UNIVERSITY OF CALIFORNIA SAN DIEGO

ghost tones Concepts and Concert

A Dissertation submitted in partial satisfaction of the requirements
for the degree Doctor of Musical Arts

in

Contemporary Music Performance

by

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2024

The Dissertation of David Aguila is approved, and it is acceptable in quality and form for publication on microfilm and electronically.

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Vita

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Abstract of the Dissertation

ghost tones Concepts and Concert

by

David Aguila

Doctor of Musical Arts in Contemporary Music Performance

University of California San Diego, 2024

Wilfrido Terrazas, Chair

This dissertation will cover the practice of approaching the trumpet, collaborating with composers and performers, audio production, and concert presentation of my final recital *ghost tones*. In the first two chapters I will detail concepts I call parametric performance practice, decoupling the instrument and performer parameters for new methods of sound creation and manipulation/modulation. Chapter three introduces these concepts to composers and performers who I collaborated with to create works for *ghost tones*, with the intent of bringing these concepts beyond myself. I will then discuss the impact of working with trumpet, electronics, and audio production to compose acousmatic works for my album *Configurations of the System*, playing four of these tracks during the recital. I will then discuss the aspects of sound projection,

to have all electronic and amplified elements in the concert, as well as the staging, lighting, and concert attire. Finally I will reflect on the process and the continued research and practice moving forward beyond this recital.

Image I.1: *ghost tones* program image

Introduction: *ghost tones*

A "ghost tone" in the brass lexicon often refers to a dynamically soft note, which contains air and fewer overtones than what is traditionally played with brass instruments[1]. In comparison to a full tone, a ghost tone is nearly audible and inaudible. Audibility while performing extremely quietly and losing control of the nuanced technique evaporates when amplified, in the addition of a microphone ghost tones can be more readily explored as a performer. The concept of my recital; ghost tones, was envisioned as a single concert-length program that explores this aspect of brass playing in different capacities. Through exploring the "ghost tones" I have

[1] Ghost note definition. https://ccnmtl.columbia.edu/projects/jazzglossary/g/ghost_note.html

discovered there is a depth in technique when both physicality and sonic diversity intertwine which draws complex constellations of microcosms of sound in performance. Ghost tone are present throughout pieces in my recital, blending of air and tone occurs throughout Ulrich Krieger's *Althing I* and the ghost tones within Nasim Khorassani's *Shabah* were a surprise find when working on a different technique eventually combining the two together. The use of this technique within these pieces, the distant ghost-like timbres in my work *Depths III*, and the masked use of trumpet within my acousmatic pieces unified my recital and felt appropriate to title the recital ghost tones.

This recital is the culmination of a practice I have been cultivating for well over a decade working with composers, composing, utilizing electronics, and exploring the trumpet outside the realm of Western Classical Music. A turning point when most of these changes occurred was during my Master's degree at the California Institute of the Arts (CalArts), where my trumpet teacher Ed Carroll, said "All I do is give permission". It was the permission or freedom that I was searching for, especially coming from the stringent music conservatory teachings I'd had during my undergraduate at the Eastman School of Music. Throughout my time at CalArts, I had three goals, learn electronics, learn to compose in my style, and play trumpet in ways I'd never imagined. By the end of my degree, I felt I'd accomplished all of these goals and set off a three-year period in Los Angeles continuing to build up this practice and perform. Throughout that period trumpet had taken a more reduced role, composing, and electronic music performance & production were the main areas that I had cultivated. My time away from the trumpet is more due to burnout on the instrument, and moments still overcoming the rigorous teachings of undergraduate. Nonetheless, I continued working within music, and in the three years in Los Angeles had become more active in the experimental and improvisation community using

electronics. In late 2016, a close friend suggested I look into a master's program in the Netherlands that focused on Stockhausen, and in particular the sound projection program. After some research into the program, faculty, and performance opportunities, the program seemed like a great opportunity. The degree and work I had been doing with live electronic performance seemed similar. I would be accepted to the program and attend the Stockhausen courses in the Summer of 2017, completely opening a new world of music to me. There was so much for me to learn, and I was enjoying the music deeply, finding that not only did the concepts of electronic music help me better understand how I listen, but provided new ideas and methods for me to think about composition with electronics. One unexpected event during the Stockhausen courses came when listening to a performance by Marco Blaauw, Dutch trumpeter in Ensemble Musikfabrik and trumpet instructor during the Stockhausen courses. Marcos' performance of *Harmonien* during the courses reinvigorated my passion to play the trumpet. Unfortunately, I was not able to attend the master's program, but I had an endless amount of energy dedicated to learning and exploring not only Stockhausen but also where I could take my practice. The research and practices I have cultivated since that moment in late 2017, and throughout my degree at the University of California San Diego are presented in my final recital, ghost tones. Within this dissertation, I will discuss my final recital *ghost tones,* dividing the entire process into four areas that will be discussed; collaborative work with composers utilizing parametric performance practice, electro-acoustic research with microphone placement, playback works which explore the intersections of acoustic and post-production audio work, and theatrical elements of lighting, staging, and attire. In the playback works, (+2dB), hide, Play Radio, and white tiger each have samples or improvisations I performed on the trumpet that were processed with audio effects transforming the sound. In some of the pieces the trumpet is unrecognizable

due to the processing and in others the unprocessed trumpet blends into the textures of the piece. Conceptually each of these four playback pieces uses the trumpet, however, the trumpet due to the overall textures, densities, processing, or techniques may not be identifiable as a trumpet, and the main goal is to reconfigure the trumpet and its sound. In *Althing I* and *Depths III*, there was a large portion of time dedicated to research and experimentation on how microphone placement alleviates the need for acoustic dynamic audibility, providing precision for performers to execute techniques without a need to force dynamic. Instead, by placing a microphone within the instrument and amplifying the sound, the dynamic range for the techniques is more compact allowing for the performer to perform micromotions on the instrument and with the body that would otherwise be almost imperceivable. Collaborating with composers provided an exchange of ideas to realize a piece. In presenting concepts of parametric performance practice, a method of performing that decouples the performer and body delineating a precision of each of these parameters for performance, new works would be composed using these practices, but also help to disseminate the practice through these composed works. The final aspect of the performance was the theatrical components,

The first two chapters will detail parametric performance practice and the framework in which I use the techniques to create two distinct sound pallets. These two sound chapters are crucial in how I approach the trumpet to perform on the instrument. The first chapter will introduce the concepts of parametric performance practice and how I have developed this practice through the study of works not only for trumpet but also open instrumentation, the notational development of Stockhausen's work from the late 1950's to early 1970's, and sound synthesis. In covering works by Stockhausen, as well as some of my work in live processing, and synthesizers will serve as a foundation for what I call parametric performance practice and how

it is applied to trumpet playing. Chapter two will focus on how I use parametric performance practice, focusing on two types of sound I have found to be most interesting to me in my work with the trumpet: fragile microsounds and abrasive noisy sounds. Some of these sounds and techniques have previously been developed and used in other works and by other trumpet and brass players, in some cases some of the sounds were developed in my practice. The third chapter details collaborations with composers and performers in creating new works using methods of parametric performance practice, the development of notation, also discovery of new types of sounds, and electro-acoustic research with microphone amplification. The collaborative aspect of working with composers furthered the work of parametric performance practice, the development of new sounds within the fragile and abrasive sonic palettes, and revealed new possibilities with the aid of amplification. Chapter four will discuss my method of working within audio production and guided listening for each of the four acousmatic works presented during my recital. Some of the techniques I used in the acousmatic pieces are modern interpretations of electronic musicians in the 1950's, taking this to create my own work. This chapter will also discuss the importance of documentation and the methods I use, the importance of improvisation, how I see composition within my practice of audio production, and how I use the tools of audio production to realize my intentions. The fifth chapter will present an overview of the concert presentation, sound projection, and staging of ghost tones. The concert experience for the audience is an important aspect, including the programming of the works, timing between works, how sound will be spatialized, the staging of the performers, the lighting, and concert attire. I'll conclude with thoughts on the presentation of ghost tones as well as plans for not only the works on the recital but also what my plans are in continuing each of these practices. My plans for these works in future performances will be discussed, as well as performances since the

recital. My album *Configurations of the System* which includes the acousmatic works from ghost tones, and my plans for future albums. Finally, how I plan to continue my research and practice of parametric performance practice and audio production.

1. Parametric Performance Practice

Parametric Performance Practice is an approach to playing the trumpet, where the parameters of the instrument and the body of the performer are more distinctly separated giving the performer more nuanced and precise control of aspects of playing the instrument. The development of parametric performance practice came during my research of early electronic pioneer Karlheinz Stockhausen, his work from the 1950s to the early 1970s, the methods of musique concrète tape manipulation, performances practices using Ableton Live processing acoustic instruments, and work with recording and post-production engineering. In working with various electronic instruments there is typically a knob or fader which can alter a single parameter such as pitch or filter cutoff or dynamic. With acoustic instruments this isn't the case; parameters typically have two or more parameters tied, i.e. dynamics and overtones regarding the trumpet. I began to explore what methods I could discover to either untie and discover parametric performance practices; the distillation of each of the parameters of the performer & instrument to create new methods of sound production and manipulation. As I developed parametric performance practices for the trumpet, I researched written works that I could draw inspiration from. A selection of these works filtered the lexicon of Western Classical music to the most fundamental musical concepts along with electronic music synthesis merging the two methods into sound creation and musical interaction. I began to relate this to the modern-day modular synthesizer, which is a collection of modules within a system that can be patched by cables to create a sound that dynamically changes through time with the input of changes of knobs and faders from the performer. When these patch cables are removed, a new patch with the

same modules can be constructed, and by doing so a new sound just as dynamic as the previous can be constructed. The trumpet history and pedagogy that has been primarily explored is a single method or patch of playing, in my research, I aim to explore the new patches that can be discovered using the modules of trumpet practice. By defining the parameters of performance, and intersecting the concepts from electronic music, I continue to develop my practice further by collaborating with other performers and composers striving to expand these methods beyond just brass instruments and to all acoustic instruments.

In 2017 I discovered an unusual graphic score by Karlheinz Stockhausen for open instrumentation titled *Spiral* (1968), the symbols were familiar at times to Western notation, others with text, and some that seemed like a math equation. The score would be my entry into building up my practice into parametric performance practice. As I studied to work unraveling the complexity of the notation, I noticed that the graphic notation was written process-based work, each graphic representing a specific type of transformation over time. The piece was composed in regard to the unfolding of events, however, the content of each event was based on the stochastic transmissions of a shortwave radio. In continuing my research for the piece, there were two compositions *Prozession* and *Kurzwellen* preceding *Spiral*, and two after *Pole* and *Expo*, laying the groundwork for the notation and transformations. Not only this but the notation, conceptual thinking of process pieces, and working with electronics had been developing since 1958 beginning with *Kontakte.* I felt that the study of specific works, *Kontatke, Momente, Mikrophonie I, SOLO, Prozession*, and *Kurzwellen* would provide insight into better performance practice of *Spiral.*

The fundamental elements of *Spiral* are performer-selected transformations of four main parameters of a sonic event, those parameters being, register/range, duration, intensity/dynamic,

and segments/divisions within a duration. An event is selected by searching through shortwave radio signals and is imitated and transformed by the performer, searching can be done at any time to change the initial event imitated. Transformations are contained within a sequence of events separated by vertical lines indicating a short pause, for instance, the first event is four stacked plus signs with a "Poly" transformation as well. There is a note in the performer directions of *Spiral* to reference the scores of *Kurzwellen*, *Prozession*, and *SOLO* for supplemental explanations and comparison to those scores. Other than the main four types of transformations, there are 18 additional graphics for the performer to learn. What I began to realize in my study was the concepts of The Four Criteria of Electronic Music and Moment Form from *Kontakte* were present. The microphone placement and its impact on the timbre of the instrument were taken from *Mikrophonie I*, and also asks the performer to present a broad scope of timbres like in *SOLO* to be used in their performance. Finally, *Spiral* was to be spatialized, sending the sound around the space as it had been done in the three previously mentioned pieces.

The larger scale component of events in *Spiral* is revealed from a 1971 London lecture by Stockhausen on his work *Momente*. Stockhausen describes a "moment" as "When sounds occupy a particular region, a certain register, or stay within a particular dynamic, or maintain a certain average speed - then a moment is going on: these constant characteristics determine the moment"[2]. A series of events can be equivalent to moment-forming, "The degree of change is a quality that can be composed as well as the characteristic of the music that is actually changing. I can compose with a series of degrees of change, or we can call them degrees of renewal. Then I can start with any musical material and follow the pattern of change, and see where it leads, from

[2] Stockhausen, Karlheinz. 1989. Stockhausen on Music: Lectures and Interviews. Edited by Robin Maconie. N.p 63.: Marion Boyars. (Stockhausen 1989, 92)

zero change to a defined maximum. That is what I understand as moment-forming"[3]. In the score for *Prozession* an event is to be chosen from a previous piece based on the performer, and chosen from *Mikrophonie I*, *Gesang Der Jünglinge*, *Kontatkte, Momente, Telemusik, SOLO,* and *Klavierstücke I - XI* and each of these are to be "...a musical process by means of methods similar to those I had already employed in *Plus-Minus*, *Mikrophonie I*, and *Mikrophonie II*"[4] The process of transformations.

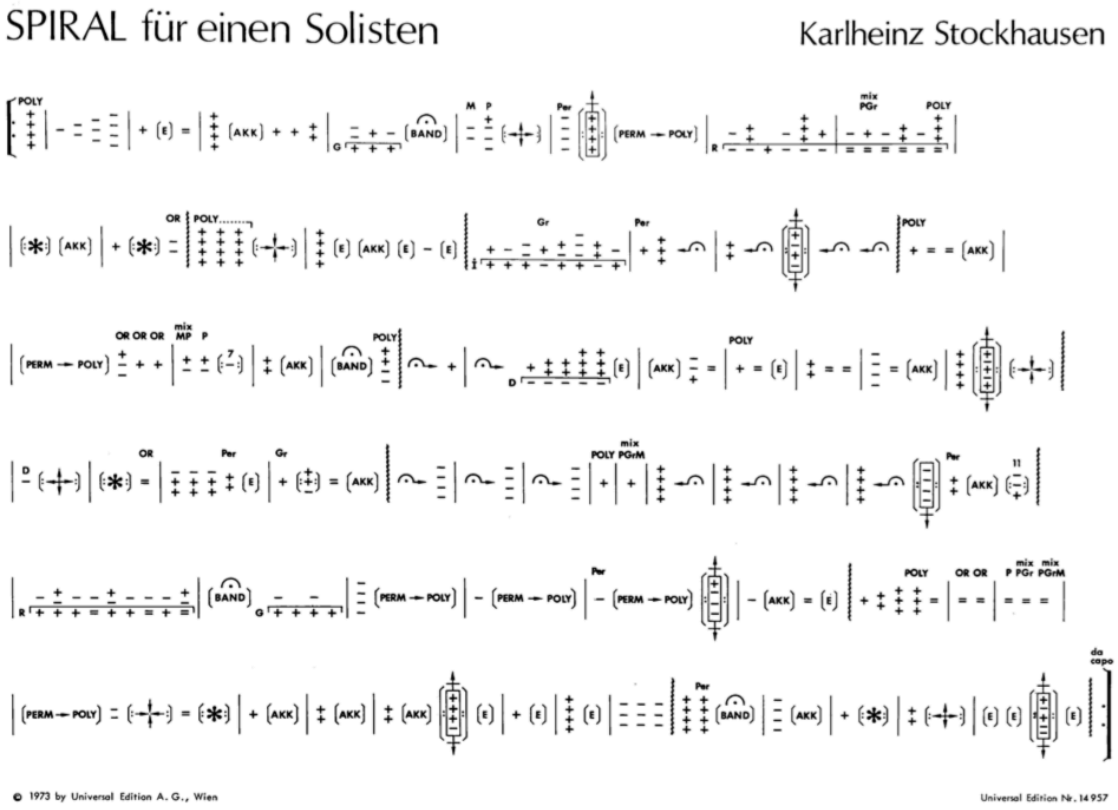

Image 1.1: Score for *Spiral*

[3] Stockhausen, Karlheinz. 1989. Stockhausen on Music: Lectures and Interviews. Edited by Robin Maconie. N.p 64.: Marion Boyars. (Stockhausen 1989, 92)
[4] Karlheinz Stockhausen, Karlheinz Stockhausen, Prozession / Ceylon, Stockhausen-Verlag – Stockhausen 11, 1995, CD, p. 22

The work within *Laptop+Trumpet,* is an improvised duo with Ethan Marks which we started during our degrees at the California Institute of the Arts. In this duo I created custom audio effects racks to process and perform with Ethan. I transformed Ethan's trumpet with these custom audio effects racks I chose and began to think about how my work in that setting could be transferable to the preparation of *Spiral.* Reflecting on improvising with Ethan and our album, we had "events, moments, and moment-forming", and our process was transforming each event over the course of a performance. The transformations I did with audio effects were similar to some of those within *Spiral*, the use of echo, the use of recording to recall precious events, condensing a recording until it became a band of sound, and layering recorded loops on top of the live processing. My preparation was aided by some of the liner notes of Michael Vetter Integral Version of *Spiral* from Stockhausen CD no. 46, where he suggested preparing a plan of each of the plus and minus symbols and that the improvisatory nature would still occur within the planned process. Vetter was a vocalist, and long time interpreter of Stockhausen's music. He along with Natascha Nikeprelevic, also a vocalist, went on to record *Pole*, a duo expanded notation version of *Spiral*, and *Expo,* a trio version of *Spiral* with electronic musician Felix Hoefler performing electronics. With all of this in mind, I began to wonder if there could be parameters of the music creativity process within *Spiral*, my practice with audio effects, and how could all of these intersect for me to create diverse sounds with the trumpet.

Timbral exploration of acoustic instruments are present in *Mikrophonie I* and *SOLO*, both are electro-acoustic works, however, *SOLO* explores timbre in an acoustical format whereas *Mikrophonie I* does so through amplification. There is also experimentation of moment-forming and process in both pieces, *SOLO* more so than *Mikrophonie I*, Stockhausen giving more opportunity for the performer to make choices in the unfolding of events throughout each piece

by providing options of schemes that can be constructed and realized. In *Mikrophonie I* the centerpiece is a large tam-tam that is excited by different objects, some of the objects chosen by the performers. Two groups of three performers, each group with two performers at the tam-tam, one holding a microphone and exciting it with objects as the other activates, the final performer for each group is in the audience using a filter to remove or highlight certain frequencies that are exciting while also moving the sound from front to back on their respective side of the group on stage. The timbral aspect of the piece is the way the microphone picks up the way each of the different objects excite the tam-tam and the filter transforms the sound. Based on the position of the microphone to the excitation, "So we always have this triangle of possibilities of microphone movement with respect to the point of excitation, affecting the dynamics, the timbre, the degree of reverberation of each sound"[5].

I have been fortunate enough to hear this piece live with Ensemble MusikFabrik in 2020, assist in technical sound for a performance in 2022, and perform the filters with Red Fish Blue Fish in 2024. An aspect of the 2024 performance we tested was the microphone used, dynamic or condenser as well as the size, for the performers to hold, eventually decided to use Shure SM81 because of its more accurate frequency response and long body. The use of the microphone as an instrument, altering the timbre by position I found applicable with the use of a microphone stand, and instead of moving the microphone moving the bell of the trumpet in the same manner as in *Mikrophonie I*. The proximity of the bell to the microphone, especially when close I found to reveal sonic characteristics, unlike traditional trumpet sound, adding depth and nuance to each action taken by the performer and the instrument.

[5] Stockhausen, Karlheinz. 1989. Stockhausen on Music: Lectures and Interviews. Edited by Robin Maconie. N.p 81.: Marion Boyars. (Stockhausen 1989, 92)

These timbral changes with a microphone were then explored acoustically when reading the score for *SOLO*, ranging from normal instrument timbre with three additional options. The timbral choices are left up to the performer, but there are some examples given from previous performances for flute and trombone. For the version with the flute, the flautist used piccolo, flute, recorder, and alto flute while also humming, and in the trombone version the use of the straight, cup, and wawa mute were used. In addition to these three timbres are options for noise, ranging from somewhat noisy, noisy, or very noisy. There are examples given of blown air, key clicking, bow scratching, and electro-acoustic modulation. The use of filters and modulators are options for the timbral and noisy options of the piece. The piece is titled *SOLO*, however, there were three assistants needed to initially help with the electronics for the piece. These additional assistants were needed with the microphone gain, feedback, and playback of tape loops. A score was for the assistants dictating when each is needed to initiate their phase of the piece. There are concepts and symbols in *SOLO* that I see as predecessors to the graphics used in *Spiral*. Two of the assistant interpretation schemes are the use of polyphon, polyphonic layering, and blöcke, the superimposition of elements. Within the performer score, there are arrows that ask the performer to interpret the following, preceding or both following and preceding pages, and *Spiral* asks the performer to think of the following or preceding event.

Having a better grasp of the larger-scale form of events, the process of transforming, and timbral qualities, how could I begin to now mimic the shortwave radio range of squelching single sideband, spectral noise, and filtered elements? I turned my attention to *Kontakte*, the earliest of all of these pieces, specifically the process Stockhausen for creating the electronic part for the piece. The piece is credited as being the first to synthesize sounds, due to the working practice underwent to create the electronic tape, Stockhausen devising the Four Criteria for Electronic

Music, the unified time structure, splitting of the sound, multi-layered spatial composition, and the equality of tone and noise. The criteria served as a foundation for the synthesis of sound using electronic equipment and provided a new perspective on my listening globally to dissect and recreate any sound I heard or imagined. The creation of sound is set by the unified time structure using a series of pulses to create pitch and timbre, this sound could be a single series of fundamental pulses in a rhythm or layered to create a more complex sound. A more complex sound of layered pulses could then be split, revealing each constituent fundamental series of pulses which is the second criterion of electronic music. As a trumpet player, I had played the antiphonal works of Giovanni Gabrielli, a sixteenth-century Venetian composer, whose music groups at each of the cardinal points within the cathedral, the multi-layered spatial criteria takes the concept of placement of sound and motion further by using of depth perception. A close sound then can be made to sound distant, shaped by the environment around us before reaching our ears and vice versa, in using a quadraphonic array of speakers an immersive authenticity of sound in space can be produced. Finally, the equality of tone and noise with electronic instruments allows a precision use of noise, with the most narrow band of noise being pitch and the widest being a full auditory spectrum of noise, individual bands can be created to form various collections of scales of noise.

After internalizing the concepts from the four criteria, and experimenting with electronic instruments to follow these concepts I transitioned to the trumpet, contorting my body to find methods of sound production contrasting what I had been taught. There were already some techniques I was familiar with, such as split tones, and had taken some inspiration from Ethan when we had played together, deconstructing what I heard for me to reproduce. I developed new methods of activating the lips, maintaining the flexibility of switching between more traditional

playing and my new way without creating habits that could damage the musculature of my embouchure. My results were more limited to that of Stockhausen, however, two categories of sounds in particular, fragile microsounds and abrasive noisy sounds, and I have been able to cultivate each to have control similar to that of a single parameter on a synthesizer. When picking up the instrument I had more curiosity as to how small changes either in my body or the instrument would impact the sound. Parametric performance practice of the body and instrument continued, influencing how I approached the instrument, not just as a trumpet but as an acoustic synthesizer.

In my broader perspective of what the trumpet is, I am approaching the instrument as an acoustic amplifier of a physical input. By taking this perspective, the parameters of the trumpet practice can be separated into two elements, the instrument and the performer/body. In identifying each of the parameters, control of the individual parameters can be defined and used in the development of sound creation, manipulation/modulation, and musical interaction. Sound creation I define as the means to activate sound, this typically is done with vibration of the lips inside the mouthpiece. However, blowing air also produces sound, and in my research I not only examine alternative methods for sound creation in the trumpet. These methods may contort the lips and embouchure in unconventional ways, or may not use the lips at all. Manipulation and modulation are methods the performer can use parameters of the instrument or body, to create variation over time when playing a sound. This is similar to how modulation sources on a synthesizer modulate parameters. Musical interactions are the result after sound creation and manipulation/modulation have been examined for a particular sound. Throughout the process, I am improvising and exploring the amount of control I have over the parameters I am using. These improvisations are revealing in how I can use the current parameters in a musical context,

the facility of ease to transition between the current sound and a different one. The transitions between sounds I explore with the current parameters used, and other sounds that either use one or both parameters to understand the mechanisms of the instrument and the body. These moments often lead to understanding that transitions between techniques are possible: in some instances with ease, other instances there may be unexpected sounds, or impossibilities due to the limitation of my practice of the techniques at that moment. After more extensive research and practice are completed within the musical interactions, I have met with composers to begin to share these new sonic palettes with them, with the intention of sharing these not only with composers but also with trumpet players. The parameters of the trumpet are more easily defined due to these parameters being limited in scope while also being more visible in its precise control in comparison to the performer parameters.

a. Instrument Parameters

Before defining each of the instrument parameters, I want to take a macro view of the trumpet and how it functions, and by doing so the specific parameters which I am looking at will become more clear. The trumpet is an overtone instrument, with a section of three valves. These three valves traditionally allow for a set of seven valve combinations allowing the instrument to play in the chromatic 12-tone system. When a valve is pressed the air travels through an extra length of tubing; the valve slides, allowing for additional pitches to be played.

Beginning with no valves pressed will be the foundation of how I will describe the valves. The second valve slide is the shortest and is equivalent to lowering the pitch by a half step in equal-tempered tuning. The first valve is double the length of the second, and when pressed sounds a whole step lower than the open position. Finally, the third valve is the length of the first

and second valves, lowering the pitch by a step and a half. An amplified sound/vibration travels from the lead pipe to the valves from the third to the second and the first valve finally before exiting the valve block to the bell. The seven main combinations will be notated throughout in this manner.

0: No Valves Pressed - Open	0: C overtone series
2: Second Valve	2: B overtone series
1: First Valve	1: Bb overtone series
1,2: First and Second Valve	1,2: An overtone series
2,3: Second and Third Valve	2,3: Ab overtone series
1,3: First and Third Valve	1,3: G overtone series
1,2,3: First, Second, and Third Valves	1,2,3: F# overtone series

The order listed above would sound like a chromatic descension, from G4 and after arriving at 1,2,3, the pattern would repeat. The valve slides are roughly the length to allow for an equal tempered tuning system, however, adjustments will inevitably need to be made as the trumpet still is an overtone instrument. To make the needed adjustments for this tuning system, the valve slides the length of the first and third slide can be lengthened to play more in tune. Some pitches such as D4 on the trumpet are not in tune due to the approximation of the length of tubing used to achieve consistent equal-tempered tuning. These pitches, among others, require the valve slides to be lengthened to match tuning and can be adjusted by either first or third slides or a combination of both in minimal amounts. Some glisses can be done with the valve slides, but this is limited to the length of the slide; the third slide can only gliss one and a half steps whereas the first slide can gliss a whole step.

Brass instruments are overtone-playing instruments, these ratios are based on the relationship to the fundamental pitch. The trumpet overtone series does not begin on the true fundamental of a 1:1 ratio, but on the second overtone; a 2:1 ratio. For brass players as the ratios become smaller, the distance between pitches decreases while also offering options for fingering

a note. By the sixth overtone in a series the number of alternate fingerings for notes is more abundant, as an example; G5 can be fingered as 0 as the 5th overtone of the C series, 1,3 as the 7th overtone of the G series, 1,2 as the 6th overtone of the A series and 1,2,3 with the extension of either the first or third slide as the 8th overtone of the F# series. In some cases, alternate fingerings provide better tuning or timbral differences that may suit the performance better. Switching between fingerings of the same pitch offers microtonal differences, especially when changing between each of the possible fingerings. Rebecca Saunders *White* explores microtonality in the higher register and in doing so there are several opportunities for valve and slide combinations for these pitches.

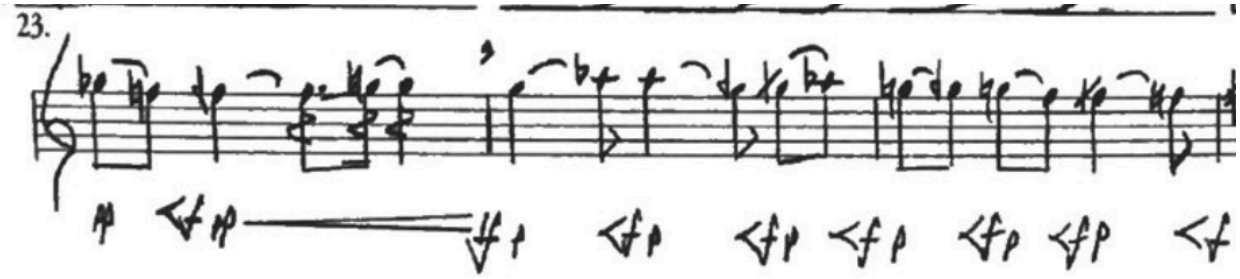

Image 1.2: excerpt of Rebecca Saunders *White* for solo double bell trumpet. Microtonal variations of "G5"

Thus far the valves have been introduced as a binary system for pitches and valve slides have been presented for tuning, however, each can be used in other methods for manipulating and sound creation. The valves can be used in a "half" position creating a smearing gliss effect when moving through the overtones being played. When moving slowly through a valve position of "open/up" and "closed/down" filtering occurs to the pitch, these micro-valve movements manipulate/modulate the sound when exploring similar to that of a filter on an electronic instrument. The amount of filtering is dependent on the valve used, and if the valve is depressed

beyond a certain point the pitch is also altered due to the mechanics of the instrument. When using the first valve there is an apparent change to the pitch as this valve is connected to the bell and is the final valve before sound is heard. In contrast, the third has the most flexibility, due to it being the first in the series as well as the overall length of the third valve slide. In certain combinations of second and third feedback occurs, where the air moves through the valve block back into the lead pipe. The sonic result is the natural multiphonic of the trumpet creating a pure overtone beating. Due to the vague position of this natural feedback/multiphonic, I am still developing this technique further for consistent control.

With the valves in the open position, the slides are in a closed vacuum and when pulling a slide, the compression of the instrument wants this to return to the initial position of the slide. When pressing the valve while the slide is in the extended vacuum state, a low-pitched drum-like sound is heard. Depending on the valve combinations and which valves are depressed different pitches are heard. Combinations with the third valve slide extended tend to have more resonance due to the amount the slide can extend. In H.K. Gruber's *Exposed Throat,* the removal of a slide provides an alternative path for the sound to be heard creating timbral variations of a pitch.

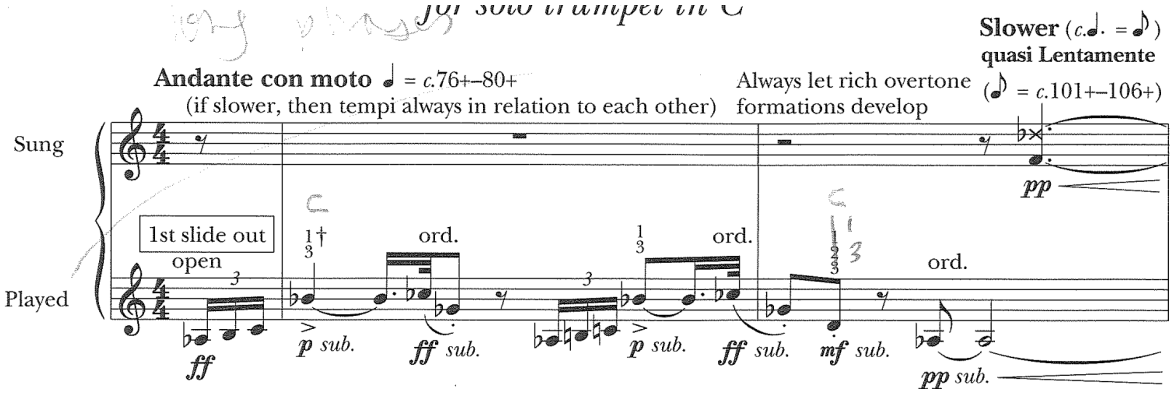

Image 1.3: excerpt of H.K Gruber's *Exposed Throat*

Image 1.4: Van Laar Double Bell C trumpet with ¼ Tone Valve

Some trumpet makers, such as Hub Van Laar and Antoine Courtois, are adding additional ¼ tone valves to the instrument, allowing access to more precise methods of playing these pitches. Previous to the ¼ tone valve addition to brass instruments, the use of alternate fingerings and valve slide extensions were used to precisely tune these pitches. Stephen Altoft has done extensive research on performing microtonal music on the trumpet, creating helpful sheets notating the fingering and valve depressions for 19 and 24 division octaves for both ¼ tone trumpet and standard chromatic trumpet. The valve placement is typically the first to receive the incoming vibration from the lips and can be placed on the main tuning slide, added to the slide below the main tuning slide, or an additional valve placed in the valve block. The first two of

these slides are rotary valves making the size very compact, the final option is a piston valve. Regardless of the type of valve, both require an additional finger of the left hand to depress the valve.

