USE OF ELECTRONIC MUSIC IN

BRASS SOLO LITERATURE

A THESIS IN
Musicology

Presented to the Faculty of the University
of Missouri-Kansas City in partial fulfillment of
the requirements for the degree

Master of Music

by
TAYLOR HOUSTON HICKS
B.M.E., University of Northern Iowa, 2017
M.M., Western Illinois University, 2020
D.M.A., University of Missouri-Kansas City, 2023

Kansas City, Missouri
2023

USE OF ELECTRONIC MUSIC IN

BRASS SOLO LITERATURE

Taylor Houston Hicks, Candidate for Master of Music degree

University of Missouri-Kansas City, 2023

ABSTRACT

Brass and electronics is a relatively new performance genre from the late twentieth century that incorporates ever-advancing audio and computer technology. Over the last fifty years, the genre has advanced tremendously, comprised of hundreds of works across the brass family. As a performer, I discovered that while the repertoires of all brass instruments featured electronic works, the importance of the genre and the ways in which it was used varied dramatically depending on the instrument.

This thesis explores the ways in which brass and electronics is regarded as a genre and its role in brass performance. It examines the genre's historical implications, how both genre and medium have developed, and what the future may hold. The basis of the thesis is an

original research survey of forty-nine completed responses, that posed questions relating to the use, aesthetics, development, and future trends of electronics within brass music. Through this research, I uncovered a wealth of untapped research material and a significant gap in current scholarship regarding brass and electronics.

The thesis is divided into five categories, an overview of both existing scholarship and the survey I implemented; establishing where brass and electronics stand, its historical position, terminology, and its interaction with existing acoustic mediums; three chapters specific areas of import that were highlighted in both prior scholarship and within the results of the survey, concepts of accessibility, and the viability of the genre moving into the future. The thesis concludes with a series of appendices that contains the survey questions and a trio of works lists categorized by instrument.

APPROVAL PAGE

The faculty listed below, appointed by the Dean of the UMKC Conservatory have examined a thesis titled "Use of Electronic Music in Brass Solo Literature," presented by Taylor Hicks, candidate for the Master of Music degree, and certify that in their opinion it is worthy of acceptance.

Supervisory Committee

Andrew Granade, Ph.D Committee Chair
UMKC Conservatory

Alison DeSimone, Ph.D
UMKC Conservatory

Paul Rudy, DMA
UMKC Conservatory

CONTENTS

ACKNOWLEDGEMENTS

I would like to express my deepest appreciation to my committee chair and thesis advisor Dr. Andrew Granade. Without him, the completion of this thesis would not have been possible. Dr. Granade's unrelenting support and guidance allowed me to reach for greater heights over the course of this thesis project.

I would also extend my sincere thanks to my other committee members Dr. Allison DeSimone and Dr. Paul Rudy. Their insightful feedback allowed me to advance the quality of this project far beyond what it would have been otherwise.

I must also thank the University of Missouri-Kansas City, the Conservatory of Music, Theater, and Dance, and all of the incredible faculty that have challenged me to grow as a musician, scholar, and human being.

DEDICATIONS

I would like to take a moment to thank my family, most especially my parents, Walter and Christina Hicks. Without my family and their unwavering support, I would not be the musician, scholar, or person that I am today. I cannot ever express how indebted to them I am, nor how grateful I will always be.

CHAPTER 1

LITERATURE REVIEW AND SURVEY METHODOLOGY

Introduction

As the son of two music educators, music has been a part of my life from the beginning. My first experience with music was when I was only ten days old, when I attended my first concert, my mother's school choir. In the summer before fifth grade, I began my journey as a tubist learning from my father who was a tuba player as well. The tuba and instrumental music became a focal point in my life, attending various honor bands and all-state festivals while solidifying my desire to enter the family business and become a music educator like my parents. I learned in my undergraduate work that while the tuba today has a considerable and ever-growing repertoire to choose from, it is a far cry from the canons of other brass instruments. It was not until Vaughan-Williams wrote the *Concerto for Bass Tuba* in 1954 that the tuba was given its place as a solo instrument. With that background of fighting for inclusion in the repertoire in mind, it becomes clear why the tuba community has embraced electronic music with a fervor, eagerly taking any music to grow our repertoire. My first

introduction to brass and electronic music was in my Junior recital, where I performed a commissioned piece for tuba and electronic sonic landscape. The composer was a former student of my father's, who at the time was working in Los Angeles as a film composer. The goal of the commission was to have something unique to me that I could premiere as a soloist on my first official solo recital. Since that recital, I have performed at least one electronic piece on every recital I have given. I deeply enjoy the variety of styles and opportunities that exist for brass and electronics, and wanted to explore the genre in more detail. As such, it made perfect sense to align that desire with my thesis research to make brass and electronic music the focus of this document. As I began researching however, I noticed a significant gap in the scholarly research on electronic music. While I was able to discover and read several articles and monographs about electroacoustic music, aesthetics, and electronic music as a whole there was shockingly little on brass and electronics as a genre. I wanted to add to the scholarly literature about a performance genre that has been so important to the low brass community. To accomplish this goal, I performed my own ethnographic research survey reaching out to performers, educators, and composers in an effort to gather information and opinions on the nature and

importance of electronics within brass repertoire. To supplement the data collected by the survey, I examined existing literature and scholarship on electronic music alongside the scant performance papers written about brass and electronics to help establish a scholarly framework in which to place brass and electronics. What follows is the result of my research. To begin, we must understand the literature surrounding electronic music.

Electronic Music as a Historic Discipline

The electronic production of music has become one of the defining features of music in the late twentieth and early twenty-first century. A significant portion of scholarship on music and electronics has focused on the examination of the history of electronic music as a whole, treating electronic music, electroacoustic music, and anything to do with music and electronics as a broad genre. Within these overarching histories, most of the scholarship covers three main topics: electroacoustic music as a subgenre, the historical development of music with electronics, and the advancement and use of technology to create music. Often, these topics overlap, such as articles dedicated to specific facets of electroacoustics within musical history or the particular usage of technology by a given composer or group,

but these three areas provide a useful lens through which to approach the literature on electronic music.

On the topic of electroacoustic music, it has been the primary point of departure for scholars since the genre has long ties to the avant-garde and academic musical worlds. Electroacoustic music is defined by Simon Emmerson and Denis Smalley as "music in which electronic technology, now primarily computer-based, is used to access, generate, explore, and configure sound material, and in which loudspeakers are the prime method of transmission."[1] Scholarship breaks electroacoustic music into two primary groups, acousmatic (as music designed to be played via loudspeaker that exists solely in recorded format) and live electronics (technology centered on the generation, transformation, and use of electronic media in live performance). Part of the discourse surrounding this subgenre has been its place in the greater world of music scholarship. Some writers, like Michael Clarke, Leigh Landy, and Simon Emmerson, have proposed an entirely new system of analysis, with frameworks and terminology

[1] Simon Emmerson and Denis Smalley, "Electroacoustic music," *Grove Music Online,* 2001, Accessed June 23, 2022.

developed specifically to discuss electroacoustic music.[2] For example, Emmerson's *The Language of Electroacoustic Music* presents a new lexicon that is necessary to address electroacoustic music.[3] Some research has crossed the boundary between historical and electroacoustic narrative, as is the case with Adrianna Cuervo's article on the Sal-Mar construction at the University of Illinois.[4] The Sal-Mar Construction is an avant-garde musical instrument created by composer/performer Salvatore Martirano, who was also a faculty member at the university.

In addition to the discussion of electroacoustic music, scholars have attempted to write the history of the genre's development. Peter Manning, in the book *Electronic and Computer Music*, lays out a critical timeline concerning the early development of electronic music, as well as its progression into the modern understanding that we have today.[5] In addition, there are several scholarly works that focus on exploring specific aspects of development, often in conjunction with a particular composer or a specific

---

[2] Michael Clarke, "Analyzing Electroacoustic Music: An Interactive Aural Approach," *Music Analysis* Vol. 31 no. 3 (October 2012); 347–80; Simon Emmerson and Leigh Landy, *Electroacoustic Music Analysis* (Cambridge: Cambridge University Press, 2016).
[3] Simon Emmerson, *The Language of Electroacoustic Music* (Basingstoke, Hampshire, UK: The Macmillan Press Ltd, 1986).
[4] Adriana Cuervo, "Preserving the Electroacoustic Music Legacy: A Case Study of the Sal-Mar Construction at the University of Illinois," *Notes* Vol. 68 no. 1 (September 2011), pp. 33–47.
[5] Peter Manning, *Electronic and Computer Music 4th ed.* (New York: Oxford University Press US Branch, 2013).

technological idea. For instance, Dave Henderson wrote a fascinating monograph on the history of experimentalism with electronic music and the nature of composition within a system of experimentation and exploitation.[6] Others, like Flo Menedez, focused on the historical interactions between real instruments and electronic media, how they developed, and how compositional methods shifted to adapt to the changing landscape.[7] In this regard, Menedez explored the earliest works that combined solo acoustic instruments and electronics, and compared composition styles that are considered "traditional" versus the methods that were created in order to take advantage of increasing technology. Some works of scholarship have even allowed modern audiences insight into the shifting reception of electronic music over time, as is the case with Irmgard Bontinck's 1972 article detailing a conference in which electronic music's explosive popularity was both noted and marked as something for further study by researchers of the time.[8]

---

[6] Dave Henderson, *Journey to a Plugged in State of Mind: Electronic Music: 100 Years of Experimentation and Exploitation* (London: Cherry Red Books, 2016).
[7] Flo Menezes, "To Be and Not to Be: Aspects of the Interaction between Instrumental and Electronic Compositional Methods," *Leonardo Music Journal* Vol. 7 (1997), pp. 3–10.
[8] Irmgard Bontinck, "New Patterns of Musiçal Behaviour of the Young Generation in Industrial Societies," *International Review of the Aesthetics and Sociology of Music* Vol. 3 no. 2 (December 1972), pp. 263–71.

Finally, researchers have demonstrated how technology has played a critical role in the development of electronic music from its infancy. Peter Manning detailed recording technology's importance in early electronic music while some, like Jean-Michel Réveillac focused on a world where machines were the new instruments and recordings or playback was the new performance.[9] Several other scholars explored the more scientific side of technology, with some looking at specific scientific principles relating to the evolving nature of sound.[10] Finally, other scholars examined how different groups or locations implemented technology, such as the work at the Parisian IRCAM[11] (Institut de Recherche et Coordination Acoustique/Musique), the aesthetics driven American "Hub," or the work at various bastions of learning like the previously mentioned Sal-Mar Construct at Illinois and the well-known programs at Columbia and Princeton.[12]

---

[9] Peter Manning, "The Influence of Recording Technologies on the Early Development of Electroacoustic Music," *Leonardo Music Journal* Vol. 13 (2003), pp. 5–10; Jean-Michel Réveillac, *Electronic Music Machines: The New Musical Instruments* (London: Wiley-ISTE, 2019).
[10] Patrick Valiquet, "The Spatialisation of Stereophony: Taking Positions in Post-War Electroacoustic Music," *International Review of the Aesthetics and Sociology of Music* Vol. 43 no. 2 (2012), pp. 403-21.
[11] Thibaut Carpentier, Natasha Barrett et al. "Holophonic Sound in IRCAM's Concert Hall: Technological and Aesthetic Practices," *Computer Music Journal* Vol. 40 no. 4 (Winter 2016), pp. 14–34.
[12] Scot Gresham-Lancaster, "The Aesthetics and History of the Hub: The Effects of Changing Technology on Network Computer Music," *Leonardo Music Journal* Vol. 8 (1998), pp. 39–44; Adriana Cuervo, "Preserving the Electroacoustic Music Legacy: A Case Study of the Sal-Mar Construction at the University of Illinois;" Simon Emmerson and Denis Smalley, "Electroacoustic music."

Given the rapid evolution of the genre, there is a significant proliferation of views and styles within the ostensibly young art form. This feature of the genre, coupled with the dichotomy between popular and academic musical pathways and the constantly improving and changing, has allowed for scholars to approach the music through a wide variety of aesthetic ideas. The advent of electronic music, computer music in particular, led to a shift in musical aesthetics often centered on the concept of what music actually was and did the more mathematical and programming-esque electroacoustic count as music?

Aesthetics as a Topic of Consideration

While aesthetics is typically defined as the philosophical study of the nature of art, beauty, and taste, within music, scholars have focused on the interpretation and enjoyment of music, as well as the meaning (or lack thereof) of music. This subset of philosophy has been at the forefront of discussions of meaning and value within music since the late nineteenth century, so it stands to reason that aesthetics and the conceptions of meaning that it encompasses have been a significant component of the literature

surrounding electronic music.[13] Scholars have explored ideas of value in performance, interactions between aesthetics and technology, and how the philosophy of taste and beauty has shifted within electronic music over the course of the last half century.

Even beyond discussions of meaning and beauty in electronic music, the genre has had a complex reception history. While composers in popular and film music embraced electronics, electroacoustic music was entrenched as a niche concern of academics. Gareth Loy et al in the article "Why is Good Electroacoustic so good, and Bad Electroacoustic so Bad?" posits that it is the nature of electronic music that plays a role in the perceived quality of a work.[14] They argue that the reception of a given work is tied explicitly to the experience of those listening, in part because every note, tone, phrase is expressly selected by the composer to have a particular effect. While it could be argued that this is the case for any music, it is especially true concerning electroacoustic music, as the medium allows for minute control over musical elements and for the music to be significantly denser and more tonally complex than the majority of "traditional" music. In the venue of

[13] Elizabeth Mackinlay, Denis Collins, and Samantha Owens, *Aesthetics and Experience in Music Performance* (Newcastle, UK: Cambridge Scholars Press, 2005).
[14] Gareth D. Loy et al, "Why is Good Electroacoustic Music So Good? Why is Bad Electroacoustic Music So Bad?" *Computer Music Journal* Vol. 18 no. 3 (Autumn 1994), pp. 7–8.

performance, there are several arguments taking place in existing scholarship. Some focus on the contention between commercial and academic electronic music, also known as the popular versus the "serious," something that hearkens back to Babbitt's "Who Cares if You Listen?"[15] Ben Neill, in his article "Pleasure Beats" argues that the determinant factor between popular and serious electroacoustic music was the usage of rhythm.[16]

Electronics, especially after the advent of personal computing and digital interfaces, created a noticeable shift in performance and the understanding of what music is in the modern period. As early as Schaeffer's work in the 1950s, electronic music's use of technology has altered how audiences perceive music. Recording was a key element of this, using "found sound" and dialogue to engage with the audience at a higher level of meaning. The personal computer in particular was noted by scholars as a game-changing development in electronic music, drastically altering the aesthetics of both performance and composition. Guy Garnett explores the concept of Interactive Computer Music, something he describes as "a subgenre of

[15] Milton Babbitt, Stephen Peles, Stephen Dembski, et al, "The Composer as a Specialist," *The Collected Essays of Milton Babbitt* (Princeton: Princeton University Press, 2011), 48–54.
[16] Ben Neill, "Pleasure Beats: Rhythm and the Aesthetics of Current Electronic Music," *Leonardo Music Journal* Vol. 12 (2002), pp. 3–6.

'performance-oriented computer music,'" i.e. electronic music with a strong performance component.[17] Garnett explores the interplay between human performer and computer, delving into what each brings to the performance. The interplay of humans and electronics is a point of contention within current discourse, given that electroacoustic music is more often than not a solo "performer" inputting direction to the electronics or even more atypically, simply hitting play on a computer within an empty stage. Electronic music has also diverged on the compositional front, as Micheal Koenig points out in his article on aesthetic integration in computer-composed scores.[18] In comparing how well his particular style pairs with electroacoustic music, he notes a change in thought and terminological differences when producing electronic music. Scholars have noted that electroacoustic music tends to rely on a set of terminology derived from computer programming and scientific terminology. Analysis and composition are often replaced by terms like algorithmic description and compositional processes, while things like form or style are replaced by graphic or scientific notation. Overall, technology has been seen not only as

[17] Guy E Garnett, "The Aesthetics of Interactive Computer Music," *Computer Music Journal* Vol. 25 no. 1 (Spring 2001), pp. 21–33.
[18] Gottfried Michael Koenig, "Aesthetic Integration of Computer-Composed Scores," *Computer Music Journal* Vol. 7 no. 4 (Winter 1983), pp. 27–32.

a new tool, but as an avenue towards a complete shift in thought affecting multiple aspects of the musical process.

The shift in aesthetics, as is the case with any art form, did not happen immediately or instantaneously. Some scholars have approached aesthetics within electronic music by considering the development of the genre throughout the last three-quarters of a century. Andra McCartney is one of the scholars tackling the place of aesthetics within electroacoustic music by examining female electronic music composers and the effects of straddling two worlds both of which are decidedly male dominated and gendered on their compositional careers.[19] McCartney examines not only the historical aspect of the heavily gendered and at times overtly sexualized terminology but also the changes that are being made by female composers to create a more welcoming and inclusive environment and to combat long established norms. There are some scholars who examine specialized aspects of electronic music's history. Scot Gresham-Lancaster explores the Hub, an American ensemble that explored the concept of "computer network music."[20] Network music was a form of computer music designed to combat

[19] Andra McCartney, "Inventing Images: Constructing and Contesting Gender in Thinking about Electroacoustic Music," *Leonardo Music Journal Vol. 5 (1995),* pp. 57–66.
[20] Scot Gresham-Lancaster, "The Aesthetics and History of the Hub: The Effects of Changing Technology on Network Computer Music."

the established idea of electronic music being solely a single composer rigidly controlling every aspect of the music. Instead, the Hub used computer music to create social and collaborative music with each participant computer "reading" what came before it, altering it, and then sending it along until reaching the final product. The future of the genre is yet another aspect of scholarship that is being pursued, with scholars trying to predict where the field is headed as well as what will be held as aesthetically important. Aaron Hynds, with his article titled "New Directions" that considers the place of new music within the tuba and euphonium community.[21] Hynds notes that new music is often couched within established repertoire, and when it is the feature, it is often part of less publicized performances.

Performance is a powerful means of establishing and shaping aesthetics. As electronic music developed as a genre, more and more composers and performers began experimenting with the manner in which meaning can be shaped by the performance. Scholars note that electronic performances have

[21] Aaron Hynds, "New Directions," *International Tuba and Euphonium Association Journal* Vol. 41 no. 4 (2014), pp. 52–54.

changed over the course of the last seventy-five years, with shifts in analysis and acoustics paving the way for new methods of music making.

Electronics as a Performance Genre

Since the 1950s when music with electronics solidified as a genre, there have been a variety of ways of performing said music. This has led, as stated previously, to an in depth examination in how to discuss electronic music and its subgenres.[22] This new discussion created a new facet of musical scholarship where electronic composers were able to construct a working language and compositional framework that was not dependent on traditional theoretical ideology and instead to embrace a more technical and at times scientific mindset.[23] This mindset encompassed both composition and analysis, with both sides using the more scientific idiom that embraced the nature of electronics. Similarly, the nature of scores and performances also shifted, with the discussion of what exactly defines a score or a performance becoming important in the scholarship. The nature of a score became rather malleable, especially with electroacoustic and computer music, where "scores" often became more blueprints or musical

[22] Michael Clarke, "Analyzing Electroacoustic Music: An Interactive Aural Approach."
[23] Lelio Camilleri and Denis Smalley. "The Analysis of Electroacoustic Music: Introduction," *Journal of New Music Research* Vol. 27 no. 1-2 (2008), pp. 3-12.

architectural plans than what is typically understood as a musical score in the Western tradition. This is due, in part, to the shift in mindset that was common in both electronic music and the avant-garde of the 1960s and 70s.

As technology and techniques improved, so too did the ability for composers and musicians to create new works using electronics. While technology that stemmed from recording equipment has always been the basis for electronic music, the personal computer was the biggest game changer for music.[24] Kristen Hermes wrote a practical guide to becoming a live electronics performer for Routledge Press.[25] Her book approaches practical considerations in becoming what she calls "a great musician," discussing DAWs (Digital Audio Workstations) and other controllers, live synthesis processes, and how to create custom tools to personalize a performance opportunity. Others, like Fedorkow, Buxton, Smith and Schreiber look to examine the way sound and space interacted within a listening area to create different acoustic settings.[26] Fedorkow and his

[24] Guy Fedorkow, William Buxton, and K.C. Smith. "A Computer-Controlled Sound Distribution System for the Performance of Electroacoustic Music," *Computer Music Journal* Vol. 2 no. 3 (December 1978), pp. 33–42.
[25] Kirsten Hermes, *Performing Electronic Music Live* (New York, NY: Routledge Press, 2022).
[26] Guy Fedorkow, William Buxton, and K.C. Smith. "A Computer-Controlled Sound Distribution System for the Performance of Electroacoustic Music."; Ewa Schreiber, "In the Face of the Other: Contemporary Composers' Reflections on the (Ideal) Listener," *International Review of the Aesthetics and Sociology of Music* Vol. 48 no. 2 (December 2017), pp. 225–44.

contemporaries explored the concept of space as it interacted with sound by manipulating pan, volume, and other acoustic properties to create areas of refraction and "phantom sounds."[27] Schreiber, on the other hand, explored more of the aesthetic and psychological elements of electronic music, examining how performance of music with electronics developed and the search for an "Ideal Listener."[28] Her "Ideal Listener" was one that, much like Babbitt's specialist, not only had an advanced knowledge of the technicalities behind the music being performed, but would also intentionally listen to the performance multiple times in order to wring the most information and understanding from the music.

