A Modular Artistic Practice for the Post-Classical Guitarist

Emmanuel Jacob Lacopo

Schulich School of Music
McGill University
Montreal, Quebec

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Abstract

The guitar is a hybridized, cross-genre instrument that has developed unique performance approaches and practices across the varying musical worlds it appears in. However, the world of classical guitar has yet to fully embrace the innovations and approaches that began appearing as early as 1960. While the guitar repertoire involving electric guitar, technology, and electroacoustic approaches has become quite large, much of it does not explore the varied breadth of features present on the instrument. Moreover, it fails to address key parameters that communicate interaction with chosen technological elements. The world of electronics is ever-growing and demands a system that is equally dynamic and adaptable. To address this need, *A Modular Artistic Practice* welcomes a world of new possibilities for the guitar repertoire within classical music.

In this project, I utilize technology to unify different stylistic and cultural roles of the guitar that have been traditionally separated. By blurring the roles of composer, performer, and improviser, I deliberately select hardware and software that facilitate electro-acoustic creative processes for self-sufficient applications and develop a methodology to communicate and notate the use of these tools. This paper will discuss my approach to augmenting my acoustic instrument, creating a pedalboard that utilizes technology as a compositional, improvisational, and interpretive tool, rethinking our approach to electric guitar extended techniques, and much more. By simplifying the process of incorporating this methodology in one's practice and making its integration more accessible for musicians without prior experience, I develop a technological approach that expands the repertoire and possibilities of the instrument. This process bridges the gap between vernacular and art-music traditions, and, by doing so, I advocate for an increased awareness and appreciation of the guitar's versatility as a concert instrument.

The integration of this approach:

1. Strengthens the performance experience
2. Creates well-rounded musicians and artistic processes
3. Addresses a gap in academic literature that limits the genre's potential growth and accessibility
4. Aids classical musicians through the process of navigating our evolving musical landscape
5. Creates conversations around our art that signify the place in time it was created in

Ultimately, I propose innovative approaches for a 21st century technological performance practice and provide a resource for performers and teachers.

Abrégé

La guitare est un instrument hybride et multi-genres qui a développé, avec succès, des approches et des pratiques d'interprétation uniques dans les différents mondes musicaux dans lesquels elle apparaît. Cependant, le monde de la guitare classique n'a pas encore pleinement adopté les innovations et les approches qui ont commencé à apparaître dès le début des années 60s. Bien que le répertoire de guitare impliquant la guitare électrique, la technologie et les approches électroacoustiques soit devenu assez vaste, une grande partie n'utilise pas l'instrument à sa pleine capacité. De plus, il ne parvient pas à aborder les paramètres clés qui communiquent l'interaction avec les éléments technologiques choisis. Le monde de l'électronique est en constante évolution et exige un système tout aussi dynamique et adaptable. Pour répondre à ce besoin, *A Modular Artistic Practice* accueille un monde de nouvelles possibilités pour le répertoire de la guitare dans la musique classique.

Dans ce projet, j'utilise la technologie pour unifier différents rôles stylistiques et culturels de la guitare. En brouillant les rôles de compositeur, d'interprète et d'improvisateur, je sélectionne délibérément du matériel et des logiciels qui facilitent les processus de création électro-acoustique pour des applications autonomes et je développe une méthodologie pour communiquer et noter l'utilisation de ces outils. Cet article discutera de mon approche pour augmenter mon instrument acoustique, créer un pédalier qui utilise la technologie comme outil de composition, d'improvisation, et d'interprétation, repenser notre approche des techniques étendues de la guitare électrique, et bien plus encore. En simplifiant le processus d'intégration de cette méthodologie dans sa pratique et en rendant son intégration plus accessible aux musiciens sans expérience préalable, je développe une approche technologique qui élargit le répertoire et les possibilités de l'instrument. Ce processus comble les traditions vernaculaires et artistiques et, ce faisant, je plaide pour une prise de conscience et une appréciation accrue de la polyvalence de la guitare en tant qu'instrument de concert.

L’intégration de cette approche :

1. Renforce l’expérience de la performance
2. Créer des musiciens et des processus artistiques complets
3. Supprime une pénurie culturelle qui limite la croissance potentielle et l'accessibilité du genre
4. Aide les musiciens classiques à naviguer une pratique musicale en constante évolution
5. Créer des conversations autour de notre art qui signifient le lieu dans le temps dans lequel il a été créé

En fin de compte, je propose de nouvelles approches pour une pratique de la performance technologique du 21e siècle et fournir une ressource aux interprètes et aux enseignants.

Acknowledgements

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To Michael Bruzzese, you have been my closest friend and oldest musical companion since we were five years old. From our earliest memories making music and putting bands together, to our nights obsessing over Coltrane's late records, you have opened my mind to some of the most beautiful art this world has to offer. Thank you for it all, my friend!

To David and Pat, who would have thought that those first guitar lessons in the parents' basement, all those years ago, would have led to this. You have shared your love of music with me and have shaped my life ever since; thank you for always believing in this passion of mine, and for pushing me to achieve this dream.

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Finally, words cannot express my thanks towards my wife, Amelya Hempstead. You are the unbelievable producer behind all my musical releases, an incredible artist in your own right, and an endless source of inspiration. More than the art you create, and the support you have provided me with throughout these years, you have taught me what it means to truly live, love, and experience what this world has to offer. Our endless talks have had a deep influence on this work and the music I have created — I appreciate all that you do, and I love you endlessly.

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Chapter 1

Introduction

There is never any end. There are always new sounds to imagine; new feelings to get at. And always, there is the need to keep purifying these feelings and sounds so that we can really see what we've discovered in its pure state. So that we can see more and more clearly what we are. In that way, we can give to those who listen the essence, the best of what we are. But to do that at each stage, we have to keep on cleaning the mirror.

— John Coltrane

1.1 Introduction

The basis of my Doctoral research stems from the desire to create a personal artistic output, while pushing past the boundaries of genre definitions. Through this, we are naturally met with a feedback loop of innovation that further propels the possibilities of our instruments and processes; a testament to the people that have lived and shaped this world, and in turn, how this world then shapes the art we are capable of creating.

As we will examine, this approach to artistic practice comes with its own set of obstacles. However, the modularity of one's approach to pedagogy and musical practices exemplified in my research represents a necessary approach for the overall genre's continued evolution. While I write from the perspective of a guitarist, it is important to note that this methodology can be applied to any musician, regardless of their instrument. The process of augmenting one's acoustic instrument or voice and opening ourselves up to new technical and technological possibilities remains in reach for every creative individual. As John McGrath and Richard Perks point out:

> *"In the 21st century, the guitar continues to be reimagined and reinvented. From simple adaptations of modifications made by performers themselves, to custom-made instruments commissioned to fulfill very specific creative needs, to the mass production of new lines of commercially available instruments, the extant and emergent forms of this much-loved musical instrument vary perhaps more than ever before. Such diversity in physicality reignites the longstanding ontological question: What is a guitar"?*[1]

This mentality inspired me to document my own journey throughout the expansion of my own 21st century artistic practice — a repertory that unifies the different stylistic and cultural worlds of my instrument. Throughout my time in academia, it has been my experience that the development of one's artistic vision and narrative was not prioritized. I have since endeavored to illustrate my own vision of 21st century classical music; a vision that accentuates the importance and reality of our lived experiences and the diverse perspectives available to us in our communities. Above all, this research has highlighted the necessity of developing approaches that keep us autonomous and adaptable in our artistic practices.

1.2 Terminology

To grasp the extent of this research, there are first a few terms we must clarify. 1. The term ***classical guitar,*** generally refers to the acoustic nylon string guitar. It is, however, quite common in contemporary performances to present classical music on different iterations of the instrument, such as the electric guitar and the world of technology that accompanies it. It is apparent that the term *classical guitar* may not suffice to describe the music I have chosen to study. Curiously, some guitarists have opted to use the term *contemporary classical musician* or *contemporary classical and/or electric guitarist*. The lack of consistency only further muddies the water and lacks clear definition. For this research I have elected to use the term classical guitar, to

[1] Perks, Richard, and John McGrath. "21st century guitar: Evolutions and Augmentations." (1).

signify the performance of classical music on the guitar; whether that be on the traditional nylon string acoustic guitar, or its electric counterpart.

2. Moreover, ***post-classical*** refers to a growing phenomenon in the genre that unifies classical music with digital and studio effects typically found in experimental music environments. My work in this domain aims to blend my influences in Progressive genres, Post-genres, improvised music, and New-Music to unify different stylistic and cultural worlds of my instrument.

3. Additionally, I have begun to view my compositions through the lens of what I call: ***Time-Capsule Music***. The issue with incorporating specific effect pedals into a compositional practice, is that technological developments move so quickly and inevitably render specific units obsolete. As time goes on, the ability to easily recreate the sound-world of these works becomes increasingly difficult. However, I have become interested in the idea that decoding music isn't limited to staff notation, but can include a wide array of MIDI notations, audio recordings, and so much more. The role of the performer eventually becomes to decode these ideas and re-create them with the tools they have available to them. This might lead them down a more minimal aesthetic, or even a more maximal one - but my interest lies in modular communication over extended periods of time, and the use of recorded material as communicative interpretive tools.

4. Finally, the artistic framework suggested in this paper is best approached through the perspective of ***a modular artistic practice***. The concept of modularity was introduced to psychology after the publication of Jerry A. Fodor's landmark book *The Modularity of Mind* (1983). It establishes a framework of cultivating separate parts that, when combined, form a complete whole (Cambridge). Moreover, Post-Fodorian theorists, such as Sperber (2002) and Carruthers (2006), state that the mind is modular

through and through.[2] This study uses modularity to demonstrate the need to develop dynamic artistic practices consisting of far-reaching influences and creative processes. Additionally, it attributes an attitude of resourcefulness and adaptability among performers.

1.3 Overview of the project

Problems and Rationale

My project develops an approach to combat a lack of clarity surrounding the possibilities of the guitar in 21st century classical music. In order to understand the necessity of this research, we will first establish a brief historical overview of classical music's use of the guitar.

The Acoustic Nylon-String Guitar

Among classical musicians, the guitar has yet to experience the same acceptance and popularity offered to mainstream orchestral instruments. Zane Banks presents that Its avoidance is "largely due to the fact that the acoustic nylon-string guitar is significantly softer than other instruments, and due to its lack of volume and projection, is often drowned out in chamber settings and fails to fill a large hall with its sound".[3]

However, Banks points out that "It was the efforts of guitarists Andrés Segovia, Julian Bream, and John Williams that raised the classical guitar's profile and presented it as a legitimate, virtuosic, concert hall instrument".[4] Despite the controversies surrounding Segovia, his approaches, and chosen repertoire, it cannot be denied that his work increased the instrument's repertoire and had a positive impact on its

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[2] Robbins, Philip, "Modularity of Mind", The Stanford Encyclopedia of Philosophy (Winter 2017 Edition), Edward N. Zalta (ed.), https://plato.stanford.edu/archives/win2017/entries/modularity-mind/
[3] Banks, Zane. "The Electric Guitar in Contemporary Arts Music." PhD diss., The University of Sydney, 2014. (3).
[4] Ibid. (4).

development. Additionally, Bream and Williams continued Segovia's tradition of commissioning works from contemporary composers and presenting them on extensive concert tours.

During the 1950s, Julian Bream also began to write articles for composition publications, detailing how to write idiomatically for the instrument. Due to the pioneering efforts of these individuals, and many others, Banks concludes that "the classical guitar is now widely accepted as a legitimate concert hall instrument and most established conservatories offer degrees on the instrument".[5]

While this is a positive outcome for the guitar, the dogma that surrounds our approaches is what this paper aims to combat. Banks does not fail to note that "despite his triumphs regarding the repertoire and status of the classical guitar, Segovia was a major opponent to the use of electric guitar in any genre of music, stating that the instrument was an abomination".[6] It was precisely this attitude towards expansion that fostered a barrier of conservatism and traditionalism within the traditional classical guitar repertoire.

The Electric Guitar

As further outlined by Banks in *The Electric Guitar in Contemporary Arts Music*, "in the majority of the repertoire written between 1950–1959, the electric guitar assumes the role of an accompanying instrument, in either an orchestral or chamber setting".[7] There are indeed occasional instances where the instrument is used for solo passages, however, "it appears to be used more for the novelty of its tone color and timbres rather than its capacity to execute important thematic material".[8] It should also be noted that to a modern-day listener who's been exposed to the many capacities of the instrument, whether through personal experience or media exposure, "the manner

[5] Ibid.
[6] Ibid. (7).
[7] Ibid. (41).
[8] Ibid.

in which the electric guitar has been used in these compositions sounds bland".[9] This is because the possibility for effects was not yet accessible. While guitarists could achieve different levels of natural gain through their amplifiers, the options were extremely limited when compared to our current reality. While there has been progress in the electric guitar repertoire, there remains a conservative attitude limiting a deeper understanding of the possibilities afforded to us.

Composing for the Post-Classical Guitarist

The guitar's environment is working against a scarcity of academic literature concerning the role and function of technology, the electric guitar, and electroacoustic approaches in contemporary classical music. As stated by Tim Brady, "there is no single source to get information on the instrument's performance practice, no acknowledged standard as there is with the piano or the violin. […] Though we all use frets and strings, the variety of different features from one electric guitar to another seems anathema to standardization".[10] The instrument's strength lies in an extreme diversity in performance tradition when compared to most western musical instruments, but these possibilities call for an open and flexible mind. With this information, the challenges presented to today's post-classical guitarist are the following:

1. The full breadth of technological features available on the guitar has not been explored within western classical music
2. When used, we have not developed a clear enough system to communicate:
    a. The difference in tonal and timbral possibilities available to us on electric guitar and a respective notational methodology
    b. The interaction with external effect hardware or software and a respective notational methodology

[9] Ibid.
[10] Laganella, David, and Tim Brady. "The Composer's Guide to the Electric Guitar." Pacific: Mel Bay Publications, 2003.

   c. The true extent of extended-techniques available to us on electric guitar
3. The entry-point to working with music technology is too high, and it is unrealistic to assume that the average classical musician has the necessary technological capacity to understand even the basis of a Max patch or analog signal path[11]
4. Even when a musician possesses the necessary skillset, technology develops exponentially and renders many units, and complete pieces, obsolete over short periods of time.

Very few composers provide any instruction in crafting musical elements outside the usual dynamic and timbral markings found in traditional acoustic guitar scores. As we will see throughout this research, very little thought is attributed to preferred amp settings, effect choices and interaction, or guitar pickup selections. The instrument's rich history and accessibility to the modern innovations of amplification, effect pedals, external hardware, and software, make it one of the most versatile instruments that Western classical music has at its disposal. By embracing the modularity of guitar approaches, we can bridge the gap between the guitar's vernacular and art-music traditions and showcase a versatility that can enhance the instrument within the genre of classical music.

The guitar exists in a rarified field where its instrumentalists are usually the ones who are creating their own music and, by virtue of this, each person develops their own unique sound and way of playing; bringing an indeterminate aspect of their own original techniques and timbres. For this project, I composed and arranged several contrasting works that feature a range of techniques and technological requirements. For each work, I developed a self-sufficient approach, as outlined by Dr. Enns, towards rendering the sonic ideas physically possible, a notation system that highlights the different timbral and technical possibilities of the guitar, and a methodology for interacting with and further communicating chosen technologies.

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[11] Enns, Suzu. "Towards a Self-Sufficient Approach for the Electronic-Acoustic Clarinetist: A Resource for Performers and Educators." Montreal: McGill University, 2017.

My compositions *After Dark*, *an endless battle of contrasting memories*, and *the way water breathes*, each exemplify the use of **technology as a compositional tool** and **technique as an augmentable construct**. Additionally, they present new notational possibilities. My arrangement of *Gay Guerrilla* by Julius Eastman presents an example of **technology as a tool for improvisation**. Finally, *Buddha* by Julius Eastman and *Miniature Beams* by Marguerite Brown exemplify the use of **technology as an interpretive tool** within my framework of *A Modular Artistic Practice*.

Primary Objectives

1. **Develop** a clearer understanding of the versatility of the guitar within classical music.
2. **Identify** and **solve** presented challenges in both instrumental and technological contexts.
3. **Perform** works that demonstrate effective use of available tools.
4. **Propose** pedagogical approaches for the inclusion of technology within classical guitar music.
5. **Create** a resource for performers, composers, and teachers.

