TRANSIENCE: AN ALBUM-LENGTH RECORDING FOR SOLO PERCUSSION AND ELECTRONICS

by

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A thesis submitted in partial fulfillment
of the requirements for the
Doctor of Musical Arts degree
in the Graduate College of
The University of Iowa

May 2017

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CERTIFICATE OF APPROVAL

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D.M.A. Thesis

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For those in the middle of the musical Venn diagram

ACKNOWLEDGEMENTS

I extend my deepest gratitude to Dan Moore, without whom this project would not exist. Over the past decade, he has been a tremendous teacher, mentor, and friend. I am so very thankful that I chose Iowa all those years ago.

I am thankful every day for my family, who have encouraged my musical spirit since I was young and who have faithfully attended performances both large and small.

Many thanks to Taylor Ambrosio Wood for being so willing to share her compositional and musical talents in service of this project. I hope that we are able to share many more musical experiences together!

Thank you to Boomer for being an excellent study buddy, a much needed distraction, and a source of unconditional love.

Finally, thank you to Sean, who encouraged me to accept the offer to return to school at Iowa and who has selflessly devoted many hours to helping me complete this project.

PUBLIC ABSTRACT

The use of technology to enhance music-making is common in both classical and commercial music styles. It is uncommon, however, for classical musicians to use technology intended for commercial music-making in live performance.

This thesis explores the potential for using commercial music technology in a classical music performance setting through the composition and performance of ten new pieces for solo percussionist and electronics. While the resulting music sounds comfortable and the musical language is familiar, the act of performing the music with the aid of technology creates an exciting and compelling visual and aural show for audiences.

The ten works require the use of traditional percussion instruments including the marimba, vibraphone, glockenspiel, and drums, as well as electronic sounds and electronic music hardware championed by DJs and EDM musicians. These pieces of hardware are controlled using the electronic music software Ableton Live 9.

The music was composed through a collaboration between percussionist and composer Taylor Ambrosio Wood and Christine Augspurger. All electronic sounds found in this thesis were designed specifically for the pieces. Following the composition and design of all music and sounds, the ten pieces were professionally recorded, resulting in a full-length album – *Transience* by Christine Augspurger.

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CHAPTER 1 INTRODUCTION

My goal for this thesis was to create and perform solo percussion music aided by electronic music technology popularized by commercial electronic musicians. The power and simplicity of these pieces of technology allow a single performer to create rich and complex music without the need for other performers. Using this technology in this way is uncommon in the concert hall, and this project exposes new live performance possibilities for classical musicians.

With this goal in mind, I enlisted the help of composer and sound designer Taylor Ambrosio Wood. Our collaboration on the conception, composition, sound design, and performance of this project is the focus of this document. The collaboration provides an example of how musicians can utilize the internet to communicate and deliver musical ideas, and illustrates the blurring of the line between composer and performer – an increasingly common occurrence in music today.

The recording that accompanies this thesis is a full-length album of ten works composed and performed specifically for the recoding. This document helps to contextualize the recording project within the broader electronic music framework and details the process of collaborating on, creating, and recording the album. Chapter 2 surveys the development of electronic technologies in art music as well as electronic technologies in commercial music as they relate to the project. To demonstrate the need for these new compositions, Chapter 3 features a discussion of the existing repertoire for percussion and electronics and Chapter 4 provides a review of current recordings related to this project. A detailed description including the conception of the pieces, the

collaborative process, and an overview of the recording procedures is provided in Chapter 5. Chapter 6 discusses the distribution of the completed album, the future of the live performance, and other potential opportunities for presenting and promoting this thesis and album.

CHAPTER 2 REVIEW OF ELECTRONICS AS INSTRUMENTS

Early Electronic Art Music

Though the timelines of electronic art music and commercial electronic music are often considered separate musical streams, this chapter seeks to show that each heavily influenced the other in terms of musical philosophy and implementation of technological advances. This is demonstrated by tracing important musical and technological milestones in electronic art music and commercial electronic music and showing the interaction between them.

Any discussion of the historical development of electronic music must begin with the work of the Radiodiffusion Television Francaise (RTF) studio in Paris, and the Norwestdeutsher Rundfunk (NWDR) studio in Cologne.[1] These studios and their respective musical philosophies are the core of all electronic music that follows: the French *musique concrete* focused on the manipulation of recorded acoustic sounds whereas the German *elektronische musik* focused on the synthesis of entirely electronic sounds. From their initial formation in the mid 1940s until 1955, each studio adhered solely to their respective philosophical approach to sound sources and manipulation. In 1955-56, Stockhausen's seminal work *Gesang der Junglinge* mixed synthesized tones with highly processed sound recordings of a young boy's voice. This work is the first

[1] Detailed accounts of these studios and their work are available in academic scholarship including Andrew Hugill, "The Origins of Electronic Music" in *The Cambridge Companion to Electronic Music* ed. Nick Collins and Julio d' Escrivan (Cambridge: Cambridge University Press, 2007) 5-23., Thom Holmes, "Early Electronic Music in Europe," in *Electronic and Experimental Music: Technology, Music, and Culture* (US: Routledge, 2008) 41-78. and Peter Manning, "Developments from 1945-1960," in *Electronic and Computer Music* (Cary, US: Oxford University Press, 2004) 17-98.

instance of combining *musique concrete* and *elektronische musik* into a single composition.[2]

With the groundwork laid by the entirely electronic sounds coming from the RTF and NWDR, compositions combining electronic sounds with acoustic instruments became more prevalent starting in the 1950s. Numerous variations arose as composers explored the possibilities: alternation between pre-recorded electronic and acoustic sounds, as in Edgard Varese's *Deserts* (1949-1954); pre-recorded electronic sounds and acoustic sounds occurring at the same time, but not coordinating precisely, as in Bruno Maderna's *Musica su due dimensoni* (1952); and the playback of pre-recorded material where the acoustic instruments must coordinate with it, as in Stockhausen's *Kontakte* (1960).[3]

Mauricio Kagel's *Transicion II* (1959) is often referenced as the first use of a tape recorder as a live performance aid.[4] This sparked an interest in the possibilities of live electronics in performance, which Stockhausen pursued intensively beginning in 1964.[5] More complex works followed with some requiring multiple assistants to operate all

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[2] Holmes, *Electronic and Experimental Music,* 66-67.

[3] These delineations and examples of the types of acoustic and electronic sound combinations are provided by Barry Schrader in his article "Live/electro-acoustic Music — a Perspective from History and California." *Contemporary Music Review* 6, no. 1 (1991): 91-106.

[4] Manning, *Electronic and Computer Music*, 158.

[5] Manning points to *Mikrophonie I* (1964), *Mixtur* (1964), and *Mikrophonie II* (1965) as the resulting works of this period.

electronic functions in performance. This practice became known as "assisted" or "composer assisted" electronic music.

The Synthesizer and Commercial Music

The invention of the transistor at Bell Labs in 1947 resulted in the proliferation of the synthesizer. Prior to the transistor synthesizer, composers relied on sine wave generators or synthesizers powered by large and delicate vacuum tubes, such as the iconic RCA Mark II.[6] The transistor, once miniaturized, allowed for smaller, simpler, more durable synthesizers which were subsequently much cheaper and created more accurate musical results. Inventor Robert Moog produced the first voltage-controlled transistor synthesizer, the Moog Modulator, in 1964.[7] The Moog synthesizer found a home not in the electronic art music studios of composers, but in the recording studios of commercial musicians including The Beatles, Pink Floyd, and Emerson Lake and Palmer.

Other electronic art music techniques began to garner the attention of commercial musicians. The Beatles, along with producer George Martin, pioneered the use of the recording studio for producing musical effects, instead of simply capturing live sound,

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[6] Holmes discusses the RCA Mark II, its technological innovations, and installation at the Columbia-Princeton Electronic Music Center in Thom Holmes "Analog Synthesis and Instruments," in *Electronic and Experimental Music: Technology, Music, and Culture* (US: Routledge, 2008) 143-155.

[7] Voltage-control was a subsidiary advancement made possible by the transistor. Voltage-controlled devices allowed for electronic parameters to be driven by devices other than knobs and dials, thus a piano keyboard could be used. The development of voltage-control technology and transistors are tracked in Jeff Pressing, "The Synthesizer as an Instrument," in *Synthesizer Performance and Real-Time Techniques* (Madison: A-R Editions, 1992) 1-26.

during the recording of *Revolver* (1966).[8] Later that year, *Sgt. Pepper's Lonely Hearts Club Band* (1967) featured the prominent use of signal processing techniques, reversed tape playback, and pre-recorded tape loops on tracks including "A Day in the Life."[9] The rock group Pink Floyd relied heavily on synthesizers, and also established ties to French *musique concrete* by including recordings of everyday sounds like footsteps, frying eggs and bacon, or jingling cash registers on their iconic album *Dark Side of the Moon* (1973).[10]

Looping, MIDI, and EDM

Tape loops, though first used in the Paris and Cologne studios, played an important role in the art music development of minimalism in the mid-1960s. Composer Steve Reich relied on tape loops to create phasing effects in works like *It's Gonna Rain* (1965) and *Come Out* (1966). Both works use recordings of human voices speaking in a non-musical context.[11] This use of recorded, non-musical sounds ties back to *musique concrete*, but many consider Reich a pioneer in the commercial DJ practice of sampling.[12]

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[8] Holmes, *Electronic and Experimental Music*, 408-410.

[9] Holmes, *Electronic and Experimental Music*, 408-410.

[10] Manning, *Electronic and Computer Music*, 173-174.

[11] *It's Gonna Rain* features sound clips of Pentecostal preacher Brother Walter warning of the great flood and the story of Noah. *Come Out* uses a sample of an interview given by one of the Harlem Six.

