TRANSIENT DELETE: ORIGINAL COMPOSITION WITH A CRITICAL EXAMINATION OF THE COMPOSITIONAL PROCESS AND A SURVEY OF DIGITAL TECHNOLOGY IN OPERA

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This paper explores various technologies available to the modern composer and utilized in recent modern opera, providing creative approaches to producing aural, visual, and theatrical performance environments. It also explores my own use of digital technology in *Transient Delete. Transient Delete* is a digital miniature-opera that explores different aspects of a community of post-human cyborgs. The story follows Iméra, a newly converted cyborg as she acclimates herself to this new cybernetic existence. During this process she meets several other cybernetic entities that are there to help guide her through her metamorphosis.

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PART I: CRITICAL ANALYSIS

CHAPTER 1 Introduction

Opera has always relied on and has been constrained by technical possibilities and limitations in creating visual, aural, and theatrical performance elements. Everything from rigging and lighting to the acoustic properties of a performance space plays a significant role in opera production. In the last thirty years, advances in digital technologies have further enhanced theatrical production in the realm of lighting control, audio enhancement, and graphics generation. As these technologies continue to evolve, so does the nature of opera. With the current integration of digital technology into opera, we have begun to see a rise in a new species of opera, the "digital opera." Pip Greasley, in his article *Subtle Futures,* raises questions regarding whether digital technology in opera is just a fashionable trend, or if it represents a pivotal moment in the history of opera, changing our experiences and cognition of operatic performances altogether.[1] He believes that a new type of artist is emerging out of the avant-garde to reinvent the medium. Greasley sees this new movement as one that is redefining the notions of space and time through digital means. He also believes that digital technology in opera enables the composer to blur the traditional distinction between the performer(s) and the audience. My survey of recent operas supports Greasley's assertion that composers are utilizing digital technologies in new and profound ways, pushing the boundaries to create new forms and technologies.

This essay explores digital opera in which the concepts and creation of acoustical and theatrical phenomena are heavily dependent on digital technologies. Beginning with a survey of

1. Greasley, Pip. (2012), "Subtle futures", *International Journal of Performance Arts and Digital Media* 8: 1, 125–127, doi:10.1386/padm.8.1.125_1.

recent technological trends in opera, this paper includes a discussion on several recent vocal and dramatic works that rely significantly on technology. It also examines relevant critical literature and theories surrounding the use of technology in opera. Finally, this essay will provide a critical analysis of my own use of technology in my opera *Transient Delete*. From the earliest beginnings of *Transient Delete* I set out to create a digital opera that compositionally explores and incorporates many the new innovations that are now available to operatic composers.

CHAPTER 2 Precompositional Activities

Influences

Although digital opera is still in its infancy, there is a growing body of vocal works that utilize digital technology. In these works, electronics are typically used to augment the sonic capabilities of the vocal performers and to augment or replace instrumental ensembles. In preparation to compose *Transient Delete*, I studied a variety of these pieces. The majority of these vocal works simply used live vocal effects processing. However, I also studied works that used digital technology to enhance theatrical aspects of the performance including lighting systems, stage control, robotic props, and motion capture systems. The examination of these works influenced my compositional choices and approach. Most influential to my compositional process were pieces by Borboudakis, Essl, Machover, Saariaho, and Young. However, there are also a number of composers whose works had a less direct yet profound influence on my compositional choices in *Transient Delete*. These include pieces by Aperghis, Greasley, Kokoras, Nelson, Scelsi, Stocco, Stout, and Wilson.

Kaija Saariaho's *Lonh* is one of the first pieces for voice and electronics that I encountered and was the source of my first inspiration to write a digital opera. With its eerie sonic qualities and attention to textural counterpoint, this piece utilizes digital technologies to augment the performer, the performance, and performance space.[1] In *Lonh* Saariaho uses a Max/MSP[2] patch to control the playback of quadraphonic and 8-channel audio files. She also

1. Kaija Saariaho, Text by Jaufré Rudel. *Lonh: for soprano and electronics.* (London, Chester Music, 2005).
2. Saariaho includes with the score a data CD with the necessary software and audio files to run the piece. These materials are also available for download on her website at:

uses the patch to control reverb parameters and other effects such as delay in multi-channel diffusion for live vocal processing.[3] By utilizing spatialized amplification, *Lonh* creates a very immersive performance environment. For Saariaho, *Lonh* was a precursor to her much larger opera *L'amour de loin*.[4] This piece also utilizes a Max/MSP patch to synchronize fixed audio samples with the orchestra. *L'amour de loin* was also a significant influence on my *Transient Delete.*

Another piece that was very influential in my preparation was Minas Borboudakis' piece *Εδιζησ[A]μην εμε[Ω]υτόν*.[5] This piece is a vocal theatrical work for stage that effectively combines vocal performance, theatrical drama, live digital audio processing, and digital visual projections. This piece heavily influenced the visual aesthetic of *Transient Delete*. The use of 3D motion graphics and 3D projections in *Εδιζησ[A]μην εμε[Ω]υτόν* is captivating and creates a spatial immersion that brings the viewer into the stage. It seamlessly creates an ambiguity as to the size, depth, and breadth of the performance space making it appear both large and intimate simultaneously.[6] In addition to the visual influence *Εδιζησ[A]μην εμε[Ω]υτόν* has had on my compositional process it has also influenced my approach to vocal processing.

One distinguishing aspect of Borboudakis' vocal processing is his use of two non-connected stereo microtonal harmonizers to create polychords from the vocalist's live

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http://www.petals.org/Saariaho/Lonh-electronics.html

3. Kaija Saariaho, Text by Jaufré Rudel. *Lonh: for soprano and electronics.* (London, Chester Music, 2005).

4. Jocelyn Morlock, "Kaija Saariaho's Lonh – an appreciation," jocelynmorlock.com September 29, 2012, accessed February 9, 2015, http://jocelynmorlock.com/2012/09/29/kaija-saariahos-lonh-an-appreciation/

5. "ἐδιζησ[Ἀ]μην ἐμε[Ω]υτόν," Works for stage, premiered May 16, 2012, accessed August 18, 2015, http://www.minasborboudakis.com/cms/index.php?idcatside=15

6. Minas Borboudakis,"ἐδιζησ[Ἀ]μην ἐμε[Ω]υτόν" (video of performance), Jul 19, 2012, accessed February 12, 2015, https://www.youtube.com/watch?v=IVGV_QTK1TM

performance materials. These harmonizers are controlled by various presets that utilize semitones and microtonal tunings. Borboudakis also uses a series of convolution reverbs to further transform specific sections of the vocal part. To achieve this Borboudakis creates layers within the vocal lines by applying varied levels of convolution processing, distinguishing different vocal techniques. Melismatic sections receive more convolution processing than syllabic sections, distinguishing the two vocal techniques from each other and creating layers of textural contrast within the vocal part.[7]

Another work that was influential in my approach to vocal processing is Karlheinz Essl's *Sequitur IX* for mezzo-soprano and live electronics.[8] Essl describes his *Sequitur* series as a reference to Berio's famous cycle of solo *Sequenza* pieces that focuses on specific performance techniques of their respective instruments.[9] Essl states that *Sequitur IX* scrutinizes non-western chant and vocal technique, combining overtone singing with western plainchant and *bel canto*. To achieve this Essl uses a series of live computer-generated sound effects that transform a single vocal part into a rich canonic polyphony. He also uses the computer to process artificial multiphonics, imitating Eastern throat singing techniques. His effects include a ring modulator, detuner, flanger, comb-filter, and various delay effects.[10] These are sequenced by pre-composed presets that can be triggered by a performer controlling a computer or MIDI

7. "technische Angaben," ἐδιζησ[Ἀ]μην ἐμε[Ω]υτόν for solo voice & live electronics (2012), last modified December 20, 2012, accessed February 19, 2015, http://www.minasborboudakis.com/cms/media/pdf/technic%20pdfs/EDIZHSAMHN_electronic.pdf
8. Karlheinz Essl, "Sequitur IX: for voice and live-electronics," Karlheinz Essl, 2008, accessed July 17, 2014, http://www.essl.at/div/scores/sequitur-IX.pdf
9. Karlheinz Essl, "Sequitur IX for mezzo-soprano and live electronics," (streaming audio), posted March 18, 2012, accessed January 17, 2015. http://www.essl.at/works/sequitur/sequitur-9.html
10. Essl, "Sequitur IX: for voice and live-electronics."

controller. These triggers are clearly indicated by cues to the computer operator throughout the score.[11] Essl's computer performance aspects are intentionally simplistic in order to make it possible for the vocalist herself to be able to perform the piece unassisted if necessary.[12]

Many other works have also influenced my compositional process for *Transient Delete*. However, these pieces mentioned above provide the primary inspiration for the vocal writing and signal processing in *Transient Delete*.