Outcomes and Conclusions

As outlined by Suzu Enns, “technology plays a significant role in almost every aspect of a successful music-related career, however, studying and creating music in this domain requires classical musicians to become equally proficient as instrumentalists and technicians”.[12] Despite this, the entry-point to this realm of music making is far from accessible; in my experience, most of the available courses in this domain either require special permission for admittance or prior intermediate-level experience and knowledge. With careful experimentation and integration, my proposed

[12] Ibid.

modular approach guides students in learning to listen in new ways, while understanding what they are listening for.

Moreover, it can strengthen the performance experience, provide opportunities for creative expression, create musical approaches that define an evolutionary moment within the genre, and push the boundaries of the classical guitar's performance practice. This is done with the goal of outlining the idea that musical literacy can be expanded to entail a student's ability to function in various musical settings by performing, responding to, or creating music, while understanding the elements involved in that process. Ultimately, I propose new pedagogical approaches that address our current challenges and shortcomings in 21st century classical music, including but not limited to the following factors: technology, equipment, notation, composing, listening, improvising, interaction, balance, and analysis.

Chapter 2

The Post-Classical Guitarist

Artists must look beneath the surface
and show that there is more to this world
than meets the eye
— Marvin Gaye

2.1 Objectives

This study outlines the extent of sonic possibilities available on the guitar within the context of 21st century classical music. While the scope of this work is guitar-centric, this research can be adapted to any performance practice, and is intended to serve as a greater resource for performers, teachers, and students — regardless of their level of experience working within the domain of music technology. The objectives are as follows:

- **Research** current pedagogical methods and repertoire for guitar and technology

- **Artistic research** towards the application of a *Modular Artistic Practice*

- **Identify** areas where our current approach to music technology is lacking

- **Determine** potential solutions

- **Propose** approaches for application

- **Establish** comprehensive pedagogical methods

2.2 Issues in the Field

There is already an extensive list, many of which are cited in this paper, of resources illustrating an investigation into the question: *what* is a guitar? Extensively documented by Perks and McGrath, "while, at first, this may seem like a simple, perhaps even facetious question, it has consistently prompted further consideration. The guitar remains a staple instrument amidst a range of music traditions from around the world — and as such traditions progress from one generation to the next — this question takes on increasingly complex and nuanced meanings".[13] However, it has been my focal interest, and the interest of this study, to further probe: what is a guitar truly capable of? Furthermore, considering all the possible iterations of the guitar, what are the boundaries of the *classical guitar*?

Perks and McGrath affirm that "the guitar is a locus for musical and cultural interactions within and across cultures".[14] It has accommodated more diverse players, techniques, and styles than any other instrument in use today, but Michael O'Toole points out that "the enormous cultural and stylistic breadth of its tradition has not made it easy for music history to digest".[15] As we examined in Chapter 1, the traditional classical guitarist's repertoire does not make use of technological innovations that could circumvent the inherent shortcomings of the instrument and reflect its full capabilities. Through the use of existing modern innovations (such as the electric guitar, amplification, and external effect pedals), and augmentation techniques to be further discussed in Chapter 3, we can unify various stylistic and cultural worlds of the guitar to create a more realistic picture of classical music in the 21st century, all the while showcasing a versatility that can enhance the use of the instrument within classical music.

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[13] Perks, Richard, and John McGrath. "21st century guitar: Evolutions and Augmentations." (1).
[14] Ibid.
[15] O'Toole, Michael (2020). "John Williams: Changing the culture of the classical guitar." Routledge. 2020.

In his book *Instruments of Desire*, Steve Waksman discusses the lack of academic writing and research surrounding the electric guitar.[16] This gap in the literature can partly be attributed to the fact that the number of available guitars, amplifiers, effects, and digital technology is growing exponentially every year and is becoming increasingly daunting for the average player or composer to wrap their heads around. Tim Brady invites us to “imagine the sound of a violin. Even with adding in we still hear one basic sound that functions as a violin in pretty much any context, be it a string quartet, a symphony orchestra, a country fiddler, a jazz violin solo or Celtic rock band”.[17] With the guitar, however, there is not one single sound attributed to the instrument. It calls for a flexible mind that allows each guitarist to develop their own unique sound and way of playing.

It’s for this reason, to combat this lack of literature and grow the repertoire, that previously discussed classical guitarists dedicated a large portion of their career to close collaborations with composers. While they have made enormous contributions to the instrument through this dedication, there remains a difficulty to impart an idiomatic understanding of the instrument to non-guitarists. This is because the all-encompassing world of guitar is complicated and becomes even more-so when we look to modern approaches. In his interview with Guitare Moderne, Brady states that "you have to know a lot of weird technical stuff: the tuning is weird, the pedals are weird. It’s a hard culture to enter. The strength of the electric guitar is that it has this huge potential sonic vocabulary. The weakness is that you have to take the time to learn that vocabulary”.[18] When asked about his own commissioning process, Brady goes on to say:

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[16] Waksman, Steve. “Instruments of Desire: The Electric Guitar and the Shaping of Musical Experience.”Harvard University Press, 1999.
[17] Laganella, David, and Tim Brady. “The Composer's Guide to the Electric Guitar.” Pacific: Mel Bay Publications, 2003.
[18] Brady, Tim. “Spotlight: Tim Brady Part I.” By Guitar Moderne. Guitar Moderne. October 28, 2019. https://www.guitarmoderne.com/artists/spotlight-tim-brady-part-i#more-4584.

> *"To make my life easier, half the composers I commission are guitar players. They know that stuff, but half aren't. We generally have two or three workshops for the latter where they come with recorders and for three hours I plug in all my pedals; show how an EBow works; put chopsticks in the strings; scratch the pick on the strings; play soft and play loud. I play with an overdrive versus distortion, and we go through all that. The guitar has a very specific, peculiar technology. Guitarists who want a commissioned work need to work with composers a little more—and vice versa".*[19]

Despite the instrument's modular evolution, many conservatory-trained classical guitarists themselves approach the world of music technology as a domain entrenched with learning curves and complications. As presented by Dr. Suzu Enns, "many performers lack the knowledge and expertise to study and perform music in this domain".[20] In her *Self-Sufficient Approach for the Electronic-Acoustic Clarinetist*, Dr. Enns outlines the issues around comprehensive instruction for electronic-acoustic music as demanding rehearsal and performance schedules leading to a lack of time and resources to explore new skill sets, lack of awareness around existing options, limited time in private lessons, or lack of experience.

For these reasons, when attempting to create a work in this domain, Enns states that "it is unrealistic to expect classically trained musicians to have the necessary skills and knowledge to decipher even the most basic technological requirements for a piece. Lack of performer-centered hardware and software makes it even more difficult".[21] Bullock et al. additionally state that the practical needs of instrumental performers are rarely ever considered throughout the design of modern technologies. "The software used to create live electronic music, such as Max/MSP, offers incredible creative freedom for composers; yet the programming language and skills required to create Max/MSP patches are beyond the capabilities of most performers".[22] The difficulties continue for performers who receive a faulty Max/MSP patch from the

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[19] Ibid.
[20] Enns, Suzu. "Towards a Self-Sufficient Approach for the Electronic-Acoustic Clarinetist: A Resource for Performers and Educators." Montreal: McGill University, 2017. (5).
[21] Ibid. (7).
[22] Ibid.

composer, or a patch using a different version of software. Further issues are presented when a performer wishes to modify the patch depending on their artistic preferences, access to equipment or concert venue.

According to Bullock, et al., these static patches, “typically designed by composers, are of variable quality and are often incomplete, esoteric, confusing and undocumented. This inevitably disempowers performers by forcing them to rely on composers and/or technical assistants who act as intermediaries to the technology".[23] For this to change, we must adopt new pedagogical approaches to provide formal training to performers and instructors alike.

As we will explore in Chapter 3.6, new holistic educational approaches are necessary to provide formal training to performers, composers, and pedagogues. This would afford students the necessary preparation for realistic performance careers that increasingly include technological approaches. Regardless of one’s intent to include these approaches in their overall performance practice, Bullock, et al. conclude that a deeper understanding of music technology approaches “may be advantageous solely for its potential benefits on general musicianship”.[24]

2.3 Research Goal

How can we unify various stylistic and cultural worlds of the guitar within classical music to create a more realistic picture of the instrument’s capacity?

One stance that researchers may take against my work, is my chosen use of industry-produced effect pedals over novel software and instruments developed within research laboratories. While the previous section of this chapter outlines my general apprehension towards these approaches, it may be helpful to offer further investigation. The now-pervasive use of the electric guitar and effect pedals did not begin until the era of the 1960s. Outlined by Banks, it was this era, however, that welcomed an

[23] Ibid. (9).
[24] Ibid. (10).

exploratory outlook towards the possibilities of this instrument and laid the foundation for new emerging genres today. There was a growing contingent of established rock guitarists such as Jimi Hendrix, Eric Clapton, Jeff Beck, Jimmy Page and Dave Gilmore who redefined how the electric guitar could be played.[25]

While these musicians existed in a different musical realm, their contributions to re-defining the guitar cannot be ignored. Unfortunately, most of the developments uncovered by these players were never formally documented or extensively explored within the classical guitar repertoire. While classical music is evolving and experiencing a surge in the use of electric guitar and technology, there remains a scarcity of academic literature about their role and functionality.

In order to address this gap of knowledge, we must create an accessible system that communicates the full versatility of the guitar and its associated technology. This then facilitates future electro-acoustic creative processes for real-world applications and modular performance practices.

[25] Banks, Zane. "The Electric Guitar in Contemporary Arts Music." PhD diss., The University of Sydney, 2014. (52).

2.4 The Post-Classical Musician

While I've chosen to use the term *post-classical* in my artistic aesthetic, the associated skill sets are present in many modern artistic practices. The prefix *post* has been used across genres to generally define itself by a departure from a musical tradition. While not specifying what the exact departure is, this music holds the original aesthetic as inspiration for further sonic evolution. From the early vihuela to Shoegaze sound-baths, the guitar is the ideal instrument to present the characteristics of a modular artistic practice. With the previously discussed framework of modularity defined as cultivated separate parts that form a complete whole, the skill set of the post-classical guitarist consists of the following:

1. Leaning into the deep-rooted history of guitarists **composing** their own music. As we will see in Chapter 2.7: Technological Affordances, this inevitably leads to the discovery of new instrumental possibilities and the necessary methods of communication for re-creation.
2. The ability to **improvise** in both solo and group settings. Additionally, while we understand improvisation in harmonic, melodic, timbral, and rhythmic contexts, the post-classical guitarist views improvisation as a sonic exploration that can be equally manipulated in the world of effect boxes.
3. To be **adaptable** and **modular** in the practice of technology as compositional, interpretive, and improvisational tools.
4. Attain **self-sufficiency** in using their chosen set-up. This includes setting up and tearing down in a timely manner, properly testing levels and blending parameters, troubleshooting technological difficulties, and more.
5. Configure and troubleshoot the basic **MIDI** and audio capabilities in a digital audio workstation
6. **Produce** vocal/instrumental/electronic arrangements using music production software

7. **Distribute** their music to streaming platforms
8. Understand and use basic **music technology terminology**, and **music production techniques**

The focus of this study prioritizes the development of a creative practice that intertwines the acts of composing, performing, and improvising. In specific relation to the guitar, the cultural associations of the instrument are inextricably tied to these practices. To substantiate this claim, the framework presented throughout this paper illustrates the process of connecting the guitar's history of varied performance practices and techniques, as well as the use of effect pedals, within classical music. While the scope of this research is not intended to outline every iteration and aesthetic of guitar playing throughout its multi-century history, it highlights the necessity of welcoming the personal interests of our studying musicians in order to grow the genre.

2.5 Composers

We must now shift our focus to that of the actual use of the electric guitar and technology within the genre, as much of our lack of literature can be attributed to a lack of detailed or general documentation. The following quote by Andrew Noseworthy presents us with necessary context: "Between the late 1970s and early 1990s, several experimental composers emerged who were accomplished electric guitarists that featured the instrument as central to their creative practice".[26] There are many notable features of this era, ranging from a heavy involvement with the electric guitar's amplification as integral to their work, an exploration of the instrument's technical and sonic capabilities, and extra-musical elements and technologies, to name a few. Noseworthy continues: "This would lead into the development of a repertoire that heavily featured the electric guitar and showcased scores for classical music genres

[26] Noseworthy, Andrew. "Transference Music: For Electric Guitar Soloist and Amplified Orchestra" (2023). Electronic Thesis and Dissertation Repository. 9250. https://ir.lib.uwo.ca/etd/9250. (111).

such as solo, chamber, quartet, large ensemble, symphonic, electroacoustic and large spatialized ensemble".[27]

Glenn Branca

Glenn Branca was part of the earliest wave of composers who explored the fringes of classical and rock music. While Branca didn't pursue any academic studies in composition, he was a figurehead of New York City's experimental art scene throughout the 1970s.

Our point of interest in Branca's work lies specifically with his Symphonic compositions. Noseworthy explains that "contrary to the standard symphonic orchestra, Branca's initial symphonies were led by large groups of electric guitars and joined by the electric bass, drum kit, and occasionally keyboards or brass".[28] These works brought together an array of loud instruments to create sound masses that would drone on at length. As stated by Branca, his use of the term symphony was the "perfect analogy for creating something that develops over the entire evening, the way a play develops in acts".

As we will see in Chapter 2.7: Technological affordances, Branca also explored instrument augmentation in his second and third symphonies through mallet guitars, harmonic guitars, keyboards with guitar pickups, and more.

Scott Johnson

An important example of what we'll examine in Chapter 5.5: Technology as compositional and interpretive tools, is the work of Scott Johnson. As stated on his website, his 1982 work, John Somebody, was "the first piece to use the transcribed

[27] Ibid.
[28] Ibid.

pitches and rhythms of a recorded speaking voice as the basis for an instrumental score".[29]

Long before the ease of 21st century Digital Audio Workstations, tape parts were created through physical editing with a razor blade, overdubbing, and punching-in and out on a tape deck. Johnson explains: "The original phrases were looped and layered in synchronization on a multi-track tape machine. Then that polyphonic tape was itself looped, and the results carved into it with a mixing board, which allowed me to highlight any segment of any phrase, or combine it with others, all in pre-arranged rhythmic synchronization".[30]

At the core of this approach is the necessity for creative exploration and the use of the studio as a compositional tool. On this point, Johnson takes a stance like that of my own: "In a larger sense, I think that what I had in mind would have seemed very familiar to composers from the Renaissance to Stravinsky: a reawakening of serious music to the influences of the living vernacular".[31]

Tim Brady

Tim Brady has established a prolific body of work for the electric guitar that has simultaneously tackled the instrument's lack of academic literature. Brady's compositional output has led to the development of a notated practice for many of the techniques and approaches that have become representative of electric guitar performance. Additionally, Brady includes detailed score indications to denote electronic specifications such as pickups, amplification, and effect pedals.

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[29] "Compositions: John Somebody." Scott Johnson. https://scottjohnsoncomposer.com/compositions/johnsomebody.html
[30] Ibid.
[31] Ibid.

What remains most interesting about Brady's output, is how his approach to composition and orchestration is informed by his relationship with the electric guitar. Brady states:

> *"When I compose for an orchestra, I'm constantly trying to recreate a guitar sound with pedals, and related effects. [...] I build with masses, with densities, or on the contrary, I build solo lines. But I do very little counterpoint. All this comes from the nature of my instrument, imprinted in me, and the fact that it is always at the center of my practice".*[32]

2.6 Improvisers

Going through a music education system as a guitarist, you'll hear a recurring joke; If you want a guitarist to stop playing, put sheet music in front of them. If you want a classical guitarist to stop playing, take the sheet music away.

As Juniper Hill points out in *Incorporating Improvisation Into Classical Music Performance*, "the paucity of improvisation over the last 150 years of western art music is an anomaly".[33] While improvisation is nearly a ubiquitous skill among many genres and cultures, one might still ask the question: why would a classical musician want to improvise?

While motives vary, reasonings include personal expression, lessened performance anxiety, improved technique, social engagement, or even simply the joy of spontaneous composition.

However, before we can go any further, we must first establish a broad definition of what improvisation is, and the myths around it. Hill defines "musical improvisation as a spontaneous creative activity in which artistic decisions are made in the moment of

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[32] Brady, Tim. "TIM BRADY: MAKING HISTORY WITHOUT LABELS." By Frédéric Cardin. PANM360.https://panm360.com/en/interviews-panm360/tim-brady-interview-electric-guitar-making-history-without-labels/.