In the brass world, the tuba family in particular, there have been several pieces of scholarship relating to the performance of electronic music and avant-garde in general. Andrew Larson tackles experimentalism within the tuba repertoire, analyzing the top three experimental works (some of which are electronic), considering the route forward for the repertoire using the saxophone as a model and creating a list of extended techniques used in the

[27] Guy Fedorkow, William Buxton, and K.C. Smith. "A Computer-Controlled Sound Distribution System for the Performance of Electroacoustic Music."
[28] Ewa Schreiber, "In the Face of the Other: Contemporary Composers' Reflections on the (Ideal) Listener."

music.[29] Many doctoral and master's performance students are required to write some form of performance papers analyzing the works that they play on their degree recitals and as a result, many of the documents analyzing this literature come from this category. For example, as part of his doctoral dissertation Craig Potter examined works that include fixed media and live-processed electronics as part of the performance.[30] Another example of this type of scholarship is James Long's dissertation on the works included in his three doctoral recitals, wherein he briefly analyzes each piece and its history within the repertoire.[31] These performance papers, few that they are, encapsulate the majority of the literature that speaks to brass and electronics specifically, though many of them address electronics as part of a greater narrative. In the *ITEA Journal* (International Tuba and Euphonium Association), there have been several articles on tuba and electronics, including publications on notable members of the tuba community who helped establish electronics as a major part of the repertoire. Mark Nelson, a tubist known in the community for his prolific commissioning, wrote an

[29] Andrew Brian Larson, "Investigating 'Experimentalism': A Case Study of the Tuba and its Repertoire," DMA diss., Louisiana State University, 2013.
[30] Craig G. Potter, "The Electroacoustic Tuba: A Study of Selected Works for Tuba with Fixed Media and Live Processed Electronic Accompaniments," (DMA diss., University of Maryland, 2018).
[31] James A. Long, "Three Dissertation Recitals of Tuba and Euphonium Music," (DMA diss., University of Michigan, 2021).

article in remembrance of Barton Cummings.[32] Cummings was a champion of the tuba and electronics genre in the 1970s and 80s, being responsible for commissioning some of the first works for the genre as part of the over one hundred works composed for him. He was also responsible for several books on contemporary tuba performance and integrating electronics into performance.

Performance Practice within Electronic Music

As electronic music developed into its own performance genre, new methods of performance practice likewise had to be created. Several scholars have attempted to summarize the performance approach to electronic music, in order to better couch the genre within either historical practice or modern pedagogy. Electronic music has acted as a major departure point from more "traditional" music, even among the avant-garde community. There has been significant discussion concerning music with electronics including whether to consider it music at all. This being said, it is no surprise that performance practice within electronic and electroacoustic is an active and growing topic of discourse. Examining

[32] Mark Nelson, "Remembering Barton Cummings," *International Tuba and Euphonium Association Journal* Vol. 41 no. 4 (2014), pp. 15–18.

scholarship on electronic performance practice, it is clear that despite the significant diversification of the genre over the last three-quarters of a century, research seems to either examine electronics as a whole or electroacoustics especially. This may be a holdover from electroacoustic music's role as a primarily academic genre, or possibly the repertoire is not influential enough to be seen as a particularly valuable field of research. This is in comparison to other styles of music, where there are scholars examining particular facets and subgenres, such as Buckholz and Rainer's individual works on instrumental performance practice in the romantic period.[33]

There have been several scholars who have attempted to create an overview of electronic performance practice, with a significant spike of interest in the topic in the early 1990s. Three different scholars published articles between 1995-96 on the topic, with the weightiest being co-authored by Karlheinz Stockhausen and Jerome Kohl.[34] The article is a transcription of a spontaneous lecture Stockhausen gave during his visit to the Freiberg

[33] Chris Buckholz, "Performance Practice for Eighteenth Century Solo Trombone Literature," *ITA Journal* vol 35 no. 1 (2007), pp. 48–50; Bernhard Rainer, "Bruckner on Valve Trombone? —Low Brass Performance Practice in Anton Bruckner's Works," *Historic Brass Society Journal* Vol. 28 (2016), pp. 135–161.
[34] Karl Stockhausen and Jerome Kohl. "Electroacoustic Performance Practice," *Perspectives of New Music* Vol. 34 no. 1 (Winter 1996), pp. 74–105.

Musikhochschule in 1991 as they were performing his piece *Mixtur* for orchestra, four sine-wave generators, and four ring modulators. The lecture consists of Stockhausen's opinions on what he called the "six areas of electroacoustic performance practice" that mainly divided different techniques and usages of electronic instruments into semi-specific categories. Around the same time, Alistair MacDonald examined electronic performance practice from a more esoteric point of view in **"**Performance Practice in the Presentation of Electroacoustic Music." MacDonald posits that electroacoustic music, more so than many other genres, relies on a partnership and mutual understanding between listener and composer in order to convey a deeper and more complex form of meaning.[35] The article's most provocative claim is that electronic music, by virtue of being entirely digital and hence having no real "hard, physical form" is an illusion. As such, there is a depth of manipulation and variability available to electronic music that is lacking in any other medium that has to rely on kinetic sound generation. Mari Kimura offers a third approach in "Performance Practice in Computer Music," primarily focusing on the

[35] Alistair MacDonald, "Performance Practice in the Presentation of Electroacoustic Music," *Computer Music Journal* Winter 1995, Vol. 19 no. 4, pp. 88-92.

nature of performers interacting with electronics and the difficulties that this work inspires. Kimura notes that in addition to the wealth of new sounds and performance opportunities that are offered by electronics, there are also a number of difficulties. Some of those inherent difficulties include the learning curve of performing electronic pieces with musicians unfamiliar to the medium, adapting to the often complex and non-traditional notation, struggling to keep the ensemble and electronics aligned without losing one or the other, and the danger of damaging someone's hearing.[36]

Since those articles in the 1990s, electronic music has advanced in popularity to the point that the genre is being included in books dedicated to general musical knowledge. For example, Russell Kuhtz includes a discussion on historical electronic music when discussing music of the twentieth century, next to serial and aleatoric music. He also mentions the growing use of recording systems and digital instruments, and the need for the average musician to at least have a passing understanding of electronic music as they do with the avant-garde and Romantic styles.[37] Furthermore, as technology has advanced over the past two decades, musicians have

[36] Mari Kimura, "Performance Practice in Computer Music," *Computer Music Journal* Vol. 19 no. 1 (Spring 1995), pp. 64–75.
[37] Russell Kuhtz ed., *Music: Techniques, Styles, Instruments, and Practice,* 1st ed. (New York: Britannica Educational Publishing, 2017).

implemented it more regularly into their daily lives. Musicians rely on electronic technologies for metronomes, tuners, self-recording, and many more critical pedagogical and performative uses. As a result, more recent scholars like Gerald Klickstein[38] mention ways in which electronic use can be integrated into healthy and effective performance practice, and even the venerable Roland Jackson includes several sections in his book *Performance Practice* to techniques, terminology, and ideas specific to electronic music.[39]

As you can tell from this short survey of the literature, the study of aesthetics, electronics as a performance genre, and electronic performance practice has primarily been dedicated to establishing a baseline of the large field of electronic music. I began this project to gain a better understanding of how the history, literature, aesthetics, and performance practice of electronic music has developed within the brass family in particular. Since this information was not in secondary sources, I decided to gather the information by creating and administering a survey examining the place of electronics within brass repertoire. This survey asked academic and

[38] Gerald Klickstein, *The Musician's Way: A Guide to Practice, Performance, and Wellness* (New York, NY: Oxford University Press, 2009).
[39] Roland John Jackson, *Performance Practice: A Dictionary-guide for musicians Vol. 1* (New York, NY: Routledge Press, 2005).

professional educators, performers, and composers their opinions on electronic music, examining a wide range of concepts in order to gather enough information to make some preliminary conclusions about brass and electronic music.

Survey Methodology

The survey used as the basis for this thesis was developed to glean impressions on electronic music from practitioners on brass instruments. The survey was originally designed to be used as an interview script with the resultant interview being recorded and transcribed. However, due to time constraints and a desire to gather as many disparate opinions as possible, I pivoted to an online survey format with questions reworked to fit better as a digitally submitted written artifact. Fully approved by the UMKC IRB, the entire survey was delivered through a closed system on Google Forms, with results cataloged on a connected Google Sheet. Potential survey participants were approached over the course of a two-month period between October and November of 2022. The first communication determined interest, and I sent those who expressed interest in participating a follow-up message containing instructions and a link to the survey's Google Form. In total 150 people were initially contacted, resulting in forty-

nine submissions out of approximately seventy interested parties. This gives the survey a roughly 30% conversion rate from contacts to submissions, with an impressive percentage of approximately 70% of people expressing interest following through and submitting a survey. The participants involved include professionals from a variety of backgrounds, ages, and lifepaths with answers coming from musicians specializing in all brass instruments, composers, and educators as well as performers. The survey was completed entirely online, with access to the results limited to myself and my thesis supervisor Dr. Andrew Granade. Answers were then collated and analyzed in order to observe potential patterns within the thoughts of the participants.

The Google form was formulated to give the participants as much room to answer as possible. In this way, with the exception of a handful of transitory questions and the initial acceptance of the participation per IRB standards, every question was formatted in an essay or short answer format. This purposefully chosen format freed the participants to write as much or as little as possible, allowing them to better draw conclusions and elaborate on their thoughts. The questions were also structured to allow for a freedom of thought, with few “yes or no" answers; rather questions were designed to

provoke thought and discussion. This approach did lead to some inconsistencies in answers, such as a differentiation between “landmark” and “standard” works or the occasional repetition of answers if a participant had accidentally answered a future question while elaborating on a prior one. Despite formatting the project in such a way to allow personal details, the only personal information collected were emails as a form of answer identification, and little to no personal information will be used within this thesis and only with the participant’s express written permission.

The survey consists of nineteen questions, split into three primary groups: general, composer-focused, and performer-focused. The general questions were geared towards trying to establish a baseline for comparison among survey participants. The questions bookend the composer and performer-focused questions, with the first section exploring the background of the participants and the role of electronic music as a discipline. The second section primarily examined the submissions' impressions on the importance of electronic music as a medium, the trends they saw within the genre, and any advice or thoughts for electronic music moving into the future. The results of the survey questions suggest some fruitful paths of

explorations, and some interesting areas of overlap between a majority of submissions.

The composer-focused group included seven questions focused on electronic compositional techniques and the difference between writing electronic music and acoustic works. Several of the questions were geared toward the compositional process, examining how the composers treat electronic music, whether their process changes when writing for electronics versus acoustic instruments, and how they treat electronics as a musical element. The final part of the composer section asked the participants about the difficulties and benefits of electronic music as a genre as well as its viability and value.

Questions eleven through sixteen made up the performer-focused group, though a considerable number of the self-described composers also completed this section of the survey. This section began with questions exploring the canon of brass and electronics, and asked participants about both landmark and standard works. For the purposes of the survey, I made a differentiation between the terms "landmark" and "standard or major." In the context of this project, "landmark" was employed to mean a work of historical significance (oftentimes participants listing the earliest work for

their instrument and electronics, though others were offered), whereas "standard or major" works are those frequently performed or have served as points of inspiration for later works. One question specifically asked participants about any works they have commissioned and performed, examining where some of the previously listed landmark and standard works originated.[40] The final series of questions in the performer section covered similar ground to the later composer questions, considering the benefits and difficulties of brass and electronics music for their instrument as well as the trends they notice as performers within the genre.

As the survey unfolded, I received a significant amount of data regarding the brass and electronics genre. It was important to note that some of the survey results charted a different course than I had originally intended, but those answers highlighted some surprising elements of thought within the brass family. That is not to say that the survey was unsuccessful, as much of the data helped answer the preliminary questions I asked in the beginning work of this thesis. These questions related to the importance, history, and future of the genre moving forward.

[40] These lists of landmark and standard works have been compiled by instrument with basic categorical information available in the appendix of this thesis.

Preliminary Considerations and Initial Questions

Beyond just wanting to add to the literature on brass and electronics, there were three major questions I wanted to examine with this project: 1. Is brass and electronics an important or viable genre and who is performing it? 2. What is the history of brass and electronics? And 3. What Repertoires exist and how are they growing? By investigating the data through the lens of these three questions in light of the survey results and the existing literature, it is possible to get a strong understanding of the brass and electronics repertoire as it relates to the brass family as a whole.

The first issue of brass and electronics being an important and viable genre of performance was at the forefront of my thoughts when beginning this research. As a tubist, I find electronic music and brass and electronics are a core component of our repertoire, as the genre began shortly after the tuba began to be considered a solo instrument. In many ways, it could be argued that brass and electronics has become a primary genre for solo tuba and euphonium, alongside tuba/euphonium and piano and unaccompanied instruments. However, when cataloging the results of the survey it became apparent that this primacy was not shared by other members of the brass family. In fact, as will be discussed later in the thesis, the opposite was the

case. It is for this reason that the exploration of electronic music's place as a viable or important genre within the brass family is a topic of considerable worth. This exact question was asked of both composers and performers, in the second section of the general questions, with the express purpose of culling the thoughts of active performers and educators on the genre. It is my belief that these musicians are most able to give concrete answers as to the value of a genre, given that they are the ones that are either intentionally performing it or are encouraging their students to do so.

In considering the second question, I made the decision to concentrate the history of electronic music within this thesis on its relevance to the brass and electronics genre. That being said, it is worth noting that while some of the history of electronic music is often covered within the context of undergraduate music history survey courses, the full history of electronic music is much more interesting and complex than one might originally believe. Electronic music has played a pivotal role in the development of the avant-garde, the advancement of performance practice, and the development of musical technology as far back as the 1930s. While this history is undoubtedly important, this thesis will instead focus on the period from roughly 1970 until the present day. It is also critical to track the

advancement of brass and electronics within different members of the brass family, as tackled in depth later on, different members of the family have embraced both Electronic music and other performance practices to greater or lesser degrees that are frankly quite surprising, and shines a light on a potential source differentiation in what can often be considered a rather homogeneous research discipline (namely "brass" methods and research).

This notion ties directly into the last of the three questions, namely that repertoires of brass and electronics not only exist, but are actively growing and gaining relevance within the brass family. While there are differing levels of importance within different brass instruments, every instrument has some amount of Electronic music as part of its canon. This fact, coupled with the rise in digital-only or fully electronic recitals in response to the COVID-19 pandemic, has made brass and electronic repertoires all the more prominent, even in instruments where it is not a primary genre. This recent shift had led to an interesting avenue of research for the thesis, as the level of exposure that brass and electronics found as a major genre for solo literature is considerably different than it was even five years ago. A major portion of this thesis' later chapters will be dedicated to the accessibility and

viability of these repertoires, their growth, and how they have played into the development of brass and electronics as a genre.

Having examined the previous scholarship and cataloged the data from my own research, it was time to collate all of the material into a unified document. In order to best structure the data, I wanted to organize the thesis in such a way that previous scholarship informs the results of the survey and the conclusions that I have drawn. Each chapter is meant to operate as both a stand-alone document, dealing with a particular facet of my own scholarship as well as work as a cohesive whole. Each chapter includes its own subchapter for ease of navigation, and to maintain flow within the document.

Overview of the Thesis

This thesis has six major sections, categorized as five chapters and an appendix. Each chapter approaches a specific aspect of the research involved whether that be the historical application of electronic music, the aesthetic value, the impact on music accessibility and performance practice within brass repertoire, and the differing levels of impact that electronic music has had on repertoire for the instruments of the brass family.

The second chapter, "Basic Historiography of Brass and Electronics as a Genre," establishes the historic foundation of the project by defining and framing certain terms and technical specifics in order to mitigate any miscommunication later in the paper. The timeline contained in this chapter begins roughly around 1970, as that is the point at which electronic music begins to be composed for brass as a solo instrument. This timeline couches the thesis within the development of modern avant-garde, electronic, and computer musics, as well as late 20th to early 21st century brass solo repertoire. This chapter also explores the role of technological advancements within the musical world and how said advancements were responsible for the increased viability and accessibility of electronic music as a performance genre. The last component of the chapter is a discussion of "landmark" and "standard" repertoire lists, as well as the difference between the two.

Chapter three, "Important Influences on Performance, Composition, and Development," considers the various influences found in the development of brass and electronics as a genre. This includes a significant discussion of the findings of the survey, taking opinions from musical professionals from three musical spheres of performance, composition, and education. This

chapter examines the influences that have shaped electronic music as a whole as well as brass and electronics as a genre including the compositional considerations and the aesthetics, external influences on electronic music (namely pop music, film, and the argument between classical and avant-garde), and how performance practice and the interaction between man and machine has evolved over the last half-century.

One of the fundamental benefits to modern brass and electronic music is the incredible accessibility it presents to modern performers. Chapter four is dedicated to exploring this accessibility and what it means to the brass music. A surprising result of the survey was the emphasis on the accessibility and variety of available music as a major positive of the medium. The results also highlight a difference in thought on "landmark" and "standard" works. Variety and portability are also discussed as major contributions to the success and continued existence of brass and electronics as a performance genre. The chapter discusses the impact of tradition, both as to how the genre developed and its ultimate subversion of publishing and performance. This chapter also examines the pedagogical and performative use of brass and electronics for modern musicians.

Chapter five “Viability of Brass and Electronic Music as a Genre,” as the final chapter of the thesis, addresses the viability of brass and electronics as a medium and its success moving into the future. This concluding chapter considers the reception of the brass and electronics works by composers, educators, and performers and examines the point of separation in the genre's importance to the repertoire between different members of the brass family. This section also addresses the lack of serious scholarship on brass and electronics as a specific field of study. Prior to this study the vast majority of writing consisted of performance papers devoted to individual recital sets as part of degree requirements rather than examinations of the genre as a whole. This chapter also grapples with electronic music’s (brass and electronics especially) position as a potential vehicle of change and social commentary beyond any other brass medium, as noted by participants in the survey.

Finally, there is an Appendix section, consisting of the survey questions, lists of “landmark” and “standard” works, and bibliographic information. This will hopefully serve as an important launch point to future scholarship into the realm of brass and electronics.

CHAPTER 2

HISTORIOGRAPHY OF BRASS AND ELECTRONICS AS A GENRE

Introduction

When my father first suggested commissioning a film composer that was a former student of his to write a piece for my recital I was ecstatic.[1] As someone who has always enjoyed video game and film music, I was eager to delve into my own musical adventure. After receiving the piece from Ben Chrisman, I was surprised by the fact that it was for tuba and fixed media and quickly realized that performing with electronics was a fundamentally different experience than I have ever had as a performer, one that challenged me and opened a new world of possibilities. Scholars like Simon Emmerson, Leigh Landy, and Dennis Smalley who have made their career studying electronic music have emphasized that the medium often exists separately from "traditional" art music. Because of this separation, there is a need for a new set of terminology specifically to discuss electronic music performance. As a genre that has evolved both significantly and rapidly, there are several terms that warrant an explanation. The first part of this

[1] Ben Chrisman, *Themes on Dante's Inferno* (N.p.: Theoretical Media, 2015).

chapter focuses on important terms that will be used frequently throughout the thesis that warrant an extended elaboration. This chapter seeks to address the ambiguity in some of the basic terminology that are frequently used such as electronic music and electroacoustic that have important but somewhat nuanced differences. I will also establish my interpretations of certain key vocabulary, which will become important when discussing the results of the survey. In order to fully understand the results of the survey, and the importance of brass and electronic music, it is critical to have a foundational understanding that includes the basic terminology used by those within the electronic music field, and a brief overview of the historical development of the medium especially as it relates to the technological innovations that drive much of the forward progress.

Functional Terminology

One of the greatest difficulties with the understanding and development of music with electronics is the steep learning curve for those trained in Western acoustic music. There is merit to the idea that electronic music is a wholly separate style of music from acoustically composed works, given a reliance on the different modes of composition, terminology, style of analysis, and aesthetic principles from what is generally used in acoustic

music.[2] Therefore, it is important to clarify terminology in order to prevent misunderstandings. It goes without saying that there may be some vagaries on broad terms and some contention on specific technicalities, but it is important to lay the foundation.

The first and broadest working term is "electronic music," also synonymous in my conception as *music with electronics*. According to Lejaren Hiller, electronic music is defined as "any music involving electronic processing, such as recording and editing on tape, and whose reproduction involves the use of loudspeakers."[3] Needless to say, this is an incredibly broad categorization that encompasses functionally any music that uses electronics in any way, as long as it reproduces it via loudspeaker. It is not viable to base the categorization on mode of composition, as in modern practice the overwhelming majority of music is composed at least in part using electronics. These compositional aids might include: MIDI (Musical Instrument Digital Interface) instruments, recording studios, composing software like Finale or Noteflight, synthesizer programs, and DAWs (digital/audio workstations) such as ProTools and Reaper to name

[2] Simon Emmerson, *The Language of Electroacoustic Music* (Basingstoke, Hampshire, UK: The Macmillan Press Ltd, 1986).
[3] Encyclopedia Britannica Online, s.v. "Electronic Music," by Lejaren Hiller, accessed January 18, 2023.

only a few. By centering the distinction in performance, it allows us to better focus on the music. For the purposes of this thesis, I am using "electronic music" to encompass any form of music that uses electronics as the main mode of accompaniment or performance of musical material. This term is used in later chapters primarily as a way of discussing the genre as a whole, regardless of the plethora of styles or genres that have evolved in the last seventy-five years.

The second and only slightly less broad term is *electroacoustic music*, a term of choice in academic dialogue both in the classroom and in scholarship. Electroacoustic music is defined by Emmerson and Smalley in *Grove Music Online* as "Music in which electronic technology, now primarily computer-based, is used to access, generate, explore and configure sound materials, and in which loudspeakers are the prime medium of transmission."[4] Emmerson and Smalley note that electroacoustic music has two main subcategories, *acousmatic* and *live electronics*. Acousmatic music deals primarily with "closed-circuit" works, pieces of music that are entirely developed (conceived, composed, recorded, produced) via an electronic

[4] Simon Emmerson and Denis Smalley, "Electroacoustic music," *Grove Music Online,* 2001, Accessed June 23, 2022.

method and requiring loudspeakers to be performed. These pieces exist solely in recorded format, and can only be heard when played back through a loudspeaker system. In contrast, live electronics rely on technology to produce and alter sound, either by generating new sound and pushing it through loudspeakers or by taking existing live material and altering it before again sending it through the loudspeaker. In my work, I associate the term "electroacoustic" with the more academically and avant-garde aligned music within the genre. Electroacoustic will typically be used regarding music that is heavily influenced by either the avant-garde or the heavily programming and mathematical works that evolved out of the *elektronische musik* of 1950s Cologne. This decision is based more on how the term "electroacoustic" is used in common parlance than on the virtue of its definition. While the definition does not specifically mention a popular or academic leaning rather referring to the materials in use, the usage of the term is overwhelmingly attached to academic writings and performances, and as such has adopted that characteristic into its definition.