[12] Reich observes, "The big difference is that the DJs are sampling other people's music and rearranging it with stuff that they generate themselves. I'm sampling specifically non-musical sounds," but

Sampling and looping are the foundation of hip-hop DJing, a musical genre and subsequent culture which developed in The Bronx in the 1970s. A DJ's main job was to play records to get the crowd dancing, and to sustain the break (a small phrase of rhythmic material on a record) by manually looping it.[13] In the mid 1970s, DJ Grandmaster Flash devised a way to sustain the break using two turntables, two records, and a mixer.[14] Soon, synthesizers were added to a DJ's equipment to assist in adding bass lines, melody, and accompaniment to the looped break. This creation of live loops in real time without assistance from a recording device and the use of synthesized sounds recontextualizes the foundational musical characteristics of the RTF and NDWR. These practices are also the core of all other electronic dance music (EDM) that followed. This is an important example of cross pollination – hip hop DJs replicating electronic studio effects live during performance.

Throughout the 1970s, the synthesizer's popularity continued to grow, and it became a fixture in the instrumentation of commercial rock music. This popularity inspired numerous manufacturers to create more powerful synthesizers with more sound capabilities.[15] While many commercial musicians utilized the synthesizer, there was no

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the fact remains, many DJs and commercial musician cite Reich as a main influence in their own music. In Heidi Sherman, "The Father of Sampling Speaks" *Rolling Stone*, March 27, 1999.

[13] The origins and development of this culture and practice can be found in Chapters 1 and 2 of Mark Katz, *Groove Music* (New York: Oxford University Press, 2012) 14-69.

[14] Katz, *Groove Music*, 56-57.

[15] For examples, see Pressing, *Synthesizer Performance*, 9-12, and Manning *Electronic and Computer Music*, 264-268.

standardization among synthesizers, creating significant compatibility problems between devices and other audio equipment. The creation of MIDI (Musical Instrument Digital Interface) in 1981-82 provided synthesizer manufacturers with an industry standard for quantifying musical information as transmittable data. MIDI, though initially associated with synthesizers, allowed for developments in electronic music hardware and software used by commercial musicians and electronic art music composers alike.[16]

Out of the hip-hop and disco traditions grew two foundational EDM styles: house and techno. Both of these commercial electronic music genres combined the DJ and turntable techniques of hip-hop with the driving pulse of disco music to create a unique dance culture.[17] These two styles also utilized new technology made possible through MIDI: MIDI controllers, drum machines, and sequencers.[18] These technologies supplanted turntables as the main source of rhythmic loops and allowed for further interaction and customization of the sounds in live performance. This electronic equipment can be considered the DJ's instrument. Performing using this technology

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[16] Manning, *Electronic and Computer Music*, 267.

[17] The documentaries *Pump up the Volume: The History of House*, directed by Carl Hindmarch (2001: UK, Flame Television Production Ltd.), and *High Tech Soul: The Creation of Techno Music*, directed by Gary Bredow (2006: US, Gary Bredow) provide detailed descriptions of the development of these two electronic music genres.

[18] MIDI controllers may be programmed to execute any number of functions by communicating MIDI data between the controller and other software. These functions could include turning on or off a note, information regarding frequency and amplitude used to create synthesized sounds, or toggling on or off an audio effect. Drum machines create synthesized drum sounds and sometimes bass lines. Sequencers allow for the recording, editing, and playback of MIDI.

requires careful preparation and practice, as performing on any acoustic instrument would, and serves as the main source of sound production in live shows.

All of this hardware necessitated communication between the hardware and the user. A simultaneous timeline for musical programming languages exists with the previously discussed hardware and methods. Paralleling the development of other programming languages, these musical programming languages began to emerge in the 1940s at the same time as the hardware and the larger development of computer science.

A highly influential language was the MUSICn series developed by Max Mathews beginning in the late 1950s.[19] These languages constructed programs that enabled the creation of entirely digital sound, a contrast to all other electronic sound which was created in the analog realm. Mathews' work built upon music data structures used by Lejaren Hiller and Iannis Xenakis.[20] During the 1970s, influential composers Gottfried Michael Koenig, Barry Truax, and Jean Piche continued composing in entirely electronic music modeling after the Paris and Cologne studios, but using software and algorithms to generate compositions.[21] This practice became known as computer music. Although the computer technology advancements of the 1970s and 1980s inspired new interest in computer music composition, the practice was mostly eclipsed by the

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[19] Manning, *Electronic and Computer Music,* 187-189.

[20] Holmes, *Electronic and Experimental Music*, 254-255.

[21] Manning, *Electronic and Computer Music,* 203-205.

popularity of mixing acoustic instruments with electronic sounds in the tradition of Stockhausen, Maderna, Kagel, and others.

MIDI and MUSICn, combined with the advent of the personal computer in the 1990s, enabled the development of many other powerful digital audio software tools. MUSICn laid the groundwork for Max/MSP, an object-oriented musical programming language developed by Miller Puckette in 1988 and refined over the following decade.[22] Max/MSP is commonly used in electronic art music composition today. An example of the utility of MIDI is found in DAWs (Digital Audio Workstations), which initially focused on creating a digital recording environment. DAWs quickly became popular additions to home computers with programs such as Logic, Cubase, Pro Tools, and Ableton. Electronic art music composers and especially commercial electronic musicians rely on these powerful pieces of software to create and enhance their musical visions.

The past thirty years have seen a great diversification of commercial electronic music. Hip hop culture gave birth to rap and contemporary R&B in the United States. House and techno were embraced by European dance club culture, and split into a variety of subgenres, which are referred to collectively as EDM today.[23] While these two commercial electronic music streams have significantly different musical characteristics and cultural followings, they are still grounded in the musical concepts of the Paris and Cologne studios. In addition, they are both based on the use of drum machines, synthesizers, sequencers, and computer software to produce the musical material. An

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[22] "FAQ: Max: History and Background" *Cycling 74*, https://cycling74.com/support/faq_max4.

[23] Subgenres include Trance, Ambient, Acid House, Drum'n'Bass, Garage, Synth Pop, Dubstep, and many others. A helpful infographic can be found in Bronte Martin, "The proliferation of EDM," *The McGill Tribune*, November 5, 2013, http://www.mcgilltribune.com/features/the-proliferation-of-edm/.

important contribution, as pioneered by Grandmaster Flash, is treating these electronic tools as instruments and musical equals in commercial music.

Today, the two categories initially conceived for the performance of electronic art music remain the most used in art music. These are performance of pieces for entirely electronic sound and pieces which integrate acoustic and electronic sounds together. There is a further subdivision within the latter of prerecorded tape music or live electronic processing. However, it is uncommon in classical art music for a performer to treat electronic equipment as an equally important performance instrument. This recording project relies heavily on the aid of commercial electronic music equipment to execute the performance of the newly composed music for solo percussionist.

CHAPTER 3 REPERTOIRE FOR PERCUSSION AND ELECTRONICS

Important Historical Works

The repertoire for percussion and electronics developed alongside the use of electronics found in art music. Many of the seminal works for electronics in art music included percussion as an acoustic instrument. Contextualizing these pieces along with other landmark works in the percussion and electronics repertoire provide the historical basis for this recording project.

John Cage was the first composer to experiment with combining acoustic percussion with electronic playback. *Imaginary Landscape No. 1* (1939) and *Credo in US* (1942) each called for a pre-recorded electronic track, controlled by one performer, to accompany other percussionists playing acoustic instruments. *Imaginary Landscape No. 1* requires records playing a constant frequency. In *Credo in US,* Cage suggests that the phonograph should play something "classic," like Dvorak, Beethoven, Sibelius, or Shostakovich. While these pieces predate the electronic music of the Paris and Cologne studios, the pre-recorded electronic material was not generated by Cage himself, setting them slightly apart from other early electronic music.

The advent of electronic art music composition led to the use of pre-recorded electronic music (from here forward referred to as "with tape") created by the composer with electronic or acoustic instruments. Previously mentioned important works including Varese's *Deserts* (1949-1954), Maderna's *Musica su due dimensoni* (1952), and Stockhausen's *Kontakte* (1960) each called for percussionists within a chamber ensemble. Similarly, the earliest works for acoustic instruments with live electronics,

including Kagel's *Transicion II* (1959) and Stockhausen's *Mikrophonie I* (1964) require percussionists.

In addition to electronic chamber music, compositions for solo percussionist and electronics began to emerge. The earliest documented solos for percussion and tape include William Cahn's *Etude for Taperecorder and Percussion* in 1969 and Hans Werner Henze's *Prison Song* in 1971.[24] Early works for percussionist and live electronics include Alvin Lucier's *Music for Solo Performer* (1965) and Marta Ptsazynska's *Space Model* (1972).[25] Cage's *27'10.554" for a Percussionist* (1956) occupies compositional space somewhere between these two practices, as Cage instructs that performers may be aided by pre-recorded material, though what musical material is recorded and how it may be processed electronically is left to the performer. Compositions for solo percussionist and tape and for percussionist and live electronics continued developing alongside the development of electronic art music.

A major innovation for composers and percussionists was the emergence of Max/MSP in the 1980s and 1990s. Kaija Saariaho's *Six Japanese Gardens* (1994) is considered the earliest significant work for percussionist and Max/MSP. The percussionist uses a footpedal to trigger pre-recorded electronic sound events within Max/MSP. This piece, and many other percussion and Max pieces like it, combine the underlying idea of percussion and tape with live electronic interactions. The pre-recorded material pre-exists and is not created by the performer, but the advancement of the work

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[24] Alexander Wier, "Performer and Electronic-Activated Acoustics: Three New Works for Solo Percussion and Live Electronics," (DMA diss., Arizona State University, 2015), 12.