[33] Hill, Juniper. "Incorporating improvisation into classical music performance.", in John Rink, Helena Gaunt, and Aaron Williamon (eds), Musicians in the Making: Pathways to Creative Performance, Studies in Musical Performance as Creative Practice. New York, 2017; online edn, Oxford Academic, 21 Dec. 2017. (1).

performance".[34] This definition can also include the improvisation of musical parameters that are usually classified as interpretive choices — such as "tempo fluctuations, articulation, dynamics, agogic accents, vibrato, timbre and so on".[35] Within the genre of classical music, Hill states that one of the main factors inhibiting improvisation today is an underlying attitude that the creative potential of performers is somehow inferior. She continues: "To encourage the incorporation of more improvisation into western art music is inherently to advocate for performers to be allowed—and to allow themselves—to exercise greater authority in the creative process".[36]

Through its general disregard, we've cultivated several myths around this art-form that disenchant curious musicians. The first point that Hill addresses is the following: "Just because a decision is spontaneous does not mean that it is unprepared or that it comes out of nowhere. Improvisation may be greatly facilitated through general training to improve skill sets and specific practice sessions to prepare material and explore ideas".[37]

Moreover, we perpetuate the belief that improvisation belongs to genres outside of our own. Hill responds: "In actuality, a broad variety of improvisational practices have flourished throughout many centuries of western art music practice. It is generally acknowledged that improvisation was an intrinsic part of performance practice during the medieval, renaissance and baroque eras".[38]

Tim Brady states that "the real goal of improvisation is experiencing the flow of time and the interaction of sounds and people".[39] Improvisation is more than just

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[34] Ibid. (2).
[35] Ibid.
[36] Ibid.
[37] Ibid.
[38] Ibid.
[39] Brady, Tim. "TIM BRADY: MAKING HISTORY WITHOUT LABELS." By Frédéric Cardin. PANM360. https://panm360.com/en/interviews-panm360/tim-brady-interview-electric-guitar-making-history-without-labels/.

creative exploration, Hill goes on to mention that it can be an important developmental tool both as a learning technique for students and as a practice strategy for professionals. Additionally, in her own research, she concluded that students found improvisation "useful for deepening understanding of traditional repertoire, improving technique and aural skills, expanding interpretative and expressive possibilities, discovering a personal voice, and lessening performance anxiety".[40]

2.7 Technological affordances

James Gibson introduced the concept of *affordance* in 1979, suggesting that the affordance of anything is a "specific combination of the properties of its substance and its surfaces taken with reference to an animal".[41] Essentially, Gibson suggests that affordances are actionable possibilities provided to an organism, through its environment. Similarly, Don Norman revised this definition in 2013, emphasizing the role of the *capabilities* of the agent: "An affordance is a relationship between the properties of an object and the capabilities of the agent that determine just how the object could possibly be used […] The presence of an affordance is jointly determined by the qualities of the object and the abilities of the agent that is interacting".[42]

In relation to the way we approach our instruments, we can further understand this concept through the delineation of *inherent* and *augmented affordances*. An *inherent affordance* can be understood as the natural potential of an instrument. For example, the acoustic guitar inherently produces sound through a vibration of the strings, which is then transmitted to the bridge, and amplified by the resonance of the top of the guitar before emitting from the soundhole. Contrarily, *augmented affordances* allow you to increase the possibilities of an instrument. In the previous

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[40] Hill, Juniper. "Incorporating improvisation into classical music performance.", in John Rink, Helena Gaunt, and Aaron Williamon (eds), Musicians in the Making: Pathways to Creative Performance, Studies in Musical Performance as Creative Practice. New York, 2017; online edn, Oxford Academic, 21 Dec. 2017. (4).
[41] Perks, Richard, and John McGrath. "21st century guitar: Evolutions and Augmentations." (52).
[42] Ibid. (53).

example, an *augmented affordance* can be seen as the installation of an electro-acoustic pickup to achieve greater amplification than inherently afforded.

Richard Perks states that “performers may modify an instrument by changing the pickups or wiring in an electric guitar, or make use of external music-making devices such as effects pedals, EBows, laptops and more, to alter or augment its physicality and/or sonic potentialities”.[43]

However, it is important to be aware of certain basic factors. It has been my experience that there eventually comes a point where you must sacrifice a possibility present on the instrument in order to gain a new affordance — there can never be a constant linear growth pattern. For example, consider the scale length, and weight differentials that must be taken into account when constructing an 8 string electric guitar, versus a 6 string electric guitar, versus a 6 or 8 string nylon string guitar. Moreover, when installing a pickup for a direct input in a nylon string acoustic guitar, one must be aware of the balance between the acoustic volume and amplified volume in the concert space.

[43] Ibid.

Chapter 3

An Augmented World of Guitar

The thing about the guitar is that it has to be constantly re-imagined, de-constructed, then re-constructed if it is to continue to be a vital force in music's future landscapes.

- Joe Satriani

3.1 Objectives

My objective for this project was to develop an adaptable and accessible system — constructed for performers, from a performer's perspective — that unifies various stylistic and cultural worlds of the guitar, to create a more realistic picture of the instrument's capabilities in the 21st-century.

The essence of the *Modular Artistic Practice for the Post-Classical Guitarist* is to instill an exploratory perspective in today's performing classical guitarists. The principle of this approach is that the performer becomes more adaptable and modular in their performance practice, to contribute to an evolving musical landscape. Through the research and use of all tools the guitar has at its disposal, we learn about how our musical and societal innovations can evolve symbiotically and influence our pedagogical approaches. This process is not focused on negating the importance of developing novel technologies and augmented instruments in research laboratories. However, it accentuates the necessity for an accessible system that all performers can easily grasp. As previously outlined in this research, most performers lack the time to become adequate technicians and attain sufficient knowledge in working with complicated technologies. This is the reason for this approach, to highlight the performer's need for tools that lead to accessible creativity.

3.2 Context

Today, the ways in which we understand, and present the guitar is continuously evolving. This chapter will provide a range of examples and perspectives to create a framework for how we might understand the inherent and augmentable possibilities the guitar affords us. This is done with the goal of combating the lack of academic literature surrounding the use of the electric guitar, and modern industry-standard technologies, from the performer's perspective.

As Richard Perks and John McGrath state in the opening of their anthology *21st Century Guitar: Evolutions and Augmentations*: "From simple adaptations or modifications made by performers themselves, to custom-made instruments commissioned to fulfill very specific creative needs, to the mass production of new lines of commercially available instruments, the extent and emergent forms of the guitar vary perhaps more than ever before".[44] Moreover, the role of technology in relation to the guitar's evolution has proven to be exponentially intertwined. The use of modern musical devices – such as EBows, effect processing, laptops, and AR technologies – are allowing performers and composers to re-define the guitar in the modern age.

A guitarist's choice of instrument and equipment to amplify and modulate their sound is critical to the works they perform and their own original aesthetic. As we will see, the affordances of one's set-up greatly influence the type of music they will produce. The use of amplification and effect pedals are a standard part of the guitar's performance practice in other genres and continues to be explored in classical music. Yet, as Noseworthy explains, "further clarification regarding this equipment is required when considering a newly written piece of music. This is because the incorporation of electric guitar gear can be both a universal and a highly personal experience that

[44] Ibid. (1).

ranges from player to player".[45] Developments in the instrument's technological capabilities have historically evolved in tandem with developments in the larger realm of music technology. As we will see in this chapter, there are certain effects that have become so mass-produced, that they have become inextricably tied to the aesthetic of the instrument; such as different types of distortion, delay, and reverb. While these effects can be considered a standard part of any electric guitarist's set-up, Noseworthy points out that "other effects, such as elaborate harmonizers or modulated delays, are more strange and idiosyncratic".[46]

To give further context into the guitar's history and trajectory, we will explore the perspectives of Charlie Hunter and Nels Cline. Hunter is considered one of the leading performers of six, seven, and eight-string hybrid guitars. As illustrated in 21st century guitar, "his distinctive technique combines guitar parts with bass lines and percussive elements, allowing him to function as a complete rhythm section".[47] When asked how he defines a guitar, Hunter states that "it's a folk instrument and every folk has a different version of it. But it's also the only instrument that really has elements of harmony, melody and rhythm in it, but doesn't own any of those things outright".[48]

Nels Cline is an American guitarist and composer whose innovative use of effect pedals, and novel technology such as the Kaoss Pad, continues to "expand the affordances of the augmented 21st Century Guitar".[49] In his interview for Perks' and McGrath's anthology, Cline makes a point to delineate the affordances gained through the guitar's exploration in other genres.

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[45] Noseworthy, Andrew. "Transference Music: For Electric Guitar Soloist and Amplified Orchestra" (2023). Electronic Thesis and Dissertation Repository. 9250. https://ir.lib.uwo.ca/etd/9250. (124).
[46] Ibid.
[47] Perks, Richard, and John McGrath. "21st century guitar: Evolutions and Augmentations." (101).
[48] Ibid. (109).
[49] Ibid. (173).

> *"Sound itself is of such importance in what we call or what we understand is or generally just classify as 'pop music'. […] There's a theory that the text of pop music is the record you know, that the score cannot capture all of the timbral data in any inadequate way, and sound is so important, and there's also this idea of the studio as virtual environment. You know it's not always trying to, since things like Electric Ladyland or the Beatles, not trying to portray actual spaces but kind of virtual spaces".*[50]

These virtual explorations concurrently create a new vocabulary of sounds and tones. When we allow ourselves to explore this history and imagine potential trajectories, we then provide potential avenues of exploration in any context, not limited to genre-specificity. As Cline goes on to describe: "There's a way to create something, not unlike a pop song or blue version of Musique Concrète, or something of Varèse, where you're using the medium of tape and any kind of outboard gear to change sound. Now we have this ability with the effects pedal world".[51] This allows today's performer the ability to present a world of sound that was once only available in studio recordings.

In terms of the direction of the guitar's evolution, my own opinion is like that of Cline's. "I just see it as inching forward in sort of like baby steps, mostly relating to the world of effects pedals and maybe getting away from identifiable guitar sounds, but I think that there will always be a reaction to that that will bring things back to this kind of basic power and bluster of guitar that comes I think from blues".[52]

3.3 Obstacles

In my performance practice and academic career, a growing concern has been the lack of access to instruction that considers the needs of the 21st-century classical performer. While music-technology courses are available at most academic institutions,

[50] Ibid. (179).
[51] Ibid.
[52] Ibid. (183).

very few do not require special permission or a previously established knowledgebase to take part in the semester's lessons. Even fewer explore ubiquitous, industry-produced/standard technologies that would better prepare students for real-world musical scenarios. Consequently, despite their growing interest and experience with this repertoire, most students, as noted by Dr. Enns, begin to feel "disempowered and disengaged due to their lack of knowledge".[53] Therefore, as a musician whose instrument is inextricably tied to these practices, a crucial step of my research has been to demystify the process of modernizing the genre in an accessible manner that centers the performer.

3.4 Research Questions

In the upcoming section, 3.5: An Organology of the Guitar, I will illustrate the extent of possibilities offered to performers and composers in relation to the guitar. However, to understand the crux of this research and the trajectory of the overall process, a personal anecdote is necessary.

While my introduction to the guitar was through rock and metal music, I eventually found myself entrenched in the study of the traditional classical guitar. Years had passed before I realized I had abandoned a large world of musical influences that contributed to my originality as an artist. It was this realization that prompted my interest in this work. Therefore, this research is equally a response to an academic need to fill a gap of knowledge, and an account one can follow to develop their own relevant artistic practice. To rebuild my past artistic approaches, I developed the following research questions that guided my investigation and experimentation:

[53] Enns, Suzu. "Towards a Self-Sufficient Approach for the Electronic-Acoustic Clarinetist: A Resource for Performers and Educators." Montreal: McGill University, 2017. (30).

How do I want to amplify my instruments?

How can I choose equipment that will be used for a wide range of situations?

Is the equipment I'm choosing performer-friendly?

Can any musician begin to learn how to use my equipment with basic guidance and practice?

Is my equipment portable and streamlined for quick set-up and tear-down?

Is this equipment readily available for purchase?

If any aspect of my set-up becomes technologically obsolete or discontinued, can it be easily replicated?

Through the development of a Modular Post-Classical system, I've documented an approach that can be adapted to the needs of the performer, while remaining accessible to the average classical musician.

3.5 An Organology of the Guitar

As stated at the beginning of this paper, the term classical guitar is usually attributed to the acoustic nylon-string guitar. However, the goal of this research is partly to provide a resource to guitarists and composers to further understand the true possibilities of this instrument. Within the extensive family tree of the guitar, classical music can be performed on many of them. Here, we will focus on the important factors that we must consider in relation to the guitar's organology, and the many ways in which one might extend it in both capacity and definition.

The guitar, as we know it today, is a result of a compendium of factors. Perks and McGrath state that "were it not for the Western canon and repertoire, the fact that tuition (for those that could afford it) would be given by someone trained in Western classical practice, and various social class shifts, we may have a completely different history of popular music, and by extension, contemporary popular guitar".[54] Moreover,

[54] Perks, Richard, and John McGrath. "21st century guitar: Evolutions and Augmentations." (96).

it must be noted that the importance of the 19th century guitar cannot be trivialized. They go on to say: “If classical music stayed the preserve of the bourgeois, then the gap between that and ‘folk’ music would have been wide enough for there to be a distinction and two divergent instrument sets. Instead, social movement has meant that we adopted 19th-century guitar with its standard range and tuning. It was then exploited by players to suit their own needs in contemporary style with the tuning system unquestioned”.[55]

To begin to understand the complexities of this instrument, the first question we must ask ourselves is: what are we extending from? We can no longer assume that the guitar is solely a six-string instrument with a standard tuning. Perks and McGrath highlight this importance as “certain aesthetic and sonic dogmas are still perpetuated. It is essential that organology is aware of this, given the importance of communities in the understanding and framing of the instrument”.[56]

[55] Ibid. (97).
[56] Ibid.

Guitar Type	
Acoustic	Nylon-String Classical
	Steel-String
	Archtop Guitar
	Resonator Guitar
	Flamenco Guitar
	Harp Guitar
	Romantic Guitar
Electric	Solid Body
	Hollow/Semi-Hollow Body
	Archtop Electric
Options available in both types	Lap Steel/Pedal Steel
	Twelve-String Guitar
	Double/Multiple-Neck
Guitar Cousins	Oud
	Lute
	Theorbo
	Vihuela
	Baroque Guitar
	Ukulele
	Mandolin
	Banjo

The above table illustrates several possibilities of standard guitar instrumentation. In terms of extension, Tom Williams suggests that we can view this through the lens of four possible starting points:

1. Extended acoustic guitar
2. Extended jazz guitar
3. Extended rock/metal guitar
4. Extended abstract guitar

He states that “this organization, while broad, seeks to reflect the continual dissolution of smaller categories (such a classical guitar, folk guitar, percussive guitar)

on the basis that there is clear evidence that these communities regularly mix with one another".[57]

However, extension is a modular concept that involves multiple perspectives. One of the most common explorations is extension by **fret number**; this can also include the manipulation of divisions of the octave to achieve microtonal guitars.

Furthermore, **altered tunings** are one of the most accessible techniques for instrument extension. This allows guitarists to quickly extend or diminish their range, organize their fretboard in novel ways, and create interesting intervallic patterns with familiar fingerings. Williams explains that the guitar's standard tuning — E A D G B E — "is likely to have emerged as a result of its physical convenience in relation to Western harmonic practices and was certainly solidified by the body of repertoire that grew through the 19th century".[58] Considering the prevalence of the classical guitar in the 20th century, and the developments that then occurred in popular guitar music, it is not so strange that this tuning system remained a widespread practice. Alternate-tunings can be thought of as an affordance that allows the performer to explore new systems of fingerings — an "idiomatic realignment of the instrument".[59] Now, there are genres in the 21st century, such as Math-Rock, that have entire repertoires dedicated to different tuning systems.

Extension by **device** include EBows, slides, and effect stompboxes, to name a few. For example, performers can use a slide to perform pitches that extend beyond their fretboard or achieve a similar effect with pitch manipulation stompboxes like the Digitech Whammy. We must, therefore, as Williams states, "consider that a guitar's range is not necessarily defined by the ends of the fretboard alone, and that the

[57] Ibid. (84).
[58] Ibid. (82).
[59] Ibid.

