's downtown loft studio on Chambers Street, the first of which took place on December 18, 1960. As Yoko Ono remembers it:

When I first thought of renting a loft, my friends in classical music, Juilliard people, advised me not to do it downtown. They said, 'You're crazy, you're wasting your money, nobody's going to go there. Anybody who's interested in 'serious' music goes to midtown (Qtd. in Gann 2006:24).

The concerts featured Young's work, as well as that of his friends and contemporaries Henry Flynt, Terry Jennings, Toshi Ichianagi (Ono's first husband), and Young's teacher, Richard Maxfield. Flynt (1996) describes Young's preoccupation with newness. One indication of Young's outlook at the time of this concert series is the concluding line of the flyers for the Chambers Street concerts: "THE PURPOSE OF THIS SERIES IS NOT ENTERTAINMENT" (Flynt 1996:59). By June 1961, Young began curating a series at Fluxus "founder" George Maciunas' A/G Gallery on Madison Avenue (Flynt

1996:67). There were also a number of concerts taking place at the Living Theater in 1960, where Merce Cunningham had moved his studio, including performances by Brecht, Cage, Tudor, Kaprow, Ichiyanagi and Young.¹³

Skipping ahead for a moment to 1963 before returning to other pivotal events in 1961-62, the Avant-Garde Festival founded by cellist Charlotte Moorman was another major venue for this music that began at Judson Hall (across from Carnegie Hall) on August 20, 1963 to an interested, but baffled, press (Rubin 1963). The duo of Gordon Mumma and Robert Ashley performed at the second installment in 1964, a concert of their own works (Ashley's *Wolfman* and Mumma's *Hornpieces*) as well as a Morton Feldman composition for two pianos. The concert was less than well-received by at least one member of the press, the New York Times writer Howard Klein: "The entertainment was an exercise in tediousness...None of the antics showed much imagination except that of old-hat iconoclasm" (Klein 1964:29). Regarding the title of the festival, Moorman said, "we never thought of applying the term avant-garde to this festival of concerts. We hated it – all of us did – Varèse, Cage, Tudor, Behrman" (Varble 2003:173). What made her decide to use the label was an unhappy customer who made legal troubles for the festival during the first year. "That's when I added 'Avant-Garde' to the name, just so that everyone would know that the festivals are not composed of works by Mozart" (ibid.).

¹³ For example, there were documented concerts of new music at the Living Theater on January 25, March 14, April 11, August 1 and August 8 (Hendricks 2003:184-5).

Fluxus

Of all the topics mentioned here, Fluxus has the most published material available (Jenkins 1993, Pijnappel 1993, O'Dell 1997, Williams 1997, Friedman 1998, Smith 1998, Hendricks 2002, Higgins 2002, Solimano 2002, Hendricks 2003). This is due, in part, to the fact that what falls under its broad rubric encompass (in one way or another) nearly every topic covered in these pages. As one recent publication asks, "What's Fluxus? What's Not!" (Hendricks 2002). In addition, a number of works made in the Fluxus spirit are "gallery friendly," and have therefore been able to thrive and exert more influence over time than the site-specific Happenings, for example. It is also due, however, to the audacious organizational verve of "Mr. Fluxus" himself, George Maciunas. Fluxus is "both an attitude towards art-making and culture that is not historically limited, and a specific historical group" (Smith 1998:1). It "developed out of a need for a mechanism to present and disseminate a growing number of new works certain artists were producing...not out of a specific ideological program" (Smith 1998:25). This attitude was intended to be based on

an unpretentious directness that brought into question the notion of high art...thus, part of the larger, more general development in the twentieth-century avant-garde that sought not just to change art but to change the way people perceived the world and cultural differentiations (Smith 1998:3).

One of the early impulses for Fluxus was The Audio Visual Group (AVG) formed in 1959 by Dick Higgins and other artists who had taken part in Cage's class at

the New School for Social Research. Beginning in 1959, the AVG put on a number of concerts and events that were a kind of template for the La Monte Young-curated Chambers Street series discussed above. Maciunas and Young met in "a continuation of Cage's class taught by the composer Richard Maxfield at the New School for Social Research in late 1960 or early 1961" (Smith 1998:31).

An important touchstone was the publication of *An Anthology*, co-edited by La Monte Young and Jackson Mac Low, with a striking graphic design by Maciunas. *An Anthology* "was significant for the formation of Fluxus because it helped to solidify the growing relationships among a group of artists interested in experimental work" (ibid.:39). Maciunas decided to publish a second book that Young did not want to be involved with, so he moved ahead with the project, calling it Fluxus. As a result, "the first use of the word Fluxus by Maciunas was thus not as a reference to a style...attitude...or even a group, but simply as a title to a publication" (ibid.:40). The 1962 Wiesbaden Fluxus Festival is often cited as being the real 'coming of age' of Fluxus, but as Smith points out, it "came into being through a series of developmental stages; it is impossible and/or incorrect, therefore to pinpoint a specific date or location for its beginnings" (ibid.:25).

The Dance Scene as Catalyst

One precursor of artist-initiated developments in dance that effected the milieu of post-WWII music the Sonic Arts Union exists within is the seminal collaborations

between John Cage and Merce Cunningham, beginning with the August 1942 *Credo in Us*. The Cage/Cunningham collaboration is directly related to two of the members of the Sonic Arts Union: Gordon Mumma and David Behrman, who both worked with Cage, David Tudor and the Cunningham troupe steadily from the the mid-1960s into the mid-1970s.¹⁴ The Cunningham group was a laboratory for the development of new techniques and devices for live electronics and interactive dance/music systems.¹⁵

The San Francisco Dancer's Workshop that Ann Halprin founded in 1955 was another important organization, which, in 1959-60, had as their co-musical directors La Monte Young and Terry Riley (Rainer 1965:145, Strickland 1993:10). La Monte Young delivered his *Lecture 1960* there to a class in contemporary music in the summer of 1960 (Young 1965:73). Halprin's workshop also produced dancers who would later help form the Judson Dance Theater group, including Yvonne Rainer.

The Judson group formed in part as a result of choreography workshops Robert Dunn gave in the fall of 1960 at Merce Cunningham's studio in the Living Theatre building, one floor below the theatre. Perhaps not surprisingly, Dunn had also attended and been influenced by his studies with Cage during his tenure at the New School in the late 1950s.

It was the "concert of dance" in 1962 at the Judson Church that signaled the coming of age of the group, which combined the synergies of Happenings, avant-garde

¹⁴ Mumma worked with the Cunningham company nearly full-time from August 1966 until mid-1974.

¹⁵ For more on this topic, see Rogalsky 1995.

music from both the classical and jazz traditions (in collaborations with composer/performers like Philip Corner, Meredith Monk, Cecil Taylor, and later Bill Dixon), and the experimental compositional approaches of the visual arts. Several aspects of this concert would later become essential features of the Judson Dance Theatre...the democratic spirit of the enterprise; a joyous defiance of rules, both choreographic and social; a refusal to capitulate to the requirements of communication and meaning that were generally regarded as the intention of even avant-garde theatre; a radical questioning, at times through serious analysis and at times through satire, of what constitute the basic materials and traditions of dance (Banes 1982:174).

Although the "golden era" of the group lasted only two years, their impact on the creative arts of the time was sizable. The group's end happened because "individuals were emerging from the group whose needs were no longer satisfied by the collective concerts" (Banes 1983:209). Regarding the demise of Judson, Philip Corner has written

There were, in fact, problems in the differences of the quality of people's work. What could have held everybody together was a sense of personal exploration, a certain newness...if everybody were committed to exploration...[but] when people start coming in doing familiar stuff – not pioneering, not exploring, not even against established dance...it had to end. And aside from that, people were developing their own careers; they had less time for it and less need for it (Banes 1983:209-210).

This shift in "need" from a collective support system to the pursuit of an individual career seems to be a common trajectory for artist-initiated groups.

The ONCE Group

In Leta Miller's (2003) essay on the beginnings of the ONCE Festival, she points to several catalysts that led to its production. The first is a 1958 lecture by Karlheinz Stockhausen, attended by Robert Ashley and Gordon Mumma (among others) where he "urged young composers to assume responsibility for performances of their own works rather than relying on institutional support" (Miller 2003:28). Next came the 1960 residency by Spanish composer Roberto Gerhard, who ONCE founder Donald Scavarda has said, "was the catalyst" (ibid.:33). That same month, John Cage, David Tudor and Luciano Berio "all came to Ann Arbor -- without support from the School of Music" (ibid.:34). The final event Miller isolates as sparking ONCE is an August 1960 international composers' conference in Stratford, Ontario that principal ONCE organizers Mumma, Roger Reynolds, Ashley, and George Caccioppo attended. It was less than successful in their view. Reynolds remembers, "I think probably Bob said, 'We could do a better festival than that.' So ONCE hatched right there in the car" (ibid.:40).

The first ONCE festival took place in February and March, 1961, and continued annually until 1968, when it disbanded after Ashley took a position at Mills College. During the years of its operation, the festival managed to bring an enormous diversity of artists from many disciplines to Ann Arbor to perform, from Luciano Berio to Eric Dolphy, Morton Feldman and the Judson dancers. The ONCE Group also toured on several occasions around the United States. Performances that blended elements of

dance, music and theater were central, and helped synthesize the many tributaries of this stream of 1960s art, so much so that one author (James 1987) has dubbed it a "microcosm of the 1960s musical and multimedia Avant-Garde" due to its "community orientation, cosmopolitan decentralization, and collaborative, interdisciplinary working methods" (James 1987:360). The still-active Ann Arbor Film Festival "was a direct outgrowth of the ONCE Festival" (Mumma 1967:391). ONCE also was what helped bring together the composers that would then form the Sonic Arts Union. Mumma and Ashley were already working together with ONCE, as a duo, and with Milton Cohen. Alvin Lucier came to ONCE as choir director of the Brandeis University chorus in 1964, and David Behrman made his first ONCE appearance at the 1965 fest.

There are times in a culture-community when the situation is ripe for action, when you find the right people in the right place at the right time. It is important to note that the production of once-a-year only events would not have sparked the creative momentum in Ann Arbor. What is needed is a continuous scheduling of diverse and even opposing activities (Mumma 1967:396).

Experiments in Art and Technology

Experiments in Art and Technology (EAT) was founded in 1966 by engineers Billy Klüver and Fred Waldhauer, and artists Robert Rauschenberg and Robert Whitman. Centered more or less in New York City, its purpose was to

maintain a constructive climate for the recognition of the new technology and the arts by a civilized collaboration between groups unrealistically developing in isolation. Eliminate the separation of the individual from technological change and expand and enrich technology to give the individual variety, pleasure and avenues for exploration and involvement in contemporary life. Encourage industrial initiative in generating original forethought, instead of a compromise in aftermath, and precipitate a mutual agreement in order to avoid the waste of a cultural revolution (Klüver & Rauschenberg 1967).

Although EAT was not officially established until 1966, Klüver had already begun his experiments combining art and engineering in 1960 with the construction of Jean Tinguely's *Homage a New York*, a machine that destroyed itself. Then working at Bell Labs, Klüver and fellow Bell workers "constructed timing and triggering devices to release smoke, start a fire, [and] break support members...it destroyed itself in 30 minutes" (Klüver 1983:4-5). Klüver began to attend the Happenings at the Reuben Gallery in the fall of 1960. He was also greatly impressed with a show curated by Martha Jackson, "New Media-New Forms," which included works by Dine, Kaprow, Whitman and Oldenburg (ibid.:9).

By 1966, the limitations of the Happenings and the Judson Church situation were apparent. Interest among the artists to use technology had grown (Klüver 1983:40). As a result, Klüver, Whitman, Waldhauer and Rauschenberg formed EAT and produced the "9 Evenings" performances of theatre and engineering at the 69th Regiment Armory, which opened on October 13, 1966. The series of concerts included works by Cage, Tudor, Rauschenberg, Judson dance members Steve Paxton and Yvonne Rainer,

Deborah Hay and others.

Although EAT produced a number of collaborative works acting "as a transducer between the artist and the industrial laboratory" (ibid.:56), most relevant to this work is the Pepsi Pavilion project for the World Expo in 1970 in Osaka, Japan. The Pavilion was an experimental structure clothed in fog, light and sound, and was a kind of crowning achievement of EAT in its quest for a healthy marriage of technology, industry and creative arts. Gordon Mumma, David Tudor and engineer Larry Owens designed the unique 37-loudspeaker sound system for the building, with Mumma in charge of the sound modification devices, and Alvin Lucier submitted a proposal for a site-specific composition that was never carried out due to the shutdown of the project. In the end, budgetary issues and aesthetic differences with Pepsico, the corporate sponsor, caused the project to be abandoned.

Ant Farm

The San Francisco-based Ant Farm was "a collective of radical architects who were also video, performance, and installation artists," formed in 1968 by two recently graduated architecture students, Doug Michels and Chip Lord. They were soon joined by Curtis Schreier, Hudson Marquez and Douglas Hurr, among others (Lewallen & Seid 2004:1). Initially working mainly in architecture, the medium in which they were trained, the group soon broadened their experiments into (often political) performance art and video avenues. Taking inspiration from the architecture of the rock group as a "model of

practice," (Lewallen & Seid 2004:6) Ant Farm explored with a spirit of collective creation, that, though different from the Sonic Arts Union's *modus operandi*, was much in the same spirit of invention, mutual support, and exploration.

Composer/Performer Groups

In the mid-1960s there was a sudden explosion of groups of composer/performers, many of whom were creating live electronic music¹⁶. Combining varied influences from the above elements with an interest in live electronics, improvisation (in one form or another) and collective collaboration, they surged into the arts milieu of the 1960s.

Larry Austin's New Music Ensemble (NME), based in Davis, California, began meeting in 1963 "as performers, to explore free group improvisation and to make new music" (Austin 1968:16). In part from being exposed to Austin's group, Italian composer Franco Evangelisti formed the Gruppo di Improvisazione Nuova Consonanza in Rome in 1964, using improvisation as "no longer a new-dadaist attack on the concept of a work of art, rather its expansion" (Borio 1992:2).

In 1965, AMM was formed in London by Eddie Prevost, Lou Gare, Keith Rowe and later, Cornelius Cardew. AMM "denied all external authority and resisted individual attempts to impose their will upon events" (Prevost 1995:13). Also in 1965, the

¹⁶ See Mumma 1975, Ernst 1977 and Cox 2002 for more on these groups.

Association for the Advancement of Creative Musicians (AACM) formed in Chicago.¹⁷ This collective, coming from a jazz background (a trait also shared by many members of AMM, the NME, and Musica Elettronica Viva) in the African-American south-side of Chicago, fused their interests in jazz and post-Cage experimental musics into a new and organic aesthetic. AACM members Anthony Braxton and Leroy Jenkins would later collaborate with members of the Sonic Arts Union, Musica Elettronica Viva (MEV) and Merce Cunningham (cf. Ericson 1970 and Kisselgoff 1975).

MEV was formed in 1966 in Rome by American expatriate composer/performers Richard Teitelbaum, Frederic Rzewski and Alvin Curran, along with Allan Bryant, Jon Phetteplace, Carol Plantamura and Ivan Vandor. Later, saxophonist Steve Lacy would also join the group. MEV was interested in improvised live-electronic music and a new formal relation "such as that existing between many different individuals considered not as mere 'performers' but as living bodies, and the relation created between the individual and his own 'double' " (Rzewski in Austin 1968:23).

In 1966, after performing a concert together at the Rose Art Museum at Brandeis University organized by Alvin Lucier, the Sonic Arts Group came into being, as outlined in depth below. Based on the long working relationship between Robert Ashley and Gordon Mumma and their experiences with the ONCE group, the union also included Lucier and David Behrman. The name was shortly changed to Sonic Arts Union because

¹⁷ For more on the AACM, see George Lewis's groundbreaking monograph, *A Power Stronger Than Itself* (2008).

"Ashley suggested we change our name...[since] we were not really a group that improvised or made collaborative works. We were simply like-minded composers who got together to share equipment and perform concerts" (Lucier 1998:5).

Each of the aforementioned artist-initiated groups served a variety of purposes, and functioned in many diverse forms, but there are a few overarching concerns they attempted to address: the creation of venues for their creative expression, a support structure and community for marginalized arts/artists and as a framework within which to create new intermedia experiments, and the construction of networks to link geographically separated artists through aesthetic communication and performance possibilities. This early aesthetic activism and community-building laid the groundwork for the kind of collaboration we see in the Sonic Arts Union.

From the Individual to the Collective

In an enlightening article (Austin 1968), members of Larry Austin's New Music Ensemble, AMM, MEV and the SAU discuss why they formed groups, what purpose they served for the music, and the nature of group vs. institutional dynamics.

The real problem exists in the basic reluctance the individual has to overcome to allow himself to be a part of a group in the first place...we all must believe that there is something more here in the group at this moment than we can accomplish as individuals (Austin 1968:15).

This balancing dynamic between the group and the individual is something Gordon Mumma addressed in the same discussion, "Group experimentation seems to end for

many people when they have gained prominence as an individual" (in Austin 1968:17).

Cornelius Cardew (of AMM) questions what the possibilities might be if the individual can truly meld with a group –

Does group direction, or authority, depend on the strength of a leading personality...or does the collation of a set of minds mean the development of another authority independent of all the members, but consisting of them all? (Austin 1968:18).

Before delving into the history and workings of the Sonic Arts Union, I introduce the "cast of characters" through brief biographical sketches of their origins and early work.

Robert Ashley was born in Ann Arbor, Michigan, a place that would be instrumental in his early creative life, on 28 March 1930. There is almost no information on his childhood and family available, and he is, for the most part, uninterested in discussing this period of his life, as he considers it not directly related to his work. He enlisted in the Army for a short time, attended the Manhattan School of Music for one year, and then moved back to Ann Arbor to attend the University of Michigan because he "wanted to get a Ph.D. in music" (Soltes 1998). Unfortunately, he

didn't get along very well with the composition department, and they didn't get along very well with me, so nothing came of that. It was very discouraging, except for the last year that I enrolled as a special student. I had a wonderful teacher named Roberto Gerhard, who was a Spanish composer who had been in exile from Franco's regime, in England, and he had come to replace somebody on sabbatical. He was extremely encouraging to me" (ibid.).

Ashley started working in the Speech Research Laboratories at the University of

Michigan

which was a very nice institute, independent of the university. They were very encouraging to me. I worked there for three years and they actually offered me a Ph.D. in psychoacoustics. I declined because I thought I should stay loyal to my idea of being a composer. But it meant that I got a lot of experience with theory of speech, with theory of hearing, with the various theories of language roots and what language means, and with electronics. There was more electronic equipment in that place than I had ever had a chance to use before, so that was very fruitful for me" (ibid.).

Like Mumma, he worked with Milton Cohen's "Space Theatre" and organized the ONCE festivals before joining the Sonic Arts Union in 1966. His work since the SAU has been focused on opera works for stage and television.

David Behrman was born in Salzburg, Austria on 16 August 1937 and grew up in New York City. He was born into a family of artists and intellectuals -- his father was the famed playwright and novelist S.N. Behrman, and his uncle the celebrated violinist Jascha Heifetz. Behrman attended the Phillips Academy Andover, where he met his colleague, pianist/composer Frederic Rzewski. After Andover, Behrman studied privately with composer Wallingford Riegger, "a wonderful man who introduced his students to the work of Cowell, Varèse, Ives; and to radical left politics; and to species counterpoint and serialism, among other things" (Behrman in Pollack 1992:371). He attended Harvard for music composition, studying with Walter Piston and graduating in 1959. He remembered Piston as, "a skilled craftsman and as a creator of music with grace and a style that sprang from an intelligent, complex mind with a sharp, understated New England wit" (ibid.). Behrman spent 1959-1960 in Europe on a Paine Fellowship,

first in Darmstadt and later in Belgium, working as an assistant to composer Henri Pousseur. Upon returning to New York City in the early 1960s, he became involved in the new music fomenting downtown.

Alvin Augustus Lucier was born in Nashua, New Hampshire in 1931. He was named after his father, a classically trained violinist and lawyer who was elected mayor of Nashua in 1937. His mother, Kathryn Lemery Lucier, played popular songs on the piano, and one of Lucier's earliest musical memories are of his mother and father playing music together. Lucier studied drums beginning around age nine, performing with the school band and later as a substitute in the New Haven Symphony.

His early interest was Jazz, including the big bands of Stan Kenton and Count Basie. He attended Portsmouth Priory preparatory school in Rhode Island, and upon graduation entered Yale University in 1950, where he became deeply taken with Classical music, studying composition with Richard Donovan, David Kraehenbuehl and Quincy Porter. He received a B.A. from Yale College in 1954 and briefly attended the Yale School of Music from 1955 to 1956. In 1958, he entered a Master's program at Brandeis University, studying with Arthur Berger, Irving Fine and Harold Shapero. In 1959 he attended the Tanglewood courses, studying composition with Aaron Copland and Lukas Foss.

He completed his MFA at Brandeis in 1960, and was awarded a Fulbright fellowship to Italy, where he spent two years, first enrolling in the Benedetto Marcello conservatory in Venice, where he studied with Giorgio Federico Ghedini. During the

second year, he moved to Rome and studied with Boris Porena, Goffredo Petrassi's assistant, as well as spending two weeks at the Studio Fonologico in Milan. He spent a summer at the Darmstadt courses in Germany, where he was first exposed to the music of John Cage and David Tudor.

In 1963 he was invited to join the Brandeis faculty as a choral director. While director of the choir he performed and recorded works by Earle Brown, Morton Feldman, Robert Ashley, Pauline Oliveros and others. In 1970 he joined the faculty at Wesleyan University and was appointed the John Spencer Camp Professor of Music, a position he holds to this day.

Lucier's earliest music, composed while a composition student at Yale University, was written somewhat in the style of Stravinsky. During his time in Italy, Lucier delved into the compositional approaches of the European avant-garde, composing *Fragments for Strings* (1961) for string quartet and *Action Music* (1962) for piano. He also experimented with tape music, composing at the electronic music studios in Milan. Upon his return to the United States, Lucier realized that the European styles he had been studying and composing in were not his natural aesthetic voice.

Inspired in part by his colleagues, composers David Tudor and John Cage, Lucier reinvented himself with a composition for amplified brainwaves, *Music for Solo Performer* (1965). His subsequent work continued to explore sound phenomena, such as *Vespers* (1967), which used Sondol echo-location devices to musical ends, and is discussed in Chapter Four.

By the mid 1970s, Lucier returned to composing for acoustic instruments, applying his approach to sonic phenomena in a series of works called *Still and Moving Lines of Silence in Families of Hyperbolas* (1973-1974). Other pieces from this era came closer to gallery installations than standard concert pieces, such as *Music for Pure Waves, Bass Drums and Acoustic Pendulums* (1980), which uses sweeping sine tones to cause ping pong balls hanging in front of bass drums to move wildly, striking the drums in indeterminate rhythms based on their unique vibratory properties.

In the 1990s and into the 21st century, Lucier continues to follow his exploratory path, writing pieces that examine the sonic properties of resonant vessels, from the teapot in *Nothing Is Real (Strawberry Fields Forever)* (1990), to the bronze metallophones of the Indonesian gamelan, in *Music for Gamelan Instruments, Microphones, Amplifiers and Loudspeakers* (1994).

Gordon Mumma was born on March 30th, 1935 in Framingham, Massachusetts the eldest child of two. His father was a credit manager for a paper products company, and his mother was a substitute school teacher. His younger sister, Karen Palmer is a cellist and music teacher. He has early memories of his father playing both cornet and harmonica and having a classical record collection, and of attending rehearsals of the Boston Symphony Orchestra conducted by Koussevitzky with a BSO patron friend of his parents.¹⁸ His family moved to Hinsdale, Illinois in 1946 or 1947. Mumma began

¹⁸ Mumma recalls hearing rehearsals for the premieres of a Walter Piston symphony, and Bartok's *Concerto for Orchestra* in the 1940s (Email correspondence with the author, 4/23/09).

studying piano and the French horn in junior high school there. He played the horn avidly from junior high on. The family moved again after two or three years to Ferndale, Michigan, a suburb of Detroit, where Mumma began to study with Kenneth Schultz, hornist for the Detroit Symphony. He attended music camp at Interlochen for four summers beginning in 1949, and was actively performing in various chamber groups and orchestras both in and outside the school environment. In 1952, after being kicked out of high school for playing jazz (Stan Kenton arrangements) during a chamber music rehearsal, he was given the choice by an enlightened principal, who saw his potential, to attend the University of Michigan to study music. He began his studies at the University of Michigan in January 1953, and studied with composer Ross Lee Finney for a short time, with whom he had a troubled aesthetic relationship, but whom he respected. Robert Ashley and George Crumb were two now notable students in Finney's seminars. Later, Spanish composer Roberto Gerhard was a visiting lecturer at Michigan, and Mumma, like Ashley, spent a significant amount of time discussing music with him. Mumma's work with Milton Cohen's Space Theatre, and in the cooperative electronic music studio he built with Robert Ashley is outlined later in this chapter, as is his instrumental work with the ONCE festival.

The Forging of the Sonic Arts Union

One catalyst for the formation of the Sonic Arts Union was a concert of the music of Earle Brown and Morton Feldman that took place at Town Hall in New York

City, on October 11th, 1963. Gordon Mumma and Robert Ashley had driven out from Ann Arbor for the performance, and Alvin Lucier remembers coming down from Brandeis University, in his role as conductor of the Brandeis chamber chorus, to perform in the concert. A New York Times review of the performance by Theodore Strongin (1963:21) does not specifically mention the work of the Brandeis chorus, or Lucier, but "choral fragments" are mentioned in Strongin's description of Brown's pieces. Alvin Lucier has identified the Brown work the chorus performed as *From Here* (1963) (email correspondence with the author, 4/16/09). Other pieces performed on the concert included Feldman's *Vertical Thoughts* (1963), *Straits of Magellan* (1961), *for Franz Kline* (1962), *Swallows of Salangan* (1960) (one of the pieces the Brandeis chorus performed in), and Earle Brown's *Pentathis* (1958) and *Available Forms I* (1961). The concert was "sponsored by the Foundation for Contemporary Performance Arts, Inc., which sells paintings by avant-garde moderns to make money to perform music by avant-garde composers" (Strongin 1963:21). David Behrman remembers meeting Robert Ashley at "one of those famous Town Hall concerts," but it is unclear if it was this particular performance, and whether that was when he met Mumma as well, though he did enter into a written correspondence with Mumma regarding electronic instrument construction by 1964 (interview with the author, 12/8/06). Lucier and Behrman had met earlier, during their respective time in Europe through Frederic Rzewski.

For the 1964 edition of the ONCE festival, Ashley and Mumma invited Alvin Lucier and the Brandeis chamber chorus to Ann Arbor to perform. The chorus

performed on two nights of the fest, February 28th and February 29th, playing works by Michael Adamis, Henri Pousseur and John Cage on the first concert, and pieces by Morton Feldman, Anton Webern and Joseph Byrd on the second.

David Behrman was invited to ONCE in 1965 and presented *Track* (1965), a chamber work for acoustic instruments with tape accompaniment, on February 13th. On March 29th, 1966, for a ONCE recording date, his *Wave Train* (1966) was performed by the ONCE group with David Tudor, on a shared program that included Mumma's *Horn* (1965) and a piece by Ashley entitled *Quartet* (1966).

The event that is considered by all four composers as the real beginning of their work as the Sonic Arts Group (as they were first known before changing the name to "Union") was when Lucier invited Ashley, Behrman and Mumma to perform at the Rose Art Museum at Brandeis University on April 22nd, 1966. The pieces performed on this concert included (according to Lucier) Mumma's *Hornpipe* (1967) and Behrman's *Runthrough* (1967), but the group was not billed as the Sonic Arts Group at this point. Lucier had organized and performed a concert in the museum a year before, on May 5th 1965, with John Cage and Christian Wolff, which included the premiere of Lucier's *Music for Solo Performer* (1965). The other works on the concert were Cage's *0'0"* (1962) and *Rozart Mix* (1965), as well as *Spring* by Christian Wolff.

That concert I did with Cage in 1965, which gave me the idea to invite these guys to the Rose Art Museum. The museum was more up to date on art than the music department, if you can understand that. They had a series of directors that came right out of the professional world, Bill Seitz and Sam Hunter, they came out of MOMA...they were sophisticated pros, so when I approached Sam and I said, 'I would like to invite John Cage, I don't think the music department would appreciate...' he said, 'Great!' For Sam, Cage was the composer, for the music department, he was a crackpot!" (Alvin Lucier, interview with the author, 6/3/05).

Of the Sonic Arts Group's first concert, Lucier recalls,

The Rose Art Muesum was a wonderful place to perform, because it wasn't a concert hall. It had an upstairs, a downstairs, and a little platform in between so you could see up and down, and so it was an unconventional space that was great for performance because the audience comes in with very different -- not very different, but different expectations. So, we did our concert with Bob and David and Gordon, and it was total disaster. Nothing worked, you know! In those days there wasn't any such thing as a big mixer..." (interview with the author, 6/3/05).

Despite the fact that "nothing worked," Ashley remembers,

after the [Brandeis] concert we were just talking and we said, "Well, we should get together." I think it was Alvin and I mainly that were doing this...We just had the idea that if one of us got invited to someplace, we could offer the guy four composers instead of one composer...I think that was a successful part of it. Then we started doing a lot of concerts" (interview with the author, 9/11/06).

Gordon Mumma remembers a variation of this origin story:

It was somewhere about '65 that Alvin and David and Bob Ashley and I, probably sitting in Bob's house or something like that with what I suspect was some kind of Kentucky whiskey, but who knows what it was at the time...'We should do concerts!' We liked each other, we liked each other's music, we liked the differences of each other's music - and that phrase is fundamental. It was the fact that we were all very different, and doing interesting things, they different than what I was doing, different from what Ashley was doing, and all the rest of it" (interview with the author 6/4/05).

Clearly at the foundation of their union was friendship as well as aesthetic connections and mutual interest in each other's work, but there were also practical reasons for joining together as a performing group:

The ONCE Group pieces involved a lot of people -- they were rather expensive by those standards, and so the idea of doing just a smaller piece that you'd have three people could help you with -- because they knew about equipment and that kind of thing -- was sort of interesting to me...in other words, I could do certain pieces that I wouldn't necessarily think of as part of a solo concert...[so] Alvin and I started talking, and we decided that we could do this other kind of concert which had three or four composers on it and do smaller pieces that didn't involve so many people." (Robert Ashley interview with the author 9/11/06).

In a letter to David Tudor dated August 27th, 1966, Gordon Mumma wrote:

I hope you see [David] Behrman in the next few weeks. He will tell you of what he has been doing while we were in Europe [for Mumma's first Merce Cunningham tour]. He has made a group, called SAG, I think for Sonic Arts Group, and scheduled some Lincoln Center concerts...I saw Pauline [Oliveros] in NYC, at Behrman's. She was on her way back to San Francisco. I think she is the SAG representative for the west coast. Couldn't be in better hands (Mumma 1966a).

What this letter implies is first that David Behrman's role in helping create the Sonic Arts

Union may have been greater than that shifting beast called memory recalls, and second, that the original intention for the Union might have been broader in scope, encompassing other like-minded composers like Pauline Oliveros. Further evidence of this is a concert, likely organized by Behrman and Ben Patterson (and alluded to in Mumma's letter) which took place at the Lincoln Center performing arts library on 7 November 1966. The concert was billed as the "Sonic Arts Group," and was listed as including a performance of Lucier's piece for amplified brainwaves, *Music for Solo Performer* (1965), as well as performances of unknown works by Max Neuhaus, Takehisa Kosugi, Ben Patterson and Takahiko Imura (NY Times, 1/6/66:154).

How the group settled on their name, changing it from "Group" to "Union" is another detail that is now filtered through memory. Gordon Mumma, in 1982, remembered,

the name Sonic Arts Union was actually invented by Ben Patterson, who took us on as a manager. Ben Patterson was a composer and a good bass player, by the way, and an entrepreneur of new music in New York. He gave us the name Sonic Arts Group, and we changed it to Sonic Arts Union later on (Plush 1983:110).

More recent interviews by the author have all four members of the Union remembering Robert Ashley as the driving force behind the adjustment:

I think because of the ONCE Group, and there were other groups around -- it's a strange word anyway, and I thought we weren't really a group. I mean, we didn't have an ensemble, we were just four guys, and so I suggested that the word 'Union' might be a better description of what we did than 'group'. I mean, we didn't actually rehearse, you know? We played. (Robert Ashley, interview with the author, 9/11/06).

Though the specifics of how these early decisions were made will likely never be completely unraveled, the Union had been forged, and their work together was underway.

Continental Shifts

In 1933, composer Henry Cowell published an edited volume entitled *American Composers on American Music*. Cowell collected articles from a number of American composers in an effort to present the state of American art music through the words of its practitioners.¹⁹ One of Cowell's contributions to the text is an essay titled "Trends in American Music," in which he categorizes the various streams of American compositional activity in relation to both their national affiliations (were they born in America or are they immigrants) and how their methods compare to those practiced in Europe. Cowell's first category is dedicated to composers that "have developed indigenous materials, or who are specially interested in expressing some phase of the American spirit in their works" (1933:3). This group included himself, Charles Ives, Carl

¹⁹ The book also surprisingly included Mexican Carlos Chavez and Cuban Alejandro Garcia Caturla, broadening the idea of "America" with its scope.

Ruggles, Charles Seeger, Roy Harris, Henry Brant and Ruth Crawford. Cowell proceeds to describe a total of eight categories of American composers, with African-American composer William Grant Still being "difficult to group."²⁰ As with any categorization, much is learned from how the categories are imposed, what is left out, and what is included. John Cage, Harry Partch and Conlon Nancarrow are notably missing, but given the publication date of 1933, Cage had only just begun to study with Cowell, Partch was only beginning to build his music system, and Nancarrow was approaching his decision to join the Abraham Lincoln brigade in Spain. Certainly, had the book been published a decade later, these artists would have likely appeared in its pages.²¹

I begin this brief discussion of continental shifts as they relate to the work of the Sonic Arts Union with Cowell's text because it is an early example of 20th century American composers attempting to define themselves. Of course, there are a wide range of books written by scholars in search of an American art music aesthetic (cf. Cameron 1996, Heintze 1999, Karolyi 1996, Levy 1983, McCue 1977, Tawa 1984, Tischler 1986, Von Glahn 2003, Yates 1990), but this is one of the earliest composed by the artists themselves. In addition, Cowell's text encompasses, more or less, the artists and

²⁰ Still is described by Cowell as possessing "perhaps the beginnings of a genuine new style," though "his works are unformed and contain many crudities" (1933:11).

²¹ Of course there are many problems with the canonization of these same figures (e.g. the "American Five") in scholarly discourse as being representative of the full gamut of 20th century American experimental music expression, the polemics of which scholars such as George Lewis, on Chicago's AACM (2008), and Benjamin Piekut (2008), on New York City circa 1964, have begun to address with their much needed interventions. In this particular case, the familiar list does in fact represent a number of the touchstone figures for the SAU's work.

"aesthetic tradition" the Sonic Arts Union members felt a connection with, particularly the work of Ives and Varése.

So, how did these American composers describe themselves in 1933? There is a consistent trope throughout Cowell's collection that positions each composer discussed through their relationship to European styles and approaches. There is also a continual search, in nearly every essay, for an indigenous American approach to music creation, and what makes their activities uniquely American. For example, Roy Harris discusses how Americans are immediately recognizable while in Europe because their "climate, plus...social, political and economic customs have produced this characteristic American by the same biological process" that created Europeans (Harris 1933:150). Harris argues that these very same customs and biological processes manifest something uniquely American in the composers' music, especially in the use of rhythm. For example, Harris states,

our rhythmic impulses are fundamentally different from the rhythmic impulses of Europeans...Our sense of rhythm is less symmetrical than the European rhythmic sense. European musicians are trained to think of rhythm in its largest common denominator, while we are born with a feeling for its smallest units (Harris 1933:151).²²

George Gershwin also contributes to Cowell's text, stating that jazz "is probably in the blood and feeling of the American people" and "that it can be made the basis of

²² This is certainly a problematic assertion, but it is presented here to illustrate the historical argument the artists were making.

serious...works of lasting value" (Gershwin 1933:186). Gershwin adds that these "new-found materials should be called American, just as an invention is called American if it is made by an American!" (ibid.). John J. Becker's essay expands the binaries beyond Europe and America, placing the choice composers have between being "imitative" or "creative" (Becker 1933:188).

If Cowell and his colleagues' statements and justifications of "American-ness" seem dated, they have nonetheless continued to be reproduced in the ensuing years with a steady stream of variations on the topic (with this study being another iteration, if self-consciously so), creating a textbook manifestation of Hobsbawm and Ranger's *Invention of Tradition* (1984). These invented traditions, Hobsbawm explains "seek to inculcate certain values and norms of behaviour by repetition, which automatically implies continuity with the past" (1984:1). Thus, the repetition of the same figures and identifying marks of American experimental music actually beget the tradition they claim to describe. Hobsbawm outlines three types of invented traditions:

- a) those establishing or symbolizing social cohesion or membership of groups, real or artificial communities, b) those establishing or legitimizing institutions, status or relations of authority, and c) those whose main purpose was socialization, inculcation of beliefs (1984:9).

The bulk of writings developing a concept of American experimental music fall into the first two categories. The first is produced by scholars through the creation of a specific community of artists and aesthetic approaches that helps to artificially strengthen the bonds of real, existing social and artistic communities, some of which were outlined

in the first half of this chapter. Unfortunately, this canonization also produces the negative result George Lewis has called attention to that "discursively disconnects African-Americans [and other groups] from any notion of experimentalism or the avant-garde" (2008:xxxii). Henry Cowell's inability to find a category for the young William Grant Still in his laying out of the American milieu, mentioned earlier, is but one manifestation of this problem.

The second type of invented tradition outlined by Hobsbawm is seen clearly throughout most of the literature on American experimental music; a quest for legitimation as an identifiable tradition to be taken seriously, and that is on par with European art music. With titles that include language such as *Serenading the Reluctant Eagle* (Tawa 1984), and some variation on American composers' search for identity, (cf. Levy 1983, Tischler 1986) it is clear that this is one relatively common trope in the discourse. Kyle Gann (1997) faced the problematic issue of identifying and labeling an American musical aesthetic head on when he wrote,

At this late and sophisticated date...a concern with what is specifically American in music would seem to have been discredited. The limitations of nationalism as an aesthetic...have been apparent for decades. As an antidote, the slogan "American music is whatever is written by American composers" has become widely accepted, valued for its refusal to impose essentialist criteria that would separate "real" American composers from less authentic ones. Laudable as such a motivation is...the slogan's seemingly benign transparency has left American music in a vulnerable position (Gann 1997:xiii).

Gann states that the result of a broad approach in defining musical Americanism is a

situation so focused on "the dichotomy between the Eurocentric tradition on one hand and ethnic musics--by which the 'Third World' is meant--on the other, that 'American classical music' is perceived as just a special case of the European tradition" (1997:xiv). This creates a situation, Gann argues, in which American composers are "preserving [their] own cultural inferiority complex" (ibid.). Gann claims that "for the sake of our national musical self-esteem, it is urgent to show that America is not an empty vessel into which the musics of other societies may be poured, but a culture with its own genius, innovations, and traditions" (ibid.). This proclamation echoes Gershwin's comments quoted previously from over sixty years earlier; that American composers should treat their innovations as if they were technical inventions eligible for patent.²³

I contend that given the cultural capital held by American experimentalists in relation to, for example, Indonesian experimentalists, none of Gann's negative repercussions are visible in broadening the definition of American experimentalism, as George Lewis (2008) and others have done. The strength of the tradition is in fact bolstered by its diversity of expression.

Although it is problematic for music historians to canonize a specific group of artists, or a certain aesthetic, it is the nature of academic discourse to move in cycles, and in relation to the cultural and temporal context the scholarship is created within. Eventually, as has been recently demonstrated by Lewis, Piekut (2008), and Joseph

²³ One issue with Gann's statement that he himself acknowledges is the fact that the history of the American nation is bound up in the idea of its being a vessel for other cultures, and that is one of the sources of its uniqueness.

(2008), the ideological pendulum begins to swing in another direction. These scholars contributions ask what exactly American experimentalism is, and question the formations of long-established canonic figures and the previously uncontested historical representations of their exploits. For example, Piekut's (2008) reassessment of the infamous 1964 performance of Cage's *Atlas Eclipticalis* (1962) by Leonard Bernstein and the New York Philharmonic, informed with interviews from former orchestra members, tells us that the story is much more layered and complex than has been popularly related by both Cage and the scholarly record to this point. Lewis' landmark study of Chicago's AACM (2008) reconstitutes American experimentalism as the pan-racial, pan-genre practice it truly is, and Joseph's (2008) work on composer and multimedia artist Tony Conrad, traditionally considered somewhat of a minor figure in the story of American minimalist music, reconsiders this narrative through a conscious act of refocusing attention on Conrad's "minor history."

That said, there are equitable reasons certain narratives prevail when discussing an American experimentalist tradition, or any historical subject. Denise Von Glahn's argument for the importance of place in forming American musical identity is useful for this particular discussion, as it advocates a long view of American musical practice and musical history that will, if adopted by historians, certainly include the above-mentioned interventions:

Occasionally, given time and distance, patterns emerge; we detect recurring ideas and behaviors that illuminate the thinking that has prevailed and the choices that have been made...These patterns help explain an object or system that might otherwise be too fragmented and complicated to be understood at all. It is here that the idea of place provides an entree, not only into the works of some of America's most respected composers, but also into their perception of America itself (2003:7).