Double-belled instruments have been in existence for at least one hundred years; double-belled euphonium and the echo cornet; small use-case instruments. The reemergence can be attributed to Marco Blaauw searching for quick timbral shifts between mutes or muted and unmuted. In Ensemble MusikFabrik the brass members each have their respective instruments with a double bell variant; french horn, trombone, euphonium. Marco has worked with Hub Van Laar, providing input on the double-bell trumpet. Van Laar now offers double bell C trumpets with a ¼ tone valve in their line of instruments. There are a few other horn makers who have made this instrument, more often in these cases it is a conversion of two instruments; a trumpet and bell from another instrument. Most often the double bell is in C, however recently a technician; Jacob Hoskins, from Meridian Winds in the United States, has made a Bb conversion double bell. Van Laar has worked with Ben Neil on his most recent iteration of the Mutant Trumpet, which is a triple-bell, six-valved instrument, along with electronic components (knobs, buttons, faders).

Image 1.5: Ben Neil's Mutant Trumpet 4. "Version 4 includes 16 switches, 2 X/Y joysticks, 5 potentiometers and 2 Infrared motion sensors for a total of 28 onboard controllers. The new instrument utilizes the STEIM RoSa software with a Max control interface along with Ableton Live. Version 4 made its debut in the premiere performance of Fantini Futuro at Roulette in Brooklyn, NY in September 2019"

The second bell is activated by a rotary valve with a trigger activated by the left-hand thumb. The valve is attached to the first valve prior to the curve to the main bell, this is to maintain the intonation between the two bells. The second bell has another point of connection attached to the primary bell, which is a bar and screw for stability and resonance. In order for projection, the second bell has a curve; reminiscent of the bend in Dizzy Gillespie's trumpet, however with a softer bend, which curves the bell up and above the primary bell. Just as with the piston valves, it is possible to half-valve, allowing for the sound to travel out of both of the bells. In Rebecca Saunders' *White*, there are smooth transitions from one bell to the other using slow valve motion. There is a spatial element when using the double bell, the stability point to the primary bell can be unscrewed and the second bell to be turned over the left shoulder. The soft curve of the second bell allows for a nearly parallel relation with the primary bell. In some cases the bells have been made to have multiple positions; Nathan Plante's double bell is one such horn

that has vertical options for spatiality. In Nasim Khorassani's piece, *Shabah* explores the spatial component of double bell trumpet and will be discussed in chapter three.

Image 1.6: Nathan Plante's Double Bell trumpet with the second bell in the downward position

b. Performer Parameters

Detailing the minutia of each parameter of the performer while taking into account how personal this is for the performer, the parameters I detail will inevitably need to be scaled and adjusted accordingly for each performer. The result is focused more on sound creation, manipulation/modulation, and musical interaction, and keeping this intent will allow the performer to arrive at one of the many options for parametric control. I believe that in having a mindset on the sonic result and in doing so enjoying the process, other methods will be conceived and further developed by performers beyond what will be detailed in my writing. The caveat is that if pain, stress, and potential injury seem to be coming from the method of sound

creation, re-evaluation must be considered. In developing more precise control of some of the techniques of performer parameters I've had to re-evaluate how to execute it with less force and potential injury. In some cases it was the performer parameters, in other instances, it was the instrument parameters or a combination of the two. As I detail each of the parameters, I'll first present them in the traditional methodology of trumpet playing to set a foundation from which I will veer toward my research.

Similar to preparing a bow with rosin, a wind player's inhale and exhale is the preparation for sound activation with wind instruments. A relaxed throat allows for unrestricted airflow to be taken in while also filling the lungs to near full capacity. The turnaround of the air from inhale to exhale should be almost instantaneous, and the speed/velocity of the inhale/exhale can impact not only the turnaround of the air but can allow for more precision in utilizing the air for activation of the lips for brass players. Holding the breath for added compression before the release is a technique that can assist in accuracy, it can cause tension in the body, and embouchure and turn may lead to inaccuracies. The air can be inhaled through the mouth or nose, although the amount of air will be greater through the mouth. By inhaling through the corners of the mouth, the trumpet embouchure has the consistency of position in the mouthpiece.

The velocity of the air as it exits the body is crucial in brass playing since it has an impact on the vibration of the lips and what harmonic/overtone in the series is produced by the trumpet. The slower the velocity the lower the pitch, whereas the faster the velocity the higher the pitch. The velocity of the air can be practiced without the instrument by saying a "tsss" sound to control the consistency of air and velocity. When playing the trumpet, there is resistance that is felt by the performer when playing due to the vacuum from the compression of air from the valve block. Using this resistance, the balance between the instrument and the performer's air

velocity is practiced for slotting the pitches in the overtone. Slotting is a term used by brass players and can be related to how a string performer plays harmonics on a single string. For strings, the lower the harmonic, there is wider range of accuracy on the string where the finger can be placed, while for higher harmonics the range of placement of the finger is smaller range requiring pinpoint precision. As brass ascends in register the harmonics are more compact and balanced with the resistance helps to slot them more easily.

Control over the velocity of air is managed by the diaphragm muscles, and not by the aural cavity or throat. As air is expelled from the lungs the diaphragm is utilized to maintain the same speed. Consistency of airflow allows for the pitch to be steady without any wavering. The control of these muscles can also make quick register changes more efficient since the diaphragm can adjust for the needed slotting for the higher register.f It is not typical for the air to be contained in the aural cavity unless circular breathing. During circular breathing, the aural cavity replaces the diaphragm to control the velocity of air for a brief moment. In circular breathing air is quickly inhaled through the nose while the cheeks are used to maintain a buzz.

The tongue's usage is for the initial articulation/attack/transient of the note. One placement is to have the tip behind the top front teeth, articulate with the tip with a “tah, tu”, or “du” sound. Two other placements can be with an anchored tongue; where the tip of the tongue is placed behind the bottom front teeth and the portion behind the tip articulates behind the top front teeth. The last option for placement has the tip of the tongue rest on the inner flesh of the lower lip, the articulation is then struck with the portion behind the tip of the tongue behind the top front teeth. Each method has its own set of benefits for clarity and use cases. Using the tip of the tongue to articulate behind the front teeth allows the tongue to create a tube-like shape with the sides for more consistent airflow. Each of these options of the tip of the tongue provides

different clarity of options for the initial articulation, ranging from percussive and snappy to gentle and rounded.

The back of the tongue serves two purposes, to adjust the velocity of the air or to articulate. Just like a finger covering a portion of a running hose, the back of the tongue in combination with the diaphragm can help to control the velocity of air from the lungs. Raising and lowering the back of the tongue adjusts the velocity but in conjunction with the use of vowel shapes in the aural cavity; "e" for the upper register by raising the tongue and "o" for lowering the tongue to aid in the low register creates consistent airflow. The second purpose of the back of the tongue is for secondary articulation or multiple tonguing, particularly with fast passages. Multiple tonguing can be either double or triple tonguing. In addition to the normal sound used; "tah, tu, du" to articulate a "ka" or "ku" is used, activating the back portion of the tongue. A pattern for double tonguing is typically written as "TK" and for "TTK" triple tonguing, "T" for the tip of the tongue and "K" for the back of the tongue. Depending on the piece and repetition, multiple tongue articulations can be reordered to achieve clarity in odd-metered fast passages such as quintuplets; some options can be TK-TTK, TTK-TK, TK-TKT, TKT-TK.

The tongue can also articulate into the mouthpiece; known as tongue rams, to create a resonant pitch. These pitches are based on the fingering pressed and are limited by the seven valve positions. Based on the fundamental series of the instrument, but as noted by Stockhausen in *Eingang und Formel*

> "*On the trumpet, strangely enough, noises sound ½ tone higher than normal notes. For this reason, they have to be fingered ½ tone lower than usual."* [6]

[6] Karlheinz Stockhausen, *Eingang und Formel (Aus Michaels Reise) für Trompete 1983*

Tongue rams are percussive, and have a varied articulation based on the air velocity before the tongue hits the cup of the mouthpiece The air preceding the tongue swells into the articulation, where compressed air in the aural cavity held back by the tongue creates the most immediate articulations. The dynamic of tongue rams has a wide range and can vary from soft to loud and are dependent on the air velocity.

The lips act similarly to a reed or string by vibrating, however, unlike woodwind or string instruments the vibration is the flesh itself and not an exterior activator. The lip vibration is amplified into the mouthpiece, activating resonances in the trumpet, and exits the bell as a sound. When buzzing outside of the mouthpiece the lips buzz/vibrate freely at any frequency, but within the system of the trumpet, restrictions are placed on what frequencies will resonate through the instrument, locking the vibrations to specific frequencies based on the length of the tubing. Depending on the valve combination depressed the instrument system will "slot" the closest pitch based on the buzz frequency, air velocity, and lip tension.

When increasing the register, air velocity and vibration of the lips are further controlled by the tension of the corners of the embouchure and the aperture. The corners of the embouchure help tighten lips or relax the lips controlling the aperture size. With a relaxed embouchure, more flesh vibrates allowing more surface area to vibrate producing a fuller tone, particularly in the lower and mid registers. Whereas tightening the embouchure makes the aperture smaller with a precise area of vibration which allows for accuracy in the upper range. The relationship between the embouchure and aperture is a system for distributing energy needed for the surface area of flesh to vibrate for the registers that can be played on the instrument.

The embouchure setting of the lips when playing the trumpet, typically is flat with tight corners of the lips. Depending on the range the corners may be tighter, when ascending into the

upper register, or more relaxed in the lower registers. The aperture is the opening between the lips, and is typically quite small. The relationship between the embouchure and the lips must be balanced, allowing the lips to vibrate for a full sound. When the aperture and embouchure contain tension the sound produced lacks fullness in amount of overtones and brilliance, while also constricting the amount of flexibility when playing. The amount of backpressure when playing into the instrument varies on range: less in the lower range more in the upper range, but the amount of back pressure created between the player and the instrument should be minimal throughout.

2. Acoustic Synthesizer

I began to reimagine how performance can be created using parameters of the body and of the instrument for sound creation, manipulation/modulation, and musical interaction. I envision sound creation development similar to how I typically work with synthesizers when designing sounds, either I have a sound I've imagined and begin to realize it using the parameters or by placing limitations on the parameters I use, guiding my ear to a "patch". Often when realizing an imagined patch the path will present unexpected methods of sound creation branching the original intention for a moment. In some cases, there may be parameters that are tied together that are antithetical to the imagined sound, which then leads to a reimagining of how parameters are used initially. A more creative method I find is when limitations on what parameters will be used are presented. Limitation of parameters when I sound design using synthesizers and when using the trumpet places my attention only on the parameters chosen. I frequently begin with the intent of using one to two parameters from the performer and the instrument. This forced limitation on parameters removes any sonic creation intent. My attention is solely focused on the sound and where it leads me, at times I'm reactionary to what I hear trying to have more precise control over a parameter. In wanting to achieve precise control an unexpected loss of control occurs, but the loss of control reveals not only where the limitation of the parameter is but, similar to my method for imagining a sound, where there is a depth of new possibilities for sound creation. When exploring sound creation I introduce manipulation and modulation to explore the limitations of my control over parameters, the depth that I can manipulate/modulate varies on the parameters used. Manipulation/modulation is simply a change over time of any parameter. It can be a repeating cyclic adjustment of a parameter or an evolving

dynamic change; in the sense that there is a wide range of change occurring. Typically I experiment with how individual parameter modulation impacts the sound creation and how much control over the single parameter of the instrument or performer. I repeat the process with additional parameters, curious how the combination will not only impact the sound creation but where the limitation of my control will occur. Throughout the entire process, especially in using limitations, I intend to have the process for musical purposes, how it can be used in a solo or group context, and in what manner can I relay the information to the benefit of a composer I'm collaborating with or in the development maintain focus on the evolving nature of one moment to the next and allow the unexpected to inform my next parametric motion.

There are two main groups of sounds that I have been interested in and have developed are fragile micro sounds and abrasive noisy sounds. Even though there are two groups there are moments when some of the sounds created fit into either category based on the manipulation/modulation of parameters. How I designate a fragile micro sound is based upon the dynamic; which is usually soft, and how much precision I have of the parameters tend to create the sound but have little control over all of the sound or modulation. These tend to have inherent instability not only in their control but also in their sonic character. This instability gives the performer a sense of fragility in knowing that pushing beyond the threshold of control will cause the sonic creation to be lost and fall into another. The term microsound is also used in electronic music when working within the context of granular synthesis techniques, where samples are played back within small time frames. Fragile microsounds in my perspective are sounds that challenge the performer when playing softly, and when the physical interaction between the performer and instrument is minimal. The interaction can be with the finger depression of the valve of the trumpet, or how the movement of the embouchure within the mouthpiece. These

sounds challenge the performer on the type of individualistic control of these physical interactions as well as the available sonic diversity with these parameters.

Abrasive noisy sounds tend to have a louder dynamic and in some cases extremely loud, due to the frequency content containing a richer density of overtones these can be noisy or abrasive sounding. The parametric control is equally as precise to fragile microsounds, but has more flexibility in control allowing for greater depth of modulation of the parameters. The abrasive sounds tend to be more taxing due to the physicality needed to perform the techniques, whereas the fragile sounds are less likely to place a physical strain on the performer. This is situational as either can be demanding and taxing depending on the duration and dynamic played, but neither of these should cause any pain or injury to the musculature of the performer. As with any technique, if there is pain, there is a more efficient way to approach it. The spectral content of abrasive noisy sounds fill more of the audible range, and due their spectral content may contain less consonance harmonically. The physicality involved and sonic result make these techniques often more harsh and abrasive to the ear. However, control over the parameters can shift the spectral content to form more consonant harmonic relationships.

There will be additional parameters that will appear later in my research on electro-acoustic trumpet and amplification. Amplification or signal processing of an acoustic instrument offers audibility or transformation of any sound made. In combination with two groups of fragile microsounds and abrasive noisy sounds, the acoustic synthesizer offers a wide range of musical interaction possibilities in solo or group settings. The potential cross-over for how each of these methods of parametric performance practice thus far discussed can influence one another not only in performance but in finer control of the parameters.

a. fragile micro sounds

There is typically a small area of motion of performer parameters to activate the sound, and small motions of the instrument to either modulate or control the timbral aspects. The fragile microsounds on the trumpet I've to be most interested in are based on the embouchure, aperture, and backpressure within the lips inside the mouthpiece. Although not limited to these three parameters of the body, the aural cavity, tongue position and amount of saliva are helpful in aiding the production of these sounds. One technique in particular I've explored to have control over and variation stems is from electronic birds. This technique is created when high tension of the lips in producing is assisted by the backpressure created with the instrument and the throat of the performer."Electronic Birds" is executed with a tight embouchure, small aperture and a small amount of moisture on the teardrop of the lips. There is usually a steady pitch center with chaotic instances interjecting or adding to what is heard. When achieving the technique, it can sound like seagulls. The density of chaotic interactions is controlled by the amount of air, tension of the aperture, amount of saliva, and backpressure. This offers a single electronic bird, a small flock, and large flock density of sound and interaction. Electronic birds stemming from the technique of split tones, which I categorize within abrasive noisy sounds, and are split tones in the high register of the trumpet.

Ulrich Krieger's *Althing I* takes the electronic bird technique further with three variations: high harmonic squeals and high haunting. In *Althing I* the trumpet is amplified allowing for more precise control and audibility of these variations. High harmonic squeals are a pure tone when executing "Electronic Birds" without the chaotic interjections, control of register to create melodic gestures via graphic notation. High haunting is similar to high harmonic squeals with the addition of opening the aperture for air to pass through. When working on

Shabah by Nasim Khorassani, we were exploring the different densities of electronic birds that are played, high haunting and when doing so my lips vibrated producing a ghost tone in combination with electronic birds. Other fragile sounds are created with the small amounts of air to vibrate the lips, creating nuanced timbral shifts. I often hold air in the aural cavity and force air to the lips using the cheeks. When done slowly, short vibrations occur and can be controlled to speed up to create a buzz for pitch or done in reverse to slow a buzz to this. If spit is added to this process the textural quality of sound has a fluid timbre. There is a difference between working acoustically and amplified fragile microsounds, in that the dynamic needed for the performer to be audible is balanced by the microphone and amplification. This aids the performer in being more nuanced in consistency of the techniques. Not only does amplification aid in nuance, but provides greater opportunities for unexpected fragile microsounds to be discovered.

b. abrasive noisy sounds

Abrasive noisy sounds are more physically demanding, and dynamically more present than fragile microsounds. The physicality of abrasive sounds contorts the embouchure beyond the normal position. One of the sounds is split tones, and are created when the lips vibrate at two different frequencies producing a specific pitch and the partial below it. mattie barbier describes split tones in his companion guide to his album *Face|Resection* from 2016 for Nicolas Deyoe's composition *facesplitter*.

> A split-tone is a type of lip multiphonic achieved by splitting the embouchure between two adjacent partials, creating a dyad-based multiple sonority on a brass instrument. Lip multiphonics differ from voice multiphonics in that they are multiple sonority created entirely by the player's

> lips- as opposed to the more common voice multiphonics, which is a combination of singing and playing. This book focused primarily on split-tones as they are main technique utilized in the works that this writing focuses on.[7]

mattie details two ways in which the split tone can be achieved/found; lip slur and over-focus or via lip bend. Christine Chapman; the hornist from Ensemble MusikFabrik and also a phenomenal trumpet player, details the lip bend technique in a video segment on split tones. Christi shares the technique on French Horn in the video: "You're going to slowly slide down, slur down…. And you're going to do it very slowly to the point where it starts to flip down. … right before the lower F started to sound, there was a moment of instability. So to try and find the sweet spot where both partials are sounding at the same time, you bend chops down slowly, look for that moment of instability, and try to hang onto it.[8] I've found the lip bend method to be personally most effective in my practice and in teaching this technique. The exercises in *Face|Resection*'s companion guide is trombone-specific, the partial relationships between trombone and trumpet are similar, and octave transposition is all that is needed to execute the exercises on the trumpet.

The partial relationship of split tones continues regardless of the range, when in a higher range the partials become closer and may wind up producing a "noisier" tone. The consonance or dissonance (noise) of the split tone can be controlled by the amount of bend, particularly by the lower lip. The most consonant split tones are often in the mid to low ranges due to the partials being a wider interval than in the upper range. These split tones also have the widest range of consonance and dissonance; in tune fourths to noisy tritones. The "noisy" quality of the split tones is often caused by beatings of the two intervals, similar to two oscillators at close frequencies. There is a certain flexibility in split tones which allows for consonance and

[7]mattie barbier and Rage Thrombones Publications 2016
http://www.mattbarbier.com/resources/faceresectiontextfinal.pdf
[8]Christi Chapman, Ensemble MusikFabrik "On - Split tones for Horn & How to Find Them" (accessed November 24 2021) https://www.youtube.com/watch?v=-S225MTwy5s&ab_channel=EnsembleMusikfabrik

dissonance by moving the lips. The bottom lip has been able to make these shifts more easily, by collapsing the interval. The range of split tones will be expanded when working with Ulrich Krieger in *Althing I* into the double pedal range, for even more noisy split tones.

One technique I developed is called extreme noise, and sounds like a loud screeching. This technique is performed with the lips pursed into the mouthpiece, with air from the aural cavity activating the lips. There is extreme back pressure created when doing this, which is helpful to circular breathe when playing. The sound fills the audible spectrum, but can be filtered through the use of microvalve motions. Extreme noise is explored more thoroughly in *Shabah* in chapter three.

3. Collaborating with Composers and Performers

During the tumultuous time of the pandemic and global lockdown I continued my research and practice with the trumpet discovering new parameters of the body and instrument, while also returning to the tradition I was simultaneously trying to leave. It was refreshing returning to the old method books and exercises I played throughout my time with the trumpet. By doing so there were memories of my teachers and lessons with them that came back, and wound up giving insight on how I could navigate a path forward and continue to develop parametric performance practice. Along with this I had a two projects pre-pandemic that continued through, the first was a collaboration with Ulrich Krieger, performer, composer and faculty at the California Institute of the Arts (CalArts) where I did my masters degree, and with Ilana Waniuk and Teresa Díaz de Cossio, two colleagues of mine with whom I'd been playing with since the very beginning of our time together at UCSD. Along with these two collaborations came a third, post-pandemic with Nasim Khorassani, a composer and colleague also at UCSD.

In collaborating with these performers and composers I was challenged to develop new sounds, or push the boundaries of what I could do with fragile and abrasive sounds. Some of these sounds and methods of working I had been practicing and developing, but I owe much of the newest iterations of these to the work done in these three pieces. In particular my collaborations with Ulrich Krieger, opened new pathways to explore these concepts and bring them when working with in^set and Nasim Khorassani. Outside of the context of my recital these are also the first set of pieces that explore parametric performance practice in ways I had

personally been developing the concept. Within the confines of trumpet *Althing I* and *Shabah* are approaching these in different forms which is great to see how composers are taking these methods. In *Depths III* discovery of parametric performance practice can be applied to instruments that are not trumpet or brass has been crucial in how I can continue to communicate these ideas to more instruments.

a. Collaborating with Ulrich Krieger

In 2019 I reconnected with Ulrich Krieger, who is a faculty member at the California Institute of the Arts in Composition and Experimental Sound Practices, and had worked with him during my master's degree from 2013 - 2015. We reconnected in the Fall of 2019, sharing music and meeting in person to talk about a solo trumpet piece, *All Very Close*, he was revisiting and planning on updating. The pandemic put a pause on our meetings, the following Fall of 2020 we began to meet via Skype and Zoom to work on the piece. Throughout the Fall of 2020 into the early Spring of 2021, we met via video calls workshopping for an updated version of the entire piece. Ulrich would send revised sections or pages of the score, and I would send recordings back to him with notes. The back-and-forth of page edits always led to a video call where we would run through sections together.

The time spent with Ulrich was highly influential and impactful on some concepts of parametric performance practice and electro-acoustic research. Some of the techniques I had been working on such as air sounds, split tones, and electronic birds now had a new framework for me with the close amplification of the lavaliere microphone taped to the inside of the instrument. Franz Hautzinger is a trumpet player whose work Ulrich was familiar with, Franz uses microphones to amplify himself blowing air through the instrument. The album *Gomberg*

III-V by Hautzinger was a suggested listening by Ulrich, on the timbral shaping close micing could provide on the trumpet. In *Gomberg III-V*, Hautzinger primarily uses air sounds as material, playing with the distance and proximity to the microphone amplifying specific aspects of the air sounds of the trumpet. Amplification with close proximity reveals a personal quality to the instrument that only a performer has. The text in *Althing I* performer notes describes the amplification and sound quality as…

> All sounds need to have a 'close-up' and 'hyper-realistic' quality. The amplification level needs to be very high in order to 'listen into' these quietly performed sounds, revealing their internal structures and otherwise unheard sonic elements of these sound, which in normal (acoustic) listening are too quiet to project to an audience—now the audience can have its "ears on the bell". This includes, but is not limited to the higher frequencies of these sounds. While the pedal tones need to use the proximity effect of the microphone(s) for an additional bass sound boost and desired bass sound quality. Pedal tones should have a boomy, space-filling, standing wave quality, even in pp.[9]

Audio effects are used with the lavaliere microphone, reverb along with compression and EQ to create the desired sonic quality. A selection of pedals were suggested by Ulrich, ultimately we found the Zoom A1X Four to work best, as it was a digital pedal with multiple audio effects in a chain, also having a pedal that could be used to control volume. The signal chain of audio effects was set as a compressor, EQ, volume controlled by the pedal, reverb, and a final EQ to shape any additional ringing from the reverb. Fragile microsounds with the changes to microphone and microphone placement completely changed, no longer fighting acoustic audibility. Added gain of the compressor and dynamic volume control through the use of the pedal allowed for a much wider dynamic range with these techniques. The control over the global dynamic of the amplified sound with the use of a pedal is extremely useful when fading in and out of phrases, when needing breaths, and ensures amplification only when needed.

[9] Ulrich Krieger. *Althing I* (2018/20)

Amplification with the change in microphone and placement opened up new possibilities of control from the body and the instrument for parametric performance practice that I had never had before, and wound up becoming extremely useful for the updated version of *Althing I*, and later work in my piece *Depths III*.

Image 3.1: Lavaliere microphone placed on the inside and top of the bell for Althing I

The type of air sounds was expanded, to include ingress air, pitched air, formant air, whistle tones, low flutters, and the mixture of air and tone. Ingress air simply is inhaled through the instrument, offering a higher-pitched version of the exhaled blown air. Exhaled air can be pitched by using the tongue, aural cavity shapes and vowel sounds help to shape the pitch. When

blowing without the lips touching the mouthpiece, a deeper tone of air is heard and blends mostly air with a little pitch or ghost tone emerging. Formant air, vowel inflections, is similar to pitched air, valve depression creates the formants rather than the aural cavity. Whistle tones are heard by blowing air through the mouthpiece at an angle, creating a whistling-like high tone that contains fewer harmonics. On the other end of the frequency spectrum, low flutters are flutters tonguing with air when all the valves are depressed and can sound like the feathers of a bird flapping rapidly. Each of these air sounds is fairly straightforward in terms of parametric control and repeatability, the exception being the mixture or blending and transitioning of air and tone. Low-velocity speed of air was needed to activate the lips. Most often the transition from air to tone required slow and very gradual transitions, with an emphasis on the sound development between pure air and pure tone, allowing the parameters to naturally find the most active position. The microphone and amplification assist in the dynamic aid in transitions from air to blended air and tone, and to tone.

The amplification of electronic birds allowed for an expansive range of new sonic possibilities with this technique. Unamplified electronic birds have three types of density available, low, medium, and high, now harmonic squeals, high haunting sounds, harmonious sustains, and overpressure of the embouchure were all explorable. Each of these techniques had a description above and I'd had workshopping periods with Ulrich to realize the sonic character of each. High harmonic squeals for instance are single electronic birds at the lowest density, without the chaotic interjections. A variation of this is high haunting, adding the opening of the aperture for air to pass through. The control of both of these types of electronic birds allows for single-pitch melodies shown in the scores as graphics. Control of this technique requires air velocity, tension of the lips, and amount of overpressure. Overpressure is created with a very

tight embouchure and a very small aperture. At any point, different densities of electronic birds can be introduced to create a texture of these techniques.

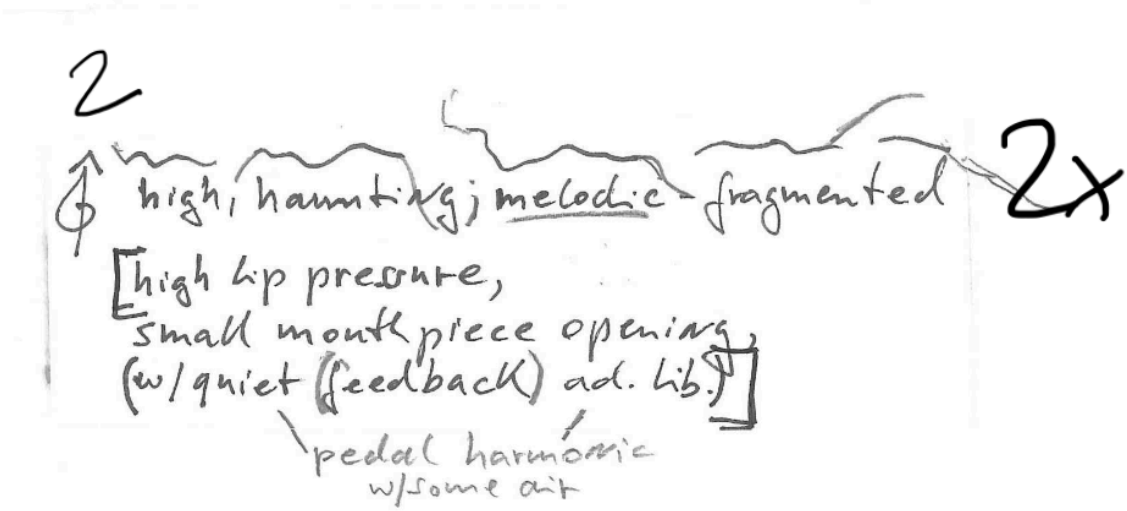

Image 3.2: High haunting melodies from *Althing I*

Split tones within *Althing I* typically are within the best range for trumpet and are featured most predominantly on the fourth page. In this section of the piece, a pitch is to be played followed by either an upper or lower split tone entering, all based on the fundamental pitch B. Typically when playing split tones I found it easier to play the primary pitch, relaxing the lips to create the lower pitch, and this is the case for the majority of the split tones in this section. There are two moments where the lower pitch is played, before creating a split tone on the harmonic above. Instead of relaxing the lips, slight tension is required to ascend to the harmonic above to create the split tone, this tends to create a noisier split tone. There is a certain flexibility in split tones that allows for consonance and dissonance by rolling the lips in and out. More consonant split tones tend to have more distinction in each of the pitches played and can create more pure intervals. Dissonant split tones often compress the intervallic distance and can

sound like distortion or noise. The higher the pitch of a split tone, the more often dissonance is heard, compared to the lower register split tones. There are a few brief moments where pedal split tones are to be played.

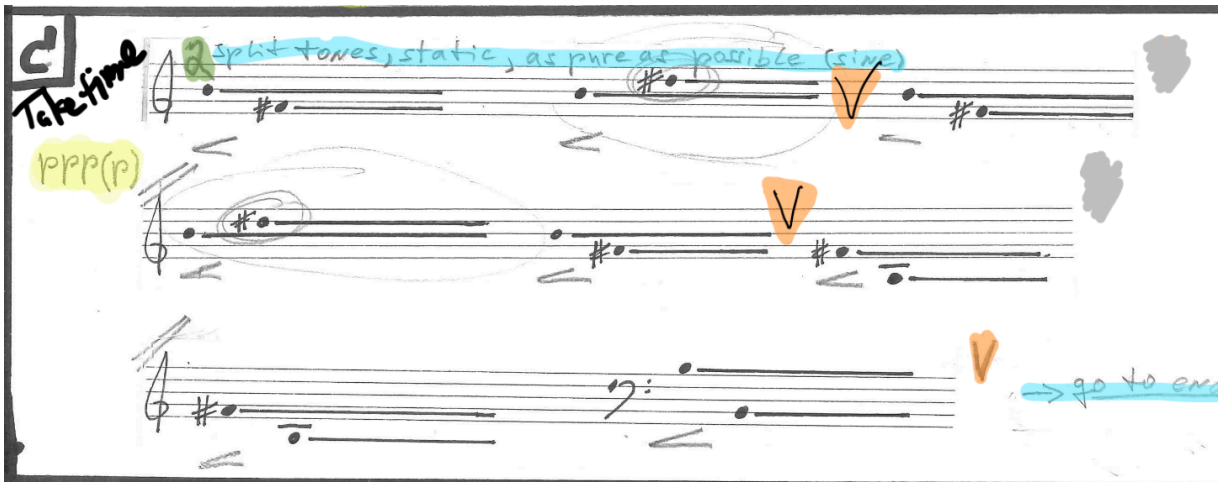

Image 3.3: Split tones from page four of *Althing I*

In addition to air sounds, split tones, and electronic birds, the range of the trumpet was expanded downward to triple pedal tones, notes three octaves below the typical trumpet range, microvalve motions, percussive sounds, and saliva sounds. The trumpet mechanically is an overtone instrument, however, it does not sound the fundamental pitch of the harmonic series, instead, the lowest pitch of the instrument is the second harmonic. While it is possible to play the fundamentals on the trumpet without contorting the embouchure, there are not very many pieces that explore this range or lower. Extending the range three octaves lower required a variation of the embouchure for each, the pedal range overall required a more relaxed embouchure with some alternate fingerings needed for tuning. Two octaves below, I found that the use of more top lip within the mouthpiece provided more resonance and stability of pitches, and standard lower octave fingerings worked well. In the triple pedal range, the top lip was used in the mouthpiece,

the bottom lip activating the vibration of the lip, and some alternate fingerings worked better in specific moments for the piece. Pedal tones require a large volume of air to be played, however, the acoustic dynamic for the piece is very quiet and with the amplification sustaining the notes became much easier. In moments throughout the *Althing I* the pedal tones are to fade in from niente and blend tone with air. Discovering the balance of these required time and practice, however, these were not overlay demanding techniques to control. The most demanding variation of the pedal tones was the pedal split tones, while possible it took many guided sessions with Ulrich and trial and error to find consistency in the technique. Ultimately, I found that puckering the lips, rolling them slightly outward with a balance of pinching and air from the aural cavity rather than the lungs worked best. The sound of the pedal split tones often creates a distortion of two pitches rather than a clear distinction in the middle register of the trumpet.