'instrument' extends much further in some instances to the technologies that surround it".[60]

Finally, extension by **augmentation** incorporates larger physical changes to the instrument. This can include modifications to the scale length of the guitar, the addition of multiple necks or strings,[61] or even technological augmentations to the instrument.[62] Considering this vast scope of possibilities within the guitar's heterogeneity, it becomes increasingly important to view the standard tuned six-string guitar as a limited range instrument. By doing so, we then re-contextualize our understanding of the instrument's true possibilities.

Effects

The average classical musician usually explores the use of electronics through tape playback on iTunes or through software like Cycling 74's Max/MSP. However, my focus is on industry developed technologies. While there are a few reasons for this, it is mainly due to their reliability, accessibility, presence of online forums dedicated to answering questions, and company quality-control and support.

With the goal of clarifying the range of possibilities for performers and composers, the following table illustrates much of the range of available effects. While this is guitar-specific, it's important to note that any instrumentalist can make use of these tools. Additionally, these can come in the form of hardware stomp-boxes, or software plugins.

[60] Ibid. (98).
[61] Note that there is also the possibility to reduce the number of strings. For example, Jacob Collier performs on a five-string guitar.
[62] The most common example of this would be the installation of a pick-up in an acoustic instrument.

Category	Description	Examples
Utility	Pedals that perform typical utility functions such as tuning, filtering out unwanted noise, or interaction with other effect parameters.	- Volume - Expression - Tuner - Buffer
Gain	Pedals that provide different levels and varied timbres of distortion.	- Distortion - Overdrive - Tube Screamer - Fuzz
Pitch Shifting	Pedals that can harmonize and/or transpose an instrument's pitch. Where the Digitech Whammy comes with a built in expression pedal, other units, including those in multi-effect units, can be used in conjunction with an external expression pedal.	- Digitech Whammy - Eventide Harmonizer
Modulation	Pedals that affect the overall colour and quality of the instrument's sound, as well as the possibility to manipulate its timbre.	- Chorus - Vibrato
Sense of Space	Pedals that are capable of enhancing the instrument's sense of space, through the use of delay (echos that the user can manipulate), or reverb.	- Boss RE-202 Space Echo - MXR Carbon Copy Deluxe - Meris Mercury 7
Boutique	These are highly specific pedals that, regardless of popularity, you cannot expect every player to have access to.	- Chase Bliss MOOD - Hologram Electronics - Microcosm
Multi-Effect	Pedals that have multiple effects within one unit.	- Line 6 HX Stomp - Eventide H90
Extra-Musical Objects	These are objects used to augment the range, technical capabilities, and pitch of the instrument.	- Bow - EBow - Slide - Tremolo/Whammy bar - Plectrums - Capo

Amplification

Amplification is one of the defining characteristics of electric guitar performance practice. As stated by Banks, "the 1936 Gibson ES-150, used by Charlie Christian and marketed as a jazz guitar, was the first Spanish 'archtop' electric guitar to experience

widespread commercial success".[63] Up until the 1930s, it was rare for jazz guitarists to take a solo because of the instrument's lack of volume. As noted in Banks' research, I'm in agreement with the possibility that the combination of Christian's technical abilities, and the advent of amplification may have convinced composers that the electric guitar provided more musical possibilities than they first assumed.

Today, guitar amps have evolved considerably and play a large role in an individual's sound; offering differing amounts of speakers and configurations of speaker size and brand. It's crucial to note that the necessities of classical music performance, both in a solo and ensemble context, require far smaller amplifiers than that of popular music genres. Speaking with *Guitar Player* in 2011, Tim Brady states: "I have to think of myself as an acoustic instrument, and I use the amplifier to accomplish that".

Also, units called modelers have become more ubiquitous over the years, and come in pedal, plugin, and traditional amplifier formats. As described by Sweetwater, they are devices, software, or plugins "that emulate the coloration added to a signal by an amplifier, particularly an instrument amplifier such as those used with guitars and bass guitars".[64]

The following table represents the different types of amplifiers most employed by performing guitarists.

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[63] Banks, Zane. "The Electric Guitar in Contemporary Arts Music." PhD diss., The University of Sydney, 2014. (20).
[64] Sweetwater. "Guitar Amp Buying Guide."
https://www.sweetwater.com/insync/guitar-amp-buying-guide/

Amplifier Type	Description
Tube	Tube amps usually sound louder than solid-state amps of the same wattage. Most tube amps have separate channels that can switch from clean to distorted tones, However, tubes deteriorate over time and must be occasionally changed.
Solid-State	These amps use transistors for their preamp and power sections They are very reliable, often have a very clean tone, and may also offer distortion.
Modelling (Similar to on board modelling units, but in an amplifier format)	*Modeling amps use digital processors to simulate the sound of tube-amps. Modeling amps are programmable, and often have built-in digital effects.*
Hybrid	Hybrid amps use a tube in the preamp section and solid state circuitry in the power section to mimic the tone of a tube amp, without requiring the use of actual tubes.

To achieve the same relationship between gesture and electric signal on the acoustic nylon string guitar, there are a few available options. A clip-on microphone can be attached to the sound hole of the instrument or under the tied strings at the bridge of the guitar. While convenient and cost efficient, this option does not provide optimal sound quality. Alternatively, the performer can choose to perform with a high-quality microphone on a stand. “However, the musician must stand quite still when using this set-up for live electronics, which can result in discomfort and tension”.[65] Finally, the performer can choose to have a pickup installed directly under the top of their guitar to create a direct input like that of electric guitars; this option is the most convenient and remains relatively cost efficient.

To continue, regarding the electric guitar, there exists several pickup types and configurations.[66] The following chart exemplifies the possible options available to performers and composers. It is important to note that wiring configurations, such as in series or parallel, play a larger importance in the performer’s overall individual sound

[65] Enns, Suzu. “Towards a Self-Sufficient Approach for the Electronic-Acoustic Clarinetist: A Resource for Performers and Educators.” Montreal: McGill University, 2017. (25).
[66] W., Rory. “7 Common Pickup Configurations.” Artist Guitars, April 29, 2022. https://www.artistguitars.com.au/blog/7-common-pickup-configurations/

than timbral variability within a composition context. Additionally, tonal characteristics vary between brands, and one should refer to the manufacturer for specific information.

Pickup Type	Explanation
Humbucker	The humbucker is designed to get rid of ‘hum’, having two coils that phase cancel each other. Most importantly, they conduct a higher output, outperforming single coil pickups in settings that require higher levels of gain.
Single coil	Single coils use a single magnet to achieve brighter tones than that of a humbucker or P90.
P90	P90’s are single coil pickups with a higher output, and can be viewed as somewhat of a middle ground between a humbucker and single coil.

Common Pickup Configurations	Guitar Examples	General Tone Characteristics
SSS (single coil - single coil - single coil)	Most commonly found on classic Stratocaster-style guitars.	• **Position 5** provides a rounded, mid/bass heavy tone • **Position 4** is slightly thinner than other positions • **Position 3** offers more depth to your tone • **Position 2** will provide a high-mid tone • **Position 1** offers more twang and treble attack
HSS (humbucker - single coil - single coil)	Most commonly found on classic Stratocaster-style guitars.	• **Position 5** is the classic, responsive, single-coil neck tone • **Positions 3, 4 and 5** work exactly the same as an SSS configuration • **Positions 1 and 2** bring in the humbucker in the bridge for a higher output • There are different common wiring modifications
HSH (humbucker - single coil - humbucker)	Most commonly found on classic Stratocaster-style, or Super-Stratocaster style guitars.	• A Humbucker in **position 5** will provide you with a very full tone • **Positions 3 and 4** blends in the single-coil • **Position 2** can balances the middle single-coil and output of the bridge humbucker • **Position 1** will have a significant output • This pickup configuration can vary from guitar to guitar

Common Pickup Configurations	Guitar Examples	General Tone Characteristics
HH (humbucker - humbucker)	Most commonly found on Super-Stratocaster style, or Les Paul style guitars.	• **Position 3** engages the neck pickup which will usually have great bass response • **Position 2** blends both pickups • **Position 1** offers a high output Humbucker in the bridge • Dual Humbuckers are popular because of their higher output, and cancelling unwanted hum from single-coils
SS (single coil - single coil)	Most commonly found on Telecaster style guitars.	• **Position 3** provides a clean warmth • **Position 2** engages two single coils for a popular rhythm tone • **Position 1** produces twang and tightness popular with Country, Rock and Pop players
S (single coil)	*Just one single-coil, usually in the bridge and often a p90 pickup rather than a standard single-coil. Most commonly found on Esquire Telecaster style or Les Paul Junior Style Guitars.*	• If a single-pickup guitar has a selector switch, they're usually customized to control parameters like treble frequencies, or even cut the signal entirely like a kill-switch
H (humbucker)	*Just one humbucker, usually in the bridge. Most commonly found on Esquire Telecaster style or Les Paul Junior Style Guitars.*	• Any single-pickup guitar is approached in a similar fashion

In a musical genre such as classical music, where we devote an extreme amount of attention to shifts in color, timbre, and dynamics, the complete world of guitar and electronics seems like the ideal instrument to explore the extent of our musical parameters.

Technique

A central concept within this research is the idea of technical capacity as an augmentable object. After the advent of amplification and effect units, as seen in Banks' *The Electric Guitar in Contemporary Arts Music*, "composers were presented with an instrument which was far more versatile than it had been in the 1950s".[67] Had it not been for these developments outside the realm of classical music, "composers would have had little to work with as the majority of art music compositions written for electric guitar, borrowed techniques, timbres and textures which were the foundation of the instruments practice in popular music".[68] Yet, this issue isn't so far-removed from our present situation. Michael Gordon, co-founder of Bang on a Can, states the following:

> *"When I started that group [Michael Gordon Philharmonic] there just weren't guitar players who could read music and play electric guitar and play in a chamber group. There were guitar players who could read music but they played classical guitar; they had electric guitars but they didn't know how to make them sound like electric guitars. The electric guitar players didn't know how to read music and if you found someone who knew how to do both things, they had no idea of what to play what we think of as chamber music".*[69]

Part of my goal throughout this research was to connect my traditional classical (acoustic nylon-string guitar) training with my upbringing in electric guitar culture. The inherent technical affordances, including extended techniques, are well documented for these instruments. Through a combination of these musical approaches, my goal was

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[67] Banks, Zane. "The Electric Guitar in Contemporary Arts Music." PhD diss.,The University of Sydney, 2014. (52).
[68] Ibid.
[69] Ibid. (85).

to unearth a gap where new technical possibilities emerge. The most basic extension can simply be the use of open plucking-hand classical technique on the electric guitar. To take this further, when combined with the traditional method of performing with a plectrum on the electric guitar, we now have the potential for *hybrid picking*. This allows for wider intervallic jumps with ease and a general smoother motion between strings. Additionally, with fewer pick strokes, this leads to an overall sound that is more legato to that of traditional picking.

Progressive Metal guitarist, Tosin Abasi, has been contributing to this growing field of technical discoveries for quite a few years. Typical slurs, or more commonly known as hammer-ons and pull-offs, have recently been explored by Abasi in a percussive context, being articulated with only the fretting hand, free from any articulations in the picking-hand; generally referred to as *hammer-ons from nowhere*. This gesture allows for quick flurries of notes that can be combined with other innovative techniques. For example, selective picking, is a technique employed by Abasi that, as the name suggests, selectively picks one of the notes from a group of hammer-ons from nowhere for a set of articulations. This technique is extremely useful in outlining harmonic motion in a rhythmic context. Lastly, *thumping* is a technique that uses the thumb to articulate the strings in a percussive manner. While this is most used with single note lines, it can also replace the plectrum in selective picking hammer-ons from nowhere for an extra percussive element. Inspired by Victor-Wooten's slap-bass technique, Abasi popularized its use on extended range guitars.

3.6 Process

The creation of my set-up evolved over this three-year research. As the core of my work is to remain modular at nature, my chosen approach will likely change and evolve over the years. However, by referring to Dr. Enns' research procedure, the process no longer seems as daunting:

> ***Identify*** *the basic equipment needed for live electronic-acoustic performance*
>
> ***Gain*** *a basic knowledge of the purpose and function of the equipment*
>
> ***Consider*** *my personal performance needs and the needs of the repertoire*
>
> ***Research*** *the diverse options on the market by reviewing company websites and seeking advice*
>
> ***Purchase*** *or* ***borrow*** *equipment as needed*
>
> ***Acquire skill*** *in the basic use and function of the equipment and* ***practice***
>
> *During the post-concert reflection,* ***evaluate*** *the effectiveness of the chosen equipment and my ability to integrate it into my performance practice*

At the beginning of this project, I had the following tools at my disposal: a six-string acoustic nylon-string guitar, a six-string Epiphone Les Paul (electric guitar), a seven-string Schecter Hellraiser (electric guitar), an eight-string Abasi Larada (electric guitar), a 1x10 Yamaha amplifier, a Focusrite Scarlett audio interface, Ableton Live 11, and several amplifier plugins by Neural DSP. While this afforded many possibilities, it remained incomplete for both a fully hardware or fully software set-up, and I needed to decide upon a dedicated workflow. From the very beginning, I knew I had to approach this from a modular standpoint. The reason being that not every concert takes place in one's home city. Musicians must consider the costs and risks associated with flight travel and large amounts of equipment. Therefore, one must consider how they can recreate their complete set-ups in smaller, travel-friendly formats.

Still, I had to consider if I would want to perform with an amplifier, a laptop or some sort of physical modeling unit. If I decided upon the amplifier, I would need to also purchase external effect pedals to replace the affordances of Ableton Live and digital plugins that already come with effects. Additionally, an amplifier poses many more difficulties in transportation than a laptop, and one would have to rent a replacement when traveling. A laptop in conjunction with Ableton Live, offers a wealth of possibilities, yet still falls victim to system crashes and CPU overloads.

Additionally, since I perform on both acoustic and electric guitars, I had to consider how I'd go about amplifying and processing my signal on both types of instruments. The first step involved making the decision to install a pickup in my acoustic nylon-string guitar. This would allow me to capture a direct signal from my instrument, like that of my electric guitars. An issue in this process was that the direct signal from the pickup was actually not strong enough to be properly amplified when plugging directly into an amplifier or interface; it required the additional use of a D.I box and preamp. I was faced with the following three scenarios:

1. Amplifier suitable for both electric and acoustic nylon-string guitars, and a pedalboard consisting of a preamp, EQ, and other stompboxes.
2. Laptop with Ableton Live, additional plugins, audio interface, and a pedalboard consisting of a preamp, EQ, and other stompboxes (if not already covered within Ableton's stock effects).
3. Amp Modeler with a built-in preamp and multi-effect algorithms, integrated within a pedalboard of other stompboxes.

Ultimately, I chose to go the route of the Line 6 HX Stomp XL. This system acts as an amp modeler, preamp, and multi-effect pedal. Additionally, it has an in-depth looper, an effects loop for external effect pedals, and the ability to create separate patches for each of my instruments.

In addition to the HX Stomp, my pedalboard consists of a volume pedal, boutique modulation pedals, and an expression pedal to control selected parameters with ease. Expression pedals can also be used to mix your live-sound mid-performance. In the case of my acoustic nylon-string guitar, I have the expression pedal set to control the mix of my effects loop. My external modulation pedals are grouped together in a separate loop within my board, and they play a large role in my compositions. However, depending on the characteristics of the venue, they sometimes necessitate different mix levels. With the expression pedal set to my regular mix level when fully depressed, it can go down as much as 15% when completely released. This allows me to react in real time to issues in balance and amplification.

Lastly, the HX Stomp is small enough to fit in a backpack and, if necessary, can fulfill the role of my other modulation effects. This allows the performer to transport their live rig with ease. However, it requires one to adapt to my constructed modular approach in order to learn how to listen in new ways and re-create the concept of their full-board patches within a singular unit when touring.

3.7 Conclusions

I concluded that a modular approach to performance was ideal for my needs as a performer, composer, improviser, and pedagogue. This research has identified the necessity for accessible systems of technological study so that performers can acquire sufficient knowledge and skill to work in this domain autonomously. Additionally, avoiding philosophical meandering, it remains tantamount to welcome exploratory perspectives within classical music; without delineating hierarchies of acceptable and unacceptable influences and approaches, in order to welcome the full capacities of our instruments in the 21st century. Moreover, it is the responsibility of performers to collaborate and share their knowledge with other performers, composers, technicians, and pedagogues, to foster a community dedicated to the evolution of our art-forms and their research.