The representation of American experimentalism employed here to briefly locate the Sonic Arts Union in relation to the European scene is not polemically motivated, except to perhaps add further ballast to Amy Beal's assertion that as a result of the term's broad nature it will "inevitably come up against contradictions and counterexamples" (2006:2).²⁴

All four SAU members, in the course of their interviews with me, mentioned experiencing a feeling of difference while performing their music in Europe in the late '60s; a feeling that what they were doing was truly something new that the European audiences were still in the process of conceptually catching up with. Each SAU composer identified this as being a result of something American embodied in their work; but what is that elusive element?

Studies by Michael Nyman ([1974] 1999), David Nicholls (1990) and Catherine Cameron (1996) are perhaps the most influential scholarly texts after Cowell's early endeavor to attempt a broad definition of what exactly American experimentalism might

²⁴ In her 2006 *New Music, New Allies*, Beal addresses in-depth the wide-ranging post WWII interrelationship between American experimentalists and the German cultural establishment from Zero Hour to reunification, to which the reader should turn for a dedicated and detailed study of this topic.

be.²⁵ Nyman's approach is to differentiate between experimental music and avant-garde music "which is conceived and executed along the well-trodden but sanctified path of the post-Renaissance tradition," stating that the distinctions between the two "ultimately depend on purely musical considerations" (Nyman 1999:1-2). Nyman does not rely on the Europe/America binary to describe experimental music, and in fact discusses artists he defines as experimental from both sides of the Atlantic. Nicholls's work, on the other hand, is focused specifically on the American brand of experimentalism, and its stylistic divergence from European forms.

Nicholls outlines the subjects of his study through more than the purely musical, connecting the artists who make up his core constituents of the early American experimental tradition -- Cowell, Ives, Seeger, Crawford, Cage, and Ruggles -- through having studied with Cowell in one form or another, and their involvement in the New York City-based left-wing Composers' Collective (1990:1-2). Nicholls also points out that these artists grouped themselves together in a cohort described by a Boston reporter in 1931 as "the lunatic fringe of modern music" (1990:3).

Catherine Cameron's contribution is the most comprehensive attempt at defining American experimentalism -- indeed, her entire book is devoted to "framing the movement within the context of artistic and national politics" and attempts to "illustrate

²⁵ Mauceri (1997) is notable for his historical and polemic analysis of the use of the term "experimental music." Michael Broyles's (2004) volume describes what he has dubbed an American "maverick" tradition, connecting a rugged, individualistic pioneer spirit to American experimentalists' work.

the importance of considering artistic dynamics from a broad social perspective" (1996:xiii). Cameron argues that these American composers chose a strategy of "abandonment" to "challenge the dominance of European art music in the United States" (1996:2).

As Benjamin Pickut recently pointed out, one problem with these definitions is that "all of these formal characteristics or general tendencies associated with experimental music can be found in countless other styles, genres, traditions, or aesthetics, yet the musicians of these other formations never seem to factor into discussions of experimentalism" (2008:3), a point well-argued throughout George Lewis's ethnography of the AACM mentioned earlier.

The relationship of the Sonic Arts Union's aesthetic practices to a generalized conception of those employed in Europe is obviously complex, and too broad a topic to be easily summarized here. Their musical practices exist neither in conscious opposition, nor as a mimetic response to the contemporaneous music produced in Western Europe during the SAU's heyday. As Amy Beal's work illustrates, the story lies contentiously somewhere between these two poles.

The brief section below discusses two vexatious historical events in the Sonic Arts Union's relationship to European artists, followed by counter-examples of European contemporaries who seem to have practiced an aesthetic consonant to that of the SAU. In presenting these vignettes, I argue that it was not an embodied sonic nationalism that set the SAU apart from much of the contemporaneous musical activities

in the late 1960s and early '70s as much as a specific aesthetic stance that was explored on both sides of the Atlantic, inspired in part by Cage's work.

As mentioned earlier, Stockhausen's visit to Ann Arbor in 1958 was influential to the development of Ashley and Mumma's ideas of independent production. On November 9th, 1966 in Davis, California, Ashley took part in a conversation with Stockhausen alongside Larry Austin that was subsequently published in the first issue of *Source* magazine that isolates some of the aesthetic differences between Ashley and the German composer (Ashley 1967). Ashley begins by speaking about the differences in "eventfulness" and the approach to live performance between Stockhausen's music and his own, in the context of discussing his 1963 composition *In Memoriam Esteban Gomez*. Ashley states, "if the event is an integral part of the performance process, the audience hears the evolution of the event" (1967:104). Ashley continues by describing his compositional aesthetic at the time, in which the performance is vital to the completion of the work: "There is another solution besides yours, Karlheinz. Yours is to memorize or to build something before it gets to the stage" (1967:105).

All three artists agreed that the implications of radical compositional forms was changing the role of the composer into something closer to a "director," at which point Ashley discusses his work with (presumably) the ONCE group: "it has been very difficult for me to find a graphic version of the kind of pieces I'm interested in now. I've been working with a theatre group. We come to these pieces through talk, through performance...It's literally impossible for me to score" (ibid.). Stockhausen argues that it

would be "horrible" to revert to an "aural tradition, like Africa" (ibid.:106). Ashley's response to this is that " there are some things that are very important and very beautiful that cannot be put on paper" (ibid.). Clearly this is an aesthetic dichotomy between the performative indeterminacy coming out of Cage and the deterministic compositional approach Stockhausen (for the most part) employed.

Stockhausen broadens the discussion to the role of the composer tradition in "transporting something from someone to someone else" (ibid.) to which Austin asks, "Would you say the U.S. has this kind of tradition?" (ibid.) Stockhausen replies that "it's the same culture [as Europe]" (ibid.). Austin and Ashley hesitantly agree, with Ashley clarifying, "when I say we have the same tradition as Europe, that doesn't mean that we necessarily understand the same things. The aspects of music that seem to have the most promise are still not international" (ibid.).

This conversation between the the three composers certainly shows some nationalistic (or at least continental) language, especially in Ashley's most recently quoted statement above, but for the most part it is a discussion of differing aesthetics. Indeed, Stockhausen's live electronic music work of the 1960s cannot be ignored as a contemporaneous parallel expression of the kind of music-making the SAU were involved in, simply with a different compositional outlook in which the work is fully-formed before the performance, not completed in the process of performance, a practice

the SAU favored.²⁶

Another European composer the SAU critical engaged with was Pierre Boulez. In a 1969 interview, Boulez speaks vehemently on what he views as the ills of the American scene, beginning with the assertion that "there should be no antagonism between the American and European composer. I am always fighting the nationalistic point of view" (Peyser 1969:19). Immediately following this statement, however, Boulez embarks on a logically tenuous diatribe, stating that:

Americans are jealous...thinking the Europeans are taking attention away from them. The Americans do operate under a severe handicap, of course; they have no strong personalities in the field. If they were strong enough to establish their personality on the world, they would see that no national favoritism exists (Peyser 1969:19).

Boulez sees the problem of the American composer as a problem of product quality when he says, "for an American artist to be exported to Germany he has to be better than the German product. They have no one in America as good as Hans Werner Henze, and that is not setting your sights very high. A composer the stature of Stockhausen they have not" (ibid.). He sees this issue as a result of American composers working in academia, a situation which he says, "is incestuous...a big marriage in which the progeny deteriorates, like the progeny of old and noble families. The university musician is in a self-made ghetto, and what is worse, he likes it there" (ibid.). Despite

²⁶ As a historical note, David Behrman and Alvin Lucier both took part in the controversial performance of Stockhausen's quasi-"Happening," *Originale*, in New York in 1964. The event was protested by a group organized by Henry Flynt as an expression of imperialist musical "laws." For more on Flynt's critique of this performance, see Piekut (2009).

this, the Times reporter posits, "Boulez does not think that the United States is beyond all hope" (ibid.). Boulez says, "It must lie with an American who is both intellect and practical musician, What is needed in America is a musical John Kennedy. As long as you have no Kennedy in music, you have no future of music in America" (ibid.). When asked if he would accept a rumored offer of a position as director of the New York Philharmonic, Boulez states,

I could not have considered it. The circumstances of directing the New York Philharmonic are such that you are the prisoner of a frame. I am not American enough to be such a prisoner (ibid.).

Of course, Boulez accepted the position as director of the New York Philharmonic in 1971, and held it (presumably as a "prisoner") until 1978.

Prior to accepting the position with the New York Philharmonic, Boulez was conductor at the 1970 Ojai contemporary music festival in California. Boulez's appointment to that position outraged the SAU and a group of fellow American composers, who drafted an angry letter to Lawrence Morton, artistic director of the festival. The letter was "signed by Alvin Lucier and Robert Ashley, and supported by several other composers, among them Morton Feldman, Pauline Oliveros, Larry Austin, Terry Riley, La Monte Young, Frederic Rzewski, David Tudor, Gordon Mumma, Jon Appleton and The Sonic Arts Union" (Ericson 1970:15). Ashley remembers Lucier as having written the letter, asking him to co-sign it before they sent it out for the additional signatures (Ashley interview with the author 9/11/06).

In the letter, the composers state that the choice of Boulez as conductor for the

1970 Ojai festival,

represents the same old imperialistic thinking we have had to put up with for years in this country due to the predominance of all those European conductors of our fine orchestras who have kept themselves isolated from our musical ideas so that they can maintain the illusion of European superiority and thereby retain control over much of our musical resources (ibid.)

The letter further critiques Boulez's assertion of the role of universities in promoting and presenting contemporary music:

were [Boulez] at least slightly aware of the activities of almost any good college or university music department in this country, he would realize that this very music is both taught and performed extensively by students and professional faculty alike...he is obviously unaware of the intensive activity or excellent performing groups such as are found at the University of Illinois, Mills College, University of Chicago, Brandeis, the San Francisco Conservatory and many other institutions..What the hell is this guy talking about? What are his motives? (ibid.)

More recently, Ashley remembers that the "university ghettos" Boulez spoke of were "of course, the only places that were playing his music too!" (interview with the author, 9/11/06).

I quote the letter at length as it continues its relentless critique of Boulez by stating that his own music "has ceased to be relevant to these times," and that it is,

clear that the great change in the direction of musical thought is now coming from America, primarily through the thinking of our distinguished composer John Cage. There is hardly a younger composer, painter or poet anywhere in the world who is not directly or indirectly indebted to the music and writings of this man. But unlike his colleagues — Henri Pousseur composed a 'chance' opera on the Faust theme, Luciano Berio made a 'happening,' Karlheinz Stockhausen even wrote several pseudo-'hippie' pieces in the style of La Monte Young -- Mr. Boulez refuses to acknowledge this shift in thinking and is therefore deaf to the beauty and excitement of the music it engenders. As a result, he has copped out of his responsibilities as a composer and has become a conductor in the grand old style in order to revive relevance to his own work by virtue of historical connection. He has become so bitter that he has had to resort to vicious attacks upon other composers and on American culture in general (Ericson 1970:29)

Ojai director Lawrence Morton's reply to the letter was that

The signatories constitute a special group which I think is not qualified to speak for American music in general. If it had included Copland, Babbitt and Carter — who probably wouldn't have written this kind of a letter anyway—it would have carried more weight" (ibid.).

Morton also quoted a remark of Boulez's about the letter: "If war has taught us anything it is that nationalism of this sort is destructive of life" (ibid.). This fiery exchange is interesting on several levels when seen in its totality, especially in Boulez's insistence in both articles that he is against musical nationalism, while at the same time making statements about the inferior quality of American composers in comparison with those of Europe.

Of course, not all the interactions between the SAU and their European contemporaries were so vitriolic or contentious. As a counterpoint to the above

examples, there were Europeans such as Eliane Radigue, Hugh Davies and "Gentle Fire," and the live electronic group "Intermodulation" in the UK, and Godfried Willem-Raes in Belgium that were aesthetically synonymous to the SAU.

Davies constructed his own electronic instruments and was drawn to both the modernism of Stockhausen, whom he worked with as an assistant in the 1960s, and the anarchic freedom of Cage. To quote Davies,

The influence of Stockhausen's approach to live electronics, involving his typically detailed compositional control over what was played and operated, was, in my own work and that of Gentle Fire, counterbalanced by that of John Cage and David Tudor, who featured greater freedoms and more diverse combinations of sound sources and often of independent loudspeaker channels (Davies 2001: 54).

Godfried Willem-Raes, who co-founded the live electronic music "Logos Group" in Belgium in 1967, felt a kinship to the work of the SAU as well as *Musica Elettronica Viva* (Raes 1992:29). From '67 to '72, Raes and the Logos Group performed with their homemade instruments. In 1972, however, the group made the "decision to cease using large and elaborate electronic equipment for public concerts" (Raes 1992:30). The reason for this, according to Raes, was that the

complex-looking instrumental decorum usually overwhelmed the audience, and we were often queried more about the equipment than about what we were trying to achieve musically...Although entirely homemade, the apparatus was impressive and lent us a kind of authority and power. This embarrassing and unintended situation led us to give up the use of eye-catching live electronics in our concerts. All the equipment 'stayed home' in our studio where it continued to evolve (ibid.).

The above examples seem to lend credence to the argument that the difference between the "American" and "European" streams of vanguard music is not necessarily geographically bound, but rooted in a musicological and aesthetic disparity that Nyman splits into a divide between an "experimentalist" and "avant-garde" aesthetic, and that he outlines throughout his book on the subject ([1974] 1999:1).

Having begun this discussion of continental shifts with Henry Cowell's 1933 ruminations on the subject, it seems fitting to return to them here. Cowell's position on musical nationalism was that the music transcends those boundaries, but that the nationalist argument was necessary for American composers circa 1933 in a quest for aesthetic independence, and to avoid imitation in a tradition that "up to now has been tied to the apron-strings of the European tradition" (1933:13). According to Cowell, an aesthetic independence would result in an "awakening" that would generate "works capable of being accorded international standing. When this has been accomplished, self-conscious nationalism will no longer be necessary" (ibid.).

Revisiting the Afrological and Eurological

In a 1996 article George Lewis discusses important issues of location and historicity through the lens of racialized difference, focusing on problems in the study of post-war experimental music that uses real-time decision making. Lewis centers his critique on what he calls the "erasure or denial of the impact of African-American forms on the real-time work of European and Euro-American composers" (216). To discuss

these problems, he constructs a "historically emergent rather than ethnically essential" binary system of Afrological and Eurological systems of improvisative musicality (ibid.:217). Lewis embodies these systems in the historical figures of Charlie Parker and John Cage.

I suggest that Lewis's dualist argument -- a necessary and much-needed intervention into the previously de-racialized discourse of experimental music -- is perhaps not the only way to arrive at his goal of an American experimentalist tradition represented as "multicultural and multiethnic, with a variety of perspectives, histories, traditions and methods" (Lewis 2004:170).²⁷ In order to begin this healing process, it is possible to look at both historically emergent systems in their overlapping regions, as opposed to their differences, to view them as postulating similar answers to the same question.²⁸ Lewis gestures towards this, but only in discussing groups such as MEV (Lewis 1996:119), not in his discussion of the historical antecedents (Cage and Parker) he employs.

There are two points I will examine as examples of these overlapping regions of approach. The first is the shift from a reified individual to collective identity in both traditions. The second concerns the forms of expression of that identity in both

²⁷ The aforementioned deracialization was manifested mostly through willful disregard for the many experimental African-American musical practices that took place outside the previously perceived bounds of American experimentalism.

²⁸ This is not an attempt to erase the clear differences in socio-economic history and background many performers from each stream embody. In addition, it must be noted that these two categories are not homogeneous groupings of artistic practice, but overarching networks beneath which a plethora of broadly varying activity takes place.

traditions, and how the different approaches may be seen as solutions to a similar problem.

The nearly synchronous shift in both traditions from an individual-centered art to an interest in collective creativity happened roughly at the beginning of the 1960s. In the Afrological system, the change from a foreground/background model (i.e. soloist/rhythm section) to an abstract, collective model not based on cyclical harmonic patterns or melody variation arguably begins to occur around 1960, with Ornette Coleman's recording of *Free Jazz* (1961). From the Eurological system, John Cage's composition *Cartridge Music* (1960), mentioned earlier, is an example of an open system composition that approaches improvisation in its realization.²⁹ In the case of the Coleman piece, the musical material is largely generated in the course of performance, with only a map of the general structural flow and some composed melodies decided beforehand. With regards to *Cartridge Music*, the musical material is also generated during its performance with only the score (greatly abstracted from earlier notational models) and fixed instrumentation as guides. In both of these examples, there is a devaluing of motivic and/or standard notational elements give the performer the actual material they will be producing during performance. In addition, there is a de-centering of authorship for the sounding result of the composition. The composers, Coleman and Cage, are identified as such, but the burden of authorship for the sonic result is spread equally among the

²⁹ An earlier pair of works that had similar aims would be Lennie Tristano's 1949 experiments in collective improvisation (*Intuition* and *Digression*) and John Cage's proto-Happening, *Theater Piece No. 1* from 1952.

performers. As the 1960s moved forward, these conceptual seeds would sprout, leading to the work of groups like AMM, MEV and the AACM³⁰, (as well as many others) all of whom worked extensively with both improvisation and cross-genre approaches and techniques to music-making.

Lewis's discussion of "personality" in the trans-African and trans-European traditions (1996:241-3) brings up another dyad in the form of the Afrological concept of "saying something" (Berliner 1994:262-27) and Cage's statement that "I have nothing to say and I'm saying it" (1961:109).³¹ I briefly discuss the overlap in these two seemingly disparate approaches.³²

One of the tropes in Cage's philosophy is the quest for a music that "is not descriptive of the performer, but is descriptive of what happens" (Kostelanetz 1987:222). The escape from memory, taste, and bias are all primary tenets of Cage's art. The paradox of this is, as Lucier has stated,

most of these pieces were intensely personal, particularly as far as the performances were concerned. The neutrality of these structures seemed only to place the performer, and therefore the listener, more firmly in the human situation in which most people found themselves in that burgeoning technological world (Lucier 1998:11).

³⁰ Chicago's Association for the Advancement of Creative Music includes artists such as Muhal Richard Abrams, Roscoe Mitchell, Wadada Leo Smith, Anthony Braxton, and many others. See Lewis (2008).

³¹ This is an unfortunate pairing, as it perhaps only enforces racial stereotypes of "emotional" blacks and "rational" whites.

³² For more on erasure as a trope in the European and Euro-American avant-garde music, see Whitesell (2001).

Cage's thoughts on jazz center on his views that it "always seems to me to be confined within a world of ideas and musical relationships" (Cage 1981:171). He also says that the music "resembles a conversation" and that "rather than each one doing what he wants, he listens with all his might to what the other one is doing, just to answer him better" (ibid.). Cage then recounts how he once took part in a rehearsal of a jazz group in Chicago and tried to convince them to perform "as a soloist, as if he were the only one in the world" (ibid.). After the ensemble did this, Cage called it "successful Free Jazz," but once the performers were in front of an audience "they started taking up their old habits of conversing and answering again. It is very difficult to liberate yourself so quickly!" (ibid.:172).

In the recounting of this meeting, there are several things to notice (besides its problematically paternalistic tone) regarding the different approaches to collectivity. Cage's approach is to isolate the ensemble as individuals and ask them to act independently from one another, whereas their "habit" is to form a collective and produce music by "conversing" with each other. Symbolically, these are two different approaches to "liberation" – on one side Cage's harmonious anarchy of individuals, and on the other, the formation of a community -- but the intended result is the same. The result is to produce a music that is not a projection of the individual musicians' egos and tastes, and with both approaches that is the result.

The difference is a question of synchronicity, what Borgo (2005) has called sync or swarm; the creation of a collectivity in sync, or of a group of individuals in a self-

organizing chaos system. In both cases, there is a decentralization of power, and a non-hierarchic model, producing a music with no center but with a multiplicity of centers.

Cage himself advocates this "disorganization" but doesn't "see that in terms of non-participation or isolation, but rather precisely as a complete participation" (Kostelanetz 1987:259). So although the Eurological (in this case Cage-ian) approach to collectivity is through asynchronous "liberation" and the Afrological through a synchronous approach, the result is a whole which is a sum of its parts, not a projection of a single individual will or ego. In a way, both approaches aim towards what Cage identified as his ideal (non)form of government: "Live and let live. Permit each person, as well as each sound, to be the center of creation" (1981:100).

In addition to Cage's desire to escape egoistic creativity, his problems with improvisation are its tendency toward magnifying habit and ego: "Most people who improvise slip back into their likes and dislikes, and their memory, and...they don't arrive at any revelation that they're unaware of" (Turner & Cage 1990:472).

In some of his later improvisational works, like *Child of Tree* (1975), *Branches* (1976) and *Inlets* (1977), non-masterable instruments like amplified cacti and water-filled conch shells are used to make their performance a real-time discovery for both the performer and the audience. Cage hoped to "find ways of improvising that release us from our habits" (Retallack 1996:274), and these pieces were his attempts at that.

If we compare this approach to the trans-African approach to virtuosity, we can find some overlapping ground in intention, if not in approach. One of Cage's intents

with the use of non-standard objects as instruments, like the cacti and conch shells of *Child of Tree* and *Inlets*, is to subvert the paradigm of the virtuosic performer by giving them an instrument that cannot be mastered.

In her conversations with Cage, Joan Retallack mentions Christopher Shultis, who spent many years studying and playing *Child of Tree*. She said that "he's constantly thinking about new ways to do it and feeling that where he was with it the last time he performed it is not where he wants to be now, at any given 'now'" (Retallack 1996:305). In this statement, we can see that even in a piece like *Child of Tree*, this particular performer, at least, is approaching it from the point of view of attempting to improve his relationship to the piece – in short, the same as any musician improving their relationship to their instrument and the music they play, or what Berliner, discussing jazz, calls "the never-ending state of getting there" (1996:viii).

The Sonic Arts Union composers' place in this discussion of overlaps between the two streams of musical activity Lewis constructs is perhaps best embodied in Gordon Mumma and David Behrman's 1970 performance of a collaboratively realized piece with visual artist Robert Watts and two AACM members, saxophonist/composer Anthony Braxton and violinist/composer Leroy Jenkins.³³ The work, *Communication in a Noisy Environment* (1970), was performed at Automation House, located at 49 East 68th Street in New York City on November 19th and 20th, 1970. The composition was

³³ The program notes for the composition (Mumma 1970c) do not list Leroy Jenkins as a collaborator, but the photograph below, from Mumma's archive, places Leroy Jenkins at the performance.

described by the performers as "a musical and social ensemble in several spaces, communicating by electronic interlinks" (Mumma 1970c:1). The program notes characterize the form of the work as being "open, similar to that of modern jazz, though the idiom extends into the realms of the supernatural, stellar, and surreal" (ibid.). One of the goals of the work, as described by Anthony Braxton, was to have "music that is socially usable, and from which there can be direct results. I dig watching shoe-makers, watchmakers, and ceramicists work. I wish my art could be as useful as theirs--I wish somebody could put tea or coffee in my music, or put their feet in it" (ibid.).

Fig. 1.2. (from left) Anthony Braxton, Leroy Jenkins, and Gordon Mumma performing *Communication in a Noisy Environment* at Automation House, New York City, November 1970. Courtesy of Gordon Mumma.

A review by Raymond Ericson depicted the multi-level intermedia event as being comprised of exactly the kind of life as art/art as life components Braxton described: "on the first floor, a jeep-like Mehari Citroën; on the second level, a floor strewn with dry leaves, brush and logs, which still had a woodsy smell. The Citroën in time became a monster, with its motor racing, horns blaring, neon-tubed windshield wipers swishing back and forth" (1970b:80).

Ericson's testimony places the musicians on the third floor,

playing amplified instruments -- violins, clarinets, saxophones; a toy zither, xylophone, police whistle, cow bell; a French horn—but never in the conventional musical style. Images flashed on the walls—maps, words, abstract paintings, seascapes, anything. Two hundred targets from the National Rifle Association lined the walls of the third floor. On other available spaces were lifesize woodchuck, crow and police-training targets from the Stoeger Arms Corporation, pictures of a moose, a wild boar and a mountain climbing goat (ibid.).

Communication between the musicians, audience and environment was complicated, according to Ericson, by a rising level of cacophony as the performance progressed: "The planned chaos of image and sound was gradually raised to a level at which communication was impossible. The air was further polluted with the smoke-like spray from a fire extinguisher" (ibid.). Ericson wonders if this engineered difficulty of communication was the point of the performance; if not, he continues, "an unintended moral could be inferred" (ibid.). Indeed, it is tempting to apply the analogy of *Communication in a Noisy Environment* to this attempt at reading across the polemic divide Lewis presents.

Although I have utilized Lewis's concepts of the Afrological and Eurological for the purposes of this discussion, another approach that is very useful is an interdisciplinary look at improvisation, perhaps best characterized by Hazel Smith and Roger Dean's (1997) work. Smith and Dean view improvisation from a multimedia perspective, which takes into account some issues Lewis raised in his essay. For example, Smith and Dean discuss the influence of Bebop on the Abstract Expressionist painters in New York (1997:109) as well as the Beat writers (1997:85). Belgrad (1998) also discusses these spheres of influence, and a "culture of spontaneity" in all the arts occurring at this point in history. The Abstract Expressionists effect on the New York School of composers has also recently been discussed in scholarly studies (e.g. Johnson 2002). What this illustrates is that Lewis' call for scholarship that approaches American experimentalism as "multicultural and multiethnic...with a variety of perspectives, histories, traditions and methods" (Lewis 2004:170) may well be on its way.

The Avant-Garde and the SAU

Having described the historical and social environment that led to the formation of the Sonic Arts Union, the geographic and aspects of their aesthetic location, what of the theoretical roots of their work as an avant-garde tradition?

The scholarly theorization of the avant-garde as an expressive practice and theoretical tradition that is not simply the discussion of individual works or artists can perhaps be traced back first to Ortega y Gasset's *The Dehumanization of Art* (1968)

originally published in 1925, and Renato Poggioli's work, *The Theory of the Avant-Garde* (1968), which, according to Poggioli (1968:xvi) goes back to a lecture given around 1942, and a "complete sketch [that] dates back to the autumn of 1946" (ibid.). Using aspects of Ortega y Gasset's argument at various times, Poggioli proposes to "diagnose" avant-garde practice to find its "tendencies and ideas," and to treat it "not so much as an aesthetic fact as a sociological one" (1968:3). He labels it as a sociological phenomenon because of the complex relationship between the avant-garde and society at large, and furthermore identifies a "general psychology and ideology" of avant-gardism (1968:5). Though Poggioli sets out to map these psychological and overarching ideological forces driving avant-gardists, he seems to bite off more than he can (theoretically) chew, using broad generalities that remain relatively ungrounded in specific examples. Some of the characteristics he ascribes to the advance guard include "activism," "antagonism," "agonism," and "nihilism," (1968:131). Poggioli's intention was to look for universals in avant-garde practice, but by not convincingly anchoring those universals in practiced artistic experience, and most importantly in specific works of art, his work ultimately falls short of its aims, despite some remarkable historical research into the changing meanings and uses of avant-garde as a label, and poignant discussions and insights into his various themes.

The above critiques notwithstanding, there are useful aspects of Poggioli's work, both in general and in the specific case of discussing the area of activity that encompasses the work of the Sonic Arts Union and their contemporaries. The idea of

innovation and newness, crucial to many avant-garde artistic practices, is described by Poggioli as "the myth of the new" -- a "taste or cult" which he adroitly points out "is not a new thing" (1968:214). This "myth," as characterized by Poggioli, is at its base a fundamental difference in how the "ancients" and the "moderns" each relate to and evaluate the presumably similar concrete concept of "newness."

Whereas the ancients considered the new as at most a relative value, the moderns almost always treat it as an absolute. That the sense of tiredness with the old and the repeated is a universal psychological impulse, recurrent or permanent, is a commonplace verity. But characteristic of the classical fatigue in the face of the already-done and already-said is also the doubt that one can find a 'new' truly worthy of taking the place of the 'old'" (1968:214).

Therefore, the difference between the two conceptions is that "the ancients and the classical writers tended to give a lucid and pitiless criticism of the new; but the moderns almost always yield to the temptation to seek...the unknown zones of art and culture" (1968:215). The modernist relationship to the "new," as posited by Poggioli, is therefore "neither ancient nor universal" (Berenson qtd. in Poggioli 1968:215). The history of this "ancient" versus "modern" oppositional binary is outlined extensively by Matei Calinescu (1977), who traces the quarrel back to Leonardo Bruni's fifteenth century dialogues, and Hippolyte Rigault's *Histoire de la Querelle de Anciens at des Modernes* (1856), characterizing the division as both "a direct consequence of the erosion of Tradition's authority in matters of knowledge and...taste," and the development of a conception of historical time (1977:23).

Rosalind Krauss (1985) also approaches the idea of "newness" and "originality"

as a myth, but her position is that there is not something inherently different between the "ancients" and "moderns." According to Krauss, the avant-garde itself is in a cycle of repetition, both as a result of its obsession with the pursuit of the new, but also through its relationship to the past, a relationship which exists, whether or not it is consciously acknowledged.

If the very notion of the avant-garde can be seen as a function of the discourse of originality, the actual practice of vanguard art tends to reveal that "originality" is a working assumption that itself emerges from a ground of repetition and recurrence (1985:157-158).

Her position is that absolute newness, or

a beginning from ground zero...the self as origin (1985:157) itself is a myth -- that everything is related to that which came before, and that a position of naivete to those relations does not make one's work '...safe from contamination by tradition' (ibid.).

The 1980s brought a number of theoretical works discussing the avant-garde (cf. Bürger 1984, Krauss 1985, Huyssen 1986, Crane 1987), all of which differentiate between a historical avant-garde encompassing surrealism and Dada, a neo-avant-garde, the broad community of post-WWII experimenters to which the Sonic Arts Union composers would be considered members. Bürger argues that this so-called neo-avant-garde cannot "attain the protest value of Dadaist manifestations...in part...owing to the avant-gardistes' effects having lost their shock value" (1984:57-58). This is, in Bürger's view, a terminal failure, since he defines the avant-garde's role as being the "intention of returning art to the praxis of life" (1984:58). Bürger's own fatal flaw, according to Hal

Foster's (1996) critique, is that "his very premise that one theory can comprehend the avant-garde, that all its activities can be subsumed under the project to destroy the false autonomy of bourgeois art -- is problematic" (1996:8).

Indeed, Susan McClary (1989) presents a case study of avant-garde composers who consciously remove themselves from Bürger's notion of an avant-garde attempting to remove the boundaries between art and life. In McClary's reading of 20th century composers, she finds "a music that has sought to secure prestige precisely by claiming to renounce all possible social functions and values" and that "The prestige value of this music, in other words, is inversely correlated with public response and comprehension." (1989:60). This is a far cry from the somewhat utopian, social betterment through social challenge model of the avant-garde advanced by other theorists. What McClary finds is a retreat from the social, and a prestige system based on the distance of that retreat. The Sonic Arts Union composers were not in the "who cares if you listen" camp discussed by McClary, but they were also obviously not attempting to create marketable, Top 40 music. As discussed briefly below, the SAU's concern for audience reception is one of the things that differentiated them from many of their contemporaries, like Pierre Boulez and Milton Babbitt, who seemed to subscribe to McClary's concept of "terminal prestige."

One issue that seems to be under-discussed in avant-garde theoretical discourse are the implications of the use of technology by a neo-avant-garde that is not based upon the mass-production or industrial techniques employed by visual artists such as Andy

Warhol, Richard Serra, and Donald Judd. The work of the Sonic Arts Union and some of their "neo-avant-garde" contemporaries, particularly David Tudor, exists on an alternate technological route -- that of the tinkering individual craftsperson, innovating quietly in parallel to the technological advances of society at large. Their political engagement is subtler, more surreptitious.

Their use of self-made instruments, even in the face of commercially available synthesizers, is one manifestation of this practice-based aesthetic position. In addition, their compositional approach, inspired by the philosophical implications of John Cage's indeterminate works, was freed through their use and repurposing of technological detritus. By letting go of many aspects of artistic and/or political will -- or intention -- in their work, in contrast to the Romantic-era inspired notions of the "historic" avant-garde, these cybernetic explorers were able to make their own brand of radicalism that was a kind of aesthetic anarchism, and that in some ways returned Benjamin's (1936) "aura" to the "age of mechanical reproduction."

This was accomplished through their use and repurposing of mass-produced elements (e.g. transistors, circuitry, scientific equipment) to create special-purpose tools for individualized musical works that are time-and-space specific, and by design always sonically different from performance to performance.

In addition, by creating a body of work that was both in the tradition of "high art" abstraction, yet at the same time appealing in some degree to a more popular/crossover audience than someone like Babbitt or Boulez (though not as much as their

younger contemporaries Phillip Glass and Steve Reich would in the 1970s), without explicitly referencing "pop" of any kind, they do seem to have built a small bridge across the so-called "great divide" between high art and mass culture (Huysen 1986:viii), not through institutionalization or co-option of their work (in the Adorno-ian, dialectical sense), but through an alternative technological imaginary.

Conclusions

In many of these diverse artistic ventures, common threads exist. One such thread is the influence of John Cage's art and philosophies, which were one important catalyst of the 1960s zeitgeist among this community of artists. From Happenings, to the use of live electronics and an expanded definition of performance, Cage's explorations were far-reaching. That said, the impact of Cage and Tudor have often been overstated in histories of this period, as there are examples of the influences moving both to and from Cage. For example, in former Merce Cunningham dancer Carolyn Brown's recent memoir, she discusses a conversation she had with Cage in September 1970, on the occasion of his 58th birthday:

Perched in the tiny rear seat of the Fiat convertible, John began a rather odd conversation that I related in a letter to Earle...[Cage said] he hated what Gordon [Mumma] and David Tudor are doing with electronics. "It's not musical composition. David is not a composer." And then he said, "But I'll use what they've discovered." (Brown 2007:557-558).

Mumma makes the point that Tudor was in a transition period from performer to composer during the period the SAU was formed, and that he was also influenced by much of his younger contemporaries' work:

Tudor didn't consider himself a "composer" until after the October 1966 performance of his *Bandoneon!* and the March 1968 premiere of *Rainforest*. Most of his work with live-electronics until 1966 was performing John Cage's music (from *Cartridge Music* through the *Variations* series (II, and V particularly). The influences worked both ways. Notably Tudor was influenced and encouraged by Lucier's *Music for Solo Performer* (1965) and *North American Time Capsule* (1967). Also Ashley's *The Wolfman* (1964), Behrman's *Wave Train* (1966) and *Players with Circuits* (1966). I'd also place my *Mesa* (1966) on that list. Other than these and Cage's work, I consider the most important motivation for Tudor's flowering as a composer to be Pauline Oliveros and her *Applebox Double* (1965) which Oliveros and Tudor performed in February 1965 at a ONCE Festival concert. Tudor was also VERY much influenced by the milieu of the San Francisco Tape Music Center activities, with his participation there from 1964 onwards.(Mumma, email correspondence with the author, 4/23/09).

Another interesting point in discussing these groups is why they initially formed these alliances, for what reasons they eventually dissolved?³⁴ There seems to be a common path in the sense of an initial decision to submerge into a group identity to draw upon the strengths and support the community offers. Once artists, as individuals, find their voice, they leave the community to embark on a solo career. This is a shift from isolation to family then back to isolation, but with the added benefit of a family

³⁴ On this matter, Gordon Mumma suggests, "I can't speak for all groups of creative people, but the SAU didn't 'break down,' it was constantly evolving, with its individuals active in other cultural associations or working individually. With the increasingly diverse activities of its individuals, the SAU became both impractical and no longer 'necessary' in its quasi 'object' state" (email correspondence with the author, 4/23/09).

network. As Larry Austin wrote at the time, "It's a family affair, and the family doesn't care if anyone comes or not. The family enjoys what it's doing, and it wants to see itself doing it" (Austin 1968:18).

Another thread in this chapter is the location of the SAU's work in an aesthetic tradition -- is there something identifiably American in their work? Can they be considered as part of an avant-garde tradition? Are the "afrological" and "eurological" descriptors proposed by Lewis an effective model to discuss their work? I have argued that perhaps this is an opportune time to abandon some of these existing binaries and categories to view things in a broader context of interpenetrating spheres, as the many problematic issues surrounding the behavior of these labels and categories seems to contradict the "lived" cultural milieu described in the first half of this chapter.

The 1960s itself, as a collective historical moment, was certainly pivotal to creating the atmosphere and environment within which all these activities and experiments could thrive. Jean Baudrillard, in his admittedly dystopian writings on "extreme phenomena" has characterized the outpouring of creativity in this era "the orgy" (1993:3), describing the impact of the "superconductive events" that took place at the time as "whirlwinds which no longer affect just states, individuals or institutions, but rather entire transversal structures: sex, money, information, communications..." (1993:37).

According to Baudrillard, these superconductive events are "no longer confined within a given system, but can leap from one system to another" (ibid.) In other words,

the 1960s and its collection of historical "superconductive" events influenced not only the specific conditions within which the creation of the SAU was made possible, but both the superconductors (from a variety of "systems") and the activities they spawned have produced broad, long-term, underlying McLuhan-esque "messages" that are still being unpacked.³⁵

As this study demonstrates, technology and its manipulation for musical purposes plays a large role in the developments and innovations of the Sonic Arts Union and their contemporaries -- but it is not their sole legacy or "message" to society, nor is it the only generating factor for their work.

³⁵ Marshall McLuhan's media theories (cf. McLuhan 1964), which were especially popular in the 1960s, described his belief that various media delivered a message that was often not visible on the surface at the time the media was put into play -- for example, one message of the lightbulb, from the perspective of McLuhan's theory, was not that it generates light, but that it changes human relationships to the concept of day and night.

Chapter 2. Aesthetics of an American "Tinkering" Technoculture

In Chapter One, I outlined the cultural and historical backdrop of artist-initiated groups that led to a discussion of the formation of the Sonic Arts Union in 1966, and examined the Union's broader location in relation to concepts of sonic nationality (particularly the "American" and the "European") and their feeling of connection to a Western Art Music continuum. Now that some of these ideas are in place regarding the location of their work, this chapter moves into the aesthetics of their musical practice, beginning with a brief history of the emergence of the genre of live electronic music and progressing into a discussion of a creative, technology-based subculture of which they were key members. Although geographically and culturally the SAU are certainly in the center of a pan-European avant-garde tradition, their creative use of technology springs from a different well; a post-WWII American "tinkering" technoculture of do-it-yourself ingenuity. I focus on their approach to using and abusing technology, and their aesthetic

exploration of the physical properties of defective electronic circuitry, connecting these technological practices of play and transgression to a broader practice of American tinkering in other technologies; for example, Robert Post's (1994) study of hot-rod culture. I use Levi-Strauss's conception of the *bricoleur* and engineer as a theoretical tool to describe the Sonic Arts Union's techno-musical practice. By putting their relationship to technology in the foreground, I place the SAU in a broader cultural context of technological play and experimentation. In addition, I offer another approach for looking at electronic music history as the story of artists' relationships to technical objects.

I am by no means suggesting that there is an American patent on this type of practice; I am merely delineating the bounds of this research, and looking at one example of the American "brand" of this kind of activity. In fact, on the macro level, this is a pan-historical, pan-stylistic, pan-cultural creative impulse and upstart relationship to technology that includes artists as diverse as Hugh Davies in the UK, Bo Diddley in the southern US, and the so-called "Congotronics" of Kinshasa, among many others.¹

In the final section of the chapter, I briefly discuss the implications of the SAU's aesthetic approach to traditional Western musical work concepts and their relationship to improvisation.

¹ "Congotronics" refers to Kinshasa groups such as Konono No. 1 and others that perform traditional music in amplified form, using self-made electronic equipment salvaged from junk yards and spare parts from automobiles.

The Emergence of an Aesthetic – Live Electronic Music

In discussing the emergence of live electronic music as an aesthetic and musical practice, I will begin by defining it and discussing its historical development. Gordon Mumma (1975), in his lengthy and detailed overview of the genre, goes back to the late 1800s to trace the history of live electronics. Mumma describes one of the first electronic musical instruments, "an electromagnetic resonator controlled by a vibrating metal bar and a hammer," invented by Ernst Lorenz in 1885, whose principle is "similar to that used in several present-day electronic pianos" (Mumma 1975:287). Joel Chadabe (1997) also goes back to these early pioneers, discussing Leon Theremin's namesake instrument from 1920, as well as early electronic keyboard instruments like the Ondes Martenot and Trautonium, both introduced in 1928, and their more commercially successful keyed relative, the Hammond organ, which was introduced in 1935. So as not to reiterate this material, available in detail elsewhere, let us simply say that these early electronic instruments can be seen as the symbolic ancestors to what would become live electronic music practice in the 1960s because they were conceived as performance tools, not studio tools. Lejaren Hiller quoted trautonium maestro Oskar Sala as having said that he was "convinced of the necessity of performing music to achieve the results he wants" (Qtd. in Chadabe 1997:12).