[25] Ibid, 13.

as a whole depends on the interaction of the performer with the electronics to trigger sonic events.

Building on this idea of performer interaction with electronic processes are contemporary composers like Cort Lippe. Lippe's compositions require the performer to interact with Max/MSP using a footpedal or other controller.[26] The computer is also able to interact with the performer by responding to the musical material played by the performer, changing the digital synthesis and compositional algorithms used to affect the electronic sound outcomes.

The Prominence of Fixed Media

While many works for percussion and live electronics exist, they are still somewhat uncommon on concert and recital programs within and outside of academia. Works for percussion and tape are the dominant performance practice in percussion and electronics today for two main reasons: simplicity and compatibility. Purchasing a piece for instrument and tape requires the performer to practice their independent part, and then align it with the accompaniment. The tape part is usually provided by the composer as a CD or digital sound file. The performer need not be concerned with owning the correct software or any complicated audio hardware, only a speaker system to amplify playback of the tape part. This greatly simplifies the daunting task of using electronics on the performance stage.

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[26] Notable works include Music for Hi-Hat and Computer (1998), Music for Marimba and Computer (2004), and Music for Snare Drum and Computer (2007). Cort Lippe, "Compositions," *UB Faculty Profiles*, accessed January 16, 2017, http://www.music.buffalo.edu/faculty/lippe/compositions.

Three main pieces of scholarship chronicling the repertoire for percussion and electronics exist: Yi-Chia Chen's 2011 dissertation *A Catalog of Solo Works for Marimba with Electronics and An Examination and Performance Guide of "Flux" for Marimba and Electronic Tape by Mei-Fang Lin,* Michael Ptacin's 2012 dissertation *An Annotated Bibliography of Works for Solo Marimba and Electronics Published from 1978-2012*, and Brad Meyer's *Electroacoustic Percussion Repertoire List* available on his personal website. These dissertations focus entirely on works for marimba and electronics, while Meyer's list includes works for a variety of instrumentation categories which include percussion instruments as well as keyboard instruments. Of the ninety listed works in Chen's dissertation, thirty-four are for live electronics, effects, or the malletKAT MIDI controller. The remaining fifty-six are for marimba and tape. Ptacin's dissertation lists thirty-four solo works for marimba and electronics, with only four listed as utilizing non-fixed media. Meyer's research cites 107 works for percussion and electronics, with twenty-two listed as using live electronics. While these three lists are not exhaustive of the percussion and electronics repertoire, they indicate a clear bias toward the use of pre-recorded tape as opposed to live electronics among composers and performers alike.

Electronic Percussion and the Composer-Performer

Works for percussion and live electronics may be classified into two categories: those in which the electronics and acoustic parts are conceived by a composer and performed by a performer, or those in which the performer is also the composer. In the case of pieces created entirely by a composer and performed by a performer, the

composer must create all electronic parts and programs required to execute the piece. The composer must also provide the performer with a practical plan for setting up all necessary equipment including microphones, speakers, and other hardware. Because the composer has done all of the programming for the electronic parts, it is challenging for the performer to feel a sense of ownership over that portion of the piece in the same way a performer must take ownership of any acoustic music they perform. The performer who is also the composer may not experience this, as they must conceive of all electronic parts in the role of composer, and then execute them in the role of performer. Many leading percussionists who use live electronics today compose and perform their own music.

A trained musician must devote a significant amount of time to practicing their acoustic instrument. Musicians view their instrument as an extension of themselves and as an integral part of any performance. A musician performing on an acoustic instrument with live electronics does not typically experience this same oneness with the electronics. These types of pieces usually require minimal interaction with the hardware or software creating the electronic sounds. The end result is a performer who often feels disconnected from the electronics: they are required to execute the piece correctly, but the electronics are not instrumental equals. Great care in preparation and practice is required to perform with the unyielding fixed media.

This project aimed to dissolve the dichotomy between composer and performer, while simultaneously regarding the acoustic instruments and electronic tools as instrumental equals. Both musical parts required careful practice and preparation, as well as accuracy and artistry in recording and performance to bring the newly composed music to life. The process of collaborating with Taylor Ambrosio Wood further blurred

the line between composer and performer, as many portions of her compositions were further edited and changed by me in recording and performance.

CHAPTER 4 REVIEW OF SIGNIFICANT EXISTING RECORDINGS

A review of significant existing recordings will assist in demonstrating the need for this project. In searching for recordings, I chose to limit my choices to artists who have primarily art music training. I also chose to limit the recordings, with one exception, to those within the last five years to ensure the technology used to perform the pieces is comparable to what is available today. Finally, I chose to include artists whose use of electronics makes up a significant portion of their body of work and musical reputation. My recording is a comprehensive musical program, and the albums I have chosen reflect that. Researching art musicians using electronics in performance revealed three main trends:

1. Performers using live electronics to create ambient music and/or soundscapes.
2. Performers who utilize loopers to create layered musical compositions, sometimes incorporating audio processing effects.
3. Classically trained musicians whose interest in electronics leads them to "crossover" into commercial music making.

Ambient Improvisers

There are a number of percussion composers and performers who use live electronics to create ambient music. These compositions are often perceived by listeners to be soundscapes – rich sonic tapestries created live and in real time using a variety of instruments. This practice draws on the early electronic music genres of French *musique concrete* and the manipulation of recorded sounds, as well as the ambient music genre

pioneered by Brian Eno in the 1970s. The unifying qualities of this music include: an emphasis on capturing and manipulating a variety of intriguing and often non-traditional sounds, the act of recording these sounds and activating the playback live and in real time, and the general lack of musical organization at a temporal level. A driving pulse is rare or fleeting in this type of electronic percussion music, as the music seeks to draw listener's focus to the timbral characteristics of the sounds themselves.

The compositional process for these types of musicians generally centers around improvisation and indeterminacy. Many of their compositions have general progressive outlines for musical material, but do not strictly adhere to a score. The technological equipment for these types of performances generally includes microphones and a speaker system, and the computer software used is most often Max/MSP or a similar audio programming language. Iowa Percussion alumnus Andy Thierauf's music often falls into this category. While he has not recorded an album of his music at this time, he is active as a live performer throughout the country. His YouTube and Soundcloud accounts feature high-quality recordings of several of his works. Selected works including *Growing Fast in Sawdust* (2012) and *The Universe Expanded* (2015) use traditional percussion instruments like the vibraphone in conjunction with found sounds such as metal pots or glass bottles to create acoustic sounds.[27] These sounds are then processed using

[27] Andy Thierauf, "Growing Fast in Sawdust at PASIC Tech Day 2013," YouTube video, 9:51, posted January 2014, https://www.youtube.com/watch?v=5JRNpjBZaYQ&list=UUtE8PNmH71r_mSdEOyqgIzg. Andy Thierauf, "The Universe Expanded," YouTube video, 8:40, posted June 2016, https://www.youtube.com/watch?v=vUTX3g_vKrg.

Max/MSP to loop or delay them, and are further altered through other signal processing techniques live during each performance.

Australian percussionist Nat Grant takes a similar musical approach, using acoustic percussion instruments and found sounds in an improvisatory way to create "sound as a sculptural medium."[28] Like Thierauf, she favors the vibraphone as a traditional melodic and harmonic instrument, and objects including bottles, keys, beads, and other household items as unique found sounds. Nat has recorded three albums which are available on Bandcamp: *Momentum* (2012), *Precious* (2016), and *Live Recordings 2016* (2016).[29] *Momentum* is available as a studio recording, or as a live recording from two separate performances in 2013. It makes use of a variety of sounds including bells, toy piano, vintage radio samples, bird calls, and gongs. *Precious* is a work whose musical material is entirely generated from hundreds of old keys. Grant collected over 300 keys over a three-year period before performing and recording the ten-minute piece. *Live Recordings* consists of three new improvisatory pieces performed live in 2016. It is unclear whether Grant uses Max/MSP, Ableton Live, or other software to augment her live sound, though a program from the Australian Computer Music Conference 2014

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[28] On her personal website she writes, "[My] work explores intersections between improvisation, chance and intention in the development of sound as a sculptural medium." I first became aware of Nat's music after she visited the University of Iowa and gave a percussion masterclass in fall of 2010. Nat Grant, "About," *Nat Grant Music*, accessed January 16, 2017, http://www.natgrantmusic.com/about.html.

[29] Nat Grant, "Nat Grant Music," Bandcamp profile, accessed January 16, 2017, https://natgrantmusic.bandcamp.com/.

credits her as an Ableton Live user.[30] Thierauf and Grant provide excellent examples of percussionists using live electronics to explore sound creation and manipulation in an improvisatory way. Also notable is their heavy reliance on audio processing effects which greatly alter the timbre and clarity of sampled sounds. My recording incorporates improvisation and the processing of live sounds, but most of the pieces are less avant-garde and more rhythmically and formally structured in nature.

Live Looping

Looping plays a key role in the production of my recording. Many current performers utilize looping as a major part of their live electronics setups. Payton MacDonald, developer of the "Super Marimba," has established himself as a well-known looping artist within the percussion community.[31] The "Super Marimba" is a marimba which uses amplification and a variety of guitar pedals to activate live electronic effects, but requires no computer software.[32] MacDonald's third Super Marimba album, *Super*

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[30] Harmony: Proceedings Of The Australasian Computer Music Conference 2014." 2014. In *Australasian Computer Music Conference 2014*, 56. Melbourne. http://acma.asn.au/media/2015/03/ACMC-2014r2.pdf.

[31] Payton writes, "Super Marimba is the nexus point of all of my artistic activities. I bring it all together here: jazz, classical, Hindustani music, and whatever else might be in my head at the moment." I first became aware of the Super Marimba when MacDonald visited the University of Iowa and gave a performance in fall of 2011. Payton MacDonald, "Super Marimba," *paytonmacdonald.com*, accessed January 16, 2017, http://www.paytonmacdonald.com/SuperMarimba.htm.