Libretto

Selecting and constructing a libretto was one of the most challenging aspects of creating *Transient Delete*. Near the end of my search, I finally decided to arrange and write the libretto myself, working with excerpts from selected poems by Rainer Maria Rilke. I determined that the libretto of *Transient Delete* would focus primarily on topics of trans-humanism and post-humanism, as I am very fascinated with the philosophical, ethical, and technological issues they bring up. The libretto of *Transient Delete* explores the experiences of a new cyborg that has just purged all remaining human transients to become part of an emergent immortal collective. The main character Iméra has conversations with three other characters within the collective, confirming her state and experience in the networked consciousness and her immersion into the collective. With this construct in mind, I set out to create the libretto by transforming excerpts of Rilke's poems into the existential metamorphosis of the young female character Iméra. I chose Rilke for three reasons: 1) Rilke's works have long been an interest of mine, 2) his

11. Ibid.
12. I have speculated as much seeing how the score mentions the performer initiating the effects. However, in the live performances I have observed through video documentation Essl himself controls the computer part.

works often consist of highly lyrical writing and often evoke mystic existential imagery, and 3) all of Rilke's works are in the public domain. In many ways Rilke is considered a transitional figure, some suggest he is a bridge between modern and post-modern poetry. This parallels the transitional phase of trans-humanism between human and post-human.

I began constructing the libretto by selecting 19 different Rilke poems selected from Rilke's *Book of Images.*[13] I also gathered translations by Edward Snow for each of the 19 poems.[14] Not wanting to embrace any specific translation I also made my own very literal translations of each poem the original German into English. With the combination of these two translations I then selected short phrases or sections that I felt expressed the concepts and aesthetics that I wanted for the libretto (see figure 2.1). I then made edits to each section, changing and at times adding a few words so that each phrase reflected that concept of *Transient Delete.*

13. Rainer Maria Rilke, *The Book of Images*. Translated by Edward Snow (New York: North Point Press, 1994). Originally published as *Das Buch der Bilder* (by Axel Juncker Verlag, 1902).
14. Ibid. 5-107, 240-252.

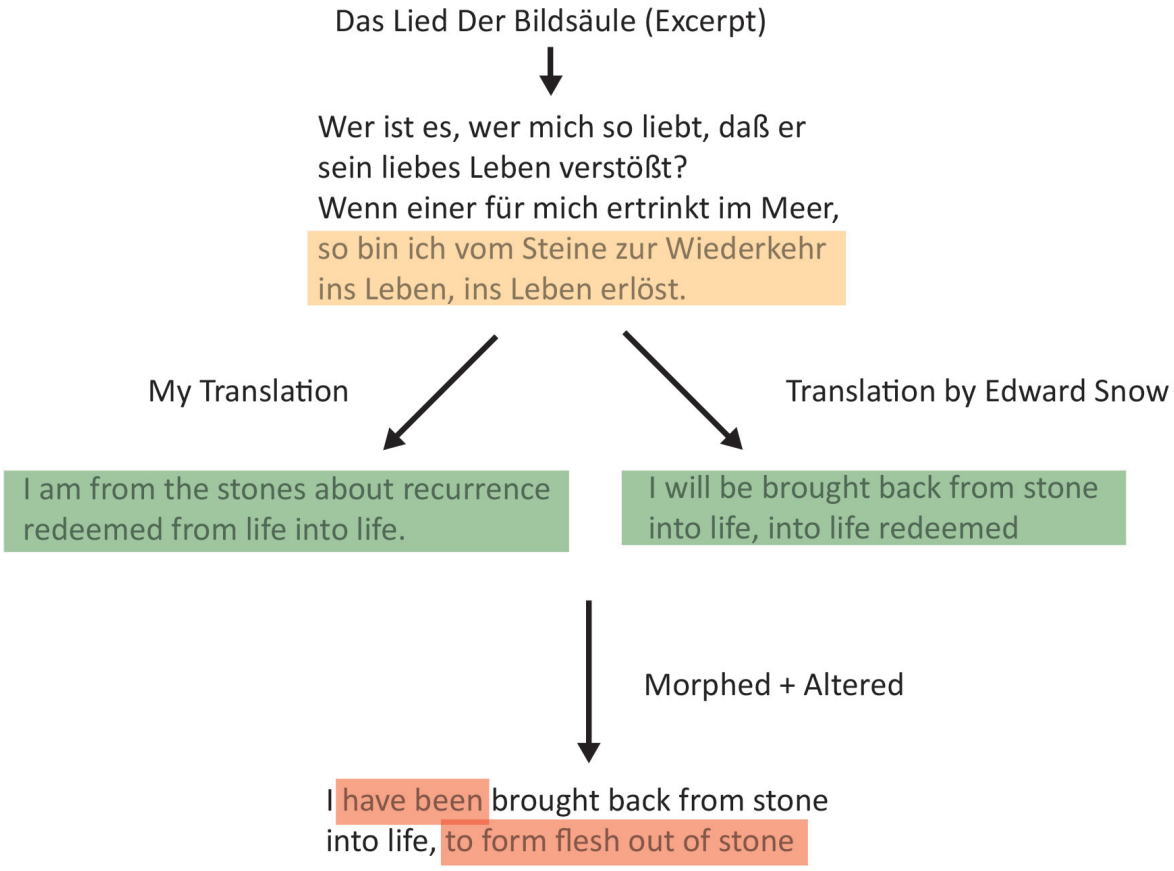

Figure 2.1 Libretto writing process pt.1

Source: All figures (with the exception of Figure 4.5) are original and were drafted and compiled by the author of this document.

For certain sections I reverted back to the original German. For example, figure 2.2 below demonstrates how I took an excerpt from *Die Engel* (*The Angels*), combined my translation with Edward Snow's translation,[15] altered the composite text to say exactly what I

15. Ibid., 31

wanted (seen in red), then translated the text back into German (seen in purple) to create the final text used in the libretto.