These early inventions channeling electricity for the purpose of live musical performance, later developed into magnetic tape technology, which was quickly adapted

for compositional purposes by Pierre Schaeffer, Pierre Henry and others, beginning around 1952.² This stream of electronic composition differed from the performance-based electric instruments mentioned above because of its more cloistered approach to studio creation, with performance becoming the diffusion of the studio work, as opposed to live production of electronic sound. This post-Schaeffer lineage led to the compositional approaches later practiced in the institutional electronic music studios at universities such as Columbia-Princeton, Harvard, and the electronic studios throughout Western Europe in the late 1950s and early 1960s. Although Schaeffer focused more on transforming or re-arranging acoustic sounds, or *musique concrète*, and these other studios had slightly more focus on electronically-generated sounds, the compositional practice was in both cases based on the idea of total control from creation to performance, no doubt stemming from both a post-serial world, and as Milton Babbitt has said, "the prospect of having one's music performed adequately...as it was conceived" (Qtd. in Chadabe 1996:18). This is nearly opposite to how the live electronics composers discussed here approached their music. As Robert Ashley has said, "There always are two points of view that influence every composer: one toward more and more premeditation or pre-control, and one toward invoking whatever you think the energies of being spontaneous are" (Qtd. in Gagne & Caras 1982:20).

Even before Schaeffer and Henry began experimenting with the manipulation of

² Schaeffer and Henry used disc recording and playback machines prior to their adoption of magnetic tape.

concrete sounds in the studio, a young composer in Seattle named John Cage created a composition that used his school's variable-speed turntable in a live performance piece to accompany dance. Cage's *Imaginary Landscape #1* (1939) can be seen as a symbolic departure point for the live electronic music that developed in the 1960s because Cage used the inherent capabilities of the turntable for his composition, rather than creating instruments that imitated existing acoustic instruments. This acceptance of things as they are foreshadows the Zen-informed aesthetic position Cage would soon adopt.

For most of the 1950s, Robert Ashley and Gordon Mumma were based in Ann Arbor, Michigan, and were marginally involved in the University of Michigan's music department. Both would spend about one or two years, officially, as students.³ Of the four SAU members, they were the first to begin working with electronic media. Ashley worked in the speech therapy department. Mumma was involved in the local music scene as a freelance musician, and also worked in the university's acoustics and seismics laboratory. Through their work together in Milton Cohen's sound and light Space Theatre project, the two began collaborating, building the Cooperative Studio for Electronic Music in 1958. Ashley was a very competent pianist, and Mumma an excellent horn player. This performance mentality manifested itself overtly in their approach to electronics.

In the context of Milton Cohen's Space Theatre, rather than having a "do-it-all"

³ Mumma remembers his enrolled student years at Michigan as spanning the period from January 1952 "until some vague time in 1954" (email correspondence with the author, 4/23/09).

synthesizer (or synthesizers) like many of the institutional studios, Ashley and Mumma would build new equipment in the course of composing, tailored for their specific needs:

We would decide that we needed a certain kind of equipment, and so Gordon would make it, or I would make it, or somebody would make it...it just seemed very natural for that kind of music to evolve through the availability of equipment. (Robert Ashley interview with the author, 9/11/06).

Also in 1958, Karlheinz Stockhausen came to the university to lecture and give a performance of his work. Ashley was assigned to be his host. Stockhausen spoke to the students about self-determination for the independent composer, which greatly moved both Ashley and Mumma, reinforcing their own ideas for the new studio. Concerts and lectures by John Cage and David Tudor in 1960 were also revelatory for the two younger composers.⁴ In Mumma and Ashley's view, one of the main reasons for delving into electronic music was the lack of access to ensembles that could perform their acoustic music. Through the studio, the two could create orchestral textures with limited means.

Their first studio was built for less than \$700, and the second for less than \$2000, which Mumma said at the time, "compares favorably with the cost of a grand piano" (Mumma 1964:243).⁵ The first studio, designed by Ashley, employed "three tape transports, associated playback and recording amplification, a five-channel mixer, an audio-frequency oscillator (sine, square, and pulse waveforms), a portable tape recorder

⁴ For more on Cage and Tudor's 1960 visit to Michigan, see Miller (2003).

⁵ With inflation, \$700 in 1958 would be equivalent to roughly \$4591 in 2005. \$2000 in 1958 would be equivalent to about \$13119 in 2005.

for field work, and a monitor-amplifier with loudspeaker, all of which are commercially available" (Mumma 1964:242).



Fig. 2.1. Gordon Mumma in his studio with a combination of handmade and consumer electronics. Ann Arbor, Michigan 1962. Photo by Jacqueline Leuzinger, courtesy of Gordon Mumma.

In addition to this commercially available gear, Ashley's half of the studio contained the following homemade items Mumma and Ashley built: "a reverberation device, passive R-C filters, and a ring-bridge modulator. The few simple modifications applied to the commercially available equipment include special head configurations for the tape transports and continuously variable controls for the erase and record currents

from the recording amplifier" (ibid.:242-243).

Ashley had the tape transports mounted above the mixing and amplification equipment, which allowed him, in a comfortable seated position, to develop "facile techniques of magnetic tape composition which rely almost exclusively on switching and mixing procedures, and make little use of splicing or cutting of the tape itself" (Mumma 1964:243). As Ashley stated, "I made an electronic music studio with whatever stuff I could get together; in becoming a composer, that was the first thing I decided to do. And I designed my own personal studio in the direction of real-time music" (Gagne & Caras 1982:20).

The repurposing of consumer audio equipment was also a staple in the studio, a point discussed in more depth later. As Ashley explains, "there was a big push in the commercial world to sell reproduction equipment...to sell Frank Sinatra records" (interview with the author, 9/11/06). As a result, the golden era of the hi-fi and "high fidelity" home audio equipment generated not only tools to play back Sinatra records, but also provided relatively low-cost electronic components for this new experimental medium.

In addition to consumer electronics, surplus military equipment was readily available at the time. Ashley continues, "at that time, the US government was dumping a lot of their electronic circuitry into the public markets...you could buy anything that the government...made that cost \$10,000 to make, and you could buy it for \$10" (interview with the author, 9/11/06). These "guilt-laden by-products of the dreaded military-

industrial complex," as described by Collins (2006:201) were nonetheless employed oppositionally, in what Pomeroy (1991) has characterized as "aesthetic research" that "...often takes on the piratical aspect of secondhand R&D. Although the hardware may not be fresh, the implementation is frequently beyond the scope of the original designers' intentions" (Pomeroy 1991:275).

Gordon Mumma's first explorations of electronics were as a child, when he "took apart his father's turntable and reconstructed it to play records either forwards or backwards. 'I kept rebuilding my bicycle when I was a kid, too.' " (Henderson 2002:31). Mumma also remembers a neighbor, circa 1948, who was a medical doctor that had "built his own successful disk-recording studio from scratch, and re-assembled old 1930s disk lathes. He had 5 Ph.D.s, in medicine, philosophy, electrical engineering, psychology, and literature. Now there's a tinkerer...from him I learned much about technological history" (email correspondence with the author, 4/23/09). Later, around 1953, he continued this interest by taking apart and reassembling a reel-to-reel deck used to record sound effects for the University of Michigan's drama department, which Mumma identifies as the beginning of his real work with electronic instruments:

My first work in electronic music was probably 1953 or 1954. The drama department did lots of plays...and they needed music for it. I was doing piano music accompaniment, a few instruments or the like. They had a couple mono tape recorders, junky things, so that they could do background sounds; an automobile driving by in a play or something like that. I just jumped in and recorded the music that I would play on the piano, or that the ensembles played, so they could rehearse with recordings. It wasn't but a week or two later that I was taking one of those tape recorders apart to see how it worked...they were pretty simple in those days -- that's where my electronic music work got started! (Gordon Mumma interview with the author, 7/11/05).

David Behrman and Alvin Lucier came to adopt electronic music in their work later. Behrman met Mumma at the same 1963 Town Hall Earle Brown/Morton Feldman concert in New York that seems to have been the nexus for the four composers. Beginning sometime in 1964 Mumma sent a series of letters to Behrman that were "a primer on how to build basic electronics" (David Behrman interview with the author, 12/8/06).⁶ Lucier, after his time in Europe as a Fulbright scholar, became convinced that "complex, serial, high-powered music just didn't interest me at all" (Lucier 1995:26), to the point that he actually stopped composing for a time.

The aesthetic turning point in Lucier's work was the 1965 composition *Music for Solo Performer*, which creatively used electroencephalography (EEG) equipment and extremely amplified brain waves to resonate percussion instruments spread about a performance space, and which is discussed in detail in Chapter Three. I quote Lucier at

⁶ Behrman believes he has Mumma's letters in a storage space in New Jersey (interview with the author, 12/8/06).

length as he explains his musical use of what would normally be medical equipment in what Madeleine Akrich (1992) has called the “de-description,” or “un-writing” of the intended use of a technical object. Lucier’s understanding of this de-description is that he is simply working with a modern-day manifestation of the Romanic-era “landscape”:

I went through a great deal of anxiety making that piece because it was the first time I let structure go. I simply let the continuity of those alpha pulses as they flowed out of my head determine the moment-by-moment form of the performance. A few colleagues advised me to record my alpha and compose a tape piece, but I decided to perform it live. That was a dangerous decision because in a live performance you have to be able to generate alpha in front of an audience. You can't be sure you're going to get it (Lucier 1995:32).

Two Theories of Analysis

One way to discuss this emerging new musical work with electronics is through a conflation of two approaches to viewing the genre postulated by two of its practitioners. Gordon Mumma (1975) presents an overview of live electronic music practice based on the performance medium. Mumma divides the work into four categories: 1) live performance of instruments with tape, 2) performed tape, 3) live electronic music without tape, and 4) live performance with digital computers. For the first, he describes works that alternate and/or layer live instruments and recorded tape, such as Edgard Varese's *Deserts* (1949-52). The second, performed tape, is tape music approached as a *non-fixed* medium, as in Cage's *Rozart Mix* (1965), which allows audience members and performers to add tape loops to the sound environment during the performance. Live

electronic music without tape, Mumma's third category, is the area the Sonic Arts Union's work primarily inhabits – that being electronic sound generated in real-time during the performance. The fourth and final category Mumma outlines is live performance with digital computers, which historically did not begin to emerge until around 1970, with the appearance of smaller computers and telephone data-links to transmit material from larger computers. In current live electronic music practice, nearly all new work being created is in this category, due to the portability, accessibility and sophisticated audio manipulation software programs available to synthesists.

The second theoretical view of electronic music practice, by the younger composer Ron Kuivila (Behrman & Kuivila 1998), a member of the late 1970s iteration of the group Composers Inside Electronics, is based on the composer or work's relationship to the technology employed for its realization. Kuivila draws spatial/movement analogies to describe these relationships. 1) Getting "under" technology; 2) staying "over" or "above" it, and 3) diving "into" it. Getting "under" the technology, Kuivila says, is "working directly with physical principles," (1998:13) as much of Alvin Lucier's work with natural sonic phenomena accomplishes. Staying "over" or "above" the technology is to work with abstract principles. This context is perhaps best embodied in Robert Ashley's fascination with human communication and his use of technology to help illuminate and articulate that mysterious phenomenon. Diving "into" technology is working with "obsolete or banal technologies" (ibid.). Much of David Tudor and Gordon Mumma's live electronic work can be seen in this light, because, due to the

exponential rate of technological change, their homemade electronic boxes become technologically obsolete almost immediately after creation.

By combining these two ways of looking at live electronic music works, it is possible to abstract overarching concerns, approaches, uses and relations to technology. Clearly, a composition can inhabit more than one category at a time. For example, Lucier's *Bird and Person Dyning* (1975) uses an electronic Christmas tree ornament made to look and sound like a small bird as a source for the creation of audio illusions in conjunction with binaural microphones. The piece, using Mumma's classifications, is live electronic music without tape. Using Kuivila's terminology, the work approaches technology by both delving "into" the banal bird ornament and at the same time getting "under" it, to expose the fascinating phantom images of the ornament's sound projected in a space, created through the physics of heterodyning and feedback principles.

Live Electronic Music as a Folk Practice?

In a 1980 article looking back on developments in electronic music, John Rockwell describes what he calls "electronic folk music." He describes its practitioners as using "funky, homemade equipment" and a casual performance environment "...featuring composers working with the equipment right in front of an audience, improvising or letting the electronics interact with live performers" (Rockwell 1980:D21). Rockwell labels this new kind of electronic music an "aesthetic reaction to the more fiercely dehumanized aspects of the electronic music of a couple of decades

ago" (ibid.). In discussing this "dehumanized" earlier electronic music (presumably work in the vein of the Columbia-Princeton center composers, and other institutional electronic music studios) the author uses adjectives such as "oppressively scientific," and "cold." (ibid.) The composers he mentions as proponents of this new "electronic folk music" include Behrman, Ashley and Mumma. What is interesting about Rockwell's positioning of the SAU composers as a more "human" alternative to the more academic electronic music he demonizes is that it seems to be based largely on the concept of the composer/performer, and more generally, live electronic music practice as outlined above. The fact that the composer is in the room with the audience creating the work live -- as opposed to being in a studio or projecting a fixed tape work -- seems to strike the author is less cold and sterile, giving an illusory nostalgic glow of a warm fireplace to this technologically advanced music.

This concept of the "folk" in live electronic music practice is also discussed by Gordon Mumma in interviews and in writing as early as 1974, and it seems to be a concept he continues to endorse.

I think the reason I call it folk art has to do with its essentially being not mass-produced even though it might be used in some mass media way. However it's basically not mass-produced and there's no strong standardization. If David Tudor or David Behrman or Paul DeMarinis...used all the same circuits, we might think of it another way. But in fact, they're all very different; they even use them differently (Mumma in Ashley 2000a:100).

Mumma's conception of the folk, in this case, focuses upon mass production vs. individual tools, and the ways of using those tools that are non-standardized and

composer-specific. This is a curious application of the term, since folk is usually applied to a tradition, a shared practice. Mumma has also said he uses the "by-products" of his culture to "make something out of nothing," a practice he likens to the Trinidadian transformation of surplus oil storage drums into the steel pan orchestra (Qtd. in Ashley 2000a:98). The following example sheds more light on this issue.

I made an analog multiplier for David Tudor once. He didn't know what that was, but he had used one that I had made for somebody else and he wanted me to make him one...Some months later he showed up in town...and he had this thing, and he wasn't using it the way it was designed for use...but he had the whole thing going. He had a spectacular musical thing going...and it's not that he misunderstood me; there was no misunderstanding at all. It was just that he asked me to make something and I had one point of reference and he had another (Mumma in Ashley 2000a:102).

As seen here, it appears that Mumma's idea of live electronic music is as a shared practice, but it is a practice founded on individual creativity and uniqueness – so one composer's frame of reference can shift the resultant use of a given technology. A shared practice among these tinkerers is the interest in delving into the electronics, both by building new circuits or, in the case of Lucier's *Solo Performer*, repurposing existing ones. To further illustrate his point, Mumma gives the example of someone using a video camera with the "circuit boards pulled out...and worn for decoration." Though this is not how a video camera is commonly used, Mumma suggests that "...we might not recognize that as video art, but that's as much video art as what we're doing" (Mumma in Ashley 2000a:102).

Mumma has elaborated on this folkloric conception in essays, such as the 1974

article, "Witchcraft, Cybersonics, Folkloric Virtuosity," which originated in a lecture he gave on several occasions in the early 1970s. Mumma discusses his early impressions of the California experimental art scene after a year of living and working at the University of California, Santa Cruz. His discussion of the music scene in and around Santa Cruz begins with a brief historical and cultural introduction of northern California, setting the stage for his thoughts on the work being made there.

The spiritual influence of...early Spanish culture is still important in California. It is now mixed with the spiritual ways of the indigenous Indians and the immigrant Asians and European Protestants. Witchcraft and occultism are part of the spiritual ambience, and sometimes the political manifestations of California (Mumma 1974:71).

By beginning his essay using this mystical and distinctly American multicultural base for his investigations, Mumma has already departed from the typical discourse for experimental music prevalent at the time, which was (for the most part) focused on aesthetic or theoretical issues and not cultural interpretations of the work, for example, the writings of Babbit, Boulez, and Stockhausen. Mumma's grounding of the work he discusses using a brand of ethnomusicological methodology is in itself a statement of his view of his work and that of his contemporaries as folkloric. At the very least, he is actively engaging with the fact that their work is a product of a culture, and uses non-musical objects produced by the culture for musical purposes.

Part of Mumma's folk conception is based around what he calls "folkloric virtuosity," which he somewhat cryptically describes in this same article:

Much folkloric art is...innovative in its virtuosity. All of the work I have mentioned is innovative in its virtuosity, and is in some sense folkloric. Furthermore though it is the art of a literate people, and electronic technology is the manifestation of a highly literate society, it has many characteristics of non-literate art. None of it is mass produced, and very little is notated. Most of it is used by people who teach it directly to one another and distribute it only by performance. (Mumma 1974:76)

Though it may seem with twenty-first century politically correct hindsight that a kind of "noble savage" romanticized view of folk forms was part of his notion of folkloric virtuosity, it is clear that Mumma had a forward-thinking, comparative perspective on the music he and his colleagues made and of its place in the global soundscape. Mumma compares the practices of his associates to folk practices because of three basic elements: their music (and instruments) were not mass produced, very little of the music is notated in a traditional sense, and most of it is taught orally and distributed only in performance. As a result, his is a practice-based comparison, not just conceptual. This idea is embodied in the habit of playing the musical saw, which Mumma has used for many years as one of his sound generating devices in both a solo context, or in the context of his live electronic music.

His concept of "virtuosity" is further explicated by describing the use of the voice in various musics: "Though not everyone has equal access to electronic resources yet, one resource shared by all peoples, and also used in innovative ways, is the human voice" (Mumma 1974:76). Mumma proceeds to describe Tuvan overtone singing, mouth harp practices in parts of Asia and Central Africa, and the use of voice in Australian

didgeridoo performance. This view of innovation and virtuosity in the "folk" realm is also expanded upon in Mumma's consideration of performance practice:

People from non-literate societies often perform several activities at the same time: the dancer who plays an instrument and sings simultaneously. This kind of virtuosity is uncommon in Western literate arts. There are exceptions, such as Meredith Monk, a remarkable singer, dancer, and composer of poetic theatre in the United States (Mumma 1974:76).

His intention with each of the above examples advocates a global view of music production that views innovation and experimentation in all these musical practices, be it electronic music or folk forms, as equally important, valid, and influential, occupying the same sonic and conceptual space when viewed from this global perspective. This idea is reinforced in Mumma's discussion of delivering the lecture based on this material at a Darmstadt summer course in 1973:

it was an interesting situation in the Darmstadt context because I did comparative cross relations of folkloric musics. What I mean by folkloric musics is from various different kinds of technology, from electronic technology, from non electronic technology, from all different parts of the world....I made cross relations between many things. That was uncommon in the Darmstadt situation, which tends to be more narrowly focused in terms of its cultural concerns. Mine was much more broadly inclusive of different kinds of musical experimentation and musical technologies. And I considered of equal importance the explorative use of what are typically called primitive technologies, that is, from non electronic and nonliterate cultures. I considered them all as the same level of importance, which they are. And that was a little bit controversial. (Gordon Mumma interview with Vincent Plush 1983:121)

Gordon Mumma's interest in global innovation and experimentation led him to a long

lived interest in the experimental music scene of Latin America, after first crossing paths with that scene on a Merce Cunningham tour of Latin America in the summer of 1968. Mumma made several extended visits to the *Cursos Latino Americano de Musica Contemporanea* in 1975, 1977 and 1981, and wrote an article on some of the work that was happening there. Mumma describes his impressions of the courses he attended:

I'd call it a Latin American Darmstadt except that it's only a Darmstadt in the sense of courses and performances, a kind of central festival with seminars and workshops and the like. It doesn't have any of the character of Darmstadt beyond that. It's a far more inclusive, diverse situation in terms of musical cultures than Darmstadt is. There's a much broader concern with--with socio-musical issues. There are concerns about music education, musical pedagogy, with popular musics, with all kinds of things....there's a considerable concern with musical origins in indigenous ways, which is much more complicated in Latin-America than it would be, say, in Germany. So that there would be lectures and courses on indigenous musics as well as on electronic music, or on virtuoso 20th century piano techniques, things of that sort...the fare of the curriculum is much broader, much more inclusive, much healthier in that respect, in the Latin American courses. (Gordon Mumma interview with Vincent Plush 1983:123-124)

Mumma gives the sense that what he found in the Latin American new music courses, versus those at Darmstadt, was a kindred philosophy to his own about the validity and importance in looking at folkloric and "new music" forms as both using innovation and experimentation to express sound, and that all these expressions spring from a cultural context that both defines and inspires them:

a much greater concern for the socio-cultural welfare of other musicians and a concern for how music is made, for the socio-cultural aspects of how music is made as well as the technical and theoretical aspects of how it's made. (Gordon Mumma interview with Vincent Plush 1983:124)

Of course, commonalities can also be a magnifier of difference:

The economic and technical affluence of Latin America is quite spotty, and very much more restricted for complicated reasons that are political often as well as economic....In some aspects of it, it would be called a technological poverty, which is to say not that there isn't one, that there isn't a technology, but that it's of quite a different level. I often felt a little uncomfortable, particularly when I was in Uruguay and in the Dominican Republic, being often a primary...representative of electronic technology, musical electronic technology. Because it seemed to me that the musical issues that I dealt with were so often dependent upon the technology which didn't exist in a rational or easily available way in those places. (Gordon Mumma interview with Vincent Plush 1983:124).

The incorporation, appropriation, or willful alignment with folk and "primitive" elements in the arts is practically a tradition in itself from the 18th century through the modernist period, as Belgrad (1998) and Bloechl (2008), on indigenous American art, and Lemke (1998), on African art, have illustrated. Matthew Gelbart's detailed study on the emergence of the terms "art music" and "folk music" in Europe demonstrates that these aesthetic categories "are inherently socio-political instruments" (2007:5). Gelbart suggests that in the early eighteenth century, these categories were "almost exclusively based on the functions of music, so the folk and art categories would have been quite foreign ideas at the time" (2007:9). Indeed, Gelbart argues, it was not until the mid-1800s that folk music and art music "acquired connotations more or less consistent with their present

meanings" (2007:9).

Sally Banes (1993) has characterized the interest in the "folk" amongst the 1960s New York avant-garde as a somewhat misguided attempt to build a community, under the assumption that "to make art that somehow resembled folk art could work backwards, as an index of potent, productive communal bonds" (Banes 1993:95). Following this logic, Banes furthers, "if community implies folk art, then to have what looks and feels like folk art must, in part, constitute community" (ibid.). In other words, the artists attempted a kind of "reverse engineering" of traditional conceptions of community formation.



Fig. 2.2. David Behrman (left) and Alvin Lucier, possibly at Brown University, February 1973. Courtesy of Gordon Mumma.

Bricolage, D.I.Y., Know-how and "Tinkering"

"Know-how" as a term and concept likely entered common use in the 20th century, though Margaret Bryant reports it as appearing in an 1857 newspaper article (1957:577), and the *Oxford English Dictionary* notes its first use in an 1838 issue of the *New Yorker*. A 1944 article by Louise Pound reports that use of the term is "growing by leaps and bounds," and that it "reflects all phases of the task of getting the job done," but also means the "skill of the art" (1944:65). That the term seemingly originated in the United States makes sense given the vast number of technological breakthroughs in the American industrial world of the 20th century, but John Rae has suggested that the "American-ness" of the term relates to the fact that "as a people we have placed a far higher premium on knowing how than on knowing why. The folk-heroes of American technology are the Edisons and the Fords, men with a minimum of formal training, dedicated to cut-and-try, lacking in scientific and inclined to be scornful of scientific method" (Rae 1960:141).

This kind of active, experimental relationship with technology was not unusual for young men of the SAU's generation, as Susan J. Douglas (1992) and Carroll Pursell's (1992) studies of "boy engineering" have illustrated. Douglas states that in the 20th century, tinkering with machines "became obsessions for boys and men across America," characterizing this hands-on exploration of technology as "...defiant, [and] challenging the ways in which entrenched corporations hoped their inventions would be

used" (1992:45). Douglas argues that this "conscious defiance" and "oppositional, anti-establishment" use of technology allowed the mostly white middle-class boys and men involved in these activities an acceptable outlet for rebellious feelings, and to "postpone" their integration into the institutional bureaucracies of society at large (1992:46). Of course, an entire commercial industry sprung up as a result of this "market," (certainly tempering the "oppositional" nature of this practice) in products like the do-it-yourself stereo kits, ham radio sets, model rockets, chemistry projects, and so on, epitomized in the DIY philosophy of the by-then venerable *Popular Mechanics* magazine (which was first published in 1902).

In the context of discussing the Sonic Arts Union's technological play, I examine a particular kind of know-how practiced by end-users of technologies, or, in the case of the SAU, electronics designers reordering and recontextualizing found components. What might we learn about a tradition of non-industrial technological play and invention through the SAU's social and aesthetic experiments with technical objects?

One of the classic American manifestations of know-how and tinkering is drag racing culture, and in general, amateur car repair and modification. Robert Post's detailed monograph on the rise of this practice in the United States in the 1950s describes a technoculture based on the "Yankee" idea that time was "valuable enough to try to save" (1994:xviii) through the pursuit of speed, but that also "relished the thought that what dragsters did on asphalt or concrete was, on paper, simply not possible" (1994:xxi).

Another American tinkering tradition that has previously been discussed is that

of guitar tinkering, which includes a lineage of musicians as diverse as Les Paul, Bo Diddley, Jimi Hendrix, Eddie Van Halen and Greg Ginn. The last two are the subject of a 2004 article by Steve Waksman in which he describes their technological play as part of a tradition founded on a "rather informal process of experimentation and adjustment in pursuit of results that were sometimes not clearly defined until they were achieved" (2004:675). He goes on to place this technological practice at the confluence of two trends -- that of "technological enthusiasm" (cf. Wright 1992) and "DIY," or do-it-yourself (cf. Gelber 1997). Drawing on Turkle (1984) and Post (1994), Waksman rightfully acknowledges that tinkering is not a homogenous practice, putting forth several kinds of archetypal relationships tinkerers have with the technical objects they work with, noting that it "often involves an inversion of the usual means-end relationship that governs technological work" (Waksman 2004:684). The taxonomy Waksman develops begins with tinkerers that develop a fascination with the machine itself that overrides and specific technical goal, followed by those that have more pragmatic goals (2004:684). Waksman also differentiates the degree to which a tinkerer is engaged with the nut-and-bolts of construction; for example, are the objects being built from scratch as many of the instruments created by Mumma and Behrman were, or is it a "kit" approach, building within a set of guidelines and with a prescribed collection of materials. Waksman's approach and framework to analyze various kinds of tinkering and play with technology is useful in the specific context of the SAU in many respects, some of which are outlined below.

The "Americanness" of this particular brand of technological play has been explored by Eugene Ferguson, who attempted to describe "the connections between the distinctive qualities of American technology and the great central dream of democracy, in which everyone can share the good life" (1979:3). Ferguson argues that a purely economically-driven model for describing American infatuation with innovation "is to miss the strong romantic and emotional strain in the narrative of American involvement with its technology" (ibid.). Ferguson does, however, focus on mass technologies, high-yield line production and efficiency in his discussion of American technological traditions, and not so much on the workbench tinkerers' approach that might be the closest analogy to the technocultural practice of the Sonic Arts Union and their colleagues.

Claude Levi-Strauss's transformation of the humble French folk figure of the bricoleur into a platform for structuralist theories on mythical thought is of interest when looking at the SAU's practices. Levi-Strauss explains that the original meaning of the *bricoleur* was "...someone who works with his hands and uses devious means compared to those of a craftsman" (1962:16). In American vernacular English we might call this person a tinkerer, or handyman. The implication of labeling an individual in this way (further illuminated by Levi-Strauss's use of the word "devious") is that he is gifted with some kind of technical or specialized skills, but that those skills were learned outside of an institutional environment, and through a lengthy period of experimental trial-and-error before reaching the point of fluency currently embodied.

Levi-Strauss differentiates between the *bricoleur* and engineer by explaining that the latter is "...always trying to make his way out of and go beyond the constraints imposed by a particular state of civilization," and the former "...by inclination or necessity always remains within them" (1962:19). He further elucidates this point by stating that the "engineer works by means of concepts and the bricoleur by means of signs" (1962:20), or that the engineer works in a realm of abstract ideas beyond available materials, whereas the *bricoleur* requires "...the interposing and incorporation of a certain amount of human culture into reality," (ibid.) and therefore must use the concrete materials available to them.⁷

In the context of the Sonic Arts Union and their practice of electronic experimentalism we can see aspects of both the *bricoleur* (through the artists' physical labor and use of materials) and the engineer (embodied in their philosophical and compositional intentions).⁸ This dual character to their work falls in line with Levi-Strauss's statements that

⁷ Jacques Derrida critiques Levi-Strauss's binary framework by countering that "if one calls bricolage the necessity of borrowing one's concept from the text of a heritage...it must be said that every discourse is *bricoleur*" (1978:285). Additionally, Derrida states that Levi-Strauss's "engineer" is "a myth" because "a subject who would supposedly be the absolute origin of his own discourse and would supposedly construct it out of nothing...would be the creator of...the verb itself" (ibid.). Derrida's position is that all discourse and activity is finite, and bound in one way or another to "received historical discourse," making the engineer simply another "species" of *bricoleur* (ibid.).

⁸ Timothy Taylor (2001) has previously employed Levi-Strauss's ideas to discuss *musique concrète* pioneer Pierre Schaeffer's work, though in that context he was discussing Pierre Boulez's disparaging remarks of Schaeffer's use of found sounds as "mere" *bricolage*, (2001:57) not applying the term to the artists' approach to the physical technologies used in creating the work.

art lies halfway between scientific knowledge and mythical or magical thought. It is common knowledge that the artist is both something of a scientist and of a 'bricoleur'. By his craftsmanship he constructs a material object which is also an object of knowledge" (Levi-Strauss 1962:22).

The form of bricolage the Sonic Arts Union practiced was both a result of necessity and an aesthetic position. The necessity was a result of lack of access to the resources of either a pool of performers interested in contemporary music, and the economic limitations that prohibited them to purchase the early special purpose synthesizers that were in well-funded studios like the Columbia-Princeton electronic music studio. Robert Ashley explains,

We had access to nothing. It's hard to explain now, because there are so many new music organizations that are made up of conventional instruments who...will play contemporary music, but in the 1960s, that situation simply did not exist, in any form. I mean, if you wrote a piece for flute, you'd be lucky to get a flute player to play it! So, electronics were available. There was a big push in the commercial world to sell reproduction equipment. They wanted to sell Frank Sinatra records, and so there were a lot of pioneers in that consumer electronic world who were making things available. You could buy them in the store, that weren't available, say, in the 1940s. In other words, you could buy preamplifiers, you could buy microphones, you could buy all that stuff (Robert Ashley interview with the author, 9/11/06).

This consumer equipment was affordable, and could be adapted to be as effective a tool as the special-purpose equipment that was only just beginning to become available at the time. The specialized equipment, when it did exist, however, was economically well out of reach of the SAU composers.

Mixers that you could plug everything into just didn't exist! There were no professional loudspeakers, there wasn't any Meyer sound - you had to grab what you could from someone's house -- we had KLH and ARL. That was beautiful too, because in Boston these companies would build these new home acoustic suspension speakers. We all had these PAT 4 Dynaco preamps, which were very important. They had various inputs on the back, they had special high impedance microphone inputs, they had auxilliary, they had phono, which we didn't use, and they had line inputs, so that we each could have a pair of stereo inputs into a single preamp. So you could switch from one piece to another piece...I mean it sounds trivial, but it was extremely important. And we would take our PAT 4s with us when we performed in other countries, because then we could plug into whatever amplifiers were available...the source of all our music went into that one, inexpensive component. I think maybe Gordon had wired his own...I think Gordon would have changed the inputs or something so that we could all be accommodated (Alvin Lucier interview with the author, 6/3/2005).

These surplus technological materials actually gave the SAU access to a large amount of resources, albeit non-traditional resources that required a significant amount of labor and technical knowledge to transform into a useful form. As a result, the SAU, like true *bricoleurs*, worked with materials that were both economically viable and physically available to them. This methodology of limited means, however, soon developed into an aesthetic position, an exploration of the limitations for their own unique and interesting properties. As Gordon Mumma remembers:

I went to the military surplus stores, and bought leftover military stuff, which is part of the reason I was still making vacuum tube things later -- because I could afford it! They were hot, they burned out, but the other part, and I think this is true of Behrman, also...we bought "defectives" and "throw-outs". We got them at Canal street in NYC, I got them from military surplus places in the Detroit and Ann Arbor area. We bought junk!...I was smart enough to know about things, and I discovered (for example) that certain manufacturing defects in certain models of certain capacitors were unpredictable, and **very interesting** musically. (Gordon Mumma interview with the author, 7/11/05).

The acceptance and transformation of defective and throw-out circuitry into a foundation of their practice, though certainly coming in part from the 1960s zeitgeist of incorporating indeterminacy into the work that became Cage's hallmark, is one way the SAU helped found an aesthetic constructed with the technological detritus of their society. As a result, the SAU in some ways conceptually aligned themselves with visual art contemporaries like Jean Tinguely, Allan Kaprow and others who practiced *assemblage* – what Barbara Haskell (1984) has dubbed an “aesthetic of junk,” used as “a way of rescuing art from overly subjective and rarefied realms and bringing it back into contact with the ordinary and the ‘real’ ” (1984:17).

When commercial synthesizers began to become available, the SAU for the most part continued to use their self-made equipment, with the exception of a piece by Alvin Lucier, *Duke of York* (1971), that used an ARP 2600 synth. Otherwise, the equipment they used continued to be either self-designed or repurposed pre-made modules and circuits. The choice to continue using their equipment was again a combination of convenience and economic viability, but also an aesthetic choice. Since they already knew

how to build, use, and maintain their equipment, it wouldn't make sense to spend the large sums needed to purchase a commercial synth. To continue to use their instruments was not simply a sense of attachment to a physical object, but to both its functionality, as it specifically related to a composition, and the sound itself:

after the big "hi-fi" explosion, then you got into the business of synthesizers for pop music, which meant Moog, Arp, you know, all that kind of stuff, and suddenly those things were available...so suddenly these new kinds of instruments, these new kinds of sounds were available that hadn't been 10 or 15 years before, even for John Cage. I mean, the first John Cage pieces I heard just used contact mics and an amplifier! (Robert Ashley interview with the author, 9/11/06)

The aesthetic choice to continue to use their instruments was not simply a sense of attachment to a physical object, but also to both its functionality, as it specifically related to a composition, and the sound itself:

The reason we liked to build our own equipment, at least David [Behrman] and Gordon [Mumma], the sounds were better. They were more into the electronics. They were related more to David Tudor. Why did we like David Tudor's music more than Mario Davidovsky? They're both good, but why do we? Because David Tudor goes right into the electronics, he understands what is in there, and if he doesn't understand it, he's exploring it, whereas the studio people are sort of "outside" the sounds a little (Alvin Lucier interview with the author, 6/3/2005).

The "inside" and "outside" descriptor employed here by Lucier ties into Kuivila's (1998) analytical framework mentioned earlier that uses a composer's relationship to electronics and technology as a metaphor for their musical and compositional practice. The resultant music is not just a matter of developing sounds and putting them in some kind of order

from the "outside", without dealing with the internal technical dynamics of how the sound reaches the output stage. It is a sonic schematic of the relationship between the composer and their tools -- their instruments. By being "inside" the electronics, both David Tudor and the SAU composers track the sound from its genesis in circuitry to its output from loudspeakers. They both shape the character and draw out the unique and personalized properties of that particular conglomeration of electronic modules, following its signal path from electrical impulse to physical vibration.

It was an artistic choice, I think I have to put it that way, but it's a very interesting question that I haven't thought about -- why didn't I go and get myself [a commercially produced synthesizer]? I was good friends with Bob Moog, I could have got myself one...I was very impressed with things they did...but I'd been doing all that myself! I'd built stuff that did that already. What Moog had done that was impressive was that he put the combinations in one thing -- he built for studio situations -- that didn't work for me, I was building for the road, so my stuff was either simpler or smaller, or unique to each situation. (Gordon Mumma interview with the author, 7/11/05)

The quirkiness and uniqueness built into the circuitry and component combinations Mumma and Behrman employed were part of their experimentalist approach to electronics, but also part of their aesthetic signature, as these individualized cast off parts interacted with each other to create unexpected results.

In addition, Mumma mentions the issue of the portability of their equipment is something all the composers also mentioned, as they were building "for the road" -- the equipment needed to be manageable enough to break down after each performance into a reasonable enough size to make the journey to the next destination. The many years

Behrman and Mumma, especially, spent on the road with the Cunningham Dance Company certainly played into these concerns.

Mumma and Behrman were especially interested in the compositional possibilities revealed as a result of hardware glitches the original components' designers would have likely called defects:

There were flaws that made the storage aspect of a capacitor [interesting]. You couldn't rely on them in a Moog synthesizer or a Buchla -- but if I put them into a situation where they could interact in an unpredictable way...ah! That's not "chance operations" -- they were modifying the way the signals were going through. That's interesting! You got the distinction? (Gordon Mumma interview with the author, 7/11/05).

In a letter to David Tudor in 1966, Mumma writes about an output splitter he was building for himself and Tudor, and describes the chaotic response of the gear, as well as his pleasure at its inconsistency:

The circuit is only about as stable as your Olson or Lafayette mixers. That is, there is a tendency to overload and slow recovery with audio signals of wide dynamic range. I like this effect - you would too, if you were thinking in terms of calling the device a "modifier." But if you want just an output splitter with a high degree of reliability, I think the earlier version is better for you (Mumma 1966b).

Regarding a "special oscillator" he was building at the same time, Mumma writes, "I've built in a lovely bit of instability to this trigger, so that below a certain division it fires pseudo randomly, best described as a 'sputter' " (Mumma 1966b). These interesting defects that Mumma and the SAU prized in the materials they pieced together were simply not possible with commercial synthesizers, because the industrial and consumer

context those instruments were created within required reproducibility and repetition, not the anarchic and mutating signal paths both "built in" by the inventors and produced naturally by the cast-off parts used by Behrman and Mumma.

You can't make repeatable things out of junk -- which is the difference between Bob Moog and me, other than that he was smarter than I was, and much more sophisticated with electronic design than I was! But he was also building stuff for other people...For me, I could just experiment - if it didn't work, I'd throw it away, try something else, ok, fine, we'll use that, you know? I was essentially "fooling around" in a pantry of junk, making a dinner, in effect, I mean, that I could use in a piece! That's something of a simplification, but...David Behrman did a good bit of that also. We shared some basic designs of comb filters or odd designed ring modulators, you know, simple stuff like that, but what made them interesting was not what they were as individual things, but how we put them together in combinations -- we made "communities," if you will (Gordon Mumma interview with the author, 7/11/05).

This is not to imply that the early synthesizers being built by inventors like Don Buchla and Bob Moog were aesthetically vilified by the SAU, they were simply built for a different purpose and within a different context, though the initial "cottage industry" milieu these instrument designers worked in was closer to the SAU's position than the corporations and institutional manufacturers of electronic musical technologies.⁹

⁹ See Pinch and Trocco (2002) for a detailed examination of Moog and Buchla's work.

That is a very interesting historical aspect -- how the evolution of the synthesizers outside of RCA and Columbia-Princeton, MIT...that's a different world -- a very different world. It was the things where people got together and made the instruments they played, that's a whole different thing than the military-backed stuff, or that the telephone [company] AT&T did, you know -- a different world. (Gordon Mumma interview with the author, 7/11/05).

The synthesizers of Moog and Buchla were built for an unknown audience of consumers and industry professionals, unlike the individualized creations pieced together by the SAU for their compositions:

They were trying to make a duplicable thing that could be relied upon...They had to do that, hoping they could make something of a living out of it! They were doing things that were innovative in very different ways...But they had technological limitations. They couldn't go too far without losing track of what connected to what...I mean, it had to be predictable enough so that they could write instructions and things like that. Also -- and this is a big difference -- in order to make things that you can duplicate, 50 models of something or other synthesizer, you had to have the same parts for each. You could buy them in bulk, and you bought the ones you knew were reliable. (Gordon Mumma interview with the author, 7/11/05).

This brings up the issue of economic viability and mass acceptance (and reproduction) of a given technology, which is typically how "successful" technologies have been defined in history of technology studies. In the case of the Sonic Arts Union's inventions, they were for the most part never intended to be marketed -- they were individual creative tools created for the specific context of realizing SAU compositions.

One interesting caveat to this is a series of promotional materials dated October 1965 Gordon Mumma produced advertising his "Cybersonic" equipment for sale. One

of the ads describes the consumer audience for this venture:

To meet the demands of a rapidly growing art, CYBERSONICS has introduced a series of sound-control devices for use in sound-editing, processing and electronic music composition. Designed especially for use in small broadcast, film, television, and electronic-music studios, the modest cost of this equipment will appeal to sound-technicians and composers who work independently as well as those affiliated with educational and commercial institutions. (Mumma 1965).