[32] In an interview with William Patterson University, Payton explains that he chose to incorporate electronics into his marimba setup to allow him to create musical layers. The electronics could be easily transported and setup, and served as a practical replacement for other players and marimbas. He chose to use traditional guitar effects pedals (two loopers and two distortion pedals) as opposed to computers and software to make the setup as simple as possible. William Patterson University Instruction and Research Technology, "Payton MacDonald - Super Marimba," YouTube video, 20:19, posted October 2014, https://www.youtube.com/watch?v=yJYOf1cys_s.

Marimba III (2013) is his most recent recording. The album consists of six tracks which play continuously without pause. These tracks highlight his signature sound – a mix of minimalism, jazz, and Hindustani styles as well as improvisation. Each composition begins with a single musical phrase that is looped and built upon. Slowly, Payton brings in effects created by a distortion pedal, which often signal the climax of the piece. In addition to the distortion effect, Payton uses non-traditional mallets including marimba mallets wrapped in plastic shopping bags. While my recording uses some of the same electronic effects as Payton, it differs in the technology used to create them, and incorporates a number of acoustic instruments in addition to the marimba.

A discussion of art musicians who rely heavily on looping is not complete without Zoe Keating. Though she is a cellist, not a percussionist, Keating is well known in both art music and commercial music circles as a successful looping artist, and has toured the world performing her music. She has self-released two albums, *One Cello x 16* (2005), and *Into The Trees* (2010).[33] While *Into The Trees* is outside of my five-year time period limitation, Zoe must be considered in the discussion of loopers because of her commercial success and her technological transparency. In a 2010 interview, Keating describes her live process:

> Everything is recorded on my MacBook Pro using a Motu UltraLight audio interface, the software and a nice microphone. That's it. I don't even use a preamp. What I do is take my cello, attach microphones to it and the audio from the cello goes into the computer and is processed by Ableton Live and SuperLooper. I use them for different types of looping and layering effects. I typically record cello phrases, then play them back and determine the phrases that work best together. The wizardry is that the software automates the process. I know how the pieces are going to go, so I set up what I call an empty MIDI score prior to recording. It's a series of automated, hands-free MIDI

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[33] Zoe Keating, "Music," *zoekeating.com,* accessed January 16, 2017, http://www.zoekeating.com/projects.html.

> messages. For instance, the message might say "Record for four bars. Stop recording. Now, go to track two. Record for two bars. Stop recording. Now, mute track one. Record track three for six bars. Now, record track four. Now, fade up track two slowly.[34]

This information is especially helpful in trying to dissect the techniques and technology she uses live. Her pieces depend on playing exactly the right musical segment at the right time, as most or all of the electronic processing is automated within the computer program.

Keating's music relies solely on the sound of the cello. She does not incorporate any other instruments or synthesized sounds. Only occasionally does she choose to process the sound of the cello in any way other than the looping itself. My recording uses looping, and some of Keating's automation, but incorporates synthesized sounds and audio processing techniques in addition to the looping of acoustic sounds.

Crossover Artists

Classically trained crossover artists form the final group of artists and albums. This trend is especially common in the percussion community. The members of the bands Square Peg Round Hole and Tigue are all classically trained percussionists, and both bands apply their collective percussion and art music experience to the rock and indie commercial music genres.

Square Peg Round Hole (hereafter SPRH) consists of Indiana University graduates Evan Chapman, Sean M. Gill, and Carlos Pacheco-Perez. They use vibraphone,

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[34] Anil Prasad, "Zoe Keating: Reflecting motion," *innerviews.org*, accessed January 16, 2017, http://www.innerviews.org/inner/zoekeating.html.

synthesizers, drumset, and other percussion instruments to perform music heavily rooted in instrumental indie rock.[35] Their first album *Corners* (2013) follows the trajectory of a rock record with a variety of songs centered around four chord progressions. The vibraphone and synthesizer stand in for guitar and bass, and both players also use percussion instruments to complement the permanent rock drumset. Their sophomore album, *Juniper* (2016), is more refined in terms of musical and harmonic content and overall structure. They increase their use of sampling, and explore the use of analog synthesizers, both to great effect.[36] SPRH implements the purely electronic sound of synthesizers as well as the signal processing of acoustic instruments to create a gritty rock sound. They do not rely heavily on looping or live electronics effects, as much of their electronic sound processing is done in the studio. They have been featured on NPR's World Cafe and continue to promote themselves heavily via YouTube, Facebook, and other web outlets.

Similar to SPRH, the band Tigue is includes members Matt Evans, Amy Garapic, and Carson Moody, all trained percussionists from the Eastman School of Music and The Ohio State University. They describe their music as "one half new music ensemble, one

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[35] "[SPRH is] a cohesive creative unit; drum set, vibes, and Rhodes being the primary sound palette." I first became aware of SPRH in 2013 through social media and on the recommendation of friends. Their albums are available on Spotify, and through Bandcamp. Square Peg Round Hole, "Square Peg Round Hole Music, *bandcamp.com*, accessed January 18, 2017, https://squarepegroundholemusic.bandcamp.com/.

[36] Square Peg Round Hole, "About," *squarepegroundhole.me,* accessed January 18, 2017, http://www.squarepegroundhole.me/about/.

half art-rock band."[37] Like SPRH, Tigue has a drumset player, giving all of their music a clear tie to rock, and the other two players perform on a variety of percussion instruments, as well as vibraphone and synthesizer. Unlike SPRH, the percussion instruments play a much greater role than the vibraphone and synthesizer. Also, many of the percussion instruments used by Tigue could be considered found sounds. Flowerpots, pitched metals, scrapers, and bottles all appear in their music.

Tigue's first album, *Peaks* (2015), begins and ends with all players clicking drumsticks together in an intricate 16th-note grid with imitative accent patterns passing between the three players.[38] From there, each track bleeds into the next, developing percussive patterns, loops, harmonic chord progressions, and haunting melodies. Unlike SPRH, whose album tracks are definitively separate songs, Tigue's continuous tracks reflect their art music training. The album sounds like one complete and unbroken musical thought, with instrumental and textural changes marking each designated song. Tigue relies on synthesizers, looping, and live electronic sound processing to perform their music, and some parts of my recording use the same tools in a similar way. They are active in the Brooklyn music scene, and have a growing social media presence.

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[37] "One half new music ensemble, one half art-rock band, Tigue unites homegrown ethos and conservatory precision. Tigue approaches the role of a performing ensemble with a unique fluidity – collaborating through multi-disciplinary work, commissioning and performing works by living composers, and simultaneously generating material of their own." I first encountered Tigue through a friend's recommendation and again through social media in fall of 2015. Tigue, "About," *tiguemusic.com*, accessed January 16, 2017, http://tiguemusic.com/bio.

[38] *Peaks* is available on Spotify and through Bandcamp. Tigue, "Tigue," *bandcamp.com*, accessed January 16, 2017, https://tigue.bandcamp.com/.

Each of these artists and their respective albums utilize electronics in conjunction with acoustic instruments to create their own musical identity. My recording combines acoustic and electronic techniques from all of these artists, who in turn draw from art music and commercial music practices. I admire the seamless flow of tracks on the recordings of Tigue, Payton MacDonald, and Nat Grant, which provide the illusion of one long performance. While this was not practical for my recording, the live performance of my album features transitional moments which emulate this effect. The improvisatory and ambient soundscapes by artists like Andy Thierauf and Nat Grant have further helped to inform the ways I construct these transitions between larger pieces of pulse driven music in live performance. Like the loopers and the crossover bands, many of my tracks are heavily pulse driven and based on loops, though I rely only sparingly on individual drumset sounds to provide pulse. While these artists use many of the same acoustic and electronic instruments and effects I have, none have assembled all of them into a comprehensive solo recording and performance. My project directly descends from the work of these artists and many others, but relies on a unique combination of performance techniques and technological aids to properly execute the newly composed music in both recording and live performance settings.

CHAPTER 5 PROJECT DESCRIPTION

My goal for this recording project was to create and perform solo percussion music aided by the electronic music technology popularized by commercial electronic musicians. The music was to be a comprehensive solo percussion performance and recording which explored the combination of acoustic percussion instruments with electronic music technology originally designed for commercial use. The music was to be entirely new, thus expanding the percussion and electronics repertoire, while demonstrating the potential of using commercial music technology as a performance aid for a solo performer. A live performance of the program was intended to create a unique experience for audiences and was to require the performer to display virtuosity on the acoustic instruments and command of the electronic components. The newly composed music was to be recorded to allow for easy distribution throughout the percussion and academic music community, as well available to the public.

Using musical technology initially designed for commercial electronic music would inform the musical style and sounds of the compositions, as well as the ways in which the compositions were to be constructed and performed. The sounds of commercial electronic music include synthesizers, electronic drums, and electronically altered acoustic samples. The hardware and equipment used in commercial electronic music includes keyboards, electronic drum pads, and controller pads with assignable buttons and knobs. Commercial electronic musicians like DJs and EDM artists must practice for performance using only their hardware and equipment. The advancement of their live performance often depends on activating the right piece of equipment at the right time, just as an acoustic musician must continuously play their instrument to sustain

their performance. The treatment of the acoustic instruments and electronic equipment as equals in terms of preparation, practice, and execution in the recording studio and on the stage was one of the core goals of this recording project.

Bringing this musical vision to life required a composer familiar with percussion and commercial electronics. Former classmate and colleague Taylor Ambrosio Wood has experience in both of these fields.[39] I asked her to collaborate with me to design and compose an album-length set of works for solo percussionist and live electronics. Taylor's training and compositional style paired with our shared musical interests made her an excellent choice for this collaboration.