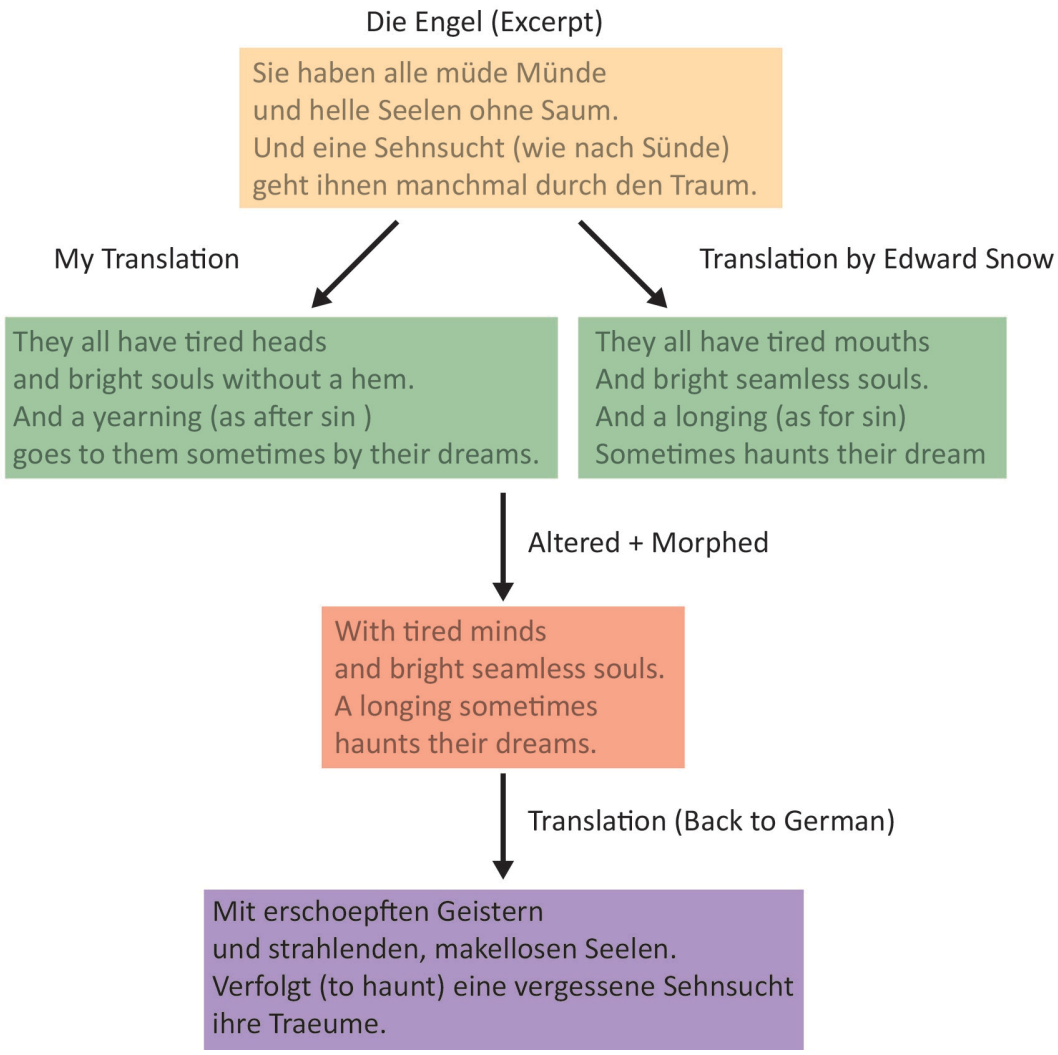

Figure 2.2 Libretto writing process pt.2

Note: Thank you to my friend Heike Mader for her help with re-translating the altered excerpts back into German

At times I used larger sections with only minor changes, subtractions, or additions. In figure 2.3 below you can see how I took several excerpts from *Die Engel,* some of which stayed in German and some ended in English. All excerpts were altered to some degree.

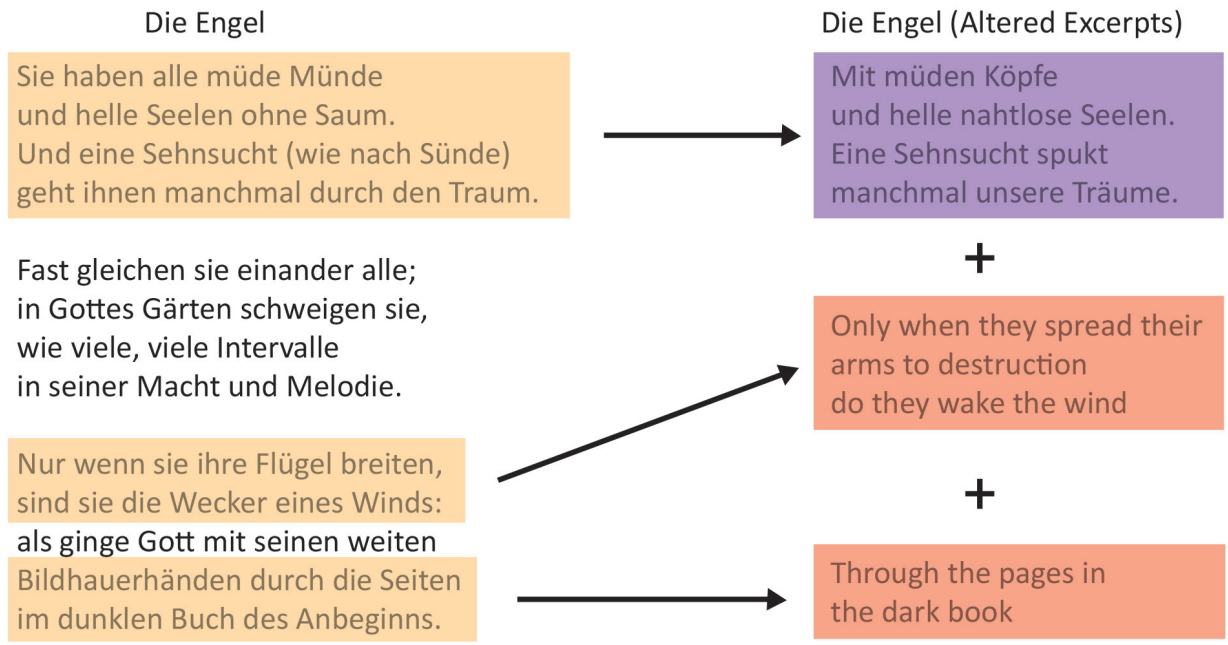

Figure 2.3 Libretto writing process pt.3

The next step in writing the libretto included taking all the edited excerpts and sorting them into categories that fit specific characters based on four categories of emotions or personality traits. I included one exception to this pattern: all texts in German were given to the character Klar who plays an older sage-like character in *Transient Delete*. The final libretto includes four different speaking characters. Each character is associated with a category of emotion or personality. By organizing the phrases into groupings based loosely on these four different categories I was able to bring coherence to each character. Figure 2.4 below illustrates this process of sorting the excerpts into the different categories.

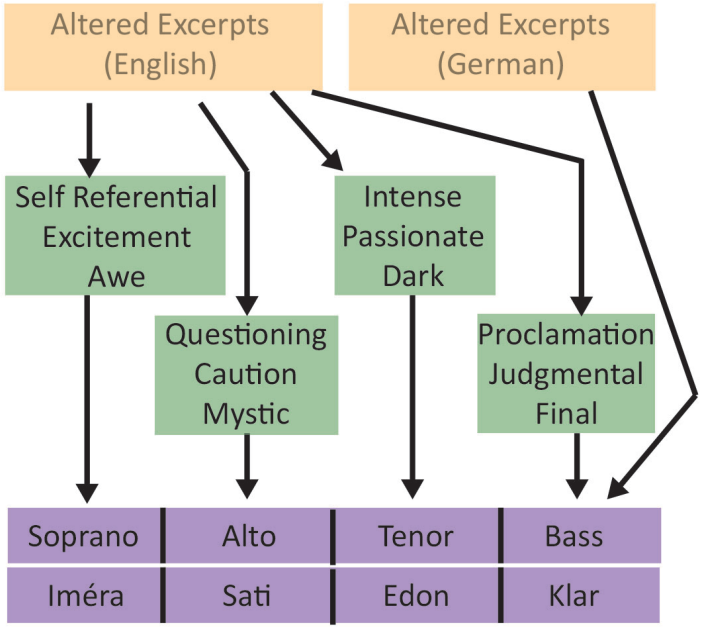

Figure 2.4 Libretto writing process pt.4

Once the excerpts had been sorted, it was possible to organize them into coherent lines of dialogue (see figure 2.5). Figure 2.5 below shows how excerpts for four different poems including *Ernste Stunde*, *Die Engel*, *Initiale*, and *Erinnerung* are combined to create a completed section of the libretto.