Mumma's flyer advertises a number of components; for example, an "articulation gate" that "makes possible manually operated, continuously-variable onset and decay times for any audio signal," and a "spectrum processor," which is "a multi-function unit that enables the composer to achieve extremely refined control of sound-spectra, including programmed electronic-articulation of sound" (ibid.). In an interesting change of course from Mumma's embrace of indeterminacy in his use of technical objects mentioned above, the cybersonics ad boasts that the equipment "employs the most reliable technology of transistor circuitry" (ibid.). According to Mumma,

That Cybersonics project was an extension of electronic design work I had been doing with William Ribbens for several years. Ribbens was a research engineer at the University of Michigan and we collaborated on many projects. After various inquiries from people who wanted to purchase what we were doing, we breezed a bit into catalog to "test the air" for possible commerce. The address on that flyer was the house in which Ribbens lived at that time. The Cybersonics work-studio was in his basement, and I did some of the design work and building at my house. (email correspondence with the author, 4/23/09).¹⁰

¹⁰ William Ribbens appears as an electronics performer on the recording of Mumma's *Horn*

Another interesting counterpoint to Mumma's discussion of repeatability among the mass-produced synthesizers that both Pinch and Trocco (2002) and Bernstein (2008) have shown is that the early synths coming out of Bob Moog and Donald Buchla's studios were widely variable in their performance, and that it was in part the variability and uniqueness of each device that was prized by musicians that used them. For example, in describing his reaction to hearing composer/musician Sun Ra's Model B Moog synthesizer, Moog employee Jon Weiss recalls: "I happened to hear this machine, and [Sun Ra]...made sounds like you had never heard in your life, I mean just total inharmonic distortion all over the place, oscillators weren't oscillating any more, nothing was working, but it was fabulous" (Pinch and Trocco 2002:223).

Pinch and Trocco also describe composer Brian Eno's practice of leaving "a little note on his VCS3 synthesizer telling his technician, 'Don't service this part. Don't change this' -- he preferred the sound the ring modulator produced when it was 'broken' " (ibid.) The authors conclude that "It is the departures from theoretical models of instruments -- the unexpected resonances and the like -- that make an instrument particularly valued" (ibid.) -- an aesthetic that sounds surprisingly similar to that of the SAU; the chief difference of course being that the Moog and Buchla synths arrived as either kits or ready-made "black boxes."

Behrman's critique of commercial synths is similar to Mumma's, focusing on the repeatability and lack of uniqueness in the mass-produced instruments, as well as his

(1965) that appears on Tzadik CD TZ7074.

perception of their tendency toward commodification by mass culture:

[commercial music synthesizers] tend, when used alone, to produce sounds which are quickly used up by our culture (become clichés). This is probably because they are designed as general-purpose, saleable packages adept at producing everything from TV commercial sound effects to imitation of conventional instruments. (Behrman, undated program note for *Homemade synthesizer music with sliding pitches*, courtesy Gordon Mumma).

Gordon Mumma, in a 1997 article on the use of electronic music in the Cunningham Dance Company tied the use of commercial synthesizers to an aesthetic divide between "explorers" and "homogeneity":

Cunningham Dance Company musicians preferred the challenge, risk, and reward of electronic instrument building and system design. This resulted in non-standard, often one-of-a-kind systems unique to each piece. The impetus of the explorer prevailed. In contrast to this explorer tendency was the predominant tide of homogeneity in electronic music culture elsewhere. The attraction of easy commercial and academic acceptance warped the aspirations of many musical artists, who succumbed to using electronic technology in the pursuit of imitating the sounds and musical culture of acoustical instruments, rather than exploring musical possibilities indigenous to electronic resources. The idea of "product" was fundamental in that regressive cultural tide. The vision of its practitioners rarely extended beyond shallow entertainment possibilities for their work. For the Cunningham musicians the concept of "process," and the exploring of artistic risks remained a more attractive cultural goal (Mumma 1997:55).

Certainly one reading of Mumma's critique would be to see it as the classic avant-garde strategy of placing oneself in opposition to mass-culture and commercialization, but another reading, more germane to this discussion, is that it describes the aesthetic implications of the artists' relationship to the use of technology. How does one approach

the musical use of technology -- as a consumer or a producer? As an explorer or an entertainer? Will one use electronic technologies as a mimetic device to sound like an acoustic instrument, or attempt to draw out the possibilities inherent in the technology itself?

Although a certain amount of technical virtuosity was required to design and piece together these instruments, the SAU and their colleague David Tudor decided to stay firmly on the side of exploration, often embracing the technological unknown, as Behrman remembers:

[Tudor] often didn't understand what was going on - it was the beauty of it - that it was complex feedback paths and so on that he liked but that wasn't really understandable. It's not so different than today, often when you're working with software, you'll get some "black software" box, like downloaded things from CNMAT, which are complicated mathematics inside a thing with an input and an output, so you try it out and if it sounds good, then it's ok, you don't have to understand what's inside (David Behrman interview with the author, 12/8/06).

Besides the aesthetic reasons for using home-built equipment, there was also the economic divide between the two:

I remember considering buying synthesizers, but they were always very expensive...to buy - I don't think there were credit cards then - if you didn't have \$2000 you didn't have \$2000, period. [laughs] Plus, I guess, really, right from the start, I was interested in making special purpose things that you couldn't have satisfied by buying a synthesizer -- I mean, like having 32 oscillators, you couldn't buy a Moog with 32 oscillators. And it was fun building things. Because that was brand new, things were cheap, and lightweight. Transistors were new, and just the idea that you could make a circuit for \$12 and power it off a battery and it would sound, in some way, good -- such a new thing. That was the fascinating thing to do, for me (David Behrman, interview with the author, 12/8/06).

Mumma actually used a do-it-yourself synthesizer kit for his piece *Passenger Pigeon* in the early 1970s, but typical of the SAU aesthetic, he built the device in his own way to achieve an unexpected result different from the kit's intended purpose:

Passenger Pigeon was a self-destructing composition that got underway in the 1970s, it's a later work -- '70, '71...it used a synthesizer that was from a synthesizer kit. I don't remember where I got this kit, but I sabotaged the whole way it got put together. I use the word in an absolutely positive, if not downright heroic way -- "sabotage." You rebuild, and you redo the way it was designed, to make it do other things. In the case of synthesizers that were coming out circa '68, '69, '70 (because you didn't want to dig into the Moog), they were all marvelous, but it was too early to rebuild them -- they cost a lot of money. But when the kits started to come out with instructions to put them together...which made it so you could come up with something that the designer didn't know about. See, that's what David Tudor, and David Behrman and I did, we took standard stuff -- that's not all we did -- but we often took standard stuff and simply re-did it. (Gordon Mumma interview with the author, 7/11/05).

This independent, experimental, do-it-yourself, trial-and-error approach is not just a result of an aesthetic position or economic necessity, however. It is also part of an American technological tradition, a "peculiarly American line of can-do engineers and

tinkerers, a line beginning with [Benjamin] Franklin and including Eli Whitney, Alexander Bell, [Thomas] Edison and the Wright brothers" (Zachary 1997:3). Called American "know-how," "can-do," and "Yankee ingenuity," this tradition of innovation and experimentation is a much-discussed quality of American technological culture (cf. Carlson 1991, Cowan 1997, Ferguson 1962, Kasson 1976, Millard 1990, Segal 1985, Zachary 1997). This tradition has not been based strictly on the work of the engineer as described by Levi-Strauss, but is a combination of the engineer's science with the craft knowledge and experimental outlook of the bricoleur.

In his discussion of important American electrical technologies inventor Elihu Thompson, Bernard Carlson (1991) explores this necessary combination of approaches, calling the first "scientific knowledge," and the second "craft knowledge." Carlson's two forms of knowledge are very similar to Levi-Strauss's notions. " 'Scientific knowledge' generally refers to information about the natural world that is organized into formal theories and legitimated through experiment and observation...'Craft knowledge' denotes the ideas and insights that individuals acquire through direct, hands-on manipulation of devices" (Carlson 1991:4). Carlson's view of Elihu Thompson's work attempts to "...recover the craft component..." of inventors, to "...provide insight into how modern engineering embraces both scientific and craft knowledge" (ibid.:5). His thesis is based on his belief that "...the electrical industry in the late nineteenth-century was based as much on craft knowledge as on scientific theory" (ibid.:7). Thompson, like many inventors, embodied this amalgamation of approaches, as he "created new electrical

technology by using the manual skills he had developed as a young man while building apparatus and conducting experiments..." (Ibid:6). This "workbench culture" of the solitary, individualist inventor and tinkerer is one context within which these technological innovations occur, but another is what has been called "machine shop culture" (cf. Millard 1990).

This social, creative context for experimentation, "a unique craft culture subtly adapted to the needs of running an invention factory," described by Andre Millard (1990:25) in his study of Thomas Edison's work is much closer to the type of creative exchange that characterized the Sonic Arts Union's composers work with electronics, particularly Mumma and Behrman's sharing of information and their technologically charged postal correspondence with each other and David Tudor. Millard describes "all-night experimenting sessions, with midnight feasts and hours of storytelling...Far from being sedate, intellectual environments with library quiet, Edison's laboratories were noisy, crowded places that often seemed on the verge of uproar" (1990:23). In another anecdote about Edison's labs that could just as easily describe the working philosophy of the SAU, a new employee, "asking about the rules of the lab" was told, "Hell, there ain't no rules here! We're trying to accomplish something!" (Millard 1990:24).¹¹

¹¹ One chief difference between the community of Edison's labs and that of the SAU, of course, is that Edison's labs consisted of employees given the task of producing profitable projects, not the community of friendship and aesthetic exploration that defined the SAU.

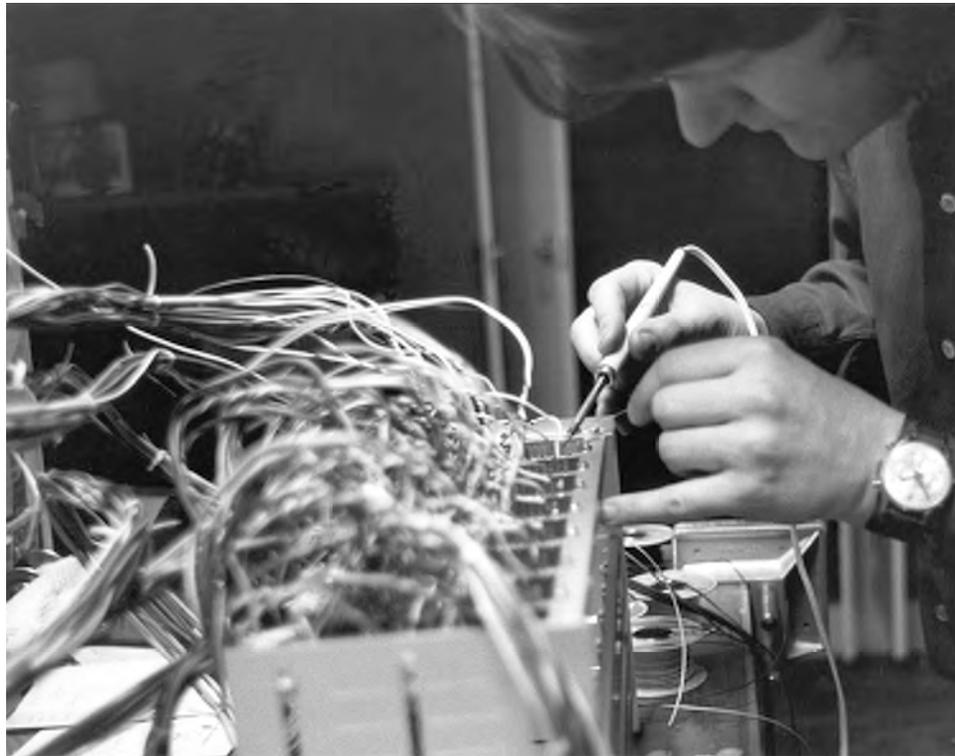


Fig. 2.3. Mumma soldering connections in his sound modifier console for the Osaka world fair Pavilion. EAT studio, New York, 1969. Courtesy of Gordon Mumma.

A Technological Approach to Utopia

The tendency for a culture to look towards the utopian possibilities of new technology is a well-documented and natural reaction to new tools and the change they bring about.¹² American society especially has tended toward this viewpoint of technology (cf. Kasson 1976, Segal 1985, Sturken et.al. 2004). When this predisposition

¹² Of course, apocalyptic prophesies are another common response to new technologies.

is combined with the context of avant-garde artists in the heady times of 1960s America, it is not surprising that some utopian ideas found their way into the philosophical approaches of the Sonic Arts Union and their colleagues.

Howard Segal's classic 1985 study of American technological utopianism discusses the work of more than forty authors throughout the 19th and early 20th century, examining their various points of view on American utopianism and technology. Segal defines "technological utopianism" as "a mode of thought and activity that vaunts technology as the means of bringing about utopia" (1985:10). The use of technology to bring about utopia is not one Sir Thomas More's 1518 originary *Utopia* would have employed, with their strong connection to the natural, but of course the term has had a life of its own since More first introduced the notion. The American techno-utopian idea, according to Segal, is based on the potential for the emergence of a utopia, and not necessarily on reality (1985:75). Identifying groups like the early conservation movement, some members of the Technocracy reform movement (specifically Harold Loeb), and the rise of city and national planning as examples, Segal characterizes these early technological utopians as "a prominent part of American culture" that attempted to predict "nontechnical aspects of utopia" (social by-products) that would "follow inevitably in the wake of the technical ones" (1985:128).

John Kasson's 1976 study of American republicanism and technology traces techno-utopianism in the writings of Edward Bellamy's 1888 *Looking Backward* and Mark

Twain's 1889 *A Connecticut Yankee in King Arthur's Court*.¹³ Kasson sees in these books a utopian view of technology that are culminations of "over a century of American attempts to integrate technology and republican values" (1976:230). Faced with the late 19th century unequal division of technological innovations among society at large, Bellamy and Twain wrote these stories in an attempt to "achieve a final synthesis in the dialectic between technology and republicanism" (ibid.).

This American fascination with technological utopianism is not constrained to those 19th and early 20th century moments described by Segal and Kasson, however, as Andrew Kirk (2002) has shown.¹⁴ Kirk focuses on the late 1960s "Appropriate Technology" (AT) environmental movement, spawned by British economist E.F. Schumacher's idea of using what he called " 'intermediate technologies', those technical advances that stand 'halfway between traditional and modern technology' as the solution to the dissonance between nature and technology in the modern world" (Kirk 2002:360). The AT movement is best represented by Stewart Brand's *Whole Earth Catalog* (WEC), which "brought together all of the divergent counterculture technology trends under one roof" (ibid.:363) and was inspired in part by Buckminster Fuller's utopian technologies. Kirk characterizes the technological activism of the AT and WEC as advancing the "radical notion that by staying home from the protest demonstration and modifying your toilet [to be more efficient], or building a geodesic dome or a solar collector, you could

¹³ Segal (1985) also mentions these works as technological utopian efforts.

¹⁴ Lewis Mumford's 1934 classic *Technics and Civilization* should also be mentioned here as an influential American techno-utopian text.

make a more immediate and significant contribution to the effort to create an alternative future than through more conventional expressive politics" (ibid.:364). In a direct (if round-about) connection to the SAU, before publishing the WEC Brand was involved in Ken Kesey's acid tests, and was one of the main organizers of the seminal 1966 Trips festival -- through those events, Brand crossed paths with the San Francisco Tape Music Center composers, as illuminated in David Bernstein's (2008) volume on the SFTMC.

Although the Sonic Arts Union and their colleagues were not operating with the overt techno-utopian intentions of the contemporaneous AT and WEC, they were considering these issues in their aesthetic practices, especially in their relationship to the technical objects they used; a relationship further illuminated in the final two chapters of this study.

David Tudor, who Mumma and Behrman worked very closely with in the context of the Cunningham dance company, wrote the following philosophical statement regarding his relationship to technology, employing an early manifestation of the inside/outside binary discussed by Kuivila & Behrman (1998):

The view from inside – The realm of electronics, entered into in the spirit of discovery, can give the musician a new world. Electronic components and circuitry, observed as individual and unique, rather than as servo-mechanisms, more and more reveal their personalities, directly related to the particular musician involved with them. The deeper this process of observation, the more the components seem to require and suggest their own musical ideas, arriving at that point of discovery, always incredible, where music is revealed from 'inside', rather than from 'outside' (David Tudor, handwritten note. Getty Center special collections).

When David Tudor wrote these words, most likely to be used as program notes for his group "Composers Inside Electronics" in the early 1970s, he articulated a utopian vision for electronic music, hinted at earlier in these pages by Gordon Mumma's referring to he and his colleagues' work as "building communities" of devices. Tudor expresses the possibility of a "new world" by delving "inside" the electronics. Expanding upon Mumma's description of the interesting possibilities of "defective" circuitry, Tudor celebrates the "individual and unique" properties of the equipment, and anthropomorphizes the electrical circuitry, so that the artist is placed in the position of attempting to coax out the "personalities" of the components. By allowing the circuit path to reveal its properties unhindered from the "outside," musical findings can be made that were suggested from "inside" the system. Gordon Mumma reinforces Tudor's sentiments, stating that the "attitude" of the artist towards the technology is of great importance:

more important is their attitude about using electronic technology in their work. Rather than impose the formalities of non-electronic and European concert traditions upon it, they develop their art from their experiences with electronics and the diversity of the culture in which they live. One result is that music can become an organic part of its environment...More recently in my work I often find the inherent sounds of a process so interesting that I hesitate to impose any outside formality or influence upon them (Mumma 1974:75).

Mumma, like Tudor, expresses the idea that the composer's job is to simply build the electronic "community," then let it run its course without outside influence, as an organic process. This hands-off, watchmaker approach is of course related to the aesthetics of

indeterminacy, but in the context of this discussion also implies a kind of anarchic political consciousness towards the work itself, and specifically in the use of electronic circuitry.

The anthropomorphism and humanization of technology is one natural technique for individuals to come to terms with these technical objects' place in the world. In Chapter Four, I look more closely at how the man/machine binary is dealt with compositionally in several works of the SAU, and Gordon Mumma's ideas on artificial intelligence in his music, but one relevant historical precursor to this personalizing concept of the machine is the work of Louis and Bebe Barron.

The Barrons created what is considered the first piece for magnetic tape in the United States, around 1950 (Holmes 2008:80), but are perhaps most famous for composing the first electronic music score for film -- 1956's *Forbidden Planet*. Of interest here is the way they conceptualized the identities of their home-built electronic circuitry. Bebe Barron told Thom Holmes in 2001, "We never considered what we did at that point [to be] composing music...What we did was build certain kinds of simple circuits that had peculiar sorts of nervous systems" (Holmes 2008:81). For *Forbidden Planet*, the Barrons would "build a circuit for every character...We would consider them as actors" (Holmes 2008:86). The circuits' human-like qualities did not end there: "we could never reconstruct them. They just seemed to have a life span of their own...We never could predict the movement of them, the patterns of them" (ibid.). This view of their electronic instruments clearly echoes Tudor and Mumma's above sentiments -- a

romantic sensitivity for them as individuals and creative actors that have personalities and human characteristics.

The transcendent implications of humanizing these technical objects is encapsulated in the following anecdote told by John Cage regarding an early encounter with artist Oskar Fischinger:

[Fischinger] began to talk with me about the spirit which is inside each of the objects of this world. So, he told me, all we need to do to liberate that spirit is to brush past the object, and to draw forth its sound. In all the many years which followed...I never stopped touching things, making them sound and resound, to discover what sounds they could produce (Cage 1981:73).

It is this impulse to go beyond the confines of a given technology that continues to this day in studios, garages, basements, villages and warehouses around the world as the next generation of tinkering explorers continue to redefine our relationship to (and use of) technological artifacts.

Composition and the Work Concept

The implications of the technological practices and aesthetic position of the Sonic Arts Union to traditional concepts of "the work" is worth briefly exploring here before entering into a discussion of their relationship to improvisation. Although the ontology and identity of Western Art Music compositions has been debated at length by aestheticians and musicologists (Ingarden 1966, Anderson 1982, Levinson 1990, Nattiez 1990, Fisher 1991, Goehr 1992, Treitler 1993) and to a lesser degree, how these concepts

can be applied to improvisation in Jazz and non-Western musics (Jacobs 1990, Bowen 1993, Brown 1996, Young & Matheson 2000), none have discussed the implications of post-1950s live electronic music to these concepts.

Ron Kuivila is perhaps the first to discuss work concept issues as they relate to electronic systems music, in his 2004 article on David Tudor's relationship to composition, realization and circuit-building. Kuivila rightly characterizes the ontological position of live electronic music as a "liminal situation caught between composition and performance...This creates a musical situation in which advance planning is only partially useful, perfect compliance is impossible, and the concepts of contingency and action are essential" (Kuivila 2004:22).

The concept of composition as practiced by the Sonic Arts Union broke traditional conventions of the composer's relationship to the work by employing homemade electronic systems as the basis for pieces. As Gordon Mumma has explained, "I consider that my designing and building of circuits is really 'composing.' I am simply employing electronic technology in the achievement of my art" (1970:1). What this system-based compositional aesthetic led to is a consideration of "time-based behavior of an electronic configuration as the identity of a musical composition" (Kuivila & Behrman 1998:14). As a result, the composers of the Sonic Arts Union began creating what Robert Ashley has called "instructional scores" to realize the potential of the electronic system plans. He connects the use of this type of score to the radical aesthetic position in the Union's music:

The great advantage of the 'instructional' scores was that they could make a much more radical kind of music. The graphic scores, after all, still had to rest on the music stand and the player had to look at the paper, as in old music. So the sounds and the way they were organized could be compared, unfavorably, to whatever the audience had come to expect (Ashley 2000:7).

The fact that the electronic circuitry itself -- a fixed entity like a score --- was the composition, yet its performance allowed a broad amount of performer leeway that borders on what most would call improvisation, has profound implications to concepts of compositional identity and performance practice. These implications materialized in a letter from Ms. Felicia Healy of the U.S. copyright office to Robert Ashley in 1968, which stated that two of his (non-electronic) works were being denied publication because they did not contain "a certain minimum amount of original...musical expression" (Healy 1968). Healy goes on to describe that in order to be registrable, a composition must be "fixed in tangible, concrete form" in which the composer had "made most of the determinations as to pitch, rhythm, etc." (ibid.). Although in this case the works in question were not specifically electronic music works, the copyright office was in essence saying that a system-based composition could not be published as a musical composition because the sonic expression of that system is not due to the authorship of the composer, but the performer -- the composer had not provided a "tangible" plan of the sonic result of the work. This is interesting because, as David Behrman (1965) and others have pointed out, traditionally notated works also have a number of indeterminate aspects.

Many of the things done by the musician, and absolutely essential to a good performance, were not to be found in the score: deviation from the metric values, differentiation in timbre and intonation, types of pedaling and tonguing and sliding, as well as aspects of the sort described by a vague word or two--'con fuoco,' 'lebhaft' – words so vague they had meaning only to a player culturally conditioned to them (Behrman 1965:58).

The difference between the indeterminacy of earlier times and that of the aesthetic that the Sonic Arts Union practiced is embodied in this anecdote from David Tudor about American composer Roy Harris:

[Roy Harris] came to New York and was interviewed on the radio. They asked him how he felt about young composers. He said that at the moment he was feeling that they were in a very bad state. He explained that he had just been to a party the previous night and had been introduced to a young man who was to have a performance of a work in several days' time. He asked the young man, 'How is your piece?' and the young man answered, 'I don't know – I haven't heard it yet' (Tudor qtd. in Austin 1967:2).

It is this decidedly non-deterministic approach to performance and the embrace of variation from night to night that characterizes much of the live electronic music practice of the Sonic Arts Union and their colleagues. As David Behrman recently stated in a 2008 filmed interview, "It's less fascinating, less interesting to have a notated piece performed...[because] it's more or less the same. It's also more predictable, and safer. It's just more interesting to be leaving things to the moment -- then, some moments are better than others, but that's sort of the nature of life."

Concepts of Improvisation in Live Electronics

In the music of the Sonic Arts Union (SAU), the roles of improvisation, indeterminacy and chance are largely based upon two shared developments and influences central to their work, some of which were discussed in Chapter 1. The first is the work and philosophy of John Cage, and the second is the invention of live electronics as a viable medium for composition and performance in the late 1950s, described earlier. Beyond these two foundations, there is a range of varying approaches that are composer and composition-specific. The purpose of this section is to describe the aesthetic departure point of the Sonic Arts Union through discussion of their ideas and those of their contemporaries. I begin by outlining John Cage's aesthetic conception of indeterminacy and chance and its historical antecedents to examine what became one basis of the Sonic Arts Union's explorations. Following this is a discussion of how improvisation was conceptualized and employed in this new genre of live electronic music. This is accomplished through examining the thoughts and aesthetics of the Sonic Arts Union's contemporaries, and finally by looking at the SAU itself, and how some of these concepts are put into practice.

Cage's Concept of Indeterminacy and Chance

In John Cage's 1958 essay "Indeterminacy," he discusses several compositions by other artists with regards to three basic components: structure, method and form. He

defines structure as "the division of the whole into parts," method as "the note-to-note procedure," and form as "the expressive content, the morphology of the continuity" (Cage 1961:35). Using these three tools, he examines their relation to indeterminacy. His definition of indeterminacy is a composition that is

Necessarily experimental. An experimental action is one the outcome of which is not foreseen...A performance of a composition which is indeterminate of its performance is necessarily unique. It cannot be repeated (Cage 1961:39).

Beginning (at least in the published iteration, as the form of Cage's essay itself is indeterminately organized) with an analysis of Bach's *Art of the Fugue*, Cage determines that because the timbre and dynamics (amplitude) of the piece are not notated, they are indeterminate in nature. Besides being a good example of Cage's shrewd rhetorical skills at defending this new music against attack from classicists, it illustrates that indeterminacy is not new to musical composition, but something that -- at least in Western art music -- simply had not been focused upon for some time or explored to the degree that it was, beginning in the early 1950s by Cage and others. Later in the essay, Cage discusses the piece *Induces* by Earle Brown, which he states is not an example of indeterminate composition, the main reason being that the piece is through-composed in all elements, and has a conducting score, or a fixed relation of parts. Though Brown used "tables of random numbers" to generate the fixed material, Cage says they were "used in a way which introduces bias" (ibid.:37). He then proceeds to describe how the structural hierarchy of the piece is "intolerable" because it is the "subservience of several [of the

musicians] to the directives of one [the conductor] who is himself controlled, not by another, but by the work of another [the composer]" (ibid.).¹⁵ This statement of decentralization, with overt political connotations, is in line with Cage's beliefs in an ideal (non)government of individuals (Cage 1981:99-100). What Cage seems to be most at odds with in this way of organizing a piece is that it suggests "the presence of a man rather than the presence of sounds" (ibid.). This line of thinking, a consistent trope in Cage's philosophy, is one of erasure, or perhaps (keeping in line with the Zen roots of his approach) better described as a quest for emptiness – the elimination of individual bias, taste, and intention – a way to "let sounds be sounds." In fact, this philosophy is arguably the cornerstone of SAU member Alvin Lucier's work, whose compositions

eschew all gestural aspects of traditional composition...to replace them with the pure physical presence of sound. Rather than use sound as material to be shaped into some personal utterance, he presents sound in as tactile a physical manifestation as possible (DeLio 1984:91).

Cage's ideas of indeterminacy do have roots in earlier experiments. William Hayes, in a 1751 booklet titled *The Art of Composing Music by a Method Entirely New* discussed (in a slightly flippant tone) "a technique for composing music which involved the splattering of ink on staff paper" (Cormier 1975:285). There are also the 18th century *ars combinatoria* composition games (cf. Ratner 1970) and Mozart's musical dice-game

¹⁵ The critical tone of parts of Cage's essay, which is printed in a miniscule typeface, is acknowledged by Cage on the first page of the work with the following disclaimer: "The excessively small type in the following pages is an attempt to emphasize the intentionally pontifical character of this lecture" (1961:35).

Musikalisches Würfelspiel (cf. Zbikowski 2002) – the latter of which was overtly drawn upon for Cage's *HPSCHD* (1969).

Cage's use of chance in composition is a different, though related, compositional technique that he employed almost exclusively post-1951, perhaps best illustrated in his use of the *I Ching*. By using 'chance operations' to compose with the *I Ching* as 'translator,' the act of composition becomes a set of actions removed from individual volition that are then rendered into music through the process of mapping the results into a musical context. The result, in Cage's view, is that "the intention of the mind was put out of operation" (Retallack 1996:127). The main difference, then, between indeterminacy and chance in Cage's work is that indeterminacy occurs during performance, usually in the ordering or relation of parts, where chance is chiefly carried out during the compositional process.¹⁶ Some of the compositions of Marcel Duchamp, such as the 1913 *Erratum Musical* is an earlier example of chance composition that resembles the approach writer William S. Burroughs would later use in his "cut-ups" by drawing pieces of the compositional material from a hat to order the work.

In general, improvisation, here defined as the creation of musical materials in the course of performance, does not occur in the bulk of Cage's work.¹⁷ In most of his works, the musical materials or a score is pre-determined prior to performance and it is

¹⁶ However, Cage identifies a performative use of chance operations in a pedagogical technique used by painter Mark Tobey that puts "the body into a situation where it could not do what it intended to do...and that's what chance operations do" (Retallack 1996:127).

¹⁷ Late in his life, Cage began to explore improvisation. This period was discussed in Chapter 1.

the sounding realization/interpretation of those materials and the formal structure that is left to sort itself out while being performed. The musical objects are set in motion and then collide as they will. Some compositions, like *Cartridge Music* (1960), use an "open system" (Holmes 1985:141) of notation. In the case of *Cartridge Music*, there are a number of transparent sheets with varying notations on them, which, when combined "is about as close to improvisation as a 'system' can sound" (Holmes 1985:142). This piece, one of the earliest examples of live electronic music, set the stage for the explorations of the 1960s.

Of Cage's *Cartridge Music*, Gordon Mumma has recently stated,

The similarities of the 'amplified small sounds' of Cage's *Cartridge Music*, and the live performance with the same technological procedures in the 1958-1961 Space Theatre performances by Ashley and I are notable. However, we worked very differently than did Cage with these resources. We didn't work from scores or instructions, but instead limited our sound resources so as to explore their development within our own structured plans (Mumma, email correspondence with the author 4/23/09).

Improvisation in Early Live Electronics Groups

In studies of electronic music, the Sonic Arts Union is often grouped with contemporaneous ensembles like Britain's AMM and the Rome-based ensemble Musica Elettronica Viva (MEV) under the rubric 'live electronics' (cf. Ernst 1977, Cox 2002). 'Live electronics' is "that genre of electroacoustic music so-named in the sixties to declare that pre-recorded, pre-edited tape playback was not being used as the sole source of electroacoustic sound" (Austin 1991:107). Although these groups all created very

different music with different methods, they are bound together historically through their pioneering use of 'live electronics' (and arguably, their connection to Cage-ian aesthetics), so they can be seen to represent a 'tradition' of sorts. In the case of AMM and MEV, improvisation plays a more vital role than it does in the work of the SAU, but by looking at those groups' varying interpretations and uses of improvisation, some light can be shed on the compositional and performance practice of the Sonic Arts Union.

Cornelius Cardew, a member of AMM for several years its early days, wrote "Towards an Ethic of Improvisation" in 1967. He focuses on two issues: improvisation as an exploration of the ephemeral roots of music, and the "virtues" a musician can develop to be effective as an improviser. Regarding the former, he says

Written compositions are fired off into the future; even if never performed, the writing remains as a point of reference. Improvisation is in the present, its effect may live on in the souls of the participants...but in its concrete form it is gone forever from the moment that it occurs, nor did it have any previous existence before the moment that it occurred, so neither is there any historical reference available (Cardew 1967:xvii).

Cardew calls recordings of improvisation "essentially empty, as they preserve chiefly the form that something took, and give at best an indistinct hint as to the feeling and cannot convey any sense of time and place" (ibid.:xvii). These sentiments are echoed in Cage's philosophy as well: "An ear alone is not a being. I have noticed listening to a record that my attention moves to a moving object or a play of light" (1961:31). Regarding the "virtues" to be developed that he discusses, Cardew is hoping musicians will work on "a certain moral discipline" that is "essential" for improvisation (1967:xvii).

Both Cage and Cardew had the aspirations of the individual escaping private tastes and memories so the results were not "merely a gulash made up of the various musical backgrounds of the people involved" (Cardew 1967:xix). The hope was that the musicians "extend themselves beyond the limitations of their education and experience" (ibid.). In Cardew's case, this is a kind of improvisation akin to Derek Bailey's (1982) definition of "non-idiomatic" improvisation – a form of improvisation that is free of an idiom or style. In Cardew's "ethics," one of the virtues he mentions is "integrity" (1967:xx). By this he means "the difference between making the sound and being the sound" (ibid.). Also, with his plea for "selflessness," he asks the improviser to "look beyond yourself" (ibid.). The AMM approach to improvising was to "search for sounds and for the responses that attach to them, rather than thinking them up, preparing them and producing them" (Cardew 1967:xviii). Cardew's emphasis on the ephemeral and immediate nature of improvisation and the ideal of embodying sound itself leads him to proclaim, "when you play music, you are the music" (ibid.:xvii).

Alvin Curran, of MEV, begins his essay "On Spontaneous Music" with the similarly mystical words "improvisation is the art of becoming sound" (1995:1). He expands on this statement by stating that improvisers become the "composer, performer, director and teacher" and are "fused into one single role" (ibid.). Both MEV and AMM used improvisation as the primary generating practice for their music, though one big difference between the two is that AMM was a more or less fixed group, and MEV was a "meeting place: a performance group, a way-station, and a school where older and

younger learn from each other and play together on the same stage" (Nyman 1974:110). MEV worked to "define fields of action whose final course is decided in the momentary encounter with unpredictable life-situations" (Rzewski in Austin 1968:23). MEV also had a strong political element to their approach. Their most iconic work, *Spacecraft* (1968),

was a lofty creative ideal to be realized by each individual within the communal situation. The plan was concerned with the process of struggle, away from what Rzewski called 'occupied space' – personal taste, inherited clichés – to a 'created space'...which was neither his nor another's, but everybody's (Nyman 1974:110).

Rzewski's *Sound Pool* (1969) opened the performing pool of musicians to include those who came to be part of an audience – much in the style of a Happening – but contained the instruction, "If you are a strong musician mostly do accompanying work...help weaker players to sound better" (Nyman 1974:111). These gestures towards a communal political ideal, or the harmonious co-existence of a group of individuals, were a hallmark of the improvisational work of MEV.

Another development, "biofeedback" in a musical context, further complicates the ideas of composition and improvisation, and was pioneered by SAU member Alvin Lucier and MEV member Richard Teitelbaum. With his *Music for Solo Performer* (1965), discussed in Chapter Three, Alvin Lucier opened the door to the use of the human brain as an instrument, when he amplified the alpha waves his brain was producing to create pulses broadcast through speakers to make nearby instruments sound. Lucier performed with his brainwaves musically, like an instrument: "I learned that by varying both short bursts and longer sustained phrases of alpha...I was able to get a wide variety of

sonorities" (Lucier 1976:61).

Richard Teitelbaum also used biological processes as control devices for his Moog synthesizer in the MEV work *Spacecraft* (1968). Teitelbaum sees the construction (or lack thereof) of the piece itself as a biofeedback model. Each musician "carried on an inner search through the recesses of his own consciousness. The images and experiences encountered on this inner space journey were translated by the performers' gestures through electronic instruments" which resulted in "an electronically transformed 'double' mirroring the performers' internal subjective states" (Teitelbaum 1976:37). Teitelbaum reported "unusual sensations of body transcendence and ego-loss" in the music, "guiding individuals into collective consciousness, merging the many into the One" (ibid.:39).

Conclusions

This chapter discussed the Sonic Arts Union's crucial role in the development of a live electronic music aesthetic in the 1960s. Their play with technology was born from a post-WWII American technoculture that presented a surplus of defective "throw-outs" and new, emerging transistorized technologies to this community of *bricoleurs*. Ashley, Behrman and Mumma in particular built a number of instruments with these available materials employing self-taught handcraft techniques that were shared freely among colleagues such as David Tudor, Pauline Oliveros, and others. Alternatively, the recontextualization of equipment was a hallmark of Alvin Lucier's engagement with

technical objects, revealing their identities through transparent presentation. Prizing the uniqueness of these technical objects and drawing out their personalities was a significant part of their musical practice that was completed live, during the course of performance. The SAU's use of indeterminate practices to realize their compositions places their aesthetic somewhere between the traditional poles of improvisation and composition. The implications of this to the work concept in Western art music, and the line between a "folk" practice and an "art" practice illustrate an approach that draws on a number of influences and techniques. Characteristic of the 1960s cultural milieu that precipitated the group's activities, a rhetoric of optimistic utopianism runs through their conception and use of technology, epitomized in Gordon Mumma's description of their collections of instruments as electronic communities.

Chapter 3. Traversing Inner Landscapes in Alvin Lucier's

Music for Solo Performer 1965

Chapter Two discussed aspects of the overarching aesthetics that guided the Sonic Arts Union's work; from their relationship to an American technological tradition to the SAU and their contemporaries' understanding and practice of indeterminacy and improvisation. This chapter, a sustained discussion of Alvin Lucier's landmark composition *Music for Solo Performer 1965*, views the piece as one of the aesthetic shifts that led to the formation of the SAU and their creation of a unique body of electronic music works.

With *Solo Performer*, Lucier made the decision to engage with technical objects on their own plane, drawing out their unique characteristics and discarding the traditional compositional aesthetics he was previously engaged with. As a result of these actions, the composer discovered his own voice, and a community of artists with whom to explore this new technological medium. *Music for Solo Performer* was a chasm leapt across by Lucier, but his intentions in this action mirrored the compositional shift each SAU member experienced in varying degrees as they moved from composing for acoustic

instruments and studio electronics to the live electronics that became their hallmark.

In 1964, Alvin Lucier was teaching at Brandeis University, directing the Brandeis Choral Union and Chamber Chorus. He had returned from a two-year, Fulbright sponsored sojourn to Europe the year before to take the position. His return to America coincided with his realization that he was not interested in composing music in the style of his European contemporaries, as he had been attempting to do since his graduation from Yale.

I was not satisfied with the trends of contemporary music that I had heard in Europe. I was satisfied with it as music but I realized that these were not the directions in music which I could adhere to. I realized that if I would write music in some of those styles, such as the post-serial or other similar trends, I would be talking in a dialect, not in my own personal language. So, when I came home, I just waited and thought about different things - my mind was a blank because I was not doing any work on composition (Rovner 1998).

As it turned out, this "blank" mind was the fertile soil needed for Lucier to make this radical shift in his compositional process: "When you are in that state you can really accept and absorb new ideas freely and utilize them in your own work." (Rovner 1998) "I was at a point in my compositional life where I didn't have any good ideas. I had done some electronic music in Italy when I was on a Fulbright there, but I hadn't really found anything that interested me; I certainly didn't feel like composing instrumental music" (Lucier 1995:46).

At the time, physicist Edmond Dewan¹ was working at a lab near Brandeis doing

¹ Dr. Dewan was approached to be interviewed for this project, but did not respond.

brain wave research for the U.S. Air Force to investigate a problem by which "certain pilots who were prone to epilepsy were blacking out...When the sunlight would shine through the spinning props, it would lock onto something visual in the brain of the pilot" (Lucier 1995:46). Dewan was an avid amateur organist and used to visit the Brandeis music department (Alvin Lucier, personal communication to the author). As Lucier remembers,

Dewan described to me this phenomenon that had to do with visualization, that by putting yourself in a non-visual state -- it would be called a meditative state now -- you could release the potential of the alpha that is in your head. It's a very small amount, but it would become perceptible, at least to an amplifier. The idea of it just struck me very strongly, probably more for theatrical or visionary reasons than for sound or musical reasons, because I didn't know what it was going to sound like. Actually, it doesn't sound like anything because it's ten hertz and below audibility; it isn't a sound idea, it's a control or energy idea (Lucier 1995:46).

According to Lucier, Dewan was an accomplished amateur organist and "was eager to share his ideas and equipment with any composer interested in exploring this hitherto uncharted region. Inspired by the imagery and technology of electroencephalography (EEG), I immediately set to work to discover all I could about alpha" (Rosenboom 1976:60). Fittingly, this piece, ultimately for a solo performer (and assistant), came at the time of a major artistic shift in Lucier's work. It required many hours of solitary exploration to discover how he might turn this "control or energy idea" into a piece of music.

Working long hours alone in the Brandeis University Electronic Music Studio with Dewan's equipment (two Tektronix Type 122 preamplifiers in series, one Model 330M Kronhite Bandpass Filter, which had been set for a range of from 9 to 15 Hz, one integrating threshold switch, electrodes, appropriate connectors etc.) plus the studio's conventional equipment, I learned to produce alpha fairly consistently. I found that success could be attained by setting the gain on the audio amplifier to a point just below oscillation, so that even a relatively weak alpha signal would come through. Often, I could produce alpha only in short bursts; it took precisely the right physical and psychological conditions to sustain it in longer phases" (Rosenboom 1976:60).

In the above recollections, we can see several major issues that were important to the work's creation: the idea of "control" and "energy"; an exploration of meditative states and "the right...conditions"; and a way to "release the potential...that is in your head." Lucier's very personal journey, examining his mental states and figuring out how to transform them into art, is an analogue to the internal artistic struggle he was facing at the time while discovering his compositional voice.

The process he went through to explore the physical and mental aspects of the EEG's artistic potential was also an intimate examination of what "conditions" would help him realize his own "potential" as an artist. Ideas of "control" and "energy" were absolutely important tenets of the Darmstadt aesthetic approach at the time, and something Lucier wrestled with -- and ultimately let go of -- to take his work in this new direction. Lucier himself names this piece as a turning point in his oeuvre, so the physical and mental process he went through in discovering this piece is a fascinating example of taking the most fundamental generating material of art (the brain and its electric

impulses), and making that material itself the subject of the work.