Chapter 4

Communicating an Evolving Musical Landscape

"Music is one of the ways by which you can know everything which is going on in the world. You can feel the vibrations of everybody in the world at any given moment. Through music you can become sad, joyful, loving, you can learn. You can learn mathematics, touch, pacing…You can see colors through music. Anything! Anything human can be felt through music, which means that there is no limit to the creating that can be done with music. You can take the same phrase from any song and cut it up so many different ways—it's infinite."

-Nina Simone

4.1 Objectives

In the previous chapters, we examined the scope of this research and how it has existed within niche circles of the genre. We also saw how this led to a lack of literature surrounding the possibilities of the instrument, and inevitably created a repertoire that does not always make use of technological innovations. This chapter's goal is to show successful examples of modern notation systems in the repertoire and my own technological solutions within my own composition practice. Moreover, we will examine how this provoked the necessary ideation of *Time-Capsule Music*, and provide a roadmap to new pedagogical solutions when faced with today's evolving musical landscape.

4.2 Modern Notations

Current Issues

Throughout my research of the existing repertoire in this domain, many pieces exhibited recurring issues in their notation. Regarding the electric guitar, very little, if any, instruction to tone, timbre, or amplification was noted. Whereas in classical guitar

performances the performer can physically move their plucking hand position to seek out different timbral colors, this is primarily accomplished through pickup selection on the electric guitar. Despite this being such a fundamental strength of the instrument, very little of the repertoire takes the time to notate desired pickup positions. Classical musicians performing on electric guitar often ascribe to a singular static sound. Additionally, when incorporating effect boxes into the work, Noseworthy describes that few composers use “flexible descriptions of the desired sound”,[70] address the differences in effect categories, or pay attention to signal chain order.

As we saw in Chapter 3.5: An Organology of the Guitar, effects can be categorized under utility, gain staging, pitch shifting, modulation, time-based and miscellaneous effects. Noseworthy explains that “equipment setups can vary greatly between different players and therefore, this approach to effects pedal notation can allow for performance flexibility while still yielding similar results in performance”.[71] For spatial and pitch shifting effects, other settings to consider are the exact speed and number of delay repeats or the type of delay sound, such as analog delay, ping-pong, or slap-back — to name a few. He continues: “These are terms that are commonly understood by professional electric guitarists, and this notation style again allows the player to realize the effects with their own gear”.[72]

A common issue found within my research was a lack of clarity. In classical music, it is generally common to use abstract terms to define a certain effect that we want to exhibit in the music. When it comes to electric guitar and the tools that become available with it, the same rules do not apply. For example, Distortion is a type of gain, but many individual effects belong in this realm; such as overdrive, and fuzz. Yet many composers view the electric guitar through a binary of a clean tone and distorted tone, rather than its actual varied spectrum of timbral capabilities.

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[70] Noseworthy, Andrew. "Transference Music: For Electric Guitar Soloist and Amplified Orchestra" (2023). Electronic Thesis and Dissertation Repository. 9250.https://ir.lib.uwo.ca/etd/9250. (127).
[71] Ibid.
[72] Ibid.

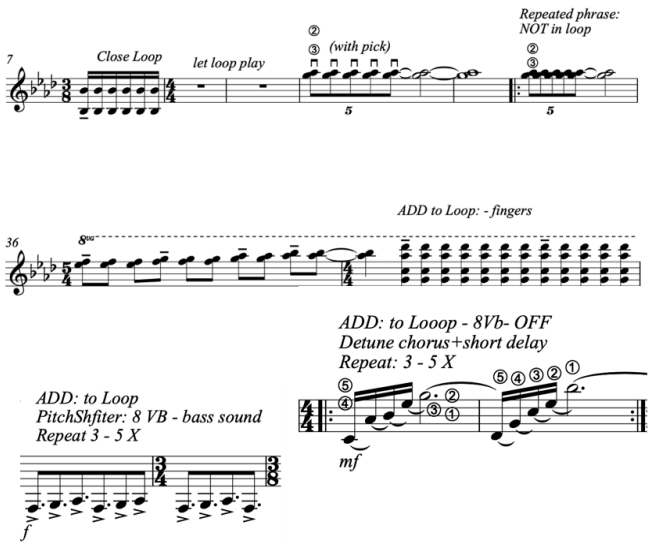
However, I was able to uncover examples in the repertoire that achieve the necessary communication to successfully create a work in this domain.

***Simple Loops in Complex Times* by Tim Brady**

Simple Loops in Complex Times - mvt. 1
v.2 - recording - Apr. 2020

NPU - clean
w: short slap-back delay - 357 ms.
mix- low!
Start Loop
(play 8ves with fingers)

The opening of *Simple Loops in Complex Times* offers much information for the interpreter. Brady asks the guitarist to play with a clean signal on the neck pickup (NPU) of the guitar. Additionally a short slap-back delay is notated to the millisecond alongside an indication for the general mix of the effect. Brady also differentiates between sections played with a plectrum and sections played with open right hand classical technique. Finally, clear instructions are given when to start a loop, end a loop, and overdub new material.



***The Workers' Dreadnought* by Shelley Washington**

Shelley Washington demonstrates a similar approach in her electric guitar quartet, *The Workers' Dreadnought*. In this opening page, Washington lays out the pedals the performers need for each movement, addresses the concept of blending between parts, and differentiates between drive and distortion sounds.

Pedals Needed Throughout Piece

Use whatever settings on individual guitars that make the most simiar tone as possible- it is ok if they aren't an exact match. If a member of the ensemble does not possess the notated pedals, create the most similar sound possible with whatever is available.

"Drive" = light overdrive sound, somewhere between the clean, pedal-less sound and the distortion pedal. Has some edge/bite to it, but not as edgy and distorted as 'distortion'pedal sound

I. IRONCLAD

Distortion
Octaver (+1 octave down/+1 octave up)

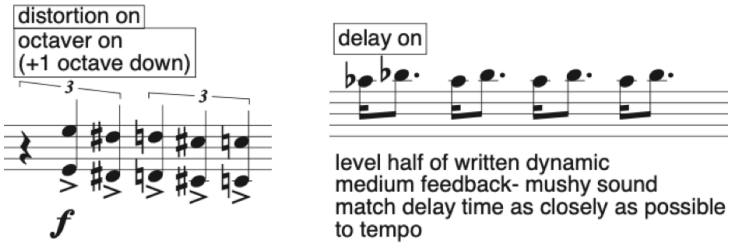
II. BLOSSOMING

Volume
Distortion
Drive
Octaver (+1 octave down/+1 octave up)
Chorus
Delay

III. THE WORKERS / HELL HATH NO FURY

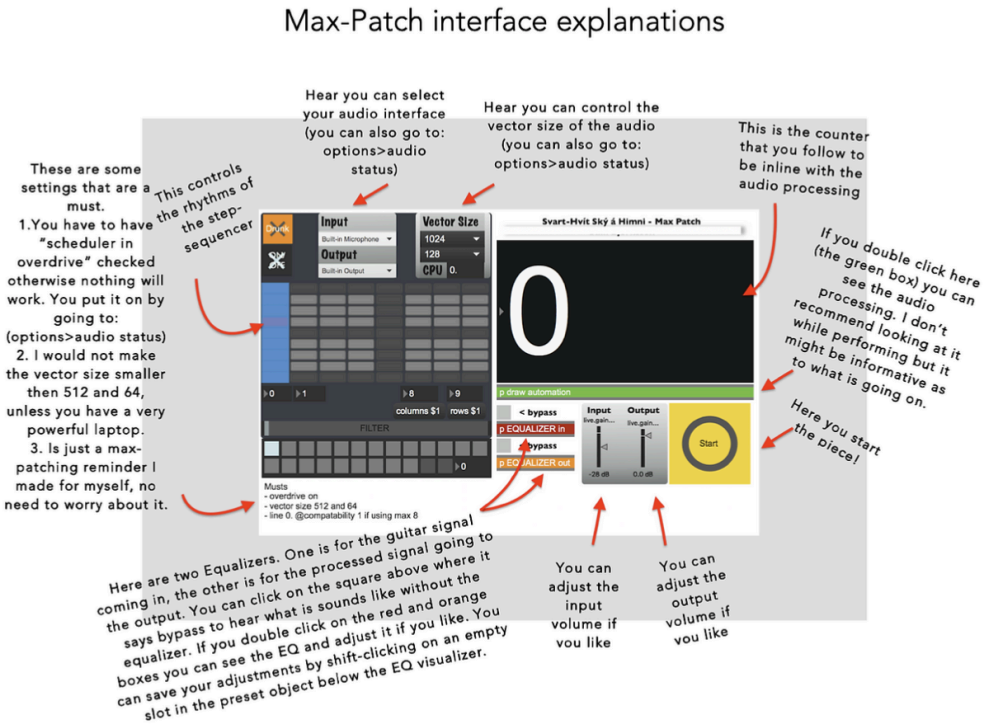
Distortion
Octaver (+1 octave down/+1 octave up)
Drive

Moreover, the following are excerpts from the work showcasing the notation of effect changes, and descriptors. Reminiscent of Brady's approach, it is a succinct and effective manner of translating the desired interaction between the instrument and available technology.



***Svart-Hvít Ský á Himni* by Gulli Björnsson**

The preface of this work, as well as the description of ways to interact with the max patch, offer a great deal of insight for the performer. When the tools we use to create this music are becoming increasingly complex, our methods of communication must become increasingly simple and comprehensive; this is precisely the route Björnsson takes. By including multiple diagrams and descriptions, Björnsson affords the performer the possibility to understand the patch they're working with, and tackle any possible issues that may arise.

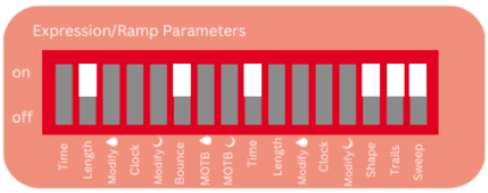


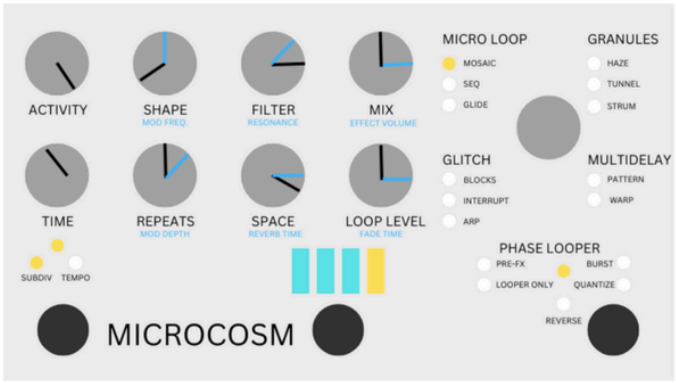
***After Dark* by Emmanuel Jacob Lacopo**

My own work demonstrates how we can incorporate the use of specific effect pedals in tandem with a flexible mindset. *After Dark* utilizes the *Hologram Electronics Microcosm*, and *Chase Bliss MOOD*. Additionally, it illustrates the incorporation of their interactions within the notation.

As my chosen effect pedals are quite popular on the market, it was necessary to document my exact settings for each pedal. Therefore, I created the following diagrams:

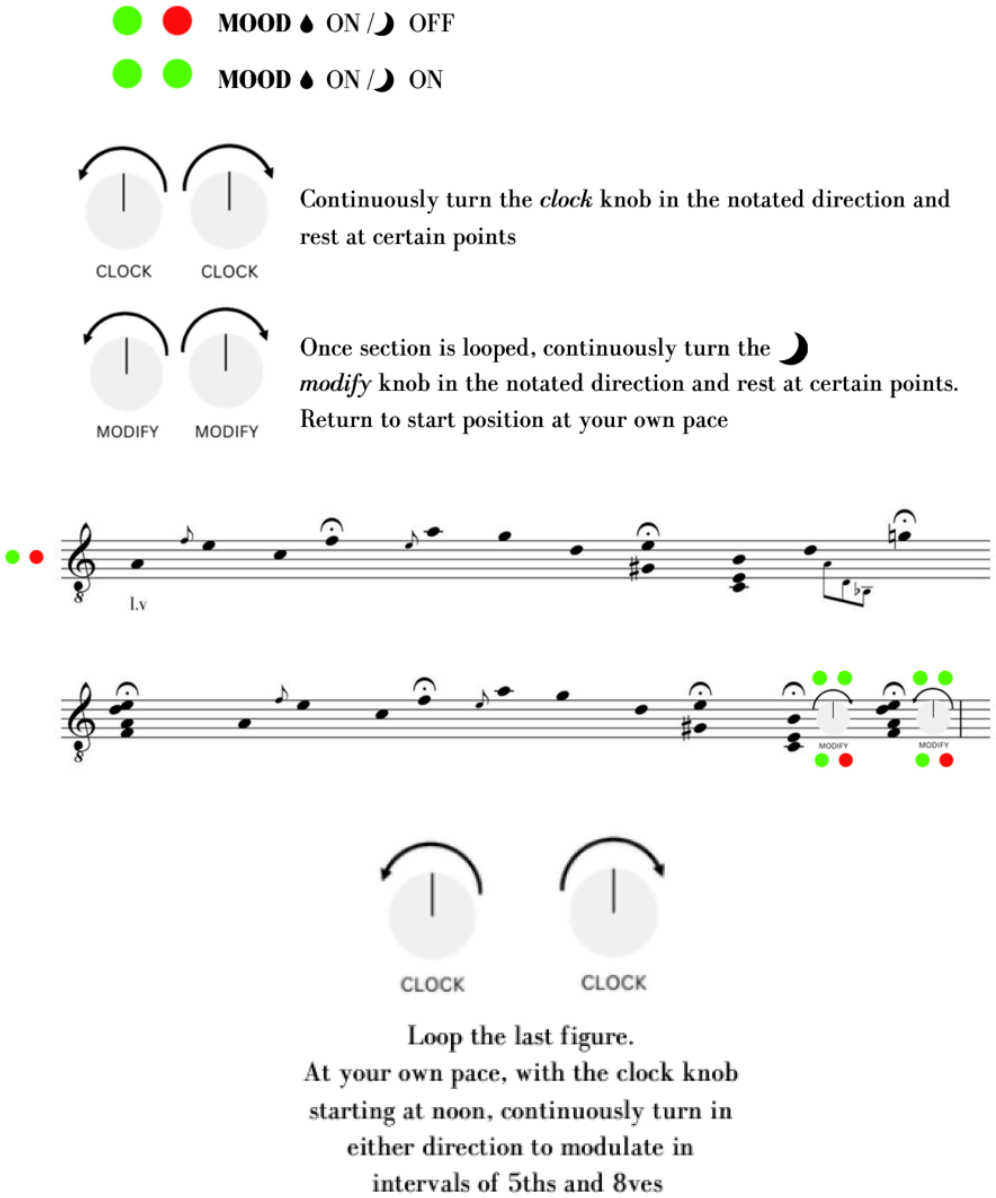
MOOD SETTINGS





MICROCOSM SETTINGS

Additionally, to achieve a sense of flexibility, I included a description of the pedals and offered possible replacement solutions. The final element to include was a notation system that accurately communicates interaction with the *MOOD's* parameters. With the goal of manipulating the speed and register of micro-looped segments from the delay, I came up with the following method:



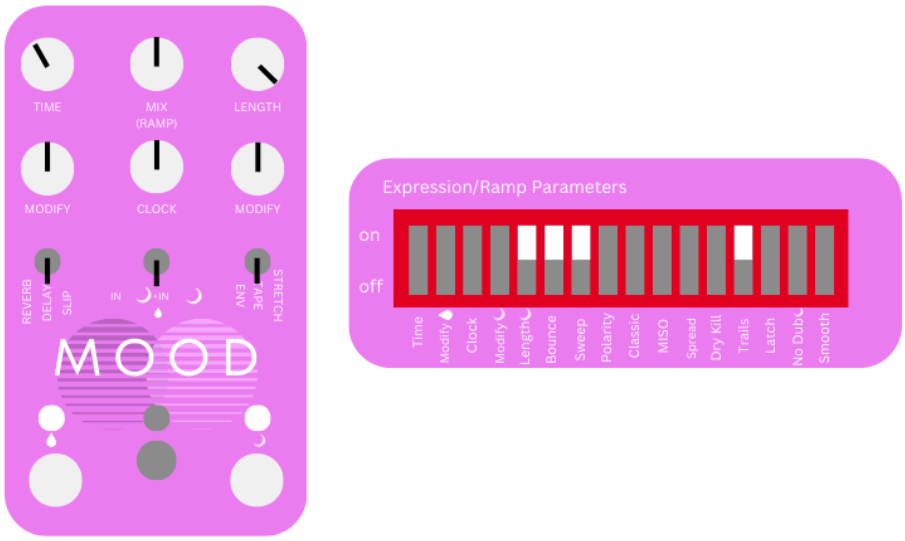
4.3 Challenges

As we have discussed in Chapter 3.5: An Organology of the Guitar, we must address the full spectrum of possibilities on our chosen instrument and technology. The argument that classical music differentiates itself through the novelty of musical notation has come into question with the ever-growing world of sound recording. Today, we can have a preserved sonic record that demonstrates exactly how something was meant to sound. I offer the same solution to performers seeking insight into the desired tone, effect parameters, balance, and mix of a specific piece. As I've done with my own work, composers can potentially upload audio files to their website or include them with purchase of the score — including a sonic example to demystify the process.