Micro valve motions were new to me when working with Ulrich, the sonic effect similar to that of an electronic filter. Ulrich used a diagram depicting how much of the valve was depressed over time; these positions and their shape are notated below the stave. These small motions are used during played notes and blown air, subtly changing the harmonic content being played. Microvalve can be divided into five positions; position one being completely open; up, and five being closed; down position. Position three is the true mid-point of the valve. Positions two and four are relatively in between the listed positions. These are ultimately recommendations, and part of the uniqueness of the piece asks to find the best resonances for your instrument. The third valve has the most flexibility in terms of altering timbre, this is because it is the first to receive sound, as well as has the ability to adjust the slide the most. There are both timbral and filtered sounds. The second valve has a similar effect to the third valve but with a smaller range of timbral and filtered sound. The first valve has the most

potential to alter pitch, as it is the last in the valve block before the sound exits to the bell. Micro-valve motion exploration on each instrument varies between pitch and timbre altering on the instrument maker. Valve Combinations can be used in combination with different timbres and filters with multiple microvalve motions. These range from airy tone, vocal-esque tone, chamber airy tone, growly tone, and inhaling/sucking tone are all possibilities with microvalve motion. When two or more valves have a microvalve motion, the change over time can be either simultaneous or like a train, one valve leading the others following slightly delayed. Microvalve train delays have the most timbrally distinction and subtly for the piece. A variation of this is the half valve fingerings, position three, and are notated within "( )". Half valve is a more general position, and like microvalve, can be done with single or multiple valves for timbrally and filtered changes.

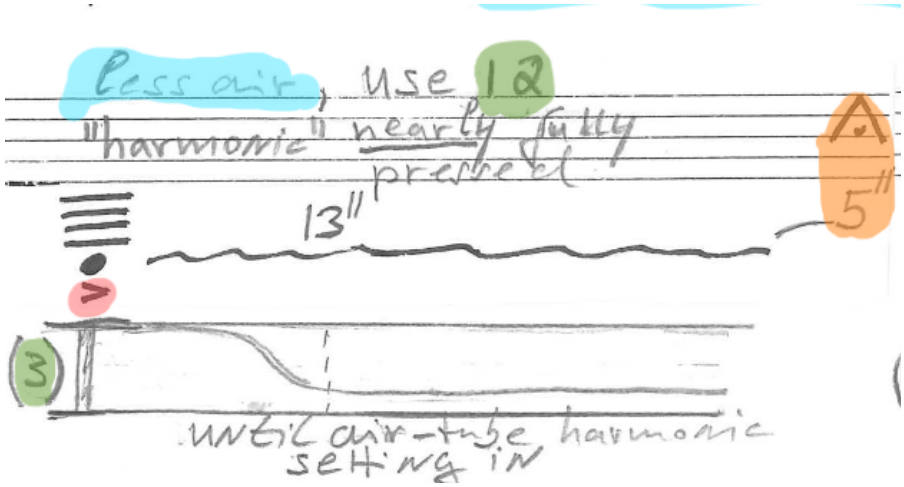

Image 3.4: Micro valve motion on a triple pedal tone, *Althing I*

The percussive sounds used in the piece are tongue rams, valve clicks, and bass drum resonances. Tongue rams are a common technique used, and are created by tonguing inside the cup of the mouthpiece. Timbre and pitch can alter tongue rams with the use of valve depression

combinations and microvalve motions. Valve clicks are heard by loosening the valve caps, these sounds are executed when releasing a valve to the up/open position. The most exciting of these was the bass drum resonance, which is heard by extending or contracting the third valve slide and releasing the compressed air with the valve to create a low resonance. Like with tongue rams depression of the first or second valve offered different pitches, in total creating four different options in range. All three of these percussive sounds are notated as rhythmic gestures, and when a range is suggested noteheads have a vertical relationship to one another. The amplification of each of these techniques requires less effort for the performer and wound up providing a more dynamic range of possibilities for each of these three percussive sounds.

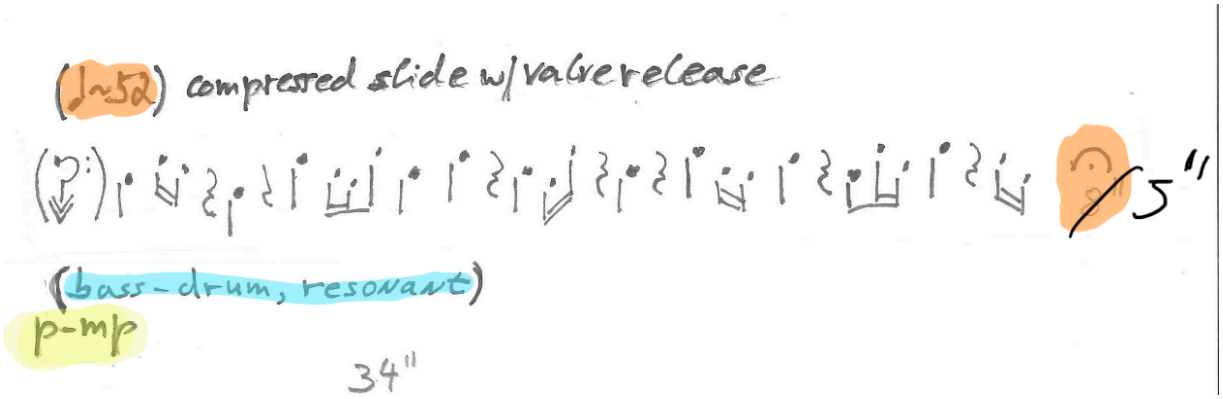

Image 3.5: Bass Drum Resonance rhythm and range, *Althing I*

In preparation for the piece I have found the addition of in-ear monitors helpful with pitch consistency due to the triple pedal tones wavering nature. I have set up an Ableton Live performance template with triggerable pitch references, played as sine tones. These sine tones are sent to a secondary volume pedal then to the in ear monitors. The secondary pedal provides control of the tones as needed for reference. A secondary musician is placed just off of the stage at a table, with the score, and laptop with the Ableton Live performance template. This musician

is following the score and triggering the playback of the sine tones throughout the portions of the piece with the pedal tones. In performing in this manner the harmonic ascent and descent through the E overtone series is most consistent. One final adjustment made throughout the piece is the removal of sung multiphonics: notated as open diamonds, as these tend to drain air quickly from my lungs and have been difficult to tune.

i. Althing I for solo trumpet and electronics

The opening of *Althing I* begins with an introduction to the Icelandic parliament and trumpets and brass. The piece bringing the two together in a meditative transition of ascending and descending of tranquility throughout its duration. With a flexible duration of a 15 or 30 minute versions, *Althing I* presents the listener with a perspective of the trumpet as a signal of ritual. The unhurried ascent from the lowest range of the instrument, to moments of contrasting material filling the frequency spectrum. I found *Althing I* to be a meditative and transcendent experience of a work as a performer. I have performed the piece at Chosen Vale International Trumpet Seminar (15 minute), UCSD Experimental Theater (30 minute), and as a part of Project Blank [SD] Salty Series (15 minute). Each page as approximate duration listed on the bottom right, the third page presents the ending for the 15 minute version. Pages one, three, and five present similar material, pedal tones, air, and percussive sounds in sequential order. Pages two and four contain electronic birds variations, air, and on page four exclusively tones and split tones. These two pages also allow the performer to choose the order of events contained within the box. Page two has up to eight options that can be arranged in any order, not all options are needed to be played. Page four has three longer sections of material: A, B, and C, that can also be chosen in any order, but the material must be played from left to right.

The Althing (Islandic: Alþingi), founded in 930 at Þingvellir in Iceland, is the oldest parliament of an independent state in the world. It was a neutral, weapons-free zone, where the various Viking clans of Iceland met to discuss political, social and religious issues and solve general problems.

Trumpets, or brass instruments in general, are some of the oldest instruments we know of. They were used as signaling instruments as well as instruments for rituals, especially funeral and death rituals (therefore sometimes aka 'instruments of darkness'). While today, brass instruments are rather thought of as a positive festive instrument. Althing connects with this archaic, ritualistic and dark side of the brass tradition, hidden at the dawn of European history.[10]

Image 3.6: Performance of *Althing I* March 2024. Photo by Vito di Stefano. Project Blank [SD] Salty Series Performance (2024)

Pages One, Three, and Five

Pages one, three, and five present the ascending and descending harmonic content of *Althing I*, for the purposes of this overview the piece will present these three pages together. The

[10] Ulrich Krieger. *Althing I* (2018/20)

harmonic content of these pages is based on the overtone series based on the fundamental pitch E. Throughout these pages, the trumpet slowly ascends from the triple pedal range through the overtones to the normal range of the trumpet. The techniques of these pages are all similar, utilizing various ranges of pedal tones, microvalve motions, air, and percussive sounds. The arc of *Althing I* occurs in these three pages placing the listener within the trumpet's lowest register, slowly stacking and removing spectral content throughout the entirety of the piece.

Before the piece begins, I loosen the valve caps in preparation for the second system of the piece. I found that loosening only the first and second valves allows for a more pitch contrast without additional valve clicks from the third valve. Five consecutive triple pedal E'as are played, each presenting a slight variation of the timbre of the pitch, the first a mixture of tone and air. The graphics following the E's are the inevitable slight fluctuations that occur in this range. Three to five seconds are given as a pause between entrances allowing for the decay of the reverb to fade. The first E presents the triple pedal tone with slight air and some saliva, and the next E enters and introduces the timbral filtering of microvalve motions. The motion of the microvalve is a subtle curve downward of the third valve. The third E now with less air has abrupt changes in the microvalve motion of the third valve, creating distinct changes in timbre. Following this is a similar but less active motion of the microvalves on the E, only three positions are used, now with a balance of tone and air. One final E is played, now with less air but reintroduces a bit of saliva to the sound, the note is much longer than any of the previous sustained E's.

The second system changes notation for rhythmic valve clicks interlocking with tongue rams. Valve clicks are only heard when releasing a depressed valve, and tongue ram pitches are influenced by what valves are depressed. Next to the beats per minute marking of 90, suggested

tongue articulation of “d” and “g”, rather than the standard “t” sound. Contrasting the higher spectral content of the valve clicks, the low tongue rams interlock, and at times align for a combined spectral attack. Another short pause after this section allows me to tighten the valve caps before playing three consecutive E’s one octave higher than previously, now playing in the double pedal range. The first of these is half valved, assisting in the tampering in and out of the note from air to blended air and tone and back to air. Microvalve motions accompany this section, using the train method, the second valve leading as the first follows in the graphic notation. As with the prior consecutive pitches a short pause for the reverb decay before the following E is played, this time transitioning from air to air tone blended, to tone the pitch now most audible, before following the same trajectory back to air. The final E follows the same transitions as the first, but does not use microvalve motions.

Air tones presented with formant vowel sounds are heard in the fourth section of the page. While brief they provide a continuation of the blended air and tone of the previous section. These formant air sounds are notated with half valve and normal valve depression, to create the “i, u, e, ä, and o” sounds. This section is similar in placidness to the sustain E’s, the valves now revealing how it can alter more than just pitched content. Two double pedal split tones are played in the next section of the piece, E with a B sounding below. This tends to fall into the dissonant or noisy style of split tones, crunching with a bit of distortion. The second of these filtered with microvalve motions of the first and second valve, moving slowly throughout the sustain. Introduction of the E and B below can be heard as the fourth and third harmonic in the E overtone series.

Image 3.7: Page one of *Althing I* score

Air sounds enter after another brief pause of the reverb decay, this time on a “t” sound. The sudden dynamic change of the acoustic and volume pedal allows for the sudden shift to be more impactful. This also allows me to lead with the acoustic dynamic, using the volume pedal to arrive at the final *sfz*. Returning to the notation of the tongue rams and valve clicks from earlier, a variation of the tongue rams is heard at this moment with the removal of the “g” articulation, in its place a “tk”. The “t” articulation I’ve found to work best by inhaling rather than blowing, “k” articulation works best as an exhalation attack. Air sounds return, now with low flutter tonguing with half valve depression, creating a more filtered sound of low harmonic content. There is a large amount of air needed for this section, and found that after the accents

lowering the volume on the pedal to inhale quickly allows for a quick inhale that is masked by the reverb decay. Following this is a B blended with air and tone, slightly shaped by microvalve motions that fade to air. A split tone E and B returns, slightly wavering, before a final B crescendo and decrescendos, filtered with abrupt microvalve motions. The microvalve motions all within the first three positions, creating subtle variation in timbre. The phrase concludes on page two, returning to the E and B split tone before a final B enters as air, blended air, and tone, ending with tone. Half of the sonic material for the piece has been presented at this point, and I consider it to be the core pitch material used.

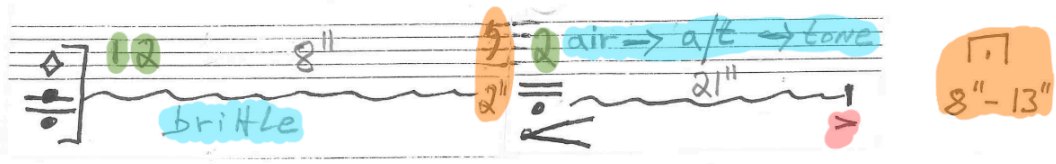

Image 3.8: Page two of *Althing I* score

A G# begins the third page, and is one of the more difficult pitches of the piece due to how it slots on the trumpet. Typically this pitch is played with the second and third valves, but found it slots better as an open fingering. The followed by a D just below the G# is played after a brief moment to breath, sustained for the same length of time. As three second pause for the decay of the reverb on the D dissipates, formanted air is introduced, filtered with halve valve motions shifting from one fingering to the next. The second system begins with a transition of air to blended air and tone of the same G# from the opening of the page, returning to air. Microvalve motions on the G# continue the formant filtering of the previous air section. Following the G#, are a sustained F#, and an A# that is sustained for twenty one seconds with microvalve motions

wavering between the first through third microvalve positions. The A#, like the G# uses an alternative fingering with no valves depressed, but with tight corners of the embouchure. The microvalve motion of the second aids in creating additional back pressure within the trumpet for more accurate pitch centering of the A#. The final phrase of the second system introduces a new percussive sound, of compressed air within the valve and valve slide, sounding like a low drum. This resonant percussive sound has a range depending on the valves depressed, more valves depressed the lower the pitch. The rhythmic graphic shows a general range between highest and lowest. I've found that by extending or contacting the third valve slide to form compression has the most resonance. The third valve will release the compression, the first and second valves determine the general range of the percussive sound is heard. This section of page three is one of my favorites, as it takes an aspect of the mechanics of the instrument using it as a continuation of percussive elements within the piece.

The third system begins with another G#, this time one octave lower, and with abrupt microvalve motions between the first through third positions. Repeating the sequence from the beginning of the page a D is played with a blend of air, the third valve executing microvalve motions. Air is fully introduced in the next phrase, microvalve motions slowly moving in a train motion, the third valve leading the graphic as second and first follow. Moments of formants form at different points, and when discovered are held for a longer duration with a fermata. Like on the final system of the first page, breaths are snuck in, this time after the fermatas.

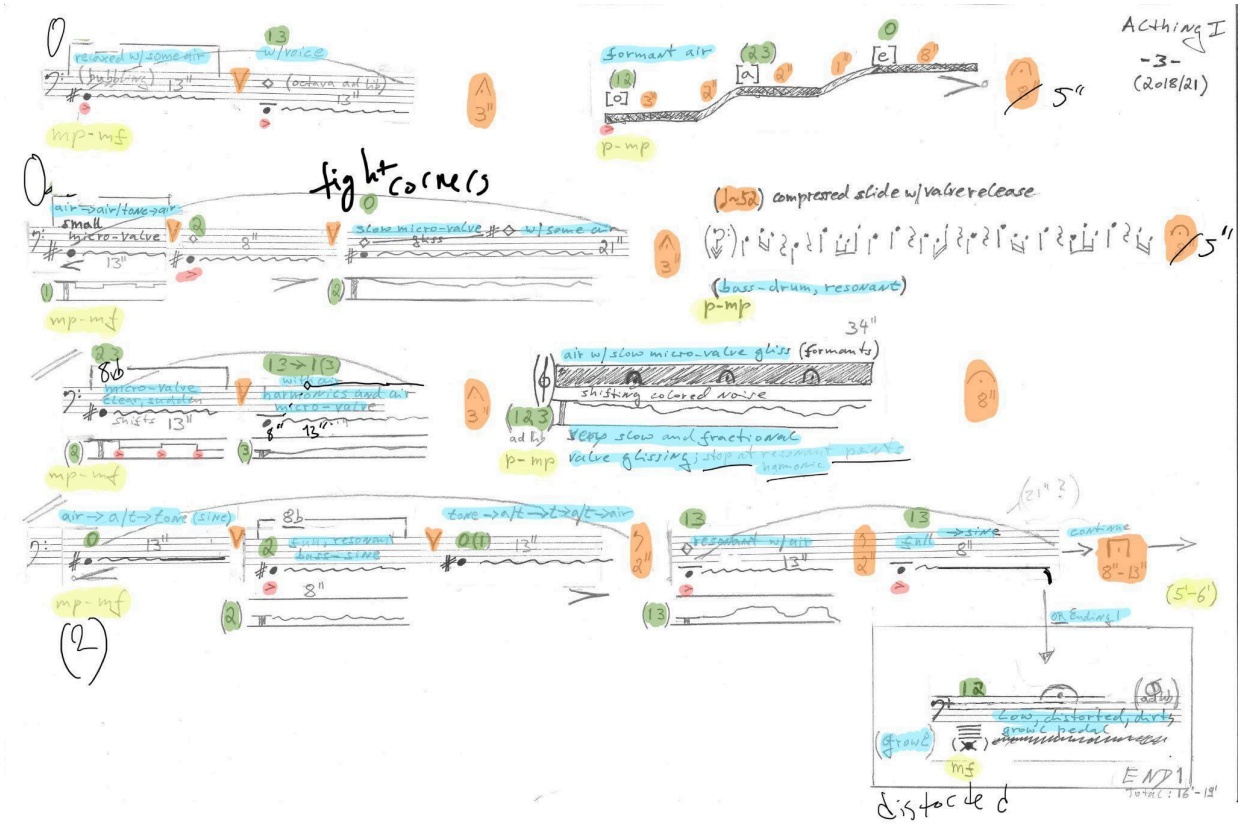

Image 3.9: Page three of *Althing I* score

The final system presents a mirrored version of the second systems pitched content, A# - F# - G# and finally to D. The A# coming starting with air, then blended air and tone, and finally to tone. There is a note in parentheses of "(sine)", which asks for the note to waver as little as possible and contain the most pure tone. Beneath is a note to halve valve with the second valve, aiding in the transition between air to blended air and tone. The F# now down one octave from previously, contains microvalve motions, along with the same suggestion of "sine" noted within the staff. The G# transitions from tone to blended air and tone, and finally to air. As with the A#, the transition between these timbres aided with halve valving, the G# assisted by the first valve. The final notes of the pages are two D's, the first blended with some air, with microvalve

motions of the third and first valve, following one another in train motion. The final D, sustained with full resonance and little wavering of the pitch. The optionally 15 minute ending of the piece is also presented in a box at the bottom of the page, with a triple pedal E. The E has a distorted sound from the additional growl that is created by the uvula vibrating. If the 15 minute version is not performed, the final D is played before moving to the next page.

The final page of *Althing I* begins with three F#'s, the first in the triple pedal range followed by two one octave higher. The second and third F#'s both have microvalve motions, the second F# has more fluid smaller motions, whereas the final has abrupt stepped motions. Following the low F#'s is a single split tone, pulling from split tones on page four, that is played as halve valve split tone on B allows for a more distinct minor second C above. The halve valve assists in the stability of the split tone, along with more tension of the aperture of the embouchure. This split tone is sonically the most similar to that of the pedal split tones from the first page. The microvalve motions are mostly done with the third valve, due to the pitch change that can occur when using the first valve. The introduction of air in the split tone is a balance of the aperture diameter, tension of the embouchure, and the corners of the embouchure working to support one another allowing air to pass through the small opening of the tight aperture. I've found that rolling the lips into the mouthpiece more, allows for each of these muscular structures to work together more allowing for consistency.

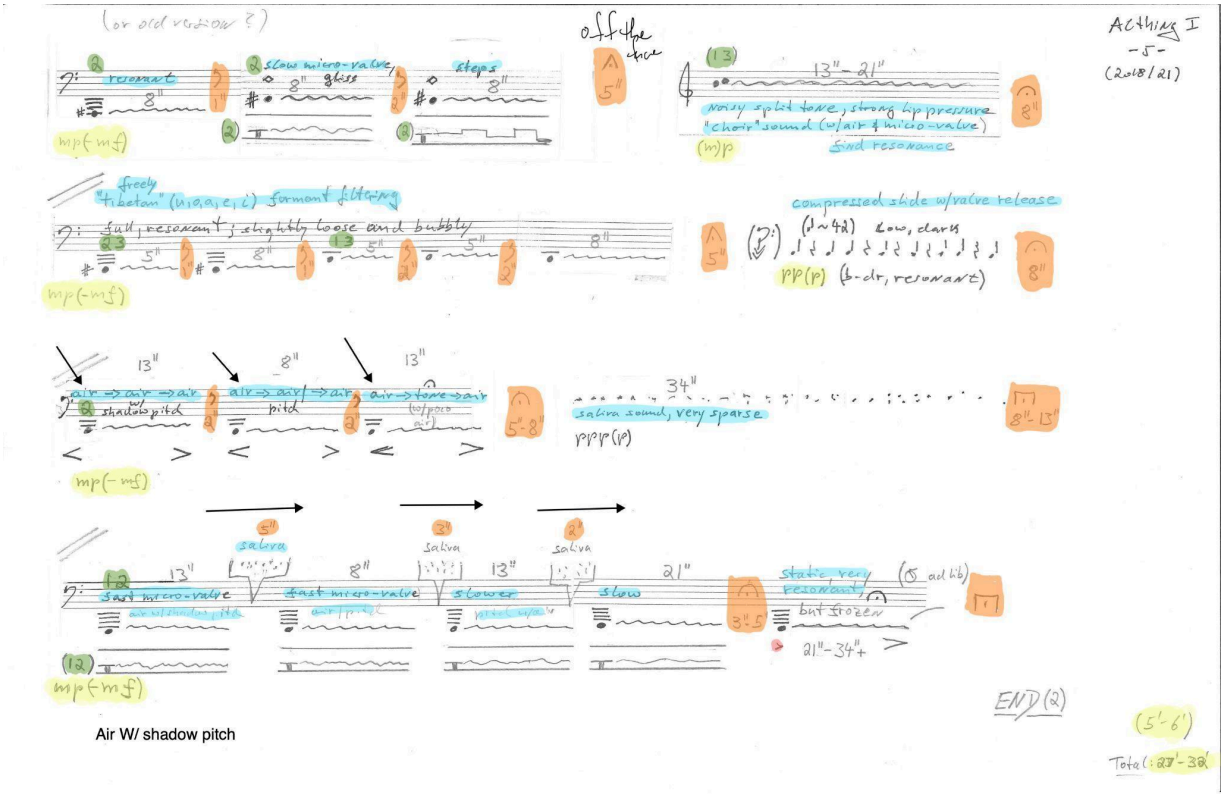

Image 3.10: Page five of *Althing I* score

The second system presents two G# and three D similar to the beginning of the third page. The arc of the piece descends again to arrive at the same triple pedal E that it began with. The G# one octave lower than on page three, now more full and resonant, slight changes in the aural cavity altering the formants, creating different vowel sounds. The final phrase of the system brings a return to the resonant bass drum from third valve compression. This phrase has a single pitch with slower rhythmic activity of only quarter notes and quarter rests. The interchange between sustained and percussive sounds continues on the third system with three B's, each transition from air to either blended air and tone or tone. Like the previous systems, this system ends with a percussive sound, however this is a more subtle sound returning from the previous

page. The saliva sounds are made by either blowing saliva into the mouthpiece or within the aural cavity. I find that more control over the amount of saliva heard is when it is blown rather than when the aural cavity is used. The final system interchanges the triple pedal E and saliva sounds, the E's each contain some modulation in timbre and pitch with the microvalve motions. The microvalve motions becoming slower and slower until the final sustain is held for a long duration, the final resonances heard from the decay of the reverb.

Pages Two and Four

The material on page two contrasts the low tones of the previous page with high-frequency content and full spectrum content. My choice of material is labeled in the image below, navigating from the top left whistle tones, followed by high haunting melodies, air sounds on "wü", ingress air, silence, high haunting melodies with low inserts, concluding with overpressure microvalve. Next to each of these sections, I have marked how many times I will play each. The amplification of the whistle tones makes it seem like wind whistling. Changes in the direction of the air within the cup of the mouthpiece vary the harmonic spectrum heard. Further change in the harmonic shading of content heard in the whistle tones can be done by forming different vowel shapes with the tongue. Following this section is the high haunting melodies, which are more precise electronic birds, usually done with a small area of the aperture with tension, and little air velocity used. The contour of the high haunting melodies can be controlled, following the graphic on the page for various ranges within this technique. I often interchange performing the entire line twice or splitting the phrase, as I intend to play this in total two times.

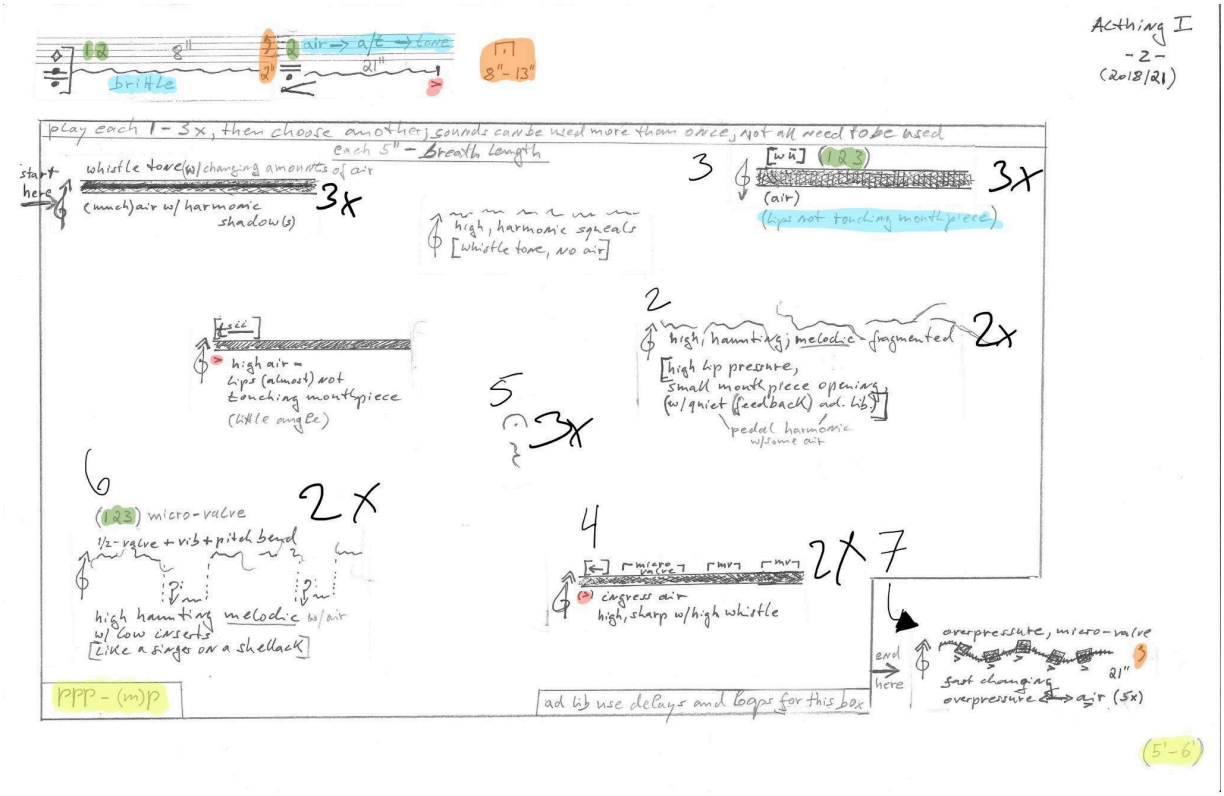

Image 3.11: Page two of *Althing I* score

Following the high haunting melodies are spectral content of air, blown with the lips away from the mouthpiece and with each of the valves in half depressed. The character of this is very close to the phonetic sound "wū", the halve valve depression providing a more formant-like quality to the sound. Due to the distance of the lips to the mouthpiece, there is less velocity of air entering the trumpet as well as less amount of air. I return to my normal playing position, with a variation of air sounds, but instead air is now inhaled through the instrument. Microvalve motions alter the formant of the air sounds, and when resonant vowels are heard I hold the timbre before continuing microvalve motions. Like the bottom of the first page, short breaks are needed to exhale before inhaling, the volume pedal offering silence from the amplification in these

moments. Three short rests following the ingress air sound, and typically I hold the trumpet as if I were playing to avoid perceptions of the piece being over. The final section within the boxed material that I play is a mixture of high haunting melodies and flutter tongued pedal sounds. Both of these utilize microvalve motions to alter the timbre and pitch slightly. Additionally the aperture opens slightly with high haunting melodies to introduce some air in the sound. I end the page with the material outside of the box, sounding as densely chaotic electronic birds in five segments that are interrupted with accented air sounds. The two other options within the box I decided against using, because of timing of the page and similarity to the options I had already chosen. I could in future versions of the piece reevaluate these, swapping the "tsiii" air sounds for ingress air potentially. The high haunting squeals take the place of either of the two high haunting melodies options I already play.

The fourth page of Althing I also allows the performer to choose the order of material. On this page the composed material is played in a more traditional context of left to right. In my version I chose to perform the option A to B to C, as I felt this complemented the material on pages three and five, as well as created a more cohesive arc of the piece. Section A or C are given directions to "go to the ending" material contained within a box in the lower right side of the piece. Section A contains the highest pitches played in the entire piece. Each of these fragments within Section A are played between two and three times, and with pure tone creating a sine like sound. The fading in and out of each pitch is assisted with the use of the volume pedal, which allows me to play the pitch without amplification at a soft dynamic acoustically before adding amplification. The cells of material are read right to left, ending with the A# and G# played twice.

Section B is also read right to left, but the performer can move between the vertically stacked content at any moment. The material within Section B is similar to that of page one and two, low flutter tongued now with pitch on the lower part of the section, high haunting melodies on the top, and the introduction of new percussive material: saliva sounds. My trajectory for this section begins with sparse saliva sounds, then introducing the high haunting melody. I don't move between these two often in the opening of section B, but quickly jump to the low flutters after high haunting melodies. I sustain the low flutters for a longer duration each time the opportunity of the material is presented, before returning to the high haunting and saliva sound interchanging. As with page two I follow the contour of the graphic for the high haunting melody. The density of the saliva sounds changes from mostly sparse to brief moments of density as towards the middle of Section B. The second of the low flutters introduces microvalve motions that alter the timbre and pitch of the almost growl-like sound. Contours of the high haunting melodies become longer and have less abrupt changes. I take these longer contours of high haunting melodies and introduce saliva sounds throughout the duration of a single contour. The final low flutter contains a blended air and tone, and a different half valve depression of first and third, compared to all three valves in the previous two low flutters. I typically follow the last two high haunting melodies before ending Section B with increasingly more sparse saliva sounds.