This probing aesthetic voyage also connects to other events and memories from Lucier's youth, specifically his time at the Portsmouth Abbey preparatory school in Rhode Island. In an engrossing interview with Ev Grimes, Lucier discusses the strong impression the meditational practice of a Trappist monk made on him, and its possible relationship to some of his ideas about *Music for Solo Performer*:

I remember going into the chapel and watching a Trappist monk in the act of contemplation...I watched him, and...he was thinking--deeply. It looked like somebody just thinking as hard as he possibly could. I remember I went back an hour later--he was in the same attitude--and I thought, 'Well, if there's any such thing as pure thought, that guy is doing it.'...whatever pure thought might be I'm not sure, but I guess pure thought would have to be thinking something that has no object in it, or something abstract, or without a visual, without dialogue, or without tension or argument--something just--I don't know what it would be, but pure thought. And that impressed me a lot...So when I did the brain wave piece, one of the nice things about the brain wave piece is you've got to sit and not think of anything; because if you create a visual image your alpha will block. So you try to not think of a visual image, and your alpha unblocks. That's known as meditation, isn't it? Don't those alpha amplifiers now--don't they teach you to meditate? And what they mean by that is not visualizing. So that brain wave piece and this experience go together very well (Grimes 1986:28).

Lucier continues by describing the ideas on meditation he feels he may have learned through this experience:

An idea about meditation, maybe mysticism...these monks are really mystics. They're practical, because they teach a school--they run a school, and they run a farm, and they're not isolated in that way. But they are mystics; they choose to be monks -- they're not parish priests, and they're not missionary priests. I think the idea of mysticism, scholasticism...I don't know, it formed me in some way, I think. My pieces are ritualistic. I mean, the way my pieces work often is they're very simple and clear, and they're stripped bare. If I start with eight things, I usually end up with four, and then I go two, and then I discover I can do it with one (Grimes 1986:29).

This concern with simplification, purity, and ritual, which have become central tenets to much of his musical practice, were in many ways born from Lucier's self-discoveries while working on *Music for Solo Performer*.²

Live vs. Tape

After learning how to produce alpha waves fairly consistently, Lucier had to decide what he would do with them. Since they exist below the normal human hearing range for pitch, somewhere between 10-14 hertz, by themselves they are not perceived as musical notes, but more like physical rhythmic pulses. His colleagues at Brandeis suggested that he record the alpha waves and make a tape piece with the material, by manipulating the recording: "...most of my colleagues at Brandeis said, 'You ought to tape record it, speed the sounds of the brain waves up, slow them down, reverberate them, filter them' -- they all wanted me to make a conventional tape piece with this idea" (Lucier 1995:48). Harold Shapero, one of those colleagues, even suggested using an easily

² *Vespers* (1968), *I am Sitting in a Room* (1970), *Silver Streetcar for the Orchestra* (1988) are three examples of simple, ritualistic process-oriented works in his oeuvre.

reproducible substitute for the alpha, that of a square-wave oscillator, telling Lucier, "if brain waves go at 10 cycles a second, why don't you use a square-wave oscillator? Why go through all that?" Lucier's response reiterates the philosophical, as well as sonic and aesthetic, reasons for his interest in using the waves themselves:

He misunderstood the sound, because 10 cycles from an oscillator is not 10 cycles from your brain--very different. Sounds different; it is different. It's not 10 cycles; it's not exactly 10 cycles. Whereas a square wave oscillator is boringly, symmetrically 10 cycles a second, if you set it at that. And to confuse a wave-form, a symmetrical wave-form, with a natural phenomenon -- I'm not talking about the imagery or the drama that it's a brain--that you're sitting there and it's a brain wave, that is there also -- I'm talking about the sound itself -- itself is different: little pops and clicks, and it fades and drifts, and it goes up and it changes, and it gets tired. It's like the flow of a river or any natural phenomenon. So, for purely technical reasons, it was more interesting than a square-wave oscillator" (Grimes 1986:55).

The attempt to reveal natural processes as they are, and not to impose upon them, is another hallmark of Lucier's work post-*Music for Solo Performer*. It is perhaps another defining characteristic of his later work, with its roots in the compositional process of the piece. The realization that "the electronics comes from your brain, from inside every person, that every person has a little electronic studio inside his or her brain" (Lucier 1995:48) was instrumental. It was not just the sound, but the poetics and transformation of the scientific/medical equipment into a tool for art:

The anxiety I had was the anxiety not to compose, but to take the existing situation, the one that every doctor knows and every person having an EEG knows, and displace it, taking it right out of the hospital and putting it into the concert hall. Then it becomes art, or at least what I thought was art" (Lucier 1995:48).

However, this transformation of the EEG into art "has to be something more than just unearthing sounds. Basic to my work is making audible that which was inaudible...But it's got to be done in an artistic way...a careful, and beautiful, and unexpected way" (Grimes 1986:117).

He decided to perform the piece live, coupling loudspeaker transducers to percussion instruments and use the energy of the waves to cause vibrations in the instruments: "When I thought of using the alpha energy to drive the percussion instruments, that was the point at which the idea became a piece, when it went into a musical realm" (Lucier 1995:50). In addition to transforming the medical into the musical, Lucier inverts the traditional use of loudspeakers to amplify music's final product. "I'm always interested in extending what a medium is able to do...I did extend what loudspeakers did; they weren't the end-product, they were instruments that drove the percussion" (Grimes 1986:89). The decision to withdraw from the traditional, intentional characteristics of composition caused Lucier great anxiety, however:

I began to think I was some kind of charlatan...if I had decided to make a tape piece and gone through all those technical motions, I may have felt more comfortable, but I finally did what I thought was the most honest thing. I tried to be very accurate about what the piece really meant: one person, alone, sitting very, very quietly, releasing a flood of energy which permeates the concert space. And to me, that was a beautiful idea, much more so than making a tape piece" (Lucier 1995:50).

In a "special version" of *Solo Performer*, a tape machine was used "as an accessory" consisting of "continuous pre-recorded alpha signals which have been multiplied in

frequency," (Mumma 1967) bringing them into the audible range. This special version was performed differently, with the performer attempting to produce bursts of alpha so that "a portion [was] applied to a special circuit which gates the tape-stored material" (Mumma 1967). This material sounded like "a ghostly tessitura, from a loudspeaker at some remote part of the auditorium" (ibid.).

Lucier's decision to use percussion instruments is likely another connection to his youth. He began his musical studies as a drummer, influenced by the big band music he grew up listening to, such as the Jimmy Lunceford Orchestra, Count Basie, Stan Kenton and others.

The only piece that comes to mind that really was influenced by my study of drumming was my brain wave piece, *Music for Solo Performer*...It's got that kind of rumbly, imminent, violent--it isn't violent, but it's thunderous--kind of a quality that I might have gotten as a teenager sitting downstairs, playing a set of drums for hours on end, just going from snare drum to tom-toms to improvising in that very fast, kind of syncopated way (Grimes 1986:5).

This is an interesting connection because the two musical performance styles seem in stark contrast: a motionless person with eyes closed causing percussion to vibrate through non-visualization versus a young child freely exploring the sounds and rhythms of a trap set. Though the performance styles, aesthetic, and sounding result are distant from one another, in both cases these experiences are personal "origin moments" of a kind. *Solo Performer* was the turning point that helped to chart Lucier's compositional thought, and his early connection to drumming was the emergence of his active music-

making.

There is also a literal parallel. For most performances of *Solo Performer*, an assistant is used to improvisationally spatialize the alpha waves and move them around to the various instruments, much like a young improvising drummer "going from snare drum to tom-toms," or as Lucier describes it, "I used an assistant to move the...volume around so that you could hear something once and something other, and that was a free form, that was just free and improvised" (Grimes 1986:61). This connection between *Solo Performer* and his early days as a drummer is far from tenuous: "after all, alpha's really a rhythm; scientists call it alpha rhythm" (Lucier 1995:58)³

Control, Texture, Contrast

In the compositional tradition of Western art music Lucier had studied and practiced prior to *Music for Solo Performer*, the composer writes the music; controls the result of their efforts, and, in general, creates a structured, notated form that explores contrast, texture and form, which is then identified as the "piece." Lucier's anxiety, at the time, in abandoning that approach (as mentioned above), illustrates the pressure of that training and his internal struggle to explore what lie beyond it. Ultimately, he made the decision to relinquish control and "give formal structure up...my colleagues were still

³ In a 2007 recording session of *Music for Solo Performer*, Lucier first performed and recorded the alpha waves, then he himself performed spatialization of the recorded alpha, sending the signals to each speaker/instrument improvisationally (Phillip Schulze, personal communication). So this performance practice continues, if slightly modified for the studio context.

thinking about those other ideas: texture, density, control--they all thought about control. Well, control what? Your brain waves?" (Grimes 1986:59). For Lucier,

The piece isn't about contrasts or counterpoint or structure or anything of that kind. This is what it is, and I had to deal with not composing much....I enjoy composing not frantically, but letting things happen. Letting the natural things happen, because there's no reason not to let them happen (Grimes 1986:58).

The composer cedes control, in that the sounding result is emerges from the performer's alpha production, but also by the method he used to construct the work itself. In electronic music practice, one type of signal is the control signal, in which one or more parameters of a generated audio signal is controlled by something else. The most common manifestation of this in analog synthesizers is voltage control, in which the amount of electrical energy fed to a given sound producing object, such as an oscillator, determines one or more characteristics of that sound (e.g. dynamics, frequency, timbre, etc.).

In the case of *Music for Solo Performer*, the alpha does not (except in the "special version" mentioned above) function as a control signal for anything; it is simply itself, highly amplified, slightly modified in the signal path through filtering, and projected by loudspeakers. The waves then interact through basic physics with the instruments within the reach of the transducers' vibration, and the instruments vibrate based upon their natural resonant characteristics, not due to a performer "playing" the instruments, or for that matter, the alpha.

Lucier's approach to revealing and using alpha as it is, instead of imposing (or

composing) upon it can be seen in opposition to the Heideggerian neologic notions of enframing (*gestell*), or the idea that "the world is materially reformed and reconfigured to try to accomplish some preconceived goal according to a preconceived plan" (Pickering u.d.), and more in tune with his concept of *gelassenheit*, or "simply to let things be in whatever may be their uncertainty and their mystery" (Heidegger 1966). Lucier's use of alpha waves echoes how sociologist and science historian Andrew Pickering has conceptualized *gelassenheit*, as "an open-ended exploratory approach of finding out what the world can offer us...that whatever one wants in the world, it's already there, somewhere in nature" (Pickering u.d.). Pickering (who mentions Lucier's brain wave piece in the cited essay) connects this philosophical stance to hylozoism, which he defines as "a kind of spiritually charged wonder at the performativity and agency of matter" (ibid.).⁴ This connection to hylozoism and *gelassenheit*, and its opposition to enframing seems a viable (though slightly cumbersome) way to describe the relinquishing of control in the compositional aesthetic and philosophical stance of this work.⁵

Music for Solo Performer is generally considered to be the first musical work to use brain waves, and is an early example of what has been called "biofeedback" music, though other works soon followed. A number of these other early works are discussed in a volume on biofeedback in the arts (Rosenboom 1976). Many of these works

⁴ Hylozoism has a long history as a philosophical concept, stretching back to ancient Greece, and has since been theorized by a number of philosophers.

⁵ Interestingly, both Ashley and Mumma performed with the ONCE group and Milton Cohen's Space Theatre at a "Hylozoist Arts Festival" in Detroit in January 1964 (concert program, Northwestern University ONCE collection).

approached the use of alpha waves differently, usually as control signals. In the case of Richard Teitelbaum's *In Tune* (1968), for example, alpha waves are used to trigger envelope followers on a Moog synthesizer, which then causes a "loud and startling burst of electronic sound" (Teitelbaum 1976). The "performer" of the alpha waves is able to "start or stop the sound simply by closing and opening her eyes...By careful adjustment of the threshold level on a trigger circuit such as the Moog envelope follower, the synthesizer can be readily controlled by eyelid position" (Teitelbaum 1976).

In Lucier's piece, the difference is that he did not want the mind "controlling" anything -- he wanted the brain's functions to unfold naturally, to create a musical structure that grew from the alpha rhythms themselves :

The idea was that I didn't want to show mind control...Discovery is what I like, not control. I'm not a policeman. I always thought of splicing alpha waves, or cutting them up in a studio...as being a brain surgeon -- and I'm not a brain surgeon....So I completely eschewed that form...and let that alpha just flow out, and the composition was then how to deploy those speakers, what instruments to use...so that if you're using sixteen percussion instruments, each instrument has different resonant characteristics, but you need different amounts of bursts of alpha to activate each one. It's easier to activate a drum, a bass drum, than it is a metal gong. So right away, built into the piece is the energy levels of the alpha activating these different kinds of instruments; there's a whole world there...There's the texture: in the sympathetic vibration and in the idea of resonance. There's your piece; it's not in the output." (Lucier in Grimes 1986:59).

As a result, the formal structure and textural shifts are related not so much to aesthetic decisions (except the choice of instruments) as to the physical properties of the resonating objects. The indeterminate and inconsistent nature of alpha production also

inherently limits the performer's agency, since "conscious decisions on the part of the performer, the desire to continue or terminate activity, may or may not be directly enacted, since even well-trained subjects have only a limited ability to define consciously such usually autonomic functions" (Reynolds 1975:201). Lucier has also used imagery from nature to discuss the power of this work, again making the connection to hylozoist thought and *gelassenheit* of palpable importance when discussing this work:

I was touched by the image of the immobile if not paralyzed human being who, by merely changing states of visual attention, can activate a large configuration of communication equipment with what appears to be power from a spiritual realm. I found the alpha's quiet thunder extremely beautiful and instead of spoiling it by processing, chose to use it as an active force in the same way one uses the power of a river (Lucier 1971).

First Performance

The premiere of *Music for Solo Performer 1965* took place at Brandeis University on May 5th, 1965 at the Rose Art Museum, the same venue where the Sonic Arts Union would debut one year later. Lucier invited John Cage to perform with him in a program co-sponsored by the museum and a student-run festival called Creative Arts Week, who together covered Cage's \$500 appearance fee (Lucier 1965a). Lucier described the venue to Cage as follows: "The structure of the Museum lends itself very well to works of an audio-visual nature, which immediately suggest your *Music Walk*, or any of the four variations" (Lucier 1965a). As late as March 30th, Lucier was still not sure if he would have *Solo Performer* ready, as stated in a letter to John Cage: "If I can get enough

electronic equipment ready I would like to try out my new idea with brain waves, but as yet I am unsure about it all" (Lucier 1965a). On April 5th, Lucier made recordings of his alpha waves in the studio, as a dated reel held in the archives at Brandeis reveals (Lucier 1965b). In a 1986 interview, Lucier described the situation at Brandeis in planning this event:

I found that at Brandeis, in those days -- I'm not painting a terrible picture of Brandeis, by any means -- I got more support from the Art Department, in some ways, than I did from my own department....modern music was done in art museums more than anyway, wasn't it? I mean, most of the new pieces were done in museums and galleries rather than Town Hall...So, the audience then was just wonderful; it was charged (Grimes 1986:56).

The piece was performed with assistance from John Cage, who attended to the spatialization of the alpha waves. On the same program, Cage performed his 1962 composition *0'00"* (occasionally subtitled *4'33" No. 2*), the score of which consists of a single sentence: "In a situation provided with maximum amplification (no feedback), perform a disciplined action" (Cage 1962).

Not everyone in attendance was charged by the performance. For example, two of Lucier's colleagues attended, and

one pretended he fell asleep -- because I performed with my eyes closed. You perform with your eyes closed so that you don't visualize anything. He made a parody of that by pretending to fall asleep...I suppose to prove that he was bored, but he was actually reflecting my non-visualization. Then the other guy put a match in the instep of his foot, and gave him a "hot foot"...They would listen to the most ugly and dissonant contemporary music...so that the instruments do the most ugly, vicious, and violent things. They would think that that was art, but, of course, what I did was different. (Grimes 1986:57).

This would not be the only time the composition had a less than desirable audience response. In a review titled "Electronic Concert Not Very Amusing" of a Boston Winterfest performance on 26 February 1966, *Globe* critic George Gelles wrote,

The sounds, and indeed the whole concert, were reminiscent of the Cage-Tudor fad that one found in New York nine or ten years ago. It would probably be impossible to get a comparable predominantly college-age audience in New York today. Was this Boston's belated electronic music baptême de feu? (Gelles 1966).

In addition, Lucier describes a New York performance in the late 1960s:

I did the piece several years later in Manhattan, and I got a very hostile audience response. But that piece does quite well...because it's a touching piece, that's what David Tudor said to me once. He said, 'That piece is touching, it's personal' (Grimes 1986:57).

These few critical audience responses aside, the compositional turning point in Lucier's music was now out in the world.

Conclusions

In Alvin Lucier's *Music for Solo Performer* 1965, a self-proclaimed landmark of discovery, we see the formation of the aesthetic contours and compositional approach he has since explored. We also see that this landscape is not simply a result of his serendipitous meeting with Dr. Edmond Dewan and his scientific equipment, but a combination of this technological encounter with an inner journey to discover his own compositional voice. Lucier's early background as a percussionist, and his fascination with the meditative practices of monks while at preparatory school show a unique voice that required the right combination of exploratory freedom and self-discovery to reveal itself.

The way Lucier himself describes technology, and his use of technology, is not as a tool divorced from human experience, existing in a cold, mechanistic alternate universe, but as a landscape, as natural and inspirational to him as trees and flowers might be to some other creative spirit:

In one way, art has always been dealing with the state that you find yourself in...The EEG was here without me doing anything about it. I don't think of technology as technology. I think of it as a landscape...If you worked in a medical center, EEG would be just like a tree -- it's what you see every day...a composer in the 19th century is talking about the landscape that he's in -- the trees and the poetry -- and I'm just doing that (Ashley 1995).

The landscape of his compositions, a number of which reveal natural processes or the physical properties of everyday objects, are not based on the inherited structural

concepts he studied as a Yale student or as a Fulbright scholar in Europe, but through dedicated self-inquiry and a willingness to, as the Cage mantra goes, let sounds be sounds.

Alvin Lucier's *Music for Solo Performer 1965* is one example of the aesthetic shift the Sonic Arts Union composers traversed in moving from writing for traditional instruments and creating studio electronic works to the live electronic music practice they would employ as the SAU. This discussion of Lucier's journey can be seen as emblematic of the aesthetic transgression and exploration that was one catalyst for the creation of the Union. In its relation to technology, Lucier's piece re-imagined the role of technical objects in music creation by simply recontextualizing the object -- like Duchamp's *Fountain* -- without modification. It was this particular Lucier composition that called Mumma and Ashley's attention to his work, reinforcing the fact that they had found a fellow explorer whose musical concepts ran parallel to their own.

Music for Solo Performer 1965 was one of the pieces Lucier performed regularly on Sonic Arts Union tours. Four other SAU compositions are discussed in greater detail in the following chapter.

Chapter 4.

Cybersonic Soundings of Space:

Feedback and Balance in the Music of the Sonic Arts Union

*"My ears feel like caves." -- Pauline Oliveros on hearing Robert Ashley's "The Wolfman"*¹

*"Ashley used to say that music was always 'about something' " -- Alvin Lucier*²

Chapter two described relevant aspects of the development of live electronic music and the Sonic Arts Union's place in that history. Their relationship and play with technology was highlighted, and the cultural context of that relationship outlined. Chapter three traced the development of Alvin Lucier's breakthrough composition, *Music for Solo Performer* (1965), which served not only as a personal turning point for Lucier, but also helped to chart the aesthetic course of the SAU.

This chapter puts the Sonic Arts Union's techno-aesthetic into practice, examining early works from each SAU composer through three lenses to look for conceptual commonalities among their diverse approaches to materials, systems, and

¹ (Oliveros 1968:78)

² (Lucier 1998:5)

sounds. I discuss four SAU pieces that seem to have intersections in conception and construction, in a search for commonalities rooted in underlying formal concerns. Each piece is discussed in terms of its use of space as both a physical site for the work and as a contributor to the structure and form of the composition. The use of feedback (both acoustic and structural) and resonance in each piece's system-concept is described and examined.

Each work combines human and machine in differing interfaces, and to different ends. The relationships between man and machine in each piece put forth varying possibilities for the coexistence and coproduction of the two in a historical period where the idea of man/machine artistic collaboration was still in its infancy. The overarching relational dynamics of each human/mechanical system and its instruments of balance are read as propositions for artistic social systems (or "communities," as Mumma stated above) embedded in the architecture of the work, taking the compositions from an exploration of physical place to an abstract model of practiced social space.³

By the middle to late 1960s, the traditional, culturally reified performance sites of art had been questioned (cf. Smithson 1979a, 1979b). No longer was a gallery or museum the only place where visual art could be found. Happenings and street theatre attempted to blur the lines of performance and life, and the sound of music could be found in the shuffling of feet across pavement, if the listener placed the frame of

³ de Certeau (1984) has expounded at length on the theoretical implications of these two terms, and I use them with his conceptions in mind. I also use them in the sense that Casey (1996) does, with "place" holding primacy in the phenomenological experience of "space."

performance around it. This multidisciplinary exploratory period that redefined the site of performance is mirrored in the Sonic Arts Union's audible engagement with space and place.



Fig. 4.1. Concert poster for SAU concert at Clinton High School gym, NY, November 10, 1970. Courtesy of Gordon Mumma.

Sounding Space

The banal, fundamental physical truth about music as most humans experience it is that it exists as vibrations projected through time and space. The possibilities of time, or rhythm, in music have long been explored and mapped by composers and musicians worldwide, in an infinity of expressions. Space, on the other hand, was historically conceptualized -- at least in the Western art music tradition discussed in this chapter -- as

the place one is in when those vibrations hit you. Of course, a space affects these vibrations, their context, reception, and meaning. Often that space is designed in such a way to affect those vibrations in a specific and measured way, but most commonly the space itself does not actively participate in the structure of the musical composition.⁴

With *4'33"* in 1952, John Cage changed all that, at least for the milieu of artists that included the Sonic Arts Union composers. By making the space itself the entire audible subject of the composition, Cage turned the tradition on its head, and spawned an outpouring of aesthetic exploration inspired by his conceptual leap.⁵ For the SAU composers, then, one challenge they faced as creative artists (though they probably did not think of it as a challenge) was how to take this expanded palette of ideas and sounds and build upon it. The SAU's compositions discussed herein mark a unique moment in their collective compositional output, spanning a period of roughly four years from 1964-1968, when they all produced works that explored the acoustic and organizational principles of feedback and spatial resonance from varying directions. Their investigation of these elements employed the acoustic properties of dissimilar spaces to actively

⁴ In the larger global context, there are a number of cultures that conjoin space and time in their musicking -- for example, the songlines of aboriginal Australia (cf. Chatwin 1987) and the *tok*, or paths Steven Feld has described in Papua New Guinea Kaluli culture as "...a poetic fusion of space and time where lives and events are conjoined as vocalized, embodied memories" (Feld 2003:227).

⁵ American composer Henry Brant, beginning with his 1953 spatial composition *Antiphony I*, also found a way to join space and time in his work, though in a much different manner than Cage. Regarding the incorporation of physical space in music, Mumma would "also extend further back into the work of Charles Ives, and even the use of 'off-stage' space in Mahler and Berlioz, not to mention Handel's river barge *Water Music*" (email correspondence with the author 4/25/09).

determine the structure, performance environment and sound of the resultant work, taking them into new realms of musical construction and interaction that would eventually (along with like-minded artists such as Max Neuhaus and younger contemporary Maryanne Amacher) evolve into of modern-day site-specific sound installation. This chapter places one piece from each SAU composer in dialogue with the others, tied together through theoretical discourse spanning cybernetics, systems theory, and recent studies in auditory cultures.

The SAU's exploration of feedback and resonance in what Nyman (1999) and others have called "systems music" is deeply connected to the concepts of cybernetics and systems theory, as well as the seminal art theory writings of Jack Burnham. Mumma himself explicitly referenced Wiener's cybernetic theories in titling his self-made technologies cybersonic modules. John Cage, one of the Union's primary champions and inspirations, was intensely interested in the media theories of Marshall McLuhan, and the scientific and socio-theoretical work of Buckminster Fuller.

The SAU's use of feedback principles -- both acoustic and methodological -- in some of these early compositions illustrates a desire to combine the aesthetic possibilities of a post-4'33" musical world with stochastic technological systems that in some ways mimic the behavior of social and biological systems. Gordon Mumma describes building communities of electronics; their colleague David Tudor anthropomorphized the circuits he employed, revealing their personalities.⁶ These facts add weight to the idea

⁶ See Tudor's "The View from Inside," described in the previous chapter.

that the group's involvement and conception of technology was not only as a tool for aesthetic exploration, but also as a model for social relationships, with utopian aspirations. One possible interpretation of the symbolic or abstract significance of these compositional structures is that they were mapping out possible routes through the many challenges of life in 1960s America, particularly human/machine relations. Especially in the case of Lucier's work and his idea of technological landscapes, the SAU presents a more expansive idea of nature and how to bring balance to closed systems like the "Spaceship Earth" Buckminster Fuller (1969) referred to -- our ultimate closed system.⁷ This interpretation is also rooted in Jacques Attali's ideas of music as a kind of prophesy, which "explores, much faster than material reality can, the entire range of possibilities in a given code. It makes audible the new world that will gradually become visible..." (Attali 1985:11). In a statement that will be employed here as a justification of sorts for the liberties taken in the following interpretation of these works, Alvin Lucier recalls, "Ashley used to say that music was always 'about something' " (Lucier 1998:5).

There is a rising interest in the development of an anthropology of sound and hearing, as several recent volumes dedicated to the topic illustrate (Kahn 1999, Bull & Back 2003, Smith 2004, Erlmann 2004), all of which are conceptually indebted to R.

⁷ This type of cultural hermeneutics through connection and analysis of the structural forms of a music is by no means unheard of -- for example, author Ralph Ellison described the United States as a "Jazz-based" culture, symbolically connecting the individualistic statements of soloists within the harmonic structure of a tune to that of a functioning, healthy democracy. Of course, the difference between the subject at hand and Ellison's ideas is that Jazz is a large-scale musical practice and tradition, and here the focus is upon individual pieces by a small group of composers -- though they certainly belong to their own tradition, as described in chapter one.

Murray Schafer's seminal 1977 discussion of what he dubbed the "soundscapes" of the world. Steven Feld proposes the term and concept of acoustemology, or "...a union of acoustics and epistemology...to investigate the primacy of sound as a modality of knowing and being in the world" (Feld 2003:226). In approaching the music of the Sonic Arts Union, I attempt to "listen again to the multiple layers of meaning potentially embedded in the sound" in order to reflect "on how the world presents itself when we listen to, rather than look upon it" (Bull and Back 2003:4), and also to hear "past the matter of music that excludes references to the world" (Kahn 1999:2).

Taking Ashley's cue that music is always about something, this chapter posits a few possible meanings for consideration, to see how these works' different approaches to feedback systems and the merging of man and machine might be seen as artistic (and human) propositions for bringing balance to systemic, and perhaps social, realities.⁸ Is it feasible to abstract and interpret the forms of construction of these compositions by the Sonic Arts Union as cultural inventions, or interventions? Are these works exploring "the entire range of possibilities of a given code" as Attali describes? Is the music about something, or is it just music?

⁸ In some ways, this work methodologically aligns itself with Robert Fink's cultural interpretations of minimalist music. Fink describes minimalism as "a cultural practice...inseparable from the colorful repetitive excess of postindustrial mass-mediated consumer society" (Fink 2005:x), connecting the music's aesthetics to larger cultural trends and practices .

Cage's 4'33" and Conceptions of Space and Culture in Sound Studies

As mentioned earlier, John Cage's 4'33" can be seen as a conceptual jumping off point for the work of the Sonic Arts Union discussed here -- the chasm Alvin Lucier leapt across upon composing *Music for Solo Performer 1965*, discussed in the previous chapter. Charlie Gere has also characterized 4'33" as a dramatic aesthetic rupture, with societal implications -- an "early warning system" that was "...a kind of ground zero of the post-war avant-garde, clearing the way for subsequent developments in one apocalyptic gesture" (Gere, 2006b:94-95). The atomic analogy is clearly intentional, reflecting the reality of the atomic age that both Cage and the SAU worked in.⁹ Gere's article is relevant to this examination of the SAU because of his use of cybernetic theory in describing Cage's piece. Using Claude Shannon's seminal information theory work on the relationship between signal and noise in a transmission, Gere rightly points out that, "in a sense, Shannon's concept of communication is the exact inverse of Cage's strategy in 4'33", in that Cage seeks to show that, in Shannonian terms, noise is signal" (Gere 2006b:97).¹⁰ Gere's cybernetic treatment of Cage can be seen as a view from another angle, using similar tools, but with pertinent implications to what the Sonic Arts Union

⁹ Gordon Mumma composed a piece for the ONCE group entitled *Megaton for Wm. Burroughs* (1964) that explicitly dealt with the implications of the atom bomb, actively engaging in its impact to society.

¹⁰ By "noise," in the context of a discussion of Shannon's work in creating low-noise message transmission systems, what is meant is "the elements of a signal that are extraneous to the message being transmitted" (Gere 2006b:97).

would build upon.

Gere also approaches the importance of the Cold War to the subject, evoking Blanchot's idea that "the historical rupture initiated by the Bomb is a 'limit experience', a point at which the notion of the human, and therefore of history, is brought radically into question, not least because the language we are still obliged to use is no longer adequate or even relevant," (Gere 2006b:92) which is also of import in this context. *4'33"* was in some ways a "limit experience" for the common practice era of composition that had already seen a major shift with the rise of serialism. The "language" that composers used did not immediately become unintelligible or irrelevant, but the impact of Cage's piece did conceptually have to be dealt with by his contemporaries, be it through dismissal, reification, or some shaded ground between.

For Gere, Cage's piece is "a cogent statement about time in the nuclear era...The threat of annihilation in a few hours or, eventually, minutes meant that previous linear models of development and progress, whether at a personal or societal level, were no longer tenable. *4'33"* was about paying attention to the now, in a time when time itself appeared radically foreshortened" (Gere 2006b:103). Gere's work therefore differs in emphasis from this study in that he focuses upon *4'33"* and its phenomenological bearing on concepts of time (which is understandable, given the work's title). Here, however, I consider its importance as a precursor, or watershed event, to the Sonic Arts Union's development of ideas and uses of space and place as the primary generators of sound and structure in specific compositions.

The importance and connection of sound and space to culture and history has been discussed at length of late, especially in the emerging auditory culture discourse mentioned above. Though in this context the subject is a rarified world of vanguard musical aesthetics and not broadly shared practices with mass-cultural impact, there is a significant dialogue with the larger society in the work of the SAU and the community of their fellow artists that should be considered.¹¹ The delayed -- and unexpected -- reverberations of the SAU's work in popular electronic music culture in recent years, discussed at the conclusion of this study, is one manifestation of that dialogue, but there are other historical precedents that lend further credence to this statement, particularly in light of further illuminations surrounding *4'33"*, discussed below.

The growing area of sound studies has explored the sonic use of space in interesting ways useful to this research. Corbin (2003) has pointed out the importance of the sound of village church bells not simply for marking time, but for conveying ideas of territory and centrality in 19th century France, as well as a way to "orient travelers or navigators within the space covered by its sound" (2003:121). This particular example is especially germane in discussing Alvin Lucier's *Vespers*, which uses "Sondol" echo-location devices so participants can navigate and sonically map a performance space.

Ann Douglas (1998) also discusses connections between artistic uses and conceptualizations of space to cultural practice through an examination of the

¹¹ Some of these connections and conversations of the vanguard with the broader culture of the 1960s are beginning to be addressed, in volumes such as David Bernstein's on the San Francisco Tape Music Center (2008).

importance of skyscrapers in early 20th century New York not only as markers of technological and economic success, but as expressions of American "airmindedness," in which "both skyline and Jazz spring from a culture that wants to swing and soar and solo" (O'Meally 1998:176). Douglas cites architect Raymond Hood's statement that he "pledged not to build the same building twice," connecting it to a Jazz musician's ability to find ever new expressions in each improvisation.¹² She also mentions John Kouwenhoven's use of an urban metaphor to describe Jazz, equating "the city's grid" to "Jazz's basic 4/4 or 2/4 beat, and the skyscrapers are its solo improvisations;" this following a statement by architect Le Corbusier that Manhattan's skyscrapers were "hot Jazz in stone and steel" (Douglas 1998:211). Duke Ellington's composition *Harlem Airshaft* is one significant example that this connection is not as conceptually tenuous as it may seem on first blush, and gives a modicum of proof that Jazz artists were actively engaging with these architectural and spatial surroundings, commenting on and describing their environment, both social and physical, through their music.

Historian Stephen Kern's 1983 *The Culture of Time and Space 1880-1918* is useful here as well, both in its broad, interdisciplinary look at humanity's conception of time and space at the turn of the century, and his methodological framing of that work. Through a close reading of Kern's study of late 19th and early 20th century conceptions of time and space, it becomes clear that the aesthetic schism of Cage's *4'33"* is deeply

¹² Of course, this concept of the ever new has been debated by Jazz scholars who have found the significant use of patterns in many musicians' improvisations, but the point is still valid in this context.

rooted in concepts and uses of space that emerged at the turn of the century.

Using the term "positive negative space," born from Cubism's merging of negative space (background) and material objects (foreground), such that they "all interpenetrate so as to be almost indistinguishable," Kern describes the use of silence and space in various media arts, particularly music, painting and literature. Kern's work reveals that the cultural lead-up to 4'33" is in hindsight plainly visible, though because his work ends at the year 1918, he does not explicitly make that connection.

Kern quotes Flaubert, author of *Madame Bovary*, as saying he would like to "write a book about nothing, a book without any exterior support, which would sustain itself by the inner force of its style...a book which would be almost devoid of subject" (Kern 1983:171).¹³ Kern also discusses Mallarmé's use of empty space in his poetry to "paint not the thing, but the effect it produces" (Kern 1983:172).

The implications of this new conceptualization of space, according to Kern, involve not only "resurrecting the neglected 'empty' spaces that formerly had only a supporting role and bringing them to the center of attention on a par with the traditional subjects," but also to ideas of the sacred and profane through a "blurring of the distinction between the sacred space of the temple and the profane space outside" (Kern 1983:179). Therefore, "if there are no holy temples, any place can become sacred; if there are no consecrated materials, then ordinary sticks and stones must do, and the artist alone can make them sacred" (Kern 1983:179).

¹³ Alain Robbe-Grillet and the *nouveau roman* writers also explored the "non-subject."

As a result of these explorations and revelations of concepts of space there was, according to Kern, a significant cultural impact to the development of democratic political ideas -- though not explicitly -- in that "traditional hierarchies" were "open to reevaluation. Value was henceforth to be determined by aesthetic sensibility, public utility, or scientific evidence and not by hereditary privilege, divine right, or revealed truth" (Kern 1983:180).

In discussing the methodological difficulties of attempting such an interdisciplinary approach, Kern advances the idea of "conceptual distance" to state, for example, that the "distance between the thinking of an architect and that of a philosopher on a given subject" has greater conceptual distance than that of two philosophers discussing the same subject. Kern posits that "any generalization about the thinking of an age is more persuasive the greater the conceptual distance between the sources on which it is based. However the distance must not be too great or the juxtaposition becomes forced" (Kern 1983:7).

Similarly, the use here of cybernetic and systems theory to describe "social systems" at work in compositions of the SAU, and the connecting of the results of those works to interventions and utopian ambitions for the American cultural landscape is based first on the fact that systems theories were at the height of their popularity at the time these works were constructed, but also in the reality that there was a sociocultural dialogue happening between the superculture and the disciplinarily broad artistic subculture the SAU belonged to.

Works by Peter Doyle (2005) on fabricating space in popular music and Emily Thompson (2002) about American architectural acoustics and listening practices take us from abstract conceptions of space to the construction of space, both physical (Thompson) and virtual (Doyle).

Thompson outlines an aural culture in early 20th century America characterized by a "reformulation of the relationship between sound and space," in which "sound was gradually dissociated from space until the relationship ceased to exist" (Thompson 2002:2). She places this dissociation in "the technological manipulations of sound-absorbing building materials" culminating in the invention of electroacoustic devices such as microphones and loudspeakers. The rise in use of these contrivances created, in Thompson's view, a cultural shift in listening concepts in which "sounds were reconceived as signals" (Thompson 2002:3).

Part of Thompson's thesis is that as a result of these two technologies, acoustic design and electroacoustic amplification, a more standardized (or normalized) design schema was employed in constructing acoustic spaces that had the impact of being "easy to understand" but "had little to say about the places in which it was produced and consumed" (Thompson 2002:3). This new acoustic practice is seen by Thompson as a way "to demonstrate technical mastery over [man's] physical environment, and it did so in a way that transformed traditional relationships between sound, space and time" (Thompson 2002:4).

Like Kern (1983), Thompson traces this impetus to "challenge the traditional

bounds of space and time" (ibid.) back to the roots of modernism in the late 19th century, and bringing the importance of acousticians' work to a similar level of impact as the work of artists, like the cubists, in forging society's modern ideas of time and space.

The early electroacoustic manipulation of space manifested itself through artificial reverberation, or echo, which allowed the sound of a space to "exist free of any architectural location in which a sound might be created," which could then be molded and controlled by audio engineers (Thompson 2002:283). Though early examples of artificial reverberation were not used to create a realistic soundscape, these virtual worlds continued to signify in cultural terms. As Peter Doyle (2005) has shown in his historical study of the development of these techniques in popular music, the construction of virtual space through reverberance and other approaches "made it seem as though the music was coming from a somewhere" (Doyle 2005:5). That "somewhere" was, as Doyle has shown, a flexible and complex venue for artists and producers to "present uniquely their own 'sense of self.' The social, the personal, the geographic, the demographic, the physico-spatial conditions of their lives (and of life in general) were rendered into aesthetic effects" (Doyle 2005:7).¹⁴

In contrast to this technological drive toward acoustic optimization and

¹⁴ This construction of virtual landscapes continues to take new and interesting turns in American musical practice, as Chapman (2008) has pointed out in his discussion of Hip Hop producer Timbaland and his colleagues' work. Chapman describes a retreat from the reverberant architectures of 20th century popular music recordings to a flat, two-dimensional, "anti-spatial topography," or "sonic no-place," (Chapman 2008:168-169) which he contends is an African-American technological posthuman aesthetic position that distances itself from the emotional transcendence of earlier R&B and Rap styles (Chapman 2008:173).

standardization, the resultant cultural dissociation of sound from a given space that Thompson discusses, and later the re-introduction of place through the virtual manipulations of artificial reverb, the works of the Sonic Arts Union discussed here seek to reconnect sounds to the uniqueness of a given performance space. These works bring the acoustic signature of a room directly into the structural identity and sonic result of the work, and in some cases allow a room's specific properties to assist in composing the piece. The live, real-time aspect to the SAU's work also places the sounds' creation in a real place at a specific moment, providing a slightly more immediate musical experience.

The place that the SAU explores in these works is conceptually much different than the evocation of places by American composers of an earlier era, as described by Denise Von Glahn (2003). Instead of exploring musical descriptions or representations of sites outside the performance space, as the works Von Glahn discusses attempt to do (e.g. Grofé's *Mississippi Suite* or Ellington's *Harlem Air Shaft*), these SAU pieces are in situ wherever they are performed.¹⁵

Alvin Lucier, *Vespers* (1968)

Like many of Alvin Lucier's compositions, *Vespers* (1968) is based on an elegantly simple idea, combined with a serendipitous technological meeting. While teaching at

¹⁵ In using the complex and much-discussed terms space and place here, I conceptually defer to Casey's (1996) philosophical/anthropological exposition of them, particularly his idea that " 'place' is no empty substratum to which cultural predicates come to be attached; it is an already plenary presence permeated with culturally constituted institutions and practices" (Casey 1996:46). Of course, de Certeau's (1984) concepts of space and place, mentioned earlier here, predate Casey's work.

Brandeis University in Massachusetts, Lucier's wife Mary Lucier decided to try to develop a communal studio with area artists by placing an advertisement in the newspaper. A young man responded to the advertisement stating that he had an empty garage that could be used for the studio. Alvin and Mary went to this man's home, only to find out that the man "worked for Listening Incorporated, an electronics company in Arlington, Massachusetts that was involved in sound research and deciphering dolphin speech" (Lucier 1995, 76). Lucier remembers,

He told me that they were developing, among other things, small, hand-held echolocation devices for boat owners, acoustic engineers, and the blind. He loaned me a prototype of one of these devices, called Sondols, and I began experimenting with it, learning how to interpret the echoes it made off objects and reflective surfaces (Lucier 1995:76).

Around the same time, Lucier began reading Donald Griffin's *Listening in the Dark* (1958). The role of listening and echo-location among nocturnal animals intrigued him; in fact the title of the composition comes from the Latin term for the largest family of nocturnal bats, *Vespertilionidae*. (Lucier 1995:76). Lucier decided to make a piece in which performers would use the Sondols to move through the performance site, responding to the reflections of the clicking sounds within the venue.

An early draft of Lucier's score for *Vespers* illustrates the importance and impact of Griffin's study, and the poignancy animals' echolocation practices had on Lucier's thoughts while creating the work:

For any number of players who would like to pay their respects to all living creatures who inhabit dark places and who, over the years, have developed acuity in the art of echolocation, i.e., sounds used as messengers which, when sent out into the environment, return as echoes carrying information as to the shape, size and substance of that environment and the objects in it (Lucier 1968b).