Before discussing brass and electronics as it relates to the brass family, it is important to specify what I am implying with the term *brass family.* The brass family as a concept is a simple and straightforward one, encompassing

the five major brass instruments commonly found in Western concert ensembles: trumpet, horn, trombone, euphonium, and tuba.[5] As a brass specialist, I was interested in examining how electronic music was treated and received outside of my own experience. Though I try to discuss the euphonium and tuba as separate entities throughout this document, it is important to note that the two are commonly discussed together and their repertoire and development often intermingle. With the concept of brass and electronics, I am using that category to make broad statements and generalizations without having to list each individual medium, type, and style. This generalization also allows for comparisons across history and across instruments.

Landmark v. Major: A Difference in Terms

In a surprising turn from the survey, I discovered that there is a perceived difference between the terms "landmark" and "major" in the way musicians categorize works. Before performing the study, I had thought the terms interchangeable, both qualifying a piece of music's significance within the repertoire. While this is true to an extent, what I discovered was that

[5]Russell Kuhtz ed., *Music: Techniques, Styles, Instruments, and Practice,* 1st ed. (New York: Britannica Educational Publishing, 2017).

"landmark" and "major/standard" look at two separate concepts. This discovery also revealed a breakdown in the performance practice and tendencies of brass and electronics, in part tied to some of the established difficulties in performing brass and electronic music. Of the forty-one participants that answered this section of the survey, nearly all were able to offer a composer or specific work when asked about the standard works for their instrument. In contrast, when asked about landmark works, only approximately half the respondents were able to give a specific piece or composer, and even fewer had stated that they actually played the piece.

I believe this discrepancy is because there is a fundamental difference in what governs landmark vs major works. I would argue, based on the responses and the piece offered, that the term "landmark" is centered on the idea that there are works within brass and electronics that have value from a perceived historical significance. When we examine some of the works listed by respondents as "landmark" it is easy to recognize a pattern that quickly forms. Works like *Chaconne* (1965) by Henrik Badings and *Aries (1977/80)* by Karlheinz Stockhausen for trumpet, Jacob Druckman's *Animus I* (1966) and *Prelude, Fugue, and Big Apple* (1973) by Walter Ross for trombone, as well as Walter Ross' *Midnight Variations* (1971) and Henri

Lazarof's *Cadence VI* (1974) were all suggested as landmark works.[6] Every single one of these works represents one of the first pieces of brass and electronics for that particular instrument. Very few of these pieces are even known to the general population of musicians, let alone played with any frequency. One of the most obvious obstacles to these pieces' performance is the inability to playback the audio, as most of these earliest pieces relied on magnetic tape, something that is a rarity in the modern day. Another difficulty lies in the esoteric and often difficult nature of the works, many of which are products of experimentation and were written before a standardized notation existed to make them easier to read for a performer.

In contrast, "major" or "standard" works seem to be chosen more on the basis of audience and performer popularity than on historical significance. Standard works are considered common performance material. I noticed that there is a differing level of popularity for brass and electronics music within the different members of the brass family. In the case of trumpet and horn repertoires, brass and electronics compositions are fairly rare so the number of major works and the general pool of pieces is significantly lower for those instruments. In the horn world particularly, brass and electronics is

[6] See Appendices for full bibliographic information

rather unpopular, with one respondent remarking that there are no landmark or standard works for horn, just a handful of decent pieces. Many of the pieces that make the list as being "major" could be broadly categorized as works that popularize or revolutionize a particular facet of brass and electronics. For example, Neal Corwell is a well-known composer within the tuba and euphonium community and has several works with electronics that set the standard for tuba and electronics compositions. There are some rare pieces that were considered by respondents and by scholars to be both landmark and major works, though these do tend to be comparably younger pieces, often originating from the 1990s rather than the 1960s or 1970s. I would argue that this is evidence for three waves of brass and electronic composition; the first being the initial period from 1965 to approximately 1978, the second being from around 1990 to approximately 2004, and the current epoch of brass and electronic starting around 2010 and continuing into today.

Brief History of Electronic Music as a Genre

In order to make the claim of three broad periods of brass and electronic development, it is important to put that periodization within the history of electronic music broadly. Electronic music began in multiple locations as a

generalized movement toward using new technology in the wake of World War II. A true "beginning" is hard to place, given that as early as 1897 there were scattered instances of composers using electric-based sound generators to experiment with new sound profiles. In the period shortly after World War II, electronic music exploded into relative popularity, with movements like *musique concrète* in Paris that focused on recorded sound, *elektronische musik* in Cologne that focused on newly generated sound, as well as other later variations in Italy, Japan, and the United States. These variations of early electroacoustic music capitalized on the increased capability and fidelity of magnetic tape recording in order to solidify electronic sounds as a viable reproducible medium such as magnetic tape.

By the 1950s, magnetic tape had become the industry standard and was a driving force that allowed both *musique concreté and elektronische musik* to be established as dominant forms of electroacoustic music. These two disciplines used the technology of the time in fundamentally different ways. Pierre Schaffer and the Paris school employed "found sound," recording ambient sounds and environments, combining the recordings to create new tones and impressions. *Musique concreté* composers did little in the way of altering the acoustic properties of a recording. Instead, they

would often rely on layering and loops to create some of the earliest examples of sonic landscape music, a genre that would feature prominently as an accompaniment type in the brass and electronics genre. In contrast, The Germans of the Cologne school used the burgeoning oscillator and tone generator technology to create entirely new, entirely composer-controlled tones that could and would be manipulated to create the earliest of electroacoustic works. *Elektronische musik* was strongly influenced by the serialist movement, an impulse that carried over into American electroacoustic music in the post-war years.[7] In the modern world of music with electronics, *musique concrète* survives most prevalently in the realm of live electronics and sampling, *elektronische musik* on the other hand became the musical progenitor that is most commonly encountered by the average listener today.

The 1950s saw the recording system, tone generator, and oscillator begin to replace staff paper, instrument, and performer.[8] The 1960s saw the development of "tape music" and "fixed media," terms that would become synonymous with electronic music of multiple types long after tape had

[7]Simon Emmerson and Denis Smalley, "Electroacoustic music."
[8] Ibid.

become outdated. “Tape music” is a broad term used as an umbrella for any work that uses magnetic tape as the recording medium. This term later came to be to function as a colloquial term referring to music with electronics, even after magnetic tape was no longer the primary recording vessel. The period between 1960-80 saw a proliferation of new compositional styles and emphases, with composers branching off into new directions rather than maintaining the prior decades’ schools of thoughts. It was during this period that electronic works with solo instruments began to be composed, one of the first being Bruno Maderna's *Musica su due dimensioni* for flute, cymbals, and tape in 1958 that paved the way for the combination of acoustic instruments and fixed media leading into 1970. Some of these first pieces for brass and electronics specifically were Henrik Badings *Chaconne* (1965) for trumpet and electronics, *Theatre Piece* (1966) by Pauline Oliveros and Jacob Druckman’s *Animus I* (1966) for trombone.[9] In these early works, the vast majority of the accompaniments were provided via magnetic tape, which led to the commonly used (though now outdated) term

[9] Bruno Maderna, *Musica su due dimensioni* (Milan: Zerboni Publishing, 1958); Henrik Badings, *Chaconne* (Amsterdam: Donemus, 1965); Pauline Oliveros, *Theatre Piece for Trombone Player* (N.p., 1966); Jacob Druckman, *Animus I* (New York: Boosey&Hawkes, 1966).

"tape music" to refer to any work for instrument and electronics, even being mentioned as a category as late as 2006 in the *New Tuba Source Book*.[10]

The 1970s saw a continuing development of technology and the early implementation of pre-digital processes, while the 1980s saw a major evolutionary step forward in terms of electronic music's versatility and complexity. It was in the 1980s that digital media overtook analog sources, beginning the shift to contemporary audio engineering and modern electronic music. Because of this shift, it is not unwarranted to consider the history of electronic music as dichotomous, with everything pre-1950-1980 as one movement and everything 1980 as another. As music entered the 1990s and the twenty-first century, performing as an electronic artist has become a staple part of popular and film music, with genres like synthpop, dubstep, house, and rave all relying on electronics for their continued existence.[11] As computers became significantly more powerful and portable, digital audio workstations became a staple part of both recording and performance. Today, it is not uncommon for an electronic performer to give a recital or perform at a gig with little more than a laptop, MIDI controller,

[10] Daniel Perantoni and R. Winston Morris, *Guide to the Tuba Repertoire: The New Tuba Source Book* (Indiana Repertoire Guides. Indiana University Press, 2006).
[11] Peter Manning, *Electronic and Computer Music 4th ed.* (New York: Oxford University Press US Branch, 2013).

and a set of loudspeakers.[12] Electronic music now relies on technological developments to be successful. Since its inception, electronic music has relied on technological advancements, first within recording technology, but then later on the advancements made by the composers and performers themselves as a way of achieving a particular sound or setup.[13]

"Eras" of Brass and Electronic Music

Based on trends I discovered between existing scholarship and the results of my own ethnographic survey, I would suggest that brass and electronic music can be separated into three main "Eras" with defining characteristics and modes of accompaniment. The "Tape" Era of brass and electronic music begins in 1965 and encompasses the entirety of the 1970s. This first era of brass and electronics relied heavily on the avant-garde genre that it stemmed from and included technical solo parts accompanied primarily by computer generated drones, synthesized waves, and other electronic effects. This period of the genre generally used magnetic tape as the primary form of accompaniment though there were some rudimentary

[12] Kirsten Hermes, *Performing Electronic Music Live* (New York, NY: Routledge Press, 2022).
[13] Peter Manning, "The Influence of Recording Technologies on the Early Development of Electroacoustic Music," *Leonardo Music Journal* Vol. 13 (2003), pp. 5–10; Peter Manning, *Electronic and Computer Music*.

computer accompaniments. As the first of the three "Eras," the Tape era was the one most concretely connected to the avant-garde style that it branched from. Music from this period commonly resembles experimental works of the time period, with both electronics and the solo instrument being used as musical elements for the composer to use as building blocks for creating their work. For example, in *Midnight* Variations by Walter Ross, the tuba rarely operates as a solo voice, but rather interacts and mixes with the electronics in order to create the intended effects during performance.[14] Trevor Wishart notes in his book *On Sonic Arts*, that electronics allow for a near total freedom from pitch as a defining factor in music. [15] Instead, notation in regards to the listening experience and what the sound material is actually doing becomes primary. This is likely a major reason that much of the early brass and electronic music is written using graphic notation, charting what is able to be heard and what material is happening rather than pitch. [16] This period primarily used synthesized sound as its base electronic material, formed by oscillators and drones in order to create prerecorded material that could then either be made into a fixed media backing track or

[14] Walter Ross, *Midnight Variations* (N.p.: Dorn, 1971).
[15] Trevor Wishart, *On Sonic Art*, (Amsterdam: Harwood Academic Publishers, 1996).
[16] Ibid.

manipulated live. One of the major developments moving into this period was the ability of oscillators to mimic and therefore interact with the timbral frequencies of instruments as well as alter the primary characteristics of the synthesized sounds in order to create captivating effects when paired with an acoustic instrument.[17] Few of the pieces from this era are played by modern performers, partially due to the nature of the solos but also because of a lack of equipment. Many of these pieces are unable to be performed today simply because they existed on programs specifically designed for that performance, or because modern recital halls and studios lack a magnetic tape player or computer from the 1970s.

The second "Era" of brass and electronics encompasses the late 1980s until around the year 2000, and saw the integration of the compact disc as the new mode of accompaniment, leading to my naming the period the "CD Era." This period of the genre saw the introduction of composers such as Elizabeth Raum, Neal Corwell, and James Mobberley. It was also in this period that brass and electronics became much more accessible, as the compact disc allowed for a greater commercialization and proliferation of

[17] Dairuo Feng, "From Pre-Recorded Tape to Live Computer Processing: Piano Music from Davidovsky to the Present Day," (DMA diss., Kansas University, 2018).

pieces. It was also by this point the nature of brass and electronic music saw somewhat of a shift. By the 1980s, brass and electronics had existed for long enough that the majority of composers had seemingly moved away from strictly avant-garde applications of the genre, and instead also were creating pieces that were more aesthetically in line with a broader audience. The change in aesthetics led to a diversification of style, which in turn led to a differentiation in "musical experience."[18] This was achieved by a shift towards programmatic style of works, taking inspiration and sometimes actual samples from popular genres, sonic landscapes, and recorded vocal audio. This led to a new branch in the brass and electronic music, with some composers continuing in a more avant-garde style and others working within the newer more programmatic style. To compliment the more programmatic nature of these newer works, the solo brass at this point began to operate in a more soloistic fashion, rather than as another texture or sound element within the piece. Likewise, some composers like Neal Corwell moved away from graphic notation and reintroduced more formal pitch notation of the electronics given that it was acting as a more traditional

[18] Trevor Wishart, *On Sonic Art,* 43.

accompaniment.[19] This meant that many of the works from this period are still performed. The longevity of these works is also aided by the fact that these pieces adopted a more melodic-focused composition style, creating a more "audience-friendly" sonic landscape than the more aggressively avant-garde sound of the first era. I find that composers within this era, such as Neal Corwell and James Mobberley, began composing with a more general audience experience in mind, drawing from popular music, dance clubs, films, and video games in order to create more experiential listenings rather than works designed to appeal to other specialists.

The final "Cloud" era is ongoing, having begun in the mid-2000s and continuing through the present day. This most recent era is understandably the least reliant on physical media, with the majority of accompaniments now being shared and performed without ever touching a physical medium. This entirely digital process has made it much easier for composers to self-publish and sell music on their own website, with a performer able to buy the piece and have both score and accompaniment near instantaneously. The balance in this period between fixed media (accompaniments composed and

[19] This period of the genre generally used magnetic tape as the primary form of accompaniment though there were some rudimentary computer accompaniments.

recorded as a finished work) and live electronics (accompaniment that requires input from the soloist that is then electronically manipulated) depends greatly on particular instruments, though in most cases fixed media is the primary method of accompaniment within brass and electronic works. This era, because of ever increasing technological versatility, is the most diverse in terms of style and materials used within the genre. With tools like Max Patch/MSP it is possible to pursue the more avant-garde works that were central to the tape era, as well as being able to create programmatic works using prerecorded sound or audio samples. This versatility has led to something of a crisis of identity within modern brass and electronic music, as there are so many options available and all are valid. In terms of mediums, much of the material today is entirely cloud or computer based, never existing as a permanent medium. However, there are still composers who sell scores that include CD accompaniment, and even those who are experimenting with magnetic tape as a kind of nostalgic medium. Likewise, in terms of styles there is a wealth of variety, from works that have soloist and electronics working as parts in a greater whole, works with soloist as the primary voice with electronic backing track, or pieces with the soloist musically narrating the thoughts and emotions of a primarily spoken

electronic recording. While there is cross-pollination and overlap between eras, these three eras encompass the major trends with brass and electronic music. These periods saw significant aesthetic development, similar to the advancement of technology from one period to the next.

Where Does Brass and Electronics fit within the Brass Family

"A common programmatic style for this year's (tuba) conference was the placement of new works amongst older, more established compositions. In doing so, the newer compositions provided contrast in what would otherwise be a fairly standard recital."[20] While this particular quote was given in relation to new tuba works as a whole, it nevertheless relates to the most commonly noted programmatic role of brass and electronic pieces. In surveying newer compositional trends, Aaron Hynds notes that new music seems to fill the role of pleasing side dish next to the more substantial main course of established works. Rarely, outside of particular bastions of new music, is electronic music the focal point of a recital. Instead, it is more typical for performers to include a work on a recital that is electronic, but have it as an appetizer, to continue Hynds' metaphor. Concerts that consist

[20] Aaron Hynds, "New Directions," *International Tuba and Euphonium Association Journal* Vol. 41 no. 4 (2014), pp. 52–54.

primarily of electronic music are often relegated either to specific conferences or concert series, where all the electronic composers and performers gather together to perform for each other or they act as a kind of gimmick performance. To give two examples, my own Doctoral lecture recital was entirely electronic, but that was a result of the recital's theme centering around works I was part of commissioning.[21] Another similar example comes from the Great Plains Regional Tuba and Euphonium Conference where Thomas Stein also did an entirely electronic recital of his student's compositions.[22] This limited sample is representative of larger trends and suggests the truth of another of Hynds' points within his article: even in a community of musicians who have wholeheartedly embraced electronic music, there is still a tendency for it to be relegated to filler role rather than a viable focus. That being said, there are some important considerations that may shift the argument in electronic music's favor.

Within the tuba/euphonium and electronics communities, the use of electronic music as either part or the focus of degree papers is fairly

[21] Taylor Hicks Tuba, "DMA Lecture Recital 10/14/22," YouTube video, 1:17:42, (March 13, 2023). https://youtu.be/KGPmqesUA2k.
[22] Concert information is available in the full conference program at the top of the webpage; Vince Kinney, "Great Plains Tuba and Euphonium Conference Program/Schedule," Accessed March 13, 2023, https://gprtec2022.wixsite.com/gprtec/schedule.

popular. In fact, these degree papers denote the majority of the extant literature about brass and electronics as a discipline. Some of these documents examine electronic music for the instrument through another lens, such as its role in the greater avant-garde or through the guise of experimentalism.[23] David Randolph's work on techniques in the avant-garde tuba repertoire is an especially important point of exploration. While not directly addressing electronic music, it is mentioned throughout the dissertation within the context of avant-garde music. Randolph elaborates on ideas like notation, extended techniques, and altered performance practices that are all easily connected to the same thoughts being established by electronic scholars like Simon Emmerson and Peter Manning. Both Manning and Emmerson noted the need for a new system of both notation and analysis when examining their mediums. In his dissertation on the avant-garde in tuba repertoire, Randolph's discussion of extended techniques is a helpful introduction to mouth slaps, buzzes, multiphonics, and other skills that are frequently used within electronic works. Craig Potter in his dissertation "The Electroacoustic Tuba" builds upon

[23] David Mark Randolph, "New Techniques in the Avant-Garde Repertoire for Solo Tuba," (DMA diss., University of Rochester, 1977); Andrew Brian Larson, "Investigating 'Experimentalism': A Case Study of the Tuba and its Repertoire," (DMA diss., Louisiana State University, 2013).

Randolph's work by specifically focusing it into the realm of electronics.[24] In addition, Potter broke the recital programming status quo by completing three recitals totaling fourteen pieces of electroacoustic tuba pieces spanning from 1970 to 2018. Potter's dissertation is a solid example of the standard of literature for brass and electronics. An introduction to the literature usually mentioning the fact that the tuba was not considered a solo instrument until over a century after its invention, followed by a breakdown of each recital with program information for each piece and a perfunctory analysis usually examining the techniques used or a particular element of the accompaniment.[25] Irving Ray undertook a similar project cataloging all the works for euphonium and electronics as part of an article published in *the International Tuba and Euphonium Association (ITEA) Journal*.[26] This is of course to say nothing of *The New Tuba Sourcebook* or its euphonium counterpart, who both have dedicated sections to music with electronics, listing every major work written for the instrument in the genre, up to its most recent edition released in 2005.

[24] Craig G. Potter, "The Electroacoustic Tuba: A Study of Selected Works for Tuba with Fixed Media and Live Processed Electronic Accompaniments," (DMA diss., University of Maryland, 2018).
[25] Another very similar example can be found in: James A. Long, "Three Dissertation Recitals of Tuba and Euphonium Music," (DMA diss., University of Michigan, 2021).
[26] Irving Ray, "Live Electronics: The Present State of Euphonium Solos with Electronic Accompaniment," *ITEA Journal* Vol. 46 no. 1 (2018), pp. 39–47.

Curiously, the tuba and euphonium appear to be the only members of the brass family that have these resources. I was unable to find a similar source book or projects taken to catalog music with electronics for other brass instruments. There have been few exceptions to this lack of literature, both of which were mentioned in the survey. One mentioned a project focused on the performance of the specific works of Meg Bowels for trumpet and synthesizer. The other was a dissertation by Erika Binsley-Loke that examined works for horn and electronics. This particular dissertation notes that while there are works for horn and electronics, few people perform them and there is neither enough interest or enough pieces to try and standardize the literature. This lack of interest within the high brass community is something that was completely unexpected, and something that was also reflected within survey responses. High brass does represent a significant minority with only nine of the forty-nine respondents being members of the high brass community. It is further exacerbated by the survey's answers, with the majority of the high brass responses repeatedly emphasizing that while there are some that are interested in electronic music, as evidenced by the fact that I had any responses at all, they are by far the minority. It is my belief, given the information within the survey and

a consideration of the development of different repertoires that there is a simple reason for there being less interest in the high brass communities: They do not need the repertoire. The horn and trumpet have been standard parts of large ensembles in some form or another for centuries, and have solo canons dating back almost as long. As such, they have a wealth of solo literature, as well as new works being composed every year. The high brass community as a whole did not need to embrace electronic music, and so relegated it to those performers who were attracted to the particular style and largely only noted by the rest of the population as a novelty or as part of a degree requirement. This situation is in direct contradiction to the low brass portion of the brass family, especially the euphonium and tuba, who have largely embraced electronic music as a major medium within the repertoire. This again goes back to the fact that by the 1960s and 1970s when brass and electronics were first starting to be composed, the tuba as a solo instrument was less than twenty-five years old and had little in terms of viable literature. As such, tuba and euphonium players took whatever they could get, from wherever they could get it. This comparison is directly supported within the survey responses, with many of the most avid supporters of electronic music stemming from the low brass portion of the

brass family. That is not to say that electronic music is a dead medium in the high brass world, rather from the answers submitted it is growing in popularity, especially in the wake of the COVID-19 pandemic.