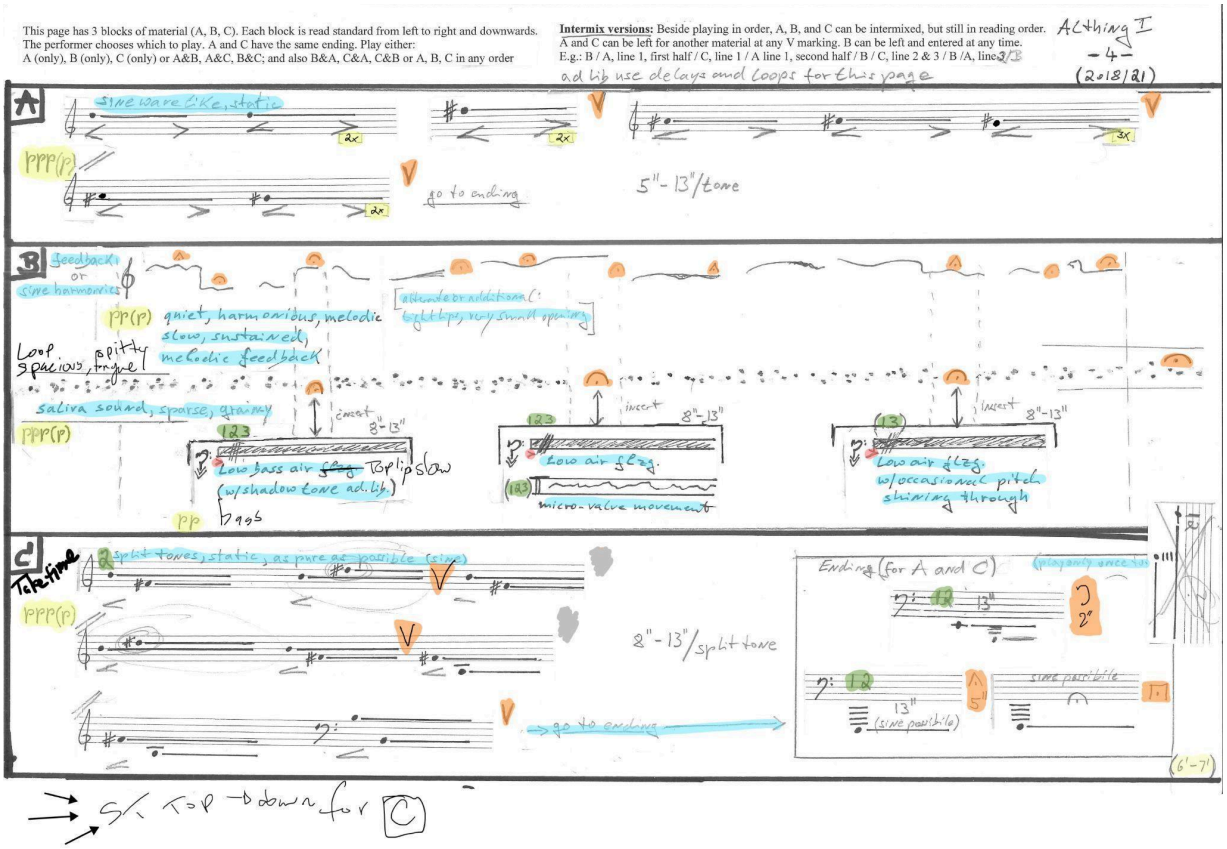

Image 3.12: Page four of *Althing I* score

Section C introduces split tones that are all based on the fundamental of B using the second valve. The notes within this section are related overtones of the B, and can be played without changing fingering, however, the technical work is focused on the embouchure. The first system begins with a B and introduces the F# below, creating the split tone. The downward split tones tend to be easier as the performer can relax the embouchure into these by rolling the lips. The top note in split tones is primarily the note that is most audible, and split tones moving downward are much easier to lock into. The second entry of this system now asks for an upward split, this is done by tensing the embouchure and aperture simultaneously while ascending to the D# to create the split tone. Luckily because this is a higher split tone the consonance and

distinction of this split tone is more distorted. Weaving between the B and F# to B and D# split tone happens two and three times respectively before changing to downward only split tones. The F# and B split tone is played twice, before a final B and B split tone. The split tone relationships to the overtone series in Section C are B and F# (4:3), B and D# (5:4), F# and B (3:2), and finally B and B (2:1). The ending material for the page is contained in a box in the bottom right, labeled "Ending (for A and C)". The material of Section C structurally presents the overtones of B which is the fifth of E, creating somewhat of a cadence for this page. The ending presents an E and B split tone, before two final triple pedal E's.

ii. Interview

On Saturday May 18th, 2024 I interviewed Ulrich discussing the performance of *Althing I* as well as our time workshopping and development of the piece. I am grateful for the time Ulrich has taken to bring this version of the piece to reality, as well as the avenues of inspiration that have come from our time together discussing the details of amplification and acoustics. Ulrich is a faculty member at the California Institute of the Arts, in the composition and experimental sound practices areas. He is an accomplished saxophonist, improviser, and composer, from recording the works of John Cage to playing with Lou Reed in *Metal Machine Trio*. Below is an extracted portion of the interview with Ulrich, covering elements beneficial to this dissertation.

> **Ulrich Krieger:** Now, you played it a few times. Do you feel both versions work like, does the shorter version work for you, too?
>
> **David Aguila:** I think it worked really well because of the space [Bread and Salt] [where] I did it. Also last summer at chosen Vale in a chapel and it worked well there. I think my pacing was a little too fast. It was like the first like pre-performance, you know like the first performance of it and I was

a bit nervous. I think it works really well, but regardless of the space. But when it's in a super reverberant space I feel like the 15-minute version gets a whole other atmosphere.
Maybe before we even get into it, you know, I you know, there's some text at the beginning of the score about You know, brass as calling instruments and the Icelandic Parliament and Vikings in this Hall. I was wondering if you could, just maybe Tell a little bit of how all of this comes together and your realization of this piece.

UK: I often have some inspiration that lies outside of music for pieces. In this case with *Althing* it's this Icelandic Nordic theme, and I have other series. Like I just released a series of water music. I have a whole series of Nordic pieces, it's a whole cycle, huge has become a huge cycle of over 20 pieces all deal with Nordic mythology, Nordic ancient culture [and] old Nordic philosophy. Something I got really interested in, um, and if I go too far off topic, just, uh, stop me. Right, you know? Basically to go all the way back, already in high school. I asked myself, "why do we read Greek and Roman or mythology in school? But no one talks about Germanic Nordic mythology?" Not that it's not read, it's actually not even talked about and that's in Germany. I knew that that's a little different [from] Scandinavian countries, especially Iceland. So I got interested in Nordic mythology and Nordic culture and I realized something is ringing with me. There is some cultural connection. That Reverberates with me and so I was looking deeper into it reading the Edda. In its original prose version, and looking into other Nordic. Sources. And I have been to Iceland once and that was very impressive. So, basically, I started working on this Nordic theme. If you look into contemporary new music, you get a lot of titles that refer to Greek mythology, tons of that. But there's hardly anything about Nordic mythology and the first time I started using Nordic titles, I had people like, actually laughing at me. I said, "what's your problem? You just had a piece which had a Greek mythological name". So, why, suddenly Nordic mythology is funny and Greek serious? Going all the way back to that, that's the cycle, and the whole interest of mine, where *Althing* fits in.

Brass instruments always [have] been Well, not always, let's see in European culture. Let's put it like that. I don't know too much about other cultures, but in European culture, It used to be the instrument of Darkness. Instruments used at funeral rights and things like that. So that's the whole background. *Althing*, as you know, is the original Parliament, Icelandic Parliament and basically, one of the very first, if not the, the very first Democratic Parliament in, in the world.
I started to write the solo pieces. A little bit inspired by the idea of the Sequenzas by Berio. You know, to have these solo pieces. But for me, in my concept they are just voices in that Parliament. *Althing I* is the trumpet piece is one voice of the parliament. The haegum which became *Althing II* chose another voice. I'm planning a harp one. So, those are like, for me basically voices in, in that Parliament. If you speak in front of a parliament. Then that's a solo. I mean, you have an audience and you do a solo. So it seemed to be the obvious thing to choose solely, for that. There is an underlying idea, I have decided if I want to follow that or not, but it could be fun to do is take these *Althing* solo pieces and actually make them chamber music.In a very easy straightforward way by basically telling the performers to use material of the original score, but in any way and in any order, they like listening to the other performers. So basically I could hear a trio of trumpet, haegum, and harp. All using material from their own scores but not necessarily in any particular order. It would be a semi-improvised chamber music piece but with already preconceived sounds and rules.

DA: My next question is in regards to the piece because it evolved, there was a first version and then we worked on like the current version together. I was wondering if you could talk about the The two versions and why you felt like things needed to be altered or you know what was what that thought for you?

UK: I can see you're looking at two versions. I'm actually looking at more than two versions at this point. I think you played a version before it was all done and written. That goes back also, to my growing dissatisfaction writing chamber music very abstractly, and then having a score and giving that to performers. Especially with these types of sounds. I think we more than once talked about Luigi Nono's work, especially of the 80s, and how he would develop a lot of his chamber, music pieces, improvisatorically, and only write a score after five, six seven, performances of the piece. Similarly for me I got more [and] more dissatisfied with just writing abstractly and really prefer to do it as a work in progress together. The first version was never really finished for me, I mean, it was the first version but was not a final version. It was like a work in progress version. Which I never really saw finished. I don't know how it happened, I [started] the piece originally goes back to Sarah [Belle Reid]. She asked me for a piece but then I think I was just too slow and over time Sarah lost interest and was interested in other stuff and a lot of her own stuff. Which I completely get, and so the piece was lying around and then you [said] that you would be interested in it, and that was for me then the reason to pick it up again and work on it. So those versions for me they're really work in progress versions, developing the piece together with people instead of trying to create an abstract final version which then the musicians get, and then might need revisions or not. It's hard to say. I mean as you know, I'm an improviser. I write music for myself which you know, how that looks. It's the music for myself, never has a traditional fixed score version. It's more like a lead sheet or ideas or routes or stuff like that. With a lot of freedom in between. And being an improviser writing music for myself, playing rock music. I really enjoyed creating something with people together, with direct feedback. So that's where all these versions come from and I think it fits also, with what I realized is just a working method of mine. I'm really slow and I do things over long periods of time. I finished my string quartet *Up Tight* II in 2018, and the first version of that piece was written in 1999. And then I revised it in 2010 and I looked at it again. I do a lot of stuff over very long periods of time and I realized that's my way of working. If you want to have a good career, it's not a way of work I would promote but it seems to work for me, and we know other people would work in a similar way. Scott Walker sometimes took 10 years to finish an album.

DA: This piece like throughout the process, it was very collaborative. I'm wondering if you could talk a little bit about how you feel. The importance of collaboration through the process to really real realize that peace is for you.

UK: Really very important. There [are] two main aspects. One, I already kind of talked a little about and that's really like writing for someone. That's like, really working with you writing the piece for you instead of writing a piece for trumpet. That has become more important for me over the last few years, still really writing a piece for someone and not writing an abstract, instrumental piece. Especially with a piece like this, which goes so deep into very kind of blurry sounds and things that are not really totally researched yet. I find if you go that deep into these types of sound on the instrument. If you don't work with someone very closely you might run into really big problems. I've seen those scores where people write multiphonics, [or] they write over partials. And they just don't work. It's all very nicely thought out but it was never really double checked with the instrument if you really can do it like that. So all this, micro variations in, in those sounds all the time in a trumpet. Of course, [it was] important that they work, and that they work for the player. But they also work, so [they] actually make sense musically and they're audible. If you do micro variations, which are you having fun to produce but then hardly anything of that is audible for the audience, then you know what for? I think this really working with someone and working on this really Seems to be stupid, but on the frontier of sound, I mean, you know, since I studied in the 1980's I was continuously trying to find new sounds on instruments and especially woodwinds and wind instruments. There was a point where I personally also thought maybe, "Now we have everything"

you know, and that you might know that Lachenmann said there are no more white dots on the map of sound, and I simply don't think that. Then people like you come along, people like mattie barbier, and suddenly systemized split tones. I haven't heard people really looking into split tones in the 80's or 90's. There were some people doing it but it was never really kind of research and systematized, like what we did for the saxophone multiphonics in the 80's and 90's. When I started using multiphonics, there was hardly any research or system out there, and then we just started doing it. Really working very closely with someone who placed the instrument and who's willing to try new ways to play the instrument. You know we realized you need to change your embouchure to get certain sounds. You need to involve more thinking about all of this than you would normally do, and all of that stuff which makes you really start playing the instrument differently. It has those two aspects. It has the compositional sound aspect. Simply having someone who can double check does that work? Does it not work? How does it work? And then also writing a piece with and for someone and not just some abstract golden instrument there.There used to be pieces in the repertoire for a while. It was said, "oh only one person can play that the person was written for". That maybe was even true for a few years, and then younger performers came and learned it and suddenly it became a standard. I don't think there has been a lot of really really deep research into those pedal tones. I mean people have done it, Markus Stockhausen is great at it you know and there's some people who are wonderful at it. Really the deep Research into it, I think only happened the last few years.

DA: A lot of the things that I've tried to discover about this on my journey to see where that research is? A lot of what I've seen is more of a catalog of here's [this] technique and here's the piece, but not necessarily here is; the Arban's book version of extended techniques or or all of these things that don't really exist. There are some folks who I could think of like Marco Blaauw, who's in Musik Fabrik, there was a brass academy and he was sharing this and when he comes to Chosen Vale, it's the same thing. People are always curious about this, but it's coming from a singular source and that's great that Marco is out there and others who are doing this, but it makes it really hard to then share the knowledge. Then begin to have it become part of the language of the instrument and get composers on board to do this.The way I've been trying to think about playing is through thinking about it like looking at a synthesizer, there's a knob that does this parameter. There's a fader that does this perimeter. If you create a patch, everything is plugged in, and you have a sound. Rip out all the cables, still the same components but you can patch a new sound. There's this parametric control over everything, and I think in working on this piece, even on these low pedal tones, there [were] parameters of the body and parameters of the instrument that we were exploring. So you talked about it, thinking of it from a physics perspective like discovering these things or at least understanding them. I suppose some of these were theorized . Then it was, how do we realize them? Or at least for this piece did you know from experience that that would be the result? Or some of it was I think also through our collaboration?

UK: A little bit of all of the above. You know, I had worked with trumpet players who used extended techniques and pedal tones since basically the late 90's. I was in Zeitkratzer with Axel Dörner. I have known Axel for a long time, then Franz Hautzinger replaced Axel Dörner. I was around trumpet players doing stuff like this already in the late 90s. Then some of my own work and research, especially on the Contra Bass Clarinet, also goes in there. Which gives you different modulations, in that range then it will be on a higher instrument. Then yes, some of it of course was more theoretical, this should be possible like this if we do this and then trying it out with you. I came in definitely with uh, some A background experience of brass instruments and brass writing.

DA: The approach that I've been coming to discovering these sonic palettes. I think there's two things that I discovered through working in what I call parametric performance practice. There's two

sound worlds that I live in mostly, when doing this It's really fragile, soft sounds, sounds where I'm on the verge of losing control of it. Maybe it's because it's such a subtle motion, or I don't have the proper control. The other side of it is these loud and abrasive sounds that are kind of on the other end of the spectrum. I'm curious if you have experienced these or if you feel like there's an even wider scale, either on saxophone or anything that you've written.

UK: I mean you basically just described my interest. I'm really interested in those extremes, especially dynamically. Doing really, very soft stuff, you know, working with Wandelweiser and then doing really loud stuff working with noise musicians, like Merzbow, or Karkowski, or John Duncan. In my own writing, there are these two aspects. I mean in this big series I'm still working on [the] saxophone. There's RAW which looks at the really loud side of things but then there's also Quantum which again is a series of pieces. Which are so quiet that again, they reach playability because every little small influence might change the sound [you're] trying to do or might not produce the sound you want to because everything's so quiet that. Every little muscle in your lip or little tension back here really has an influence on your sound. In the case of the saxophone I remember when I did, about a year ago. The first time I did the premiere of Q*uantum*, all nine pieces, I was trying reeds for two and a half hours, because you simply cannot use your normal reeds. You need very special reeds that react in a very special way. I actually have a small box where I put reads like that. And if the reed is a little too stiff or just a little too soft, then you have problems. So I find this really interesting to get to this, where I say I came up with a phrase,"you cannot control sounds 100 percent anymore like you do in traditional music but you can steer them". I see a similar thing in *Althing,* some of those modulations of the pedal tones. There they're never a hundred percent, you know, it's not like it's not like playing Sequenza. If you rehearse if you practice that enough there's a point where actually you can play exactly how it's written. But in *Alting* It will depend on, on your lips, on your breathing, on where the microphone exactly sits on your trumpet. And you have to react to those things and make split second decisions because maybe sound doesn't react the way it did on the last concert you played. So you have to live with it and work with it and I'm aware of that. I think that's important being a composer, being aware that, those are what I call "fuzzy sounds". They don't work like traditional sounds, I wake you up at three in the night and say, "hey David play me, a C Quarter sharp and give you a trumpet. You play me C Quarter shop, you know? No problem." But, These are not in this sense, traditionally repeatable sounds and that's actually an aspect I really like about it. So, there is a certain element of aleatoric in the sound.

b. Collaborating with in^set

During our first quarter at UCSD, Ilana, Teresa, and I were placed in an ensemble together collaborating with Nasim, culminating in a new work titled *Unknown*. The piece was a mixture of textures and sounds that fit extremely well, even though the trio was Violin, Flute, and Trumpet. After the performance of *Unknown* we three decided to keep playing and improvising together, and one day asked about performing *Expo* by Stockhausen. We set upon

the journey of learning the notation, and playing with shortwave radios, culminating in a performance of the piece on my second-degree recital, *The Ritual of Time Dilations*. During the experience of rehearsing *Expo,* we had all talked about what we each wanted to do during our time at UCSD, all agreeing that we wanted to research aspects of performance outside the confines of our primary instruments. Each of us supports one another in our creative endeavors and wants to perform each other's work we formed in^set, and have since performed together in the United States, Mexico, and Iceland. We have performed pieces by composers from Mexico, the United States, Iran, Colombia, Canada, and Iceland, with instrumentation ranging from each of us on our instruments, to synthesizers, Ableton Live, paper instruments, cassette machines, amplified music boxes, singing, and a range of objects, percussion instruments, home furniture, and more. We are all grateful for our willingness to dive into any project suggested, supporting one another's creative choices for the group.

When the pandemic and global lockdown happened we were all taking classes remotely, discovering ways to perform with one another distanced, Ilana in Canada, Teresa in Mexico, and I in the United States. Throughout the academic year, we experimented with ways of playing pieces, finally deciding that playing in real time was not possible as the software was still unreliable, and instead decided that each of us would record individual parts for each other's pieces. Each of us composed a work, that contained audio and video components, that would be stitched together in post-production. Coming to the decision to record allowed all of us to use our microphones, allowing me to explore fragile sounds with other instruments, with the microphone playing a key role in revealing new sonic territories. At that time I called these fragile sounds by a different name, composing a series of six text-based scores for the trio titled *Quantum Music, Entangled Performance*, but eventually settled on *a collection of fragile moments*

Image 3.13: Photo from the performance of *Expo*

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Settling on a combination of four of my text scores, *Homestar, Drifting, Juxtaposed States,* and *Pin Step*, the intent is for the performers to explore a parameter of the body and of the instrument. The score opens with the text below, inviting the performer to explore sonic possibilities through amplification by making small motions or changes with the body or instrument, exploration of the instability of the sounds and following these paths of instability, and the relationship between timbre and dynamic change. This version of the piece was presented as a digital concert during the pandemic titled *a tale of three cities* with each of our works, *Little Pods* by Ilana, *A fish tale* by Teresa, and *a collection of fragile moments*.

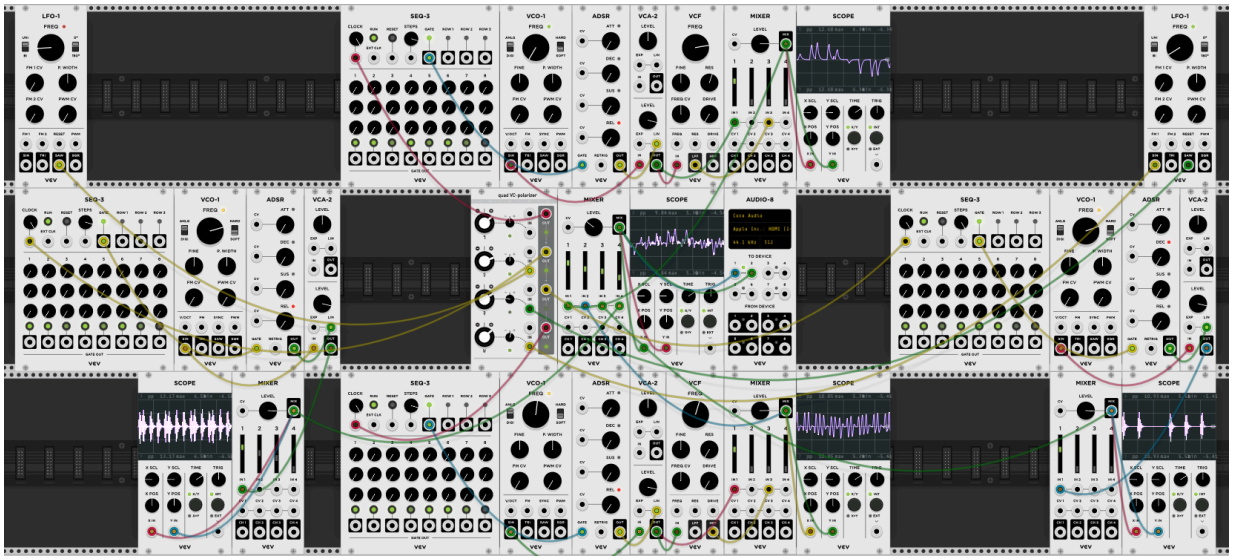

Image 3.14: VCVRack Patch used for *Drone Travel* of the Unified Time Structure and Splitting of the Sound

Throughout the process of the pandemic, it was helpful the conversations that we'd had, giving a new perspective on how I could continue to develop the piece. Upon our return to in-person classes, we were able to record a version of the piece at UCSD that I used for my album. The recording was done in Studio A using close miking, similar to what we had done during the pandemic, the difference was we were now able to play in real-time together. In my album, *Configurations of the System,* I created two versions of the piece, *Drone Travel,* and *interlude.* For *Drone Travel* I used techniques from The Four Criteria of Electronic Music, the unified time structure and the splitting of the sound, to create a slowly evolving set of pulses that speed up to create pitch and timbre and did this with four different sets of rhythms that combined to create complex waveforms then splitting into the constituent rhythmic elements. The recording of in^set was stretched within Ableton Live, similar to that of slowing the tape speed, lowering the pitch throughout the entire piece. For *interlude*, I simply left the recording as it was, only balancing the dynamics of each instrument throughout the piece.

i. *Depths III*

I wound up reimagining the score, using a graphic score with the preliminary text from *Quantum Music, Entangled Performance* embedded within the graphic itself. The graphic represents at the center a sound that is imagined or had been heard on the performer's instrument at one time, the goal of the performer is to try and arrive at that sound again and explore what parameters of control are available. However, along the journey new paths may open allowing the performer to discover that path before returning to their initial intent. Whether or not the performer arrives at that sound is not important, but the journey and how the small interactions not only from our body and instrument but between performers are what allows the piece to take on different characteristics each time it is performed. We performed the updated version in Iceland at the Sunnuhvoll Music Festival in 2023, Project Blank SD: Salty Series, and *ghost tones*.

The score and text are intended more as an invitation for the performers to explore their instruments. The direction each takes to a certain sound is individualistic, the boundaries of the piece ask the performers to play quietly and move each parameter very slowly in order to discover how these small motions impact the sound as well as how much control is available. The types of interactions between instruments wind up being more of a global masking of clarity of each, at points one instrument can be more audible and distinct. Small motions, dynamics, and control of the parameters all provide an opportunity for the discovery of fragile microsounds and abrasive noisy sounds on each instrument. I suggested a duration of the piece from three minutes up to twelve, with in^set's performances spanning this durational range.

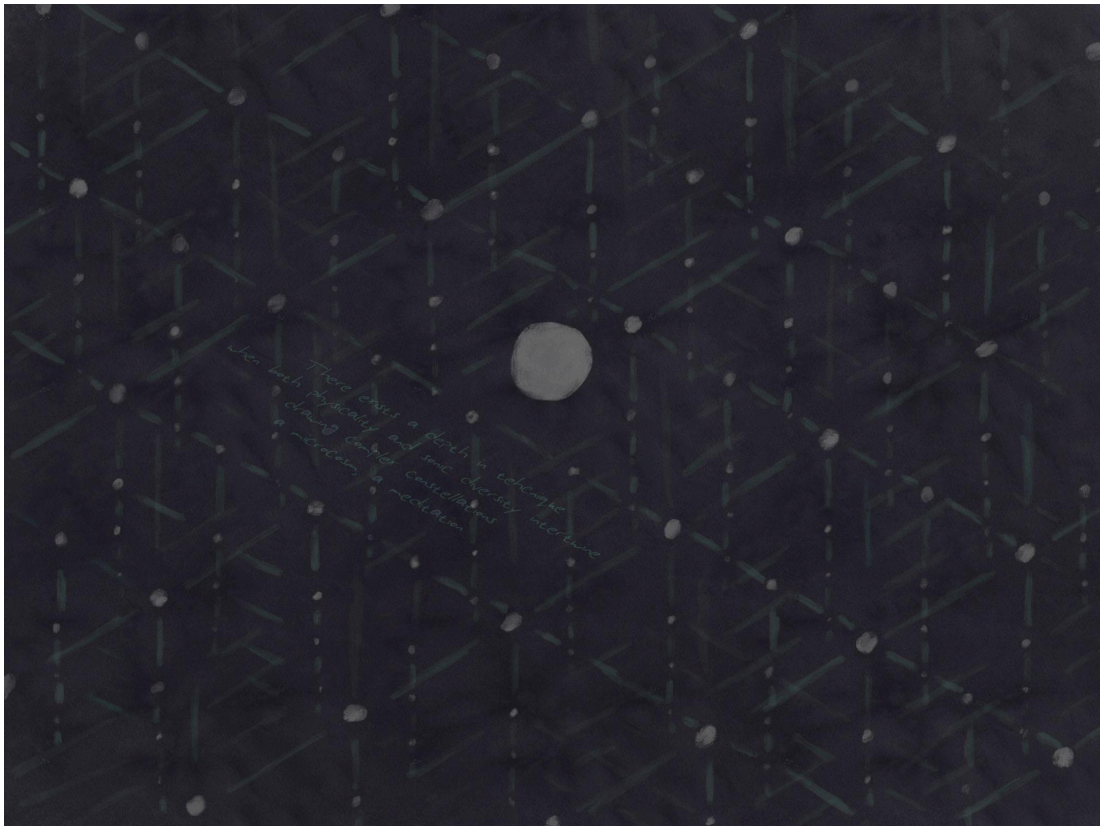

Image 3.15: Graphic Score and text for *Depths III*

"There exists a depth in technique

When both physicality and sound diversity intertwine

Drawing complex constellations

A microcosm; a meditation"

ii. Electro-Acoustic Research

In the previous performances of *Depths III*, one element that disrupted the piece was the abrupt exiting of instruments. The sudden silence is noticeable to a listener, but it also creates this unspoken need at times to return as quickly as possible to continue the ongoing texture of instruments. In order to remove the abrupt exits, a global reverb is added to all instruments. Each audio signal is sent to the reverb with a long decay time, between eight to twenty seconds,

providing time a break for each performer. A blurring effect masks the entrances, exits, and distinction of the instruments with the use of reverb creating a cohesive sonic character. The blurring cohesion of the instruments is an acoustical version of the splitting of the sound, from Stockhausen's Four Criteria of Electronic Music.

> If we understand that sounds can be composed, literally put together, not only stationary sounds which don't change, but also sounds like owww, which changes in the course of its duration; if we can compose these sounds, in the sense of the Latin *componere* meaning put together, then naturally we can also think in terms – not the quotation marks – of the "decomposition" of a sound. That means we split the sound, and this can be much more revealing in a certain context than hearing a unified sound on its own terms, and comparing it to another which is happening at the same time or immediately before or after it[11]

The trio in this instance each creates a single unified sound of its own timbre containing small changes of the sound over time, but globally creating a unified sound. Only when one player exits does the sound reveal the splitting of the constituent parts creating the whole sound. This is further masked by the reverb, not only adding a spatial depth to the instruments but also with the use of the microphone bringing the closeness of each instrument. Stockhausen describes these as a multi-layered spatial composition, "that not only does the sound move around the listener at a constant distance, but it can also move as far away as we can imagine, and also come extremely close"[12]. Reverb adds spatial depth to the instruments placing them farther in the distance, but the placing the microphones as close as possible I am now bringing sounds that would not normally be audible in performance closer to the audience.

The dynamics of the instruments are amplified allowing the precision of each of the performer's motions to be heard with clarity. The conversations and process of working through

[11] Stockhausen, Karlheinz. 1989. Stockhausen on Music: Lectures and Interviews. Edited by Robin Maconie. N.p 97.: Marion Boyars. (Stockhausen 1989, 92)
[12] Stockhausen, Karlheinz. 1989. Stockhausen on Music: Lectures and Interviews. Edited by Robin Maconie. N.p 105.: Marion Boyars. (Stockhausen 1989, 92)

the conceptual side with Ilana and Teresa were essential to the piece and its development. The recordings had turned out fantastic, but I still wanted to zoom in more on each of their instruments with the microphone to find more subtle fragile aspects of sound for both. I've continued to develop the piece further, two electronic elements becoming essential, the first is a change of microphones used as well as placement, and the second is the addition of reverb to blend and mask our sounds. In earlier interactions of the piece, each of us used more traditional microphones for recording and live performances. These choices, while helpful in getting an authentic representation of each instrument, didn't reveal the sonic landscape I had imagined.

The placement of the microphone to reveal new timbres comes from *Mikrophonie I*, mentioned earlier in the introduction. In the final moments of Stockhausen's lecture on *Mikrophonie I* in London, compiled by Robin Maconie, one of his final statements is that if performers should only use a tam-tam for the piece his reply is "Play anything. Discover the micro-world of the acoustic vibrations, amplify it and transform it electronically. That's why I call it "electronic live music' as opposed to electronic music which is produced in a studio"[13]. *Depths III* intent is to amplify acoustic vibrations, but instead of transforming them electronically, the performer's parametric control creates the transformations. A change to lavaliere microphones inspired me to work on *Althing I*, and found that micing inside the instrument added a sense of closeness I had been searching for. The proximity of the microphone within the instrument reveals new timbral aspects of each instrument without the need to force a dynamic acoustically. The addition of reverb allowed for a decay that allowed the instruments to have a vastness to them.

[13] Stockhausen, Karlheinz. 1989. Stockhausen on Music: Lectures and Interviews. Edited by Robin Maconie. N.p 87.: Marion Boyars. (Stockhausen 1989, 92)

The lavaliere microphones for Teresa and myself were taped inside the instrument. Teresa and I experimented with different placements of the microphone, taping it within the body joint and foot joint. We found that the best results were by tapping the microphone on the foot joint and completely covering the hole with tape. The position of the microphone in the trumpet was the same as it had been in *Althing I*. For the microphone placement with Ilana, we had tried to insert the lavaliere microphone within the violin, but the microphone was too large to fit. We tried placing the microphone in different positions along the bridge and along the outside of the instrument facing the f-holes, but found that the omnidirectional pattern and proximity did not work well. The lavaliere picked up mostly low-frequency content of the contact between the bow and strings and in live settings creating feedback. We instead returned to using Ilana's DPA microphone she had used in the past. The position in live settings worked well, we found that placing it even closer between the f-holes and bridge yielded the best results. There are some other types of microphones that I want to experiment with on string instruments, similar to that of contact microphones, picking up the vibration of the entire instrument. Amplification of the instruments is intended to be heard at all times, allowing the instrumentalists to focus on the parametric control listening to their sound from speakers above one each.

I have continued my work with the lavaliere microphone and effects pedal searching for both fragile microsounds and abrasive noisy sounds with the trumpet. In a more recent experiment, I connected the lavaliere microphone to my modular synthesizer system revealing interesting new interactions. There are still certain techniques that I wish to explore with minimal use of audio processing. One of these techniques that I often return to is the natural multiphonic of the trumpet. This is often initiated by playing electronic birds and halve-valving the second and third valves. What I've discovered is there is a moment when the air from the second valve

returns to the third via the half valve, and the third valve feeds air back to the tuning slide creating a feedback loop. At a moment the electronic birds become a pitch via the embouchure and aperture tension, in combination with the halve valve creating a "feedback" sound of high resonance. I've unfortunately not found a consistent method to use the technique, nor can play it readily, more often finding luck when the natural multiphonic is heard. One of the most consistent methods to finding this sound is by amplification through a lavaliere microphone with volume control with a pedal. I believe more of these sounds are still waiting to be discovered with the aid of electro-acoustic methods.

c. Collaborating with Nasim Khorassani

Nasim and I met in the Fall of 2018 at UCSD in a collaborative class of performers and composers, where composers are paired with performers culminating in a new composition. Nasim wanted to compose for flute, violin, and trumpet, this was the beginning of not only what would later become in^set with Ilana and Teresa but many different collaborations between us all. Throughout the course the four of us met, sharing techniques, sounds, and concepts of how we each approach our instrument. Long before the quarter had ended Nasim finished her piece *Unknown* for Us, a graphic score representing specific sounds and techniques each of us was to play. With ample time to rehearse and prepare the piece, in^set, enjoyed the rehearsal process and workshopping with Nasim. The experience of working with Nasim, Ilana, and Teresa was inspiring for my trumpet practice and creative research. After the performance of *Unknown,* I asked Nasim if she would be interested in composing a piece for solo trumpet, to which she happily agreed.