The piece's instructions outline the task and performance practice for *Vespers*, explaining the process of navigating a space using the Sondols:

Accept and perform the task of acoustic orientation by scanning the environment and monitoring the changing relationships between the outgoing and returning clicks. By changing the repetition rate of the outgoing clicks, using as a reference point a speed at which the returning clicks are halfway between the outgoing clicks, distances can be measured, surfaces can be made to sound and clear signatures of the environment can be made. By changing the angle of reflection of the outgoing clicks against surfaces, multiple echoes of different pitches can be produced and moved to different geographical locations in the space. Scanning patterns should be slow, continuous and non-repetitive (Lucier 1968b).

Interestingly, the above section of the score is more or less a rewording of the written instructions that accompanied the Sondol, provided by Listening, Incorporated (Lucier 1968b). Like his use of the EEG in *Music for Solo Performer*, Lucier has taken another technological object and recontextualized it as an aesthetic object, all the while using the tool exactly as it was intended.

In terms of performance practice, Lucier asks performers to "move as non-human migrators, artificial gatherers of information or slow ceremonial dancers. Discover routes to goals, find clear pathways to center points or outer limits and avoid obstacles" (Lucier 1968b). Although Sondols are the echo-locating devices used in most

of the early performances of the work, Lucier specifies that "for performances in which Sondols are not available, develop natural means of echo-location such as tongue-clicks, finger-snaps or footsteps, or obtain other man-made devices such as hand-held foghorns, toy crickets, portable generators of pulsed sounds, thermal noise or 10,000 cps pure tones" (ibid.). Lucier himself purchased a bulk of tin toys called "crickets" that make "beautiful sharp sounds which, although not terribly directional, produce fairly clear echoes from reflective surfaces" for some performances of the piece because he "thought audience might enjoy participating" (Lucier 1996:74).

The type of performance Lucier considers acceptable is not a musical performance, but a carrying out of the task at hand. He has described situations in which musicians attempted to use the Sondols as instruments, creating musical rhythmic interactions and tried to compose with the devices, which he has stated goes against the intentions of the work (cf. Lucier 1996). Indeed, though the piece was performed on numerous occasions in the context of Sonic Arts Union concerts, it was also performed as the musical accompaniment for the Merce Cunningham dance piece *Objects* (1969), with the Sondols used interchangeably by dancers, audience members, friends of the composer, or other SAU members. Lucier describes this non-musical use of the devices in the composition's instructions:

Decisions as to speed and direction of outgoing clicks must be made only on the basis of usefulness in the process of echo-locating. 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 echo-location. (Lucier 1968b).

Certainly a devotion to Cage's aesthetics of nonintentionality is one aspect of these instructions, but there is also the overt desire to reveal the characteristics of a physical space, or a physical phenomenon. This investigatory impulse is a crucial aesthetic thread present in a number of Lucier's compositions throughout his career. Of *Vespers*' role in furthering this aesthetic, Lucier has said,

I am satisfied not to compose terribly much but to let the space and the situation take over. 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 and never forget one in which I've done the piece. It's as if I take very slow audio photographs of that space (Lucier 1995:78).

After *Vespers*, Lucier continued to explore different kinds of integration of site and sound, in later works like *I am sitting in a room* (1970), in which a paragraph of text -- essentially a description of what is about to transpire -- is read into a microphone. The recording of the voice is played back into the space, and re-recorded, in a cycle that repeats over and over. With each successive generation of recording the resonant characteristics of the room are revealed with the sound of the voice as catalyst. The presence of the voice gradually disintegrates and dissipates as it is consumed by the

resonant frequencies of the performance site.

Bird and Person Dyning (1975) reveals site and sound-locational illusions through the use of two binaural microphones inserted into the ear canals of the performer and synthesized birdsong played from a Christmas ornament. The microphones pick up the sound of the ornament, and the signal is routed through amplifiers to loudspeakers spread around the venue. When the volume levels on the amplifiers are raised, feedback is produced which interacts with the chirping bird call, causing heterodyning and creating phantom images of the bird call which appear to locate the sounds in various parts of the room, and also seem to come from inside one's head or in the ears. The performer slowly moves around the space, sending mirrored sound images of the birdsong around the site, creating a multiplicity of illusions of the sound's location for listeners.

In the above works by Alvin Lucier, then, there is a clear and sustained engagement with the performance site to the degree that the space itself is pivotal to both the structure and sound of the resultant music.

From Cybernetics to Cybersonics

As illustrated above, the use of and relationship to "space" is an important aspect of the work of the Sonic Arts Union, both in terms of the cultural conceptions and its physical nature. However, in order for those sounds to explore and interact with a given space, they must first be generated. In the works described here there is a "systems aesthetic," (cf. Burnham 1968) or process-based compositional approach, at work that in

part developed as a result of the well-documented interest in cybernetics, general systems theory, and McLuhan's media studies in the 1960s that was employed not only in the field of music, but also in visual art, dance, theatre and sculpture.

Cybernetics (sometimes used interchangeably with Systems Theory) is the science of control and communication in biological and machine networks, with a specific focus on feedback behavior in a given system. Derived from the Greek *kybernetike*, which literally means the art of steersmanship, which Wiener characterized as "one of the earliest and best developed feedback systems" (Wiener 1961:12), cybernetics coalesced in the mid-to-late 1940s as a result of a series of interdisciplinary conferences sponsored by the Macy Foundation. The conferences included computing pioneer John von Neumann, mathematician Norbert Wiener, and social scientists Margaret Mead and Gregory Bateson, among others, culminating in the publication of Wiener's 1948 book, *Cybernetics*, which outlined some fundamental theories of this formative period in the field.¹⁶

Though it was initially conceived as a theoretical system for describing the behavior of systems of servomechanisms, or machines with human operators, the concepts of cybernetics began to be seen (partly as a result of input by Mead and Bateson at the Macy conferences) as applicable to some aspects of social systems. Of message transmission, one of the bases of cybernetics, Wiener has said, "society can only

¹⁶ For a detailed history of Wiener, Von Neumann and the development of cybernetics, see Heims (1980 & 1991).

be understood through a study of the messages and the communication facilities which belong to it..." (Wiener 1950:25). The transmitter of those control messages, according to Wiener, would not be concerned if the message they are sending "in its intermediate stages has gone through a machine rather than through a person" (ibid.) In his opinion the route a signal travels "is irrelevant and does not in any case greatly change my relation to the signal," (ibid.) as long as that signal has been received and transmitted faithfully.

The focus on feedback systems in cybernetics has its theoretical roots in an 1868 paper by Clerk Maxwell on mechanical systems called "governors" in engines or other machines which, through a feedback process, maintain an optimal velocity in the mechanism, as intended by either a human operator or the mechanism itself. It is, in basic terms, a system which self-balances itself, maintaining a given equilibrium and maximizing efficiency.

In the discussion of the SAU compositions, I refer to feedback systems as the abstract principles or relationships that govern the compositions' realizations, but I also refer to acoustic feedback, which is an audible feedback system most people in the modern world have experienced at some point (a squealing microphone in a public-address system, for example), which is used to great effect in several of the compositions. Feedback principles will be outlined in greater detail later, in the discussion of Robert Ashley's *The Wolfman*. Because the feedback principles applied in the pieces explored here (except *Hornpipe*, which introduces more variables into the

system) are to some degree straightforward, elegant manifestations of cybernetic feedback concepts, it seems useful to employ some of these ideas when discussing the work.

Robert Ashley, *The Wolfman* (1964)

Robert Ashley composed *The Wolfman* (1964) during the height of the ONCE Group's activities in Ann Arbor, Michigan, but the work also appeared frequently on Sonic Arts Union performances, both by itself and in an expanded theatrical form called the *The Wolfman Motor City Revue* (1968). This version of the piece was performed often during the Sonic Arts Union's April-May 1969 European tour and included the tape composition *Purposeful Lady, Slow Afternoon* (1968).

In Ashley's own words, "*The Wolfman* is an amplified improvisation on four components of vocal sound to be performed simultaneously with either *The Wolfman* (1964) (six minutes, monaural, tape composition) or *The 4th of July* (1960) (eighteen minutes, monaural, tape composition). The vocal sounds and the tape composition are to be amplified in performance by separate, monaural, amplifier-loudspeaker systems capable of producing extremely high sound-levels throughout the performance space" (Ashley 1995:6). The four components of the vocals that are explored are pitch, loudness, vowel (tongue movement forward or backward "as far as possible") and closure -- the performer's jaw opened or closed, lips "drawn as far as possible" or "pursed" (Ashley 1968:6).

In these first few instructions for the piece, we see that the exploration of extremes, in terms of both amplification and physical extension, is one focus of the work. In its original recorded release on a record included with an issue of the journal *Source*, even the listener is asked to play the recording "at the highest possible volume level." Because of the above, as well as the sheer sonic whirlwind that characterizes the piece, it has been characterized as an aggressive statement and "gained a considerable reputation as a threat to the listener's health" (Ashley 2003b:4). Ashley to some degree resists this notion, however, and in the liner notes to the 2003 compact disc reissue of *Wolfman* decided to "take this opportunity to clear up a misunderstanding of the performance of "The Wolfman" that has persisted and bothered me since the beginning. Reviewers, listeners -- and indeed, some interpreters...have understood "The Wolfman" as a person screaming into the microphone. This couldn't be farther from the truth. The vocal sounds in the performance have to be probably the softest vocal sounds ever performed in public. Otherwise, the vocal sounds would 'block' the feedback..." (Ashley 2003b:5). One reviewer Ashley is likely talking about in this statement is John Rockwell, who wrote that Wolfman "consisted of him [Ashley] shouting with maximum amplification against a deafening, electronic roar. It may have been meant as an expression of primal rage. It also seemed designed to enrage the audience" (Rockwell 1983:105).

Ashley attributes this fundamental misreading of the piece to an unfamiliarity with the materials themselves:

Because there's no tradition for that kind of performance, because the materials are unfamiliar they so dominate the performance that it's almost impossible to recognize the performer in the context of those materials. It's my experience when I perform *The Wolfman* that almost no one distinguishes what I'm doing; it's almost impossible because they're so involved with the materials themselves. So as a consequence, listeners almost always misread the actions. Literally, they don't recognize how the sounds are being produced" (Gagne et al. 1982:21).

The performance of the work is actually a fairly straightforward feedback system with complex sonic results, accompanied by some prerecorded material. Though it is often characterized as a theater piece because of the appearance of the performer as a "sinister nightclub vocalist, spotlight and all," (Ashley 1968:7) Ashley makes it clear in the score that though the piece "is to be presented theatrically, first attention should be given to realizing the sound intentions of the composition" (ibid.).



Fig. 4.2. Robert Ashley, *The Wolfman*, ONCE Festival, Ann Arbor, MI, 1965.

The piece begins with a few minutes of the pre-recorded tape piece to introduce the Wolfman. The tape includes layered concrete sounds that give the vague notion of a nightclub -- a jazz band, talking, clinking of glasses, etc. which soon begin to be electronically manipulated and transformed into noise, leading up to the entrance of a long sung tone by the Wolfman.¹⁷ The tone sung by the performer is limited to a full breath, during which time they are to subtly and slowly manipulate one component of the sound, out of a vocabulary of four variables (described above). The diagram below shows a schematic of the compositional system's format:

Fig. 4.3. Performance schematic for Robert Ashley's *The Wolfman* (1964). Originally printed in *Source* Vol.2, No. 2.

An assistant to the singer gradually increases the amplitude of the microphone, which is placed very close to the singer's mouth until acoustic feedback is generated. Ashley specifies that "the transitions between the feedback sound and the vocal sustained-tones that begin and end the phrases should be as smooth and ambiguous as possible" (Ashley 1968:6). As a result, in an ideal performance, there would be a seamless

¹⁷ The tape described here is the longer "4th of July" version released on a 2003 Alga Marghen cd. Mumma notes that a shorter version was performed on the SAU tours, and was quite different (email correspondence with the author, 4/25/09).

blend between the electronic feedback and the amplified acoustic signal of the performer's voice. From a systems, or cybernetic perspective, this is a significant structural decision.

Feedback control systems have existed since the days of antiquity, though they certainly were not conceived in the same way they are in modern cybernetic systems approaches. Mayr (1970) has outlined a number of historical feedback systems dating back to Greek times. Ultimately, the goal of a feedback system is to "maintain a prescribed relationship of one system variable to another," (Mayr 1970:7.) and to correct its course in an effort to create balance in the wake of variables that may affect the intended goal of the system. In the example of a boat's rudder control system, the steersman (the namesake of cybernetics) uses the mechanism of the rudder to keep the boat moving in the intended direction, correcting based on currents, wind, etc. In the case of *The Wolfman*, it is a classic feedback loop system, with the signal from the voice and the mouth cavity being amplified into the hall, which is then picked up by the microphone and fed back into the system, along with the continuing signals from the performer.

As a result, we have a human/machine relationship whose goal is a balanced sound between the electronically generated acoustic feedback and the performer's input, with an ideal result that the difference between the two signals be "as smooth and ambiguous as possible" (Ashley 1968:6). Ashley describes how, contrary to its sonic result, "the actual vocalization of the *The Wolfman* is probably the softest, vocal piece ever

written" (Oteri and Ashley 2001). The reason for this necessary softness on the part of the performer is the extreme amplification needed to create a feedback system that responds to the physical movements in the performer's vocal cavity, so a loud vocal utterance would actually destroy the delicate balance of the system, sending it into a state of oscillation until balance can be restored. In creating this relationship, what occurs in the system is a balance in which "performance is less dependent on the load" and "feedback serves to diminish the dependence of the system on the characteristic of the motor, and serves to stabilize it" (Wiener 1961:108).

In this case, the motor is the performer, and the load the vocal utterances of the performer. The resulting system, then, can be seen as one possible model for human/machine relations based on a sensitive use of the system by the performer, who could very easily throw the system into oscillation. This is not to layer a moralizing dimension onto the piece, but to show that in the abstract, the relationship between the two is important and clearly demarcated by both the system's structure and the way it is considered successfully carried out by the composer. *The Wolfman*, an early example of the use of acoustic feedback as the basis for a musical composition, premiered on September 1, 1964 at the second annual Avant-Garde Festival in New York.¹⁸ The

¹⁸ There is a well-documented history of the aesthetic use of acoustic feedback by African-American blues guitarists, particularly Memphis Minnie and Guitar Slim as early as the late 1940s, as Robert Palmer has shown: "Eyewitnesses...agree that nobody could outblast Slim when it came to volume. Earl King's story about Slim disdaining amplifiers and playing directly through a P.A., whose iron cone speakers would further enrich the sonic overtones of his ringing guitar strings, means in effect that he had a setup offering him virtually unlimited feedback and sustain, all of which he could rigorously control with the volume and tone settings on the guitar itself once the P.A. was properly adjusted" (Palmer 1991:664).

importance of *The Wolfman* with regards to the musical use of feedback is that the entire work is based on an acoustic feedback loop that includes the performer and the loudspeaker system. The fact that it uses a phenomenon (acoustic feedback) meant to be defeated through technological means by the equipment's inventors, not intentionally created and exploited for aesthetic reasons, is also significant.

Some scholarship on this kind of "misuse" of technology in the history of technology studies (particularly work that aligns itself with SCOT theory - the social construction of technology) is useful here -- in particular Hughes's (1983) definition of the idea of reverse salients in the development of technological artifacts, and McSwain's (2002) application of that theory to the construction and resultant social/artistic uses of the solid-body electric guitar.

Thomas Hughes defines reverse salients as "obvious weak points, or weak components, in a technology which are in need of further development" (Hughes 1983:22). Rebecca McSwain, applying this terminology to the development of the solid-body electric guitar has stated that "in the case of the guitar, loss of control of sound with electrification was clearly a weak point in this particular system" (McSwain 2002:188). To solve the problem of feedback from amplified hollow body guitars, the solid body guitar was created. As we now know, the rest is technological history -- the musical use of acoustic feedback is popularly linked to the electric guitar, as a result of, among many others, the extensive use of its properties by Jimi Hendrix in the late 1960s, particularly his reading of the *Star Spangled Banner* at the Woodstock Festival in 1969.

McSwain calls this a "social reconstruction approach" to dealing with reverse salients in technological artifacts. The salients are, in the case of the electric guitar, "not 'fixed' in technical terms, but eliminated by means of reconceptualization. The result of this reconceptualization is that the reverse salient is transformed into a forward salient, moving in a direction slightly askew from the original line of technological battle" (McSwain 2002:188). As a result, "what had been 'noise' became 'music', and this part of the technological system of the electric guitar was no longer backward, but forward, leading the way to a new popular musical aesthetic" (ibid.).

This line of logic can easily be applied to the discussion of Ashley's work, and the following analysis of Behrman's composition *Wave Train* discussed below. Instead of accepting the engineer's valuation of acoustic feedback as a reverse salient to be corrected, or as noise degrading a given signal, they re-conceptualized it, making the noise the signal. Like McSwain's reading of feedback in the development of the guitar, the reverse salient of feedback becomes a forward salient.

Gere discusses Lou Reed's 1975 feedback album *Metal Machine Music* as "both a development of, and a riposte to" Cage's *4'33*" that "fills its silence with electronic feedback so as to demonstrate, perhaps, that in the twenty years that separate the two pieces the environment had become entirely mediated by electronic information communications technologies" (Gere 2006a:110). Gere's interpretation of Reed's album is that it is filling the space Cage emptied. This interpretation, however, does not take into account the historical precedence of Ashley's *Wolfman* (not to mention Max

Neuhaus's 1965 feedback-laden realization of Cage's *Fontana Mix*, titled *Feed*), a piece that is certainly sonically closely related in its use of feedback, if not conceptually.¹⁹

The Wolfman, rather than "filling a space emptied by Cage," uses the properties of a given space to produce acoustic feedback that refracts the characteristics of that room in an ever-changing loop back to the audience, channeled through the theatrical (and admittedly terrifying) persona of the Wolfman, who appears as a well-dressed, urbane nightclub singer gone wrong.

A Systems Aesthetic

In titling his 1968 article, "Systems Esthetics," art theorist Jack Burnham coined a new term to describe some of the artwork being created at the time that was no longer centered upon production of an object. Burnham delved into Ludwig von Bertalanffy's theoretical writings on general system theory, (cf. Bertalanffy 1967 & 1968) some of which is closely related to cybernetic theory, and emerged with the idea of applying some of these concepts to the new post-object art he was seeing. According to Bertalanffy, a system is "...a complex of components in interaction" that "...need not even be material" (Bertalanffy 1967:69). Burnham argued that "increasingly, 'products' -- either in

¹⁹ It is certainly in the realm of possibility that Reed could have attended the 1964 premiere of *The Wolfman* at Judson Hall. Reed was living in New York at the time on the Lower East Side, and had recorded a song in 1964 entitled "The Ostrich" with violist/composer John Cale, who was already working with LaMonte Young, and who also may have attended the event, or was at the very least aware of it. Of course, Reed's impact, due to his high profile in popular music, certainly would have had greater mass appeal.

art or life -- become irrelevant and a different set of needs arise: these revolve around such concerns as maintaining the biological livability of the Earth, producing more accurate models of social interaction, understanding the growing symbiosis in man-machine relationships...We are now in transition from an object-oriented to a systems-oriented culture. Here change emanates, not from things, but from the way things are done" (Burnham 1974:15-16). Though Burnham's work received much criticism at the time (and continues to), recent reassessments of his work (cf. Gere 2005, Skrebowski 2008) show that the usefulness and foresight of some of his theories is relevant to various aspects of contemporary art-making.

Like the systems art Burnham was discussing by visual artists such as Donald Judd, Allan Kaprow, Hans Haacke and Robert Morris, the Sonic Arts Union's compositions discussed in this chapter follow a similarly post-object or post-formalist systems aesthetic. Though they do have scores, being of an indeterminate nature they do not specify the exact sounding result of the work, which is different with each performance and in each venue. The score's role here is therefore fundamentally at odds with its historical role as a stand-alone ideal performance, instead functioning as a set of instructions to build a system of relations between machine and human, and to explore the possibilities of a given process or set of interactions; much like Burnham's description of a Morris exhibition in Chicago, in which the plans for a sculpture were sent by mail, and the piece was constructed by carpenters rather than shipping the original from New York (Burnham 1974:18). Unlike the Morris piece -- which in

performance is ultimately a static object in a room -- in the case of the SAU there is a unique performance persona embodied in each composer that is important to the performance of the pieces, though technically not necessary for a successful realization.²⁰ Nyman (1999) applies the term electronic systems to describe the work of the SAU and their contemporaries, presumably connecting it primarily to technological terminology, as a descriptor, though he never refers to systems theory or Burnham's ideas explicitly in his writings on the subject.

David Behrman, *Wave Train* (1966)

David Behrman, like Gordon Mumma, custom-built from scratch most of the electronic instruments used in his pieces. Although he designed many of his works as systems-based compositions, his integration of the site into the shaping of the work, at least in *Wave Train*, was less pronounced than the other SAU pieces discussed here.

According to Behrman, *Wave Train*, composed the year the Sonic Arts Union formed, "marked the moment when something radical in the spirit of the 1960s first came through to me. [It] was one of those pieces, like Robert Ashley's *Wolfman* and Alvin Lucier's *I am Sitting in a Room*, in which established techniques were thrown away and the nature of sound was dealt with from scratch" (Behrman 1998, 6). The title refers to a succession of wave cycles moving in the same direction and spaced at regular intervals, a

²⁰ In fact, at a handful of concerts billed as Sonic Arts Union performances, where one or another composer was unavailable for the concert, the other SAU members performed the work in his place.

term most often employed in physics, and perhaps best illustrated by oceanic wave movements near shorelines. The piece is performed with as few as two performers, and as many as five, depending upon the resources available. The basic instrumentation of the work is one or two grand pianos, guitar pickups for each performer, an amplifier, loudspeakers, and a monophonic tape deck. If the version for larger forces is played, a bowed zither, additional guitar pickups, a ring modulator, and a square wave oscillator with a sub-audio range of 2-20hz is required (see figure below):

**Fig. 4.4. David Behrman, *Wave Train* (1966) schematic, three-performer version.
Originally printed in *Source*, Vol.2 No.1.**

The system is set in motion when the guitar pickups are carefully placed on the strings of the piano with the pickup side in contact with the strings so as not to cause them to vibrate. After the pickups are in place, the amplifier's gain is raised until acoustic feedback is emitted by the loudspeakers near the piano. At this point, a feedback system is enacted, connecting the guitar pickups and piano strings with the loudspeaker's output.

The feedback loop in this case originates from the acoustic feedback of the loudspeaker, which generates vibrations in the strings, whose sound is amplified by the guitar pickups and finally fed back into the loudspeakers to begin the next loop of the ever-morphing sound. To some degree, the acoustic feedback mechanics of *Wave Train* are similar to Max Neuhaus's 1968 realization of Cage's open-ended *Fontana Mix*, subtitled *Feed*, in which percussion instruments assume the role held by the piano's strings here.

The role of the human performers is to shape the relationships between these two (or more) looping feedback systems, while also modulating their timbre by physically affecting the piano strings. Behrman requests that the performers attempt to "keep the situation under control" like a "surfer trying to subdue an ocean breaker" (Behrman 1998,6), and that they interlock the swells of the feedback waves, as illustrated in the figure below. In this way, the performers act as governors in the system, keeping the feedback within a specific range of activity.

Fig. 4.5. David Behrman, *Wave Train* (1966). Illustration of interlocking feedback loops. Originally printed in *Source*, Vol.2 No.1.

Gordon Mumma, *Hornpipe* (1967)

Like Lucier's *Vespers*, Gordon Mumma's 1967 composition *Hornpipe* employs a feedback system intrinsically integrated with and dependent upon the performance space for its sounded result. Mumma's piece, however, is designed with a much more complex and chaotic signal path and feedback relationship in a system that includes a live performer, electronic equipment, and the acoustics of the venue. As a result, of all the works discussed here, Mumma's is perhaps the most integrative in terms of man/machine dynamics and their collaborative exploration of a performance site.

Hornpipe is a solo for waldhorn, valvehorn and cybersonic console, a performer-worn electronic instrument that "is a kind of analog computer which is worn by the French hornist, attached to his belt. The outputs of the console travel an umbilical cable to stereophonic loudspeakers" (Mumma 1974:1). Besides the economic necessity for using the cable -- "We couldn't afford to go wireless in 1966" (Mumma in Henderson 2002: 33) -- Mumma has also attached symbolism to the use of the umbilical:

The space race between America and the USSR was very much in the air at that time. Seeing images of astronauts climbing out of space capsules tethered by life support cables kind of gave my umbilical cord symbolic weight...it acquired an added theatrical sensation because of that visual addition - the heroic image (or embarrassing in that era, as I understand the Soviets did it first) of the umbilical cord (Mumma in Henderson 2002:33).

There is also a theatrical element to *Hornpipe*, alluded to above regarding the umbilical, but that Mumma has expanded upon explicitly elsewhere:

In my case, what I do is not so connected with musical traditions from the past -- there may be some theatrical connections, like in *Hornpipe*...It doesn't sound like a French horn half the time, but I'm out there holding the instrument -- that heroic image, is theatrical...everybody's seen "the horn player." It's an archetypal image, which I was perfectly conscious of when I made that piece...of using a theatrically standard situation within which I did my acoustical experimentation, but the musical result of it is...for all but a fairly well-defined, musically sophisticated audience. You could put on any other sound with that video, and it would make about as much sense as what I'm actually doing, because the musical continuity, the sound materials and musical continuity and context are fairly special (Mumma in Ashley 1976).



Fig. 4.6. Gordon Mumma, *Hornpipe* (1967). Metropolitan Museum of Art, New York, February 19, 1972. Courtesy of Gordon Mumma.

As a result, one of Mumma's interests with this work is in subverting aspects of the theatrically standard situation of the concert hall with heroic soloist. Due to the great musical divide between *Hornpipe* and what would normally transpire in such a performance situation, Mumma admits the possibility of a sense of disconnect experienced by audience members that are not part of the musically sophisticated who would understand the relationship between the strange sounds of the electronics and the horn, stating that practically any music might be substituted for these audience members without a shift in their comprehension of the event.

In *Hornpipe*, what occurs between the individual components of this theatrically standard arrangement of human performer with horns, electronic console, and the acoustics of the space -- is another variation on a human/machine feedback system that takes into account the physical location of the work in its realization.²¹

Hornpipe begins with the performer sounding out the resonant characteristics of the concert hall with one of the horns, using either the traditional mouthpiece or a double-reed. Mumma describes the basic progression of the piece as follows:

²¹ Mumma notes that "a major part of the theatre -- as well as the sounds -- of *Hornpipe* are my alternating between the waldhorn and the valved horn. *Hornpipe* is very much a theatrical composition, and is loaded with sound motifs that carry historical references (e.g. hunting and herding calls)" (email correspondence with the author, 4/25/09).

Hornpipe begins as a solo. The cybersonic console listens (with microphones) to the acoustical response of the auditorium. After a few minutes the console contributes its own responses. Hornpipe becomes a duo. The response of the cybersonic console depends on the horn sounds and the resonances of the auditorium. The resonances of the auditorium are affected by the sound responses of the console as well as by the sounds of the horn. Considering the differences in personality of various auditoriums, perhaps Hornpipe is a trio (Mumma 1970:1).

It is not surprising in an article about artificial intelligence in musical performance that Mumma would characterize the activities of the cybersonic console using anthropomorphic terms like listening and responding, but Mumma goes one step further, describing the personality of the performance space, even dubbing it a fellow performer, making *Hornpipe* a trio. In this article, Mumma focuses on personality as a common feature present in computers, humans, and, as seen above, physical spaces. According to Mumma, these personalities should be celebrated and allowed to interact in both a social and musical dialogue, as equal collaborators:

A particularly interesting similarity between computers and humans is that of personality. The personalities of humans are distinguished by individual reactions to experience. If, like men, computers are physically different from each other, accumulate various experience, and speak different languages, we can enjoy differences of that personality of computers. Though the computer is an artificial intelligence, and man a natural intelligence, we can encourage social intercourse between them. If we admit of musical performance as social intercourse, then we may include the varieties of artificial intelligence in our musical ensembles: not merely for their sophistication and speed, but also for the contribution of their personalities. We may treat the artificial intelligence not as a slave, but as a collaborative equal in a democratic musical society (Mumma 1970:1).

These personalities produce complex results through various forms of interaction within the system. The horn soundings send information on the resonant characteristics of the room to the cybersonic console, that "contains electronic circuits (a parallel configuration of automatically tunable, gated amplifiers) which respond to the sounds of the horns and to the acoustical resonances of the space" (Mumma, u.d.). As the console gathers information on the venue sent by the acoustic responses to the horn, the "circuits develop an electronic analog of the acoustical resonances of the space...a map of its resonant spectrum or relative acoustical efficiency" (ibid.). The circuits store this information, constructing a map of the resonant characteristic of the performance space. These circuits are gated, so that there is no output unless until a certain determined state is reached, at which point the gates open, releasing the stored resonant data map to the loudspeakers. In Mumma's words, "each circuit has a memory which accumulates information about its resonant condition. When sufficient information is obtained, the electronic gates open, one by one, and the resonances of the electronic map are heard from loudspeakers" (ibid.).

The result of this interplay is ever-changing and continues to loop through the feedback system, based on the venue's characteristics, and the choices of the performer:

Several variations of this procedure are possible. For example, because the cybersonic console listens (and is heard) stereophonically, sequences can occur in which the console responds to opposite sides of itself. In each performance the hornist learns from these electronic responses the acoustical resonance spectrum of the space (ibid.).

In other words, the console also picks up and responds to the sounds it produces, and in the process actually teaches the hornist about both the acoustics of the space, and how the console is responding to the inputs of the horn and the acoustics. It is through this learning process that the horn player becomes aware of the resonant characteristics of the space. After the performer collects enough data, the work can be concluded by the hornist playing anti-resonant sounds, causing the cybersonic console to gradually close its output signal gates. In Mumma's words:

To end a performance of *Hornpipe* the hornist plays sounds that are opposed to the natural resonances of the space. An anti-resonant map thus develops which is superimposed upon the electronic map of the cybersonic console, and gradually terminates operation of the piece. (Mumma, u.d.)

In some ways, this interface dynamic between human and the machine is like Lucier's *Vespers* -- a mapping of the acoustics of a space, that ends when both constituents of the system learn enough about that space to conclude their explorations. The difference in the case of *Hornpipe* is that both human and machine are collaboratively processing the resonant information of the physical space, whereas in *Vespers* the sondols are used in a more traditional technological role -- as a tool for people to complete a task.

In Gordon Mumma's *Hornpipe*, there is a fusion between man and machine that differs from the other pieces discussed here because of the artificial intelligence Mumma introduces into to the system, making both collaborators conscious, in the sense that

they both make active choices of equal import to the result.²² With *Hornpipe*, balance is achieved in the feedback system when both parties learn enough about the space they are investigating to generate mirror images of the space's acoustics -- a resonant and non-resonant map -- which brings the system to a calibrated stable state, if we read "silence" as stability.

A Conditional Art

In a 1985 book, sculptor Robert Irwin provides an interesting theoretical framework for summing up the Sonic Arts Union's multi-layered weaving of the performance site into the fabric of their music.²³ Irwin describes a conditional art in which "the art act can only occur in response to a set of specifics" (Irwin 1985:23). Like the works discussed here, whose sounding result is determined by the interaction between performer and site, Irwin's conditional art attempts to "integrate the components of the phenomenal, conditionality, and response with the practical goal of bringing modern art's focusing of qualities (beauty) to bear directly on how we order our world" (Irwin 1985:26). Irwin goes on to describe four broad, progressive categories that

²² David Behrman would later pursue a similar man/machine conscious interactivity beginning in the early 1970s with his series of works incorporating live performers with "melody driven electronics." Many other composers, such as George Lewis and his *Voyager* system, continuing this path toward a more social musical relationship between the two.

²³ Nick Kaye (2000) and Miwon Kwon (2002) have written extensively about the development of non-musical site-specific art and performance practice. Kwon also draws upon Irwin's categories in her discussion of site-specific art.

describe a work's integration into its site, with the fourth, "site conditioned/determined," being a situation where the work "draws all of its cues (reasons for being) from its surroundings" (Irwin 1985:27).

The SAU compositions described in this chapter pose an interesting challenge to Irwin's categorization of work/site interrelationship, as they incorporate aspects of all four of his categories, in part because they are musical works that are not corporeal like the sculptural works Irwin describes, but also because they are conceived for *any* performance site, not one specific site. The first artwork/site relationship he outlines, site dominant, describes works that follow "classical tenets of permanence," and are recognized as "works of art" (Irwin 1985:26).

This can be applied in this case to the composition; a score, a schematic, or the circuitry itself - in other words, the permanent aspect of the pieces that allows for pan-locational and pan-historical reproduction. In addition, the SAU's use, for the most part, of a standard theatrical format of performance -- e.g. musicians on stage in front of an audience -- could fit in this category.

Irwin's second category, site adjusted, describes works that consider the site it will be performed within, but that are "still either made or conceived in the studio and transported to, or assembled on, the site" (Irwin 1985:27).

The third category is site specific, that Irwin says "the site sets the parameters and is, in part, the reason for the sculpture...but our process of recognition and understanding of the 'work of art' is still keyed to the oeuvre of the artist" (Irwin

1985:27). The works described here are assembled/performed on site, like the site adjusted works Irwin describes, but in the case of both of these categories the reference to the work's form necessarily suggesting the identity of a specific artist or oeuvre is not so relevant here. Especially in this period of the SAU, each piece was in some ways a standalone product/experiment - the sound of each was so different that if a listener were to use only their ears to judge (as someone would use their eyes to judge a Serra or di Suvero -- Irwin's examples to illustrate this point), it would be practically impossible to identify these particular works as composed by a specific artist.²⁴

The sounding result of these compositions, however, is a result of the fourth, most integrative interrelationship Irwin outlines, site conditioned/determined. These pieces, according to Irwin, require a process of "hands-on reading of the site," much like the "slow photographs of a space" Lucier describes when discussing *Vespers*, the mechanics of the feedback system in Ashley's *Wolfman*, Behrman's *Wave Train*, or the human/machine mapping of resonant space in Mumma's *Hornpipe*. Irwin describes works that enter this category as crossing boundaries of art and utility, similar to the tasks each of these works ask of their human/machine collaborators, which in some cases seem as free from artifice as possible (Lucier's *Vespers*), and in others a combination of aesthetic and utilitarian exploration of a site (Mumma's *Hornpipe*).

²⁴ In other pieces not discussed here by the SAU composers, particularly Ashley and Lucier, the artists did develop and hone in on a certain identifiable "sound" - especially Lucier's pieces for acoustic instruments with sweeping sine tones, beginning with *Still and Moving Lines...* (1973-4) and Ashley's works for voices with and without electronics, of which *The Wolfman* is a germinal example.

Conclusions

The Sonic Arts Union compositions discussed in this chapter each explore two integrative relationships using varying techniques. The first is the interrelationship between work and site, and the second is the development of man/machine systems that employ a variety of approaches to collaboration and interaction.

The most straight-forward expression of both is perhaps Lucier's *Vespers*. In this piece, we have seen that the technology, in this case the Sondol echo-location devices, is used in the traditional role of human tool, and the site is explored with those tools, making the resonant characteristics of the site the entire aesthetic focal point of the work.

Ashley's *The Wolfman* and Behrman's *Wave Train* both explore different types of man/machine feedback systems, and the resonance of spaces other than the site -- although site does play a smaller role in both works. *The Wolfman* uses the space of the performer's vocal cavity as a timbre modulator for an acoustic feedback system. *Wave Train* uses the resonant spaces of instruments like the piano as a timbre modulator for its acoustic feedback system. Both works use the human performers as organic governors, keeping the feedback systems in a state of balance to prevent oscillation, and to maintain a specific type of aesthetic experience. In some ways, these two works by Ashley and Behrman subsume the human as a tool to maintain the system's balance.

In Gordon Mumma's *Hornpipe*, we see a glimpse of a possible future in which

man and conscious machine collaborate to explore site and sound together, folding in the physical characteristics of that site into a multi-layered dialogue that affects all the components of the system -- each part modulating aspects of the other to learn something about that particular performance site. With *Hornpipe*, Mumma postulates a congruence of man/machine and site/work that is collaborative and interactive and that attempts to remove any hierarchies of one component of the system -- a utopian proposition carried out through a polyphony of sound, space and circuit.

Closing Thoughts

We must address with song every object we meet... -- Pawnee elder¹

In his 2001 book *The Invention of Art*, Larry Shiner discusses the development of our modern conception of the meaning and practice of art. He begins with the assertion that the ancient Greeks "had no word for what we call fine art" (2001:19). The Greek used the word *techne*, which included many creative activities we might call handicraft or decorative arts today. Over time, we as a society developed, refined, and reduced art-making to a stylized practice conceptualized in a completely different way than the early Greek *techne*, at least according to Shiner. As a result, this stylized practice we call art was for some time arguably disconnected from the plastic reality, materials and process, of its

¹ Qtd. in Fletcher, Alice. 1904, p.71. "The Hako: A Pawnee Ceremony." *22nd Annual Report, Bureau of American Ethnology 1900-01*. Washington D.C.

making. Ultimately, art and music to some degree became products -- objects for consumption -- and the process by which those objects were made, as well as the materials used in their construction, were considered secondary to the culture product itself.

In this study of the musical practices of the Sonic Arts Union, I have attempted to refocus attention on the process and materials of music-making by examining both the cultural hothouse that initiated the SAU's work together, and their engagement with the technical objects they built, rearranged, and recontextualized to create the musical compositions discussed herein. I placed significance on the operational structure of the electronic systems they built, best expressed in Chapter Four, to see what might be gleaned by examining the music's mode of operation.

The work, as commonly used in a musical context, is not simply the sound projected from loudspeakers or instruments, but the entire holistic process from conception to execution. Certainly it is easier to make this kind of assertion when the musicians under discussion are physically constructing their instruments, but this physical process of constructing a work occurs with every musician in one form or another; whether it is hours of isolation in a practice room for an instrumentalist or a pile of meticulously marked manuscript paper, torn and crumpled before being heaved into a waste basket. In that way, all music is a kind of handmade sound -- a joining of the physical object with the ephemeral properties of sound. In short, music is *techné*.

Of course, this is nothing new, especially when considering the history of 20th

century visual art -- Duchamp's *objet trouvé*, Beuys's *Fat Chair* (1964), the collages of Hannah Höch and Kurt Schwitters, Robert Morris's *Box with the Sound of its Own Making* (1961), and so on -- the materials are, in many ways, the work. In scholarship on music, however, it has been a developing trend only relatively recently. Of late, there has been a wealth of ethnographic and musicological research focused on recording studios, the history of recorded sound, and the recording process itself (cf. Sterne 2003, Katz 2004, Greene and Porcello 2005, Doyle 2005). Michael Veal's study of Jamaican Dub (2007), for example, focuses not only on the musical product, dub plates, but the important materials, skills and processes that go into producing that product. It is in those details that one aspect of the essence of a musical practice reveals itself.

The tinkering technological impulse I have described in these pages is not limited to the Sonic Arts Union, the United States, or to any given generation -- it is a lively, creative relationship with technology with an army of converts that continues to grow. Witness the progeny of electronics tinkerer Reed Ghazala, who began experimenting with altered consumer electronics in the late 1960s as a young teenager, and later coined the term "circuit-bending" (cf. Ghazala 2004, 2005). Doing a search for "circuit-bent" on eBay or Youtube on any given day turns up over 100 results of the work of fellow technical explorers and tweekers. Witness ex-Lucier student and composer/performer Nicolas Collins, whose hardware hacking handbook, *Handmade Electronic Music*, has just entered its 2nd edition, a mere three years after the first edition's release.

This technical impulse to reuse and reformat gave birth to the new musical style

called chiptune in the past decade, built from the hacked hardware platform of 1990s era Nintendo Gameboy portable game consoles and the 8-bit sound chips within them. The object as art and as music takes on another layer of meaning in Tristan Perich's debut album, *1-Bit Music*, a hand assembled integrated circuit programmed by the composer and glued to the inside of a cd case, with a headphone input so the listener can literally plug into the music (cf. Perich 2007 and Jarnow 2008).

These recent and emerging communities inhabit a much different technoscape than did the Sonic Arts Union, and as such communicate and present their work in a radically different manner. With the SAU, it was their attendance of affinity-group events like the 1963 Town Hall Earle Brown/Morton Feldman concert that allowed the composers to connect. In many of the contemporary scenes, social networking websites such as Youtube, Myspace, Facebook, and others have become tactics geographically and culturally diverse artists employ to share knowledge and creative work, often finding each other through keyword search terms rather than physical attendance of events. The emergence of virtual arts communities and digital information sharing detached from physical media are but two manifestations of the current technoscape, and comprise a promising area for scholarly exploration.

Indeed, the creative and inventive uses of technology displayed by the Sonic Arts Union and described in these pages is alive, well, and in capable hands.

Appendix A:

Interviews and Archival Sources

Personal Interviews

All interviews conducted by Andrew Raffo Dewar.

Ashley, Robert. New York, New York. September 11, 2006.

Behrman, David. New York, New York. December 8, 2006.

Lucier, Alvin. Middletown, Connecticut. June 3, 2005.

_____. Email Correspondence. April 16, 2009.

Mumma, Gordon. Victoria, British Columbia. July 11, 2005.

Mumma, Gordon. Victoria, British Columbia. July 12, 2005.