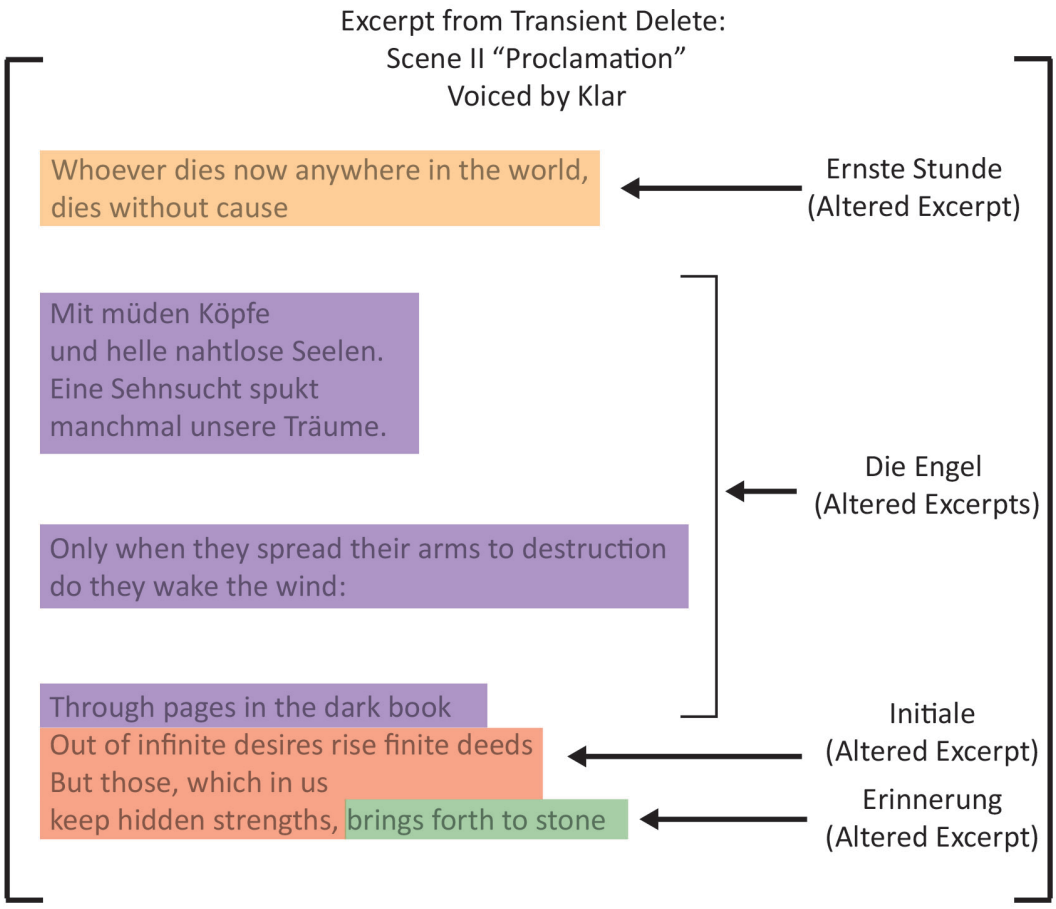

Figure 2.5 Libretto writing process pt.5

Figure 2.5 is an excerpt of the second movement of *Transient Delete* and is voiced by the bass character Klar. In the same manner, excerpts from all 19 poems were combined to form the whole of the libretto (see Appendix A).

CHAPTER 3 Laptop Ensemble

Introduction and Performance Practice

Laptop ensembles have become increasingly popular in recent years. Great appeal lies in the laptop's ability to bring a powerful processor that augments performance abilities in a live setting. Combining human and computer elements enables the simultaneous integration of many different art mediums and provides live digital processing that previously was only possible in post-production. However, there are still some aspects about live laptop performances that can be awkward and limiting. One of the most problematic aspects of live laptop performances is the absence of the visual aesthetic typically found in traditional instrumental performances. With the use of a laptop a performer can easily conduct complex functions with very minimal kinetic activity. Often a simple keystroke or tap on the touchpad can initiate a large cascade of effects and processes. This lack of physical visual queues is most apparent when computer performers perform alongside traditional instrumentalists. A clear example of this is shown in a video recording of Karlheinz Essl's *Sequitur IX for mezzo soprano and live electronics*. In this piece the computer is manipulating the voice onstage. The computer operator actuates a variety of processes by simply tapping the spacebar.[17] In comparison to the vocalist, (vocals being arguably one of the least animated of instruments), the computer performance still seems starkly less physical.[18] Essl's piece is no exception. Many pieces that combine live laptop performances with traditional instruments have similar problems engaging a theatrical side of performativity.

17. Karlheinz Essl. *Sequitur IX: for voice and live-electronics* (score).
18. Karlheinz Essl. "Sequitur IX for mezzo soprano and live electronics" (video of performance).

To fully operate a live effects patch, even a simple process requires many parameters and levels to be set and scaled at any given moment. Once several effects are layered on top of each other the number of controllable parameters become excessive. Consequently, the operator must use presets or automate entire portions of the performance. By setting up a series of presets the performer can narrow the number of live controlled parameters in order to make live performance more manageable. This raises the question of how much should be automated to ensure consistent and accurate performance while still providing some visual aspect that contributes to the overall performance. In many cases it is possible to automate the entire process, the performer forfeiting nearly all of the performance to the computer. While full automation of performances is probably safer and allows for extreme precision it disregards the human element of the performance. One of my primary interests in composing *Transient Delete* was to explore the laptop computer as a live musical instrument, not just an artificial performer; in essence, to further integrate the human and technological elements of laptop ensembles together. This goal provided a guide for many aspects of *Transient Delete*.

Another issue contributing to this absence of performativity is the nature of the computer keyboard/touchpad interface. The keyboard and touchpad are designed for speed and efficiency, resulting in an interface that requires minimal physical movement. When used in a performative environment, this narrow physical performance space allows very little room for theatrical expression. There are several ways to approach dealing with this issue. David Ogborn, in his article *Composing for a Networked, Pulse-based, Laptop Orchestra,* discusses several

different issues involved with live laptop ensemble performances.[19] Ogborn believes that for Laptop ensembles it is necessary to plan or even score theatrical aspects into the performance. Ogborn states that including live elements of physical gestures, even theatrical, exaggerated or "dramatic" gestures can serve to heighten audience participation and performer virtuosity. He also believes that such gestural performances enhance the communication between performers and the audience members. Finally he believes that gestural performances force ensemble members to observe and be aware of their own bodies, which in turn promotes health and physical posture in relation to the laptop and diminishes performance attrition.[20] While this may be true, I believe that it is also possible to obtain much of the needed theatrics by doing less computer automation. The difficult part is finding a balance between automation and theatricality. Too little automation and the performer cannot keep up. The performers become bogged down with too many tasks and often results in stiff if not disastrous performances. However, with too much automation live laptop performers become redundant or even obsolete.

Paul Vandemast-Bell, in his *Rethinking Live Electronic Music: A DJ Perspective* explores Marxist concepts that discuss the distinction between the tool and the machine. In his summary he describes the tool as a device that augments or extends the users ability. One key element in this Marxist model is that the tools derive their power from their users where the machine moves one step further towards being independent of the human by having an external power

19. David Ogborn, "Composing for a Networked, Pulse-Based, Laptop Orchestra." *Organised Sound* 17, 59, accessed November 19, 2015, doi:10.1017/S1355771811000513
20. Ibid., 59-60.

source.[21] From this Vandemast-Bell concluded that Marxism would maintain that machines eliminate the human agency from art production removing the notion of skill from the act of making. Contrarily, Vandemast-Bell argues that it is not impossible to make art through the assistance of machines but rather machines have the tendency to remove the sense of one's body, losing the corporeal presence that an artist typically has with their art.[22] While I believe this distinction of tool and machine is at its basis naïve and idealistic, Vandemast-Bell does touch on a really important concept. From this model we can construct a scale or chart to illustrate the relationship of performer and instrument. The more autonomous or machinelike an instrument becomes, the less corporeal involvement the performer has with the instrument. As a result as this scale progresses the more it can appear to diminish the skill behind the performance. Figure 3.1 below illustrates this progression.

21. Paul Vandemast-Bell, "Rethinking Live Electronic Music: A DJ Perspective," *Contemporary Music Review* 32, no. 2/3 (June 2013), 241-242, accessed May 24, 2015. *Academic Search Complete*, EBSCO*host*.

22. Ibid., 242, 247.

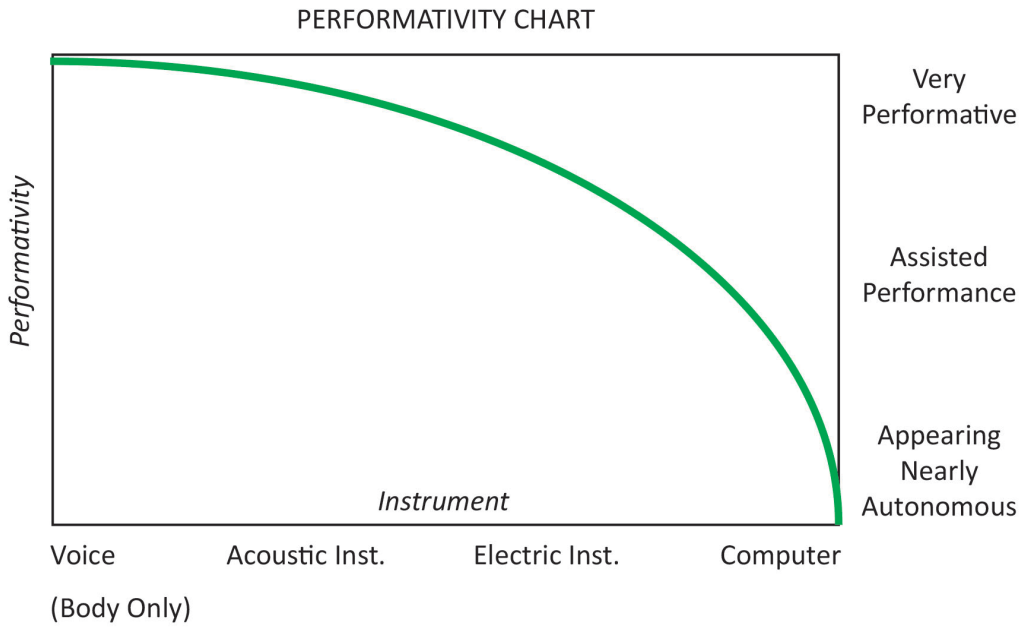

Figure 3.1 Performativity chart

In light of this tendency and in attempt to increase the theatrical aspects of *Transient Delete*, I have chosen to utilize various control surfaces and devices that extend beyond the computer's keyboard. This hardware also extends the operational range of the performers allowing them to do larger gestures during the performance. This in turn helps visually connect the performers and the instruments together. After much testing I concluded that combining the right amount of automation, performative controllers, and gesture-based interfaces the theatrical performativity can be increased greatly. In addition, this approach allows the performer to engage the music more directly, physically, and ultimately more intuitively, in a way that is more similar to that of traditional musical practices.