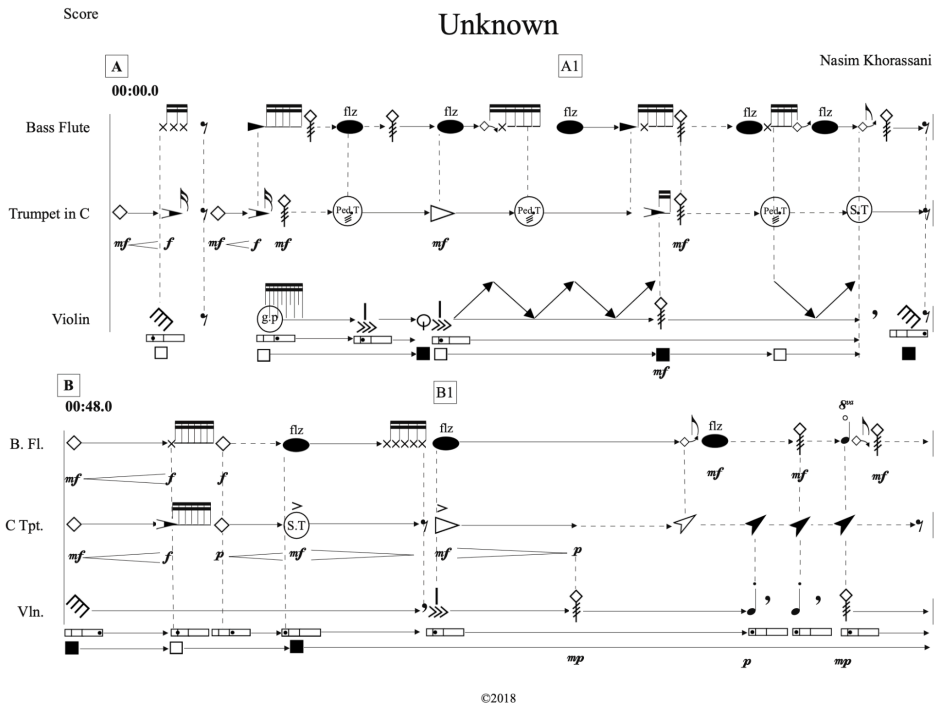

Image 3.16: Page one of *Unknown* by Nasim Khorassani

There was a brief pause on creating the piece due to scheduling and the pandemic, however in the Spring of 2022 Nasim and I were able to get together and work on the piece. There were inevitably some changes from the initial conversations Nasim and I had about the piece, usage of lighting, electronics, and theatricality. One of the biggest changes was a double-bell trumpet I had purchased from Van Laar trumpets in the Netherlands. The trumpet is in the key of C and has a second bell that can be configured either above the first bell or can be pivoted to rest on the shoulder directing the sound behind the trumpeter. The performer can choose which bell by an additional valve that is placed on the first valve directing the sound to exit either of the two bells. There is an optional tuning slide that has a quarter-tone valve that lowers the pitch of the instrument prior to the main valve cluster. Two bells allow the performer to not only spatialize sound but timbrally change between muted and open trumpets or between

two different types of mutes. All the options the double bell provided reduced the need for some of the initial ideas for the piece. I also provided videos, scores, and recordings to Nasim from composers who had written for double bell trumpet, specifically Marco Blaauw. Marco has been an advocate of the instrument, working with Hub Van Laar on the instrument, as well as collaborating with numerous composers to write for the double bell trumpet.

Image 3.17: Van Laar Double Bell C trumpet with ¼ Tone Valve

Nasim and I had met several times throughout the Spring of 2022 workshopping ideas for the piece as well as sketches she had made. We had both wanted to avoid "typical" sounds from the trumpet, focusing more on the fragile microsounds and the abrasive noisy sounds I had been developing as part of parametric performance practice. In our sessions, Nasim would often ask

how much control I had over a specific technique, more often than not pushing the boundaries of what I knew was possible. In some cases, the limitations of the body and instrument restricted the amount of control, but in others, the boundaries expanded to create a depth of control that neither of us had anticipated. One instance of this is when working on the fragile microsound technique of electronic birds, in which were explored the density of activity I could control. Electronic birds are a technique in Rebecca Saunders's piece *White,* for double bell trumpet. In the performer's notes, electronic birds are described as "Taking split-tones to the highest overtones gives a sound combining quasi-electronic pulsing, white noise, and seagull calls. Dynamics are between *ppp* and *mp*."[14]. The notes further detail the mechanics of the aural cavity and how the cavity of the mouth can alter the types of densities and can introduce air. I had been fortunate enough to work with Marco Blaauw for whom the piece was written, and during a Summer course, I had attended Marco teaching the techniques for electronic birds. I continued to explore electronic birds, discovering the extent of how much air could be introduced in a practice session. As Nasim and I continued to explore density and air, there was a moment when electronic birds, air, and tone were heard all at once. These ghost tones/whisper tones were elements I had explored as a singular technique, and had no idea these could be combined in this way.

> **Nasim Khorassani:** I remember, like one of the most exciting parts, was just to talk about, it is something that happens in those electric birds. And you're like, what is that? And we even like had to first find, what is that specific note tone happening there and then find okay, what we're going name it. So it was, it was a funny experience that I think it took us two sessions to just find out, okay, this is this sound that I'm talking about and then exploring how you can control that. And it was so magical that it was like. Well, this is amazing that we can even control this ghost tone in between of this electronic birds. [15]

[14] Rebecca Saunders. *White* (Edition Peters 2015)
[15] Nasim Khorassani interview with David Aguila (2024)

Ghost tones as a technique fit within the fragile microsound set of sounds for the trumpet, the dynamic range of ghost tones is extremely small, and the control of the technique has similar precision to the other fragile microsounds. The arrival and transition to the electronic birds, ghost tones, and split tones were specific moments in our workshopping period that are what I find to be special moments when working closely with a composer to reveal new sonic possibilities and sounds. I classify both electronic birds and ghost tones as fragile microsounds, due to the small dynamic range and precise motion of the embouchure and aperture to control these techniques. My control over these fragile sounds has become more consistent, however, ghost tones in particular still require more attention than some of the other techniques within *Shabah*. For instance, I have more precise control over the parametric control of density indicated by the colored squares above the bird graphic indicating the amount of density, medium density, followed by highest density, and lowest density.

The more abrasive noisy sounds within Shabah are the split tones and extreme noise. Split tones within the piece are more consonant sounding; there is a contrast coming out of the electronic birds section. Due to the physically taxing nature of the extreme noise and electronic birds that precede the split tones, they can often sound more distorted than pure intervals. The most demanding moment is the transition from electronic birds and ghost tones to split tones. Being able to open the aperture enough to get the ghost tone to speak, then create tension in the aperture to get the split tone to speak. There is also a demand for air capacity before moving to the split tone that must be taken into account, and usually circular breath one final breath before moving to the split tones. The following split tones are more easily navigated due to the short breaks between each. The final abrasive noise is extreme noise, and recently due to changes in the mouthpiece have had some issues with performing the technique for extended

durations. However, this could also be due to the types of large spaces I've recently been using the technique. The amount of back pressure needed and the dynamic of extreme noise is the most demanding part of this section. More often I understand that it is general muscular strength that needs to be built up to prepare for this section of the piece.

i. *Shabah* for solo double bell trumpet

Shabah contains theatrical elements that play on audience expectations and is suggested to be either the first piece or after the intermission of a concert. The staging of the piece requires that a single chair and music stand be placed on the stage illuminated by a spotlight. The performer is seated in the audience, about 2/3rds of the way into the audience seating, with the instrument waiting for the change of lighting on the chair. As the lighting changes, the performer will put on a mask that completely covers the face except for the lips, and both hands have black gloves. We found that cutting the tips off the gloves allows for a better grip on the finger buttons of the valves as well as the mute. A wawa mute is used in moments of two sections of the piece, a mute belt is suggested to hold the mute. The performer is to memorize the piece to not distract the audience with light from an iPad or changing of pages. *Shabah* is structurally divided into four sections: Section 1: Air & Tongue Rams, Section 2: Extreme Noise, Section 3: Electronic Birds, Ghost Tones & Split Tones, and Section 4: Pedal Tones, Phonetics, and the mixture of techniques. Each of the sections uses a set of distinct techniques of fragile microsounds and abrasive noisy sounds, and a mixture of parameters of the instrument throughout each section, such as double bell and microvalve motions. Approximate durations are given per page, in my score I have put approximate seconds at the start of each system and will use these as references throughout my breakdown of the sections.

Section 1: Air & Tongue Rams

The first section, 0:00 - 0:25, primarily focuses on the use of air tones that are blown through the trumpet and percussive tongue rams. The pitch content of the air tones and tongue rams are centered on the notes C# and C but are written a half step lower due to the mechanics of blown air in the trumpet. The air tones, have a small dynamic range but are directed to be played "as loud as possible, unless dynamics are written"[16] in the performer notes. The air tones vary between long sustains and short rhythmic patterns. In the first rhythmic pattern, the bell change introduces the piece's spatial component as sound quickly moves from front to back. The tongue ram is introduced at 0:27 with a slowly increasing set of eight followed by a sustained air tone beginning the second phrase of the piece. The phrase continues with air tones and spatial double bell motion, introducing a new pitch of written B. The air tone interjections continue, adding a new element to the piece, microvalve motions with air tones at 0:43. The microvalve motions are similar to the usage in *Althing I*, but in *Shabah* timbrally shift the air tones. Eight consecutive tongue rams increase in speed at 0:50, moving to two quick tongue rams with a bell change from back to front. The interchanging of air tones, tongue rams, microvalve motions, and bell shifts become more rapid, ending the third phrase with six tongue rams of increasing speed around 1:22. The bell motions have also introduced slow shifts between the front and back bell, varying from the abrupt changes from the opening. The final phrase of the piece is from 1:30 - 2:30 and begins after a brief silence with air tones slowly moving from front to back to front ending with two short air tones. A rapid succession of six tongue rams of increasing speed are broken up by moments of air tones with spatial and timbral motion. The attacks began at 1:40 - 2:30 nearly all beginning with forte piano crescendos to forte. 2:05 has two successive air tones with timbral shifts, leading into the return of eight tongue rams of increasing speed. The same air tone gesture

[16] Nasim Khorassani. *Shabah* (2021/22)

returns, now changing timbral microvalve motion for spatial change of back to the front of each note before an increasing sixteen tongue rams crescendoing to fortissimo leading into section two.

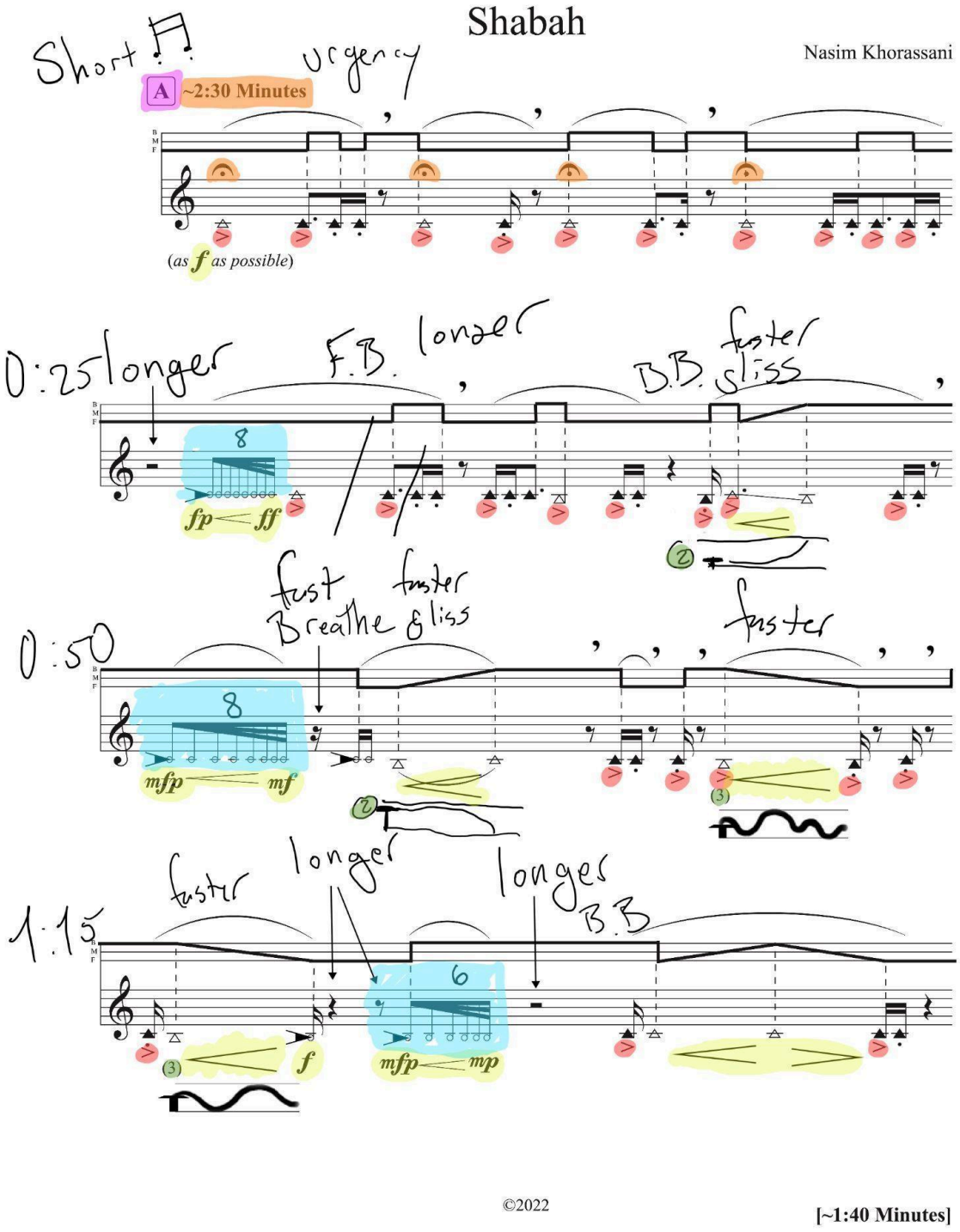

Image 3.18: Page one of *Shabah. 0:00 - 1:40*

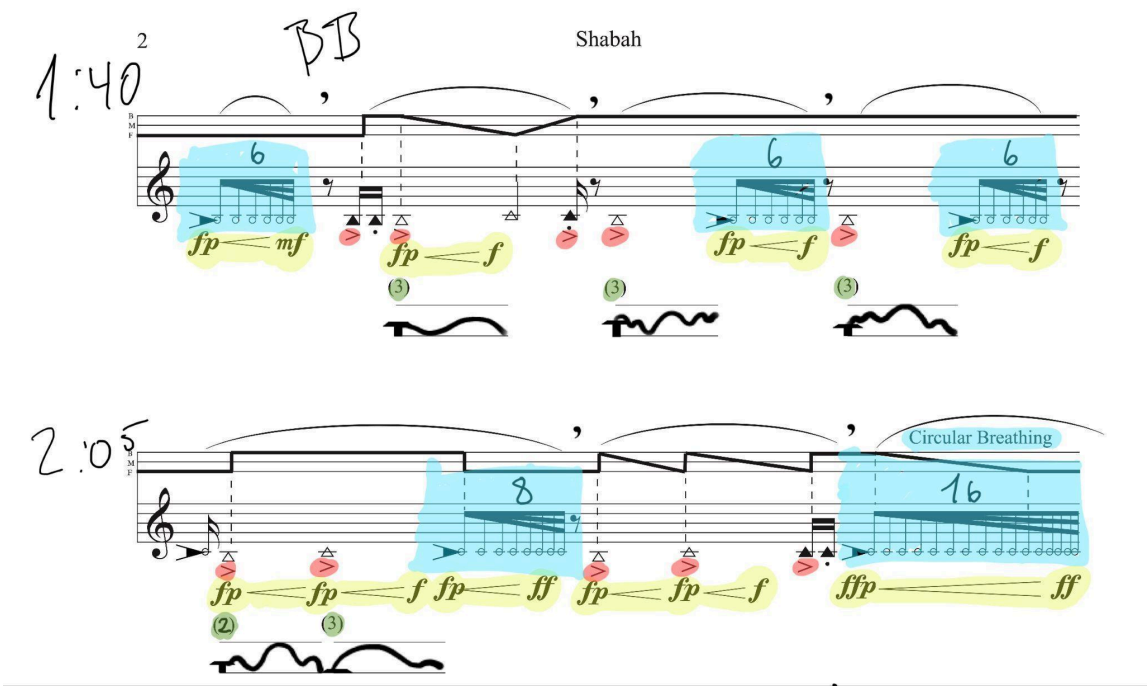

Image 3.19: Page two of *Shabah. 1:40 - 2:30, end of section one*

Section 2: Extreme Noise

Section 2 begins with extreme noise at fortissimo from the front bell, the sound of extreme noise in the context of the piece at this moment similar to screaming. Throughout the section are six pivots of my upper body moving right to left. While I am pivoting spatialized motion between the front and back bells occurs, however, in conjunction with the pivoting directs the sound not only front to back by left and right. As I face left around 2:42, a new spatialization of the bells is introduced, a blend between front and back. The half-valving of the bell valve allows for the sound to simultaneously come from both bells. As I slowly pivot toward the right, microvalve motions are reintroduced, filtering the screaming of extreme noise giving it a sense of spatial depth as I continue to pivot and move between the bells. A decrescendo beginning at 3:15 fades to niente, and after a brief silence, extreme noise returns from the silence. Now face forward again, a blend of the bells with slow microvalve motions trails for

thirty seconds as the sound moves to the forward-facing bell. A final decrescendo in the final ten seconds of this section, as extreme noise transitions to air tones at the softest dynamic of the piece.

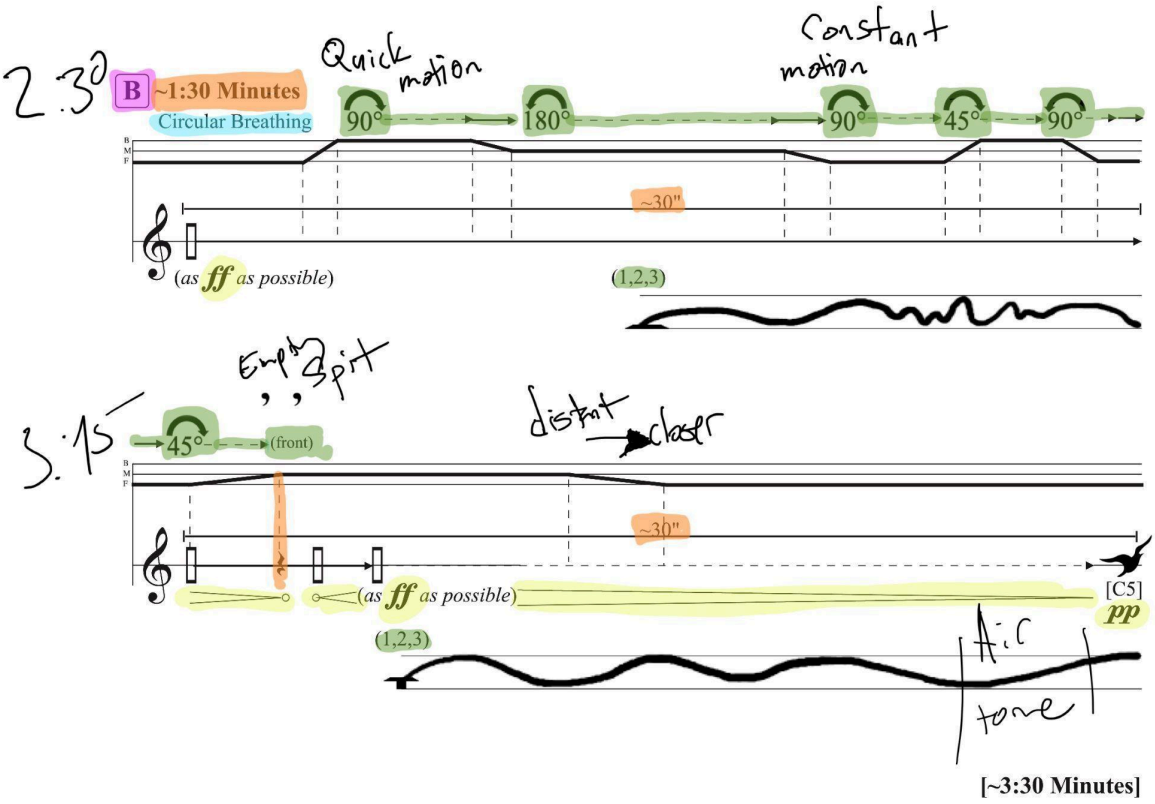

Image 3.20: Page two of *Shabah. 2:30 - 3:30, end of section two*

Section 3: Electronic Birds, Ghost Tones, & Split Tones

Section three is the longest of the entire piece (4:30 minutes), and as in the previous section, there are only momentary pauses, and both sections two and three are intended to be played while circular breathing. This section presents a quiet intensity of electronic birds, ghost tones, and split tones. The opening moment of section three at 3:30 has a medium density of

electronic birds, with rhythmic spatialization of the bells moving between front, back, and blend. From 3:30 - 4:50 is a mid-density of electronic birds, activity mostly between the two bells. There is a change to maximum density electronic birds at 4:50, until a transition to lowest density at 5:10, and the system concludes with a transition back to medium density. Ghost tones enter at 5:55, entering on note C, now one octave higher than the opening air tones and yet contain a similar amount of air in combination with electronic birds. Over the course of 5:45 - 6:52, brief moments of ghost tones enter into the texture of medium-density electronic birds moving between the bells. The ghost tone duration elongates from 6:52 - 8:00, the motion between the bells less active than in the previous sections of the piece as the highest density of the electronic birds increases at 7:45. The sustained ghost tone begins to transition to a split tone, creating a 4:3 ratio of the harmonic series on the fundamental C. The C acts as a resonance of the ghost tones preceding it. The following split tone descends to a 3:2 ratio of the harmonic series based on C, followed by a chromatic half-step split tone of the same ratio based on the fundamentals of B. Before the final half-step descent three octaves lower, I take the wawa mute from the mute belt and then play the triple pedal tone. The “[o]” phonetic sounding with the hand slightly covering the stem of the wawa.

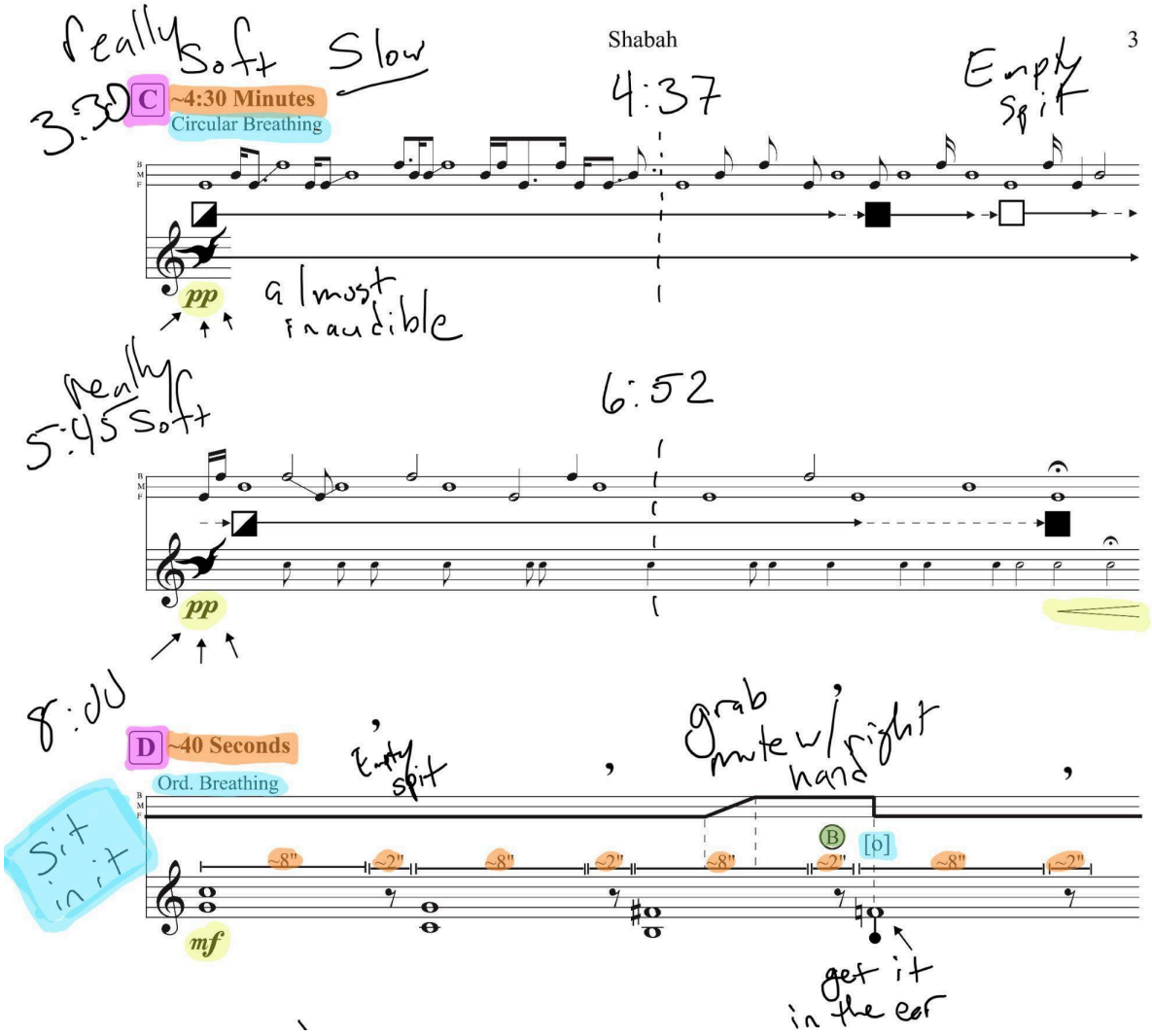

Image 3.21: Page three of *Shabah. 3:30 - 8:40, end of section three*

Section 4: Pedal Tones, Phonetics, and the mixture of techniques

The final section adds pedal tones, phonetics from the aural cavity and mute, and a majority of the previous techniques used throughout the piece. Opening the section, a triple pedal tone leads into a phonetic "[Tss]" sound further shaped by microvalve motions as a change from the front to back bell. The addition of the wawa mute in the front bell adds a slightly more filtered sound to the phonetics, removing more of the upper harmonic content. The spatial

transition completes a "[Pff]" phonetic sound, followed by a quick succession of triple pedal tones and a tongue ram that moves to the front bell. From 8:48 tongue rams, phonetics with microvalves, and triple pedal note interchange as the back bell and mixture are the primary spatialization. Two successive pedals in the front bell precede a phonetic change from the back to the front bell, leading into a triple pedal sustain on the front bell concluding the page at 9:00.

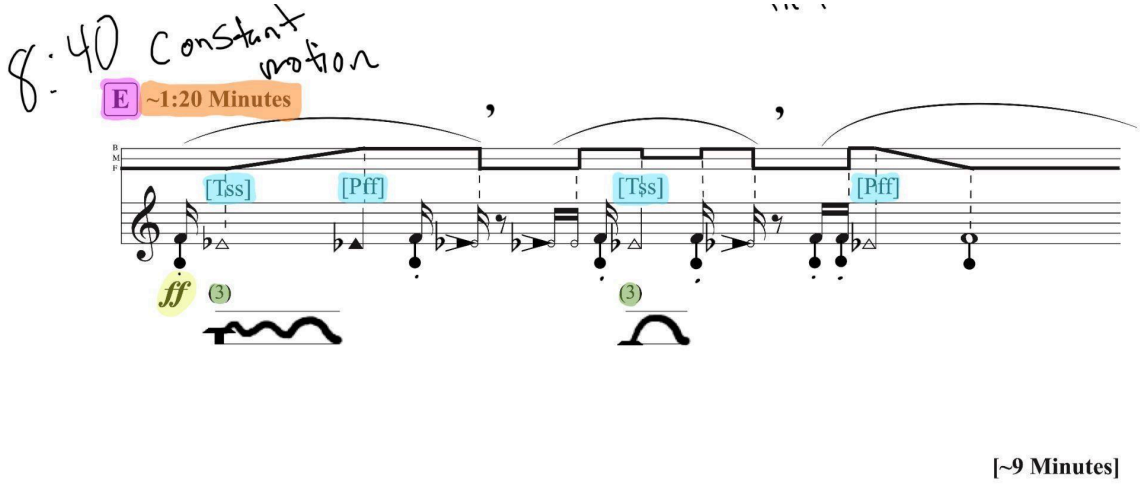

Image 3.22: Page three of *Shabah 8:40 - 9:00*

The final minute of the piece alters between the bells and sounds in a whirlwind string of phrases. The opening percussive tongue rams in the back bell act as a couplet, the first duo followed by a speeding of ten successive attacks. Two short triple pedals continue the rapid succession of tongue rams followed by a phonetic "[Tss]" shaped by microvalve motions. The final seconds of the system conclude with a change to the front bell, a triple bell tone phonetically shaped by my left hand covering the stem of the wawa mute, ending with a final tongue ram in the back bell. Eight rapidly speeding tongue rams begin at 9:15 in the back bell, followed by the phonetic "[Pss]" blended between both bells, further shaped by microvalve motions. A triple pedal tone sounds in the lower bell, and as it sustains the left hand removes the

mute placing it back in the mute belt. Two triple pedal tones followed by eight tongue rams increasing in speed as the bell moves to the back bell. The phrase continues with a brief "[Tss]" sound in the front bell, a sustained extreme noise blended between the bells, and a set of two tongue rams, spatialized back to front. A variation of the material from the opening of section four, 9:40 begins with triple pedal tones and sustained phonetics with microvalve motions interchanging as the spatialization moves from front to back. Dynamically shift from niente to fortissimo to niente on three successive phonetic sounds, the latter two with microvalve motions timbrally shifting the sound as it also moves from a blended to back bell slowly, and an abrupt change to the front on the final phonetic "[Tss]". Six speeding tongue rams spatially move from back to front, expanding to eight tongue rams in the next system, the spatialization again shifting from the back to the front. A single triple pedal tone in the rear bell sounds at 9:48, followed by extreme noise blended between the bells with a short rest before the final phrase of the piece. Moving from the back to a blend of bells, a phonetic "[Tss]" crescendos to a triple pedal tone on the front bell. Ten tongue rams increase in speed, moving from the back to the front bell, leading directly to extreme noise in the front bell timbrally shifting with microvalve motions while crescendoing to the loudest dynamic of the piece *ffff*. The lights on the stage turn off, as the performer removes the mask and hides the instrument beside them in the audience. After a brief moment of darkness, the stage lights illuminate the stage again signaling to the performer to stand and bow.

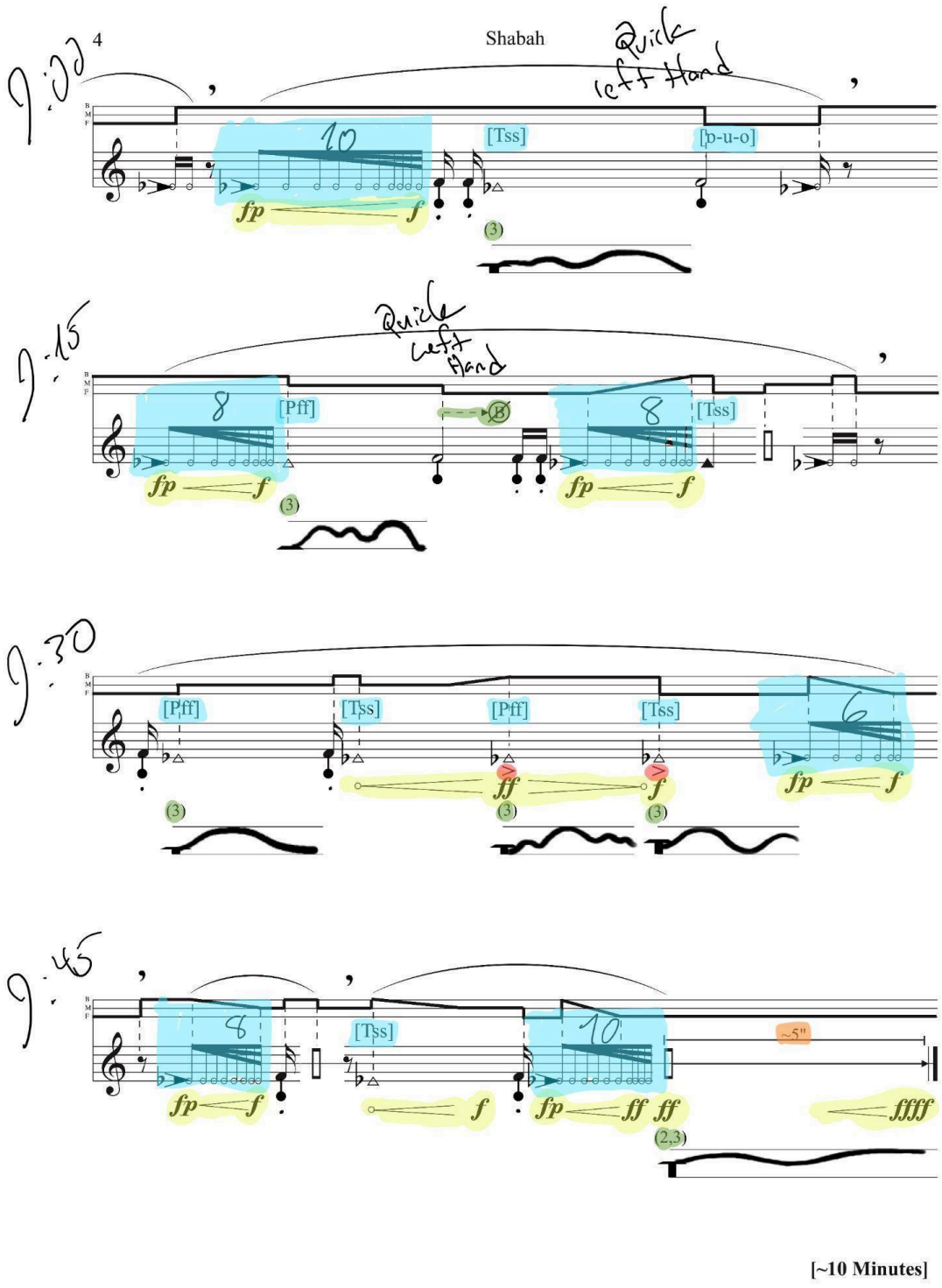

Image 3.23: Page four of *Shabah 9:00 - 10:00*

ii. Interview

On July 4th, 2024, I interviewed Nasim Khorasani, speaking with her about the process of collaborating on *Shabah*, the working process, parametric performance practice, and her experience listening to the piece for the first time. Below is an excerpt of the conversation we had, edited for correct grammar and concision.