_____. Email Correspondence. April 16, 2009.

_____. Email Correspondence. April 23, 2009.

_____. Email Correspondence. April 25, 2009.

_____. Email Correspondence. April 26, 2009.

_____. Email Correspondence. April 27, 2009.

Archival Collections Consulted

Getty Research Institute, Santa Monica, CA.
(Jean Brown Papers, Experiments in Art and Technology Records, Dick Higgins Papers, Allan Kaprow Papers, Carolee Schneemann Papers, David Tudor Papers, Robert Watts Papers).

Gordon Mumma (Private) Archive.

Northwestern University Music Library Special Collections, Evanston, IL.
(John Cage Correspondence Collection).

Oral History, American Music Series, Yale University, New Haven, CT.

Pacifica Radio Archives, North Hollywood, CA.

Robert D. Farber Special Collections, Brandeis University, Waltham, MA.

Appendix B:

Preliminary Performance Chronology of the Sonic Arts Union

Preliminary Performance Chronology of the Sonic Arts Union

<u>Date</u>	<u>Venue</u>	<u>Repertoire Performed (if known)</u>
22-Apr-66	Rose Art Museum, Brandeis University, Waltham, MA.	
7-Nov-66	Library of the Performing Arts at Lincoln Center, New York, NY	Lucier, <i>Music for Solo Performer 1965</i> . Max Neuhaus, unknown piece. Takehisa Kosugi, unknown piece. Ben Patterson, unknown piece.
19-Dec-66	State University of New York, Buffalo: Baird Hall. Buffalo, NY.	
10-Feb-67	Once Festival: Michigan Union Ballroom. Ann Arbor, MI.	Ashley, <i>That Morning Thing</i> .
21-Feb-67	"Winterfest": New England Life Hall. Boston, MA.	
2-Mar-67	Massachusetts Institute of Technology: Kresge Auditorium. Cambridge, MA.	
4-Apr-67	2nd Hellenic Week of New Music. Athens, Greece	Behrman, <i>Runthrough</i> (1966) Mumma, <i>Mesa</i> (1966) Lucier <i>Music for Solo Performer 1965</i> Ashley, <i>Frogs</i> (1966)
7-Apr-67	Avanguardia Musicale: Sala Casella. Rome, Italy.	Same as 4-Apr-67.
13-Apr-67	Société Philharmonique de Bruxelles: Palais des Beaux Arts. Bruxelles, Belgium.	
29-Apr-67	Richmond Professional Insitute: Spring Arts Festival. Richmond, VA.	Ashley, <i>Frogs</i> (1966)
19-May-67	Antioch College. Yellow Springs, OH.	Ashley, <i>Frogs</i> (1966)
4-Dec-67	First Festival of Live Electronic Music, Mills College, Oakland, CA.	Mumma, <i>Mesa</i> (1966) Ashley, <i>Wolfman</i> (1964). (Mumma & Ashley only performers)
6-Dec-67	First Festival of Live Electronic Music, UC Davis, Freeborn Hall. Davis, CA.	Mumma, <i>Hornpipe</i> (1967) Ashley <i>Frogs</i> (1966) (Mumma & Ashley only performers)

22-Feb-68	State University of New York, Buffalo: Baird Hall. Buffalo, NY.	Behrman & Mumma Performing: Behrman <i>Wave Train</i> (1966) Morton Feldman, <i>Two Pianos</i> (1957) Ashley, <i>Frogs</i> (1967) Mumma, <i>Hornpipe</i> (1967)
6-7 Jun-68	Steinway Hall. New York, NY.	
16-Oct-68	Brandeis University: Rose Art Museum. Waltham, MA.	Recording session for Mainstream LP?
20-Mar-69	“New Images in Sound Series”: Hunter College Playhouse. New York, NY.	Ashley, <i>Purposeful Lady Slow Afternoon</i> (1968) [Billed in NYTimes 3/9/69 as <i>This Electric Lightbulb</i>]. Behrman/Mumma, <i>Runway</i> (1969) Lucier, <i>Music for Solo Performer</i> 1965.
22-Mar-69	Upsala College. East Orange, NJ.	Ashley, <i>Soft Centers</i> (196?) & <i>Purposeful Lady Slow Afternoon</i> (1968)
14-Apr-69	Fylkingen: Moderna Museet. Stockholm, Sweden.	Ashley, <i>Wolfman Motor City Revue</i> (1968).
15-Apr-69	Fylkingen: Moderna Museet. Stockholm, Sweden.	Ashley, <i>Soft Centers</i> (196?)
16-Apr-69	Vanhan Utioppitastalon Juhlasali: Yleisradio. Helsinki, Finland.	Ashley, <i>Purposeful Lady Slow Afternoon</i> (1968)
21-Apr-69	Henie-Onstad Kunstsenter. Oslo, Norway.	Ashley, <i>Wolfman Motor City Revue</i> (1968).
22-23-Apr-1969	Henie-Onstad Kunstsenter. Oslo, Norway.	
25-Apr-69	Studio de Musique Contemporain: Cité Universite. Geneva, Switzerland.	Ashley, <i>Purposeful Lady Slow Afternoon</i> (1968)
29-Apr-69	“Music Now”: The Round House. London, England.	Ashley, <i>Soft Centers</i> , <i>Fancy Free</i> .
29-Apr-69	Accademia Filharmonica: Sala Casella. Rome, Italy.	
1-May-69	Societa Aquilana dei Concerti. L’Aquila, Italy.	
3-May-69	“Music Now”: The Round House. London, England.	
4-May-69	Dartington College. Dartington, England.	
6-May-69	York University, Music Department. York, England.	

8-May-69	"Music Now": The Round House. London, England.	Ashley, <i>Wolfman Motor City Revue</i> (1968).
10-May-69	Muzicki Biennale. Zagreb, Yugoslavia.	
14-May-69	Société Philharmonique de Bruxelles: Theatre National. Bruxelles, Belgium.	Behrman, <i>Questions from the Floor</i> (1969) Jacques Bekaert, <i>Pop Corner</i> Mumma & Barbara Lloyd, <i>Home</i> (1968) Ashley, <i>The Wolfman</i> (1964) Lucier, <i>Chambers</i> (1968)
11-Nov-69	Cornell University. Ithaca, NY.	
12-Nov-69	State University of New York, Albany. Albany, NY.	
10-Feb-70	Fresno State College: Student Union. Fresno, CA.	Ashley, <i>Orange Dessert</i> (1965)
11-Feb-70	Mills College. Oakland, CA.	Behrman, <i>Runthrough</i> (1966)
12-Feb-70	University of California, San Diego. Recital Hall. La Jolla, CA.	Mumma, <i>Hornpipe</i> (1967) Ashley <i>Orange Dessert</i> (1965) Behrman, <i>Sinescreen</i> (1969) Lucier, <i>The Only Talking Machine of its Kind in the World</i> (1969)
24-Mar-70	The Guggenheim Museum. New York, NY.	Behrman, <i>Sinescreen</i> (1970) Ashley <i>Wolfman Motor City Revue</i> (1968)
25-Mar-70	The Guggenheim Museum. New York, NY.	Mumma, <i>Conspiracy 8</i> (1969-70) <i>?From Coast (?)</i> Lucier, <i>The Only Talking Machine of its Kind in the World</i> (1969)
29-Apr-70	Trinity College: Goodwin Theatre. Hartford, CT.	Mumma, <i>I Saw Her Dance</i> (1970) (Mumma, musical saw, with Mary Lucier, image projections, and Barbara Lloyd, Dance)
1-May-70	The Walker Art Center. Minneapolis, MN.	Ashley, <i>Purposeful Lady Slow Afternoon</i> (1968)
2-May-70	The Walker Art Center. Minneapolis, MN.	
3-May-70	The Walker Art Center. Minneapolis, MN.	Ashley, <i>The Entrance</i> (1965), <i>Purposeful Lady Slow Afternoon</i> (1968)
10-Nov-70	Kirkland Art Center produced concert, at Clinton High Gym. Clinton, NY.	
19-Mar-71	Oberlin College: Finney Chapel. Oberlin, OH.	Ashley, <i>Frogs</i> (1966)

20-Mar-71	University of Michigan, Contemporary Directions Series: Rackham Auditorium. Ann Arbor, MI.	Ashley, <i>Fancy Free</i>
27-Apr-71	Norddeutsche Rundfunk, Studio F. Bremen, Germany.	
29-Apr-71	United States Embassy. London, England.	
29-Apr-71	British Broadcasting Corporation. London, England.	
30-Apr-71	University of Newcastle. Newcastle-on-Tyne, England.	
10-May-71	Theatre 140. Schaerbeek, Belgium.	Ashley, <i>It's There (Illusion Model IV)</i> (1971) film by Ashley & Manupelli Mumma, <i>Schoolwork</i> (1967-70) Behrman, <i>Players with Circuits</i> (1966) Lucier, <i>I am Sitting in a Room</i> (1970) with projections by Mary Lucier
4 May 1971.	Sveriges Radio, Studio 2. Stockholm, Sweden.	
3, 5 May 1971.	Södra Theater. Stockholm, Sweden.	
19-Feb-72	Metropolitan Museum of Art: Grace Rainey Rogers Auditorium. New York, NY.	Ashley, <i>String Quartet Describing the Motions of Large Real Bodies</i> (1971-72) Mumma, <i>Hornpipe</i> (1967)
6-May-72	Pro Musica Nova, Radio Bremen. Bremen, Germany.	Ashley, <i>In Sara, Mencken, Christ And Beethoven There Were Men and Women</i> (1972) Mumma, <i>Ambivex</i> (1972)
17 & 18-Jun-72	Merce Cunningham Studio, 55 Bethune St. New York, NY	Program drawn from the following: Ashley, <i>Orange Dessert</i> (1965), <i>String Quartet Describing the Motions of Large Real Bodies</i> (1971-72) Behrman, <i>Pools of Phase-locked Loops w/ Katherine Morton</i> (1972) Lucier, <i>Duke of York</i> (1971), <i>The Queen of the South</i> (1972) Mumma, <i>Ambivex</i> (1972), <i>Combine: Mographs</i> (1962-64), <i>The Dresden Interleaf 13 Feb 1945</i> (1965), <i>Quelle Heure N'est Il Pas</i> (1971)

14-Feb-73	Smith College Department of Music: Sage Hall. SAU + Nam June Paik, Katherine Morton, Russell Connor, and Martin Barman. Northampton, MA.	Ashley, <i>In Sara, Mencken, Christ, and Beethoven There Were Men And Women</i> (excerpt) (1972)
17-Feb-73	SAU w/ Katherine Morton Performing Arts Center, SUNY Albany. Albany, NY.	Ashley, <i>In Sara, Mencken, Christ, and Beethoven There Were Men And Women</i> (1972)
25-May-73	WBAI Radio (live): Studio C. New York, NY.	Ashley, <i>In Sara, Mencken, Christ, and Beethoven There Were Men And Women</i> (1972)
25-27-May-73	72-hour Concert: WBAI Radio (live): Studio C. New York, NY.	Ashley, <i>Revised, Finally, for Gordon Mumma</i> (April 1961-April 1973)
15-20-Oct-74	Festival d'Automne à Paris: Musée Galliera. Paris, France.	
23-Sep-76	Northern Illinois University, Music Bldg. Concert Hall	Behrman, <i>Cornet with Pitch-driven Electronics</i> (summer tuning 1976) Lucier, <i>Bird and Person Dying</i> (1975) Mumma <i>Hornpipe</i> (1967)
2-Feb-77	SUNY/Cobleskill. Cobleskill, NY.	Ashley, <i>The Great Northern Automobile Presence</i> (?)
13-Mar-77	SUNY/Buffalo/Center for Media Study: Ellicott Square Building, Grand Court Lobby. Buffalo, NY.	Ashley, <i>The Great Northern Automobile Presence</i> (?)
5-Apr-77	Alfred University, Alfred Campus. Alfred, NY.	Ashley, <i>In Sara, Mencken, Christ, and Beethoven There Were Men And Women</i> (1972)
6-Apr-77	Alfred University, Alfred Campus. Alfred, NY.	Ashley, <i>In Sara, Mencken, Christ, and Beethoven There Were Men And Women</i> (1972)

Bibliography

- Adorno, Theodor. 1976. *Introduction to the Sociology of Music*. New York: Seabury Press.
- Akrich, Madeleine. 1992. The De-scription of Technical Objects. In *Shaping Technology/ Building Society: Studies in Sociotechnical Change*, edited by Wiebe E. Bijker and John Law, 205-224. Cambridge, Mass: MIT Press.
- Alperson, Phillip. 1984. On Musical Improvisation. *Journal of Aesthetics and Art Criticism* 43(1):17-29.
- Amit, Vered. 2000. *Constructing the Field: Ethnographic Fieldwork in the Contemporary World*. New York: Routledge.
- Appadurai, Arjun. 1991. Global Ethnoscapes: Notes and Queries for a Transnational Anthropology. In *Recapturing Anthropology: Working in the Present*, edited by Richard G. Fox, 191-210. Santa Fe: School of American Research Press.
- Appleton, Jon, and Ronald Perera, eds. 1975. *The Development and Practice of Electronic Music*. Englewood Cliffs, NJ: Prentice-Hall.
- Armstrong, Elizabeth, Joan Rothfuss, and Simon Anderson, eds. 1993. *In the Spirit of Fluxus: Published on the Occasion of the Exhibition*. Minneapolis: Walker Art Center.
- Artaud, Antonin. 1958. *The Theatre and Its Double [1938]*. Translated by Mary Caroline Richards. New York: Grove Press.
- Ashby, William Ross. 1970. *An Introduction to Cybernetics*. London: Chapman & Hall and University Paperbacks.
- Ashley, Robert, Larry Austin, and Karlheinz Stockhausen. 1967. A Conversation. *Source* 1(1):104-107.
- Ashley, Robert. 1968. The Wolfman. *Source* 2(2):6-7.
- _____. 1995. Three Pieces: The ONCE Group. In *Happenings and Other Acts*, edited by Mariellen R. Sandford, 182-194. London: Routledge.
- _____, ed. 2000. *Music with Roots in the Aether*. Köln: Musiktexte.
- _____. 2001. Sprache als Musik. *Musiktexte* 88: 37-51.
- _____. 2003. *The Wolfman*. Milano: Alga Marghen 20NMN.048.

- Attali, Jacques. 1985. *Noise: The Political Economy of Music*. Minneapolis: University of Minnesota Press.
- Auslander, Philip. 1999. *Liveness: Performance in a Mediatized Culture*. New York: Routledge.
- Austin, Larry. 1968. Groups: New Music Ensemble/ONCE Group/Sonic Arts Group/Musica Elettronica Viva. *Source* 2(1):15-27.
- _____. 1989. David Tudor and Larry Austin: A Conversation. <http://www.emf.org/tudor/Articles/austin.html> (3 April, 2009).
- _____. 1991. Live-Electronic Music on the Third Coast. *Contemporary Music Review* 6(Part 1):107-129.
- Averill, Gage. 2003. *Four Parts, No Waiting: A Social History of American Barbershop Harmony*. New York: Oxford University Press.
- Axel, Brian Keith. 2002. *From the Margins: Historical Anthropology and its Futures*. Durham, NC: Duke University Press.
- Bailey, Derek. 1980. *Improvisation: Its Nature and Practice in Music*. Ashbourne: Moorland Publishing.
- Banes, Sally. 1982. The Birth of the Judson Dance Theatre: "A Concert of Dance" at Judson Church, July 6, 1962. *Dance Chronicle* 5(2):167-212.
- _____. 1983. *Democracy's Body: Judson Dance Theater 1962-64*. Ann Arbor: UMI Research Press.
- _____. 1993. *Greenwich Village 1963: Avant-Garde Performance and the Effervescent Body*. Durham, NC: Duke University Press.
- _____. 2003. *Reinventing Dance in the 1960s*. Madison: University of Wisconsin Press.
- Barthes, Roland. 1985. *The Responsibility of Forms: Critical Essays on Music, Art, and Representation*. New York: Hill and Wang.
- Bartlett, Andrew W. 1995. Cecil Taylor, Identity Energy, and the Avant-Garde African American Body. *Perspectives of New Music* 33(1/2):274-293.
- Barz, Gregory F., and Timothy J. Cooley. 1997. *Shadows in the Field: New Perspectives for Fieldwork in Ethnomusicology*. New York: Oxford University Press.
- Bateman, Wayne. 1980. *Introduction to Computer Music*. New York: John Wiley & Sons.

- Battcock, Gregory, ed. 1981. *Breaking the Sound Barrier: A Critical Anthology of the New Music*. New York: E.P. Dutton.
- Baudrillard, Jean. 1993. *The Transparency of Evil*. London: Verso.
- Beal, Amy C. 2002a. A Place to Ply Their Wares with Dignity: American Composer-Performers in West Germany, 1972. *The Musical Quarterly* 86(2):329-348.
- _____. 2002b. "Time Canvasses:" Morton Feldman and the Painters of the New York School. In *Music and Modern Art*, edited by James Leggio, 227-245. New York: Routledge.
- _____. 2006. *New Music, New Allies: American Experimental Music in West Germany from the Zero Hour to Reunification*. Berkeley: University of California Press.
- _____. 2008. "Experimentalists and Independents are Favored:" John Edmunds in Conversation with Peter Yates and John Cage, 1959-61." *Notes* 64(4):659-687.
- Behrman, David. 1991. Designing Interactive Computer-based Music Installations. *Contemporary Music Review* 6(1):139-142.
- _____. 1998. *Wave Train: Music from 1959 to 1968*. Milan, Italy: Alga Marghen.
- Behrman, David, and Ron Kuivila. 1998. Composing with Shifting Sand: A Conversation between Ron Kuivila and David Behrman on Electronic Music and the Ephemerality of Technology. *Leonardo Music Journal* 8:13-16.
- Belgrad, Daniel. 1998. *The Culture of Spontaneity: Improvisation and the Arts in Postwar America*. Chicago: University of Chicago Press.
- Bennett, Andy. 1999. Subcultures or Neo-Tribes? Rethinking the Relationship Between Youth, Style and Musical Taste. *Sociology* 33(3):599-617.
- _____. 2004. *Music Scenes: Local, Translocal and Virtual*. Nashville: Vanderbilt University Press.
- Berger, Harris. 1999. *Metal, Rock, and Jazz: Perception and the Phenomenology of Musical Experience*. Hanover, NH: Wesleyan University Press.
- Berghaus, Gunter. 1993. Happenings in Europe in the '60s: Trends, Events and Leading Figures. *TDR* 37(4):157-168.
- Berkhofer, Robert F. 1995. *Beyond the Great Story: History as Text and Discourse*. Cambridge, MA: Belknap Press of Harvard University Press.

- Berliner, Paul. 1994. *Thinking in Jazz*. Chicago: University of Chicago Press.
- Bernstein, David W, ed. 2008. *The San Francisco Tape Music Center: 1960s Counterculture and the Avant-Garde*. Berkeley: University of California Press.
- Bertalanffy, Ludwig von. 1967. *Robots, Men, and Minds: Psychology in the Modern World*. New York: G. Braziller.
- _____. 1969. *General System Theory; Foundations, Development, Applications*. New York: G. Braziller.
- Bertalanffy, Ludwig von, and Ervin Laszlo. 1972. *The Relevance of General Systems Theory: Papers Presented to Ludwig von Bertalanffy on his Seventieth Birthday*. New York: G. Braziller.
- Betten, Neil, and Michael Austin. 1990. *The Roots of Community Organizing, 1917-1939*. Philadelphia: Temple University Press.
- Bevelander, Brain. 1991. Observations on Live Electronics. *Contemporary Music Review* 6(1):151-157.
- Bijker, Wiebe E., Thomas Parke Hughes, and T. J. Pinch. 1987. *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge, MA: MIT Press.
- Bijker, Wiebe E., and John Law. 1992. *Shaping Technology/Building Society: Studies in Sociotechnical Change*. Cambridge, MA: MIT Press.
- Bijsterveld, Karin. 2002. A Servile Imitation: Disputes About Machines in Music, 1910-1930. In *Music and Technology in the 20th Century*, edited by Hans-Joachim Braun, 121-135. Baltimore: John Hopkins University Press.
- Bloechl, Olivia Ashley. 2008. *Native American Song at the Frontiers of Early Modern Music*. New York: Cambridge University Press.
- Blum, Alan. 2001. Scenes. *Public* 22/23: 6-35.
- Bohlman, Philip. 1997. Fieldwork in the Ethnomusicological Past. In *Shadows in the Field: New Perspectives for Fieldwork in Ethnomusicology*, edited by Gregory F. Barz and Timothy J. Cooley, 139-162. New York: Oxford University Press.
- Bonito, Oliva Achille, and Corinna Ferrari. 1976. *Europe/America: the Different Avant-gardes*. Milan: Deco Press.
- Boretz, Benjamin, and Edward T. Cone, eds. 1971. *Perspectives on American Composers*. New York: W.W. Norton & Co.

- Borgo, David. 2002. Negotiating Freedom: Values and Practices in Contemporary Improvised Music. *Black Music Research Journal* 22(2):165-188.
- Borgo, David. 2005. *Sync or Swarm: Improvising Music in a Complex Age*. New York: Continuum.
- Born, Georgina. 1995. *Rationalizing Culture*. Berkeley: University of California Press.
- Braun, Hans-Joachim. 2002. *Music and Technology in the Twentieth Century*. Baltimore: John Hopkins University Press.
- _____. 2003. "Strange Bedfellows:" The Relationship between Music Technology and Military Technology in the First Half of the Twentieth Century." In *Global Village, Global Brain, Global Music: KlangArt-Kongress 1999*, edited by Bernd Enders and Joachim Stange-Elbe, Bd. 2, 137-152. Osnabrück: Electronic Publishing Osnabrück.
- Brech, Martha. 2002. New Technology - New Artistic Genres: Changes in the Concept and Aesthetics of Music. In *Music and Technology in the Twentieth Century*, edited by Hans-Joachim Braun, 207-222. Baltimore: John Hopkins University Press.
- Brockman, Jane. 1992. The First Electronic Filmscore - Forbidden Planet: A Conversation with Bebe Barron. *The Score* 7(3):10, 12-13.
- Brouse, Andrew. 2003. New Movements: A Young Person's Guide to Brainwave Music. <http://www.horizonzero.ca/textsite/phprint.php> (accessed 12 June, 2008).
- Brown, Bill. 2001. Thing Theory. *Critical Inquiry* 28(1):1-22.
- Brown, Carolyn. 2007. *Chance and Circumstance: Twenty Years with Cage and Cunningham*. New York: Alfred A. Knopf.
- Broyles, Michael. 2004. *Mavericks and other Traditions in American Music*. New Haven: Yale University Press.
- Bryant, Margaret. 1957. Current English: "Know-How". *English Journal* 46(9):577, 595.
- Bull, Michael. 2000. *Sounding Out the City: Personal Stereos and the Management of Everyday Life*. New York: Berg.
- _____. 2007. *Sound Moves: iPod Culture and Urban Experience*. New York: Routledge.
- Bull, Michael, and Les Back. 2003. *The Auditory Culture Reader*. Oxford, UK: Berg.
- Burnham, Jack. 1968. Systems Esthetics. *Artforum* 7(1):30-35.

- Burnham, Jack. 1974. *Great Western Salt Works; Essays on the Meaning of Post-Formalist Art*. New York: G. Braziller.
- Burnham, Jack, Charles Harper, and Judith Benjamin Burnham. 1971. *The Structure of Art*. New York: G. Braziller.
- Bürger, Peter. 1984. *Theory of the Avant-Garde*. Minneapolis: University of Minnesota Press.
- Cage, John. 1961. *Silence*. Hanover: Wesleyan University Press.
- _____. 1962. *0'00"*. Edition Peters 6796. New York: Henmar Press.
- _____. 1981. *For the Birds: John Cage in Conversation with Daniel Charles*. New York: Marion Boyars Publishers.
- Cage, John, and Richard Kostelanetz. 1993. *John Cage, Writer: Previously Uncollected Pieces*. New York: Limelight Editions.
- Calinescu, Matei. 1977. *Faces of Modernity: Avant-Garde, Decadence and Kitsch*. Bloomington, IN: Indiana University Press.
- Cameron, Catherine M. 1996. *Dialectics in the Arts: The Rise of Experimentalism in American Music*. Westport: Praeger.
- Cardew, Cornelius. 1964. Cage and Cunningham. *The Musical Times* 105(1459):659-660.
- _____. 1967. Towards an Ethic of Improvisation. In *Treatise Handbook*, edited by Cornelius Cardew, xvii-xx. London: Edition Peters.
- _____. 1969. A Scratch Orchestra: Draft Constitution. *The Musical Times* 110(1516):617-619.
- Carlson, W. Bernard. 1991. *Innovation as a Social Process: Elihu Thomson and the Rise of General Electric, 1870-1900*. Cambridge: Cambridge University Press.
- Carr, Revell. 2007. In the Wake of John Kanaka: Musical Interactions between Euro-American Sailors and Pacific Islanders, 1600-1900. Ph.D. Dissertation, University of California, Santa Barbara.
- Carter, Curtis L. 2000. Improvisation in Dance. *Journal of Aesthetics and Art Criticism* 58(2):181-190.
- Case, John, and Rosemary Taylor. 1979. *Co-ops, Communes & Collectives: Experiments in Social Change in the 1960s and 1970s*. New York: Pantheon Books.

- Casey, Edward S. 1996. How to Get from Space to Place. In *Senses of Place*, edited by Steven Feld, and Keith H Basso, 13-52. Santa Fe, NM: School of American Research Press.
- Certeau, Michel de. 1984. *The Practice of Everyday Life*. Berkeley: University of California Press.
- Chadabe, Joel. 1997. *Electric Sound: The Past and Promise of Electronic Music*. Upper Saddle River, NJ: Prentice Hall.
- Chapman, Dale. 2008. "That Ill, Tight Sound:" Telepresence and Biopolitics in Post-Timbaland Rap Production. *Journal of the Society for American Music* 2(2):155-175.
- Chase, Gilbert. 1966. *The American Composer Speaks: A Historical Anthology, 1770-1965*. Baton Rouge: Louisiana State University Press.
- Chase, Gilbert. 1982. American Music and American Musicology. *Journal of Musicology* 1(1):59-62.
- Chase, Mildred Portney. 1988. *Improvisation: Music from the Inside Out*. Berkeley: Creative Arts.
- Chatwin, Bruce. 1987. *The Songlines*. New York: Viking.
- Childs, Barney, et. al. 1982. Forum: Improvisation. *Perspectives of New Music* 21(1/2):26-111.
- Cohen, Sara. 1991. *Rock Culture in Liverpool*. Oxford: Clarendon Press.
- Cohen, Sara. 1999. Scenes. In *Key Terms in Popular Music and Culture*, edited by Bruce Horner, and Thomas Swiss, 239-250. Malden, MA: Blackwell Publishers, Inc.
- Collier, Barnard L. 1970. A Composition for Cranium and Computer: Brainwave Music. *The Washington Post*, December 7, 1970: 37.
- Collins, Nicolas. 2006. *Handmade Electronic Music: The Art of Hardware Hacking*. New York: Routledge.
- Coomaraswamy, Ananda Kentish. 1956. *The Transformation of Nature in Art*. New York: Dover Publications.
- Cooper, Harry. 2002. Popular Models: Fox-Trot and Jazz Band in Mondrian's Abstraction. In *Music and Modern Art*, edited by James Leggio, 163-201. New York: Routledge.

- Copeland, Roger. 2004. *Merce Cunningham: The Modernizing of Modern Dance*. New York: Routledge.
- Corbin, Alain. 1998. *Village Bells: Sound and Meaning in the 19th-century French Countryside*. New York: Columbia University Press.
- Cormier, Ramona. 1975. Indeterminacy and Aesthetic Theory. *Journal of Aesthetics and Art Criticism* 33(3):285-292.
- Cortázar, Julio. 1966. *Hopscotch*. New York: Pantheon Books.
- Cowan, Ruth Schwartz. 1997. *A Social History of American Technology*. New York: Oxford University Press.
- Cowell, Henry. 1933. Trends in American Music. In *American Composers on American Music*, 3-13. Palo Alto, CA: Stanford University Press.
- Cowen, Tyler and Alexander Tabarrok. 2000. An Economic Theory of Avant-Garde and Popular Art, or High and Low Culture. *Southern Economic Journal* 67(2):232-253.
- Cox, Christoph. 2002. The Jerrybuilt Future: The Sonic Arts Union, ONCE Group and MEV's Live Electronics. In *Undercurrents: The Hidden Wiring of Modern Music*, edited by Rob Young, 35-44. London: Continuum.
- Crane, Diana. 1987. *The Transformation of the Avant-Garde*. Chicago: University of Chicago Press.
- Cravens, Hamilton, Alan I. Marcus, and David M. Katzman. 1996. *Technical Knowledge in American Culture: Science, Technology, and Medicine since the Early 1800s*. Tuscaloosa: University of Alabama Press.
- Crawford, Richard. 1993. *The American Musical Landscape*. Berkeley: University of California Press.
- Crawford, Richard. 2001. *America's Musical Life*. New York: W.W. Norton & Co. Inc.
- Critical Art Ensemble. 1998. Observations on Collective Cultural Action. *Art Journal* 57(2):72-85.
- Curran, Alvin. 1996. On Spontaneous Music. *Oltre il Silenzio* 2(2): unk. page numbers.
- Danielson, Virginia. 1997. *The Voice of Egypt: Umm Kulthum, Arabic song, and Egyptian Society in the Twentieth Century*. Chicago: University of Chicago Press.
- Darter, Tom, and Greg Armbruster. 1984. *The Art of Electronic Music*. New York: Quill.

- Daston, Lorraine. 2004. *Things That Talk: Object Lessons from Art and Science*. New York: Cambridge, MA: Zone Books.
- Davies, Hugh. 1968. *Répertoire International des Musiques Electroacoustiques. International Electronic Music Catalog*. Cambridge, MA: Distributed by MIT Press.
- Davies, Hugh. 2001. Gentle Fire: An Early Approach to Live Electronic Music. *Leonardo Music Journal* 11: 53-60.
- Davies, Hugh Marlais, and Ronald J Onorato. 1997. *Blurring the Boundaries: Installation Art, 1969-1996*. New York, NY: Museum of Contemporary Art, San Diego.
- Dean, Roger T. 1992. *New Structures in Jazz and Improvised Music since 1960*. Philadelphia: Open University.
- Deleuze, Gilles, and Félix Guattari. 1986. *Kafka: Toward a Minor Literature*. Minneapolis: University of Minnesota Press.
- DeLio, Thomas. 1984. *Circumscribing the Open Universe*. New York: University Press of America.
- DeLio, Thomas. 1985. *Contiguous Lines: Issues and Ideas in the Music of the '60's and '70's*. Lanham, MD: University Press of America.
- Derrida, Jacques. 1978. *Writing and Difference*. Chicago: University of Chicago Press.
- DeVeaux, Scott. 1997. *The Birth of Bebop*. Berkeley: University of California Press.
- Dewan, Edmond. 1967. Occipital Alpha Rhythm, Eye Position and Lens Accommodation. *Nature* 214: 975-977.
- Dewar, Andrew Raffo. 2004. "This is an American Music:" Aesthetics, Music and Visual Art of Bill Dixon. M.A. Thesis, Wesleyan University.
- Diamond, Elin. 1996. *Performance and Cultural Politics*. London: Routledge.
- Dickson, David. 1975. *The Politics of Alternative Technology*. New York: Universe Books.
- Douglas, Ann. 1998. Skyscrapers, Airplanes, and Airmindedness: "The Necessary Angel." In *The Jazz Cadence of American Culture*, edited by Robert G. O'Meally, 196-223. New York: Columbia University Press.
- Douglas, Susan J. 1992. Audio Outlaws: Radio and Phonograph Enthusiasts. In *Possible Dreams: Enthusiasm for Technology in America*, edited by John L. Wright, 45-59. Dearborn, MI: Henry Ford Museum and Greenfield Village.

- Doyle, Peter. 2005. *Echo and Reverb: Fabricating Space in Popular Music Recording, 1900-1960*. Middletown, CT: Wesleyan University Press.
- Drucker, Johanna. 1993. Collaboration without Object(s) in the Early Happenings. *Art Journal* 52(4):51-58.
- Dube, Saurabh. 2007. *Historical Anthropology*. New Delhi: Oxford University Press.
- Duberman, Martin. 1972. *Black Mountain: An Exploration in Community*. New York: E.P. Dutton & Co. Inc.
- Eco, Umberto. 1989. *The Open Work*. Cambridge, MA: Harvard University Press.
- Elkins, James. 1998. *On Pictures and the Words that Fail Them*. New York: Cambridge University Press.
- Emmerson, Simon. 2000. *Music, Electronic Media, and Culture*. Burlington, VT: Ashgate.
- _____. 2007. *Living Electronic Music*. Burlington, VT: Ashgate.
- Enders, Bernd, and Joachim Stange-Elbe. 2003. *Global Village, Global Brain, Global Music: KlangArt-Kongress 1999*. Osnabrück: Electronic Publication.
- Ericson, Raymond. 1970a. Is Boulez 'Imperialistic'? *New York Times*, June 21, 1970: 95.
- _____. 1970b. Study of Noise Takes Art Form. *New York Times*, November 22, 1970: 80.
- Erlmann, Veit. 2004. *Hearing Cultures: Essays on Sound, Listening, and Modernity*. New York: Berg.
- Ernst, David. 1977. *The Evolution of Electronic Music*. New York: Schirmer Books.
- Evans, Robert, ed. 1973. *Social Movements*. Chicago: Rand McNally College Pub. Co.
- Evens, Aden. 2005. *Sound Ideas: Music, Machines, and Experience*. Minneapolis: University of Minnesota Press.
- Eyerman, Ron, and Andrew Jamison. 1998. *Music and Social Movements*. Cambridge: Cambridge University Press.
- Fabian, Johannes. 1983. *Time and the Other: How Anthropology Makes its Object*. New York: Columbia University Press.

- Feld, Steven. 1982. *Sound and Sentiment: Birds, Weeping, Poetics, and Song in Kaluli Expression*. Philadelphia: University of Pennsylvania Press.
- _____. 2003. A Rainforest Acoustemology. In *The Auditory Culture Reader*, edited by Michael Bull and Les Back, 223-239. New York: Berg.
- Feld, Steven, and Keith H. Basso. 1996. *Senses of Place*. Santa Fe, NM: School of American Research Press.
- Ferand, Ernest T. 1961. *Improvisation in Nine Centuries of Western Music*. Köln: Arno Volk Verlag Hans Gerig.
- Ferguson, Eugene. 1979. The American-ness of American Technology. *Technology and Culture* 20(1):3-24.
- Fink, Robert Wallace. 2005. *Repeating Ourselves: American Minimal Music as Cultural Practice*. Berkeley: University of California Press.
- Flynt, Henry. 1996. Lamonte Young in New York, 1960-62. *Bucknell Review* 40(1):44-97.
- Foucault, Michel. 1991. Nietzsche, Genealogy, History. In *The Foucault Reader*, edited by Paul Rabinow, 76-100. London: Penguin Books.
- Fox, Richard. 1991. *Recapturing Anthropology: Working in the Present*. Santa Fe, NM: School of American Research Press.
- Freed, Hermine. 1982. Nam June Paik Retrospective. *Art Journal* 42(3):249-251.
- Friedman, Ken, ed. 1998. *The Fluxus Reader*. New York: Academy Editions.
- Frigyesi, Judit. 1998. *Bela Bartok and Turn-of-the-Century Budapest*. Berkeley: University of California Press.
- Frith, Simon & Howard Horne. 1987. *Art Into Pop*. London: Methuen.
- Fuller, R. Buckminster. 1969. *Operating Manual for Spaceship Earth*. Carbondale: Southern Illinois University Press.
- Gagne, Cole, Tracy Caras, and Gene Bagnato. 1982. *Soundpieces: Interviews with American Composers*. Metuchen, NJ: Scarecrow Press.
- Gaines, Donna. 1994. The Local Economy of Suburban Scenes. In *Adolescents and their Music*, edited by Jonathon S. Epstein, 47-65. New York: Garland Publishing.

- Gallo, Rubén. 2005. *Mexican Modernity: The Avant-Garde and the Technological Revolution*. Cambridge, MA: MIT Press.
- Gann, Kyle. 1997. *American Music in the Twentieth Century*. New York: Schirmer Books.
- _____. 2006. *Music Downtown*. Berkeley: University of California Press.
- Garland, Peter. 1982. *Americas: Essays on American Music and Culture, 1973-80*. Santa Fe, NM: Soundings Press.
- Gelber, Steven. 1997. Do-It-Yourself: Constructing, Repairing and Maintaining Domestic Masculinity. *American Quarterly* 49(1):66-112.
- Gelles, George. 1966. Electronic Concert Not Very Amusing. *Boston Globe*, February 28, 1966: unk. page no.
- Gere, Charlie. 2005. Jack Burnham and the Work of Art in the Age of Real Time Systems. In *Get Real: Real Time + Art + Theory + Practice + History*, edited by Morten Søndergaard, Perttu Rastas, and Bjorn Norberg, 149-163. New York: G. Braziller, Inc.
- Gere, Charlie. 2006a. *Art, Time, and Technology*. New York: Berg.
- Gere, Charlie. 2006b. John Cage's Early Warning System. In *Art, Time, and Technology*, 89-112. New York: Berg.
- Gershwin, George. 1933. The Relation of Jazz to American Music. In *American Composers on American Music*, edited by Henry Cowell, 186-187. Palo Alto, CA: Stanford University Press.
- Gerstin, Julian. 1998. Reputation in a Musical Scene: The Everyday Context of Connections between Music, Identity and Politics. *Ethnomusicology* 42(3):385-414.
- Gillespie, Luke O. 1991. Literacy, Orality, and the Parry-Lord "Formula:" Improvisation and the Afro-American Jazz Tradition. *International Review of the Aesthetics and Sociology of Music* 22(2):147-164.
- Gimbel, John. 1990. The American Exploitation of German Technical Know-How after World War II. *Political Science Quarterly* 105(2):295-309.
- Goehr, Lydia. 1992. *The Imaginary Museum of Musical Works: An Essay in the Philosophy of Music*. New York: Clarendon Press.

- Goodman, Nelson. 1968. *Languages of Art: An Approach to a Theory of Symbols*. Indianapolis: Bobbs-Merrill.
- Gourlay, K.A. 1978. Towards a Reassessment of the Ethnomusicologist's Role in Research. *Ethnomusicology* 22(1):1-35.
- Greene, Paul D. and Thomas Porcello. 2005. *Wired for Sound: Engineering and Technologies in Sonic Cultures*. Middletown, CT: Wesleyan University Press.
- Griffin, Donald R. 1958. *Listening in the Dark: The Acoustic Orientation of Bats and Men*. New Haven: Yale University Press.
- Guilbaut, Serge. 1983. *How New York Stole the Idea of Modern Art: Abstract Expressionism, Freedom and the Cold War*. Translated by Arthur Goldhammer. Chicago: University of Chicago Press.
- Hall, Edward T. 1992. Improvisation as an Acquired, Multilevel Process. *Ethnomusicology* 36(2):223-235.
- Hall, S. and T. Jefferson, eds. 1976. *Resistance Through Rituals: Youth Subcultures in Post-War Britain*. London: Hutchinson.
- Halprin, Ann. 1973. Community Art as Life Process: "The Story of the San Francisco Dancers' Workshop." *The Drama Review* 17(3):64-80.
- Hanlon, Terri, Dir. 2008. Roulette TV: David Behrman.
http://ubu.com/film/roulette_behrman.html (1 April 2009).
- Hansen, Al. 1965. *A Primer of Happenings and Time/Space Art*. New York: Something Else Press Inc.
- Hapgood, Susan and Jennifer Rittner. 1995. Neo-Dada: Redefining Art, 1958-1962. *Performing Arts Journal* 17(1):63-70.
- Hardin, Russell. 2003. *Indeterminacy and Society*. Princeton: Princeton University Press.
- Harding, James Martin. 2000. *Contours of the Theatrical Avant-Garde: Performance and Textuality*. Ann Arbor: University of Michigan Press.
- Harris, Keith. 2000. 'Roots?': The Relationship between the Global and the Local within the Extreme Metal Scene. *Popular Music* 19(1):13-30.
- Harris, Mary Emma. 1987. *The Arts at Black Mountain College*. Cambridge, MA: MIT Press.

- Harris, Roy. 1933. Problems of American Composers. In *American Composers on American Music*, edited by Henry Cowell, 149-166. Palo Alto, CA: Stanford University Press.
- Haskell, Barbara, and John G Hanhardt. 1984. *Blam! The Explosion of Pop, Minimalism, and Performance, 1958-1964*. New York: Whitney Museum of American Art in association with W.W. Norton & Co.
- Healy, Patricia. 1968. Letter to Robert Ashley from U.S. Copyright Office. *Source* 2(1):82.
- Hebdige, Dick. 1979. *Subculture: The Meaning of Style*. London: Routledge.
- Heidegger, Martin. 1966. *Discourse on Thinking*. New York: Harper & Row.
- _____. 1977. *The Question Concerning Technology, and other Essays*. New York: Harper & Row.
- Heims, Steve J. 1980. *John Von Neumann and Norbert Wiener: From Mathematics to the Technologies of Life and Death*. Cambridge, MA: MIT Press.
- _____. 1991. *The Cybernetics Group*. Cambridge, MA: MIT Press.
- _____. 1993. *Constructing a Social Science for Postwar America: The Cybernetics Group, 1946 – 1953*. Cambridge, MA: MIT Press.
- Heintze, James R., ed. 1999. *Perspectives on American Music Since 1950*. New York: Garland Publishing Inc.
- Heintze, James R. and Michael Saffle, eds. 2000. *Reflections on American Music: The Twentieth Century and the New Millenium*. Hillsdale, NY: Pendragon Press.
- Henderson, Richard. 2002. Bomb Culture: Gordon Mumma. *The Wire* 216:28-33.
- Hendricks, Geoffrey, ed. 2003. *Critical Mass: Happenings, Fluxus, Performance, Intermedia and Rutgers University 1958-1972*. New Brunswick, NJ: Rutgers University Press.
- Hendricks, Jon, ed. 2002. *What's Fluxus? What's Not! Why*. Brasilia: Centro Cultural Banco do Brasil.
- Hesmondhalgh, David. 2005. Subcultures, Scenes or Tribes? None of the Above. *Journal of Youth Studies* 8(1):21-40.
- Higgins, Dick. 1976. The Origin of Happening. *American Speech* 51(3/4):268-271.
- _____. 1997. *Essays on Intermedia*. San Diego: San Diego State University Press.