Compositional Style

Taylor's compositional style is influenced by rock, pop, folk, jazz, classical, and world music. Her compositions encompass a number of genres and instrumentations including orchestral film scores, solo works for percussion and marimba, electronic works for video games, and singer/songwriter tunes for voice and marimba. Taylor trained as a classical percussionist before beginning composing, and has performed in a

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[39] Taylor and I met in 2012 as percussion students at the Boston Conservatory. She and I often commiserated over the culture of the conservatory. Everyone was concerned with the classical canon, learning orchestral excerpts, and playing the most challenging repertoire at the highest level possible, however there was little interest in new music or electronic music. While this was exactly what we expected from the conservatory experience, we often found ourselves "jamming" in a practice room to avoid our prescribed lesson material. These jam sessions were inspired by our *other* musical interests: rock, jazz, folk, pop, and world music.

Taylor is a graduate of the Berklee College of Music, Valencia Campus, where she received a Master's degree in Scoring for Film, Television, and Video Games in 2016. Taylor is currently freelancing in the Portland area as a composer, sound designer, and lecturer. She has composed scores for a number of indie movies and video games, including her latest game project *Balthazar's Dream*, and is teaching an electronic music course at Clackamas Community College in the spring of 2017.

variety of musical settings as an orchestral player, marimba soloist, and member of a Zimbabwean marimba band.

Harmonically, Taylor's musical language is primarily tonal. While she does not always adhere to the rules of functional harmony, all of her works center around a key or mode. Much of her harmonic structure is influenced by rock and pop music, featuring chords built on perfect 5ths and parallel motion. Taylor often utilizes octave or perfect 5th pedals in the lower range of instruments which serve as the grounding for active accompaniment progressions and melody in the upper voices. She often uses open voicing in chords, and frequently adds extensions, especially 9ths.

Taylor's rhythmic language reflects her training as a percussionist. She often creates intricate polyrhythms among voices or instruments. She especially favors groupings of four and five notes, which often permute over barlines for long durations. Taylor also tends to utilize hocketed 16th-notes among voices which can create the illusion of polyrhythm to listeners. Taylor favors the use of dotted-eighth notes in succession – a common rhythmic driver in rock and EDM musics. Her 2014 marimba solo *Runaway* features several melodic and rhythmic themes which rely heavily on the dotted-eighth note. Finally, some of Taylor's works are inspired by minimalism, establishing a repeating rhythmic pattern which shifts in pitch, rhythm, or both slowly over time.

Taylor's music is most often through-composed with no obvious form. This tendency reflects her work in film and video game scoring, where music accompanies a series of changing events. While her works are through-composed, she develops themes and rhythmic patterns which often recur, providing listeners with familiar material. Some

of her pieces follow a more traditional Verse-Chorus form, especially her singer/songwriter works for marimba and voice. These pieces, including *Cray* (2014) and *History* (2014), are directly based on traditional pop music forms.

Collaborative Process

Taylor and I met in Iowa City in August of 2016 to discuss the initial planning stages of this recording project. We planned a rough timeline for completion of the compositions, discussed and explored the technology available to me for performance, devised an instrumentation and equipment list, and began generating musical ideas. We decided that the entire album would consist of ten small (roughly five to eight minute) pieces, differentiated by instrumentation changes. Taylor prefers to compose using a narrative to outline emotional arc and overall compositional form. Our idea for this narrative drew upon collective personal experiences we had during our time at the Boston Conservatory. While the compositions are not intended to tell a specific story, the emotional underpinning of this storyline helped us decide on a clear vision for each piece.

Initially, the instrumentation for this project was to be limited to the acoustic and electronic equipment I personally owned with one exception: the Alternate Mode MalletKAT MIDI controller. The acoustic instrumentation included: 5.0 octave marimba, 3.0 octave vibraphone, tambourine, suspended cymbal, wind chimes, maracas, glockenspiel, four tom-toms, bongos, woodblock, metallic "found" sounds, and my voice. The electronic hardware included the MalletKAT, an Akai MPD218 MIDI pad set, an Akai Key25 keyboard, and a Yamaha DTX electronic drumset. Other audio equipment

required included microphones, personal headphones, an audio interface, and the computer software Ableton Live 9.

Over the course of the next five months, Taylor and I continued collaborating solely over the internet using a combination of email, Skype, and messenger services. All materials related to the collaboration were shared via Google Drive. Upon Taylor's completion of the compositional portion of the project in January 2017, I had an entire library of project files in our shared Google Drive including scores, Ableton Live sets, instructions, and example "mock up" recordings for each movement, as shown in Figure 1.

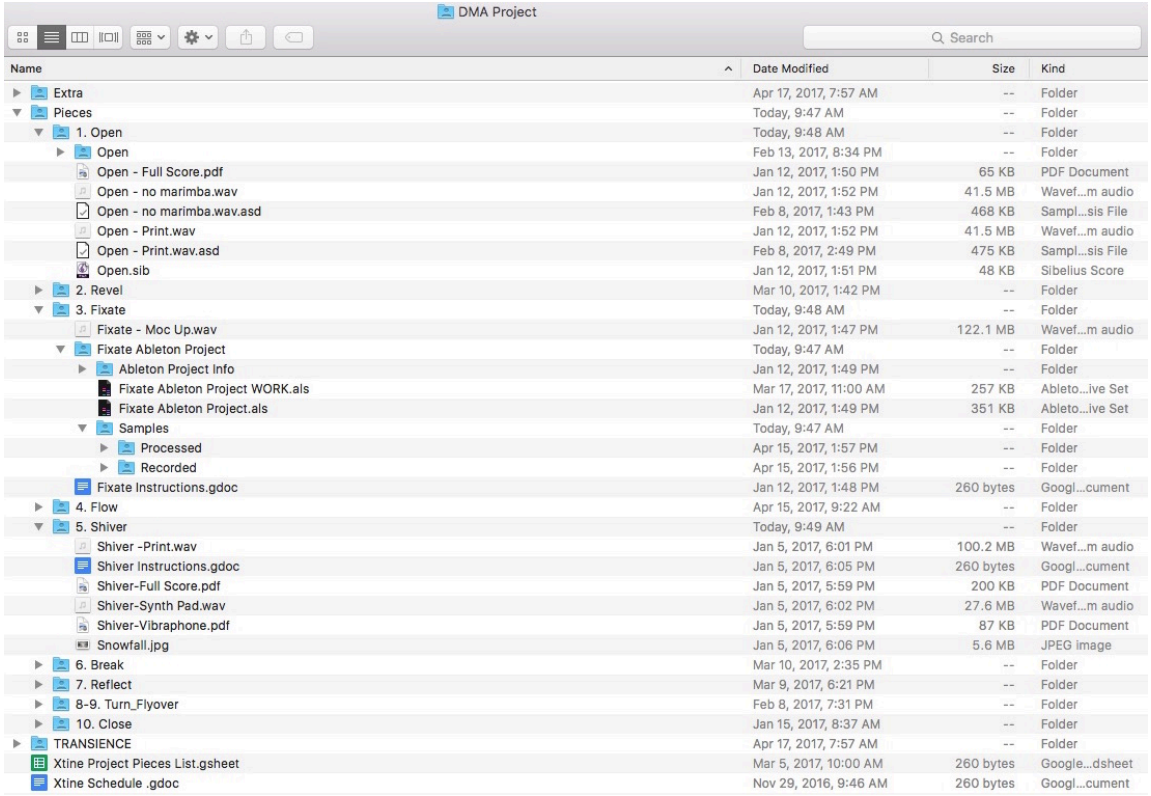

Figure 1 – Shared Google Drive Folder

Depending on the piece, compositional style, and formal structure, Taylor provided files for each movement to me in one of three states: fully completed, partially completed, or template only. Each state required a different approach from me to bring the piece from Google Drive to completed and performed in the recording studio.

The fully completed pieces, which included *Open*, *Reflect*, *Flyover*, and *Close*, consisted of a file with complete and engraved solo percussion parts, clear instructions (where necessary), an Ableton Live file containing all necessary electronic sounds (where necessary), and a mock up recording which allowed me to hear how the final piece should sound with all acoustic and electronic components, as shown with the *Open* folder in Figure 2.