David Aguila: I don't think the piece necessarily had a title, or a concept at that moment. But we were more exploring, the double bell trumpet and some techniques. And I am curious if you recall some of those early ideas that you had and could talk about it.

Nasim Khorassani: We started with the moment [to] have installation and have performance. How I can find you in a location giving [the] audience a map and in the meantime, we were doing a bunch of workshopping and research about how trumpet functions for you specifically and how you approach double bell trumpet. You introduced me to some different pieces that [were] written for double trumpet. I've listened to them, but what I noticed first [is that] they both like the double bell character [and] could have been used much, much more efficiently than just using one bell. You can leave a microphone in it without doing anything else with it, and adjust it. But correct me if I'm wrong. But I think nobody did like one to the front, one to the back. So coordination with the double bell. To get with the like spatial characteristic on that.

DA: I haven't seen a piece that explores it in this way at all.

NK: This has potential, and I'm going [to] use that [in] the best possible way. I'm also going through these processes of grief and different stages showing up. I want to also have a part of the people speaking of that voice as well. It's specific for [the] double bell, and something that researching all this possible potential with this implement as well as my interest in theatricality and installation. So the idea of hiding you somewhere turned into much more practical because as we got closer to the time and [the] setting of the date to what is going [to] happen when it's going [to] perform. We've been talking about this [for] over two or three years. It was like “Nasim, just write me a solo trumpet [piece]”. Okay, I will, and then, have you ever thought about this? Okay, I will. But then we got to this pandemic. And then we got closer to this. And you told me, Okay, there is, going be these women.

DA: The International Women's Brass Conference.

NK: Yes, it's going be that conference, and you’re going [to] perform this piece there. Okay now, I have to think more practical about the specific space, because, before that, I was thinking it's going [to] be [the] Conrad Prebys building. It's going be okay what I'm going have like these floors. I'm going [to] have these maps and stuff, but it is not going to work in any other place, and that is going to be the premiere of the piece. So in the meantime we were like we had and lots of lots of like research. All these notes, and we were improvising a lot in these practice rooms and exploring all these different timbres.

DA: I remember that moment in particular, or even those two sessions, we stumbled upon this thing and it was thought, I did it, but can I control it? I think there were quite a few of these moments where we worked and there was this conversation about these parameters, do these things. On the other side, you had envisioned certain sounds coming out and stumbling upon these kind[s] of ghost tones coming out of the electronic birds. I remember one session where you said,

“Oh, but I want this”, and we had tried so hard to make that [sound] happen, and we wound up [with] maybe it was this ghost tone in the electronic birds. What you originally wanted, and what was physically possible just could not align, but what we wound up finding was much, much better. A lot of the things that I feel that I've been doing with the trumpet is thinking about the parameters and the nuance of controlling them. When it comes to communicating that to a composer, what the mechanics are versus what sonically happens? I'm curious what was that like for you as well, between me explaining it (parameters) and us trying something sonically and then discovering something else.

NK: I was constantly thinking, you're giving me this information how I can push you further as a composer. It's not just about pushing you, it's also just about what I can make with this palette that will create [the] kind of magical events that I'm looking for. I remember we were really thinking about [it], I have the speaking part that starts at the beginning, and then it goes to extreme noise, and then from extreme [know] I wanted to go to electronic birds, but I wanted to be a transition. How can we make it a meaningful transition happening here? So we ended up exploring.

I think there was this issue, I don't exactly remember that we ended up, the circular breathing or something that was, you couldn't really decrescendo and crescendo to that. We had to come over the crescendo, and then a brief pause, breathe in and then it goes to the electronic birds. How can we make this transition from bird sound to split tones meaningful? We're going eventually all develop on that, ghost note develop, develop, develop. So then it goes to a pitch and then comes to these split tones, and then split tones open up and then boom, goes to the triple pedal with the mute. You are also thinking about how we can manage like this mute changing to be also a shock? Not a shock, but kind of more interesting than everybody seeing I'm (David) putting this mute. How it can be without a pause to put in mute, because we also have [a] double bell, it can do lots more than a normal trumpet. Again, using the actual double bell. Going to kind of like, okay, wrapping up the like conclusion part of the piece always said now, if, because the whole piece is the kind of dialogue between a ghost and me, or listener and me

DA: If you could share your experience listening to it [*Shabah*] during my recital, and particularly the experience. Even before the piece started, when you entered the hall. Even though your piece should be the first piece, there was a playback piece first, that set the tone. Could you talk about the lead up to and during?

NK: The best question you could ask me today. I was thinking, I'm the composer here, I know what's going happen, nobody is going [to] surprise me. Where the heck is he going [to] come to perform, everywhere he is going come, and I can see him. Suddenly, the sound was coming from back. I have no idea where you got [onto] the stage. I was thinking, “I'm the composer, and I am also being shocked here” which I was not expecting it to happen. “Whoa, this is crazy!”. The space is different, this space is flat, but the experience was strong. This experience was even stronger than what I had originally written. Janet told me, like she literally thought, that my piece was all electronic. She didn't know you were behind her performing. She told me, “what kind of a specialization she (Nasim) has used that is very to the point”.

4. Audio Production

My professional entry into audio production began in late Summer of 2017, working closely with Ted Taforo. Ted is a multi-instrumentalist, primarily a saxophonist, working within genres of jazz, film, and popular music. Ted and I first met while at the Eastman School of Music as undergraduates, and have been close friends and collaborators since. Ted and I have recorded some music for an upcoming album of his, and he would later ask me to master the album. At the time I had no idea what audio mastering was, but I accepted the invitation and did some research on what needed to be done. Since then I have continued audio mastering and freelance work as an audio mastering engineer. The skills I have learned not only from working in the field but also as an instructor at Point Blank Music School Los Angeles have provided me with opportunities to continually develop the practice. I would then apply the skills learned in audio mastering to mixing and recording engineering. Over the course of my studies at UCSD, I have had the opportunity to record not only myself but colleagues and instructors. The experience in the audio production process from recording to mixing to mastering has been extremely rewarding and beneficial to my work. I have been able to prepare large recording sessions of instruments, using different types of microphones in specific configurations to capture the exact sound I want from the instruments I am using. Working within the DAW, I have been able to learn how to properly use audio devices, such as compressors, saturators, and signal paths with external gear to refine the recorded sound and prepare the mix for audio mastering.

The work on *(+2dB), hide*, *Play Radio*, and *white tiger, as well as the remaining pieces from my album Configurations of the System,* are the culmination of my work within audio production: recording, mixing, and mastering, audio processing both live and post-production,

microphone placement and choice, and overall comfortability when entering a studio regardless if it is a new studio or one I am familiar with. This chapter will focus on the process and methods: of recording, live processing, composing, and creative post-production, in how I created the works presented on my recital *ghost tones* and also apply to the pieces on my album. The second portion of this chapter will guide the listener through each of the four acousmatic pieces from *ghost tones*, placing the attention on the moments and sections of the pieces.

a. Recording, Live Processing, Composing, and Creative Post Production

The four acousmatic pieces: *(+2dB)*, *hide*, *Play Radio*, and *white tiger*, all began with a main thread throughout to play, record, or sample the trumpet for each piece. Whether the trumpet is explicitly audible or not is not the intention, but to present new configurations of what I could create with the trumpet. Concepts of parametric performance practice with the trumpet stem from my work with synthesizers, research on early electronic musicians, and audio production, culminating in the intersection of the two with these pieces. In *(+2db)* and *Play Radio* curiosity arose from my research of electronics, how I could take working practices from early electronic musicians or generative synthesis techniques to translate these working practices to modern DAWs such as Ableton Live. My intention wasn't to recreate works but to take some of those working practices and see what is possible with current technology along with the thread of trumpet. However, in using these working practices I placed limitations on how I could create from the fundamental tool set of the trumpet, Ableton Live, and the research interests. Limitations I place in my creative practice challenge how I use the creative tool, forcing me to pursue different methods than I would normally to create a piece.

In hindsight, a larger working process began to coalesce into a fluid repeatable working practice of recording & live processing followed by composing & creative post-production. This

practice was influenced by my background in performance, composing notated music, working with electronics, and improvisation as both a trumpet player and electronic musician, but was not explicit during the process. Two main sections of how I document live performances through recording & live processing, followed by the organization of materials as composition & creative post-production are malleable, and do not necessarily follow a linear trajectory from one to another. However, the process of each exists within my practice for each piece and is documented within a larger archive for each work. It is during the latter part of composition and creative post-production that documentation and archiving became most apparent, and as I write this document has been important to my accuracy in detail. My obsession with documentation and archiving can be traced to my master's degree studying with Vinny Golia, who is a faculty member at the California Institute of the Arts performer-composer area in the Music School. Vinny is a multi-instrumentalist, focusing on woodwinds as an improviser as well as composer. I once had a lesson on a piece I had been working on for a few weeks permanently deleting a section of the score. Vinny shared that “even if a section doesn’t fit the current piece it could still be useful at a different time or piece”. Vinny’s advice is pertinent when documenting my project save files within Ableton Live, each of these pieces has multiple or even dozens of files organized by date that can easily be accessed and recalled. By archiving my work in this manner, each step of my process maintains the integrity of the session's trajectory. Documenting is also fundamental to how my improvised experiments on concepts are recorded, maintaining the integrity of the vision of the piece without necessarily the need for recreation of the moment, as in some cases the ephemerality of the moment is what makes the content valuable for the later stages of my process specifically in *(+2dB)* and *Play Radio*. Both of these pieces were documented improvisations in their initial file containing the original processing path or full

recording unaltered revealing the methodology: *(+2dB),* or full unaltered recording revealing transitional moments that may not serve as musical content, but as an exploratory path to material that will later become more useful as material that can be extrapolated: *Play Radio*. My process and inspiration, along with an analysis of the pieces and the process will be further explored in the following section providing context for my working practice within the larger section of audio production. Each of the four acousmatic pieces of *ghost tones*: *(+2dB), hide, Play Radio,* and *white tiger*, is contained on my first solo album *Configurations of the System* along with four other tracks that were not included in the *ghost tones* recital, but involve the same working methodology as the ones I will discuss.

Recording these pieces is akin to creating an archive of documentation since once each experiment is prepared, I will document the process utilizing recording emphasizing musical creation without reliance on future reinterpretation or reperformance. The recording format I use varies, at times I use a DAW as a hub to record using a microphone connected to an audio interface and then the computer into the DAW. The sound sources from the microphone: such as my trumpet, voice, objects, electro-acoustic instruments, and audio effects processing I consider each as a sound source. At other times, the recording is done with a field recorder using built-in microphones or additional direct inputs that will be saved on an SD card, to be later transferred to Ableton Live. In keeping organized file structures on my computer and external hard drives, locating materials from each of these projects has been beneficial in recalling projects for this dissertation easily. By logging these performance experiments by recording my fear of losing a piece of the process is reduced, and I can return to what Vinny told me if it doesn't fit the intentions at the current moment.

Image 4.1: Photo from the recording session of *Configurations of the System*: *Gazelles die like this behind bars*. Photo taken by Kiki LaPomme

Live processing of a signal transforms a sound through the use of audio effects. The transformations allow sculpting to alter the spectral content through harmonic excitement or removal, add a spatial dimension, give motion through modulation, transpose, pick apart certain signals by focusing on small moments, and more based on the devices used. When processing within a DAW, the parametric changes can be recorded allowing for changes at a future moment maintaining the unaltered source material. With analog devices, these parametric changes are documented in recording due to the difficulty of recreating the exact timing and amount of parametric change. Throughout these acousmatic pieces *(+2dB)* and *Play Radio*, I treat live

processing like a performance, recording the parametric changes of the signal as audio rather than documenting the parametric changes themselves.

Improvisation as a method of composition is essential to the experimentation process, and documentation via recording acoustic or live processing in the context of these pieces is crucial. The experiments for each of the pieces have been crafted based on my use of synthesizers, research on early electronic musicians: such as Karlheinz Stockhausen, and audio production, however, the performance aspect is always improvised. Working as an improviser challenges me as a performer to create without repetition, my mentality is to create, consistently develop, and challenge myself. My mentality comes from my experience in playing orchestral works that did not challenge me creatively. I felt my role within the orchestra. was based on the consistency of repeatability of the works in a specific framework of playing the trumpet. Now how I approach the trumpet and method for creating music allows the documentation of the performance to later be organized fully into composition & creative post-production placing my attention on present-moment creative practices that are continuously developing. From my album *Configurations of the System* the works of *(+2dB)*, *Drone Travel*, *Gazelles die like this behind bars,* and *secret concreté* each exemplify this working method. The process of recording and organizing the material into composition can be rather condensed, providing clarity for the following steps in the process or piece to be fully realized. The time frame of the entire process for a piece from start to finish is very condensed, taking only a few days to complete, leaving the final process of audio mastering as one of the longest to ensure an accurate representation on all speaker systems, and in a few cases returning to the recording phase for additional material.

Once the library of material has been recorded and organized, I begin the compositional process to create a repeatable piece. My compositional process is more through composed rather

than pre-planned. The limitations I set for each piece force a certain method for organizing audio clips. I primarily work in Ableton's Arrangement View, which is a timeline-based layout on the horizontal axis, with tracks of audio content stacked vertically. I find the arrangement view similar to that of staff paper when composing, with the ability to layer different samples from the library of recorded material. Layering material of varying densities and intensities provides, splicing sections into smaller increments, reversing, elongating, or shortening some of the techniques I use on these pieces creating a set of high and low points as the piece, or I may decide to have a piece at full density and intensity throughout. How I extract what sample and its placement is partly due to my memory of the performance, or listening through the performance reacquainting myself with the library to find what I believe is the best fit for the piece.

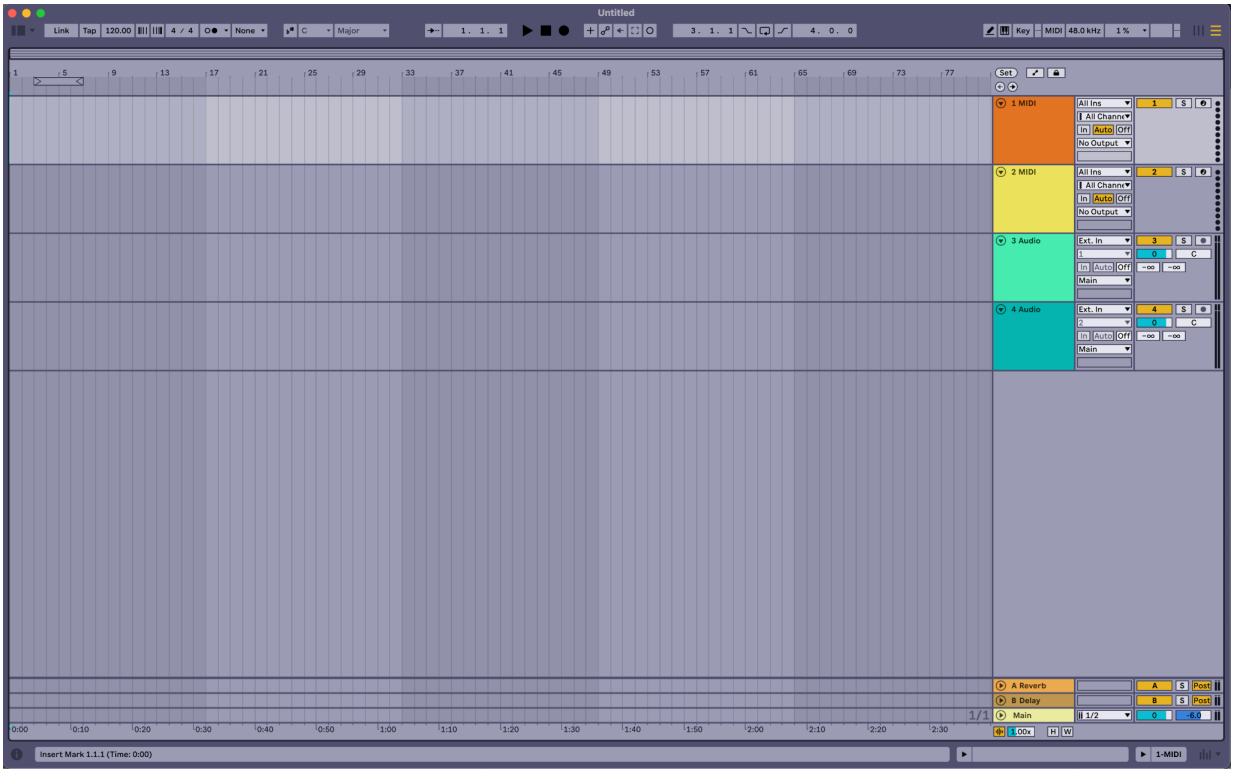

Image 4.2: *Ableton Live Arrangement View*

Processing through audio effects can also be added to each track, with the ability for parametric change over time that can be drawn or performed into the track. Unlike live processing, parametric automation is not printed to audio, instead, these changes are written as MIDI data allowing for continual adjustments of parameters as needed. The parametric changes do not only apply to audio effects but can also be made with spatial panning and volume for each of the tracks. When placing audio into a track, Ableton allows the ability to alter how the audio clip can be played in relation to beats per minute using the warp function. Warping is a set of time stretch algorithms that allow adjustment of the duration of the clip, based on the type of audio. An example is a drum beat with the "beats" warp algorithm, that allows for more precise time alignment to the tempo and grid of Ableton Live. Most of the warp algorithms allow for time-stretch or time-compression without altering of pitch, and warp markers can be placed anywhere within an audio clip to make adjustments in time as desired. Unlike tape, these warp algorithms allow for the altering of pitch solely without altering playback speed and can be helpful when aligning samples to a grid. However, the "repitch" warp differs from the other algorithms and mimics tape adjustments with speed and pitch, being the more compressed the time the higher the pitch and faster the playback duration, and the more stretched the lower the pitch and elongated the playback duration.

Utilizing Ableton as a creative audio production studio extended beyond processing and recording into the realm of mixing and mastering. In relating mixing and mastering to my experience in performing ensembles: recording is similar to practicing of the individual part that will then be rehearsed with the group, it requires the individual musicians to prepare by themselves. Mixing is similar to the rehearsal process making adjustments throughout the work to realize the piece, in an ensemble setting the conductor makes adjustments to musical moments

for balance between different groups of instruments within the ensemble. Mastering is the final quality control before it reaches the listener's ears, and I see this as a live performance with an ensemble. An obvious difference between a live ensemble and a recording is an audio recording how accurate the reproduction on stereo speakers is due to not having discrete sources for each sound source, requiring dynamic and spatial awareness to balance the elements in a piece. During the mixing phase, these elements are in mind, but this can also be a very creative aspect of the working process, where audio effects, choices in dynamics, spatial panning, and muting elements are some of the many choices that can be made. The attention to quality control of the reproduction of the mix phase occurs during mastering and is the final check to ensure that the audio is reproduced consistently across all playback systems. While this phase can be more corrective and technical, there is room for creativity using EQ to tonally balance, compression to balance dynamics, adjust the spatial components, add saturation for additional harmonics, and increase loudness. When working on an album, mastering engineers can also sculpt the dynamic arc from piece to piece, similar to the dynamic differences in a symphony, and also add additional gap time between tracks. Albums that have seamless gaps between tracks and arcs of dynamics that I've listened to for years are System of a Down's albums such as *Toxicity, Steal this Album, Mezmerize*, and *Hypnotize* all have minimal gaps between tracks, whereas albums like *Kid A* from Radiohead and *Melody A.M.* from Röyksopp have overarching dynamics between tracks. In *Melody A.M.* the tracks alternate with odd numbered tracks containing vocals, and even numbered tracks being instrumental, swaying dynamic attention between the middle of the mix with vocals present a wider stereo image of the instrumental tracks. In Radiohead's *Kid, A* global dynamic range between tracks is explored, in *How to Disappear Completely* acoustic instruments are placed more in the foreground of the mix, whereas electronic instruments are

placed off to the sides and have a greater sense of depth. *How to Disappear Completely* follows the bass and drum driven *The National Anthem*, with a repeated bass and drum rhythm that occurs throughout the track. At moments electric guitar and synthesizers enter in the sides of the stereo field adding density to the track, in the latter portion of the piece a baritone saxophone, trombone, and trumpet improvise over the drum and bass groove filling density and frequency ranges.

The final stage before finishing each acousmatic piece was to master it for consistent playback across all listening environments. This process requires minor adjustments for tonal balance, dynamic balance, and loudness. Each track has a distinct compositional and creative production phase, with my approach during the mastering phase consistent in the use of audio plug-ins throughout. I did a second revision for each of these pieces, after purchasing additional analog equipment that added more texture, warmth, and brilliance to each of the pieces. Since my work had been entirely digital until this moment, these three qualities when using analog equipment were transformative, adding more nuance to each track. The limitations of working digitally and with a limited CPU ability with my computer, the analog gear added an overall global cohesion for each of the pieces, that was more audible when listening to a collection of these pieces or my album. My process for mastering began with sending the final mix from Ableton to the external EQ with the signal flowing to the compressor, each adjustment with the analog gear was sculpted before recording the entire piece into Ableton through the analog equipment. From there, I then began to work within Ableton utilizing third-party plug-ins to make more precise changes before exporting the final masters. Some of the more common third-party plug-ins I used were from FabFilter: Pro-Q3, Pro-L2, Pro-C2, Pro-MB, and Saturn 2, Waves: Abbey Road Chambers, Abbey Road Saturator, C4 Multiband Compressor, and L2

Ultramaximizer, as well as stock Ableton Live audio effects: EQ Eight, Multi-Band Dynamics, Hybrid Reverb, Dynamic Tube, Limiter, and Color Limiter. I intended to create a cohesive sound by using the same external equipment and plug-ins throughout. My methodology is by using the same plug-ins for each piece, I can create a globally cohesive sound, adjusting the parameters of the audio effects for each piece. The reward of all of this work was hearing it in rehearsals for *ghost tones* with every bit of detail coming through clearly and balanced as I had heard in my home studio.

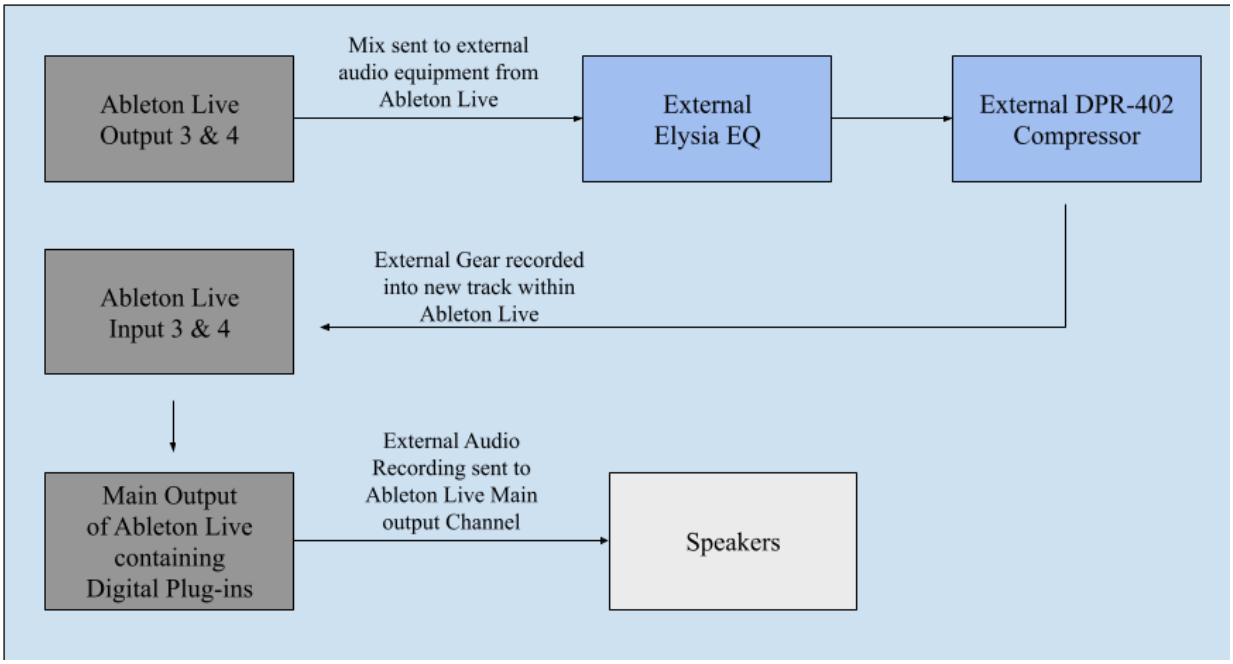

Image 4.3: Audio Mastering Workflow: Ableton Live & External Equipment

Image 4.4: *External Mastering Equipment: Elysia XFilter Mastering Edition & BSS DPR 402 Compressor*

(+2dB)

(+2dB) is exemplary of taking inspiration from a working method, recording, and live processing aspects of the practice for these pieces. I was inspired by Karlheinz Stockhausen's electronic work *Kontakte* and how he was able to take a series of pulses recorded to tape, altering the playback speed of the tape to raise or lower the pitch. Not only did the series of pulses when sped up create pitch but the rhythm is what created timbre. Stockhausen explains the process of creating the electronic tape during his 1971 lectures in London recorded by Allied Artists, and compiled by Robin Maconie in his book *Stockhausen On Music*[17]. With the use of the second tape machine he was able to create a delay, and along with a bandpass filter was able to select certain frequencies to be more or less present. Completely fascinated by the process of literally sculpting sound from a series of pulses I studied the score for *Kontakte*, attended the Stockhausen Courses in 2017 as a Sound Projectionist participant working with Kathinka Pasveer, visited the WDR studios where the original equipment is stored, and had the pleasure of hearing the piece live nearly 20 times.

> What we perceive as rhythm from a certain perspective, is perceived at a faster time of perception as pitch, with its melodic implications. You can build melodies by changing the basic periodicity, making it faster or slower for the sound to go up or down in pitch respectively. Within the basic period which determines the fundamental pitch, there are

[17] Stockhausen, Karlheinz. 1989. Stockhausen on Music: Lectures and Interviews. Edited by Robin Maconie. N.p.: Marion Boyars.

> what I call the partials, which are subdivisions of the basic periodicity, and they are represented here by the inner divisions making up the original rhythm. These are perceived as the timbre.[18]

During the pandemic, I had started to imagine how I could create an Ableton project to create my own sound from pulses, and using only filters and an echo. These were my limitations of materials to work with, and from here my working method began to develop for the piece. I made an initial recorded sample of myself playing tongue rams on the trumpet 0.5 seconds in duration, the tongue rams are a rather percussive sound and like Stockhausen served as a series of pulses. A creative limitation I placed on my work was to make an iterative process of recording creating a signal flow in which the sample would flow into one audio effect, recording into a new track, recording only the audio with parametric changes, mimicking a direct-to-tape recording, taking the recording and running it through the next audio effect, repeating the altering of effects from the previous set of recordings. I prepared a track with a bandpass filter (BPF), followed by an additional track with an echo effect turned off since it would be used in the next recording. My improvised performance used the audio of the tongue rams passing into the bandpass filter recording the parametric changes I made as an audio file, with the primary parameters used from the filter: frequency and Q (width of the band of frequencies audible), recording several takes of improvisations using these two parameters until I had a small library to choose from in Ableton Live's Session view. Ableton Live's Session View is a vertical layout allowing for the rapid creation of loops or samples that can then be recorded or organized in Ableton Live's Arrangement View for consistent timing of events.

[18] Stockhausen, Karlheinz. 1989. Stockhausen on Music: Lectures and Interviews. Edited by Robin Maconie. N.p 92.: Marion Boyars. (Stockhausen 1989, 92)

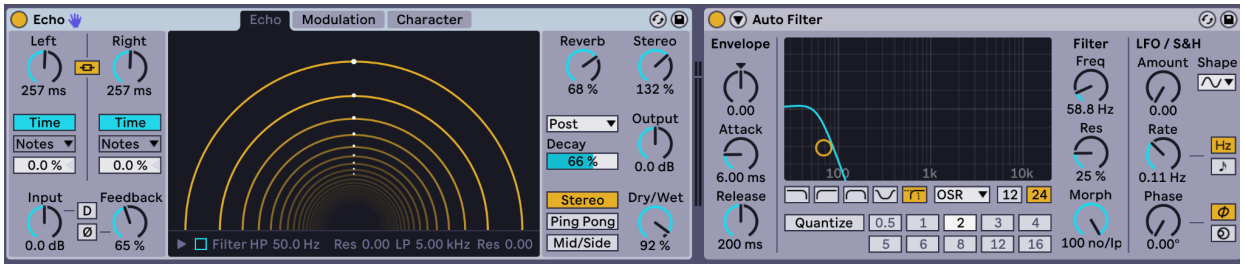

Image 4.5: An instance of *Echo and Auto Filter from Ableton Live Session of (+2dB)*

Selected bandpass filter recordings from the library were then sent to the track with the echo to then be recorded into a new track with a new bandpass filter turned off. For the echo, there were several more parameters available, from delay times independent from the left and right, feedback, reverb & reverb amount, and the offset time that creates a swing feel. As with the filter I recorded several improvisations from different BPF library sources using the echo as the main device until I then had an echo library. I continued the process of sending the echo into a new BPF track, followed by a new echo track, continuing to create libraries of samples that could be used for composition. By recording with this process each library of source material from a previous live process improvisation is preserved, to later select specific recordings from the global library to be used in the compositional & creative post-production phase of the piece.

The compositional process for *(+2dB)* was extremely fast, and the library of recorded materials was chosen and organized within Ableton Live's arrangement view in the same working session. Since the entire process was condensed I was able to rapidly select samples, layering them creating a compositional arc for the piece. There was very little post-production work done at this phase of the process. However, during the mastering process, there was one additional element of correction needed toward the end of the piece due to a low tone sustaining and was corrected by automating a compressor for this specific frequency band. Due to the piece having a large dynamic range, the amount of compression and type of compressors needed were

dependent on frequency range, dynamic range, and specific moments in the piece. Working within Ableton allowed me the type of control over different frequency ranges with a Mulit-Band Compressor, the parameters refined for each of the needs of the excessive low range dynamics.

hide

The initial phase of recording and live processing for *hide* and *Play Radio* were similar, due to travel in early 2020 to Den Haag, in the Netherlands as I was conducting research at the Library, the Royal Conservatory Den Haag, and in Kürten, Germany at the Stockhausen Archives. I had limited space in my suitcase to bring equipment at the time, but was fortunate to pack smaller electronic instruments alongside my computer, Shure SM58 dynamic microphone, Motu interface, and Zoom recorder. The roster of instruments included a KOMA Field Kit: a small semi-modular instrument with contact microphones that can convert audio to control voltage or physical interaction as control voltage that can be sent throughout the instrument, a radio: with AM, FM, and Shortwave options including with single side band control as well as volume and tuning, and an Arturia Microbrute synthesizer that has a unique multi-mode Steiner Parker filter that can be used in either low, high or bandpass mode along with the "brute factor" parameter for feedback of the signal into the filter. Both were recorded in the apartment I was sharing at the time with a local visual artist and photographer, Philine van den Hul, whom I asked to add vocals on *hide*. Both of these pieces were recorded quickly, *hide* over two days, and the majority of *Play Radio*'s material was in one evening in February 2020, with additional recording in 2022 in San Diego, California.

The inspiration for *hide* came from a series of drones recorded from the Arturia Microbrute, that I processed and layered to create modulated evolving drones. Rather than

recording into Session View, I recorded directly into Arrangement View to begin the composition & creative post-production process simultaneously. Before leaving San Diego, I had created an Ableton Drum Instrument using samples from a Roland TR-626 drum machine my uncle had given me a few years prior[19]. Unfortunately, the TR-626 was not only much too large to bring to the Netherlands but was having issues with sequence playback, and by recording samples of each drum instrument it allowed for more creative ability to MIDI program drum sequences which I provide more detail during the composition & creative post-production process section. Additionally, I recorded a sample of a single sustained trumpet note, KOMA recordings of objects on surfaces and the motor atop contact mics, and both Philine and my voice speaking lyrics I had written. These additional elements were all recorded very briefly in only a handful of takes.