Control Systems

Building and adapting physical interfaces to control the laptop ensemble was one of the most important aspects of writing *Transient Delete*. More specifically, one of my primary goals was to integrate laptops and human performer in such a way that would foster a physically intuitive performance capable of the emotion, improvisation like that of an ensemble comprised only of traditional instruments. As the native keyboard on most laptops is designed with efficiency as a priority over musicality, it became necessary to explore alternate methods of controlling the computers. I assembled a system of gesture-based interfaces comprised of motion sensing technologies and MIDI controllers that would afford better integration between the human and technological components of the laptop ensemble.

Transient Delete uses three computers to run all the sound, lighting, and projection. The work employs three different motion-sensing technologies, LEAP Motion, Mira (cycling74's iOS app), and Xbox Kinect combined with several MIDI controllers. Live performers operate two of the three computers, with the remaining computer being a dedicated automated computer performer. The arrangement and distribution of processes are as follows:

Operator 1

Processing all Vocal Channels

Sample Playback

Motion Capture Instrument

Operator 2

Live Electronic (MIDI Controlled) Instruments

Lighting Cues

Dedicated (House) Video Computer

Video Processing

Video Projection

Motion Capture

Each computer interfaces with a piece of technology that uses live motion capture. Computer one interfaces with a device called LEAP Motion. LEAP Motion is a small, compact infrared sensing camera that tracks hand and finger motions with great precision. Technologies that sense hand gestures and motions are not new to the world of music. However, LEAP Motion is a relatively inexpensive device that boasts high precision hand motion capturing within a given proximity. For *Transient Delete* I utilize this technology to capture the hand gestures computer of Operator 1, and use this data to affect parameters inside MaxMSP to control a granulation-based instrument.

Thanks to *aka.leapmotion*, a MaxMSP external created by Masayuki Akamatsu, LEAP Motion easily communicates with MaxMSP via Open Sound Control (OSC).[23] Using LEAP in conjunction with MaxMSP the two technologies together enable the operator to control sound effects parameters (see Chapter 4) by means of simple hand gestures. Probably the most useful aspect of the LEAP Motion software as it pertains to *Transient Delete* it its ability to track very

23. "aka.objects," akamatsu.org, last modified November 20, 2015, accessed November 20, 2015, http://akamatsu.org/aka/max/objects/

small motions in each individual finger with extreme precision. The leap software sends live x, y, z data to MaxMSP. In order to use this data within MaxMSP the data must be parsed, organized, and scaled to match minimum and maximum parameters relative to various effects. The scaled data can then be used to drive and control effects parameters allowing the operator the ability to control audio effects with hand gestures. In *Transient Delete* I am primarily using LEAP Motion for live manipulation of input audio from the vocalists using granular effects and audio specialization (see Chapter 4). Figure 3.2 below shows a signal flow diagram for the LEAP Motion effects control.

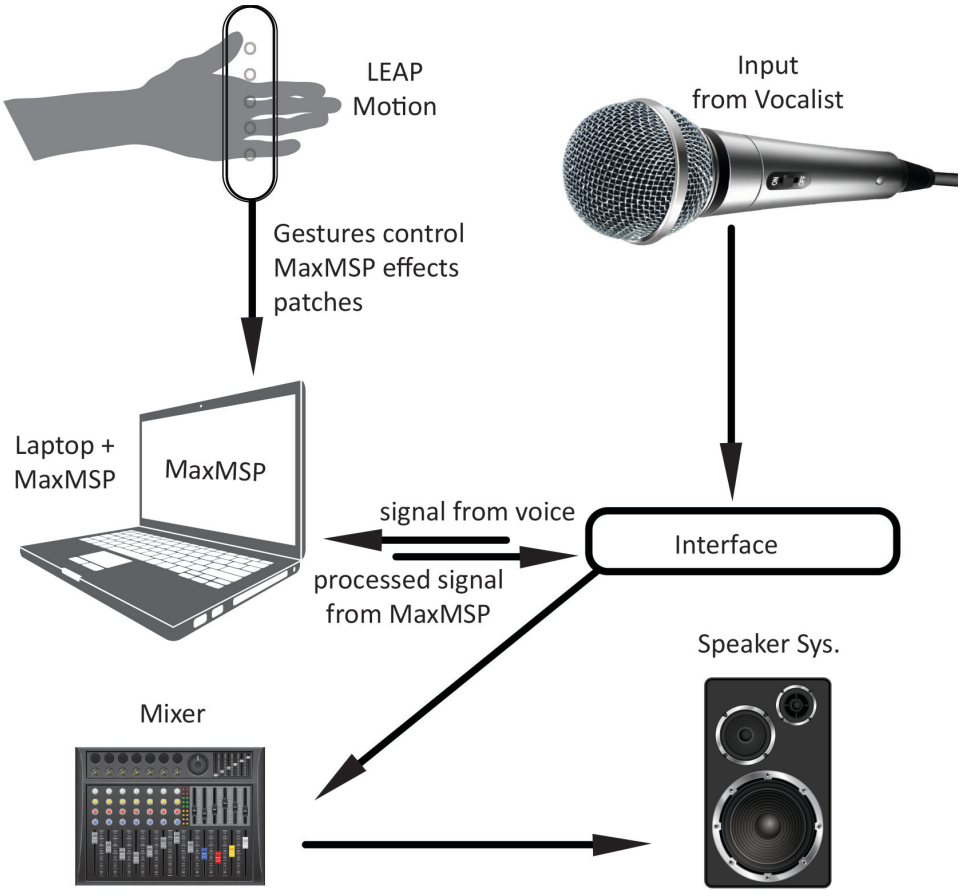

Figure 3.2 Signal flow diagram

LEAP Motion also allows a direct discourse between computer and performer that helps build musical counterpoint and merges the physical and virtual realities. There still needs to be more exploration and research into music applications of motion sensing technologies. However, through the use of technologies like LEAP Motion we can begin to see the potential of motion sensing technologies and how they can be used to intuitively control computers for music while not sacrificing performativity.

MIDI Controllers

In addition to motion tracking systems, *Transient Delete* also utilizes several physical interfaces to control the Max patches. These include a series of MIDI controllers and the laptop itself. MIDI Controllers are very useful because MIDI protocol is very well established, and can easily be integrated into MaxMSP patches with minimal effort. MIDI controllers also provide a physically tangible interface that is much closer to traditional instruments.

Transient Delete primarily uses four different MIDI controllers, AKAI MPKmini, the KORG nanoKontrol, KORG PadKontrol, and two MIDI (or electric) drum pads. To organize these instruments I have built Max sub-patches for each controller that route the signals from each controller to different aspects of the patch. Figure 3.3 below shows the Max sub-patch responsible for receiving and distributing inputs from the AKAI MPKmini.

Figure 3.3 Sub patch for AKAI MPK mini

MIDI controllers have been and continue to be a favorite among composers of electronic music for interfacing with computers. One particular reason is that many are similar to acoustic keyboard and/or percussion instruments. This provides performers with familiar aspects, which can greatly diminish the training of performers involved in live laptop ensembles

Training the ensemble

One challenge that arises when working ensembles comprised of non-traditional instruments is devising a method for training the ensemble member to use these new instruments. Tim Perkins in his *Some Notes on my Electronic Improvisation Practice* discusses

this problem in detail. He states that the problem with much of electronic music is that the performer doesn't really know or understand their instrument. With constant modifications and improvements to the instruments the performer is doomed to "eternal unfamiliarity" with their instrument. Perkins states that performers in situations like these will never fully integrate themselves or their expression into the idiosyncrasies of their specific instrument.[24] This is definitely a common issue in live laptop ensembles that necessitates training ensemble members to become more familiar with their instruments.