The trombone as one might expect given its lack of inclusion in either of the previous groups seems to be stuck in the middle, it does not have the widespread adoption that the tuba and euphonium have, but it does have significantly more well-known repertoire than either the trumpet or trombone. Within the trombone community, it seems that there is a minority of performers heavily invested in the medium, and the same relatively few performers are responsible for sustaining the genre with three participants being involved in some way with commissioning the majority of the landmark works for trombone and electronics. According to the responses by participants marked as trombonists, their repertoire often relies on live electronics and pedal effects rather than on the pre-recorded accompaniment often used in other instruments. My theory is that this particular emphasis within the instrument's performance practice is a holdover from the days of trombone as a major jazz instrument, with the heavy usage of effects pedals, loops, and improvisation to create live electronic performances.

As one might expect from a medium that has evolved as rapidly as electronic music has, there are a variety of terms that, while important, are nuanced in their differences to those on the outside. These terms stem in large part from the varied influences that act upon the genre. Electronic music often sits outside the traditional framework and has had to rely on its own created language and foundation as it has developed. Its place as an intersectional or transitional genre has allowed electronic music to grow in multiple directions, taking inspiration and influence from popular and academic traditions as well as creating its own influence. The next chapter explores concepts that have shaped electronic music into the medium that it is today, considering compositional aesthetics, external motivators, academia's role, and the human component of electronic music.

CHAPTER 3

IMPORTANT INFLUENCES ON PERFORMANCE, COMPOSITION, AND DEVELOPMENT

Introduction

With the advent of electronic music, and its solidification as a "new" type of music, the quest for a new type of audience began. In the process of creating electronic and electroacoustic music, composers began to consider who made up the "ideal audience." The term "ideal audience" stems from Ewa Schreiber's work "In the Face of the Other," and is used here to describe how composers were "focused on examining the 'receiver' that is the audience in the relationship between composer-music-listener, and the idea that the inherent relationship between composer and listener has changed and will continue to change."[1] Schreiber gives voice to the notion that the audience which historically attended concert halls and opera houses, those that now flock to popular concerts, or those who turn up the radio are not necessarily the intended audience for electroacoustic music. Schreiber examines the changing understanding of what "music" is in the second half

[1] Ewa Schreiber, "In the Face of the Other: Contemporary Composers' Reflections on the (Ideal) Listener," *International Review of the Aesthetics and Sociology of Music* Vol. 48 no. 2 (December 2017), pp. 225.

of the twentieth century, as well as the shifting role of the audience. Post-1950, there was a breakaway within the avant-garde electroacoustic movement that led to music composed without public opinion in mind. This led to the academic stranglehold on electroacoustic music, with immensely complex and dense music written for their own enjoyment. This transition as to who a composer is writing for also led to the (in)famous typologies of Adorno and Babbitt regarding the "expert listener."[2] In these typologies, Adorno and Babbitt created a separation between "experts" and "average or cultural" listeners. Schreiber notes that other scholars suggest that new electroacoustic pieces are so dense as to require multiple listenings and a fundamental focus on the mechanical inner workings of the pieces, rather than any thought to a lyrical or melodic enjoyment. In other words, in imagining the "ideal audience," many electronic music composers imagined someone who prioritized understanding over enjoyment.[3] This dichotomy between the perceived "ideal listener" and the average audience hints at a further divide that undergirds the separation between electronic music and

[2] In Relation to Adorno: Elizabeth Mackinlay, Denis Collins, and Samantha Owens, *Aesthetics and Experience in Music Performance* (Newcastle, UK: Cambridge Scholars Press, 2005); Milton Babbitt, Stephen Peles, Stephen Dembski, et al, "The Composer as a Specialist," *The Collected Essays of Milton Babbitt* (Princeton: Princeton University Press, 2011), 48–54.
[3] Elizabeth Mackinlay et al, *Aesthetics and Experience in Music*, 225–44.

more acoustically composed acoustic music. Namely, the idea that electronic music has become a fundamentally separate form of composition with different aesthetic and mechanical concerns, with further nuances between electronic and electroacoustic works.

Compositional Considerations and Aesthetics

In examining electronic music, one of the major questions I had for composers regarded how they saw the change in the compositional process between "acoustic" and electronic music. Several of the questions within the survey directed at composers were geared toward this exact line of thought, and the information that I was able to gather was different from what I had anticipated. There was a contention within responses as to whether or not the compositional process changes with the shift in performance genre. In the context of the survey, I have noticed two main avenues of differentiation, these based on the mechanical differences between acoustic and electronic composition and those on the more philosophic side. Flo Menezes argues in "To Be or Not to Be" that composing for electroacoustic music is fundamentally different from composing for an "acoustic" medium,

based first on the fact that the composer is working directly with the sound rather than through an intermediary like a score or notation.[4]

In considering mechanical changes between acoustic and electronic composition, notation was one of the major mechanical points of contention mentioned in the survey. Menezes marks notation as "designed to compartmentalize and reduce the possibilities through graphic symbolism, rather than free up possibilities," essentially restricting possibilities in order for a composition to be written in a way that a human being can perform it.[5] This belief is seconded by several respondents within the survey, with some noting electronic notation has a "freeing" effect because the accompaniment is not confined to what is playable. Others note that there is a marked difference in how the piece is constructed, and consider how the soloist will interact with the accompaniment. Several participants mention that notation is critical within electronic music, given that the accompaniment is unable to stop or change once it has begun and that pitch is no longer limited to what is physically reproducible via acoustic instruments.[6] Others have mentioned the need to start with the accompaniment track, laying what they

[4] Flo Menezes, "To Be and Not to Be: Aspects of the Interaction between Instrumental and Electronic Compositional Methods," *Leonardo Music Journal* Vol. 7 (1997), pp. 3–10.
[5] Ibid, 3.
[6] Trevor Wishart, *On Sonic Art*, (Amsterdam: Harwood Academic Publishing, 1996), 11–43.

call a “musical metronome” rather than starting with a melodic line or thematic material as may otherwise be expected in acoustic composing.[7]

Even more curious than the mechanical differences between acoustic and electronic composition are changes in mindset and philosophy displayed within survey responses. It is here that we see the most significant range of contrasting opinions among composers. In terms of mindset, some composers feel electronic music exists completely separate from acoustic composing, with several noting the role of sound inside the composing process. They feel that in electronic music, they are more prone to focus on the sounds themselves and manipulate those sounds to create the desired product rather than creating a thematic or melodic sketch and composing out the harmonies. One respondent mentioned that he views electronic sounds as existing in three categories: Synthesis, Audio Effects, and Found Sounds that all are used in different ways to create unique audio profiles. Another emphasizes the time-consuming nature of creating tones from scratch in order to combine them, something that harkens back to the original methods of creating electroacoustic music. Others argue that while there are some differences in composing for an electronic medium as opposed to an

[7] This being taken from a series of questions for composers within the survey, see Appendix A for details.

acoustic medium, that is the end of the difference. Several note that the difference is centered on a frame of mind or reference point rather than reflecting any true change to the creative process. In this way, the philosophy of composition remains the same, focusing on a particular feeling, theme, or melodic idea and then applying the tools available to achieve the desired sound.

It is worth noting that in the intervening years between the origin of electronic music in 1950 and the music of today, there has been a significant intermingling and evolution of ideas within the broad umbrella that is electronic music. Electronics have become not only an ingrained part of not only our daily lives and the majority of modern society, but also intrinsically connected to art music, popular music, and media music. Given this interconnectivity with electronic music, it is important to consider the development of audiences from the 1950s into today.

External Influences on Electronic Music

I have established within this document that electronic music has heavily relied on a number of external influences in order to grow and establish itself as an important musical medium. From the beginning, the evolution of recording equipment and other forms of technology have been essential to

the medium's existence. As the technology that was being used in recording and in electroacoustic music was used more ubiquitously in other forms of music, electronic music began working its way into the commercial realm.[8] Even at the beginning of electronic music as a genre, commercial use of electronics within music was already becoming mainstream. From multi-track recorders and electric guitars in 1950s rock and roll to the synthesizer-heavy music of the 1970s and 1980s practically assured that the everyday listener could recognize elements of electronic music. It was this new commercial music that the scholars of Bontinck's article had noticed and decided to study, with the understanding that these new groups using electronic instruments marked new ideas of musicianship and musical practice.[9] For the purpose of this thesis, I am separating the umbrella of commercial electronic music into two main subsections: *popular music,* encapsulating all of the music sold on the radio and via various physical and digital mediums, and *media music*, spanning music used in films and to some extent television and later video games.

[8] Peter Manning, "The Influence of Recording Technologies on the Early Development of Electroacoustic Music," *Leonardo Music Journal* Vol. 13 (2003), pp. 5–10.
[9] Irmgard Bontinck, "New Patterns of Musiçal Behaviour of the Young Generation in Industrial Societies," *International Review of the Aesthetics and Sociology of Music* Vol. 3 no. 2 (December 1972), pp. 263–71.

Popular music is a term most readers will know, spanning genres such as rock and roll, psychedelic, dubstep, hip-hop, and many more. A significant portion of the popular music of the 1960s-80s embraced electronics, using the advancing technology in order to pursue new creative avenues and incorporate unusual sounds into their works. Tools such as the sampler, prizmer, vocoder, digital synthesizer, even MIDI and DAWs were created by companies looking for commercial applications for electronic music.[10] Today, it is possible to achieve a full-time career as an electronic musician, giving performances and creating art on a regular basis. This is due in part to the same technology that now allows composers to digitally compose, create, and perform electroacoustic works on one device.[11] The benefit of electronic popular music can also be felt in the programming aspect of brass and electronic music. Several respondents spoke to the idea of electronic works being a fun way to break up the monotony of brass recitals and engage with the audience in a novel way. This is successful partially because a majority of brass and electronic music, especially more modern

[10] Peter Manning, *Electronic and Computer Music 4th ed. (*New York: Oxford University Press US Branch, 2013); Artists also had a significant effect on the development of electronic music, with some even cross-pollinating between the popular and academic world. *O Superman* by Lauren Andersen is one example of a popular work that can be studied through the lens of electroacoustic music, incorporating creative use of digital techniques, audio effects, and electronic layering to create a work not dissimilar to the so-called "academic" electroacoustic.
[11] Kirsten Hermes, *Performing Electronic Music Live* (New York, NY: Routledge Press, 2022).

pieces, rely on dance grooves and beats highly reminiscent of popular music. Some brass and electronic pieces go so far as to actively imitate popular music, one such example being *Heavy Duty* (2022) a work for tuba and fixed media written by Patrick Cunningham that draws from lo-fi, jazz, and funk melodies and idioms.[12]

Film music is an interesting point of consideration for me, especially as a tubist that actively enjoys playing brass and electronic music. This aspect of commercial music became relevant to the electronic world around the late 1970s, though obviously as stated throughout previous writing there is likely overlap in technology and creative process that happened earlier. By the 1980s, digital and electronic sound concepts had become an entrenched part of the film sound, a sound that would unknowingly become a major influence on the sound of accompaniments within brass and electronic works. Music within film, especially blockbuster works, operates at a number of levels that intermix and combine to aid the visual track in creating a unified piece of cinema. One aspect of the soundtrack is the creation of a "sonic landscape," an accompaniment that paints the scene of the film using sound instead of images. This sonic landscape became

[12] Patrick Cunningham, *Heavy Duty* (Patrick Cunningham Music, 2021).

incredibly relevant in brass and electronics in what I consider to be the second wave of brass and electronics that began in the 1990s. By creating landscape accompaniments, composers were able to develop vivid and engaging works for brass and electronics that utilizes the built-in emotional ties and sub-textual influences of music in film. Ben Chrisman, in his composition *Themes on Dante's Inferno* draws on his experience as a film composer to create a sonic world based on the famous novel *Inferno* by Dante Alighieri.[13] Works for brass and electronics that incorporate this cinematic style of accompaniment have become known as brass with soundscape.[14] These works are among the most popular as performances, as they offer a novel experience for both the audience and the performer. From experience, works for tuba and sonic landscape are some of my favorite works to perform, simply because it gives me as a tubist the opportunity to play with an accompaniment I otherwise would likely never have the opportunity to incorporate. Landscapes coupled with the ability of electronic works offer an incredible amount of variety to choose from in terms of

[13] Ben Chrisman, *Themes on Dante's Inferno* (N.p.: Theoretical Media, 2015).
[14] It is important to note that while this is a commonly used term, it is used erroneously. Soundscape as a term in electroacoustic refers to a particular type of electroacoustic music. This is an instance of brass performers borrowing a term without taking the inherited meaning as well. A better term, as used in this document is brass with "landscape accompaniment" or "sonic landscape"

accompaniments, something that will be covered in Chapter 5 in more detail.

As electronic music began to come into its own in the 1950s, it has been considered either its own form of music or a medium that fell under the greater umbrella of avant-garde. One of the prevailing difficulties with classifying music with electronics in the modern-day stems from the fact that even "classical" or "acoustic" compositions are composed, produced, performed, and shared via electronic means. The created dichotomy between classical and avant-garde stems in part from the rise of academic music in the later portion of the twentieth century and the annexation of electroacoustic and avant-garde music into academia's influence. The current approach to electroacoustic music is to consider it to be a part of the avant-garde, as demonstrated by several of the scholarly works on brass and electronics either directly connecting to the avant-garde or through heavy implication based on the framing of the works arguments.[15] The avant-garde had a heavy influence on the development of alternate terminologies,

[15] David Mark Randolph, "New Techniques in the Avant-Garde Repertoire for Solo Tuba," (DMA diss., University of Rochester, 1977); Andrew Brian Larson, "Investigating 'experimentalism': A Case Study of the Tuba and its Repertoire," (DMA diss., Louisiana State University, 2013); Craig G Potter, "The Electroacoustic Tuba: A Study of Selected Works for Tuba with Fixed Media and Live Processed Electronic Accompaniments," (DMA diss., University of Maryland, 2018).

extended techniques, and new methods of composition and analysis that were then adapted to work with electronic music. In electroacoustic music in particular, there is a considerable amount of historic academic influence that can be seen up to today.

Academia's effect on electronic music

While electronic music has become an intrinsic part of the popular music idiom, when students in American colleges and universities are taught about electronic music it is almost invariably the electroacoustic music that was developed, expanded, and still predominantly controlled by academic enterprises. Electroacoustic music has long been an academic endeavor. With rigid structures, complex technical requirements, and compositional methods that at times better resembled scientific or mathematical experimentation than intuitive processes there was little doubt that electroacoustic music was separate from its popular sibling.

From the 1950s, electroacoustic music and the academic side of electronic music has been centered in academic locations.[16] Because of this early association, higher education has become a fundamental starting

[16] Simon Emmerson and Denis Smalley, "Electroacoustic music," *Grove Music Online,* 2001, Accessed June 23, 2022.

ground for instrumentalists. Of the forty-nine respondents to my survey, only one participant claimed that they had been interested or even introduced to electronic music before their undergraduate work. In contrast, over 60% of respondents mentioned that they were exposed to electronics at some point as a student during their collegiate studies. Of these responses, there is a split between those who were required to interact with electronics as a requirement of their primary instrument or composition studio (around 20%) and those who had access to the equipment and were encouraged but not required to personally experiment (around 80%). With over 60% of the respondents mentioning a similar initial experience with electronic music, it is clear that collegiate study is a common birthplace of interaction with brass and electronics. This trend further reinforces the idea that academia has a vested interest in continuing electronic music as an art form, whether by requiring or simply encouraging student experimentation. I would argue, based on the results of this survey, that a cycle exists of students becoming involved in electronic composition and then in turn introducing their students to electronics, and on and on. This can also be seen in the prevalence of degree documents as the main form of scholarly discourse on brass and electronics as a specific discipline. I would contend that

electronics is a somewhat popular field for these papers specifically because the academic connections and trends within the genre are well documented and easy to track and then apply to the works the student is performing, which has been the standard structure of the majority of brass and electronic degree documents I have located.[17] I say this not to discount or downplay these scholars' work, but rather to draw attention to the nature of existing scholarship and suggest a partial explanation for the trends I've identified. It also does not escape my attention that all of these example documents are from tuba and euphonium players. From my data it seems as though the tuba and euphonium community has embraced electronics as a genre, far beyond the other members of the brass family, and so it is understandable that they have a greater amount of readily available scholarship.

Electronic music began as a medium in the 1950s in major cities like Paris and Cologne, Milan and Tokyo, before moving to bastions of higher

[17] James A. Long, "Three Dissertation Recitals of Tuba and Euphonium Music," (DMA diss., University of Michigan, 2021); Craig G. Potter, "The Electroacoustic Tuba: A Study of Selected Works for Tuba with Fixed Media and Live Processed Electronic Accompaniments;" Kevin Joseph Jenkins, "A Study of Seven Compositions for Tuba and Electronic Sound Source," (DMA diss., Arizona State University, 1994); A.C. Denner, "The Tuba and Tape: An Exploration of Repertoire for Solo Tuba and Fixed Electronic Media," (Honors thesis, University of Northern Iowa, 2019); Stephanie Frye, "Compositions for Tuba by Women Composers: A CD Recording and Commissioned Works," (DMA diss., University of Wisconsin-Madison, 2013); Aaron Michael Hynds, "The Composer's Guide to the Tuba: Creating a New Resource on the Capabilities of the Tuba Family," (DMA diss., Bowling Green State University, 2019); Lewis E. Westerfield, "Selected Works for Tuba and Electronic Media," (DMA diss., University of Alabama, 2017).

education in the United States like Princeton, Illinois, Columbia, and many others. This centralization of electronic music within places of higher learning has not gone away, with schools like Bowling Green State University, whose graduate program specifically focuses on new music with electronic music being a central component, emerging as modern leaders. Other schools, like the University of Northern Iowa, have developed reputations for encouraging and experimenting with electronic music, though not to the level of schools that specialize in the creating and performance of the genre. Several respondents, when asked about their introduction to electronic music, mentioned that they had not previously been interested in electronics beyond the requirements of a studio professor until they began working at a school where electronic music was popular. One participant had this to say about the experience "I was aware of tuba and euphonium music with electronics throughout my education but didn't experiment with performing very much of it until I began teaching. The abundance of music with electronics and the availability of high-quality playback equipment led me to experiment with more music with

electronics."[18] In this way, the schools act as influencers toward electronic music, even if a professor was not previously involved in the medium, a handful of respondents have mentioned that attending concerts at their institution eventually made them curious enough to experiment with the genre themselves.

In examination of the educational backgrounds of the participants, there is a general through line in that nearly all have some level of college degree, with just over half having doctorates. In fairness, this is partially due to the response pool, with the vast majority of respondents contacted specifically because they were able to be identified as people interested in electronic music. It may in fact be partially because they work in higher education that these musicians have remained involved with electronics and encourage their students to do so as well. Colleges and universities have access to resources and equipment that would likely be well outside the price range of even well-off individuals. For example, consider the "Espace de Projection" at the Institut de Recherche et Coordination Acoustique/Musique outside Paris.[19] Another point of consideration is the ever-increasing introduction of

[18] This quote comes from a respondent who had previously completed a doctorate at a major institution for brass music in the United States.
[19] Thibaut Carpentier, Natasha Barrett et al, "Holophonic Sound in IRCAM's Concert Hall: Technological and Aesthetic Practices," *Computer Music Journal* Vol. 40 no. 4 (Winter 2016), pp. 14–34.

electronics into the actual coursework of college students. More and more colleges across the United States are offering courses that either examine electronics directly or in conjunction with other twentieth and twenty-first century music topics.[20] This further expands the interaction between academia and electronics, with multiple degree courses like music performance, education, business, even recording integrating electronics into their syllabi. Today, education in electronic music is not limited to just college coursework, with respondents mentioning electronic music in the general education classrooms of public schools across the country.[21]

The Human component of Electronic Music

The role of the musician within electronic music has been a major concern throughout this research project. As electronics have developed and the genre of electronic music has evolved into a many layered and complex web of loosely connected ideas and musical works, it would be easy to believe that the place of a musician within the broader field of electronic composition is in danger of disappearing. I discovered that nothing could be

[20] I would also think the same trend exists internationally, but without any personal experience or research into that particular aspect of international academics I am refraining from explicitly making that assertion.
[21] Gary E. McPherson ed., *The Oxford Handbook of Music Performance Vol. 1* (New York, NY: Oxford University Press, 2022); Russell Kuhtz ed., *Music: Techniques, Styles, Instruments, and Practice* 1st ed. (New York: Britannica Educational Publishing, 2017).

further from the truth. In fact, the interaction between human musicians and electronic composition is stronger than it has ever been. It was made clear in scholarship like Bontinck's article and in overarching work in the medium done by scholars like Emmerson that even from the beginnings of electronic music the role of the musician was critical to the success of the artform.[22] In Ben Neill's article "Pleasure Beats," he demonstrates that even fifty years after the beginning of the genre there are still unresolved arguments about not only what makes electronic music, but where the separations between popular and art music with electronics lie.[23]

The difficulty in pinpointing the human component in today's electronic music lies, in my mind, with establishing what exactly the role of musicians should be in the equation. As electronics evolve, are musicians relegated merely to inputting the initial vectors and parameters and then allowing the electronics to take the reins, as is the case with some forms of electronic composition?[24] Or are musicians meant to still be active participants,

---

[22] Irmgard Bontinck, "New Patterns of Musiçal Behaviour of the Young Generation in Industrial Societies"; Simon Emmerson, *Living Electronic Music* (Burlington, VT, USA: Ashgate Publishing Company US, 2007).

[23] Ben Neill, "Pleasure Beats: Rhythm and the Aesthetics of Current Electronic Music," *Leonardo Music Journal* Vol. 12 (2002), pp. 3–6. In this particular article, Neill attributes the distinction between the two camps to rhythm above all things.