The piece opens with a droning synth that is slowly modulated creating a skipping feel throughout the piece. An amalgamation of seven different drones is layered and overlapping throughout creating the textures and a harmonic framework for the additional instruments and voice. These drones from the Arturia Microbrute contain additional harmonic due to the waveshaping of the Microbrute oscillators and are sculpted in post-processing filters and compression plug-ins within Ableton to blend each into the amalgamated drone. The vocals for Philine and myself contain three layers, two of which are slightly processed versions of the voice for clarity while the third is heavily processed with audio effects to create distorted harsh grains in the voices. My voice has an additional set of audio processing, with delays and fuzz, that catches my voice creating blips and screeches that decay with the use of the echo's built-in

[19] The Roland TR-626 is a 12 bit drum machine made in 1987. To create the samples of the TR-626, I recorded each of the 30 different sounds into Ableton Live. After editing each of the samples length, I placed the samples into a drum rack, a software MIDI instrument within Abltone Live. Once these samples had been organized within the drum rack I saved the drum rack instrument in my Library within Ableton Live.

reverb. The layered trumpets all come from a single sample that was, warped with a complex algorithm within Ableton Live, and repitched in to maintain the exact durations for each. This is one of the clearest moments of trumpet in the acousmatic pieces but also melds with the other drones as the quartet blends with the use of reverb. There are small textural elements of the KOMA's contact mics, picking up patch cables brushing against the surface of the KOMA's lid along with some marbles rolling.

The MIDI programming of the drums utilizes an approach I had developed a few years prior, where I would set the tempo to half that of the original to sequence a pattern. I found that working at a slower tempo allowed my ears to place each drum sample temporally to create a more cohesive groove. My inspiration for drum programming came from years of listening to Radiohead: *15 Step*, Thom Yorke: A *Brain in a Bottle*, and Björk: *Where is the Line* electronic drum sequencing, these tracks in particular felt frantically evolving but always tied to the tempo securely. My original sequence was two bars, and within Ableton Live it is possible to duplicate a sequence's MIDI duration by two. Doubling the duration I made minor changes, before doubling the duration again from now four to eight bars, and repeating the process until I had a sequence that was 32 bars in total. Even at the slower tempo the drum sequence had a type of groove to it, and when I set the global tempo to its initial rate the result had the freneticism and evolving consistency that I heard from my inspirations. The opening few hits of the drums, before the full sequence enters, were chopped from the MIDI sequencing and placed as a preparation for the listener that the stagnate drone will become much more active. The drums are sampled from a Roland TR-626 drum machine and are heavily processed to add impact for each hit since the 12-bit sounds from each do not have much weight for each transient. Due to the heavy processing of audio effects on all of the tracks, my CPU was rising above 100% creating

dropouts[20] in the audio. To alleviate the dropouts I underwent a process called freezing, which essentially takes any audio processing "freezing" to audio. The freezing process allows any track to be unfrozen, allowing for parametric changes to occur, and can then be frozen again. With the drums, not only did they have to undergo the freezing process, but also, were "flattened", which takes the full processing creating new audio of the processing and thus reducing the demand on the CPU.

> Live's Freeze Track command can greatly help in managing the CPU load incurred by devices and clip settings. When you select a track and execute the Freeze Track command, Live will create a sample file for each Session clip in the track, plus one for the Arrangement. Thereafter, clips in the track will simply play back their "freeze files" rather than repeatedly calculating processor-intensive device and clip settings in real time.
>
> You can also decide to flatten frozen tracks, which completely replaces the original clips and devices with their audible result.[21]

In addition to the main instrumental tracks, six return tracks are used in *hide* for additional processing for each of the elements, and for most tracks, multiple return tracks are used. The additional processing allows for the original signal to be sent to the main output unaltered, while a parallel version of the signal is sent to the return track to be processed before reaching the main output. One return track in particular is used on all audio tracks within the project, except the drums, and contains flanged reverb, adding space as modulation to the signal. A phaser, similar to a flanger but with additional notched bands of resonance, is placed on after the delay on the fluttering motor, trumpets, and jittering cables. In addition, the motor also is being sent to a bit crusher, saturated, and frequency shifted. A vocal sibilance removal return is

[20] Audio Dropouts occur in Ableton Live when either there is heavy audio processing on tracks, or when there are a large number of tracks within a project. Some audio processing plug-ins that model analog equipment typically require more computing power from the CPU and raise the usage to high levels. On older machines like mine, newer versions of Ableton Live in conjunction with these high CPU plug-ins cause audio dropouts, or breif moments when no audio is heard or clicking as the computer tries to interpolate the processing and audio simultaneously.
[21] https://www.ableton.com/en/manual/computer-audio-resources-and-strategies/

used for both Philine and my voice, with an additional reverb chamber for space. Finally, some filtered echo on the drums, allowing only the upper mid-range frequency band to pass through the effect. In the instance of the last two return tracks, these were sent to the first reverb for additional spatiality before being summed at the output. Pieces like *hide* and *white tiger* were more straightforward in their needs for mastering because of their minimal instrumentation, dynamic range, and duration[22].

Play Radio

In December of 2019, I performed Stockhausen's *Spiral* and *Expo*, both used an incarnation of the setup used for recording *Play Radio,* with the addition of the Arturia Microbrute's filter for the December performances, I opted to remove the Microbrute using only the KOMA Field Kit, and Radio for *Play Radio*. My creative motivation was a reactive system of audio and physical signals, using the KOMA as the main hub because of its mixer section and auxiliary output send. Two contact mics: one large and one small, the shortwave radio, and an LFO: that has three distinct wave shapes as well as three different speeds reaching audio rate, were sent to each of the four channel inputs of the KOMA. The lid of the KOMA was used as a resonant holder for objects: marbles, buttons, and bottle caps, with each of the contact mics placed on different ends of the box lid. Each of the four channels of the mixer has input gain, volume fader, send button, and a tilt EQ that acts like a teeter-totter, raising the high frequencies while attenuating the low frequencies or vice versa. The send output signal was sent to an envelope follower that converts amplitude changes to control voltages before finally being sent

[22] *hide* and *white tiger* both had a limited number of audio tracks, were more sparse in density, and were much shorter than the other pieces on *ghost tones*. The mastering process was more straightforward in regards to the EQ, Compression, and Limiting needs as these two tracks I viewed as experimental pop, in comparison to the more experitmental instrumental pieces of *(+2dB)* and *Play Radio*.

to the DC Motor that was also placed on the lid of the KOMA. This allowed me to send audio from any of the input channels to the motor, reacting and mimicking the source signal or combination of sources. The strength of the KOMA sends is that the signal from any channel is pre-fader, meaning that the signal strength is independent of the fader volume, and will send as if the input is gain staged properly.

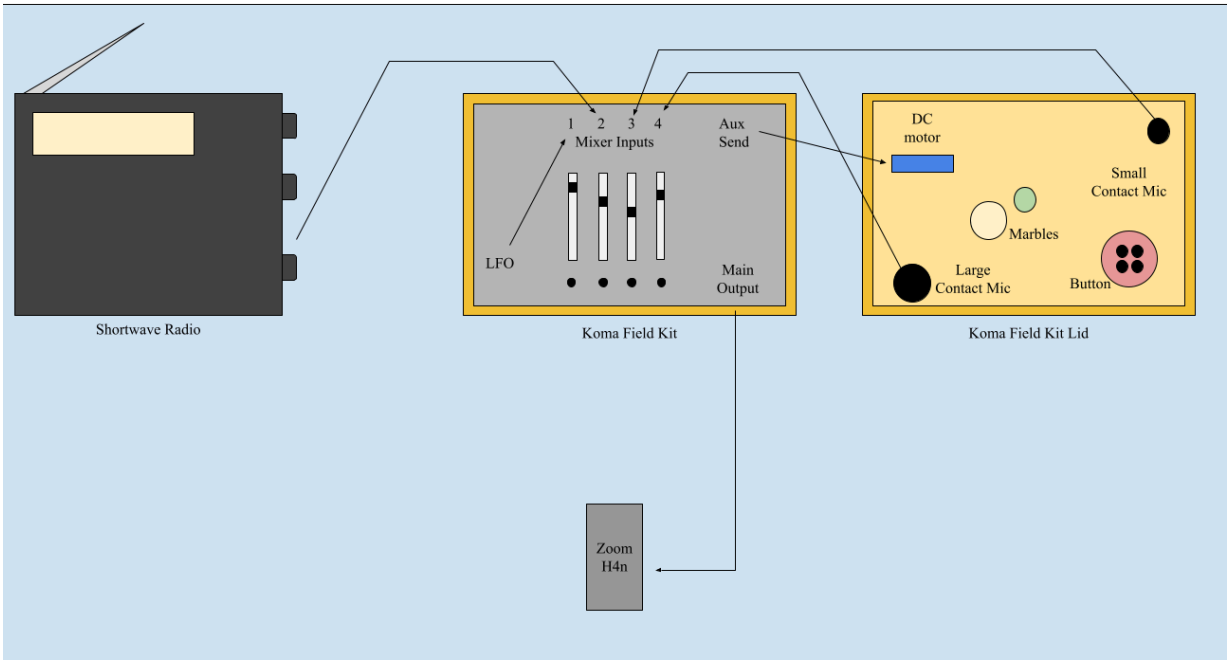

Image 4.6:*Play Radio* recording setup

The main outputs of the KOMA were sent to a Zoom recorder, in total the improvisation was over 35 minutes filled with a wide range of material of different dynamics, densities, frequency spectra, and recognizable and unrecognizable sources. I was fortunate the radio stations in the Netherlands were particularly unique compared to those in San Diego: ranging from pop music, news, and advertisements from different cultures not only from around Europe but India. Radio performance techniques were taken from my time working on *Spiral* and *Expo*, but instead of using the radio material as a source material for improvisation and process based

performance, I wanted to use the stochastic findings of radio as musical material. I am less interested in finding specific radio stations to record, but more in discovering the brief moments as I scan through the frequency bands. The material compiled in a library, is to later be used in *Play Radio*'s overall framework of creating self-generated musical interactions. The shortwave radio's single sideband had a particular active signal strength allowing for low rumbles to aperiodic squelches. After the recording, I had a large amount of material that would be used as a library for the piece, organized in Ableton Live's Arrangement view into sections labeled with descriptive titles that could be easily navigated. The piece would sit on a hard drive until 2022 before I returned to continue with the next phase of work.

Before returning to work on *Play Radio,* I had become very interested in self-generating patches in modular synthesis. These types of patches contain reactive parameters to certain events that then trigger a change in parameters that evolve slowly over time. I had used modular instruments and digital modular software, but I was more interested in creating a type of self-generating patch within Ableton, and this became the basis of the compositional process for *Play Radio*. Before designating parameters I began the process of splitting the improvisation I had done initially with radio, KOMA, and objects organizing the full improvisation with flags that detailed sections that then became the library of material to pull from for the piece. I began to organize the audio clips, creating a formal structure, and using a density of clips to oversaturate the ear with information. The duration of the improvisation was well over 30 minutes and decided to use longer sampled sections for the piece to avoid the minutiae of working with short samples, this also allowed for more interesting interactions when preparing interactions for the self-generating patch. Once I had organized the complete composition I began to add different audio effects, transforming the sound with processing, using Low

Frequency Oscillators (LFO) to change parameters, and gates that reacted to certain audio clip dynamics. LFOs were used with random waveforms to control the dynamic and panning of some tracks. Due to audio being used I couldn't generate audio, but instead used imported audio clips into a sampler, designating certain interesting regions. Now that the audio was in a format that could be manipulated via MIDI, I placed a sequencer and arpeggiator with values best suited for continuously evolving patterns of play, recording this just like live processing to a new audio track.

Due to the issue with audio not being able to generate new sounds, the decision was to have clips react to one another with the use of gates. A gate is a device that dynamically reacts, either allowing the audio to be reduced or allowed to pass through. One feature of the gate is that instead of listening to audio the device is placed on it to listen to a different track, reacting to the dynamics of the second track. The second track dynamics essentially control the first track with the sidechain gate. Some tracks had gates that were set to react to their own dynamics, one, in particular, had a gate side-chained to a track that had an LFO altering dynamics. One final track was side-chained gated to the track that was sidechain gated to the previously mentioned track. All of these gated layers in combination with the arrangement of never-fully overlapping audio clips created complex interactions.

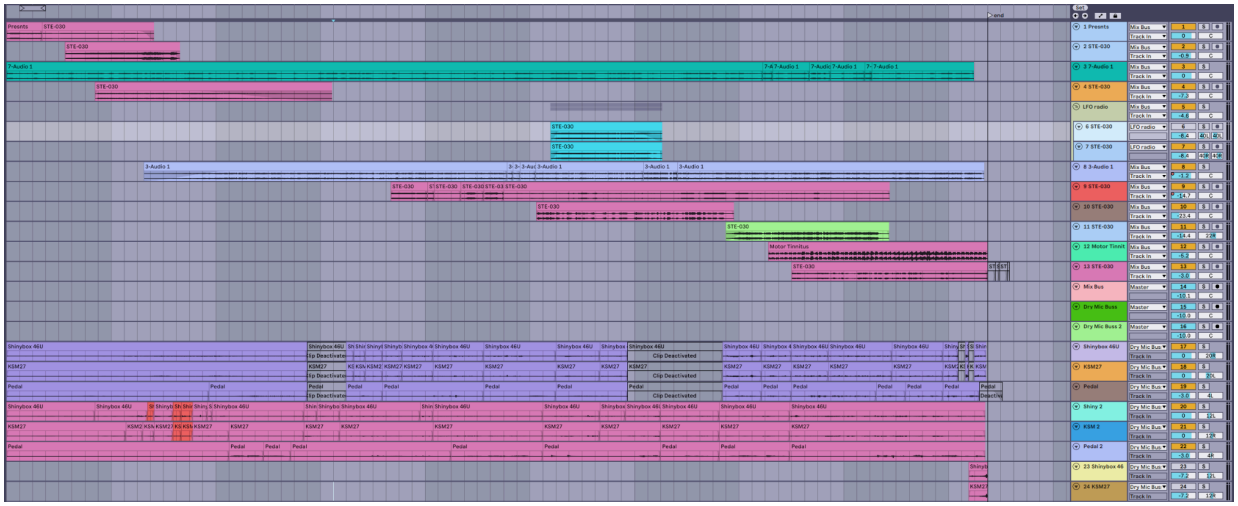

Image 4.7: *Play Radio* Ableton Live Arrangement

After all the complex gating, processing, mixing, and mastering had been completed, I still wasn't satisfied with the piece. I felt I had achieved a generative style patch with gated reactions, the structural arc of the piece, interplaying density, dynamics, panning, and interplay all worked, however, it never felt complete. I delayed finishing the piece for well over a year after this phase of composition had been completed, I would move on to other projects and experiments. One set of experiments had been working with a double bell trumpet with a lavaliere microphone taped to the inside of one of the bells that were sent to an effects pedal, the second bell had a wawa mute inserted. The initial lavaliere experiments began around the Fall of 2020 workshopping with Ulrich Krieger on his solo trumpet piece *Althing I*. I indulged in this sound world, exploring the microsounds available on the trumpet. Finally, I realized the one element missing on *Play Radio* was the trumpet, my intention with the trumpet was to blur what was the radio improv with the trumpet improv. I planned a recording session to improvise the live trumpet with the piece with minimal editing. The lavaliere mic would be placed inside the top bell running to the effects pedal with some EQ, compression, reverb, and volume control

with a pedal, the lower bell would capture the natural sound of the trumpet. The session was plagued with issues of monitoring and much of the time was wasted due to this issue, desperate to find a solution before my time ended. Luckily, breaking from trying to find a solution allowed clarity to realize a method to fix the issue immediately. I wound up recording two full takes over the playback of the piece. Each take was used and panned to the left and right respectively, the only edits made were two small sections of my improvisation, without any additional processing, and only balancing the dynamics of the trumpet with the rest of the piece. The blurring of what is trumpet and what is radio became a final coalescence of all the different elements of inspiration coming together. *Play Radio* required several mastered versions before settling on the correct settings to ensure the balance between the electronic elements and the trumpet is consistently audible.

white tiger

The final acousmatic piece on the concert *white tiger* was created in the Fall of 2013 almost a decade before the other three, and had just begun to use Ableton Live this being my first completed piece using the software. The inspiration comes from a nightmare of being taunted by a white tiger that puts me through tests and if I fail it will devour me. Limitations of the piece were to sample trumpet without playing it typically and to use only Ableton's auto filter device, and its Warp mode that allows for time stretching manipulation. I remember at the time being curious about how Warp mode worked and how it could create glitch-like effects with audio samples. I had written text based on the nightmare, recording my voice on the same Zoom recorder used in *Play Radio*. Recording as well as an improvisation of me using a cleaning brush for my trumpet mouthpiece and using my mouthpiece to tap resonant points of the bell of the

trumpet. The recording process was very quick, with automation of the auto-filter recorded after some initial adjustments of some of the samples via warping.

In *white tiger* the narrative of the text shaped the structural form of the piece, the text itself following the narrative of a dream I had. The dream or nightmare placed me on the shores of what seemed to be a deserted island with a faceless compatriot. Traversing through the jungle in front of a warehouse that spanned infinitely to my left and right with large hangar doors open allowing entry. Inside there were large crates scattered about filling the space in no particular order, other than to obstruct the pathway to the other side, which like the entrance I saw had large open hangar doors. Before we could enter, another faceless person was traversing the crates to reach the exit of the warehouse. Slipping, creating a raucous flash of white dashed across the warehouse, and in one bite a white tiger devours the faceless person. Carefully the faceless person and I traverse the warehouse, and just as we reach the end the faceless person slips falling onto a box. Before the white tiger could devour them, I offered to stay if the white tiger let the other person go. Agreeing, the white tiger decides to put me through endless tests in a rearranging labyrinth of crates within the warehouse.

This was a very early piece as I became more accustomed to working within Ableton, and there was one element that I was interested in Ableton's warp feature. At moments in the text, the warp function which is set to an algorithm for complex waveforms, is used to create unnatural stuttering in my speech pattern by creating warp markers and compressing time in small increments while also copying these audio clip splices. Throughout *white tiger,* I also alter the pitch of my speech within the audio clips and use an auto filter in low-pass recording changes to the frequency and resonance parameters. Similarly, I used this process on the constant noise of the mouthpiece brush moving through the mouthpiece utilizing both the the warp function and

auto-filter to imply variation of the audio clip when in reality it is duplicated to create an audio loop. The stuttering warped rhythmic brush became a foundation for the voice and sampled bell hit to rest upon. The final element of this piece was the samples of hitting the trumpet bell with my mouthpiece that were placed into a sampler that is similar to the repitch warp algorithm, but allows for parametric changes to that of a synthesizer, ie envelopes for amplitude and filtering, different filter options, tracking to register for parameter changes, and length of the sample to be played. Additional effects were added creating resonance on membranes, filtering, and saturation. The three main elements of starkness contrast that of *Play Radio* giving the impression of intensity by altering the vocal's pitch and stuttering warp.

b. Guided Listening

The previous sections detail the process of creating each of the pieces and this section serves as a guide for each of the acousmatic pieces from the *ghost tones* recital. The specific moments of events are detailed with time durations marked, allowing the listener to follow along easily and navigate sections of each of the pieces with ease and repeatability. The mixture of technical and poetic writing is intended to allow listeners with various musical backgrounds a means to gravitate towards certain sonic elements as they arrive. The lyrics of *hide* and *white tiger* are noted to add clarity to the intentionally manipulated vocals.

(+2dB)

The opening slow pitch descent from 0:00 to 0:32 of *(+2dB)* arrives at rhythmic resonances and clicks that originate from the sample of tongue rams performed on my trumpet. Harmonic resonances from the bandpass filter slowly evaporate, decaying into space from the echo transitioning from resonant clicks of the sample to low rhythmic thuds until 0:48. The low

thuds then become filtered descending further in the frequency range, before a cascading set of bubbling bandpass filters percolate overlapping echoes of the previous moments. Ratcheting of short delay times sways through the mid-range from 0:58 to 1:26 with less piercing resonance from the opening, steadying to a consistent rhythmic pulsing of ratcheting with bubbling filtered material that dynamically undulates from foreground to background. Suddenly a pitched ascent of compressed echo time rises and high feedback levels, leaving only the rhythmic pulses of the sample, slowly filling resonant reverberant space with periodic filter sweeps of the bubbling filter catching frequencies as it passes the sample. Slowly the resonance of the filter rises at 1:45, until meshing with the echo with long-delayed lines and reverberation parameter of the echo altering the percolating bubbling to cavernous aquatic shimmers. At 1:58 a descent occurs below the surface into the depths low pass filtering out more of the upper-frequency content, with the shimmers slowly decaying as the echo's feedback is reduced before a rhythmic pulse is reintroduced much lower. The rhythmic pulse is filtered from 1:58 to 2:23 removing nearly all of the frequency content in the upper and mid-range of hearing, before a compression of the echo's delay time raises the pitch before descending even lower. The rhythmic pulse is at its slowest and lowest audible recognizable instance at 2:32, as windlike bandpass filtering sweeps the upper-frequency spectrum, as the low rhythmic pulse undulates more consistently into the upper spectrum before a final descent filled with textured grains of short delay times with little to no feedback creating a white noise like static. 3:02 presents a powerful low-pitched and dynamically present pulse that takes over, the bandpass filter sweeping through the frequency range whipping like wind in the upper mid-range as the textured grains of the echo return. This moment continues as the filter slowly moves from within a more confined spectrum, as the timing of the echo becomes less unified between the left and right speakers at 3:47.

Suddenly a textured rise in pitch occurs from 4:00 to 4:18, this time with the use of the echo's time and feedback parameters rising until a tinnitus-like pitch and a low hum fade in, becoming louder as the filter and echo begin to create screaming wind pulses. The tinnitus-like pitch slowly begins to descend at 4:31 to 4:54 through the frequency spectrum transforming from pitch to pulses of the original sample, as the cavernous aquatic shimmers reappear. The rhythmic pulses become low thuds against the eardrum, as the pitch descends further into short clicks. From 5:17 these clicks begin to separate in temporal unification between the left and right speakers as I alter the delay offset on the right side, creating a hocketing rhythm. The rhythmic pulsing of the two channels continues to slow, revealing the original rhythm of the sample passing through the echo and filter. Layered shimmering cavernous echoing filters along with compressed textured static are added filling the low, mid, and high frequencies as a crescendo and slow decrescendo occur from 5:42 to 6:20, leaving a low hum of the rhythmic pulse at a low pitch, with the cavernous filtering fluttering to a final fade.

hide

Opening with a drone with a rhythmically skipping filter slowly upper-frequency frequency content, a new drone fades in at 0:08 much lower in pitch with more textural grains of noise before the voice of Philine van den Hul, a Dutch visual artist, and photographer, enters at 0:11. Her voice is wispy, yet distorted, textural to the second low drone, transformed through processing to giving an unsettling feeling. The rhythmic fluttering of the KOMA field kit's DC motor filtered in the background, panning left and right, providing a sense of pulse in the piece.

As Philine finishes the first verse, I echo Philine saying "no" with hawklike echoes from additional processing of frequency shifters, echo, and fuzz on my voice. The whispered verse of

text provides airiness in the voice for the processing to catch and transform. Before the third set of “no”, a drum machine enters at 0:37 in what seems to be a subdivision of time, but when the entire drum machine is in 0:41 the pattern of the loop gives the impression of variation due to the shifting downbeat creating a slow evolving groove with the voice and drones. Just as the full drum pattern enters, a quartet of trumpets enters at 0:41, sampled from drones I recorded for this piece, creating an E Major 9th chord in first inversion providing a sense of harmonic stability and relief from the ambiguity of the drones. The second verse begins with Philine saying “I’d”, which is somewhat masked in obscurity by the processing and can be perceived as “hide”.

Verse 1: Philine
Hide.
I don’t want to hide this anymore.
Pushing this.
No. *Echo no* (David). No. *Echo no* (David)
No. *Echo no* (David)

Verse 2: David
I’d (Philine)
This reality from truth.
Sinking through.
Poof. Soot. Uncouth.
“Th” of Uncouth (Philine)

My voice continues the second verse, with the same processing as Philine, with the additional hawk-like audio fx chain, and blend of dry vocals for clarity. My vocals catch the additional processing chain creating blips of my scattered delayshocketing with the drum machine, as the trumpet quartet and drones contrast the rhythmic density with calming harmonic stillness. My voice, drums, and trumpet quartet end simultaneously at 1:21 as the final sustain of the drones continues with the motor, as vocal echoes along with the fluttering motor continue. Brief moments of processed resonances of cables and marbles on contact mics enter at 1:29 as the textural grainy noise drones and fluttering fades, leaving only the resonant cables.

Play Radio

Play Radio begins with a radio announcer advertisement "Entertainment presents, the biggest family concert of 2020 straight from Mumbai done number one favorite singer of Bollywood" as static from radio surfing overtakes the announcer. Shades of noise enter the stereo field, some from radio surfing others from the air blown through the trumpet. A new radio sample enters briefly at 0:15, shifting between the clear station and radio static before a layered version of the track and Dutch news anchor enters at 0:20. The announcer speaks of "corona" between the static, and it was at this time of 2020 when Coronavirus was in Italy slowly heading West through Europe before the global pandemic. From 0:20 to 0:53 the announcer is slowly overtaken by the mixture of squelching shortwave radio, blown air through the trumpet & tongue rams, thudding motor from the KOMA field kit, and music from another radio station before a scattered radio station panning between the left and right speakers. Four radio stations abruptly enter and exit, followed by a rhythmic static and motor at 1:11. Low resonant air from the trumpet begins to fill the remaining frequency as it passes through a reverb. Transitioning from rhythmic static to rhythmic radio station interjections from 1:27 the density of sonic elements reaches a plateau, there is even a brief moment of silence just before this section begins signaling this section. Layered trumpets enter, blowing air, gurgling water in the trumpet, and squelching mimicking that of the shortwave radio interspersed with the more rapidly changing radio stations. A sample is heard from 1:34 at different moments of the song emulating the fine tuning of a station as the song passes. The radio sample is stuck in a moment, moving between a short section of the song before a glimpse of the vocalist singing "at same times" at 1:40 as the gurgling trumpet continues in the background before the pieces return to rhythmic static at 1:52 for a moment. There is a dialog between the singer and the Dutch news anchor, as static from the

radio and different frequency spectra of air are filtered through the trumpet, as a new radio station begins to emerge at 2:01. Cacophony arises at this moment before settling on a calming station enters at 2:06, as rhythmic static and trumpet air begin to fill the remaining frequency range. Trumpet tongue rams begin to thud periodically, reminiscent of the motor pulsing from 2:18 to 2:40, before transitioning to water gurgling in a valve slide thuds at a somewhat periodic rate as the radio stations change. The exhale of the water gurgling shifts to an inhale at 2:48, with the return of a previous male voice singing from 1:34.

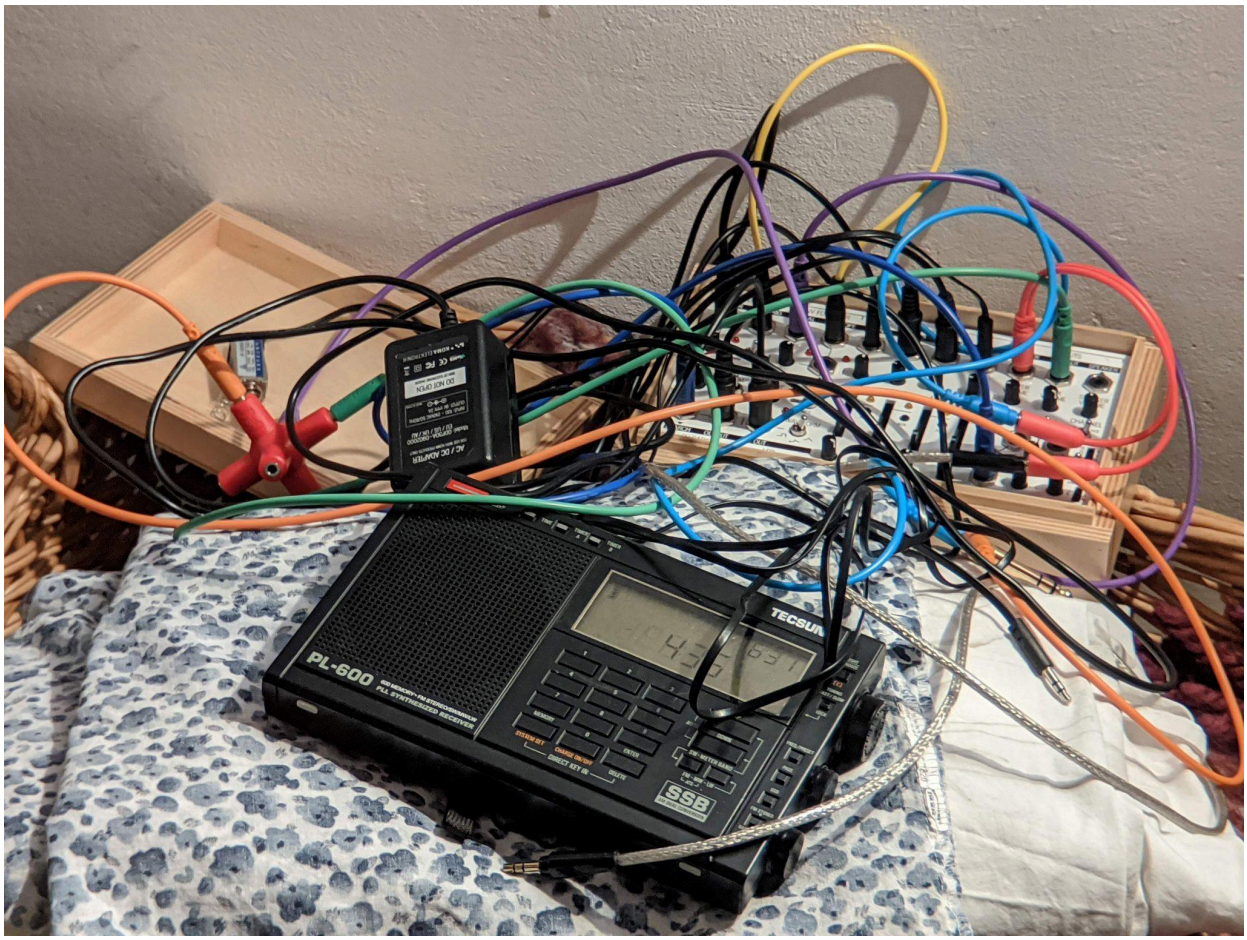

Image 4.8: Performance patch for *Play Radio*

The squelching radio and inhaled air of the trumpet mix, as a high-pitched raspy scream wavers in pitch from the trumpet. 3:00 rebalances the elements with the radio stations more in the background as the static and squelching radio begin to act as the prominent element before a slow crescendo of motor erupts alongside the radio stations to 3:16. This drop and shift of focus occur again at 3:20 as filtered noise pan in the stereo field erratically, as the male voice enters at 3:30 the sample rapidly shifts the start point, followed by a shift to a lower pitch at 3:37. Globally each of the elements crescendos in dynamic filling not only the frequency spectrum but densely packing abundant sonic information as minuscule pauses 3:50 and 3:59. Shortwave radio squelching comes to the front of the mix, changing rapidly the type of squelches in frequency range and rhythmic periodicity as sampled radio and trumpet tumble in and out of focus beginning at 4:00. Overwhelming static pushes through the mix at 4:52 as squelching static grows erratically louder and louder, as a final falling and rising shortwave squelching ends the piece at 5:00 as silence fills the remaining twelve seconds.

white tiger

Immediately following this piece both on my album and recital is *white tiger*, which is a stark contrast to *Play Radio*'s density of spectral and dynamic content. The opening begins with a tube-like instrument that rises in pitch. A melodic figure of this tube-like instrument, sampled from striking the trumpet bell with a mouthpiece, repeats twice with stuttering glitches at various moments as aperiodic static emerges, with a rhythmic white noise having its low pass filter revealing the upper harmonic content. My voice enters at 0:14, stating "don't flinch" as a pitch-shifted version of my voice replies "the white tiger is coming", followed by "ready to torment you". I call for a final plea to the listener "get out of here, return to…" before being cut

off at 0:24. The repetitious melodic figure breaks at 0:26, glitching on a single note, stuttering before returning to the full melodic figure at 0:34 as my voice re-enters with “endless tests”. The stuttering glitches begin to transfer to the voice, heard on the “m” in the slightly low pitch shifted phrase “it plays with your mind”, as the low ominous voice has descended in pitch again stating “it wants you to crumble”, followed by my response of “get through this, get out of here. Return to” at 0:55. Suddenly at 0:58 the tube-like instrument vanishes, leaving only the rhythmic stuttering white noise as the low pass filter collapses, leaving only the lower frequencies. My voice enters at 1:11, restating “don’t flinch” as the filtered white noise continues to remove any remaining mid-range content, just as the tube-like instrument returns at 1:18 this time with a single new note that both rises and falls in pitch. The filter begins to open on the rhythmic white noise until 1:30, as the tube-like instrument presents another small phrase before leaving the white noise to continue revealing more upper spectral content. My voice enters again, this time filtered warning “the white tiger is coming”, with the tube-like instrument playing its longest figure since the beginning, a mixture of some of the looped material and the singular notes since, but not with some glitched stutter. Responding to the phrase another figure is heard, this time more glitching stutter from the tube-like instrument. Two voices are heard at 1:53 one on the left and right respectively, stating “it knows my/your fears”, as the tube-like instrument becomes more prominent and the filtered white noise sweeps quickly from low to high and back low. Another warning from me “it feeds off your emotion” followed by a slightly pitched shifted “constant stoicism” with stuttering “s” on stoicism. The tube-like instrument in dialog with the voices, fills the space between phrases with melodic figures, arriving at two sets of three distinct repetitive figures at 2:16 and 2:23 as it swells through permeating patterns of the phrase as it stumbles into the original melodic loop beginning at 2:34. Another warning from my filtered

voice at 2:37, “it wants to you fail. The end is up ahead. Escape from this”, followed by an unsettling warbling pitch-shifted version of my voice with a final warning “it’s not over yet”. A final slightly pitch-shifted filtered version of my voice declares “i want to see you break” as the tube-like melodic figure ends in sync.