Jamie Bullock, Lamberto Coccioli, James Dooley and Tychonas Michailidis in their article *Live Electronics in Practice: Approaches to training professional performers* discusse two differing approaches to training performers for live electronic performance settings. One approach they discuss while also warning against such practices is providing customized Max/MSP patches or other such applications to the performers. They argue that graphical user interfaces (GUIs) designed by composers often vary widely in quality and are often incomplete, confusing and typically have little to no documentation. This inevitably causes issues during rehearsal and leaves performers dependent upon composers or technical assistants that serve as intermediaries between them and the computer. [25] I believe this is too often true. Ultimately, Jamie Bullock, Lamberto Coccioli, James Dooley and Tychonas Michailidis propose the integration of technology training instrumental performer education at higher education institution levels. Arguing that while composers have had technology integrated into their

24. Tim Perkins, "Some Notes on My Electronic Improvisation Practice," In *The Oxford Handbook of Computer Music,* edited by Roger T. Dean (New York: Oxford University Press Inc., 2009), 161-166.
25. Jamie Bullock et all., "Live Electronics in Practice: Approaches to Training Professional Performers". *Organised Sound* 18, 171-173 doi:10.1017/S1355771813000083

training and personal development for well over 30 years, professional performers has not been privy to the same technology training. [26]

While I agree with this assessment that technology training should be integrated into the training of professional performers at higher educational levels, composers cannot wait for such radical change to be implemented into higher education systems. Composers must find creative ways to help performers familiarize themselves with new instruments and GUIs utilized in electronic music. In *Transient Delete* I utilize several approaches that aim to diminish the training involved in order to operate the technology within *Transient Delete*. One primary element that I implemented into the technological aspects of *Transient Delete* is that I intentionally distributed the technological chores so that the vocal performers would have to deal with very little technology. In addition, the score also suggests using either other composers or audio engineers as the performers for the computer portion so that they are not overwhelmed by the technology and have less training involved in acclimating themselves to the technological components of the work.

To assist in training the vocalists how to work with the computer accompaniment, I have design a website that provides information that will enable the vocalist to practice outside of rehearsals with the accompaniment portions of the computer part. This website includes an audio player that sequences tracks to correspond to queue numbers in the score, thus allowing the vocalist to follow along with the score. In this manner they can trigger the playback of

26. Ibid., 172-173.

different audio samples from different sections of the score with the click of a mouse. Figure 3.4 below shows this audio player in the window.

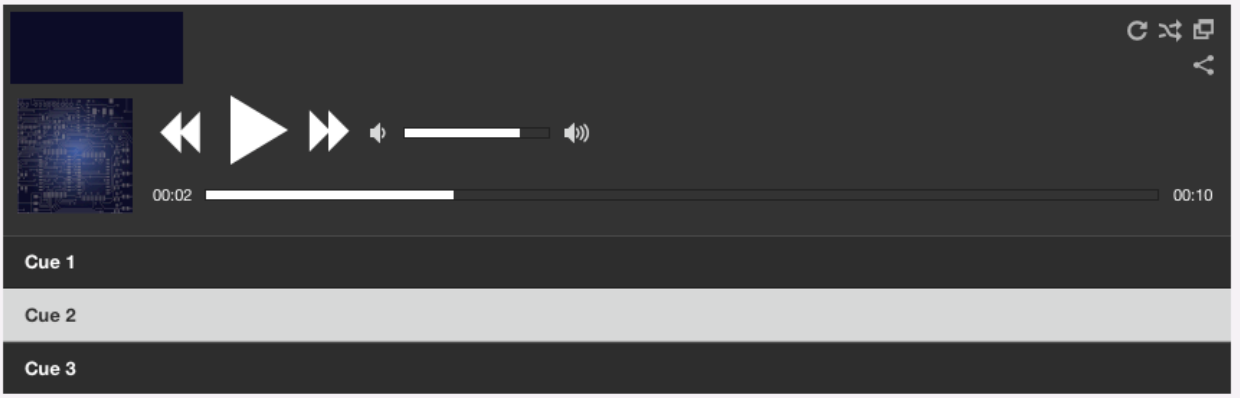

Figure 3.4 Webpage cue player

The webpage with the player can also be found at this URL:

http://benjaminshirey.com/?page_id=574

Although, I do not claim to have fixed any of the pervading issues that exist for live performers when working with technology I do believe that some of the efforts mentioned in this chapter can help the performers integrate with the technological aspects found in *Transient Delete*. Ultimately, more research needs to be done on the training of professional performers in live electronic music.

CHAPTER 4 MaxMSP

Introduction

MaxMSP played a very significant role in the development of the music, lighting and projection controls within *Transient Delete*. With MaxMSP I created several vocal-processing effects that create much of the electronic music throughout *Transient Delete*. MaxMSP also was used to create the GUIs, and software patches responsible for interfacing with the MIDI controllers and motion tracking devices utilized by the laptop ensemble. These patches receive messages and data from the external hardware devices and using the inputs from these devices to drive digital instruments and effects generating much of the sonic elements of the piece.

The effects

The primary effects utilized in *Transient Delete* include delay lines, pitch-shifters, harmonizers, biquad-filters, and granulators. To create several of these I used a sub program called gen~, which is a component of MaxMSP that allows the programmer to work at the signal/sample level. Within gen~ it is very simple to program efficient filters and effects visually without having to use C or GLSL code.

All of the delay line patches in *Transient Delete* were created using gen~. These delay patches all use a simple digital multi-effect system that that uses an infinite impulse response (IIR) filter. This digital system can be mathematically expressed as:

$$y(n) = a[x + bx(n - m)] + [x + cx(n - m)]$$

Equation 1

Where:

a = rate of blend (0.0-1.0)
b = rate of feedback (0.0-1.0)
c = rate of feed-forward (0.0-1.0)
m = rate of delay by # samples

Below in Figure 3.1 is a block/flow diagram that represents this relationship. Illustrated in the diagram, x(n) represents the input signal and y(n) represents the affected (output) signal. The graphic protocol for these type flow diagrams can be found in Rusty Allred's book Digital Filters for Everyone[27]

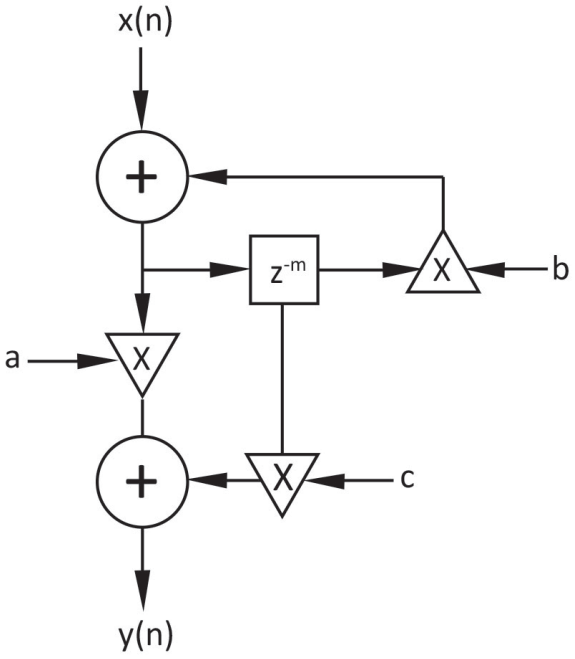

Figure 4.1 block/flow diagram for gen~ delay patch

$$y(n) = a[x + bx(n - m)] + [x + cx(n - m)]$$

27. Rusty Allred, *Digital Filters for Everyone* (Melbourne, FL: Creative Arts & Sciences House, 2010), 1-17.

This diagram can then be easily translated into a gen~ patch by converting all variables into controllable input parameters, all multiplications into signal multipliers, and all summations into signal additions. Below in Figure 3.2 is the resulting Gen patch. This completed digital delay system can create more effects than just delay lines but is also very effective at creating versatile delays. By controlling the variable parameters it is easy to create sophisticated delays that can be controlled at the rate of delay, wet/dry blend, feedback, and feed-forward levels.