[24] Alvin Lucier's "I am sitting in a room," Steve Reich's "Pendulum Music," Ellen Fullman's "Long String Instrument," and other process musics by composers like Dr. Hong-Da Chin.

interacting with the electronics in the same manner that musicians would with another soloist or some form of accompaniment? The answer, I would argue, is dependent on the particular musician and the particular piece, something that would be reinforced by answers from the survey participants. In the brass and electronics medium, the primary topic of consideration for this research, interactivity is still the order of the day. In the construction of the survey, one of the core questions for composers was "What is the typical balance between soloist and electronics?"[25] This question was geared toward asking composers how they intend the pieces to be played, thereby going right to the heart of the music and finding the fundamental core of what the relationship between soloist and electronics is meant to be. The results were not particularly surprising, with around 80% of responses noting that they intended the voices of their electronics to be either equal or have the soloist be the most forward. Given that this is still a solo genre, it is not surprising composers would feel this way, and several expressly noted that if they were going to go through the effort of writing a part for a solo instrument, they wanted to make sure that said instrument is heard and celebrated. This shared opinion gives a solid indication that at least within

[25] See Appendix A for a complete list of the survey questions.

brass and electronics musicians are still active participants. In consideration of the composers that noted they prefer to write equally balanced works, many note that it is a matter of shifting importance wherein the solo and accompaniment alternate between which has the primary voice and which is meant to be supporting. This can lead to some incredibly interesting timbres and effects, with composers using the shifting balance as a way of letting the soloist "truly live inside the soundscape." *My Mountain Top*, a work by Andy Scott is a fabulous example of this concept.[26] Originally written for solo saxophone but now available for euphonium, tenor horn, and tuba accompanied with backing tracks, *My Mountain Top* is a powerful work that incorporates poetry by Lemn Sissay and features a floating ethereal synthesized electronic landscape that the soloist is meant to effortlessly weave in and out of without ever piercing the accompaniment.

In consideration of the human component within brass and electronic music, the most obvious point of concern within this thesis centers on what exactly the humans do in performance. Performance practice is a topic that has long preceded brass and electronics as well as electronic music in general. That being said, it is important to understand how performance

[26]Andy Scott, *My Mountain Top* (Sandbach, Cheshire: Astute Music. 2012).

practice differs within the genre.[27] The performance practice of electronic music is one of the better examined aspects of the genre, likely because the genre is rather unique in its execution and can have a difficult learning curve. Interestingly, the majority of writings on performance practice for both brass and electronics and electronic music as a whole are largely focused on broad ideas and concepts geared at the whole of performance practice rather than a particular concept. I would contend that this is partially because the medium is still comparatively young and scholars have not yet begun to delve deeply into the specifics of performance practices.[28] In comparison to the research on performance practices of older periods like the Romantic and Classical, of which there are many examples of scholarship devoted to specific topics such as Bernhard Reiner's work on the valve trombone in Bruckner's music.[29] Thankfully, performance practice is a rather popular topic in brass and electronics, due to the significant

[27] Roland John Jackson, *Performance Practice: A Dictionary-guide for musicians Vol. 1* (New York, NY: Routledge Press, 2005).
[28] Mari Kimura, "Performance Practice in Computer Music," *Computer Music Journal* Vol. 19 no. 1 (Spring, 1995), pp. 64–75; Alistair MacDonald, "Performance Practice in the Presentation of Electroacoustic Music," *Computer Music Journal* Vol. 19 no. 4 (Winter 1995), pp. 88-92; Karlheinz Stockhausen and Jerome Kohl "Electroacoustic Performance Practice," *Perspectives of New Music* Vol. 34 no. 1 (Winter 1996), pp. 74–105.
[29] Bernhard Rainer, "Bruckner on Valve Trombone?—Low Brass Performance Practice in Anton Bruckner's Works," *Historic Brass Society Journal* Vol. 28 (2016), pp. 135–161.

amounts of degree recital papers that incorporate the subject.[30] The respondents of the survey also had a lot to say on performance practice and performance considerations. One of the prevailing concepts in the survey was that brass and electronics had a significant learning curve, due to the nature of interacting with a completely new medium. Many acknowledge that the most common issue with electronic music performance usually had to do with unfamiliarity or incompetence with the electronics. This causes troubles with timing, phrasing, and, most critically, balance. In order to prevent these troubles, it is important that performers have a solid knowledge of their equipment and the manner of set-up so that they can have the greatest possible chance of success under performance conditions. Performers new to the medium also have to struggle with the practice of interacting with their electronic accompaniment, especially if they are using live electronics. One of the most frequent comments on the survey was the adjustment to performing with an accompaniment that is incapable of change or relied on the performer's input first. The first issue is especially common in fixed media works, where the electronic component is pre-

[30] David Mark Randolph, "New Techniques in the Avant-Garde Repertoire for Solo Tuba"; Andrew Brian Larson, "Investigating 'experimentalism': A Case Study of the Tuba and its Repertoire"; Craig G Potter, "The Electroacoustic Tuba."

recorded and simply has to be played back during the performance. Unlike a pianist, chamber group, or even large ensemble the electronics are incapable of changing once they have been recorded, so brass and electronic performance practice dictates that performers be highly sensitive to their relationship with the recording and adjust either their equipment settings or their own playing in order to better balance. In the case of live electronics, there is a considerable investment in finances, skill, and time as each piece of equipment or pedal offers a different experience and capabilities that have to be tested before they can be used in performance. Finally, electronic music, more so than any other medium, depends on the room that it is in. A significant component of learning to be an electronic performer deals with understanding how the acoustics of the room impact the performance. Because electronic music relies on loudspeakers, how they are positioned in the room in relation to the audience and the performer can make an enormous difference on the final product.[31]

The last important consideration on the human role within electronic music is the way human ideals and values are inserted into the music itself,

[31] Patrick Valiquet, "The Spatialisation of Stereophony: Taking Positions in Post-War Electroacoustic Music," *International Review of the Aesthetics and Sociology of Music* Vol. 43 no. 2 (2012), pp. 403–21.

and the way in which music with electronics is able to become more than just notes on a page. Several of the questions within the survey are directed toward the idea of relevance and importance for the brass and electronics genre, a core question for me as I began this project. When participants were asked about the relevance and importance of brass and electronics, they understandably had a wide range of thoughts and ideas, some of which are applicable here and others that will be covered regarding accessibility and viability in the associated future chapters. What struck me as compelling is the emphasis in some responses that was placed on brass and electronics as a vehicle for social and cultural commentary. One participant went so far as to state that the only reason they tend to program any kind of brass and electronics is because it is a novel way to perform a work that has a message with which they agree. More and more frequently, there are brass and electronic works being composed that use the ability of electronics to include pre-recorded speeches and other media that make creating a message more explicit and more poignant. In my opinion, this is one of the major strengths of the medium, in that there is a more explicit method of creating meaning using recording than is possible with any other instrumental solo genre. Outside of some rather difficult extended

techniques, it is not possible for a brass player to play the instrument and talk at the same time. When a brass soloist wants to create meaning, it has to be done implicitly through feelings and expression created by the musician's musical decisions. By incorporating electronics' ability to use recording samples and other media, it allows the implicit meaning formed within the musician's playing to merge with the explicit meaning found within the samples. This creates an opportunity for expression that does not exist in solo brass playing without incorporating a vocalist of some kind. As such, this opens up a unique facet of not only performance for brass musicians, but expression as humans in general.

Changes in Listeners and Audiences from 1950-Today

Even before the 1950s electronics were slowly weaving themselves into the fabric of music. Today, electronics are an intrinsic part of music-making as a whole, not just specifically electronic music. It would not be unfair to say that very few, if any, composers today compose and publish music completely divorced from electronics. This has subsequently increased the influence that electronics have had on audiences and the reception of various forms of electronic music. Since the 1950s, there has been a perceived distinction between electronic art music, often grouped under

electroacoustic music, and electronic popular music. The utilization of electronics has become a commonplace existence, a part of daily practice, travel, pedagogy, and life in general.[32] It is in some ways understandable that electronics would play such a heavy role, given that technology that now fits in a single pocket took entire wings of buildings in the 1950s, if not buildings in their entirety to store the equipment assuming it was even possible in the first place.

Irmgard Bontinck, in a 1972 article covering a symposium of music scholars in Vienna examines some of the earliest considerations of the role of electronics within music.[33] During the symposium, it is noted by the majority of attending scholars that there had been an explosion in the amount of youth interested in music and in the number of youth musical groups since the post-war period fifteen years prior. From my understanding of the article, these groups were centered around exploring music "outside the formal music education," that often-incorporated electronic instruments and equipment that we in the United States would likely call "garage

[32] Gerald Klickstein, *The Musician's Way: A Guide to Practice, Performance, and Wellness (*New York, NY: Oxford University Press, 2009).
[33] Irmgard Bontinck, "New Patterns of Musiçal Behaviour of the Young Generation in Industrial Societies."

bands."[34] This marked one of the first instances that music scholars noticed a concerted trend involving electronics within the popular sphere of music. Likewise, this academic notice coupled with the new purchasing power of youth in the latter half of the twentieth century hinted at a shift in interest.

This growing interest in popular electronic music was contrasted by an academic utilization of electroacoustic principles in the avant-garde music of Babbitt, Adorno, Luciern, Oliveros, and many others. In the 1950s and 1960s, electroacoustic music largely retreated to the realm of academia, with the majority of the medium's composers being entrenched within universities or other bastions of learning across the globe. It is well noted within scholarship that electroacoustic music struggled in terms of audiences, oftentimes performances were limited to audiences of people that were also composers or otherwise previously interested in electroacoustic music. While in and of itself not an issue, it does complicate the transmission and proliferation of the genre.[35] This can in part be seen within the results of my survey, considering trombone and high brass answers in particular. Several times it is noted within the responses that there are

[34] Ibid, 263.
[35] Ewa Schreiber, "In the Face of the Other: Contemporary Composers' Reflections on the (Ideal) Listener."

people interested within those instruments in electronic music, though oftentimes it is the same minority that is heavily involved with it rather than the majority having even a passing interest. That being said, electronic music has seemingly become a more accepted part of the performance realm, with more and more concerts including significant amounts of music with electronics as part of the program. In the tuba and euphonium community, it is not uncommon, most notably at the graduate level, to have entire recitals dedicated to electronic music, hence the existence of the performance papers that make up the bulk of literature on brass and electronics. In the electroacoustic world, the concept of concert series devoted entirely to the performance of electronic music became more and more commonplace throughout the later part of the twentieth century into the modern day. Today, there are entire conferences devoted to the performance and proliferation of music with electronics. The tradition of schools specializing in electroacoustic music has also held and even grown in strength, with edifices like Princeton, Columbia, Illinois, and University of Southern California being joined by schools like Bowling Green State whose entire graduate curriculum is centered around electroacoustic going so far as to only offer graduate degrees in new music. Within the

instrumental community reception of brass and electronics can be mixed. As noted in his article "New Directions," Hynds argues that electronic music, amongst other new music for the tuba, is still often relegated to a novelty to be mixed in amongst more established and serious repertoire. This is an attitude that does exist within some of my responses, with a portion of the participants mentioning that they mainly have become involved with electronics as a way of adding something fun or different to round out a program, or because they are connected to the piece personally and the fact that it was electronic was convenient but not the reason to perform it.

Electronic music has evolved rapidly, due in part to the explosive nature of technological development following both World Wars. This rapid evolution was also aided by the fact that electronics permeated near every facet of music both academic and popular. This popular influence is especially interesting, as it has an undulating connection to the "academic" throughout history, connecting then breaking away then reconnecting over and over. It is also worth noting just how many commercial mediums have embraced electronics and incorporated it into their production, if only to understand how this commercialization has integrated electronics into the daily listening of most industrialized nations' citizens. As electronic music

entered into the zeitgeist of modern sound, it has become more accessible to the average listener than ever before. With the advent of digital technology, and the integration of electronics into popular and media musics, more and more composers are experimenting with creating works for electronics some of which also interact with brass instruments.

CHAPTER 4

ACCESSIBILITY AS A PERFORMANCE GENRE

Introduction

Chapter four explores the concept of accessibility within the brass and electronics genre. Using the results of the survey, I unpack the emphasis on accessibility and the variety of available music as a highlight of the medium that was foregrounded in the results of the survey. The chapter discusses the impact of tradition, both in how the genre developed and who the active parties were that enabled it to survive and thrive in some instruments. I also consider the role of brass and electronics as an avenue of subversion in regards to publishing and the increased popularity of self-published music. Finally, how the brass and electronic genre has been used in a modern setting, both for performative and pedagogical purposes is considered. These multi-faceted uses coupled with variety and portability are the major contributions to the success and continued existence of brass and electronics as a performance genre.

Tradition of Brass and Electronics works (60s/70s), original commissioners?

The New Tuba Source Book (also known as *The Guide to Tuba Repertoire*) and its analogue *The Guide to Euphonium Repertoire*, exist in an exclusive space within brass literature.[1] These two books offer a near-complete accounting of every major work for either euphonium or tuba from around 1950 until 2005, shortly before the most recent edition of the books was released. Based on my own research and consultation with colleagues, this kind of resource appears to be a rarity among the brass family. That is not to say that no other brass instruments have collections of pieces or excerpts, but I found nothing in my research that resembles a complete accounting of pieces separated into specific mediums. This feature yet again highlights a fundamental difference in the approach to repertoire within the brass family and supports my theory that part of the reason behind low brass's significantly stronger adoption of electronic music has to do with not only the amount, but also the accessibility of repertoire for the instrument as a whole. While the *Guide to the Repertoire* series is an incredible resource

[1]Daniel Perantoni, and R. Winston Morris, *Guide to the Tuba Repertoire: The New Tuba Source Book* (Indiana Repertoire Guides, Indianapolis: Indiana University Press, 2006); R. Winston Morris, Eric Paull, and Lloyd E. Bone, *Guide to the Euphonium Repertoire: The Euphonium Source Book* (Indiana Repertoire Guides, Indiana University Press, 2007).

for low brass musicians, there is a noticeable gap between 2005 and 2023, especially in the wake of a global pandemic that drastically increased the number of electronic pieces commissioned as a way for both composers and musicians to stay musically active.

Irving Ray's 2018 article "Live Electronics: The Present State of Euphonium Solos with Electronic Accompaniment" is one example of articles that are attempting to fill in this gap.[2] Ray examines the breadth of euphonium and electronics works and offers an almost comprehensive list of pieces through 2017. The performance papers for degrees that make up the bulk of the literature on brass and electronics also help to highlight what pieces are most frequently performed and most accessible to musicians. What is intriguing is the number of performance papers that include either *Midnight Variations* or *Piltdown Fragments*, two works by Walter Ross that are considered to be the first works for tuba and electronics.[3] It is curious that these pieces persisted into the repertoire, even though they are some of the first and are arguably difficult to perform in a modern setting due to a reliance on severely outdated equipment. Both works are in many ways

[2] Irving Ray, "Live Electronics: The Present State of Euphonium Solos with Electronic Accompaniment," *ITEA Journal* Vol. 46 no. 1 (2018), pp. 39–47.
[3] Walter Ross, *Midnight Variations* (N.p.: Dorn, 1971); Walter Ross, *Piltdown Fragments* (N.p.: Dorn, 1975).

typical of their time and are good examples of pieces from this early period in what I would refer to as the "First Era" of brass and electronics.[4] This period heavily relied on computer-generated drones and electronic effects for its accompaniment, and were quite often written in some form of graphic notation. This style of performance was a difficult adjustment for most performers, so it took a considerable amount of time before the medium became approachable for anyone but the most dedicated to electronic music. It is also worth noting that both of these pieces, like almost all of the earliest and a prevailing majority of the works as a whole, were the products of commissions.

[4] As mentioned in Chapter 1, I contend there are three functional "Eras," namely 1965-1980, 1985-2000, and 2007-present day. Obviously, there is some overlap and cross-pollination, but for the most part, these periods seem to represent major shifts in aesthetics and performance style, at least so far as fixed media performance is concerned.

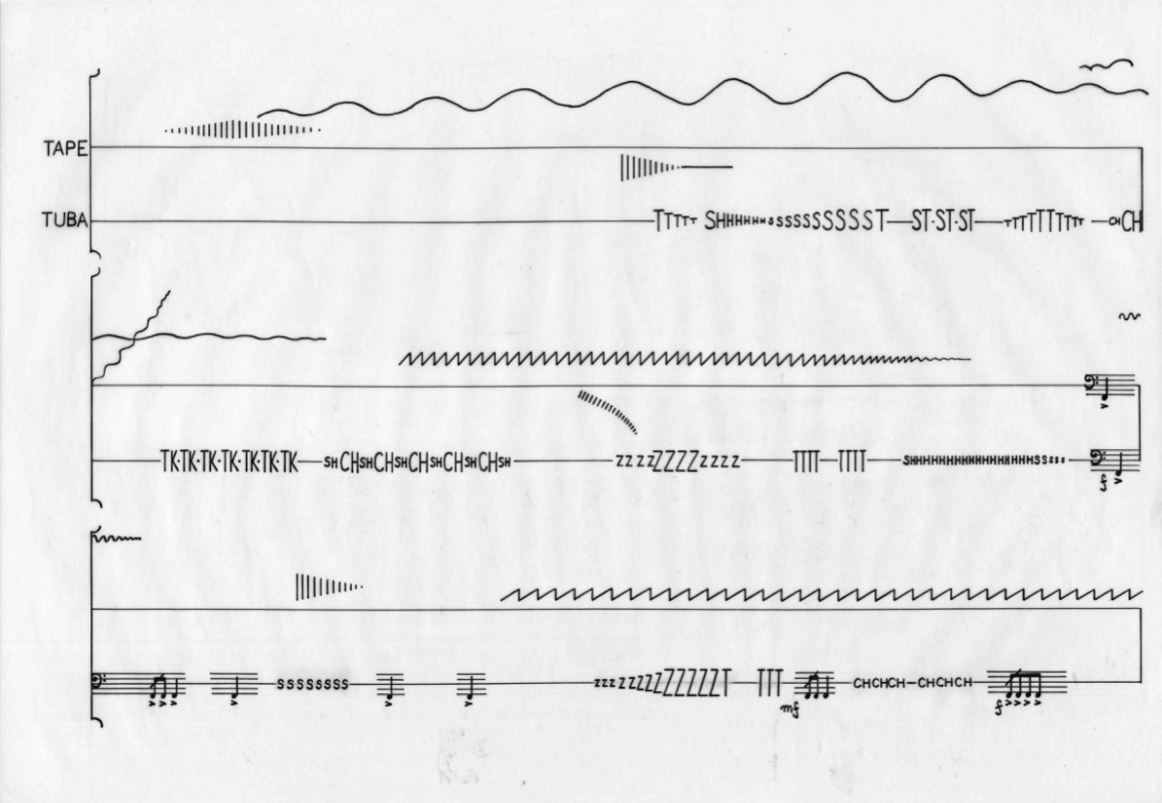

Figure 4.1- Example of a Graphic Score from Walter Ross' *Midnight Variations*.[5]

Works for brass and electronic have predominantly been commissioned pieces, especially in low brass as tuba and euphonium players constantly sought new music to add to the repertoire from any and all sources. Commissioning is a critical facet of the brass and electronic genre and not only came up frequently in my own experience with electronics, but survey participants mentioned it as well. From the beginning of the genre, there was a significant push by several performers to populate the repertoire with

[5] Walter Ross, *Midnight Variations* (N.p.: Dorn, 1971), 1.

as many works as possible. Two of the most prolific commissioners were Barton Cummings and Mark Nelson.

Barton Cummings was one of the most prolific commissioners of early tuba solo repertoire, especially in the realm of tuba and electronics. A New Hampshire native, he studied at the University of New Hampshire and afterwards joined one of the U.S. Army Bands as a tubist. In the early 1970s, he completed a Master's at Ball State and a Doctorate with Harvey Phillips at Indiana as well as being fundamental in the launch of TUBA, the predecessor to the modern ITEA. In 1974, he became the lecturer of tuba at San Diego State, and from that point and into the 80s he became a champion of new music for the tuba with over 100 compositions written for him, including works for tuba and electronics. In his later years, Cummings wrote two books *Tips to the Tuba* in 1995 and *The Contemporary Tuba* in 2004. Cummings also wrote over 500 articles, many of which dealt with either tuba and electronics or tuba performance as a whole. Mark Nelson was a student of Barton Cummings, and much like him was a career educator and commissioner. Nelson was responsible for over thirty commissioned works and premieres, many of them for tuba and electronics. Of his commissions,

several are major works that are often considered standard literature for tuba and electronics, including several works by Neal Corwell.

The role of commissions in the brass and electronics genre is significant enough that there was a specific question in the survey relating to works that the participants had commissioned and performed. The overwhelming majority of participants stated that they have been part of at least one commission if not several. Some participants noted that it being part of a commission first introduced them to electronic music. While collating the results of the surveys, I discovered that among three respondents, they had collectively commissioned the majority of the major works for trombone and electronics. Multiple performers had mentioned in various parts of the survey their interaction with brass and electronics as part of a commission or that this was primarily how they came across new works. Several composers mentioned that some of their works for electronics were the result of a commission, indicating that while there are likely some composers heavily involved enough in electronic music that they will write a work for brass and electronics, the main way brass and electronics has grown is through the commissioning of new works and projects.

Walter Ross's pieces, in addition to being great examples of early commissions and some of the first works for tuba and electronics, were also commonly cited when discussing "landmark works." As discussed in chapter two of this thesis, a "landmark work" is a piece that has significant historical value within the brass and electronics field. Many of these original works helped to set the stage for the pieces that came after and established a tone and framework that would eventually draw in curious performers. These pieces are often mentioned or referenced in the historical surveys of performance papers but rarely played in modern settings. Though many of these works have fallen out of favor with modern performers, some landmark works have maintained a level of popularity, for example Jacob Druckman's *Animus I* or James Mobberley's *Icarus Wept*.[6] Works like Neal Corwell's *New England Reveries* or *Aboriginal Voices* are unusual in that they are landmark works that are still frequently performed and have maintained their popularity well after their original premiere.[7] *New England Reveries* and *My Mountain Top* are, despite their age, still so popular that they are often some of the first works for electronics that performers

[6] James Mobberley, *Icarus Wept* (Kansas City: Cautious Music, 1998); Jacob Druckman, *Animus I* (New York: Boosey&Hawkes, 1966).
[7] Neal Corwell, *New England Reveries* (Maryland: Nicolai Music, 1990); Neal Corwell, *Aboriginal Voices* (Maryland: Nicolai Music, 1994).

encounter and part of that popularity comes from their musical characteristics.[8] I would argue that part of these works' enduring popularity in comparison to works like *Midnight Variations* has to do with their traditional tonal melodies that use electronic landscapes as an accompaniment. This means that the pieces sound much closer to what performers are used to either in acoustic music, traditional scoring, or with film music, rather than the intense and often jarring sounds of the avant-garde inspired Ross works.