If we choose to create music in this field but ignore the necessity of a flexible approach, we end up reducing the future playability of the work. With a sense of modularity, the goal is to describe the sound you want. As we have seen in the previous chapter, effects fall into specific categories. Regardless of their uniqueness, as in the case of *After Dark*, an effect can be broken down to simple descriptors that allow for its future adaptation and evolution.

Throughout this process, I've had the chance to test my practice on several occasions. The most evident example occurred within a year of composing *After Dark*. The piece was written using the Mark 1 version of the *Chase Bliss MOOD* — before they announced the release of the Mark 2, and the discontinuing of the Mark 1. While this would usually pose an immediate threat to the longevity of this composition, the Mark 2 comes with a "classic" mode to recreate the original sounds of the Mark 1. However, this became a larger issue when my Mark 1 pedal began to malfunction and needed to be replaced. As this version was no longer in production, the company was kind enough to send me a Mark 2 *MOOD*, but I quickly noticed the necessity to adjust the initial patch in order to achieve the effect I initially intended. Using my outlined

approach, I adjusted the parameters and was met with a final product that achieved my sonic goals better than the original iteration. The following graphic illustrates the final iteration of my *MOOD* notation.



Time-Capsule Music

While there were many other similar experiences throughout this research as the one detailed above, it was the moment that most heavily tested my practice and led to a new perspective on my approach. Time-Capsule Music is a term I coined to identify a necessity for a flexible, modular, and post-classical approach when creating and performing music in the 21st century. It defines a music that is not fixed in time, but evolves alongside society and its technological innovations; continuing to morph while retaining its original integrity long after the composer has passed.

Guitar-Specific Notation

One final necessary note on notational practices, is the ubiquity of multiple methods of communication that are tied to the guitar. While usually presented in standard Western notation, the guitar has a rich history of notation through tablature and even chord diagrams. Josel and Tsao's *The Techniques of Guitar Playing* points

out: “until the beginning of the eighteenth century, music for plucked instruments was scored in tablature, of which there were a rich variety of styles depending on the specific instrument and country”.[73] In the case of genres outside classical music, tablature, coupled with oral/aural traditions, remains a prominent method of notation and offers several advantages. An example of this can be seen in my composition *the way water breathes*. One of the unique features of this work is its scordatura (F A C G A E). At the time of writing this, the work is undergoing edits to be published with Les Productions d’OZ / Doberman-Yppan. In conversation with the editors, to best circumvent the issues in navigating this altered tuning, we’ve decided to present the piece as recommended by Josel and Tsao; with both staff and tablature notation.

Considerations for Amplification and Signal Chain

In the case of the guitar and amplification, the dominating field of amp modelers, max patches, and digital effects are making incredible progress. Units have ever growing platforms to swap effects and presets between players with ease. As with max patches, along with a score, composers can attach a desired preset for the exact tone they want for specific sections.

Additionally, the signal-chain, meaning the order in which you place multiple effects together, plays a crucial role in how one interacts with their sound. Robert Strachan states that the electric guitar is a “textural instrument in whose aesthetics and creative practices are bound up with the technological manipulation of the instrument’s resonances through the signal chain”.[74] With this in mind, he continues, “the effects pedal is a sounding agent in itself and has the ability to affect all of the parameters (such as timbre, melody, harmony, and time) that we find musically meaningful”.[75] The pedalboard then becomes a way of understanding and presenting your compositions.

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[73] Josel, Seth F., and Ming Tsao. “The Techniques of Guitar Playing.” University of Gothenburg, 2014. (31).
[74] Perks, Richard, and John McGrath. “21st century guitar: Evolutions and Augmentations.” (154).
[75] Ibid.

Therefore, Strachan concludes that “the signal-chain is understood as a designed system through which music is realized but with an understanding of the differing aspects of [the] music as being facilitated by separate parts of [a] signal chain”.[76]

4.4 Pedagogical Approaches

As we’ve seen throughout this research, there remains a musical hierarchy in relation to use of non-traditional tools and approaches within classical music education and performance practice. In *Thinking about Music and Technology*, Roger Mantie invites us to consider the history of music making: “Music expression begins with both human voices and hands as tools or instruments [...] The evolution continues through the more sophisticated instruments of a culture, then arriving at the electronic music tools of today. The very soul of what it is to be human seeks expression through whatever technology is on hand for music making”.[77] The following are examples that illustrate how this research can be applied within a pedagogical context.

Berklee College of Music

The curriculum at Berklee places a large importance on developing much of the approaches outlined in this paper. Taken from their website, Berklee states that “a demonstrated competency in music technology is integral to each student's Berklee education. Technology plays a significant role in almost every aspect of a successful music-related career. Additionally, it is a powerful teaching and learning tool utilized in many of the courses offered at the college”.[78] The integration of the core curriculum provides students with a broad-based musical vocabulary and offers important skills that translate to a well-rounded musical background. Upon completion of the single

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[76] Ibid. (168).
[77] Mantie, Roger. 'Thinking about Music and Technology', in S. Alex Ruthmann, and Roger Mantie (eds), The Oxford Handbook of Technology and Music Education, Oxford Handbooks (2017; online edn, Oxford Academic, 10 Aug. 2017). (xv).
[78] Berklee College of Music Official Website.

required music technology course, Berklee states that their students will leave knowing how to:

1. Use their laptop, the wireless network, and an online learning management system to manage their course work
2. Configure and troubleshoot the basic MIDI and audio capabilities in a laptop music system
3. Identify and use different types of software electronic instruments
4. Record and edit audio using their laptop computer
5. Produce instrumental, electronic arrangements using music production software
6. Distribute their music productions using standard formats
7. Understand and use basic music technology terminology
8. Recognize and discuss basic music production techniques

If we are to move towards a more realistic image of 21st century classical music, treating the instruction of these skills with care and interest is tantamount to the evolution, survival, and prosperity of the genre and the musicians who study it.

The Integra Project

The Integra Project was a study conducted by Bullock, Coccioli, Dooley, and Michailidis in Birmingham from 2010-2012. It revolved around the following research questions: “How can we most effectively teach live electronics to instrumental performers? What should we teach to performers – what should the methods, objectives and outcomes be? Is a single approach possible, or a diversity of approaches required? What are the best software and hardware setups for teaching instrumental performers?”.[79] The conclusion was that long-term exposure and dedication would be required to achieve proficiency and transform musicians’ perceptions. Ultimately, the study concludes that “it may be beneficial to incorporate

[79] Enns, Suzu. “Towards a Self-Sufficient Approach for the Electronic-Acoustic Clarinetist: A Resource for Performers and Educators.” Montreal: McGill University, 2017. (10).

music technology instruction into programmes of study for performers at higher education, regardless of their intention to incorporate technology into their wider practice. That is, the addition of music technology instruction to performance curricula may be advantageous solely for its potential benefits on general musicianship".[80]

From the very beginning of our exposure to music training, we're taught to become trained listeners. However, few understand how this skill translates in the context of music technology. Instructors are encouraged to work with students to guide the attention to unfamiliar sounds and textures, interaction, and balance. Music literacy should entail a student's ability to function in musical settings by performing, responding to, or creating music, while understanding the elements involved in that process. This perspective implies an incredibly varied set of activities, and that is the point — music literacy can be demonstrated in a multitude of ways and should not be limited.

Lastly, Suzu Enns reminds us of the most important fact of all: "letting go of one's knowledge of how things have always been, is among the most important techniques for successful paradigm shifting".[81] While some institutions are tailoring their programs parallel to the evolution of music and the requirements of modern musicianship, many are still struggling in this domain. By including technological studies within our pedagogy, performers, teachers, and students would become more independent and marketable, experience a more convenient and practical way to perform new and adventurous repertoire, be able to perform in any venue without restriction, place less reliance on assistants or live sound engineers, and most importantly, create a more accessible world of classical music.

[80] Ibid.
[81] Ibid. (92).

Chapter 5

A Technologically Creative Practice

"I'm fascinated by the notion of a perpetual sound: a sound that won't dissipate over time. Essentially, the opposite of a piano, because the notes never fade. I suppose, in literary terms, it would be like a metaphor for eternity."

-Ryuichi Sakamoto

5.1 Objectives

An objective for this project was to build a flexible approach that grows with the performer's needs over time. Major music technology distributors, such as Perfect Circuit, are acknowledging that "in the last several years, the world of effect pedals has opened up considerably".[82] While my background in performance was rooted in electric guitar sounds and timbres, the possibilities have advanced considerably throughout my time dedicated to a traditional education in classical music. I aimed to document the process and methodology surrounding my foray back into this world of music-making. My ability to understand and interact with these practices, coupled with my extensive education in classical performance traditions, led me to the creation of a framework that, I believe, captures the essence of a 21st century musician.

As we have seen throughout the previous chapter, my approach to post-classical music is supported by modularity, affordances, and time-capsule music. Contextually within the field, this was done under the framework of Dr. Enns' self-sufficient approach, dictating that a performer should have the ability to oversee and realize the separate components of a technologically involved performance. The prominence in recent research dictating a need for the genre's evolution, presents itself as a signifier of cultural change — necessitating the prefix *Post*.

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[82] Stoner, Brandon. "Effect Pedal Concepts: Building a Stereo Pedalboard - Tips & Tricks for Adding Some Space to Your Guitar Rig." Perfect Circuit. February 21, 2024. https://www.perfectcircuit.com/signal/building-a-stereo-pedalboard

Moreover, the heart of this chapter is to illustrate and enforce the process behind involving technology and augmented processes into one's practice of performance, composition, and improvisation.

5.2 Problem Statement

Similarly to Dr. Enns, "in my performance practice, a growing concern has been the lack of access to basic equipment and instruction that considers the needs of performers. Despite my growing interest and experience with this repertoire, I have continued to feel disempowered and disengaged due to my lack of knowledge in the software and hardware domains".[83] I have therefore conducted this research to illustrate the process of overcoming the inherent obstacles within our pedagogical approaches and exemplify a new artistic direction.

Guitarists working in other genres regularly experiment with technology in varying settings. For example, Waksman states that over the course of Jimi Hendrix's career, recording studios were a site where "he could enact his wildest fantasies of sound, and where he could work to exert the greatest amount of control over the sounds he produced with his guitar".[84] Additionally, "by the accounts of his ex-bandmates, his attention to detail in the studio verged on obsessive, laboring for hours over a single effect, manipulating the various technologies at his disposal past their limits, exploring every parameter until he found the sound that was just right for the song, of the song that was just right for the sound".[85] However this exploration was not limited to the recording studio, as Hendrix is widely regarded "as one of the most compelling live performers in recent history of popular music".[86] The importance lies in the use of the recording studio as a sonic tool towards the expansion of one's skill-set.

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[83] Enns, Suzu. "Towards a Self-Sufficient Approach for the Electronic-Acoustic Clarinetist: A Resource for Performers and Educators." Montreal: McGill University, 2017. (30).
[84] Waksman, Steve. "Instruments of Desire: The Electric Guitar and the Shaping of Musical Experience."Harvard University Press, 1999. (167).
[85] Ibid.
[86] Ibid. (168).

In turn, this directly influences one's live performances and creates a feedback loop of sonic development over time.

Contrarily, even adventurous classical musicians encounter their own reservations in this domain. As exemplified by composer Alex Shapiro:

> *"The sophistication of what can be achieved with these real-time techniques is unquestionably wonderful. Nonetheless, I have witnessed too many stressful occasions when the programs did not run smoothly, or crashed entirely and rudely truncated a concert. In my own pieces, I continue to opt for straight playback that requires no human counterpart – and I advise my far braver colleagues to create pre-recorded backups of their live electronics whenever possible, if only to have a Plan B at the ready, just in case".*[87]

While I do agree that a performer should be adaptable and have solutions readily available, I do not believe that we should limit our explorations due to possible difficulties. Instead, our presentations should become equally adventurous, constantly growing in parallel with our skill-sets. As we saw within Hendrix's process, this is an approach that evolves alongside the performer as they craft their unique sound. Classical musicians would be keen to realize that the possibility of a technological crash is just as prevalent as a lapse in memory during a piece, and a performer should never feel any sense of helplessness during a performance regardless of their chosen tools or lack thereof.

I was quickly reminded of this importance upon a viewing of John Batiste's Netflix documentary *American Symphony*; a striking story paralleling grief and perseverance throughout the world premiere of his symphonic work at Carnegie Hall. While the premiere of this massive composition endured several roadblocks, the most insightful hurdle presented itself midway through the concert. Morgan Enos describes the situation as follows: "Although it was inconspicuous to the audience during the symphony's world premiere, panic had set in at one point: the power had gone out

[87] Enns, Suzu. "Towards a Self-Sufficient Approach for the Electronic-Acoustic Clarinetist: A Resource for Performers and Educators." Montreal: McGill University, 2017. (11).

onstage, rendering the microphones and electronics dead".[88] All Batiste could do at that moment was play. Instead of sitting in the awkwardness, pulling listeners out of the music, and ruining the flow of the concert throughout a technical malfunction, Batiste began improvising a piano solo while the tech team were troubleshooting solutions. Where in this situation technology was the source of the problem rather than a driving force of the music, the way in which Batiste responded encompasses a broader view of a *Modular Post-Classical Artistic Practice*.

5.3 Research Questions

How can we utilize technology in a manner that serves our artistic practices and grants us adaptability in our output?

To be illustrated further in the following section, to move in the direction of this artistic practice and to test the functionality of my framework, my process proceeding in the following steps:

Pre-Planning

- Research a broad scope of available technologies and approaches
- Research the output of existing artists working in similar practices
- Experiment with different possible software and hardware approaches
    A. Borrow equipment
    B. Rent equipment
    C. Research tutorial and demo videos
    D. Read product manuals
    E. Listen to recordings of the tool used in context
- Decide upon chosen set-up

[88] Enos, Morgan. "Inside 'American Symphony': 5 Revelations About The Jon Batiste Documentary." Grammy Awards. December 5, 2023. https://www.grammy.com/news/jon-batiste-documentary-american-symphony-netflix

- Purchase equipment in such a way that I am allotted sufficient time to learn its functionality and have each element fully integrated in the overall set-up

Testing Phase I

- Test the functionality of my setup as an interpretive tool in a recorded context
- This was achieved through the release of my album *Eastman* — a re-imagination of the guitar's place in classical music through the lens of Julius Eastman's groundbreaking musical approaches.