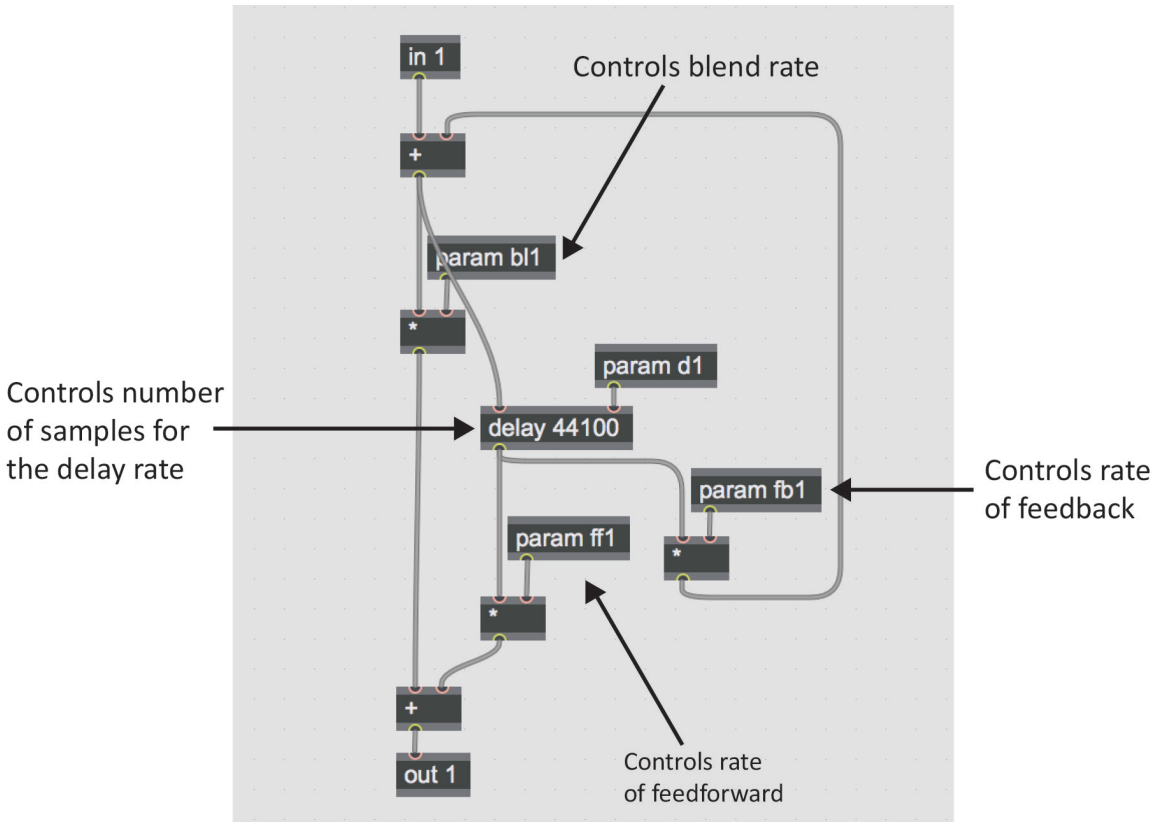

Figure 4.2 Max code: gen~ subpatch for delay effect

Transient Delete also utilizes several pitch-shifters to alter the sung pitch of the vocalists. A pitch-shifter is a simple effect that when combined with any other effect can be

very effective. Figure 4.3 provides a diagram of the primary patch responsible for pitch-shifting processes in *Transient Delete*. With only minor changes to the pitchshift~ Max help-file patch[28] I have implemented a reliable pitch-shifting system that alters pitches microtonally. This patch also serves as the basic building block for my harmonizer patch. As you can see in Figure 4.4 using a series of 5 parallel pitchshift~ objects I am able to create a harmonizer with presets tuned to specific chords.

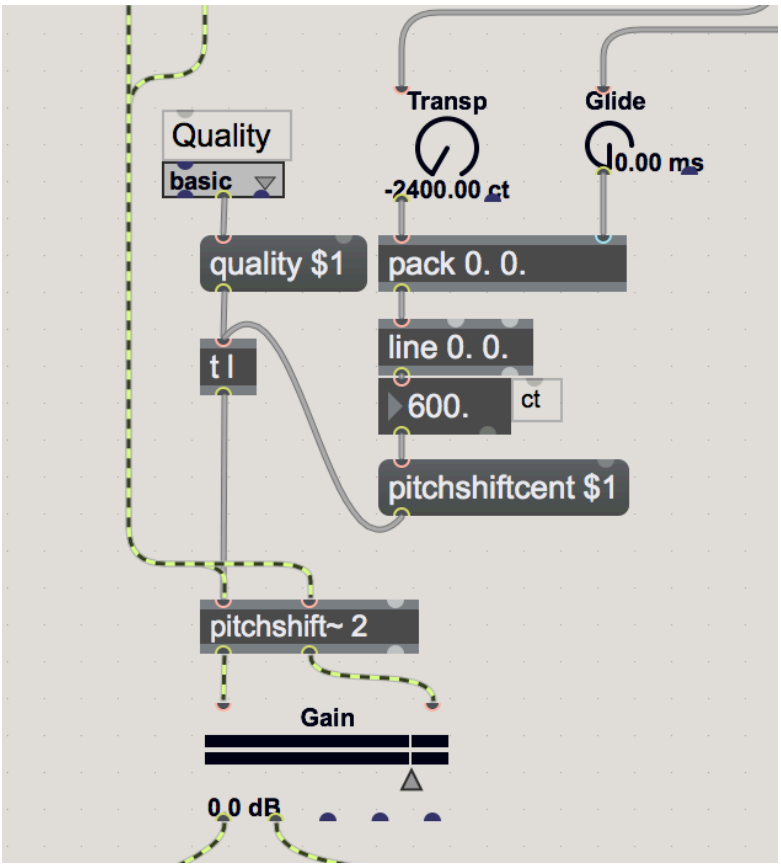

Figure 4.3 Pitchshift effect

28. MaxMSP 7 help file for pitchshift~ (included in software download)

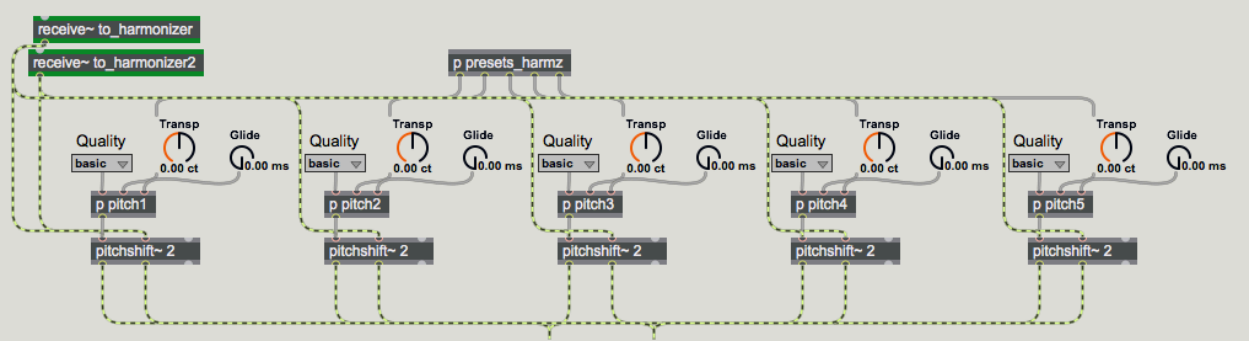

Figure 4.4 Harmonizer effect

In *Transient delete* I also have incorporated the use of a biquad filter in direct form 1, which is a 2-pole, two zero IIR filter.[29] Like the digital delay system, I was able to program this in gen~ allowing me to work at the sample level. A biquad filter can also be represented as the mathematic expression below:[30]

$$y(n) = \frac{1}{a_0}(a_0x + a_1x[n-1] + a_2x[n-2] - b_1y[n-1] - b_2y[n-2])$$

Equation 2

Below in Figure 4.5 the flow (block) diagram illustrates this mathematic expression in a format that can be easily translated into a digital filter using gen~.