Subversion of Traditional publishing methods

One important aspect of electronic music that is often overlooked is the movement toward self-publication and the ability of composers to transmit a completed product as an entire unit on their own without a publishing company. Neal Corwell is a prolific composer of brass and electronic music within the tuba-euphonium community, with over a dozen pieces composed for the medium. Curiously, he self publishes all of his music and sells it via his personal website. This is a trend that has grown over the last two decades, with more and more composers choosing to compose and then self-

[8] Neal Corwell, *New England Reveries*; Andy Scott, *My Mountain Top* (Sandbach, Cheshire: Astute Music. 2001/2012).

publish, selling the works on their own websites rather than going through a publisher as an intermediary. Peter Meechan, Canadian-based composer, is another incredibly popular professional that chooses to self-publish the entirety of his catalog. Not only does he publish physical copies, but he also offers a completely digital version using PDFs and handles rental parts through his website. All of this points toward a significant amount of versatility and accessibility on the part of a composer in deciding how they want the music to be put into the world. Having composers self-publish also can be of benefit to performers, allowing them to often get works slightly cheaper by avoiding the intermediary fees that publishing comp. There is a drawback to this new system of having composers self-publish, in that there is no centralized database for all of these individual websites. This leads to a performer crisis of being unable to find a new work, as they would have to have heard of the composer or piece in the first place or been lucky enough to accidentally stumble upon it while scrolling through the internet.

In examining the works listed within the survey and included in various pieces of existing scholarship that have been included as part of this thesis' appendices, it would appear that it is a rare minority that actively publish brass and electronic music through major publishing houses. Of the works

listed as landmark pieces for the different brass instruments, eleven of the twenty-one listed pieces were published through a publishing company, the most popular being Dorn music based in Massachusetts. When examining the major works list, this ratio shifts, out of thirty-six listed pieces over 60% publish their music either personally or publish in house and resell through a publishing company.[9] The most telling is in considering the list of other works, where only ten of the sixty-nine mentioned composers or works were published solely through a dedicated publishing house. This means that of that section of music over 85% were either lacking publishing information or were published outside the traditional system. This would seem to suggest that there is credence to the idea that brass and electronic music is a genre that has profited from existing outside of the established compositional trend, despite the inherent obstacles to accessibility that comes from having such a decentralized repertoire. It also highlights the ease with which composers are able to adapt and market music composed for the genre, as anyone with a computer is now able to compose, publish,

[9] For example, Peter Meechan sells his music through his own website, but also resells it through Potenza Music.

and sell their own electronic music provided they are able to find performers willing to purchase and program the works.

The ease with which composers can create electronic music means that even young or relatively inexperienced composers can publish brass and electronic works and begin to develop a catalog that can then help them begin working with more established publishing houses. Many of the composers that completed the survey mentioned that composing for electronics was more of a mental change than a physical one, based on using different tools rather than necessarily completely changing toolboxes. As such, writing for brass and electronics could be a phenomenal method of allowing composers to experiment with new melodic and harmonic ideas without being trapped in the palette of a traditional composition method. One of the major complaints about electronics from some of the composer participants revolved around the fact that essentially anyone can compose with electronics, and as such there are a lot of self-published amateur works for the genre that some believe to be "clogging up the repertoire." While an obviously negative slant, this belief does highlight the fact that there is a significant amount of self-publishing that is occurring, and works are being performed that otherwise would likely never see a performance beyond the

premiere if it ever got one. This is especially true concerning modern brass and electronics, what I would call the "Third Era," wherein composers frequently draw from dubstep, house, and pop beats as the primary form of sampling that is then used to create the accompaniment and often to inform the solo part.

In contrast, some publishing companies seem to have worked to encourage the composition of new brass and electronic works. Cimarron Music and Potenza Music are two examples, each with around twenty-five different pieces for brass and electronics from a variety of composers. In this way, it is obvious that brass and electronics is considered, at least financially, to be a viable medium though maybe not at the same level as more traditional mediums such as solo and piano or solo and large ensemble. These established publishing companies also have the advantage of being centralized, something discussed earlier as a negative to self-publishing. It is possible for publishing companies to have works from a variety of different composers all in one place, meaning that any performer looking for a new piece need only go to the publisher's website, enter their search information, and browse to their heart's content.

I would argue for a synergy of the two ideas, using publishers as centralized points to find new composers and then searching the internet to find said composer's website and seeing what else they may have to offer. By doing so, a performer or student can cut down on the time spent scouring social media groups or Google search pages trying to find a new-to-them composer that they enjoy. This also has the added benefit of allowing composers to build a more recognized name, while also having the freedom to disseminate their music as they please. Having places where potential performers can find electronic works also helps to boost the signal on new pieces and encourage more newcomers to get involved with the medium, possibly trusting the reputation of a publishing company with traditional works alongside electronics over a composer's personal website with only their music.

Pedagogical and Performative usage

One of the most common aspects of brass and electronic music in survey responses revolved around the pedagogical and performative uses of the medium. Several participants remarked that their first experience with electronics was either the result of a requirement from their teacher, or a desire to better understand a medium being used by their students. While

electronics and technology as a whole have been a significant part of pedagogical practice for decades, the last fifteen to twenty years have seen a marked increase in its use as a performative or pedagogical tool.[10] The COVID-19 pandemic, starting in early spring of 2020 in many ways hastened this adoption of technology with the adoption of zoom and other online collaboration tools and the drastic increase in live-streamed performances. Due to the pandemic musicians, composers, and educators alike had to develop new technology or creative applications of existing material in order to continue to make music. If a silver lining of the pandemic can be found, one example is in the greater adoption and acceptance of brass and electronic music.

One of the major performative benefits to brass and electronic music mentioned in the survey is the freedom from an accompanist without sacrificing the interaction between soloist and accompaniment whether it is fixed media or live electronics. Put simply, Electronics allowed musicians to continue performing, even while stuck in lockdowns. With brass and electronics, performers were able to develop varied and satisfying recitals

[10] Russell Kuhtz ed., *Music: Techniques, Styles, Instruments, and Practice* 1st ed. (New York: Britannica Educational Publishing, 2017).

that could be performed and recorded entirely in isolation to be transmitted digitally. This increased performance of brass and electronic works, coupled with the rapid development and widespread proliferation of live streamed concerts, also helped to reshape and redefine the nature of solo recitals. Gone are the days that no one could attend a recital because of a prior commitment; it is possible to simply give a recital and anyone that wanted to listen to it could do so at their leisure. Electronics also helped to redefine how students learn to play with accompaniment. This critical skill is one of the most important to a solo performer, as the ability to interact with the musicality of an accompanist is often what sets apart the greatest soloist on their particular instrument. Musicians like Joseph Alessi, Demondrae Thurman, Roger Bobo, and Wynton Marsalis are at the pinnacle of soloists on their instrument not simply because they play the right notes and rhythms, but because they bring incredible musicality with whatever or whomever they perform. That being said, this skill is also oftentimes equally as expensive as it is critical, taking considerable amounts of both time and money to develop. While this is more or less true depending on a particular program or location, learning to play with a pianist can be a costly venture as an hour of a pianist's time can cost anywhere between thirty to sixty

dollars just for a rehearsal, with recitals costing up to one hundred and sixty dollars for an hour recital.[11] This cost can be prohibitive for many students, limiting their musical growth due to financial considerations. Brass and electronics offer an alternative that with fixed media costs little more than the price of the piece and the money to rent speakers for the recital. This feature also eliminates the concern for performing with a difficult piano accompaniment, a real concern for brass, especially tubas and euphoniums. It is a commonly held belief amongst tubists that composers may get confused in our literature as to whether or not the tuba or piano is the soloist, given the fact that in many pieces the piano accompaniment is an order of magnitude more difficult than the already difficult solo part.

With electronics, there is an incredible opportunity for pedagogical development and a number of tools that educators and studio professors can use in order to affect real change in their students' playing. The survey highlighted the idea that the more comfortable with technology a student is, the better they will be able to adapt going forward. We have reached a point with technology that students are able to make quality recordings using

[11] These are anecdotal numbers based on my experience during my Doctoral work. As mentioned above, the cost of accompaniment may vary drastically depending on the location and the pianists available in a musician's area.

nothing more than their phones. The benefit to practicing and performing with a recording is well documented and significant, but even more so, students are able to regularly practice with their accompaniment simply using a pair of headphones or turning on a speaker.[12] The educators who answered the survey frequently mentioned that students being able to conveniently practice with the accompaniment is a positive , as it is a huge benefit compared to more traditional mediums that would require at least one other musician and are not conducive to daily practice. This access allows the student to become intimately familiar with the accompaniment and more comfortable with playing with it. It also makes it possible for student lessons to include a performance atmosphere, where the student can play with accompaniment and the teacher can get a more complete idea of how the student is actually doing and focus their feedback accordingly.

Throughout this thesis I have split brass and electronics into two primary categories: live electronic and fixed media. Each category has its own benefits and issues depending on the nature of the electronics. Live

[12] Russell Kuhtz ed., *Music: Techniques, Styles, Instruments, and Practice*; Gerald Klickstein, *The Musician's Way: A Guide to Practice, Performance, and Wellness* (New York, NY: Oxford University Press, 2009); Mari Kimura, "Performance Practice in Computer Music," *Computer Music Journal* Vol. 19 no. 1 (Spring, 1995), pp. 64–75; Alistair MacDonald, "Performance Practice in the Presentation of Electroacoustic Music," *Computer Music Journal* Vol. 19 no. 4 (Winter 1995), pp. 88-92; Kirsten Hermes, *Performing Electronic Music Live* (New York, NY: Routledge Press, 2022); Gary E. McPherson ed., *The Oxford Handbook of Music Performance Vol. 1* (New York, NY: Oxford University Press, 2022).

electronics offer musicians unprecedented control and variety in performance, allowing students to experiment to their heart's content with a wealth of different effects. This category has the most obvious hurdle of the initial step of learning how to use and obtaining the equipment. Once the student has the equipment, though, it offers a wealth of useful tools in terms of performance and refining musicality. The biggest concern with live electronics, through my own research and based on the concerns of some survey submissions, is that every aspect of the work relies on the performer's ability in order to function.[13] Unlike human accompaniment or fixed media, live electronics can only alter and interact with material given to it by the performer, as such any inconsistencies in the performer's playing will be compounded on repeatedly, possibly "running-away" within the piece. Reverb is a basic and helpful example, as it offers a versatile effect that can be used to layer sound and create novel and captivating sounds. However, any errant vibrato or poor intonation compounds on itself. Using reverb is a great way for students to develop a discerning ear and focus on a clear and present sound in order to better avoid "run-away."

[13] Craig G. Potter, "The Electroacoustic Tuba: A Study of Selected Works for Tuba with Fixed Media and Live Processed Electronic Accompaniments," (DMA diss., University of Maryland, 2018); Peter Manning, *Electronic and Computer Music 4th ed. (*New York: Oxford University Press US Branch, 2013), 58; Kirsten Hermes, *Performing Electronic Music Live*.

Fixed media, on the other hand, is a fantastic resource for students to learn how to interact with an accompaniment. The survey revealed that fixed media is generally the more popular of the two categories (with the exception of the trombone community) in part because of the familiarity and comfort it shares with more traditional accompaniments. The benefits and concerns of this category are rooted in the operative term "fixed," namely the fact that everything about the accompaniment is locked into place unable to be changed.[14] Because of this rigidity, fixed media works are a fabulous resource for students to develop consistency and metric stability. Unlike a pianist or ensemble that can speed up or slow down to compensate for metric or rhythmic instability, a recording will leave the student behind. Likewise, intonation and volume are static, meaning that the student has to recognize when there is friction between themselves and the recording and adjust appropriately. In the survey responses, balance and consistency were two of the major concerns when asked about frequent issues or difficulties these musicians want performers to notice. I would argue that while these are valid concerns and certainly issues that need to be considered, they are

[14] A small point of contention, it is possible to change certain characteristics like tempo, relative volume, and pitch though there is a trade-off in that it often results in some level of distortion or lessened quality. It is nevertheless an important consideration, especially if changing it would enable a performance that otherwise would not be possible.

also opportunities for improvements that will carry far beyond the individual piece of brass and electronic music.

Versatility and Portability

While there are a number of concerns and obstacles using brass and electronic music as a pedagogical and performative medium, I do not believe that they in any way lessen the medium's value for musicians and students. This study has shown that there are key benefits to working with brass and electronics not available anywhere else. Consider accessibility - the accompaniment is accessible anywhere the performer is able to play music and it is likely more cost efficient than trying to hire an accompanist for an equivalent amount of time. It also gives students and teachers the ability to create a more performance-like atmosphere in lessons that, combined with focused work on consistent technique, can greatly improve the student's playing ability. These benefits, coupled with the medium's versatility and portability, are further proof of the importance and value of brass and electronics. Of the forty-nine responses to the survey, around thirty-five or roughly 75% of them note the value of brass and electronics as a versatile and portable genre for performance, especially in a pandemic and post-pandemic space.

One of the greatest benefits to working with brass and electronics is what one survey respondent called the "limitless potential" of electronics as an accompanimental voice. Because of the evolution of sound design, modern sound engineering, and sampling it is not an exaggeration to say that the only limitation to what is possible with electronics is price point and imagination. This presents an opportunity for musicians (especially students) to perform and interact with sounds and styles that are otherwise inaccessible to certain instruments. With electronics, it is possible for any musician to solo with mariachi, act as the soloist in front of a film orchestra, or interact with a wide variety of cultures from Armenian to Cuban.[15] This variety also has the benefit of providing novelty and interest within a recital. Over 65% of the performers that completed the survey noted that this ability to break up "the monotony of traditional repertoire" was a fundamental reason to include an electronics piece in their recital. It offers a chance for the soloist to use a popular sound with which the audience may be more familiar, for example a sonic landscape accompaniment reminiscent of a film score, a throbbing dance beat, or a trip to another country. All of these

[15] These are two specific examples written for tuba and electronics by Sam Pilafian: Sam Pilafian, *Relentless Grooves: Armenia*. (Mesa, AZ: Focus on Music, 2006);
Sam Pilafian, *Relentless Grooves: Cuba.* (Mesa, AZ: Focus on Music, 2006).

sounds spark engagement in the listener and help draw in an audience that might otherwise be ambivalent or dismissive towards traditional "stuffy" concerts.

The use of sampling, especially of recorded speech, also opens a realm of opportunity for brass and electronic works to operate as vehicles for extra musical meaning.[16] In the last decade, more and more composers have written pieces that carry social or cultural messages alongside and interwoven into the musical. *Listen…* by African-American composer Benjamin Horne is a powerful example of electronic music used to spread a message and make a statement as both performer and composer.[17] Written for tuba, euphonium, and fixed media accompaniment and premiered in 2021, *Listen…* responds to the death of George Floyd and the subsequent Black Lives Matter protest throughout the summer of 2020. In the works program notes, Horne explains that the piece is "about our failure as a society to listen to one another. It is about our failure to educate. It is about the notion that we can no longer accept these bandages for larger societal issues particularly in regards to racism…"[18] *Listen…* incorporates not only

[16] Andra McCartney, "Inventing Images: Constructing and Contesting Gender in Thinking about Electroacoustic Music," *Leonardo Music Journal Vol. 5 (1995),* pp. 57–66.
[17] Benjamin Horne, *Listen…* (N.p.: Horne Music, 2021).
[18] Ibid

the recorded speeches taken from The March on Washington, A digital Town meeting by Former President Barack Obama, and dialogue from Black Lives Matter protests but also incorporates idiomatic samples of jazz and hip-hop in order to more fully immerse the audience in the acoustic world Horne is creating. The ability of brass music to convey meaning has always been limited to implicit processes, mainly achieved through inflection, tone, and imagined narratives. Electronics on the other hand, with its ability to sample speeches, spoken word, and directly draw from popular genres like rap and hip hop allows for a much more explicit method of conveying meaning.[19] Six survey participants had mentioned that it is this ability to incorporate extra musical narratives into their recitals that drew them into brass and electronic music, and the reason why they continue to program electronic works regularly.

One of the greatest advantages this medium has over others is the fact that it can be performed anywhere as long as there is an electrical outlet. Many scholars have considered the nature of electronic performance and the effects of acoustics and stereophony on audience experience; however, all of

[19] *Listen…* and *My Mountain Top*, are two phenomenal examples of these techniques, with *My Mountain Top* the soloist acts less as the primary voice and in more of a supportive role to the recorded voice of Lemn Sissay providing musical emphasis to his poetry; Benjamin Horne, *Listen…* (N.p.: Horne Music, 2021); Andy Scott, *My Mountain Top* (Sandbach, Cheshire: Astute Music. 2012).

that research builds upon the fact that brass and electronic works are inherently more portable than almost any other solo genre barring unaccompanied works.[20] A world where performers can give recitals in a variety of spaces with the freedom to set-up and perform anywhere where there is an electrical outlet cannot be overstated. I would consider it a game-changer when considering activities like recital tours or auditions. To give an example, I will use a recital I gave in the fall of 2022. I performed approximately an hour of music that was entirely commissioned brass and electronics works. The recital included Ben Chrisman's *Themes on Dante's Inferno* (commission), Ian Lester's *Hindsight* (consortium), Ben Horne's *Listen…* (consortium), Sean Klink's *With My Back to the World* (commission), and Jose Flores' *Un dia en la Vida* (consortium).[21] If for whatever reason I would want to give a recital tour using that program, I can fairly easily pack all of the material necessary in my mid-sized car, and I am off to the performance. With technology as it is now, almost everyone

[20] Patrick Valiquet, "The Spatialisation of Stereophony: Taking Positions in Post-War Electroacoustic Music," *International Review of the Aesthetics and Sociology of Music*, Vol. 43 no. 2 (2012), pp. 403-21; Jean-Michel Réveillac, *Electronic Music Machines: The New Musical Instruments* (London: Wiley-ISTE, 2019).

[21] Ben Chrisman, *Themes on Dante's Inferno* (N.p.: Theoretical Media, 2015); Ian Lester, *Hindsight* (N.p.: Cimarron Music, 2021); Benjamin Horne, *Listen…* (N.p.: Horne Music, 2021);
Sean Klink, *With My Back to the Wall* (N.p., 2021); Jose Flores, *Un dia en la Vida* (N.p.: Jose Flores Music, 2020).

carries the ability to practice or perform with electronic accompaniment in their pockets or in their backpacks. From a performer's perspective, it is freeing to not worry about finding an accompanist, if the piano hasn't been tuned in three years, or if the orchestra you will be playing with has never played the piece in its entirety. This feeling is reinforced by ten of the performing participants' answers that echo the comfort of being able to perform and the accompaniment not being dependent on an unfamiliar partner. Many of those same performers also agree that electronics offer their own obstacles to performance, as balance and technical difficulties are constant struggles. It is because of these obstacles that I would argue that one of the keys to success in performing brass and electronic music is using the portability of the medium to the players advantage, in order to practice consistently and frequently.

One of the key questions included in the survey related to what the participants would want newcomers to the medium to know and what the most common challenges are for them to try and avoid. Of the many answers, balance and the steep learning curve were the most frequently repeated culprits. Composers and performers alike agreed that while the genre is extremely rewarding for those who get involved, there is an

aggressive skill floor to overcome. Electronic music is its own facet of music, as has been suggested by a number of scholars that focus on the medium. Because of this, there is a lot to learn, and a lot of potential mistakes that can be made simply as part of the learning experience. While this can be frustrating and off-putting to the new and uninitiated, once that skill floor is breached an entirely new world is open for the musician to explore. I do not believe that it is an accident that those who are exposed to the medium continue to not only use it, but advocate for its growth. It has never been easier to get involved with brass and electronics either as a composer or as a performer, with the ever-advancing and evolving technology offering consistently more varied and accessible options for composers and performers of all types allowing for a greater diffusion of the genre into the greater brass community.

CHAPTER 5

VIABILITY OF BRASS AND ELECTRONIC MUSIC AS A GENRE

Popularity as a Genre and the Myth of "Standard" Works

One of the most surprising results of this project was the revelation that not all brass musicians have embraced the brass and electronics genre with the enthusiasm I expected. Tuba and euphonium specialists commonly include at least one brass and electronic work on a recital program. It is a standard part of the tuba and euphonium repertoire and, considering the responses to the survey, will continue to be so for the foreseeable future. One tuba specialist respondent argued that brass and electronics may in fact become the community's dominant genre in the relatively near future. This is the schema that shaped my initial concept of this project, and I naively expected every instrument to have a similar approach and a sizable amount of repertoire to compare. Instead, I found that each instrument community has its own separate experiences and ways of interfacing with brass and electronics.[1] It was clear through the research and survey responses that there was a sizable divide between the popularity of brass and electronics

[1] While curious, I would argue that this is more realistic than my original thought.

within high and low brass instruments. Almost all high brass respondents stated that while brass and electronic music for trumpet and horn existed, it was by no means popular nor was it sought after by the general population. High brass instruments have centuries of solo literature on which to build their performing canon. When brass and electronics became a viable genre in the 1960s and 1970s, composers did write several works for high brass (some of the first, as a matter of fact) but high brass musicians did not latch on to the genre as tightly as any of the low brass instruments. This situation has led to high brass musicians generally regarding brass and electronics as a novelty or as an isolated experience that a student has to have in order to fulfill a degree.[2] The trombone community acts in several ways as both a middle ground and an outlier between trumpets and horns on the one hand and tubas and euphoniums on the other. The majority of repertoire for trombone and electronics is focused in the realm of live electronics. It seems that as the trombone found immense success and popularity as a jazz instrument in the 20th century that musicians gravitated toward the effects driven and improvisation-heavy live electronics. Despite greater acceptance

[2] Michael Edwin Barth, "Music for Solo Trumpet and Electronics: A Repertoire Study," (DMA thesis, University of Toronto, 2011).

of electronic compositions among trombone specialists than either trumpet or horn performers, its use is still an incredibly niche part of the repertoire. The tuba-euphonium community has, more than any other, adopted brass and electronics as a primary way of increasing their repertoire. While I can accept the possibility that different instrument histories as "soloistic" options has had a significant impact on the value of brass and electronic music within the community, I remain perplexed by the lack of scholarly writing in general on the topic of brass and electronics. In my research, I was able to find only two dissertations from high brass performers on the topic of brass and electronics, one on trumpet by Michael Barth in 2011 and one on horn by Erika Binsley Loke in 2017.[3] Compare this number to the eight dissertations directly focused on tuba and electronics and the other nine scholarly writings by tuba and euphonium performers.[4] While this

[3] Michael Edwin Barth, "Music for Solo Trumpet and Electronics: A Repertoire Study."; Erika Binsley Loke, "A Survey of Works For Horn and Fixed Media From 1968 to 2016," (DMA diss., University of Maryland, 2017).