Don’t flinch
The white tiger is coming.
Ready to torment you.
Get out of here, return to…

Endless tests
It plays with your mind
It wants you to crumble
Get through this, get out of here.
Return to…

Don’t flinch

The white tiger is coming

It knows my/your fears
It feeds off your emotions
Constant stoicism

It wants you to fail
The end is up ahead
Escape from this

It’s not over yet
I want to see you break

5. Concert Presentation

Preparation for *ghost tones* first began by creating a concert order of the pieces, with *Althing I* already in mind to be the final piece of the program, and *Shabah*'s theatrical needs in mind, the bookends of the concert were quickly decided. Nasim Khorassani's *Shabah* would be the only acoustic piece on the program, with *Depths III, Play Radio*, and *Althing I* all electro-acoustic. *Depths III* would be the mid-point of the concert, performed by in^set, a trio with Teresa Díaz de Cossio on flute, Ilana Waniuk on violin, and myself on trumpet. Natalia Merlano Gómez's role as a sound projectionist was to trigger the playback of the acousmatic pieces, serving as breaks between acoustic/electro-acoustic pieces while also allowing time for any preparations I needed to be that staging, mic setup, lighting, or change of concert clothes. Alternating in this way would allow for smoother transitions between pieces and adequate time for any changes to occur. Natalia's role during *Althing I* was to trigger sine tones for my in-ear monitors, assisting in accuracy for the pitches far below the trumpet's range. I imagined the program as a cohesive experience for the audience, presenting the theme of *ghost tones*, with minimal or nonexistent silence between pieces flowing from one to another, presenting a concert-length work.

Reflecting on the sound worlds of both *Shabah* and *Althing I* each distinct and revealing a nontraditional presentation of the trumpet. The translated title of *Shabah*, "ghost" along with the ethereal tones of *Althing I*, reminded me of the type of "ghosted notes" that whisper by. These "ghosted notes" are different in this concert, presenting new tones embodying the type of airy note. Instead the new "ghost tones" not only whisper by but reimagine the types of tones that can be produced on the trumpet exploring the range of fragile microsounds to the abrasive and noisy.

Naming the recital *ghost tones* was fitting, encapsulating all of the pieces within a container, and playing with the expectations of the audience.

Entering the experimental theater, audience lighting as well as a single spotlight on stage above the chair were illuminated. Slowly the lights fade as the concert begins, Natalia dressed in all white sits at the table with the laptop initiating the playback of *(+2dB)* just as the lights fade to complete darkness. This piece serves as a portal for the audience, transporting them into the sonic landscape that will encapsulate them throughout the concert. Before the piece ends, I slowly walk over to the open space from the walled area to the back of the audience, seated dressed in all black along with a head covering and gloves. The lights on the stage reilluminated the single chair bringing the audience's attention to the stage, and I began *Shabah*. Some of the audience members were surprised by the sudden emergence of sound from behind them. This piece brings both the fragile micro sounds and the abrasive noisy sounds of the trumpet close to the audience straight from the source and unaltered through processing. As I reach the middle section of the piece, abrasive noise like screams not only place the sound behind the audience or from the back of the hall but also swirling, I begin to spin and pivot from a stationary position ping-ponging the sound to a different points all around the audience. As the tumultuous final section of the piece ends, the lighting dims and the playback of *hide* is initiated by Natalia. The drones of *hide* begin to activate the space, as I quickly return to the walled area I had initially emerged from, changing from all black to all white. Contrasting most of the other pieces on the program, *hide* has voices and a drum groove as some of the main elements, allowing the audience another perspective into the sound world of *ghost tones.* As the piece continues the dimmed light slowly splits to three points as Ilana and Teresa, also dressed in white, walk slowly

to stage left and right as I arrive center stage swapping my double-bell C trumpet for my Bb trumpet.

As the final moments of *hide are* heard, the lighting above each of us all dressed in white like ghosts, begin our performance of *Depths III*. The fragile sounds from each instrument are drenched in a luscious amount of reverb, smearing each of the instrument's sounds together with nearly unlimited decay. This incarnation of the piece was intentionally shorter than previous versions, perhaps due to my perception of time passing as I hurried between the end of *Shabah* and getting prepared for *Depths III*, nonetheless, the piece gave a breathing moment for the audience to be immersed in the soundscape of in^set. As the peaceful stillness of *Depths III* fades, Natalia initiates the abrupt interjection of *Play Radio*, both Teresa and Ilana walk off stage to audience seating as I swap trumpets again placing a secondary lavaliere microphone inside the lower bell of the trumpet. An additional microphone on a stand allows me to blend the processed lower bell with the unprocessed upper bell with the playback. Contrasting the fragile sounds of the previous piece with more abrasive noisy textures from the trumpet I create a dialog between the electronic playback radio and trumpet. The piece reaches its final climatic peak ending, and *white tiger* immediately begins, its starkness of density and frequency range more compact than in *Play Radio* presenting an unsettling calmness between the tube-like instrument and my voice transpositions. I begin to disassemble the double-bell trumpet preparing for *Althing I* and inserting my in-ear monitors. The irregular rhythm of the solo brush noise section, the barest moment of the piece, provides a respite for the audience as the speckled speech and tube-like instrument enter. A premonition of the final piece, some of the final vocals of the piece are “it’s not over yet”, and maybe the last bit of vocals are meant for me before the 30 minutes ahead of *Althing I* as “I want to see you break” end the piece. The slow downward trajectory of energy of

the concert reaches its meditative state of *Althing I* of sustained tones from the trumpet as small continuously shape the timbral qualities of the tone. The journey of the rising and sinking pedal tones of the piece is met with two sections of spectral content from a different thread before returning to the sustained tones. The lavaliere microphone and audio effects pedal aid in the fragile and most subtle of changes allowing me dynamic control externally, also adding lingering filling space through reverb. Each of the moments an apparition of wispy and ethereal techniques audible through the amplification of the instrument. As the final descent nears I feel that I have been transported to a transcendental state, bringing the audience along with me. The final triple pedal tone is held again and again as the lights dim to complete black ending *ghost tones*.

Image 5.1: Program for *ghost tones*

a. Sound Projection

When I lived in Los Angeles I was approached by Nicolás Bejarano, whom I'd met with during my master's degree at CalArts and fellow trumpet player, to create a performance version of the electronics of Mauricio Kagel's work *Nah und Fern*. Nicolás and I attended CalArts together in 2014, and had worked on a number of pieces together during our time together, including Stockhausen's work for trumpet quartet *TrumpeTent*. Kagel is an Argentinian/German composer, *Nah und Fern* was a piece originally written as a radio work for trumpet quartet and fixed media. My role was not only to create a performable version of the electronics but a score and act as the conductor during moments throughout the performance. The entire process culminated in a production of the performance in collaboration with aLma.MaddR and the Carillon Quartet presented the work ArtShare LA in 2017. The production required the four trumpeters to play the piece at different points around the space or while moving, and the electronics were presented in quadraphonic immersing the audience within the cityscape of the electronics. Nicolás after the concert suggested I research Karlheinz Stockhausen, and soon after immersed myself fully in his works, and in the Summer of 2017 attending the Stockhausen Courses and Concerts in Kürten, Germany as a participant in the Sound Projection.

During the courses I worked with Kathinka Pasveer; one of the directors of the Stockhausen Stiftung, musical directors, and instructor of sound projection. Sound Projection practice is described in the course materials as "The courses are not intended to furnish theoretical information which can be learned through normal technical training elsewhere. Rather, they are intended to provide practical training and experience in the musical performance practice of the new *musical* profession of sound projectionist. That is why a good musician, who can hear extremely well and who knows the works and how they should sound is just as qualified

- or even more so in many respects - than someone with general musical-technical training, provided they have a professional sound technician to assist them, as Stockhausen always did"[23]. I finally felt like the path I'd been on until this point finally fit together perfectly into the title of sound projectionist. The courses were filled with inspiring performances, *Kontatkte*, *Cosmic Pulses*, *In Freundschaft,* and *Harmonien*. The sound system was unlike any other I had experienced, with a 17.8 speaker system. Raised above in each corner position were two speakers, these were horizontally angled away from one another to give the spatialization fluidity as it moved around the audience, below these dual speakers was a subwoofer reinforcing the motion in the lower frequency spectrum. My time at the Stockhausen Courses was incredibly inspiring not only for my work but in my new curiosity to study the work of Stockhausen.

Image 5.2: Rehearsal of *Kontakte,* Kathinka Pasveer at the mixing console

[23] Sound Projection Course - Basics: Stockhausen Stiftung

In the following years I continued my practice and research in sound projection, and in the Fall of 2019 gave my second-degree recital at the University of California San Diego (UCSD) in the experimental theater. The concert, *The Ritual of Time Dilations*, was a mixture of solo and ensemble works composed by Karlheinz Stockhausen, Mark Andre, and myself. The skills I had learned as a sound projection participant working with Kathinka Pasveer, as well as my study of Stockhausen's music were essential to placing microphones, balancing the instruments, and spatializing each in an octophonic sound system. Since this was my degree recital I was not able to act as the sound projectionist during the concert, I was fortunate to work with a musician who I worked with closely in the weeks leading up to the concert, providing notes on each piece as well as what changes may need to happen and during which piece. In the rehearsals, the sound projectionist and I were able to test the microphone response for each instrument removing any unwanted resonances and balancing the entire ensemble in octophony. This concert provided an opportunity to present a larger-scale work culminating in all of the research I had done in concert.

My final degree recital in the Fall of 2023 was also presented in UCSD's experimental theater, with an updated Meyer Constellation Sound System, programmable lighting, and a new Digico mixing console, and was a simplified setup in comparison to my previous recital. Three devices sent a signal to the Digico mixing console, a KOMA field kit, Zoom a1x Four multi-FX pedal, and a laptop with a four-channel Motu interface. Only the Left, Center, and Right speakers were used for this concert and changed for every piece, due to this Jeremy Olson, who is the sound engineer, set the Digico to have inputs duplicated for quick muting and unmuting

depending on the piece performed. Duplication was particularly helpful with pieces like *Play Radio* and *Althing I* that used the same multi-effects pedal.

Image 5.3: in^set performing *Depths III*

The KOMA was used for *Depth III* with two Audio-Technica ATR3350xiS omni condenser lavaliere microphones, on channels one and two of the input channels of the KOMA's mixer section. The main output of the KOMA is sent to a DI box, before being sent to the Digico console, and finally the Meyer Left and Center speakers. Ilana used her own DPA microphone for her violin that was sent to the Digico and the Right speaker. All three of our signals had reverb added from the Digico console's built-in audio effects. The choice of color and decay time for the reverb had been preset during the tech rehearsal process by Jeremy. Previous performances of the piece in^set had issues with feedback due to the omnidirectional

microphones, Jeremy was able to mitigate any feedback, making it nearly imperceptible during the rehearsal and performance.

The Zoom a1x Four multi-FX pedal signal had input from a secondary ATR3350xiS that was placed inside my C trumpet bell, with output of the pedal sent to a separate DI box, following the same signal flow as the KOMA, but had two different speaker arrangements. For *Play Radio* the signal from the pedal was sent to the Center speaker to balance with the playback, and for *Althing I* the signal was sent to the Left and Right. The pedal can have up to five audio effects in a chain within any patch, including an effect that can be controlled via the built-in pedal. While working with Ulrich on *Althing I*, I found a specific chain of effects that works well for the lavaliere and used the same patch consisting of EQ, Optical Compression, Pedal Volume, Church Reverb, and a final EQ for both pieces. In addition to the pedal for my performance of *Play Radio* was a Neumann KMS 105 dynamic microphone, that Jeremy had recommended a few years prior for a performance in the experimental theater, and have since used it for every performance in the space. During *Play Radio* the Neumann was sent to the center speaker as well as blending acoustic trumpet, with the lavaliere mic.

The laptop that Natalia was using had an Ableton Live performance template we had built for this performance with two tracks in Session View. Session View was beneficial for this performance because triggering and launching clips can be done quickly. The first track had a software instrument that played with sine tones that were organized into MIDI clips stacked vertically within the track following the pitches I needed as reference for *Althing I*. The second track contained the audio clips for the acousmatic pieces, with each being triggered when needed with the exception of *white tiger* due to needing to be played immediately after *Play Radio* a feature called follow was used that would initiate the playback of the next clip as soon as the

previous clip had ended. By doing this the seamless transition between these two pieces was possible. Connected to the laptop was a Motu M4 audio interface that has four inputs and four outputs. The main two outputs, channels one and two, would be used for the acousmatic pieces and the sine tones for *Althing I* sent to channel three output. All the routing for the piece was done directly within Ableton Live with no additional work needed. These three channels were sent to the Digico, Jeremy creating outputs for the Left and Right speakers for the acousmatic pieces, and an additional output for the sine tones. The sine tones were sent out of a stage box and into a secondary volume pedal so that I could control the signal to my in-ear monitors as needed. I found that due to the extremely low range of *Althing I* pitch accuracy wavers quite wide, using in-ear monitors allows for consistency throughout the piece for the stacking of harmonic content.

During the technical rehearsals in the experimental theater each of the performers as well as Jeremy were present to balance the acousmatic and electro-acoustic. During the playback of the acousmatic pieces, I sat in the audience seating ensuring that quality was consistent throughout. Consistency for the audience had been a skill I had learned during the 2017 Stockhausen Courses when studying with Kathinka. During *Depths III*, *Play Radio*, and *Althing I* Natalia and Jeremy helped to balance the dynamics of the space as well as with the electronic and playback. This was particularly helpful in *Depths III* and *Althing I* as both were prone to feedback issues due to the microphones being used as well as the dynamic output from the speakers.

Shabah is unique in this concert not only because it is the only acoustic piece, but also due to it being spatial as well. In working with Nasim closely on the piece we were able to develop the methods that effectively placed sound in either of the bells, but also how to pace the

motion of my pivoting along with the bell choices. The placement of a single stand and chair on stage, while the performer is in the audience also has a deep impact on the expectations of the piece. When I spoke to Nasim and others after the performance, all told me how shocked they were to suddenly have sound coming from within the audience. This response has been consistent in each performance of the piece presenting the aura of a ghost.

b. Staging

UCSD's experimental theater is a black box theater, its shape is slightly more rectangular than square, with retractable stadium-style seating that was retracted for my concert with chairs placed in rows along the floor. The audience seating was inverted u-shaped, with an opening in the middle of the back of the audience where I performed *Shabah*. Two fake walled areas were placed in the theater, one stage left where Ilana Waniuk and Teresa Díaz de Cossio waited on the diagonally opposing wall was the other barrier where I waited for the concert to begin. An additional table was placed on the right edge of the audience seating where Natalia Merlano Gómez sat with a laptop with an Ableton Live performance template, an iPad with the score for *Althing I*, and an audio interface. The back right wall of the audience seating was where Jeremy Olson, the live sound engineer, sat with the Digico console and lighting board.

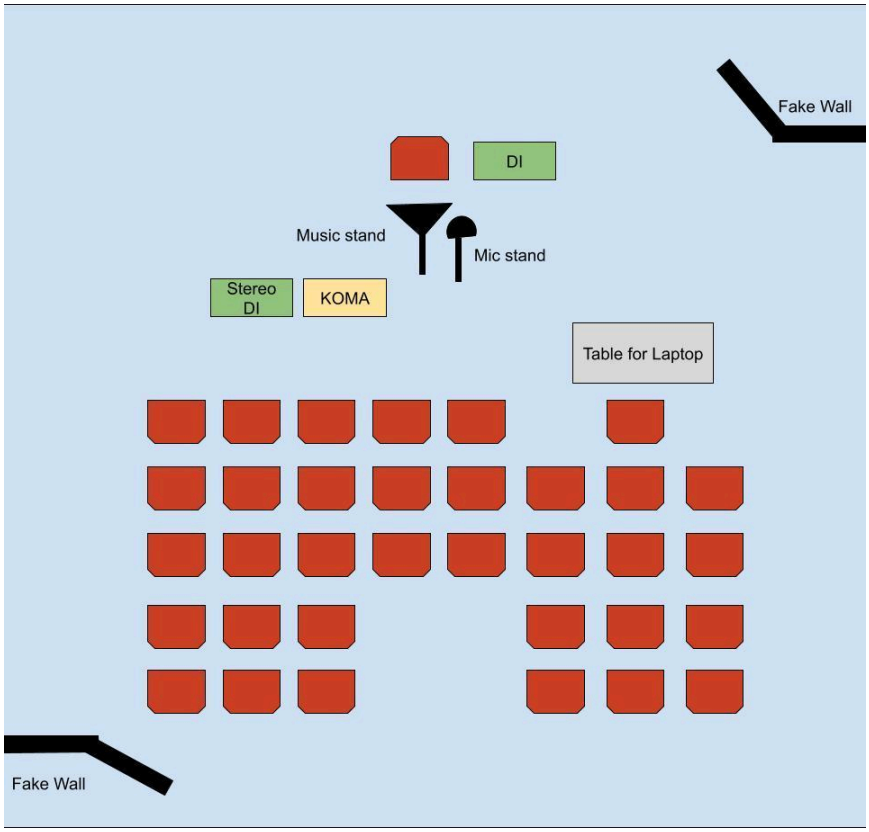

Image 5.4: Stage plot for *ghost tones*

Three main performance positions were used throughout the concert, were in the empty space within the audience seating, on stage seated at the chair and stand, and in^set placed Stage Left, Right, and Center in front of the music stand. The two walled-off areas had seating for the performers, Teresa and Ilana at the rear of the stage, and myself close to the audience with an additional table to place my trumpet and change of clothes. Natalia's position was chosen to have the best line of sight for me to confirm cues for playback triggering of acousmatic pieces as well as pitches during *Althing I* for my in-ear monitors. Knowing the first and last pieces of the concert pointed to a trajectory of where I should plan the positions for the pieces. Using the chair as a focal point for the audience, finishing with me on stage in the chair that was empty in the

beginning. The stage area had a Bb trumpet placed on the seat with my trumpet case covered in black cloth to the right of the chair allowing me to place and swap my trumpets as needed.

Image 5.5: Stage for Nasim Khorassani's *Shabah*

The lighting as the audience enters the experimental theater has a warm yellow light above the seating area, and a white light above the single chair and stand on the stage. When the change to the darkness of *(+2dB)* serves as an invitation for the audience to listen without expectation, especially in this piece because of how much live processing of the trumpet sample has occurred. The lighting for *Shabah* is dictated in the score, this allowed the planning of the lighting and staging around the chair and music stand to serve as a centerpiece for the audience to gravitate towards. Not only is the lighting dictated, but the concert dress is of all black clothing, as well as black gloves and a black head covering. The ghost of *Shabah* is unseen,

masked in the darkness amongst the audience juxtaposing the white spotlight. The lighting used in *Shabah* presents a calming neutral atmosphere, and a call from the heavens opens a beam of light placing the attention on what the ghosts will transmit to the living. As the interlude of *hide* plays, the single light above the center stage splits slowly into three points across the stage now, as Ilana, Teresa, and myself arrive under the lights all dressed white. All of us are now matching, including Natalia who had already been dressed in white. Ilana, Teresa, and I illuminated under the three spotlights for *Depths III*, and when the piece concluded, both Ilana and Teresa walked to two reserved seats in the audience. The three spotlights reconnect to one above the seat and chair for the remainder of the concert, fading to complete darkness as the final notes of *Althing I* decay.

6. Conclusions & Thoughts for the Future

Reflecting on *ghost tones* I believe many aspects were successful in coalescing each of the elements that I had been developing to immerse the audience in an experience that invites them to reimagine preconceptions of what a trumpet can do, by presenting works like *Althing I* that are antithetical to the typical: high, loud, fast tropes of the trumpet with works that are: low, soft, and low. Theatrical works like *Shabah* leave the audience surprised but also allow for many different interpretations of the piece for each of the audience members. Finally the somber and placid *Depths III* melds three instruments to one in a vast meditative space. I've given performances of *Shabah* as part of the Project Blank [SD] *Working Title* January 2024 exhibition, and *Althing I* as part of the Project Blank [SD] *Salty Series* in March of 2024. I have recorded both of these pieces and plan to release both in the near future. Nasim has finished a version of *Shabah* as a duo for two trumpets and electronics that will be workshopped and performed in the upcoming year. The intent is to bring a new version of the piece to single-belled trumpets but reimagine the piece with more spatial elements. This upcoming year I will be collaborating with two composers, Marguerite Brown a colleague in the graduate program and Michelle Lou, UCSD composition faculty, on works for trumpet that will continue to not only utilize the fragile microsounds and abrasive noisy sounds but expand them with their distinct compositional voices. I look forward to working closely with instrumentalists to discover what parameters instruments outside of the trumpet and brass family for more works of my own. Most recently I've worked with performers in Bogotá, Colombia on my piece *Depths III,* performing and recording the piece in the Summer of 2024, with a release Fall of 2024. The instrumentation for this version of *Depths III* changes to wood flute, bass clarinet, and trumpet, in the process

discovering the fragile parameters of the instruments, and how each performer interprets “fragile microsounds”.

Image 6.1: *Depths III* recording session Bogotá, Colombia Summer 2024. Flutist - Laura Cubides, Bass Clarinetist - María Fernanda Rodríguez, Recording Engineer - Luca Gardani , and myself on trumpet.

I plan to continue performing these works and collaborating with composers to create new works for the trumpet using the parameters of the trumpet. Equally important is the continued research of this topic on the trumpet to discover new methods of sound creation, and methods of manipulation & modulation, both of which further develop musical interactions in performance. There are some fragile microsounds that I have discovered while improvising that I seek to have the ability to control as I do with the sounds listed in this dissertation. The natural

multiphonic of the trumpet is a sound that I intend to spend time on in the upcoming year. Due to the multiple parameters that are needed to activate it is uncertain at the current moment how much manipulation/modulation is available at the current moment. In addition to the natural multiphonic split tones, the range, ability to create overtones, beating, and dynamic range. With beating it is possible in the mid-range with lower ratios of the overtone series: 3:2 and 4:3, I seek the same nuance in the higher overtone ratios. The flexibility in the upper range of split tones to create beating is limited, but I believe more focused work will not only allow for beating but more consonant intervals. Through my continuing research and process of learning to control the parameters of the body and instrument, unexpected moments will uncover new sounds and parameters on the trumpet that I eagerly await.

Since my recital, I have released my album *Configurations of the System* containing each of the acousmatic pieces, along with four other tracks on the album: *Drone Travel, interlude, Gazelles die like this behind bars,* and *secret concreté*. Throughout 2023 I upgraded my home studio with new equipment for continued work in audio production of my own work as well as clients. The major upgrades of my studio equipment include Neumann KH120 II speakers, RME UCXII interface, Focusrite Octopre MKII, and M2 Max Macbook with new audio effects plug-ins. Since upgrading the studio, I have worked on mastering *The Dad-Rock EP* (2024) by the German indie folk rock group Slowklahoma and mixing and mastering UCSD colleague Jonny Cardenas Stallings band, Pigimichi's newest album to be released in 2024. I have also had opportunities to engineer recordings for UCSD colleagues Akari Komura and Natalia Merlano-Gomez on a voice and electronics piece, Duo Refracta (Michael Jones, percussion and Shaoai Ashley Zhang, piano) with Ilana Waniuk, violin on Sarah Hennies work *Lake* released on Sawyer Editions in 2024, and with Timothy Gmeiner on an immersive technology work

featuring an ensemble of Preston Swirnoff on percussion, Myles Ortiz-Green on Synthesizers, Natalia Merlano-Gomez on voice, King Britt on synthesizers, and myself on trumpet and modular synth. In September 2024 I will be giving a workshop at Neofonía, the Ensenada New Music Festival on recording engineering to students, covering concepts of microphone types, polar patterns, miking techniques, using an audio interface, and DAW. In the Fall of 2024 I will resume my position at Point Blank Music School Los Angeles teaching both in person and online as the audio mastering instructor, teaching students critical listening and use of the tools within this role of the production chain.

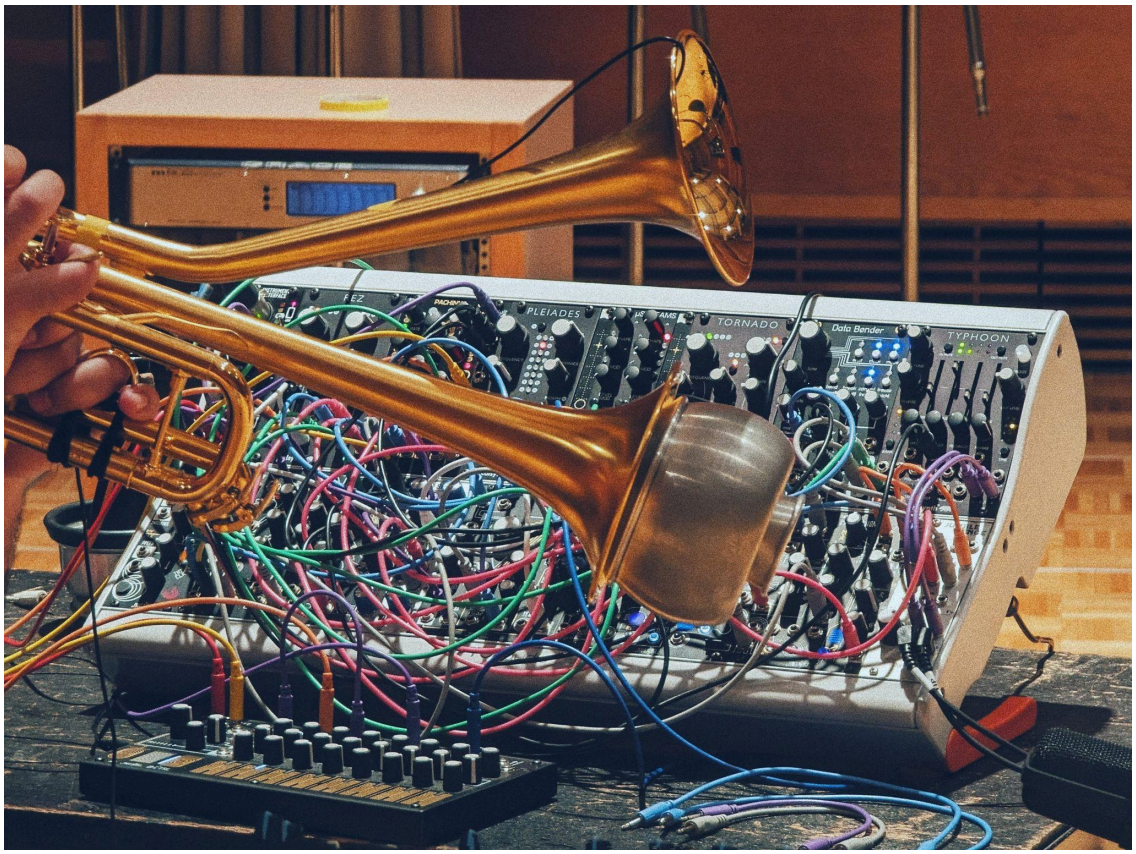

Image 6.2: June 2024 Recording Session - Double bell trumpet and modular synth

In addition to equipment and recording opportunities within audio production, I have begun to expand the live processing aspect to include a modular synthesizer system for the processing of the trumpet. In June 2024 I was awarded a recording grant by the UCSD Department of Music for recording material for new albums, one with acoustic trumpet and one with trumpet and modular synthesizer. In returning to live processing practice on the trumpet, as I had done with Laptop+Trumpet, I am now exploring this as a solo project with double-bell trumpet, modular synthesizer, and lavaliere microphone with effects pedal. I've spent a large amount of time in front of a computer in the past few years working on audio production and live processing. I wanted to veer away from what I already feel comfortable with and explore more tangible methods of doing this work. My modular system began with a collection of modules by the company Make Noise named the Tape and Micro Music Machine, the concept being recording, filtering, and delaying sound. Over several months I learned the intricacies of each of the modules and slowly began to experiment with the synthesizer. In the Winter of 2024 along with fellow colleagues at UCSD took an independent study course with Tom Erbe, who had designed many of the modules in my modular system. Throughout the quarter Tom shared the history of creating his modules, along with each of my colleagues bringing in patches to receive feedback on. It was during this time I spoke to Tom about expanding my modular system, my intentions of what I wanted to do, and gaining insight on what modules and ways I could arrive at my setup. My system doubled in size throughout the Winter quarter to include resonators, live granular synthesis, audio destruction, utilities, digital synth voices, and amplifiers. As I had done with the Tape and Micro Music Machine, I spent the following months experimenting, learning how to create meaningful musical interactions with the modules with external audio as the trigger. The recording session was the pinnacle moment of these experiments, improvising

enough material for a future album. During the same recording session also recorded improvisations, utilizing fragile microsounds and abrasive noisy sounds. These acoustic recordings contrast the typical intertwining vocabulary, and much like *Depths III* focus more on a single parameter of the instrument and the performer. Some possibilities for this material would be to re-record the playback in reverberant spaces capturing a blend of the original sound within a new space. After these re-recording experiments have materialized into a final version I plan to release these improvisations as a future album.

The more demanding of these practices is the theatrical aspect, while staging and concert attire are rather easy to present in concert, the aspect of sound projection and lighting are difficult due to access and funding of a venue rental. I would like to present *ghost tones* again in the future, in a setting that is perhaps more concise in lighting throughout the concert, these elements would also be dependent on the space what capabilities it has. One project that Doug Osmun, fellow UCSD graduate student in the composition program and collaborator, and I presented in November 2023 is *Consciousness Divination Ritual*, which is described in the program notes below.

> "Consciousness Divination Ritual is a structured improvisation which explores the relational subjectivities between human and artificial intelligences. Enaction is structured by sense, facilitating processes of transference in which an agent's enaction is structured by its sensorial capacity of the other. This also facilitates an epochal confrontation, investigating the nature of AI and its capacity to form a simulacrum of our own cognitive models, inevitably also invoking the question of the source of our own patterned intelligence."[24]

This project was a collaboration with Doug in creating a concert length work with live electronics. The stage consisted of three stations where I would perform specific techniques from the fragile microsound and abrasive noisy sound palette. These recordings would be recorded

[24] Consciousness Divination Ritual program notes. Doug Osmun

and played back into hanging metal sheets with transducers interacting with my live performance. Doug and I had done initial recordings and tests with his AI to see what was possible for musical interactions that were dynamic in real-time. Each station had between three to six metal sheets with transducers, and a microphone at each. Hung in the center of the stage was a screen for a projector that in the final two sections of the piece would become increasingly more active visually processing video samples. These demands in this project in both theatrical and sound projection are what make performances like this one difficult to present because of these factors.

Image 6.3: Consciousness Divination Ritual performance photo

Even with the demands of complex performances with sound projection, lighting, various instruments, and technology opportunities are available. In November 2023 in^set performed in Project Blank [SD]'s *Salty Series*, the works each had different demands including projections, electronic instruments both digital and analog, amplification of acoustic instruments, paper instruments, and playback. We were fortunate to apply to this series with the program of composers such as Melissa Vargas Franco, Kotoka Suzuki, Ilana Waniuk, Teresa Díaz de Cossio, and myself. The concert was presented in San Diego at a venue called Bread & Salt, in a large rectangular venue with brick and concrete, and live sound engineer. The concert was a success, especially with the diverse set of technology for each piece. In January 2024, in^set was the ensemble in residence at the Line Upon Line Winter Festival in Austin, Texas. Line Upon Line is a percussion trio that commissions and performs contemporary music in the Austin area and around the United States. As a trio, in^set was ecstatic at the opportunity to present works to a new audience. We each presented the same works each of us had composed for the concert at the *Salty Series* with additional improvisation by in^set and work composed for us by UCSD colleague Joseph Bourdeau. The space we performed in was a black box theater named *Crash Box*, and is similar to that of UCSD's experimental theater, smaller in size, containing a stereo speaker system, and lighting. The performance of the pieces went well, in particular Joseph's work "This Way Forever" was extremely well received by the audience with its theatrical lighting changes queued but the performers, singing, and playing of instruments and objects. The opportunities in^set has had to bring such large concerts reveals that concerts like *ghost tones* are possible, but require diligence in finding grants and residencies. The *ghost tones* concert is one I intend to search for opportunities to present in the future, while also continuing to develop new concert experiences for the audience.

Image 6.4: Tangible Mechanics Concert Project Blank [SD] - in^set

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