Testing Phase II

- Explore the use of chosen technology through a compositional lens
- Explore possible methods of communication
- Within the compositional process, find an intersection where composed material co-exists with technology and improvisation
- Following live performances, assess all successes and presented issues in working with the chosen technology
- Research possible solutions without affecting functionality

Testing Phase III

- In collaboration with living composers, work towards adapting my chosen technology within their compositional goals of an existing piece
- This is done with the goal of demonstrating a flexible approach to interpretation when specific equipment is not accessible to the performer

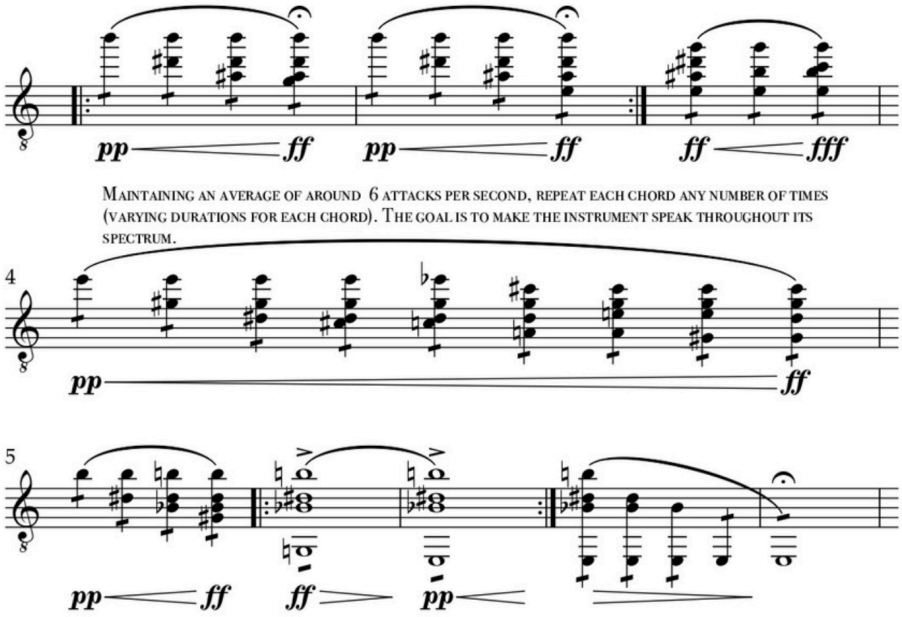
5.4 Technology as Compositional, Interpretive, and Improvisational Tools

As the possibilities for the instrument continue to expand, so the needs of the 21st century guitarist. By exploring technological advancements through the lens of compositional, interpretive, and improvisational tools, we contribute to a feedback loop

which continues to afford new possibilities. Perks and McGrath remind us that "instruments and technological devices might be seen as more than inanimate objects, however, acting instead as agents themselves, with creative inputs of their own. Engagement with such agents may be more of an artistic collaboration than a one-way, more servile utilization of objects".[89]

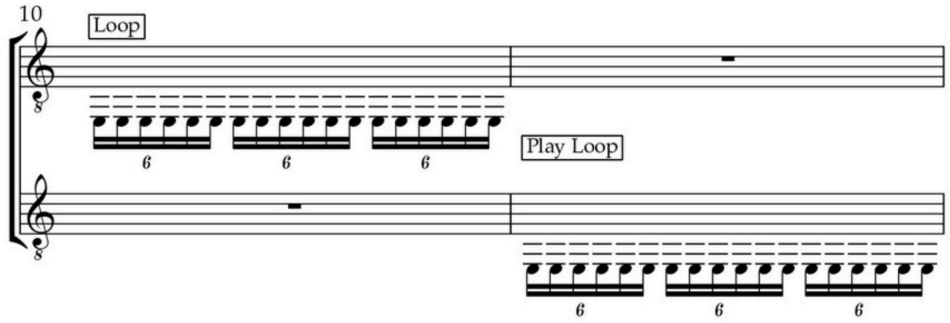
An Endless Battle of Contrasting Memories by Emmanuel Jacob Lacopo

The first composition we will be exploring is an example of technology as a compositional tool. The core of *An Endless Battle of Contrasting Memories* works towards the execution of various polyrhythms over groups of sextuplets. The opening motive presents additive harmonies from the highest B in the nylon-string guitar's register down to the 6th string's open E. The harmonic content builds in groups of an average of 6 articulations per second:

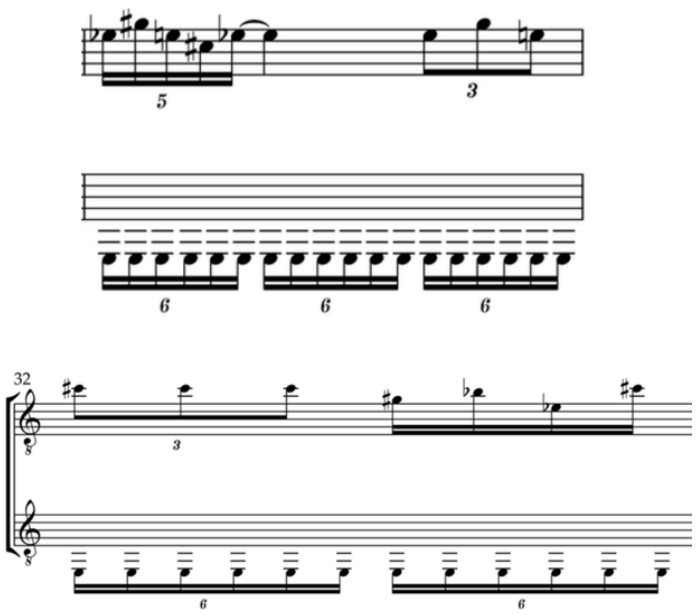


[89] Perks, Richard, and John McGrath. "21st century guitar: Evolutions and Augmentations." (2).

It then goes about solidifying an ostinato sextuplet groove with the use of a looper pedal:



Throughout this section, the live guitar's melodic material presents different rhythmic groupings over the loop.



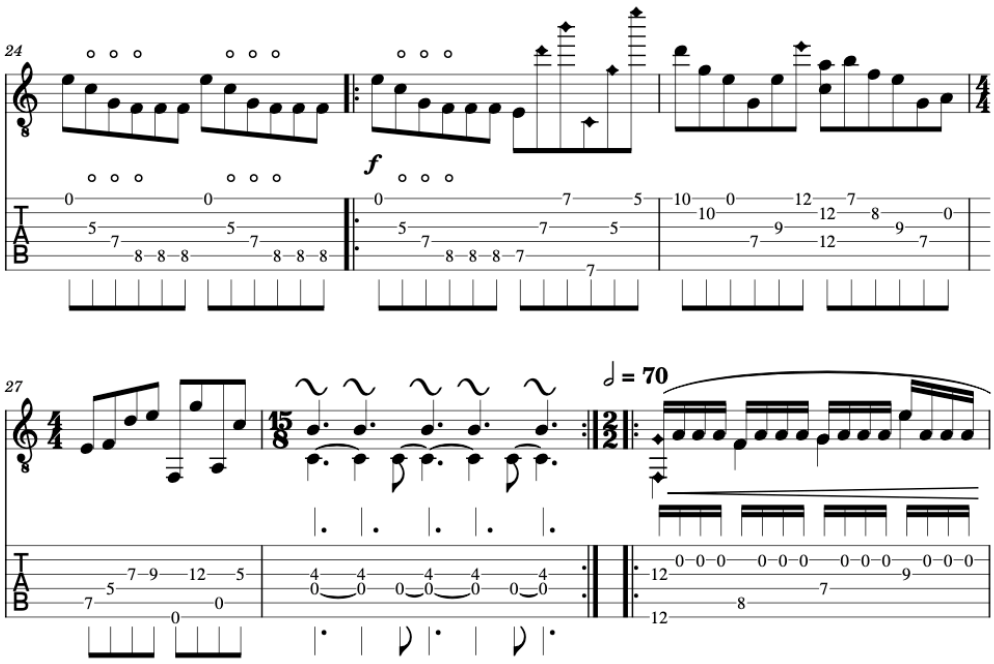
The process of composing this piece began with a personal goal of improving my own rhythmic capabilities as a performing guitarist. The use of a looper pedal mitigated the inability to perform complicated polyrhythms on a single guitar. In the context of an educational process, first breaking up the parts of a polyrhythm into its separate constituents is a necessary step in the process. The looper grants this ability

to the performer, and it was this affordance that inspired the entirety of the composition. While this can be executed on a singular guitar, the use of technology as a compositional tool, as well as a pedagogical guide, allows the performer to better shape the melodic material of the work while simultaneously embodying separate rhythms.

***the way water breathes* by Emmanuel Jacob Lacopo**

the way water breathes pulls from my musical influences in progressive music, post-rock, and ambient music. Through its fusion with the classical guitar, the piece presents a new way to approach the instrument by incorporating extended techniques, tunings, and effects typically found in these genres. A scordatura (F A C G A E), often used by the band *Covet*, transposes the instrument to an open sonority that allows for previously impossible gestures to become much more accessible. Alongside the Hologram Electronics Microcosm as a randomized, pitch shifting delay, and the MOOD as a dense ambient reverb haze, the piece replicates the unpredictable temperance of large bodies of water.

Additionally, the second theme of the work was built using Tosin Abasi's previously discussed technique of selective picking with hammer-ons from nowhere. Here, it can be seen as a technique transposed to the acoustic nylon-string guitar afforded by the electric guitar and its musical culture.



***Buddha* by Julius Eastman**

My album *Eastman* was released in May 2023, and represented a re-imagination of the guitar's place in classical music through the lens of Julius Eastman's groundbreaking musical approaches. The LA Times explains that "it's only in recent years that friends and scholars have begun slowly shedding light on Eastman's music and the blurry details of his final, erratic years — and that a newer generation of musicians has given his work a fresh look".[90] With this ongoing revival, Eastman's ingenuity and originality is slowly being uncovered, and I aimed to take part in this necessary work while imbuing my Doctoral approaches as a case study into technology as an interpretive tool.

The score to Julius Eastman's *Buddha*, shown in **Appendix A**, is both strikingly beautiful and incredibly free. A hand drawn oval (some refer to it as an egg) encircles 20 staves of stemless pitches. The score leaves much to be inferred and gives way to endless avenues of interpretation. I chose to arrange 4 different versions of the work for

[90] Swed, Mark. "He died homeless and forgotten. Now gay Black composer Julius Eastman finally gets his due". LA Times. June 23, 2021.

different arrays of guitars and electronics to showcase the use of technology as interpretive tools, and the modular interpretations that can be found within this music.

Buddha v.1 compiles the available notes on the staves into their own respective harmonies and functions as a standalone tape. Here, the electric guitar is showcased as a soloist instrument that uses the available notes to create thematic material that evolves over the course of the accompanying tape.

As shown in **Appendix B** and **C**, over the course of 2 minutes, *Buddha v2* presents a vertical time-mapped approach of the score, creating an extended harmonic progression. In an effort to circumvent the internet issues of sustain on the acoustic nylon-string guitar, *Buddha v.2* utilizes granular delay and reverb processing that expands its traditional sound world and connects chords throughout extended periods of sustain.

Similarly, *Buddha v.3* uses a horizontal time-mapped approach of six minutes to turn each individual staff into twenty respective electric guitar parts that are each performed with an Ebow.

Buddha v.4 bookends the group by employing a similar technique as in Buddha v.1. Contrastingly, the music material is processed through a technique popularized by Brian Eno. Generative music describes music that is constantly changing based on evolving sets of parameters within a system, usually also involving chance procedures. Making use of Ableton Live to create unpredictable melodic and harmonic material using the score materials that Eastman provides, in this version, the classical guitar takes the role of the soloist electric guitar but presents the material in a more organized formal structure.

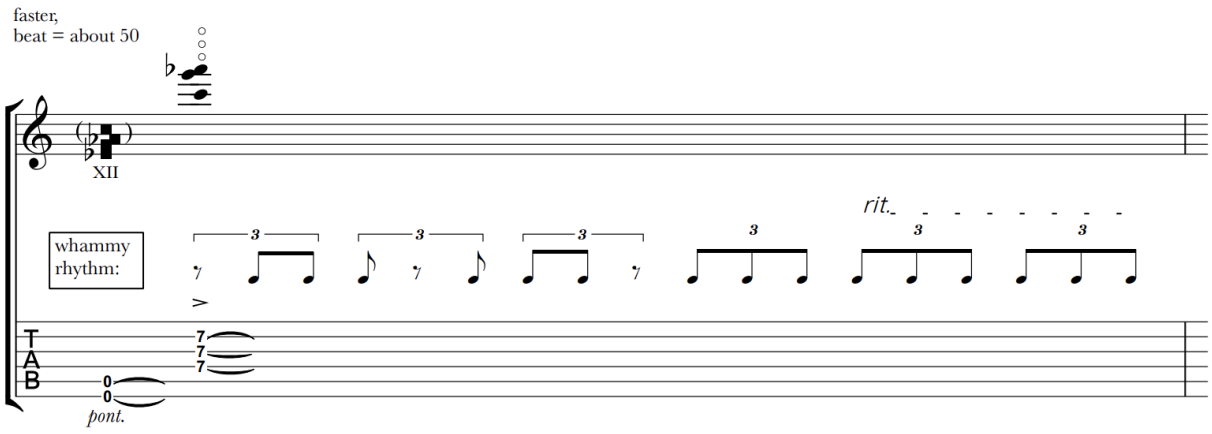
Miniature Beams by Marguerite Brown

Marguerite Brown's *Miniature Beams* presents a unique and successful approach to electric guitar writing. The details involved in this work leave us with much to discuss — points of interest involve a paper clip preparation on the two lowest strings, the use of a whammy bar, reverb, compression, and gain, a distinctive scordatura involving cent deviations, and presentation in both standard notation and tablature. However, integral to this study is a personal experience in performing this work, outlining the use of technology as an interpretive tool.

The work calls for a guitar with humbucker pickups and whammy bar, with the overall guitar tone being "relatively dark and thick".[91] While I own a guitar with a whammy bar, it's set-up with three single-coil pickups, leaving it unable to achieve the required tonal characteristics. I therefore decided to make use of my Les Paul, as its tonal characteristics were most in line with the composer's goals.

While this allowed me to build a successful tone for the work, I was left with the issue of properly articulating the motive exemplified in the image below. To accurately execute this technique, I worked with the composer to circumvent my lack of equipment. Upon testing, I opted to use a pitch shifter pedal (↑Major 2 interval) with a mix of 30%. Moreover, the interval value is controlled with an external expression pedal, with the interval moving incrementally up to the desired pitch when fully depressed.

[91] Stated in the technical sheet of the score to *Miniature Beams*



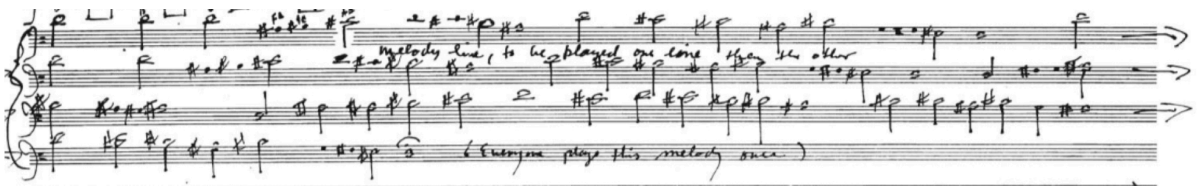
One decisive point that the performer must keep in mind when brainstorming technological solutions is that of context. In the case of *Miniature Beams*, a performer never systematically reaches the same interval upon every articulation of a whammy bar. Therefore, one's articulation of the expression pedal must reflect this, and the performer should avoid moving in complete motions from heel to toe upon every iteration.

Gay Guerrilla **by Julius Eastman**

Often performed on four pianos, *Gay Guerrilla* closes my album in an arrangement for over 30 electric guitars ranging from clean tones, distorted riffs, and heavily granulated material; creating a personal sound-designed world of Eastman's seminal work afforded by the guitar.

Formally, *Gay Guerrilla* is structured like a chorale fantasia.[92] Our point of focus within this 30 minute work, is its emotional climax, where Eastman quotes Martin Luther's chorale *Ein feste Burg ist unser Gott (A Mighty Fortress is our God).*

[92] "The chorale fantasia is a musical composition based on a Lutheran chorale, whose characteristic feature is that the presentation of the chorale melody is delayed, often constituted by an extended fugue-like section that prepares the stage for the rhetorical climax" (Chessa 193).



As we saw in Buddha, Eastman's scores infer flexibility in musical parameters. This was part of the broader modern trend of working closely with regular collaborators and transmitting information as an oral tradition. This aesthetic, coupled with the context of this passage left me with several options to consider in its presentation. While the recording of this work allows one to multitrack and manipulate multiple parts to create this effect, its live presentation requires different methods. One could simply play along with a tape track, or they could venture into more adventurous territories.