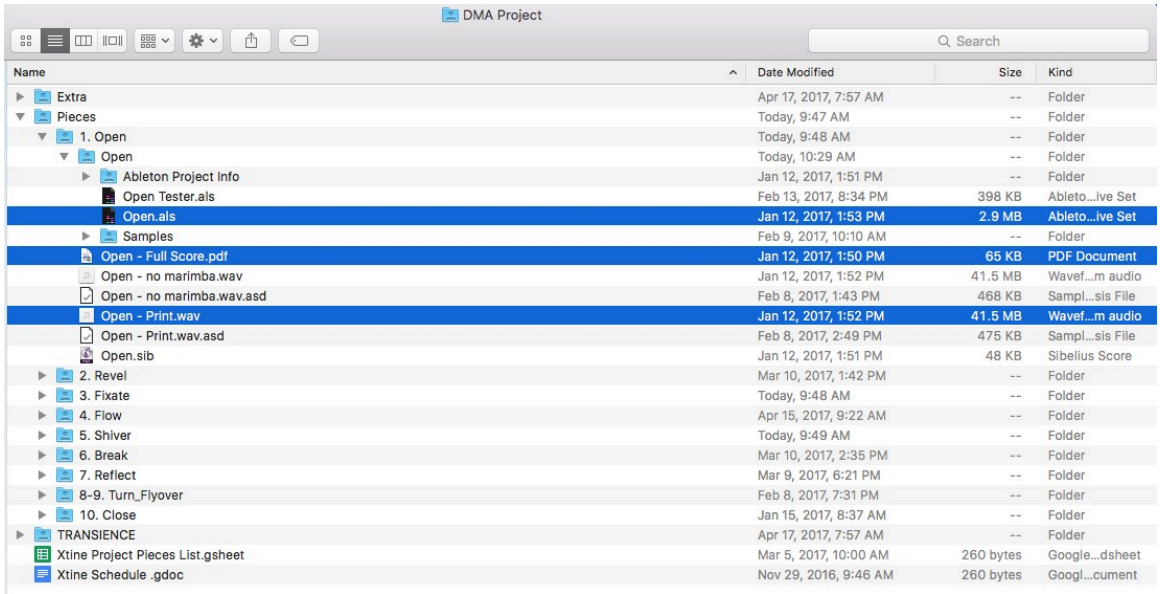

Figure 2 – Complete *Open* Folder

The file contents of the partially completed pieces varied, but each contained some combination of engraved percussion parts, instructions (where necessary),

examples or descriptions of electronic sounds to be used, and a mock up recording. These pieces sometimes included Ableton Live files, which were usually not performance ready. The engraved percussion parts were helpful in deciphering which instruments were to be acoustic percussion instruments and which were supposed to be electronic instruments, but often the engraving was less polished. In these cases, Taylor had used her MIDI keyboard to record directly into the mock up recording, and used other musical software to transcribe what she had played. This resulted in some rhythmic and phrasing inconsistencies, which I was able to decipher and polish in my own performance by listening to the mock up recording itself. Figure 3 shows a page from the score for *Shiver*, which provides an excellent example of the appearance of scores for partially complete files.

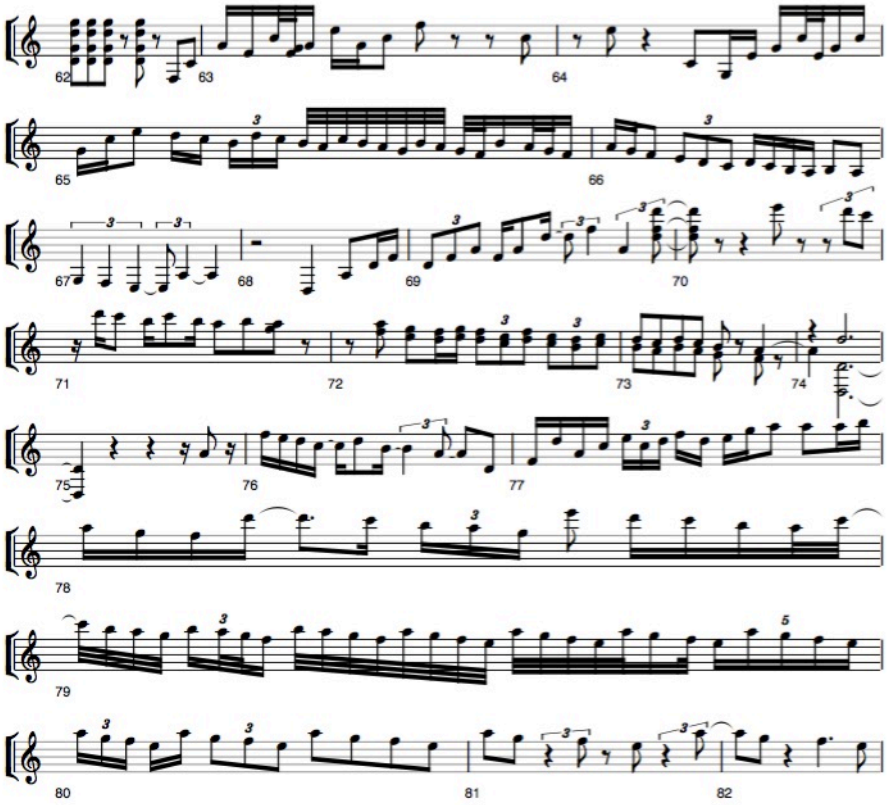

Figure 3 – *Shiver*, Score Excerpt

The pieces that only had template files required the most additional compositional work on my part. *Revel*, *Fixate*, and *Break* fell into this category. In our initial planning stages, I informed Taylor that I wished to do some improvisation on the album and in live performance. These tracks all allowed for this; thus, providing a complete form and parts was not necessary. Instead, Taylor provided me with basic instructions and several Ableton Live loops she created. The instructions outlined a general form, indicating which loops were to begin and end each piece, as well as what types of musical material the improvisations should be based on, as in Figure 4. From there, I devised more rigid forms for each series of loops, including the changes between the chorus and bridge sections in *Revel*, and the texture changes and melodic additions in *Fixate* and *Break*. I outlined a more definite form for *Revel*, and developed basic rhythmic structures for the solo drum opening of *Fixate*.

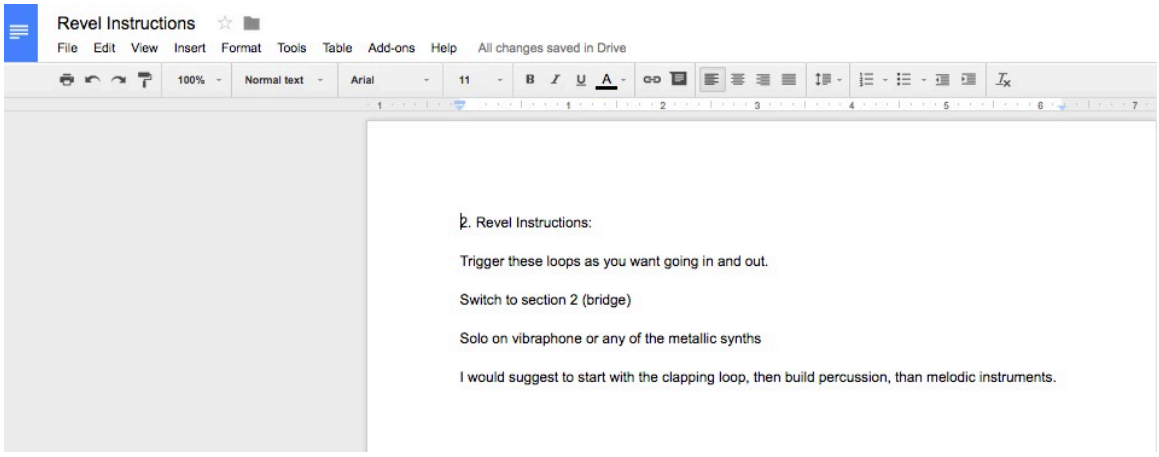

Figure 4 – *Revel* Instructions

Working out these details with each piece required considerable compositional effort on my part. These pieces blurred the line between my role as the performer and my

new role as a co-composer. Taylor and I understood at the outset of the project that I would need to make these types of changes to the music she provided. I was sure to consult her about any major changes, and she was always encouraging of my efforts. In addition to composing, preparing the pieces for recording required me to do significant amount of electronic sound design.

Taylor chose, created, or modified almost all electronic sounds she delivered in Google Drive, however she was not able to compose using any acoustic instruments. As I began to prepare the pieces for recording and performance, the addition of acoustic instruments required many of the electronic sounds to be altered further for purposes of blend and balance, or sometimes to add depth or intrigue to an otherwise plain electronic percussion sound. Almost every electronic sound used on the album was altered by me in some way using Ableton Live. There were three main ways in which I altered these sounds: by making small edits to existing Ableton Live instruments, by adding my own samples to instruments in Ableton Live, or by creating entirely new instruments using my own samples and the Ableton Live Sampler instrument.

Most of the pieces which included Ableton Live files that Taylor had constructed used preset instruments included in the software which Taylor had edited to suit the piece. The most basic way I altered the electronic sounds was by altering the parameters provided in these Ableton instruments by hand. Ableton instruments can include a variety of knobs and buttons which can drastically alter the sounds they make. Using these tools, I was able to make small adjustments to help the instruments blend with or stand apart from the other acoustic and electronic sounds.

An example of this type of electronic sound alteration can be heard in *Open* at 00:34. There, I used the "Filter Frequency" knob on the Snow Pad instrument, outlined in Figure 5, to create a slow filter sweep at the end of the musical phrase, adding interest and a hint of electronic crunch to the otherwise beautiful and traditional soundscape.

Figure 5 – Snow Pad Instrument, Filter Sweep Knob

Another technique I used to further alter the electronic sounds provided by Taylor was to add my own samples to her custom instruments. To do this, I set up a small recording station in my basement and recorded a large collection of single-note samples using a number of my personal instruments. I was then able to insert these samples into existing electronic instruments chosen by Taylor to add another timbral layer to that instrument. An example of this is the metallic instrument playing the initial melody in *Turn*. That electronic sound was initially a glockenspiel with a synthesizer beneath it, which sounded appropriate for the track, but was a little too simple for my taste. I added to it a Chinese opera gong sample, which added a slightly gritty and detuned timbre to the sound, making it emerge more clearly from the musical texture.

The last technique I used to customize the electronic sounds was to create instruments entirely from scratch. The best example of this is the mbiras and kalimbas heard in *Flow*. Taylor had planned for me to use a kalimba sampler she created, but we quickly realized that would not be a possibility, as she had created it using the Kontakte sampler, a computer program I do not own. After trying to make her samples compatible with Ableton with no success, I set out to create my own electronic kalimbas and mbiras. I sampled a number of different kalimbas and mbiras using my personal recording station. I then inserted them into Ableton Live's Sampler instrument, which changes a single sample into a playable chromatic instrument, which can be seen in Figure 6. Further alterations to the attack, decay, sustain, and release of the samples, as well as the addition of filters and other effects turned the single sample of each instrument into a very lifelike electronic instrument, playable from any of my electronic controllers. Instead of triggering the playback of a pre-recorded instrument, I can perform and improvise on an electronic version of that instrument live in real-time.