- Higgins, Hannah. 2002. *Fluxus Experience*. Berkeley: University of California Press.
- Higgins, Niko. 2003. Improvisers Unite: Jump Arts, Free Jazz Improvisation, and Practice Theory. M.A. Thesis, Columbia University.
- Hillings, Valerie Lynn. 2002. Experimental Artists' Groups in Europe, 1951-1968: Abstraction, Interaction and Internationalism. Ph.D. Dissertation, New York University.
- Hisama, Ellie M. 2001. *Gendering Musical Modernism: The Music of Ruth Crawford, Marion Bauer, and Miriam Gideon*. Cambridge ; New York: Cambridge University Press.
- Hobsbawm, Eric J. and Terence O. Ranger. 1984. *The Invention of Tradition*. New York: Cambridge University Press.
- Holmes, Thom. [1985] 2002. *Electronic and Experimental Music*. New York: Routledge.
- Hughes, Thomas Parke. 1983. *Networks of Power: Electrification in Western Society, 1880-1930*. Baltimore: Johns Hopkins University Press.
- Hughes, Thomas Parke. 2004. *Human-built World: How to Think About Technology and Culture*. Chicago: University of Chicago Press.
- Huyssen, Andreas. 1986. *After the Great Divide: Modernism, Mass Culture, Postmodernism*. Bloomington, IN: Indiana University Press.
- Irwin, Robert. 1985. *Being and Circumstance: Notes Toward a Conditional Art*. Larkspur Landing, CA: Lapis Press.
- Ives, Edward D. 1964. *Larry Gorman: The Man Who Made the Songs*. Bloomington: Indiana University Press.
- Jackson, Travis. 1998. Performance and Musical Meaning: Analyzing "Jazz" on the New York Scene. Ph.D. Dissertation, Columbia University.
- Jacob, François. 1977. Evolution and Tinkering. *Science* 196(4295):1161-1166.
- Jacobs, Henry. 2002. Electronic Kabuki Mambo [1959]. Locust 011CD.
- James, Richard S. 1987. ONCE: Microcosm of the 1960s Musical and Multimedia Avant-Garde. *American Music* 5(4):359-390.
- Jarnow, Jesse. 2008. Tristan Perich: The Tinkerer. *The Village Voice*, June 10 2008: <http://www.villagevoice.com/2008-06-10/music/the-tinkerer/>

- Jenkins, Janet, ed. 1993. *In the Spirit of Fluxus*. Minneapolis: Walker Art Center.
- Johnson, Steven. 2002. *The New York Schools of Music and Visual Arts*. New York: Routledge.
- Johnson, Steven, and Olivia Mattis. 2006. New York School. In *Grove Music Online*. (1 April 2006).
- Johnson, Tom. 1989. *The Voice of New Music: New York City, 1972-1982: A Collection of Articles Originally Published in the Village Voice*. Eindhoven, Netherlands: Het Apollohuis.
- Joseph, Branden Wayne. 2003. *Random Order: Robert Rauschenberg and the Neo-Avant-Garde*. Cambridge, MA: MIT Press.
- Joseph, Branden Wayne. 2008. *Beyond the Dream Syndicate: Tony Conrad and the Arts after Cage (A "Minor" History)*. New York Cambridge, MA: Zone Books.
- Jost, Ekkehard. 1975. *Free Jazz*. Wien: Universal Edition A.G.
- Kahn, Douglas. 1999. *Noise, Water, Meat: A History of Sound in the Arts*. Cambridge, MA: MIT Press.
- Kahn, Douglas and Gregory Whitehead. 1992. *Wireless Imagination: Sound, Radio, and the Avant-Garde*. Cambridge, MA: MIT Press.
- Kalb, Don and Herman Tak. 2004. *Critical Junctions: Anthropology and History Beyond the Cultural Turn*. New York: Berghahn Books.
- Kaprow, Allan. 1965. A Statement. In *Happenings: An Illustrated Anthology*, edited by Michael Kirby, 44-52. New York: E.P. Dutton & Co. Inc.
- Karolyi, Otto. 1996. *Modern American Music: From Charles Ives to the Minimalists*. London: Cygnus Arts.
- Kartchner, Kenner. 1990. *Frontier Fiddler: The Life of a Northern Arizona Pioneer*. Tucson: University of Arizona Press.
- Kasson, John F. 1976. *Civilizing the Machine: Technology and Republican Values in America, 1776-1900*. New York: Hill and Wang.
- Katz, Mark. 2004. *Capturing Sound: How Technology has Changed Music*. Berkeley: University of California Press.

- Katz, Vincent, ed. 2002. *Black Mountain College: Experiment in Art*. Cambridge, MA: MIT Press.
- Kaufman, Robert. 2001. Negatively Capable Dialectics: Keats, Vendler, Adorno and the Theory of the Avant Garde. *Critical Inquiry* 27(2):354-384.
- Kaye, Nick. 2000. *Site-Specific Art: Performance, Place and Documentation*. New York: Routledge.
- Kennedy, Raymond F. 1987. Jazz Style and Improvisation Codes. *Yearbook for Traditional Music* 19: 37-43.
- Kern, Stephen. 1983. *The Culture of Time and Space 1880-1918*. Cambridge, MA: Harvard University Press.
- Kirby, Michael. 1965. *Happenings: An Illustrated Anthology*. New York: E.P. Dutton.
- Kirk, Andrew. 2002. "Machines of Loving Grace:" Alternative Technology, Environment, and the Counterculture. In *Imagine Nation: The American Counterculture of the 1960s and '70s*, edited by Peter Braunstein and Michael William Doyle, 353-378. New York: Routledge.
- Klein, Howard. 1964. Music: The Avant-Garde. *New York Times*, September 2, 1964: 29.
- Klosty, James, ed. 1975. *Merce Cunningham*. New York: Saturday Review Press.
- Klüver, Billy. 1967. Theater and Engineering: An Experiment, Notes by an Engineer. *Artforum* 5(February):31-34.
- Klüver, Billy. 1980. *E.A.T. Bibliography*. New York: Experiments in Art and Technology.
- Klüver, Billy. 1983. *What Are You Working on Now?: A Pictorial Memoir of the 60s*. New York: Experiments in Art and Technology.
- Klüver, Billy, and Robert Rauschenberg. 1967. Statement of Purpose, Experiment in Art and Technology. <http://www.fondationlanglois.org/flash/e/index.php?NumObjet=6610%26NumPage=306>. (22 February 2006).
- Klüver, Billy, Julie Martin, and Barbara Rose, eds. 1972. *Pavilion*. New York: E.P. Dutton.
- Knorr, Karin. 1979. Tinkering toward Success: Prelude to a Theory of Scientific Practice. *Theory and Society* 8(3):347-376.
- Korsyn, Kevin. 2003. *Decentering Music: A Critique of Contemporary Musical Research*. Oxford: Oxford University Press.

- Kostelanetz, Richard. 1968. *The Theatre of Mixed Means, an Introduction to Happenings, Kinetic Environments, and other Mixed-means Performances*. New York: The Dial Press, Inc.
- Kostelanetz, Richard, ed. 1987. *Conversing with Cage*. New York: Limelight Editions.
- Kostelanetz, Richard. 1989. The Discovery of Alternative Theater: Notes on Art Performances in New York City in the 1960s and 1970s. *Perspectives of New Music* 27(1):128-172.
- Kostelanetz, Richard, ed. 1992. *Merce Cunningham: Dancing in Space and Time*. Chicago: A Capella Books.
- Kostelanetz, Richard. 1996. *John Cage (Ex)plain(ed)*. New York: Schirmer Books.
- Krauss, Rosalind E. 1985. *The Originality of the Avant-Garde and Other Modernist Myths*. Cambridge, MA: MIT Press.
- Kruse, Holly. 1993. Subcultural Identity in Alternative Music Culture. *Popular Music* 12(1):33-41.
- Kruse, Holly. 2003. *Site and Sound: Understanding Independent Music Scenes*. New York: P. Lang.
- Kuspit, Donald. 2000. *Psychostrategies of Avant-Garde Art*. Cambridge: Cambridge University Press.
- Kwon, Miwon. 2002. *One Place After Another: Site-Specific Art and Locational Identity*. Cambridge, MA: MIT Press.
- Lane, Mervin, ed. 1990. *Black Mountain College: Sprouted Seeds, An Anthology of Personal Accounts*. Knoxville: University of Tennessee Press.
- Laszlo, Ervin. 1972. *The Systems View of the World: The Natural Philosophy of the New Developments in the Sciences*. New York: G. Braziller.
- Laszlo, Ervin. 1973. Cybernetics of Musical Activity. *Journal of Aesthetics and Art Criticism* 31(3):375-387.
- _____. 1984. *Introduction to Systems Philosophy: Toward a New Paradigm of Contemporary Thought*. New York: Gordon and Breach.
- Leggio, James. 2002. *Music and Modern Art*. New York: Routledge.

- Lemke, Sieglinde. 1998. *Primitivist Modernism: Black Culture and the Origins of Transatlantic Modernism*. Oxford: Oxford University Press.
- Levinson, Jerrold. 1990a. What a Musical Work Is. In *Music, Art, and Metaphysics: Essays in Philosophical Aesthetics*, 63-88. Ithaca, N.Y: Cornell University Press.
- Levinson, Jerrold. 1990b. What a Musical Work Is, Again. In *Music, Art, and Metaphysics: Essays in Philosophical Aesthetics*, 215-263. Ithaca, N.Y: Cornell University Press.
- Levy, Alan Howard. 1983. *Musical Nationalism: American Composers' Search for Identity*. Westport: Greenwood Press.
- Lewallen, Constance M., and Steve Seid. 2004. *Ant Farm: 1968-1978*. Berkeley: University of California Press.
- Lewis, George. 2004. Experimental Music in Black and White: The AACM in New York 1970-1985. In *Uptown Conversations: The New Jazz Studies*, edited by Robert O'Meally, Brent Hayes Edwards, and Farah Jasmine Griffin, 50-101. New York: Columbia University Press.
- Lewis, George E. 1996. Improvised Music after 1950: Afrological and Eurological Perspectives. *Black Music Research Journal* 16(1):91-122.
- Lewis, George E. 2004. Afterword to "Improvised Music after 1950:" The Changing Same. In *The Other Side of Nowhere*, edited by Daniel Fischlin, and Ajay Heble, 163-172. Middletown: Wesleyan University Press.
- Lévi-Strauss, Claude. 1962. *La Pensée Sauvage*. Paris: Plon.
- Lubet, Alex J. 1999. Indeterminate Origins: A Cultural Theory of American Experimental Music. In *Perspectives on American Music Since 1950*, edited by James R. Heintze, 95-140. New York: Garland Publishing, Inc.
- Lucier, Alvin. 1965a. Personal correspondence to John Cage, 30 March 1965. Cage Archive, Northwestern University.
- Lucier, Alvin. 1965b. Music of Alvin Lucier, reel-to-reel tape dated 5 April 1965. Brandeis University, Farber special collections ID#032.
- Lucier, Alvin. 1968a. *Extended Voices New Pieces for Chorus and for Voices Altered Electronically by Sound Synthesizers and Vocoder*. New York: Odyssey.
- Lucier, Alvin. 1968b. Score for *Vespers* and Sondol instructional information. Getty Research Institute, David Tudor papers, box 11, folder 2.

- Lucier, Alvin. 1971. Program notes for *Music for Solo Performer* and letter to Allan Kaprow dated 18 September 1971. Getty Research Institute, Allan Kaprow papers, Box 69, Folder 3.
- Lucier, Alvin. 1976. Statement On: Music for Solo Performer. In *Biofeedback and the Arts*, edited by David Rosenboom, 60-61. Vancouver: A.R.C. Publishing.
- Lucier, Alvin. 1986. Interview by Ev Grimes, Ev. Yale University Oral History of American Music.
- Lucier, Alvin. 1995. *Reflections: Interviews, Scores, Writings*. Köln: MusikTexte.
- Lucier, Alvin. 1998. Origins of a Form: Acoustical Exploration, Science and Incessancy. *Leonardo Music Journal* 8:5-11.
- Lysloff, René T. A. and Leslie C. Gay. 2003. *Music and Technoculture*. Middletown, CT: Wesleyan University Press.
- Lévy, Sophie and Christian Derouet. 2003. *A Transatlantic Avant-Garde: American Artists in Paris, 1918-1939*. Berkeley Giverny, France: University of California Press.
- MacColl, Le Roy Archibald. 1968. *Fundamental Theory of Servomechanisms*. New York: Dover Publications.
- MacKenzie, Donald A, and Judy Wajcman. 1999. *The Social Shaping of Technology*. Buckingham, UK: Open University Press.
- MacLow, Mordecai-Mark. 2003. Critical Mass: Some Reflections. In *Critical Mass: Happenings, Fluxus, Performance, Intermedia and Rutgers University 1958-1972*, ed. Geoffrey Hendricks, 1-3. New Brunswick, NJ: Rutgers University Press.
- Maffesoli, Michel. 1996. *The Time of the Tribes: The Decline of Individualism in Mass Society*. London: Sage.
- Makanna, Philip, Dir. 1976. Robert Ashley. *Music with Roots in the Aether*. New York: Lovely Music.
- Makanna, Philip, Dir. 1976. David Behrman. *Music with Roots in the Aether* New York: Lovely Music.
- Makanna, Philip, Dir. 1976. Alvin Lucier. *Music with Roots in the Aether*. New York: Lovely Music.
- Makanna, Philip, Dir. 1976. Gordon Mumma. *Music with Roots in the Aether*. New York: Lovely Music.

- Manning, Peter. 2004. *Electronic and Computer Music*. New York: Oxford University Press.
- Margolis, Joseph. 1980. *Art and Philosophy*. Atlantic Highlands, NJ: Humanities Press.
- Margolis, Joseph. 1999. *What, After All, is a Work of Art?: Lectures in the Philosophy of Art*. University Park, PA: Pennsylvania State University Press.
- Marmande, Francis and Carol Johnson. 1996. The Laws of Improvisation, or the Nuptial Destruction of Jazz. *Yale French Studies* 89:155-159.
- Marter, Joan. 1999. *Off Limits: Rutgers University and the Avant-Garde, 1957-1963*. New Brunswick, NJ: Rutgers University Press.
- Martin, Bradford D. 2004. *The Theater Is in the Street*. Amherst, MA: University of Massachusetts Press.
- Matsue, Jennifer Milioto. 2003. Performing Underground Sounds: An Ethnography of Music-Making in Tokyo's Hardcore Clubs. Ph.D Dissertation, University of Chicago.
- Mayr, Otto. 1970. *The Origins of Feedback Control*. Cambridge: MIT Press.
- Mayr, Otto. 1976. *Philosophers and Machines*. New York: Science History Publications.
- McCue, George. 1977. *Music in American Society 1776-1976: From Puritan Hymn to Synthesizer*. New Brunswick, NJ: Transaction Books.
- McGraw, Andrew. 2005. Musik Kontemporer: Experimental Music by Balinese Composers. Ph.D. Dissertation, Wesleyan University.
- McLuhan, Marshall. 1964. *Understanding Media: The Extensions of Man*. New York: McGraw-Hill.
- McSwain, Rebecca. 2002. The Social Reconstruction of a Reverse Salient in Electric Guitar Technology: Noise, the Solid Body, and Jimi Hendrix. In *Music and Technology in the Twentieth Century*, edited by Hans-Joachim Braun, 186-198. Baltimore: John Hopkins University Press.
- Merriam, Alan P. 1977. Definitions of "Comparative Musicology" and "Ethnomusicology." An Historical - Theoretical Perspective. *Ethnomusicology* 21(2):189-204.
- Mertens, Wim. 1983. *American Minimal Music: La Monte Young, Terry Riley, Steve Reich, Philip Glass*. London New York: Kahn & Averill Broude.

- Millard, A. J. 1990. *Edison and the Business of Innovation*. Baltimore: Johns Hopkins University Press.
- Miller, Kiri. 2007. Jacking the Dial: Radio, Race, and Place in *Grand Theft Auto*. *Ethnomusicology* 51(3):402-438.
- Miller, Larry and Sara Seagull. 2003. Grounds for Experiment: Robert Watts and the Experimental Workshop. In *Critical Mass: Happenings, Fluxus, Performance, Intermedia and Rutgers University 1958-72*, edited by Geoffrey Hendricks, 20-28. New Brunswick, NJ: Rutgers University Press.
- Miller, Leta E. 2003. ONCE and Again: The Evolution of a Legendary Festival, liner notes to *Music from the ONCE Festival 1961-1966*. New World Records 80567.
- Milman, Estera. 1996. Futurism as a Submerged Paradigm for Artistic Activism and Practical Activism. *South Central Review* 13(2/3):157-179.
- Mindell, David A. 2002. *Between Human and Machine: Feedback, Control, and Computing before Cybernetics*. Baltimore: The Johns Hopkins University Press.
- Mockus, Martha. 2008. *Sounding Out: Pauline Oliveros and Lesbian Musicality*. New York: Routledge.
- Moffatt, Michael. 1992. Ethnographic Writing About American Culture. *Annual Review of Anthropology* 21:205-229.
- Moles, Abraham A. 1966. *Information Theory and Esthetic Perception*. Urbana: University of Illinois Press.
- Montague, Stephen. 1991. Live Electronics - Introduction. *Contemporary Music Review* 6(1):85-88.
- More, Sir Thomas. 1992. *Utopia*. New York: W.W. Norton.
- Mumford, Lewis. 1934. *Technics and Civilization*. New York: Harcourt, Brace and Company.
- Mumford, Lewis. 1952. *Art and Technics*. New York: Columbia University Press.
- Mumma, Gordon. 1964. An Electronic Studio for the Independent Composer. *Audio Engineering Society* 12(3):240-244.
- _____. 1966a. Letter to David Tudor dated 27 August 1966. Getty Research Institute, David Tudor Papers. Box 57, Folder 3.

- Mumma, Gordon. 1966b. Letter to David Tudor dated 9 September 1966. Getty Research Institute, David Tudor Papers. Box 57, Folder 3.
- _____. 1967a. The Once Group and How It Happened. *Arts in Society* 4(2):380-398.
- _____. 1967b. Alvin Lucier's Music for Solo Performer 1965. *Source* 1(2):68-69.
- _____. 1970a. Notes on Cybersonics: Artificial Intelligence in Live Musical Performance, unpublished manuscript. Getty Research Institute, David Tudor Papers.
- _____. 1970b. Music in America, Point de Vue. Unpublished manuscript for the publication "Nuits de la Fondation Maeght Festival 1970." Getty Research Institute, David Tudor Papers. *box#?
- _____. 1970c. Program notes for *Communication in a Noisy Environment*. Getty Research Institute, David Tudor Papers.
- _____. 1975a. Live-Electronic Music. In *The Development and Practice of Electronic Music*, edited by Jon Appelon, and Ronald Perera, 286-335. Englewood Cliffs, NJ: Prentice-Hall.
- _____. 1975b. From Where the Circus Went. In *Merce Cunningham*, edited by James Klosty, 65-73. New York: Saturday Review Press.
- _____. 1975c. Witchcraft, Cybersonics, Folkloric Virtuosity. In *Ferienkurse '74 Vol.14*, edited by Ernst Thomas, 71-77. Mainz: Schott.
- _____. 1983. Interview by Vincent Plush. 17 May 1983. Yale University Oral History American Music.
- _____. 1990. Gordon Mumma: Commentary on Five Pieces for Soundings. *Soundings* 16:144-176.
- _____. 1997. Electronic Music for the Merce Cunningham Dance Company. *Choreography and Dance* 4(3):51-55.
- _____. n.d. Program notes for *Hornpipe*. Courtesy of Gordon Mumma.
- Nelson, Richard. 2003. The Cumulative Advance of Human Know-How. *Philosophical Transactions: Mathematical Physical and Engineering Sciences* 361(1809):1635-1653.

- Nettl, Bruno. 1958. Historical Aspects of Ethnomusicology. *American Anthropologist* 60(3):518-532.
- Nettl, Bruno. 1974. Thoughts on Improvisation: A Comparative Approach. *The Musical Quarterly* 60(1):1-19.
- Nicholls, David. 1990. *American Experimental Music, 1890-1940*. New York: Cambridge University Press.
- Nicholls, David. 1998. *The Cambridge History of American Music*. Cambridge: Cambridge University Press.
- Nicholls, David E. 2000. *Conjuring the Folk: Forms of Modernity in African America*. Ann Arbor: University of Michigan Press.
- Novack, Cynthia J. 1990. *Sharing the Dance: Contact Improvisation and American Culture*. Madison, WI: University of Wisconsin Press.
- Novak, David. 2006. Japan Noise: Global Media Circulation and the Transpacific Circuits of Experimental Music. Ph.D. Dissertation, Columbia University.
- Nunn, Tom. 1998. *Wisdom of the Impulse: On the Nature of Musical Free Improvisation*. San Francisco: Self-published.
- Nye, David E. 1994. *American Technological Sublime*. Cambridge, MA: MIT Press.
- Nyman, Michael. 1999. *Experimental Music: Cage and Beyond*. New York: Cambridge University Press.
- O'Dell, Kathy. 1997. Fluxus Feminus. *TDR* 41(1):43-60.
- O'Meally, Robert G. 1998. *The Jazz Cadence of American Culture*. New York: Columbia University Press.
- Oja, Carol J. 1990. *Colin McPhee: A Composer in Two Worlds*. Washington: Smithsonian Institution Press.
- Oja, Carol J. 2000. *Making Music Modern: New York in the 1920s*. New York: Oxford University Press.
- Oldenburg, Claes. 1965. A Statement. In *Happenings: An Illustrated Anthology*, edited by Michael Kirby, New York: E.P. Dutton & Co.
- Oliveros, Pauline. 1968. Some Sound Observations. *Source* 2(1):77-82.

- Oren, Michel. 1993. Anti-Art as the End of Cultural History. *Performing Arts Journal* 15(2):1-30.
- Ortega y Gasset, Jose. 1968. *The Dehumanization of Art*. Princeton, NJ: Princeton University Press. Original edition, 1948.
- Oteri, Frank J. and Robert Ashley. 2001. "A Conversation with Robert Ashley." *New Music Box*. <http://newmusicbox.com/article.nmbx?id=1199>. (8 May 2009)
- Palmer, Robert. 1991. The Church of the Sonic Guitar. *South Atlantic Quarterly* 90(4):649-673.
- Patterson, David Wayne. 1996. Appraising the Catchwords, c. 1942-1959: John Cage's Asian-derived Rhetoric and the Historical Reference of Black Mountain College. Ph.D. Dissertation. Columbia University.
- Payne, Maggie. 2000. The System is the Composition Itself. In *Music with Roots in the Aether*, edited by Robert Ashley, 109-124. Köln: Musiktexte.
- Pekacz, Jolanta T. 2006. *Musical Biography: Towards New Paradigms*. Burlington, VT: Ashgate.
- Perloff, Marjorie. 1999. *The Poetics of Indeterminacy: Rimbaud to Cage*. Evanston, IL: Northwestern University Press.
- Peña, Carolyn Thomas de la. 2003. *The Body Electric: How Strange Machines Built the Modern American*. New York: New York University Press.
- Perich, Tristan. 2007. *1-Bit Music*. New York: Cantaloupe Music CA21042.
- Peyster, Joan. 1969. A Fighter from Way Back. *New York Times*, March 9 1969:19, 32.
- Pickering, Andrew. 1984. *Constructing Quarks: A Sociological History of Particle Physics*. Chicago: University of Chicago Press.
- Pickering, Andrew. 1992. *Science as Practice and Culture*. Chicago: University of Chicago Press.
- Pickering, Andrew. 2007. "Brains, Selves and Spirituality in the History of Cybernetics." <http://www.metanexus.net/magazine/tabid/68/id/10545/default.aspx> (14 June, 2008).
- Pickering, Andrew, and Keith Guzik. 2008. *The Mangle in Practice: Science, Society, and Becoming*. Durham: Duke University Press.

- Piekut, Benjamin. 2008. *Testing, Testing...: New York Experimentalism 1964*. Ph.D. Dissertation, Columbia University.
- Piekut, Benjamin. 2009. 'Demolish Serious Culture!' Henry Flynt and Workers World Party. In *Sound Commitments: Avant-Garde Music and the Sixties*, edited by Robert Adlington, 37-55. New York: Oxford University Press.
- Pijnappel, Johan, ed. 1993. *Fluxus Today and Yesterday*. New York: Art & Design Magazine.
- Pinch, T. J. and Frank Trocco. 2002. *Analog Days: The Invention and Impact of the Moog Synthesizer*. Cambridge, MA: Harvard University Press.
- Pinch, Trevor, and Frank Trocco. 2002. The Social Construction of the Early Electronic Music Synthesizer. In *Music and Technology in the Twentieth Century*, edited by Hans-Joachim Braun, 67-83. Baltimore: John Hopkins University Press.
- Pincus, Andrew L. 1998. *Tanglewood: The Clash Between Tradition and Change*. Boston: Northeastern University Press.
- Plourde, Lorraine. 2008. Disciplined Listening in Tokyo: Onkyo and Non-Intentional Sounds. *Ethnomusicology* 52(2):270-295.
- Poggioli, Renato. 1971. *The Theory of the Avant-Garde*. New York: Harper and Row.
- Pomeroy, Jim. 1991. Black Box S-Thetix: Labor, Research, and Survival in the He[Art] of the Beast. In *Technoculture*, edited by Andrew Ross and Constance Penley, 268-285. Minneapolis: University of Minnesota Press.
- Post, Robert C. 1994. *High Performance: The Culture and Technology of Drag Racing, 1950-1990*. Baltimore: Johns Hopkins University Press.
- Potter, Michelle. 1993. "A License to Do Anything:" Robert Rauschenberg and the Merce Cunningham Dance Company. *Dance Chronicle* 16(1):1-43.
- Pound, and Louise. 1944. 'Know-How'. *American Speech* 19(1):65-66.
- Powers, Harold. 1988. "International Segah" and its Nominal Equivalents in Central Asia and Kashmir. *International Council for Traditional Music* 40-85.
- Pritchett, James. 1993. *The Music of John Cage*. Cambridge: Cambridge University Press.
- Pursell, Carroll. 1992. The Long Summer of Boy Engineering. In *Possible Dreams: Enthusiasm for Technology in America*, edited by John L. Wright, 35-43. Dearborn, MI: Henry Ford Museum and Greenfield Village.

- Pursell, Carroll W. 2007. *The Machine in America: A Social History of Technology*. Baltimore: Johns Hopkins University Press.
- Racy, Ali Jihad. 2000. The Many Faces of Improvisation: The Arab Taqasim as a Musical Symbol. *Ethnomusicology* 44(2):302-320.
- Rae, John. 1960. The "Know-How" Tradition: Technology in American History. *Technology and Culture* 1(2):139-150.
- Raes, Godfried Willem. 1992. A Personal Story of Music and Technologies. *Leonardo Music Journal* 2(1):29-35.
- Rainer, Yvonne, and Ann Halprin. 1965. Yvonne Rainer Interviews Ann Halprin. *The Tulane Drama Review* 10(2):142-167.
- Raloff, Janet. 1982. Nipponese Know-How. *Science News* 122(19):296-299.
- Rapport, Nigel. 1997. *Transcendent Individual: Towards a Literary and Liberal Anthropology*. New York: Routledge.
- Rasin, Vera. 1957. 'Les Six' and Jean Cocteau. *Music and Letters* 38(2):164-169.
- Ratner, Leonard G. 1970. Ars Combinatoria: Chance and Choice in Eighteenth-Century Music. In *Studies in Eighteenth-Century Music*, edited by H.C. Robbins, 343-363. New York: Oxford University Press.
- Retallack, Joan, ed. 1996. *Musicage: Cage Muses on Words, Art and Music*. Hanover, NH: Wesleyan University Press.
- Reynolds, Roger. 1975. *Mind Models: New Forms of Musical Experience*. New York: Praeger.
- Rice, Timothy. 1987. Toward the Remodeling of Ethnomusicology. *Ethnomusicology* 31(3):469-488.
- Rice, Timothy. 2003. Time, Place, and Metaphor in Musical Experience and Ethnography. *Ethnomusicology* 47(2):151-179.
- Rich, Alan. 1995. *American Pioneers: Ives to Cage and Beyond*. London: Phaidon.
- Rockwell, John. 1980. Electronic Music Takes a New Turn. *New York Times*, April 6 1980: D21, D26.
- Rockwell, John. 1983. *All American Music*. New York: Alfred A. Knopf Inc.

- Rogalsky, Matt. 1995. "In Rehearsals, or Preparation, or Setup, or from One Performance to Another:" Live Electronic Music Practice and Musicians of the Merce Cunningham Dance Company. M.A. Thesis, Wesleyan University.
- Roland, Albert. 1958. Do-it-Yourself: A Walden for the Millions? *American Quarterly* 10(2):154-164.
- Rosenboom, David. 1976. *Biofeedback and the Arts, Results of Early Experiments*. Vancouver, BC: Aesthetic Research Centre of Canada.
- Ross, Andrew, and Constance Penley. 1991. *Technoculture*. Minneapolis: University of Minnesota Press.
- Roszak, Theodore. 1969. *The Making of a Counter Culture; Reflections on the Technocratic Society and its Youthful Opposition*. Garden City, NY: Doubleday.
- Rovner, Anton. u.d. "Anton Rovner interview with Alvin Lucier." <http://www.musica-ukrainica.odessa.ua/i-rovner-lucier.html> (16 April 2008).
- Rubin, Marjorie. 1963. Everything Is Instrumental in a Way-Out Concert. *New York Times*, August 17, 1963:21.
- Rubin, William S. 1967. *Dada, Surrealism, and Their Heritage*. New York: Museum of Modern Art.
- Russolo, Luigi. 1986. *The Art of Noises*. New York: Pendragon Press.
- Sabatini, Arthur J. 2002. The Sonic Landscapes of Robert Ashley. In *Land/Scape/Theater*, edited by Elinor Fuchs, and Una Chauhuri. Ann Arbor, MI: University of Michigan Press.
- Sandford, Mariellen R., ed. 1995. *Happenings and Other Acts*. London: Routledge.
- Sawyer, R. Keith. 2000. Improvisation and the Creative Process: Dewey, Collingwood, and the Aesthetics of Spontaneity. *Journal of Aesthetics and Art Criticism* 58(2):149-161.
- Sayre, Kenneth M. 1976. *Cybernetics and the Philosophy of Mind*. Atlantic Highlands, NJ: Humanities Press.
- Schafer, R. Murray. 1994. *The Soundscape: Our Sonic Environment and the Tuning of the World*. Rochester, VT: Destiny Books.
- Schloss, Joseph G. 2004. *Making Beats: The Art of Sample-Based Hip Hop*. Middletown: Wesleyan University Press.

- Schmidt, Leigh Eric. 2003. Hearing Loss. In *The Auditory Culture Reader*, edited by Michael Bull and Les Back, 41-59. New York: Berg.
- Schwartz, Elliott, and Barney Childs, eds. 1998. *Contemporary Composers on Contemporary Music*. New York: Da Capo Press.
- Segal, Howard P. 1985. *Technological Utopianism in American culture*. Chicago: University of Chicago Press.
- Shank, Barry. 1994. *Dissonant Identities: The Rock'n'Roll Scene in Austin, Texas*. Hanover, NH: Wesleyan University Press.
- Shannon, Claude Elwood and Warren Weaver. 1949. *The Mathematical Theory of Communication*. Urbana: University of Illinois Press.
- Sheff, Robert, and Mark Slobin. 1965. Music Beyond the Boundaries. *Generation ?* :27-65.
- Shelemay, Kay Kaufman. 1980. Historical Ethnomusicology: Reconstructing Falasha Liturgical History. *Ethnomusicology* 24(2):233-258.
- Shepherd, John and Peter Wicke, eds. 1997. *Music and Cultural Theory*. Cambridge: Polity Press.
- Shiner, Larry. 2001. *The Invention of Art*. Chicago: University of Chicago Press.
- Skrebowski, Luke. 2008. All Systems Go: Recovering Hans Haacke's Systems Art. *Grey Room* (30):54-83.
- Slobin, Mark. 1993. *Subcultural Sounds: Micromusics of the West*. Hanover, NH: Wesleyan University Press.
- Smalley, Denis. 1994. Defining Timbre - Refining Timbre. *Contemporary Music Review* 10(2):35-48.
- Smith, Hazel and Roger Dean. 1997. *Improvisation, Hypermedia and the Arts Since 1945*. Amsterdam: Harwood Academic Publishers.
- Smith, Leo. 1973. *Notes (8 Pieces) Source -- A New World Music: Creative Music*. New Haven, CT: Self-Published.
- Smith, Mark M. 2004. *Hearing History: A Reader*. Athens, GA: University of Georgia Press.
- Smith, Owen F. 1998. *Fluxus: The History of an Attitude*. San Diego: San Diego State University Press.

- Smithson, Robert. 1979a. Some Void Thoughts on Museums. In *The Writings of Robert Smithson*, edited by Nancy Holt, 58. New York: New York University Press.
- Smithson, Robert. 1979b. What is a Museum? In *The Writings of Robert Smithson*, edited by Nancy Holt, 59-66. New York: New York University Press.
- Solimano, Sandra, ed. 2002. *The Fluxus Constellation*. Genova: Neos Edizioni.
- Sontag, Susan. 2001. *Against Interpretation, and other Essays*. New York: Picador U.S.A.
- Stahl, Geoff. 2001. Tracing Out an Anglo-Bohemia: Musicmaking and Myth in Montreal. *Public* 22/23:98-121.
- Stent, Gunther S. 1969. *The Coming of the Golden Age: A View of the End of Progress*. Garden City, NY: Published for the American Museum of Natural History [by] the Natural History Press.
- Stock, Jonathan P.J. 2001. Toward an Ethnomusicology of the Individual, or Biographical Writing in Ethnomusicology. *World of Music* 43(1):5-19.
- Strickland, Edward. 1993. *Minimalism: Origins*. Bloomington: Indiana University Press.
- Strongin, Theodore. 1963. The Music of Morton Feldman and Earle Brown is Presented. *New York Times*, October 12, 1963:21.
- Sturken, Marita, Douglas Thomas, and Sandra Ball-Rokeach. 2004. *Technological Visions: The Hopes and Fears that Shape New Technologies*. Philadelphia: Temple University Press.
- Suvin, Darko. 1970. Reflections on Happenings. *The Drama Review* 14(3):125-144.
- Szabolcsi, Miklos. 1971. Avant-Garde, Neo-Avant-Garde, Modernism: Questions and Suggestions. *New Literary History* 3(1):49-70.
- Søndergaard, Morten, Perttu Rastas, and Bjorn Norberg. 2005. *Get Real: Real Time + Art + Theory + Practice + History*. New York: G. Braziller, Inc.
- Tawa, Nicholas E. 1984. *Serenading the Reluctant Eagle: American Musical Life 1925-1945*. New York: Schirmer Books.
- _____. 1987. *Art Music in the American Society*. London: Scarecrow Press, Inc.
- Taylor, Brandon. 1995. *Avant-Garde and After: Rethinking Art Now*. New York: Harry N. Abrams.

- Taylor, Timothy D. 2001. *Strange Sounds: Music, Technology and Culture*. New York: Routledge.
- Teitelbaum, Richard. 1976. In Tune: Some Early Experiments in Biofeedback Music. In *Biofeedback and the Arts*, edited by David Rosenboom, 35-51. Vancouver: A.R.C. Publications.
- Tenzer, Michael. 2003. José Maceda and the Paradoxes of Modern Composition in Southeast Asia. *Ethnomusicology* 47(1):93-120.
- Thompson, Emily Ann. 2002. *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900-1933*. Cambridge, MA: MIT Press.
- Thompson, Randall. 1932. The Contemporary Scene in American Music. *The Musical Quarterly* 18(1):9-17.
- Thomson, Virgil. 1970. *American Music Since 1910*. New York: Holt, Rinehart and Winston.
- Théberge, Paul. 1997. *Any Sound You Can Imagine: Making Music/Consuming Technology*. Hanover, NH: Wesleyan University Press.
- Timms, Edward and Peter Collier, eds. 1988. *Visions and Blueprints: Avant-Garde Culture and Radical Politics in Early Twentieth-Century Europe*. Manchester: Manchester University Press.
- Tischler, Barbara L. 1986. *An American Music: The Search for an American Musical Identity*. New York: Oxford University Press.
- Tomoff, Kiril. 2006. *Creative Union: The Professional Organization of Soviet Composers, 1939-1953*. Ithaca, NY: Cornell University Press.
- Turner, Steve Sweeney and John Cage. 1990. John Cage's Practical Utopias: John Cage in Conversation with Steve Sweeney Turner. *The Musical Times* 131(1771):469-472.
- Tytell, John. 1995. *The Living Theatre*. New York: Grove Press.
- Ulan, Lloyd. 1999. Electronic Music: An American Voice. In *Perspectives on American Music Since 1950*, edited by James R. Heintze, 3-39. New York: Garland Publishing Inc.
- Unattributed. 1968. Experiments in Art and Technology. *Bulletin of the American Group, International Institute for Conservation of Historic and Artistic Works* 8(2):12.

- Varble, Stephen. 2003. Interview with Charlotte Moorman on the Avant-Garde Festivals. In *Critical Mass: Happenings, Fluxus, Performance, Intermedia and Rutgers University 1958-1972*, edited by Geoffrey Hendricks, 173-180. New Brunswick, NJ: Rutgers University Press.
- Vargish, Thomas and Delo E. Mook. 1999. *Inside Modernism: Relativity Theory, Cubism, Narrative*. New Haven, CT: Yale University Press.
- Veal, Michael. 2000. *Fela: The Life and Times of an African Musical Icon*. Philadelphia: Temple University Press.
- Veal, Michael E. 2007. *Soundscapes and Shattered Songs in Jamaican Reggae*. Middletown, CT: Wesleyan University Press.
- Von Eschen, Penny M. 2004. *Satchmo Blows Up the World: Jazz Ambassadors Play the Cold War*. Cambridge, MA: Harvard University Press.
- Von Glahn, Denise. 2003. *The Sounds of Place: Music and the American Cultural Landscape*. Boston: Northeastern University Press.
- Waksman, Steve. 1999. *Instruments of Desire: The Electric Guitar and the Shaping of Musical Experience*. Cambridge, MA: Harvard University Press.
- Waksman, Steve. 2004. California Noise: Tinkering with Hardcore and Heavy Metal in Southern California. *Social Studies of Science* 34(5):675-702.
- Whitesell, Lloyd. 2001. White Noise: Race and Erasure in the Cultural Avant-Garde. *American Music* 19(2):168-189.
- Whitman, Simone, and Billy Klüver. 1967. Theater and Engineering: An Experiment. Notes by a Participant. *Art Forum* 5(6):26-33.
- Wiener, Norbert. 1950. *The Human Use of Human Beings: Cybernetics and Society*. Boston: Houghton Mifflin.
- Wiener, Norbert. 1961. *Cybernetics; or, Control and Communication in the Animal and the Machine*. Cambridge, MA: MIT Press.
- Williams, Emmett and Ann Noël, eds. 1997. *Mr. Fluxus*. London: Thames and Hudson.
- Williams, Raymond. 1989. *The Politics of Modernism*. London: Verso.
- Williams, Rosalind. 2002. Lewis Mumford's Technics and Civilization. *Technology and Culture* 43(1):139-149.

- Woodward, Kathleen M. 1980. Art and Technics: John Cage, Electronics, and World Improvement. In *The Myths of Information: Technology and Postindustrial Culture*, edited by Kathleen M. Woodward, Madison, WI: Coda Press.
- Yates, Peter. 1990. The American Experimental Tradition. *Soundings* 16:135-143.
- Yeo, Stephen, ed. 1988. *New Views of Co-operation*. New York: Routledge.
- Young, Gayle. 1989. *Sackbut Blues: Hugh Le Caine, Pioneer in Electronic Music*. Ottawa: National Museum of Science and Technology
- Young, Lamonte. 1965. Lecture 1960. *The Tulane Drama Review* 10(2):73-83.
- Zabel, Barbara Beth. 2003. *Assembling Art: The Machine and the American Avant-Garde*. Jackson: University Press of Mississippi.
- Zachary, G. Pascal. 1997. *Endless Frontier: Vannevar Bush, Engineer of the American Century*. New York: Free Press.
- Zbikowski, Lawrence. 2002. *Conceptualizing Music: Cognitive Structure, Theory and Analysis*. Oxford: Oxford University Press.
- Zuck, Barbara A. 1980. *A History of Musical Americanism*. Ann Arbor, MI: UMI Research Press.