For example, in my performance of this work at *Intersection Festival's* marathon concert at Yonge-Dundas Square (Toronto, ON), I experimented with the use of two separate loop pedals; a looper block in the Line 6 HX Stomp, and the looper within the Hologram Electronics Microcosm. The HX Stomp looper allows one to infinitely loop this material as recorded, loop at half the speed, and even loop in reverse. Additionally, the Microcosm allowed me to route the loop in several modes. I chose to use the Microcosm as a pre-fx loop, allowing me to have the option to fade modulated material in and out. Additionally, the Microcosm affords one the possibility of manipulating the loop from 1/4 of the speed up to 4x the recorded speed. Moreover, there is access to a filter, a general mix control of the modulation, a separate reverb mix control, the wave-shape of the modulated signal as well as its activity and repeats, and much more. The process went as follows:

1. Record the melodic material as written into the HX Stomp looper
2. Process that loop through the Microcosm looper
3. Improvise with looper parameters contextually within Eastman's aesthetic, always keeping an original melody present
4. Slowly ease away from interaction and fade away as denoted by Eastman's time indications

Chapter 6

Conclusion and Future Output

"I'm trying to play the truth of what I am. The reason it's difficult is because I'm changing all the time."

-Charles Mingus

6.1 Reflections

At the forefront of developments throughout this research, is my personal development of a *Modular Post-Classical Artistic Practice*. Through careful research, guidance, planning, and execution, I've been able to achieve the following goals:

1. Design a personalized set-up in line with my artistic aesthetics and goals
2. Explore chosen technology as a compositional tool and develop an associated method of notation
3. In collaboration with composers, explore chosen technology as an interpretive tool — exhibiting a modular approach in performance practice
4. Explore chosen technology as an improvisational tool in both traditional improvised-music settings, and existing pieces allowing for freedom in interpretation

The overall skill-set explored throughout this paper has connected me with other like-minded artists, and resulted in the formation of several interdisciplinary collaborations. Two projects of note are the following:

Backlined Collective

Backlined Collective is an interdisciplinary guitar-driven collective founded by Emmanuel Lacopo, Erich Barganier, Andrew Noseworthy, and Patrick O'Reilly. Each

member's individual experiences as performers, composers, and improvisers combine to create a modular post-classical practice.

for a minute there // i lost myself

for a minute there // i lost myself is a monthly free-improvisation series based in Montreal, QC. With the goal of promoting community and collective creativity, Lacopo brings together a large group of musicians from varying genres for long-form improvised performances. The final set of every concert is open to audience members to join the month's featured musicians.

6.2 Benefits

As a result of this practice, 21st century classical guitarists will:

- Become modular and adaptable in their artistic practices
- Develop a deeper understanding of their instrument's history, associated tools, and full capabilities
- Become a more flexible collaborator, capable of existing in multiple musical contexts
- Become a highly marketable, self-sufficient musician
- Be capable of setting-up and tearing-down their performance set-up without aid, manage technical difficulties, and communicate with venue tech-crews; affording them the possibility of performing in any venue with ease

Additionally, through the adoption of this method, one becomes better suited to transfer this knowledge to future generations of performing artists. The capabilities of our future musical environment will, undoubtedly, be evolved from its current state. As exemplified through the career of John Coltrane, to allow our musical environment to evolve and thrive, we are indebted to the task of constant instrumental learning and evolution to inevitably create new modes of exploration for future generations.

6.3 Obstacles

Within the context of your average classical musician, the integration of this system inevitably presents certain obstacles and disadvantages. These include:

- A reframing of how we spend productive practice time. This approach requires one to invest time and effort in learning new equipment, techniques, and more. This does not always involve direct time on the instrument, but rather a holistic practice involving multiple elements
- Cost of equipment purchase, maintenance, and repair
- Transportation of equipment
- Careful planning and organization preceding concerts; Ensuring all equipment is packed and functional (this includes back-up equipment, cables, batteries, etc.)

6.4 Final Thoughts on Pedagogy

As a rapidly expanding world of technology continues to afford us new musical possibilities, our pedagogical approaches must grow and adapt symbiotically to accurately assess the needs of the modern musician.

The approaches proposed throughout this paper, while guitar-specific, can be adapted to any musician who's passionate about evolving their practice. This research was additionally transformed into a semester long seminar dedicated to achieving the necessary pedagogical shift outlined in this paper. Geared towards addressing the initial gap of knowledge classical musicians face when presented with technologically involved practices, *A Modular Artistic Practice for the Post-Classical Musician* will hopefully grow to become a staple among music programs.

6.5 Future Output

While this research was heavily tested and enacted, there remains the necessity to fully capture the results of this work through the creation of a full-length album.

Following the submission of this document, my existing compositions will be recorded, and the studio will be used as a technological tool to enhance the album versions of this music. The rest of the tracks will be newly composed works illustrating the full breadth of capacities afforded to me throughout this process. To conclude, in the words of Miles Davis:

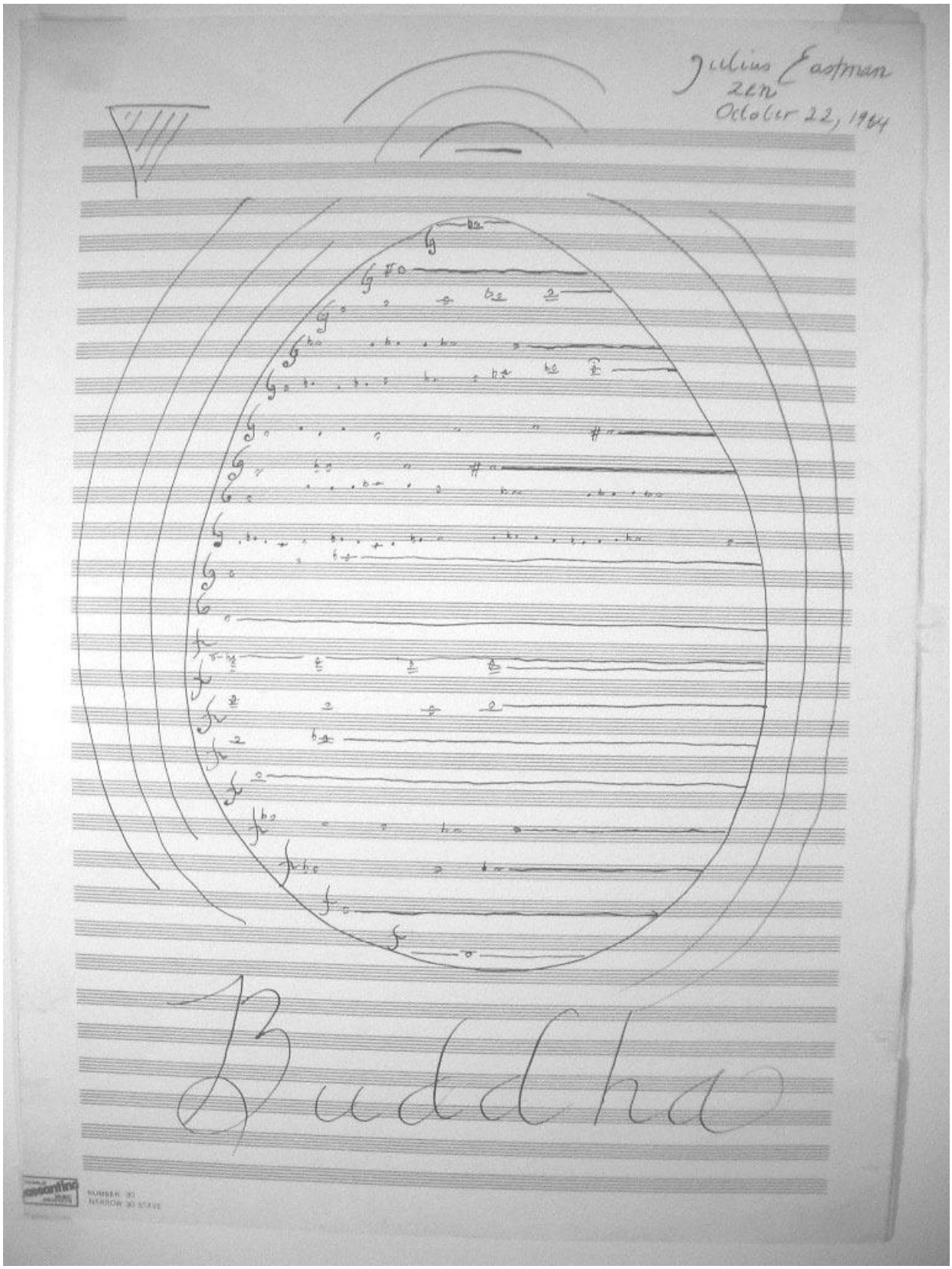
Man, sometimes it takes you a long time to sound like yourself.

Appendices

Appendix A: Buddha Score

Appendix B: Buddha v.2 Time-Mapped Score

Appendix C: Buddha v2 Altered Performance Score


Julius Eastman
Zen
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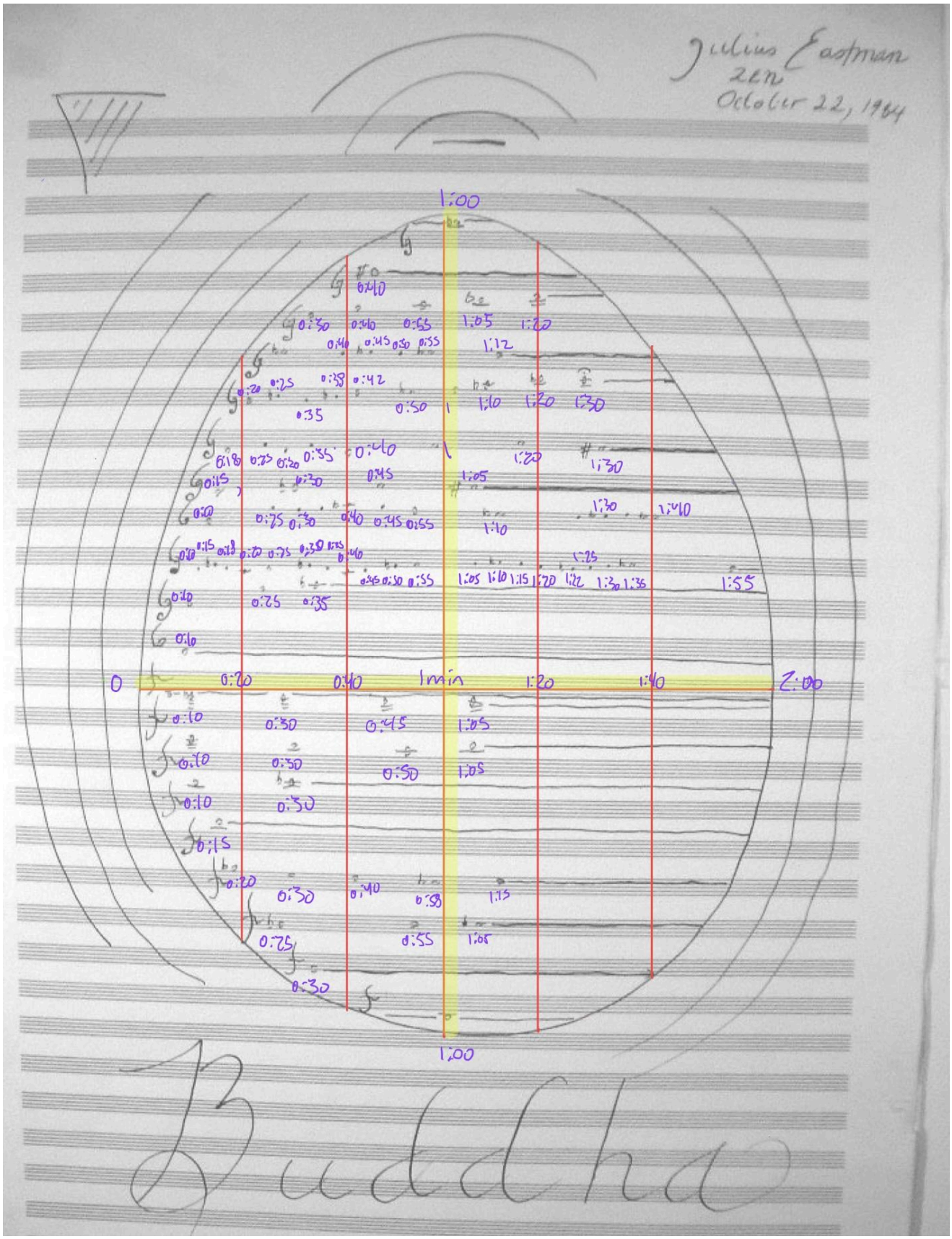
Buddha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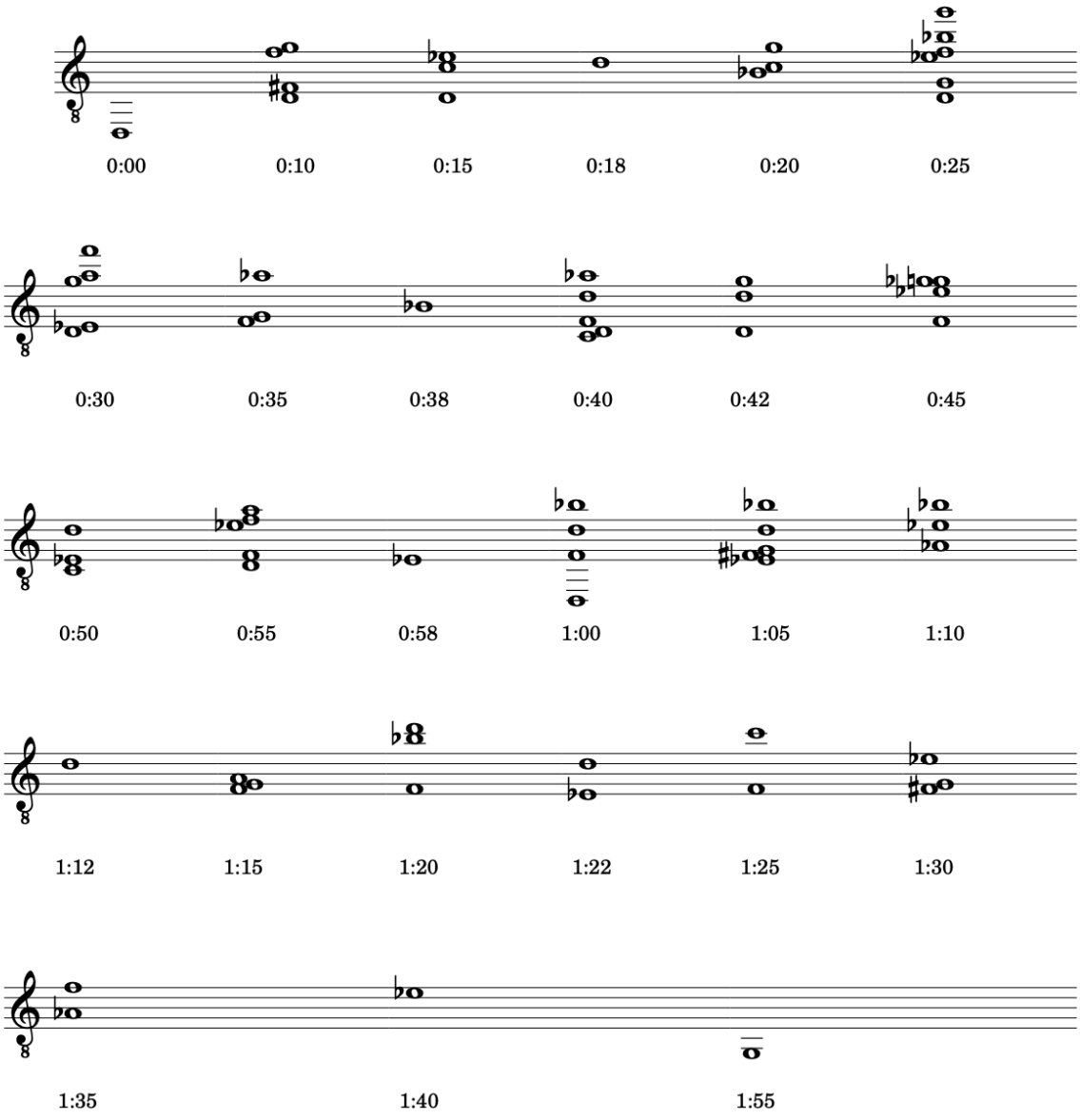
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