[4] A.C. Denner, "The Tuba and Tape: An Exploration of Repertoire for Solo Tuba and Fixed Electronic Media," (Honors thesis, University of Northern Iowa, 2019); Kevin Joseph Jenkins, "A Study of Seven Compositions for Tuba and Electronic Sound Source," (DMA diss., Arizona State University, 1994); Andrew Brian Larson, "Investigating 'experimentalism': a Case Study of the Tuba and its Repertoire," (DMA diss., Louisiana State University, 2013); James A. Long, "Three Dissertation Recitals of Tuba and Euphonium Music," (DMA diss., University of Michigan, 2021); Craig G. Potter, "The Electroacoustic Tuba: A Study of Selected Works for Tuba with Fixed Media and Live Processed Electronic Accompaniments," (DMA diss., University of Maryland, 2018); David Mark Randolph, "New Techniques in the Avant-Garde Repertoire for Solo Tuba," (DMA diss., University of Rochester, 1977); Lewis E. Westerfield, "Selected Works for Tuba and Electronic Media," (DMA diss., University of Alabama, 2017); Zackery J. Wilson, "Chamber Chip: An Album of Six Pieces for Instrument(s) and Fixed Media," (DMA diss., University of Texas-Austin, 2015).

disparity further reinforces the gap in reception between high and low brass, it also marks a continued absence of scholarly writing as a whole on the specific topic of brass and electronics.

Another aspect of the survey that was a considerable surprise was the amount of pushback on the idea of "standardized" brass and electronic literature. What was most intriguing is that this pushback came not just from high brass respondents, but across the board? It would seem, at least according to the results of my survey and exploration of available literature, that there is still a lack of standardized works among the brass family. Performers from each instrumental community argued within their survey answers that the idea of a standard brass and electronic repertoire is a myth. This may be in part to the relative newness of the genre, with only sixty years resting between the earliest brass and electronic works and today. Another factor may stem from the rate at which technology has developed and the ease with which composers are now able to create electronic works. One of the most frequent criticisms among the composers of the survey revolved around a surplus of amateur pieces using over-sampled and stereotypical sounds that flood the repertoire. Among the high brass respondents, the main argument against any real form of standardization of

repertoire stems, somewhat understandably, from the fact that the genre is not popular enough or a significant enough portion of the repertoire to warrant the effort of standardizing. Several of the high brass answers echo each other with the idea that "Music for (trumpet/horn) exists, we just don't perform it very frequently." Within the trombone repertoire, a lack of standardization is due to its learning curve regarding both knowledge and equipment, given the instrument's tendency toward live electronics. The fact that it is still a niche part of the community does not help with standardization, but several participants note that the repertoire has increased dramatically over the last ten to fifteen years. As the community that has embraced brass and electronics to the greatest extent, tuba and euphonium specialists are struggling with a different problem in terms of standardization. The major obstacles to a standard set of tuba/euphonium and electronic works is two-fold: an issue with novelty and (ironically enough) a constantly expanding pool of repertoire.[5] Composers and performers alike have lamented that many modern works for the instruments fall into the trap of relying on similar sounding beats and loops which can

[5] From my observations, self-published works can struggle to grow outside of their original commissioning group. They are not on music publishers like J.W. Pepper or Hal Leonard's website, making it difficult to truly become major or standard works.

create homogeneous and bland copies of each other. The most recent trend has been a heavy use of beats drawn from the dubstep genre. This lack of novelty is further exacerbated by the volume of new electronic works being created, given that it is now easier than ever for even amateur composers to piece together a new composition and publish it. While this surplus of repertoire is in and of itself a good thing, expanding a repertoire that did not exist prior to 1950 and one that has at times struggled with developing a canon of literature, it is problematic because pieces that offer novel experiences or engaging performances get lumped together with those that are clichéd and the half-baked.

Opportunity for Varied use

Of the avenues of future inquiry that have come from this project, one of the most potentially fruitful avenues of research could be found in a survey of available literature and creating a categorization within brass and electronic music as both a medium and a genre. This research has shown that "variety" best describes the current state of brass and electronic music, from variety in instrumentation and content to style, purpose, and presentation. Brass and electronic music has demonstrated that while it is a relatively young entry into the repertoire it is evolving rapidly to catch up.

The majority of performers responding to the survey held that the near limitless possibilities in sound that could be achieved using electronics is one of the medium's greatest advantages. Technology and its continued development has allowed soloists to interact with sounds and musical conceptions that likely would otherwise be unavailable. Similarly, technology has opened up a wealth of pedagogical and performance possibilities, offering new and exciting methods of making music that would be fascinating to explore in later scholarship. In addition to new ways of implementing technology, brass and electronics has opened a world of opportunities for both performer and composer to approach content and extramusical meaning within a recital setting.

In the responses to my ethnographic survey, the usefulness of technology was a commonality across 75% of the answers. In a question comparing the compositional process of electronic music to acoustic mediums, several composers noted that while their thought process might not change, the tools that they used would frequently change. Multiple composers mentioned a greater use of DAWs and digital media in order to build an electronic work rather than hand-drafting of a score. Over 65% of respondents remarked on the usefulness of having technology that is both

portable and accessible. Advancements in recording and audio sampling allows composers to create meaning and narrative that would not be possible otherwise. In the post-pandemic landscape, many note that there is a significant benefit to not having to rely on another human being for accompaniment, being able to easily take a recital on the road or broadcast it internationally with comparatively minimal effort. As discussed in Chapter 4, performers also credit electronic music and the technology that sustains it for the ability to access a multitude of styles and sounds that otherwise are not available to them, for example a tuba playing with Caribbean steel band or Japanese taiko ensemble. Although technology has allowed for the creation and advancement of the electronic music genre, it is worth noting that some of the difficulties most commonly mentioned by both composers and performers are connected to the technology itself. Technical difficulties are the number one complaint in response to difficulties in electronic music. While infinitely more accessible than the medium has ever been, there is still a significant learning curve in order to truly be able to operate and perform electronic music fluently, something that is obvious the first time someone attempts to perform a work with electronics. The learning curve is substantial, and contributes not only to the difficulty both composing and

performing, but to the amount of subjectively bad music that muddies the water as to the value of brass and electronics as a musical genre. Another foible caused by technology relates to its constantly evolving nature, too often works are rendered unplayable because the technology needed to perform them has become obsolete and has been abandoned. Many of the earliest pieces of brass and electronics literature are rarely if ever performed today in part due to this exact problem, few performers have access to a magnetic tape player let alone one that functions optimally. This struggle in performing earlier works has also contributed to the difficulty of brass family members codifying electronic music within their repertoire. This has led to a delineation between works with important historical significance, namely major firsts like *Midnight Variations* being understood as "landmark works." Meanwhile, works that are frequently performed or are held as representative works within the genre for a particular instrument are classified as "major or standard" works, something that caused some confusion and conflict within my survey research.

When I began this project, I had intended to focus on the aesthetics of electronic music and the ways in which these aesthetics have developed and the mutual influences between genre and performers. Needless to say, the

project has shifted, and that avenue of scholarship was left relatively unexplored. Beyond exploring and categorizing the variety of brass and electronics, the aesthetics of the genre deserves decidedly more attention than it has received to date. While electronic music as a whole is no stranger to explorations of aesthetics in scholarship by Simmon Emmerson, Ewa Schrieber, Guy Garnett, Michael Koenig, and several others, there is no dedicated work adding to the discourse in terms of brass and electronics.[6] Several of the respondents, both composer and performer, have remarked that a growing trend in the genre over the last ten to fifteen years is focused on the use of electronics as a way of pursuing extramusical meaning within music. We've already investigated how the ability to integrate audio recordings and vocal samples into brass and electronic music allows composers to take advantage of explicit meaning in works like *Listen…* and *Go to the Garden*. Those two pieces were expressly written to broach societal and cultural issues within a recital setting and through the lens of

[6] Simon Emmerson, *Living Electronic Music* (Burlington, VT, USA: Ashgate Publishing Company US, 2007);
Guy E. Garnett, "The Aesthetics of Interactive Computer Music," *Computer Music Journal* Vol. 25 no. 1 (Spring 2001), pp. 21–33; Gottfried Michael Koenig, "Aesthetic Integration of Computer-Composed Scores." *Computer Music Journal* Vol. 7 no. 4 (Winter 1983), pp. 27–32; Ewa Schreiber, "In the Face of the Other: Contemporary Composers' Reflections on the (Ideal) Listener." *International Review of the Aesthetics and Sociology of Music* Vol. 48 no. 2 (December 2017), pp. 225–44.

the performer.[7] Looking toward the future, examining the historical and contemporary existence of extramusical meaning within brass and electronics could be an interesting project, and something that is still desperately needed in the current discourse. From this research, is it clear that this aspect of meaning within brass and electronics is not going away any time soon and is likely to only continue to grow in significance. Around a tenth of respondents are involved in electronics specifically because of this societal and cultural impetus and make a conscious point to emphasize that in both pedagogical and performative settings.

Final Conclusions

When I began the research and initially created the survey that is the bedrock of this thesis, I assumed several things that I now know to either not exist or require significantly more scholarship in the future to truly understand. I have learned that within existing scholarship there is a sizable gap in the discourse surrounding brass and electronic performance and arguably brass performance as a whole. There is a significant discourse surrounding electroacoustic music in general and the performance practice

[7] Benjamin Horne, *Listen…* (N.p.: Horne Music, 2021); Eris DeJarnett, *Go to the Garden* (N.p., 2023).

of entirely electronic works, but little in terms of solo brass and electronics. Similarly, there is a wide range regarding the acceptance of brass and electronics as a genre within the different members of the brass family. This aspect, alongside the unexpected discovery that not all instruments have a readily available resource like *The New Tuba Sourcebook* or its euphonium equivalent, opens a possible avenue of scholarship regarding the concept of "repertoire" within the brass family.[8] This project has demonstrated that the brass and electronic genre has had a history that was more complex and significant than at first expected and that the genre is alive to some degree in every instrument. This viability as a genre differs between instruments, but especially among low brass performers it appears that brass and electronics is not only regarded as a valuable addition to the repertoire, but one that will only continue to grow in significance as we move into the future. Beyond the areas of future scholarship outlined above, there are other concrete projects that would build off the foundation outlined in this thesis. One regards the absence of a unified language covering brass and electronic performance, as there is still a significant amount of vagueness in the

[8] Daniel Perantoni, and R. Winston Morris, *Guide to the Tuba Repertoire: The New Tuba Source Book* (Indiana Repertoire Guides, Indianapolis: Indiana University Press, 2006); R. Winston Morris, Eric Paull, and Lloyd E. Bone, *Guide to the Euphonium Repertoire: The Euphonium Source Book* (Indiana Repertoire Guides, Indiana University Press, 2007).

terminology associated with the genre. Another aspect revolves around repertoire, regarding discussion of the separation between "landmark" and "major," the existence of "standard" works, and a revised edition or new source cataloging all of the major works for brass and electronics within the various instruments, rather than the comparatively small amount contained within this thesis's appendices.

This thesis has explored the significant historical progression of brass and electronics, covered functional terminology necessary to interact with the medium, and highlighted some of its important features throughout history. I have also grappled with some of the performative and pedagogical benefits and challenges of brass and electronics music, as well as how said pros and cons sometimes shift between instruments. This project also examined the influences that have affected the genre, and the trends that survey participants see as the genre progresses. All of this was achieved in the context of integrating existing scholarship with primary work surveying active performers, composers, and pedagogues involved in the genre. If nothing else, this paper has proven that there is a wealth of opportunity to explore brass and electronics as a specific avenue of discourse, supplementing and adding to the existing foundation of scholarship that

exists, both in regards to brass performance practice and electronic music as separate disciplines. In time, brass and electronics may be able to develop as a scholastic bridge connecting the two fields of study.

APPENDIX A

List of Survey Questions

Introduction:

The survey consisted of twenty questions, all of which were set to long form answers where the respondent could write as much or as little as they desired in response to the question, with the exception of question one, four, and eleven which were multichoice. All the questions were optional, with the exception of previously mentioned one, four, and eleven which were used to guide the participant through the survey.

Opening Questions

1. Do you understand the purpose of the survey and consent to participate? (Yes or No).
2. Give us some of your background and how did you get involved with electronic music?
3. Do brass and electronics go together, yes or no, and why?
4. Select the answer that best describes your interaction with brass music and electronics. (Composer, Performer, or Both).

Composer Questions

5. As a composer, does your approach change when it comes to composing electronic music as opposed to something like a traditional solo work for an instrument?
6. What is your compositional process when writing for brass instruments and electronics? Does it change depending on the different instruments?
7. What is the typical balance between solo instrument and electronics (i.e. equal voices, more solo, accompanimental, etc.)?
8. What are some of the difficulties you encounter when composing electronic music? Do those difficulties change the way you approach your compositional method?
9. Is there a benefit to composing an electronic work with instrument involvement as opposed to a solely electronic work?

10. Do you think solo brass with electronics is still a relevant genre for composition? What keeps it from getting repetitive or stale as a genre?
11. Did you also wish to complete the performer/instrumentalist questions? (Yes or No).

Performer/Instrumentalist Questions

12. What is the first landmark work for your instrument?
13. How significant is electronic music as a genre for your instrument and what are the standard works?
14. What are some of the pieces that you have commissioned or performed, and why did you select those?
15. What aspects/characteristics are emphasized typically in the electronic music for your instrument? Are there clichés or common sound tropes that are frequently used?
16. What are some of the difficulties that come with performing these types of works?
17. What is the worth of performing works with electronics? Is there a benefit that can't be gained with acoustic scoring?

General Conclusion Questions

18. Why is electronic music important to you as a musician, and in your opinion why should it continue as a genre (or should it)?
19. Do you see trends in the genre and where do you see said genre moving in the future?
20. What do you want newcomers to the medium to know about electronic music?
21. Finally, do you have any performers, pedagogues, or composers you would recommend for this survey? If so, please enter their name and contact information below. Thank you for your help in filling out this form and please let me (Taylor Hicks) know if you have any further questions.

APPENDIX B

Landmark works by Instrument

- Trumpet
  - Badings, Henrik. *Chaconne*. Amsterdam: Donemus, 1965.
  - Mobberley, James. *Icarus Wept*. Kansas City: Cautious Music, 1998.
  - Pounds, Michael. *Cry Out for Trumpet and Tape*. N.p., 1999.
  - Stockhausen, Karlheinz. *Aries*. Kürten, Germany: Stockhausen Verlag, 1977.

- Horn
  - Blaser, Paul. *Dance Fool Dance*. N.p., 1998.
  - Erika Loke did her dissertation on just this question and by the end of it concluded that while there was a body of literature for horn and electronics, there weren't really any stand out landmark or standard works.

- Trombone
  - Druckman, Jacob. *Animus I*. New York: Boosey&Hawkes, 1966.
  - JacobTV. *Jesus is Coming*. Amsterdam: Donemus, 2003.
  - Koopman, Eddie. *Frescobaldi's Canzone with electronics*. Tamworth, UK: Warwick Music Publishing, 2001.
  - Oliveros, Pauline. *The Heart of Tones*. N.p.: Deep Listening Publications, 1999.
  - Reynolds, Roger. *From Behind the Unreasoning Mask*. Albany, NY: New World Records, 1974.
  - Ross, Walter. *Prelude, Fugue, and Big Apple*. N.p.: Dorn, 1973. (also fun fact you can view the pdf from his website)
  - Subotnick, Morton. *The Wild beasts*. London: Schott Music, 1978.

- Euphonium

    - Neal Corwell's early works are frequently brought up, similar to tuba.
    - Boda, John. *Sonatina.* N.p.: Cimarron Music, 1970.
    - Corwell, Neal. *Odyssey.* Maryland: Nicolai Music, 1990.

- Tuba
    - Corwell, Neal. *New England Reveries*. Maryland: Nicolai Music, 1990.
    - Lazarof, Henri. *Cadence VI*. N.p.: Pytheas Music, 1974.
    - Raum, Elizabeth. *Nation*. Regina: Elizabeth Raum Music, 1998.
    - Ross, Walter. *Midnight Variations*. N.p.: Dorn, 1971.
    - Ross, Walter. *Piltdown Fragments.* N.p.: Dorn, 1975.
    - Witkin, Beatrice *Breath and Sounds*. N.p., 1976.
    - Zindars, Phillip. *Hymn.* No publisher or composition date was available

APPENDIX C

Standard/Major works by Instrument

- Trumpet
  - Mobberley, James. *Icarus Wept*. Kansas City: Cautious Music, 1998.
  - Ott, Joseph. *Chroma IV*. Minneapolis: Claude Benny Press, 1975.
  - Ott, Joseph. *3 Little Pieces for Trumpet and Tape*. Minneapolis: Claude Benny Press, 1978.

- Horn
  - One respondent notes the horn is very underrepresented in the electronic/electroacoustic musical world, with an absence of any piece that he would definitively call standard.

- Trombone
  - Druckman, Jacob. *Animus I.* New York: Boosey&Hawkes, 1966.
  - Geddes, John Maxwell. *Leo Dreaming*. N.p., 1995.
  - Hamilton, Bruce. *Wintermute.* Bellingham, Washington: Non-Sequitur Music, 1995.
  - JacobTV. *I was like Wow.* Amsterdam: Donemus, 2006.
  - Lewis, George. *Voyager*. N.p.: George Lewis Music, 1987. (work for interactive computer program, not actually a trombone/electronics piece at all)
  - Meier, Florius. *Slipstream*. N.p., *2012*.
  - Oliveros, Pauline. *Theatre Piece for Trombone Player*. N.p., 1966.
  - Phillips, Mark. *T. Rex.* Tamworth, UK: Warwick Music Publishing, 1999.
  - Sipher, John. *Changes.* N.p., 2017.
  - Sipher, John. *Perseverance.* N.p., 2020.
  - Stephenson, James. *Loop D Loop.* Chicago: Stephenson Music, 2017.

- Willcock, Ian. *For the Republic*. London: Forward Music, 1990.

- Euphonium
  - One great aspect of the tuba/euphonium world is that ITEA (International Tuba Euphonium Association) regularly has competitions now that spotlight brass and electronics which helps with bringing popularity and significance to the genre.
  - Bryant, Steven. *Hummingbrrd*. N.p.: Steve Bryant Music, 2003/2012.
  - Scott, Andy. *My Mountain Top*. Sandbach, Cheshire: Astute Music. 2001/2012.
  - Taylor, Ben. *Flow.* N.p.: Benjamin Taylor Music, 2016.

- Tuba
  - Ayers, Jesse. *The Dancing King*. N.p.: TUBA Press, 1988. **(**also you can get a pdf of it on her website)
  - Beck, Jeremy. *HoUsE Mix.* N.p.*:* Cimarron Music Press, 1995.
  - Corwell, Neal. *Aboriginal Voices*. Maryland: Nicolai Music, 1994.
  - Corwell, Neal. *New England Reveries.* Maryland: Nicolai Music, 1990. (he has a dozen plus that are all very popular that can be found on his answer to the question)
  - Harvey, Jonathan. *Still.* London: Faber Music Ltd, 1997.
  - Lippe, Cort. *Music for Tuba and Computer.* N.p.: Corte Lippe Music, 2008.
  - McLean, Priscilla. *Beneath the Horizon III*. New York: MZC Publications, 1979.
  - McMillan, Benjamin. *Tomes*. Anniston, AL: Potenza Music, 2014, 2015, 2018**.**
  - Meechan, Peter. *Floating Dreams*. Cedartown, Georgia: Potenza Music Publishing, 2007.
  - Nono, Luigi. *Post-Prae.-Ludium per Donau*. BMG Ricordi Music Publishing S.p.A., 1987. (an interesting tuba EAM work)
  - Pilafian, Sam. *Relentless Grooves: Armenia*. Mesa, AZ: Focus on Music, 2006.

- Pilafian, Sam. *Relentless Grooves: Cuba*. Mesa, AZ: Focus on Music, 2006.
- Ruggiero, Charles. *Fractured Mambos*. N.p.: Charles H Ruggiero Music, 1990.
- Scott, Andy. *My Mountain Top*. Sandbach, Cheshire: Astute Music. 2012.
- Witkins, Beatrice. *Breath and Sounds*. Melville, NY: Belwin-Mills, 1975.
- Wyatt. Scott. *Three for One*. N.p.: TUBA Press, 1998.
- Zeigel, Evan. *Heavy Metal Concerto*. N.p.: Evan Zeigel Music, 2020.

APPENDIX D

Other Works listed by Instrument

- Trumpet:
  - Bowles, Meg. *Night Sun Journey*. Newford, CT: Meg Bowles Music, 1996.
  - Chasalow, Eric. *Out of Joint.* N.p.: Suspicious Motives Music, 1994.
  - Cooman, Carson. *Reclimbing Mayflower Hill*. N.p.: Carson Cooman Music, 2003.
  - DeJarnett, Eris. *Go to the Garden*. N.p., 2023.
  - Joyce, Brooke. *Flash*. N.p.: Brooke Joyce Music, 2011.
  - Nathan, Eric. *Cantus*. N.p.: Eric Nathan Music, 2008.
  - Noordhuis, Nadje. *Captain Anya*. N.p.: Nadje Noordhuis Music, 2021.
  - Rice, Hannah. *Free to Be.* N.p.: Hannah Rice Music, 2019.
  - Rudman, Jessica. *My Father Was a Ventriloquist*. N.p.: Transfigured Lady Publishing, 2011.
  - Rudy, Paul. *...and every island and mountain were moved from their place.* Kansas City: Paul Rudy Music, 1998.
  - Simon, Greg. *The Way Through the Woods*. N.p.: Greg Simon Music, 2014.