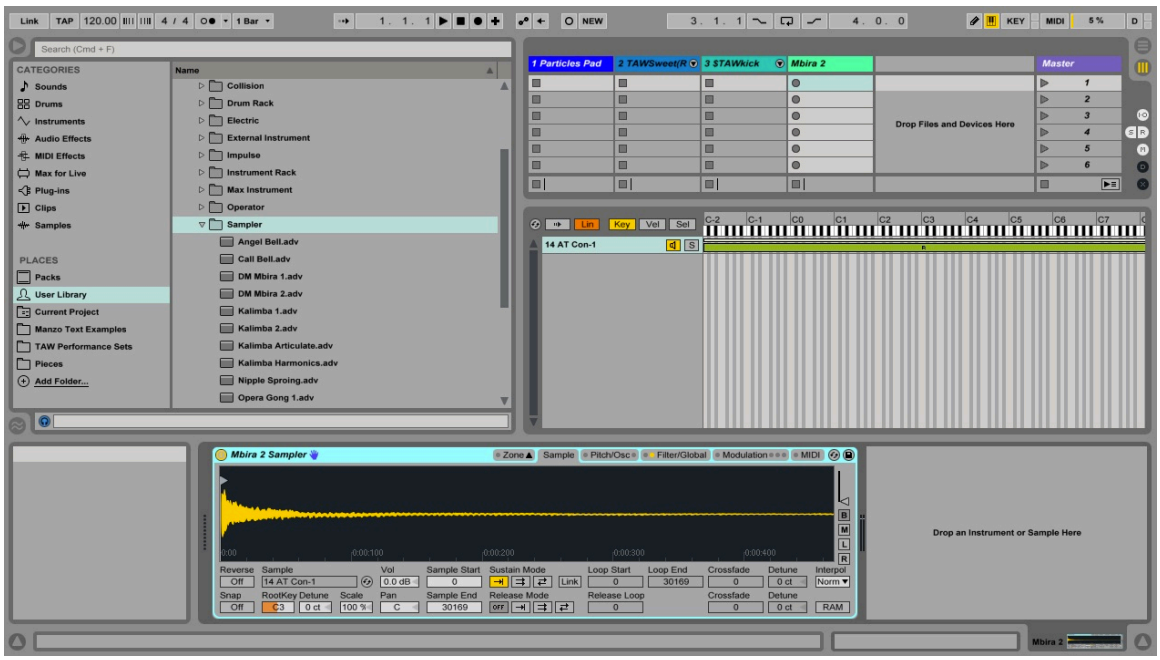

Figure 6 – Mbira 2 Sampler

These alterations to the electronic sounds again situated me somewhere between the roles of composer, performer, and now sound designer. Taylor's initial sound world, musical ideas, and vision remained entirely intact, but each had been further customized by me to suit my musical goals for the project prior to entering the recording studio. This process is an excellent example of how collaborating has changed through the use and availability of technology and the internet. This was not a commissioning project with clearly defined roles for composer and performer, but rather an example of the creative process through collaboration.

Recording Process

Transience was recorded at *Studio 93 E*, in Iowa City, IA. Recording took place in March 2017 over the course of more than sixty hours. Dan Moore served as the primary

producer and recording engineer, with assistance from James Edel of the UI Recording Studios.

The recording process required a two-pass approach. Each pass consisted of traditional acoustic recording followed by the addition of electronic components. The first pass involved the recording of as much material as possible, while the second pass filled in gaps and added other effects. The overarching acoustic recording plan was organized not by track, but by instrument, to ensure consistent sound quality on each instrument. Since the sound of a recorded acoustic instrument can be affected by small details such as instrument placement within the room or microphone placement and distance from the instrument, recording all parts for each instrument at a time was necessary to ensure a uniform sound. After recording initial acoustic material, essential electronic components were added to most tracks. We iterated the processing of recording acoustic and then electronic sounds, and the mixing and mastering process occurred after all recording had been completed.

Though the acoustic instrumentation was clearly defined by Taylor and myself at the beginning of the collaboration, I allowed my creativity to govern the acoustic sounds I chose to use in the recording studio. Many of the acoustic sounds on the album are not included in the live performance of the show because of the limitations of space and my own personal instruments. Others have been converted back into electronic sounds and will be played on stage by hitting a MIDI trigger which will in turn play the sound. The studio process also allowed me to be very creative in my design of electronic sounds, as I was not limited by the capabilities of the software or my computer in a live performance

setting. A variety of computationally intensive effects are present on the album but would be impractical in live performance because of their necessary computing power.

The track titles and main instrumentation are as follows:

1. *Open* (marimba, cello, percussion, voice, custom samples, synthesizers)
2. *Revel* (vibraphone, percussion, custom samples, synthesizers)
3. *Fixate* (multi-percussion, custom samples, audio processing effects)
4. *Flow* (malletKAT mbira, world percussion, custom samples)
5. *Shiver* (vibraphone, bells, custom samples)
6. *Break* (multi-percussion, anklug, custom samples)
7. *Reflect* (malletKAT, piano with delay, wind chimes, metallic sounds)
8. *Turn* (bowed marimba, voice, custom samples, synthesizer)
9. *Flyover* (marimba with delay)
10. *Close* (marimba, cello, percussion, voice, custom samples, synthesizers)

Please see Appendix B for illustrated liner notes.

The first pass's acoustic recording focused on the main instrumental solo parts and began with the marimba. We began with the solo marimba parts for *Flyover*, *Open*, and *Close*. Then we followed with the supporting marimba parts and small marimba loops in *Revel*, *Flow*, and *Turn*. Next was the solo vibraphone in *Shiver*, followed by the vocals for *Open*, *Close*, and *Turn*. Additionally, UI colleague Matthew Laughlin kindly agreed to record the cello parts to *Open* and *Close*. The first pass of audio recording concluded with the multi-percussion solos for *Fixate* and *Break*. These two pieces encouraged free improvisation and did not have complete written parts. Taylor recommended both should be based on a collection of audio loops she designed and

provided. The recording process for these two tracks began with me improvising to the loops at a large multi-percussion setup including four large tom-toms, bongos, and a variety of woodblocks. While improvising, a clear form for each track emerged, and these forms were further defined later during editing.

Following the completion of the initial acoustic solo recordings, electronic parts were added to each track. I generated these electronic sounds using my personal computer and Ableton Live 9. These sounds were captured on the studio computer via Pro Tools and a direct cable connection. Each sound or electronic instrument received its own channel within the Pro Tools session to allow for further alteration or control during mixing and mastering without the need for my personal computer.

Many of the custom electronic instruments used MIDI data prepared by me or Taylor prior to the recording sessions. These could be transferred into Pro Tools sessions by triggering them from my computer. Additional electronic sounds included loops, which required repetitions the length of a track or section, and one-shots or samples, which were single audio events that only occurred once, but required specific placement within the larger track.

Other custom electronic instruments could only be recorded through live performance. To record these, my computer maintained a direct line to Pro Tools, and an electronic MIDI controller, usually the malletKAT, was attached to my computer. MIDI data would travel from the malletKAT into my Ableton Live session, which would create the electronic sounds. These sounds would then be recorded into Pro Tools. Tracks that used this technique included the mbiras and kalimba in *Flow* and the reverb piano in

Reflect. Recording these tracks required a high level of musicianship, just as recording on any acoustic instrument would.

By the end of the first pass, all ten tracks contained at least some acoustic and electronic material. The second pass was used primarily to fill in gaps. In terms of acoustic recordings, I chose to add extra percussion sounds, such as cymbals and windchimes, for dramatic effect. I also added acoustic rhythm section parts to tracks which required groove, like *Flow* and *Revel*. Finally, the second pass added the vibraphone solo in *Revel*. The electronic sounds added in the second pass included more samples and loops, as well as custom drum sounds found in *Open* and *Close*.

Most audio editing was done at the end of each session. This required Dan, James, and myself to keep track of the best takes during each session for ease of editing later. Editing at the end of each day, as opposed to after all audio tracking was complete, allowed us to have each instrumental part fresh in our minds and allowed all of us to weigh in on which takes should make the final cut.

Because the edits were done during the recording process, the post-production for *Transience* consisted mainly of mixing and mastering, which were both done by Dan Moore, with assistance from James Edel. The mixing process included balancing all acoustic and electronic components, as well as the addition of audio processing functions including reverb, compression, and limiting. Additional edits including fades, space between audio events, and overall pacing of each track were made during the mixing process as well. The final mastering, performed by Dan Moore, ensured that perceived volume and quality across each track on the album was consistent and appropriate, creating a finished musical product.

CHAPTER 6 PROJECT IMPACTS AND OUTCOMES

The completed recording has been publicly released for download on my personal website. Additional art, liner notes, and other printed materials have been included as supplements the download. While there are no plans for a video recording at this time, a professional video production of a live performance of the full program could serve as an excellent complement to the high-quality audio recording. Social media played a major role in the promotion of this album. I relied primarily on social media outlets including Facebook and Instagram, as well as musical social media services like Soundcloud. This project may serve as a model for commissioning or recording projects for other artists.

The premiere live performance of the album is scheduled for May 7, 2017. At the time of this writing I am preparing for this performance. It will include all of the electronic components that appear in the recording, however much of my use of technology will be "safe," meaning that larger portions of samples and loops from the recording will be used, and not every electronic sound will be produced live on stage. As I continue performing the show, it is my intention to continue stripping away the use of samples and loops until I make every sound possible live and in real time. Because of this, the show will continue to evolve over time as my skills and comfort with the material grows.