- Horn:
  - Here is an interesting counterpoint, as there are several works that Michal commissioned though none of them are listed as major works
  - Macchia, Salvatore. *Ekphrasis.* N.p., 2015.
  - Naigus, James. *Cloud Break.* N.p.: Naigus Music, 2021.
  - Naigus, James. *Saga.* N.p.: Naigus Music.
  - Naigus, James. *Soundings.* N.p.: Naigus Music. 2013.
  - Neuman, Israel. *Turnabouts*. N.p.: Israel Neuman Music, 2008.
  - Norton, Nick. *Gone to the Other Shore for Wagner Tuba*. N.p.: Bathysphere Music, 2016.

- Ogilvie, Tyler. *Zero Point.* N.p., 2012.
- Stallman, Kurt. *Fantasy for Horn and Tape*. St. Augustine, FL: Wavefront Music, 1999.
- Van Zandt Lane, Peter. *Persistent Tracings.* N.p., 2016.
- *Soundings* actually came up multiple times amongst the horn players of the survey, possibly indicating its role as a major work for the instrument.

- Trombone:
  - Alvarez, Javier. *Mambo Vinko*. N.p.: Pytheas Music, 1993.
  - Angell, Michael. *Quick 'n Delicious*. Tamworth, UK: Warwick Music Publishing, 1992.
  - Barash, Guy. *Talkback VI*. N.p.: Guy Barash Music, 2016.
  - Beglarian, Eve. *Testy Pony*. N.p.: EVBVD Music, 2010.
  - Beglarian, Eve. *I am lost by streams* (35' with video). N.p.: EVBVD Music, 2017.
  - Belcastro, Richard. *Sonance*. N.p.: Richard Belcastro Music, 1999.
  - Boneh, Oren. *Behind the forget me nots*. N.p.: Oren Boneh Music, 2016.
  - Burtner, Matthew. *AES/AER*. N.p.: Matthew Burtner Music, 2005.
  - Cutler, Zoe. *it's not just a phase*. N.p.: Zoe Cutler Music, 2019.
  - Engebretson Mark. *They Said: sinister resonance.* N.p.: Mark Engebretson Music, 2012.
  - Fulkerson, James. *Wood, Stone, Desert*. N.p.: Media Press Music, 2004.
  - Middagh, Ryan. *Blue: A Broken Glass Bottle*. N.p.: Ryan Middagh Music, 2021.
  - Mobberley, James. *The Unpurged Images of the Day*. Kansas City: Cautious Music, 2014.
  - Niblock, Phill. *A Third Trombone*. N.p., 1979.
  - Oliveros, Pauline. *The Heart of Tones.* Deep Listening Publications, 1999.
  - Reynolds, Roger. *From Behind the Unreasoning Mask*. N.p.: Roger Reynolds, 1975.

- Rowe, Robert. *Arcturus*. N.p., 2005.
- Sipher, John. *Just Breathe.* N.p., 2020.
- Stebbins, Heather. *what i am not*. N.p.: Heather Stebbins Music, 2017.

- Euphonium
  - Robertson, Gail. *Get Your Funk On.* N.p.: Cimarron Press, 2021.
  - Robertson, Gail. *The Island.* N.p.: GAR Music.
  - Taylor, Benjamin Dean. *Bitcoin Bill Run*. N.p.: Benjamin Dean Taylor Music, 2021.
  - Taylor, Benjamin Dean. *FLOW*. N.p.: Benjamin Dean Taylor Music, 2016.

- Tuba
  - https://composerstubaguide.blog/repertoire-lists/euphonium-with-electronics/ is a great resource with citations for a variety of pieces.
  - Neal Corwell has over a dozen works for either tuba or euphonium and electronics
  - Bathory-Kitz, Dennis. *Llama Butter*. N.p.: Frog Peak Music/J.W. Pepper, 1993.
  - Chrisman, Ben. *Themes on Dante's Inferno.* N.p.: Theoretical Media, 2015.
  - Cunningham, Patrick. *Heavy Duty.* Patrick Cunningham Music, 2021.
  - Davis, D. Edward. *Let There Be Funk*. N.p.: D. Edward Davis, 2001.
  - Day, Kevin. *CYPHER*. N.p.: Kevin Day Music, 2021.
  - DeMars, James. *Tapestry III.* N.p.: James DeMars Music, 1986.
  - Evanoff, Ray. *Helpless Before a Creature Which Defies Physical Laws and Communicates Only Through Death*. N.p.: Ray Evanoff Music, 2018.
  - Flores, Jose. *Un dia en la Vida*. N.p.: Jose Flores Music, 2020.
  - Fulton, Ruby. *Breathe*. N.p.: Ruby Fulton Music, 2015.
  - Gomez, Alice. *Shaman Returns*. N.p.: Solid Brass Music, 2011.

- Grant, Jerry. *Time Cycles*. N.p.: Jerome Grant Music, 1998.
- Hersey, Joanna Ross. *ElevenTwelve*. N.p.: Joanna Ross Hersey Music, 2019.
- Horne, Benjamin. *Listen…* N.p.: Horne Music, 2021.
- Isaacson, Kurt. *Abscess*. N.p.: Kurt Isaacson Music, 2015
- Klink, Sean. *With My Back to the Wall*. N.p., 2021.
- Lester, Ian. *Hindsight*. N.p.: Cimarron Music, 2021.
- Meechan, Peter. *Floating Dreams*. Cedartown, Georgia: Potenza Music Publishing, 2012.
- Murchinson, Matthew *Disquiet*. N.p.: Matthew Murchinson Music, 2016.
- Robertson, Gail. *Funkomatic Slam*. N.p.: Cimarron Press, 2022.
- Roy, Elise. *Digestion of Memory*. N.p.: Elise Roy Music, 2016.
- Srinivasan, Asha. *Dyadic Affinities*. N.p.: Asha Srinivasan/J.W. Pepper, 2013.
- van Duuren Skye. *Thoughts on the Death of a Tree*. N.p.: Skye van Duuren Music, 2020.
- Weber, Monte. *Colossus*. N.p.: Monte Weber Music, 2014.
- Ycaza, Stephanie. *Sonidos de Ecuador*. N.p.: Stephanie Ycaza Music, 2020.
- Zegiel, Evan. *Elegy*. N.p.: Evan Zeigel Music, 2018.

BIBLIOGRAPHY

Ayers, Jesse. *The Dancing King*. N.p.: TUBA Press, 1991.

Babbitt, Milton, Stephen Peles, Stephen Dembski, et al. "The Composer as a Specialist." *The Collected Essays of Milton Babbitt*. Princeton: Princeton University Press, 2011. 48–54.

Barth, Michael Edwin. "Music for Solo Trumpet and Electronics: A Repertoire Study." DMA thesis, University of Toronto, 2011. https://tspace.library.utoronto.ca/bitstream/1807/31687/1/Barth_Michael_E_201111_DMA_thesis.pdf

Bevan, Clifford. *The Tuba Family*. Hampshire: Faber and Faber Limited, 1978.

Bontinck, Irmgard. "New Patterns of Musiçal Behaviour of the Young Generation in Industrial Societies." *International Review of the Aesthetics and Sociology of Music* Vol. 3 no, 2 (December 1972), pp. 263–71. https://www.jstor.org/stable/836720

Buckholz, Chris. "Performance Practice for Eighteenth Century Solo Trombone Literature." *ITA Journal* vol 35 no. 1 (2007), pp. 48–50.

Camilleri, Lelio and Denis Smalley. "The Analysis of Electroacoustic Music: Introduction." *Journal of New Music Research* 2008, Vol. 27 no. 1-2, pp. 3-12.

Carpentier, Thibaut, Natasha Barrett et al. "Holophonic Sound in IRCAM's Concert Hall: Technological and Aesthetic Practices." *Computer Music Journal* Vol. 40 no. 4 (Winter 2016), pp. 14–34. https://www.jstor.org/stable/26777020

Chrisman, Ben. *Themes on Dante's Inferno.* Theoretical Media, 2015.

Clarke, Michael. "Analyzing Electroacoustic Music: An Interactive Aural Approach." *Music Analysis* October 2012, Vol. 31 no. 3, pp. 347–80. https://www.jstor.org/stable/41811604

Cuervo, Adriana. “Preserving the Electroacoustic Music Legacy: A Case Study of the Sal-Mar Construction at the University of Illinois.” *Notes* Vol. 68 no. 1 (September 2011), pp. 33–47 https://www.jstor.org/stable/23012858

Cummings, Barton, interview by Carol Nowicke. "Oral History Interview of C. Barton Cummings." International Tuba-Euphonium Association Oral History Project. (September 16, 2004).

Cummings, C. Barton. *The Contemporary Tuba*. New London, Connecticut: Cimarron Music Press, 2004.

Denner, A.C. “The Tuba and Tape: An Exploration of Repertoire for Solo Tuba and Fixed Electronic Media.” Honors thesis, University of Northern Iowa, 2019. https://scholarworks.uni.edu/hpt/405/

Emmerson, Simon and Denis Smalley. “Electroacoustic music.” *Grove Music Online.* 2001. Accessed June 23, 2022: https://doi.org/10.1093/gmo/9781561592630.article.08695

Emmerson, Simon and Leigh Landy. *Electroacoustic Music Analysis*. Cambridge: Cambridge University Press, 2016.

Emmerson, Simon. *Living Electronic Music*. Burlington, VT, USA: Ashgate Publishing Company US, 2007.

Emmerson, Simon. *The Language of Electroacoustic Music*. Basingstoke, Hampshire, UK: The Macmillan Press Ltd, 1986.

Encyclopedia Britannica Online, s.v. “Electronic Music,” by Lejaren Hiller. Accessed January 18, 2023, https://www.britannica.com/art/electronic-music.

Fedorkow, Guy, William Buxton, and K.C. Smith. “A Computer-Controlled Sound Distribution System for the Performance of Electroacoustic Music.” *Computer Music Journal* Vol. 2 no. 3 (December 1978), pp. 33–42. https://doi.org/10.2307/3679455

Feng, Dairuo. “From Pre-Recorded Tape to Live Computer Processing: Piano Music from Davidovsky to the Present Day.” DMA diss., Kansas University, 2018.

Frye, Stephanie. “Compositions for Tuba by Women Composers: A CD Recording and Commissioned Works.” DMA diss., University of Wisconsin-Madison, 2013.

Garnett, Guy E. “The Aesthetics of Interactive Computer Music.” *Computer Music Journal* Vol. 25 no. 1 (Spring 2001), pp. 21–33. https://www.jstor.org/stable/3681632

Gresham-Lancaster, Scot. “The Aesthetics and History of the Hub: The Effects of Changing Technology on Network Computer Music.” *Leonardo Music Journal* vol. 8 (1998), pp. 39–44. https://doi.org/10.2307/1513398

Henderson, Dave. *Journey to a Plugged in State of Mind: Electronic Music: 100 Years of Experimentation and Exploitation*. London: Cherry Red Books, 2016.

Hermes, Kirsten. *Performing Electronic Music Live*. New York, NY: Routledge Press, 2022.

Hron, Teresa. “Composing idiomatically for specific performers: collaboration in the creation of electroacoustic music.” Doctoral diss., University of Montreal, 2015.

Hynds, Aaron Michael. “The Composer’s Guide to the Tuba: Creating a New Resource on the Capabilities of the Tuba Family.” DMA diss., Bowling Green State University, 2019. EBSCOhost. http://rave.ohiolink.edu/etdc/view?acc_num=bgsu1558255903237631

Hynds, Aaron. “New Directions.” *International Tuba and Euphonium Association Journal* vol. 41 no. 4 (2014), pp. 52–54.

Jackson, Roland John. *Performance Practice: A Dictionary-guide for musicians vol. 1*. New York, NY: Routledge Press, 2005.

Jenkins, Kevin Joseph. "A Study of Seven Compositions for Tuba and Electronic Sound Source." DMA diss., Arizona State University, 1994.

Kimura, Mari. "Performance Practice in Computer Music." *Computer Music Journal* Vol. 19 no. 1 (Spring, 1995), pp. 64–75. https://doi.org/10.2307/3681300

Kinney, Vince. "Great Plains Tuba and Euphonium Conference Program/Schedule." Accessed March 13, 2023. https://gprtec2022.wixsite.com/gprtec/schedule.

Klickstein, Gerald. *The Musician's Way: A Guide to Practice, Performance, and Wellness.* New York, NY: Oxford University Press, 2009.

Klink, Sean. *With My Back to the Wall*. N.p., 2021. Tuba and Electronic Media.

Koenig, Gottfried Michael. "Aesthetic Integration of Computer-Composed Scores." *Computer Music Journal* Vol. 7 no. 4 (Winter 1983), pp. 27–32.

Kuhtz, Russell ed. *Music: Techniques, Styles, Instruments, and Practice.* 1st ed., New York: Britannica Educational Publishing, 2017.

Larson, Andrew Brian. "Investigating 'experimentalism': a Case Study of the Tuba and its Repertoire." DMA diss., Louisiana State University, 2013.

Lester, Ian. *Hindsight*. N.p.: Cimarron Music, 2021.

Loke, Erika Binsley. "A Survey of Works for Horn and Fixed Media From 1968 T 2016." DMA diss., University of Maryland, 2017.

Long, James A. "Three Dissertation Recitals of Tuba and Euphonium Music." DMA diss., University of Michigan, 2021.

Loy, D. Gareth et al. “Why is Good Electroacoustic Music So Good? Why is Bad Electroacoustic Music So Bad?” *Computer Music Journal* Autumn 1994, Vol. 18 no. 3, pp. 7–8. https://doi.org/10.2307/3681173

MacDonald, Alistair. “Performance Practice in the Presentation of Electroacoustic Music.” *Computer Music Journal* Vol. 19 no. 4 (Winter 1995), pp. 88-92. https://doi.org/10.2307/3680993

Mackinlay, Elizabeth, Denis Collins, and Samantha Owens. *Aesthetics and Experience in Music Performance*. Newcastle, UK: Cambridge Scholars Press, 2005.

Manning, Peter. “The Influence of Recording Technologies on the Early Development of Electroacoustic Music.” *Leonardo Music Journal* Vol. 13 (2003), pp. 5–10. https://www.jstor.org/stable/1513442

Manning, Peter. *Electronic and Computer Music 4th ed.* New York: Oxford University Press US Branch, 2013.

McCartney, Andra. “Inventing Images: Constructing and Contesting Gender in Thinking about Electroacoustic Music.” *Leonardo Music Journal Vol. 5 (1995),* pp. 57–66.

McMillan, Benjamin. *Tomes*. Anniston, AL: Potenza Music, 2014, 2015, 2018.

McPherson, Gary E. ed. *The Oxford Handbook of Music Performance vol. 1.* New York, NY: Oxford University Press, 2022.

McPherson, Gary E. ed. *The Oxford Handbook of Music Performance vol. 2.* New York, NY: Oxford University Press, 2022.

Menezes, Flo. “To Be and Not to Be: Aspects of the Interaction between Instrumental and Electronic Compositional Methods.” *Leonardo Music Journal* vol. 7 (1997), pp. 3–10. https://doi.org/10.2307/1513239

Morris, R. Winston, Eric Paull, and Lloyd E. Bone. *Guide to the Euphonium Repertoire: The Euphonium Source Book*. Indiana Repertoire Guides. Indianapolis: Indiana University Press, 2007.

Neill, Ben. "Pleasure Beats: Rhythm and the Aesthetics of Current Electronic Music." *Leonardo Music Journal* Vol. 12 (2002), pp. 3–6. https://www.jstor.org/stable/1513341

Nelson, Mark. "An Interview with Barton Cummings." ITEA Journal 32, no. 2 (2005).

Nelson, Mark. "Remembering Barton Cummings." *International Tuba and Euphonium Association Journal* vol. 41 no. 4 (2014), pp. 15–18.

Palombini, Carlos. "Machine Songs V: Pierre Schaeffer: From Research into Noises to Experimental Music." *Computer Music Journal* Vol. 17, no. 3 (Autumn, 1993), pp. 14–19.

Perantoni, Daniel, and R. Winston Morris. *Guide to the Tuba Repertoire: The New Tuba Source Book*. Indiana Repertoire Guides. Indianapolis: Indiana University Press, 2006.

Phillips, Harvey. *Mr. Tuba*. Bloomington, Indiana: Indiana University Press, 2012.

Pope, Steven Travis. "Editor's Notes: A Taxonomy of Computer Music." *Computer Music Journal* Vol. 18 no. 1 (Spring, 1994), pp. 5–7. https://doi.org/10.2307/3680511

Potter, Craig G. "The Electroacoustic Tuba: A Study of Selected Works for Tuba with Fixed Media and Live Processed Electronic Accompaniments". DMA diss., University of Maryland, 2018. https://drum.lib.umd.edu/handle/1903/20727

Rainer, Bernhard. "Bruckner on Valve Trombone?—Low Brass Performance Practice in Anton Bruckner's Works. *Historic Brass Society Journal* vol. 28 (2016), pp. 135–161.

Randolph, David Mark. “New Techniques in the Avant-Garde Repertoire for Solo Tuba.” DMA diss., University of Rochester, 1977.

Ray, Irving. “Live Electronics: The Present State of Euphonium Solos with Electronic Accompaniment.” *ITEA Journal* vol. 46 no. 1 (2018), pp. 39–47.

Réveillac, Jean-Michel. *Electronic Music Machines: The New Musical Instruments*. London: Wiley-ISTE, 2019.

Richter, Heather Noyes. “An Annotated Bibliography of Selected Works for Tuba Published by The Tuba Euphonium Press.” DMA diss., University of Georgia, 2010. https://getd.libs.uga.edu/pdfs/richter_heather_n_201008_dma.pdf

Ross, Walter. *Midnight Variations.* N.p.: Dorn, 1971.

Schreiber, Ewa. “In the Face of the Other: Contemporary Composers’ Reflections on the (Ideal) Listener.” *International Review of the Aesthetics and Sociology of Music* Vol. 48 no. 2 (December 2017), pp. 225–44. https://www.jstor.org/stable/26844622

Scott, Andy. *My Mountain Top*. Sandbach, Cheshire: Astute Music. 2012.

Stockhausen, Karl and Jerome Kohl. “Electroacoustic Performance Practice.” *Perspectives of New Music* Vol. 34 no. 1 (Winter 1996), pp. 74–105. https://www.jstor.org/stable/833486

Tuba, Taylor Hicks. “DMA Lecture Recital 10/14/22.” YouTube video, 1:17:42. March 13, 2023. https://youtu.be/KGPmqesUA2k.

Valiquet, Patrick. “The Spatialisation of Stereophony: Taking Positions in Post-War Electroacoustic Music.” *International Review of the Aesthetics and Sociology of Music* 2012, Vol. 43 no. 2, pp. 403-21.

Vaughan Williams, Ralph. *Concerto for Bass Tuba in F Minor*. London: Oxford University Press, 1954.

Westerfield, Lewis E. “Selected Works for Tuba and Electronic Media.” DMA diss., University of Alabama, 2017. https://ir.ua.edu/bitstream/handle/123456789/3530/file_1.pdf?sequence=1&isAllowed=y

Wilson, Zackery J. “Chamber Chip: An Album of Six Pieces for Instrument(s) and Fixed Media.” DMA diss., University of Texas-Austin, 2015.

Wishart, Trevor. *On Sonic Art*. Amsterdam: Harwood Academic Publishing, 1996.

VITA

Taylor Hicks was born January 15, 1995 in Clarinda, Iowa. As the son of two music educators, he has been a lifelong musician, having attended his first concert at only five days old. Mr. Hicks is currently working on two concurrent degrees at University of Missouri-Kansas City, a Doctor of Musical Arts in Tuba Performance and Master of Music in Musicology. He has earned a Master's in Tuba Performance at Western Illinois University in 2020, after obtaining a Bachelor's with Honors in Music Education from the University of Northern Iowa in 2017.

Mr. Hicks has competed in several solo artist events, achieving 3rd place in the Missouri MTNA Young Artist Competition, and regularly competing in International Tuba & Euphonium Association's Regional and National Solo Artist, the Mock Orchestral Auditions Competitions, as well as the Falcone Artist Competition. He is a member of the UMKC Conservatory Tuba and Euphonium Studio, student coach for the undergraduate brass quintet "No Strings Attached," and the International Tuba & Euphonium Association. Last year, Mr. Hicks presented a round table discussion titled "The Power of Teamwork: The Commission and Collaboration Process" at two regional International Tuba & Euphonium

Association conferences and is slated to perform with the UMKC Tuba Band at the International Tuba & Euphonium Conference this June in Tempe, AZ.

One of Mr. Hicks's passions is the pursuit of commissioning new music for Tuba. He is a frequent participant in developing repertoire for the tuba as a commissioner of works from composers like Ben Horne, Patrick Cunningham, Ian Lester, Sean Klink, Jose Flores, and Ben Chrisman. Mr. Hicks especially loves the process of working with new and young composers. Tuba and electronics is Mr. Hicks' medium of choice, with commissions that span a broad range of styles and aesthetics. It is his belief that the commission and collaboration process is a critical part of leaving a legacy and furthering the tuba repertoire

Mr. Hicks is the founder and lead content creator for the website Tubatalk.com, a site dedicated to providing access to interviews on a variety of musical topics, educational resources and a forum for the commissioning of new works for tuba. Tuba Talk is the foundation of Mr. Hicks' Doctoral Project, with the intent to add recordings, links to method books and solos, collaborations, and other resources. As an educator and musician, it is Mr. Hicks' desire to create a website that can serve as a gateway for fellow

tubists of all ages to find useful information without having to scour the entirety of the internet looking for pieces of information.