Moving forward in my career, this thesis, which includes both the album and this document, will serve as an excellent representation of my professional work. I plan to use both components when applying for academic music jobs. Additionally, I hope to be able to present them to concert venues and use them in performer applications for festivals and

concert series. This project also provides an excellent presentation topic for music conferences like the Percussive Arts Society International Convention.

Taylor and I have discussed the possibility of presenting our collaborative project at academic institutions. At the time of this writing, we have agreed to join the performance and composition faculty at the Birch Creek Music Festival in the summer of 2017, and to present a masterclass and performance at the Interlochen Arts Academy in the fall of 2017. We hope to expand our forthcoming masterclass into a multi-institution tour which may include presentations on topics including the collaboration process, the technical setup and execution of the music, and live performances of the album.

Finally, it is my hope that this initial project leads to a continued collaborative relationship with Taylor. In addition to being a talented sound designer and composer, Taylor is an excellent percussionist. In the future, I hope we are able to share the performance stage as a composer/performer duo.

APPENDIX A GLOSSARY

analog Used in recording and live audio. The pressure of sound waves provides a continuous audio signal.

algorithm A process or set of instructions, often followed by a computer. Used in the composition of computer music.

Ambient Music A genre of commercial music developed by Brian Eno in the 1970s. Key characteristics include the use of synthesizers and samples, the lack of strong pulse, and musical emphasis on atmosphere over structure.

audio interface A piece of hardware which allows audio equipment like microphones and speakers to be connected to a computer. Often, audio interfaces also include analog to digital and digital to analog converters.

break A hip hop term referring to a small amount of instrumental musical material (usually four measures or less) which is repeated.

computer music The use of computer technology, including algorithms, to assist in the composition of music. Computers may also be programmed to generate music by themselves.

DAW (digital audio workstation) Computer software used to record, edit, mix, compose, and process recorded audio and synthesized sound.

Delay An audio effect where the input signal is delayed and then repeated back multiple times, creating the effect of repeating or echo.

digital Used in recording and live audio. Refers to the use of a digital signal, where information is converted into bits. Each bit maps to a discrete value for each sampling point.

drum machine A piece of electronic music hardware which synthesizes the sounds of drums, and sometimes other instruments.

EDM (electronic dance music) The current overarching title for dance music popular in clubs and commercial music. Includes a variety of specific sub-genres including House and Techno.

elektronische musik The electronic art music style associated with the Norwestdeutsher Rundfunk (NWDR) studio in Cologne. The style emphasizes the production of electronic music using only synthesized electronic sounds.

found sounds Non-traditional objects used as percussion instruments. Can include, but is not limited to: flower pots, keys, water bottles, pieces of wood, hunks of metal, etc.

hardware Physical objects which facilitate interaction with a computer. In this proposal, hardware refers to the audio equipment and controllers which require physical interaction to create sound.

House A genre of EDM which grew out of disco during the early 1980s in Chicago. Musical characteristics include "4-on-the-floor" bass drum, open hi-hats on off beats, and the use of synthesizers for pitched musical material. Primarily electronic and inspired by minimalism.

live electronics The use of any electronic sound in live performance. Implies that the electronic sound is created or generated live in the performance.

loop A short repeated section of musical material which creates an ostinato pattern.

Max/MSP A visual, object-oriented programming language created by Miller Puckette in 1988. Max/MSP is one of the most popular musical programming languages among art music composers today.

MIDI (musical instrument digital interface) A carrier of musical data. Allows musical hardware and software to be connected and facilitates communication between them.

MIDI controller Any hardware or software that generates and transmits MIDI signal. Usually used to trigger sounds or events.

mixer A piece of electronic hardware which enables users to change parameters on an audio signal. These parameters can include volume, timbre, and other effects.

musique concrete The electronic art music style associated with the Radiodiffusion Television Francaise (RTF) studio in Paris. The style emphasizes the production of electronic music using recorded audio samples of acoustic sounds.

object-oriented programming A programming language model which focuses on the use of objects and data structures, as opposed to actions and logic.

phasing Two identical pieces of musical material that are played steadily but with an offset. The result is a constant echo or desynchronous effect.

preamp Short for pre-amplifier. Used to raise a weak electrical signal to a stronger electrical signal, allowing for further alteration or processing.

pre-recorded electronic sound A fixed piece of electronic music which is prepared before performance, and is not meant to be altered in performance.

processed audio The application of any kind of electronic effect to an audio signal.

real time In the context of this proposal, describes the ability to directly modify an electronic soundstream.

sampler A piece of musical hardware which uses sound recordings ("samples") as fundamental material. The sampler can then process this musical material further.

sampling Capturing an existing sound and reusing it as an instrument or sound in a different way.

sine wave generator An oscillator which can create a consistent waveform signal. Used in early electronic music to produce pure frequencies or long tones.

software A computer program which can produce and interpret information, or provide instructions to the computer. Usually requires hardware to interact with it.

synthesis The generation of purely electronic sound using hardware or software.

synthesizer An electronic instrument which generates purely electronic sound.

tape music (fixed media) See pre-recorded electronic sound.

Techno A genre of EDM which developed in the late 1980s in Detroit. Inspired by House music and hip hop. Musical characteristics include "4-on-the-floor," heavy backbeat, and synthesized harmonic and melodic material.

transistor A semiconductor which can switch or amplify an electronic signal. It is an essential component in all electronic devices. Transistors replaced vacuum tubes because of their size, durability, reliability, and cost.

Trigger Interacting with a piece of hardware to activate an electronic event or effect.

vacuum tube A device that controls electric current. Used before transistors to amplify an electronic signal in electronic music equipment.

voltage-controlled synthesizer A type of synthesizer which produces waveforms using transistor technology.

APPENDIX B LINER NOTES

1 Open
Features the marimba and introduces listeners to the acoustic/electronic sound world of the album. The marimba interacts with the cello and other electronic sounds before setting out on its own.

marimba, tambourines, cello, voice, windchimes, key chimes, cymbal, wind gong, loops, synthesizers, APC Key25

2 Revel
A blissful and childlike exploration of the possibilities of looping both acoustic and electronic instruments. The vibraphone finally joins the mix with a simple melody, which quickly grows into a jazz-inspired solo.

children's tap shoes, shaker, surdo, agogo bells, marimba, quijada, metal pipes, vibraphone, malletKAT, loops, APC Key25

3 Fixate
An opening meditation on pulse and polyrhythm morph into an unsettling pattern which passes between the drums and electronic sounds. A haunting metallic melody is punctuated with more drumming and other polyrhythmic material.

tom-toms, loops, APC Key25

4 Flow
African-inspired percussion loops compliment a number of mbira and kalimba loops to create a complex rhythmic tapestry. The "kalimbira," a custom instrument created by Christine and played using the malletKAT, is featured in an improvised solo.

shekere, djembe, agogo bell, marimba, mbira, kalimba, loops, malletKAT

5 Shiver
Lacking meter and strict rhythms, this vibraphone lament is supported by a low and ominous drone. The entrance of the glockenspiel provides a moment of repose before the drone returns.

vibraphone, cymbal, windchimes, glockenspiel, temple bell, thai gong, wind gong, bowed vibraphone, APC Key25

6 Break
A complimentary continuation of Fixate, this movement opens with improvisational and soloistic drums. Soon a cacophony of other percussion instruments join to create an ever-intensifying groove.

tom-toms, bongos, woodblocks, piccolo woodblocks, angklung, loops, APC Key25

7 Reflect
To stand on the largest stage alone with a piano and your thoughts.

malletKAT

8 Turn
Electronic instruments create a melody and accompaniment of loops. The metallic and bell sounds recall the childlike sound world of Revel. The voice and marimba join, evoking a sense of nostalgia alongside a sense of hope.

voice, bowed marimba, bells, thai gong, opera gong, toy piano, triangles, loops, malletKAT, APC Key25

9 Flyover
The marimba with a simple electronic delay continues the hopeful innocence of Turn. The thick marimba texture provides aural warmth and fullness.

marimba

10 Close
Beginning with the same musical material as Open, the marimba again sets out on its own, but is soon joined by a collection of electronic and acoustic elements. The marimba's "heroic" melody is mimicked by the cello and other voices, though the marimba is allowed the last musical word.

marimba, tambourines, cello, voice, windchimes, key chimes, cymbal, wind gong, loops, synthesizers, APC Key25

Christine Augspurger is a percussionist, composer, electronic musician, and educator. She specializes in the exploration of the intersection between acoustic and electronic music in live performance. A native Iowan, Christine holds degrees from The University of Iowa and the Boston Conservatory, and is currently completing the DMA in Percussion Performance at The University of Iowa. In 2014 Christine was a semi-finalist in the prestigious TROMP Percussion Competition in Eindhoven, The Netherlands. She has studied with Dan Moore, Keith Aleo, and Nancy Zeltsman.

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This album is the final product of one of the first DMA Recording Projects for the University of Iowa School of Music, completed in the spring semester of 2017. Taylor Ambrosio Wood, with assistance from Christine Augspurger, composed all pieces specifically for this project.

Special thanks to: Dave Gier and Dan Moore for pushing ahead with the DMA Recording Projects and kindly inviting me to participate in the pilot project.

Additional thanks to: David Gompper, Nathan Platte, Zack Stanton, William Jones, James Edel, the UI Recording Studios, Sara Maccabee, Pauline Wieland-Plowman, Jenny Hall, Sean Mattingly, Boomer, and all others who contributed their time and energy to helping me complete this project.

Producer: Dan Moore
Editor: Dan Moore
Engineer: Dan Moore
Assistant Engineer: James Edel
Composer: Taylor Ambrosio Wood
Additional Composition: Christine Augspurger
Sound Design: Taylor Ambrosio Wood
Additional Sound Design: Dan Moore and Christine Augspurger
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