29. Rusty Allred, *Digital Filters for Everyone* (Melbourne, FL: Creative Arts & Sciences House, 2010), 12-17.
30. Ibid.

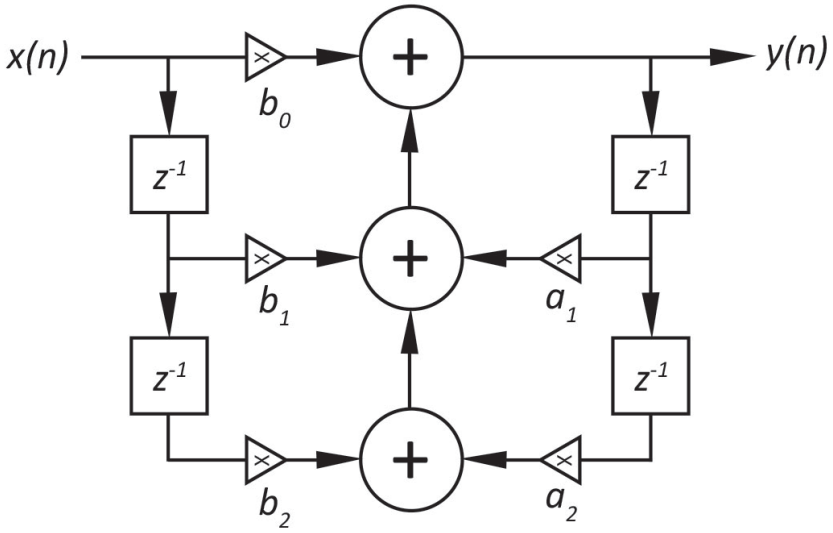

Figure 4.5 Biquad block/flow diagram

Source: Adapted from Rusty Allred, *Digital Filters for Everyone* (Melbourne, FL: Creative Arts & Sciences House, 2010), 12-17

Figure 4.6 illustrates the final of the biquad filter in Gen.

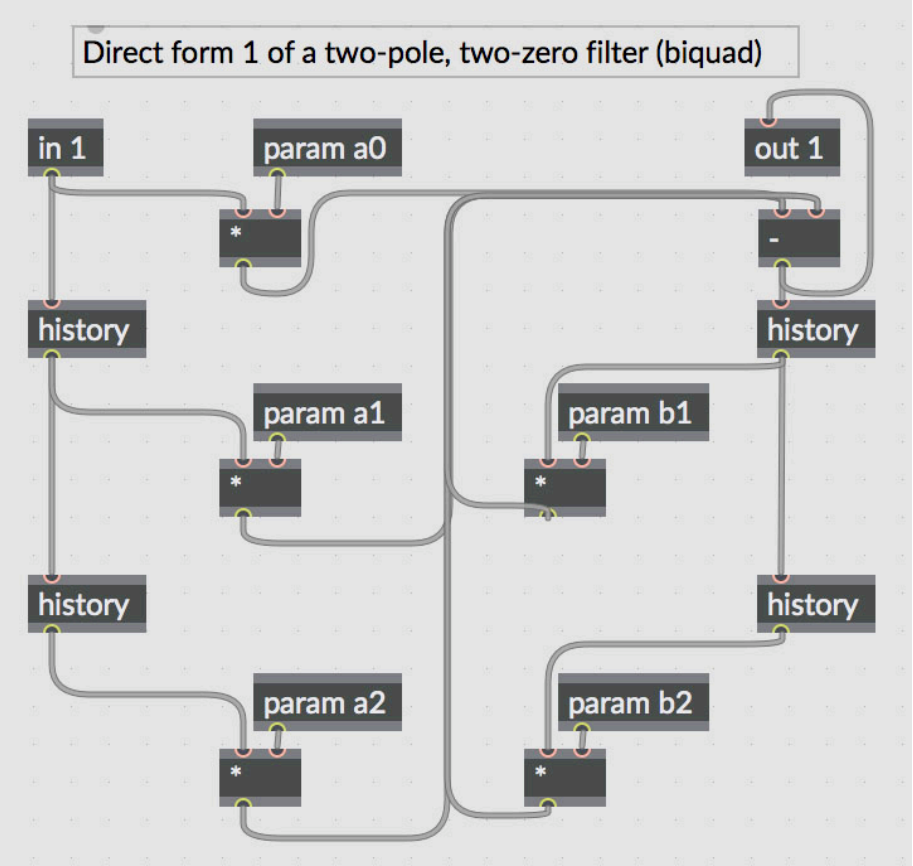

Figure 4.6 Max code: gen~ subpatch for filter effect

MaxMSP's filtergraph~ object can calculate filter coefficients based upon an interactive graphic image of any desired filter. By using filtergraph~ to control the variable parameters of the biquad Gen patch above (Figure 4.6), we can use the biquad to create a number of varying filter designs including: Lowpass, Highpass, Bandpass, Resonant, Bandstop, Peak/Notch, Low-Shelf, High-Shelf, and Allpass filters (see Figure 4.7).

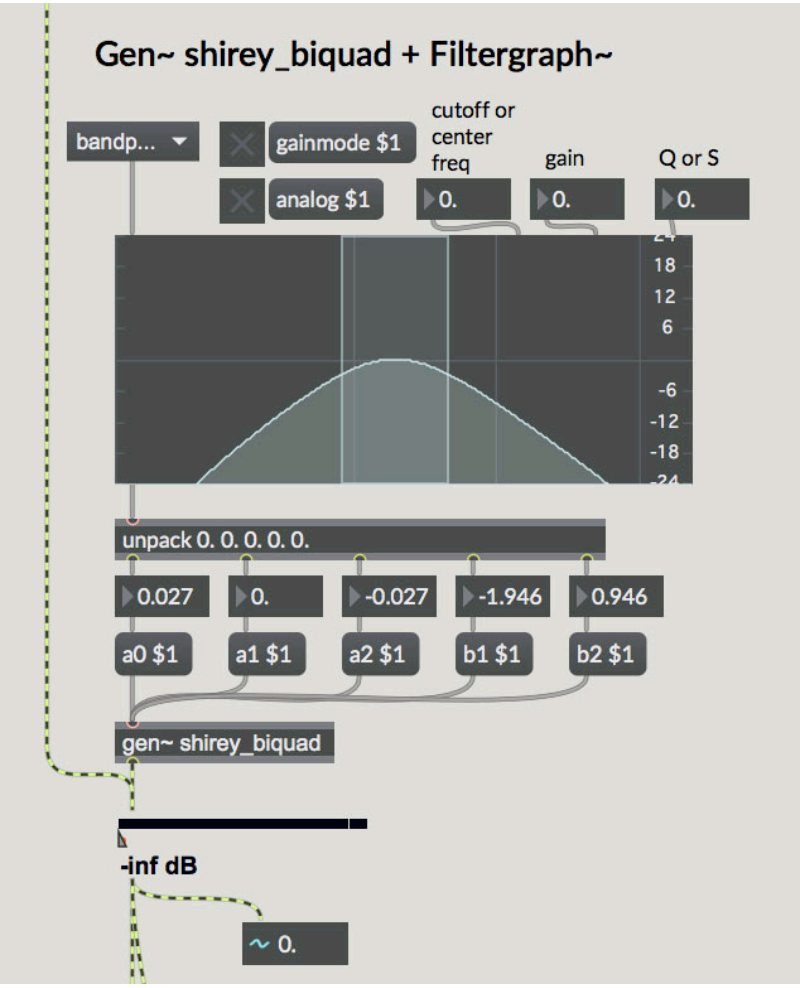

Figure 4.7 Filter effect

The patches above represent the primary effects that are used throughout the opera. Other effects include a granulator, reverb, and repeater.

Laptop Itself As A Performance Tool

Finally the laptops themselves become instruments controlling and managing all the different effects and processes, each with its own set of control systems acting as an appendages to the networked body that is made up by the laptop ensemble. As discussed in chapter 3 one common issue that arises when using laptops as performance instruments is how

to manage many different effects and processes simultaneously. My solution to this issue involved building three different GUIs for each computer that would help to streamline the process for each operator. The GUI for the first computer combined some of my own previous work in GUI designed with some work by the brilliant Leaf Cutter John in his Multi-Effects patch.[31] Examples 3.8 and 3.9 below show my final patch utilizing many aspects from Leaf Cutter John's multi-effects patch.

31. "Mr Matrix," *Draggable FX routing system*, last modified March 24, 2013, accessed November 10, 2014, https://cycling74.com/toolbox/mr-matrix-draggable-fx-routing-system/#.Vk9NMFwXx1J

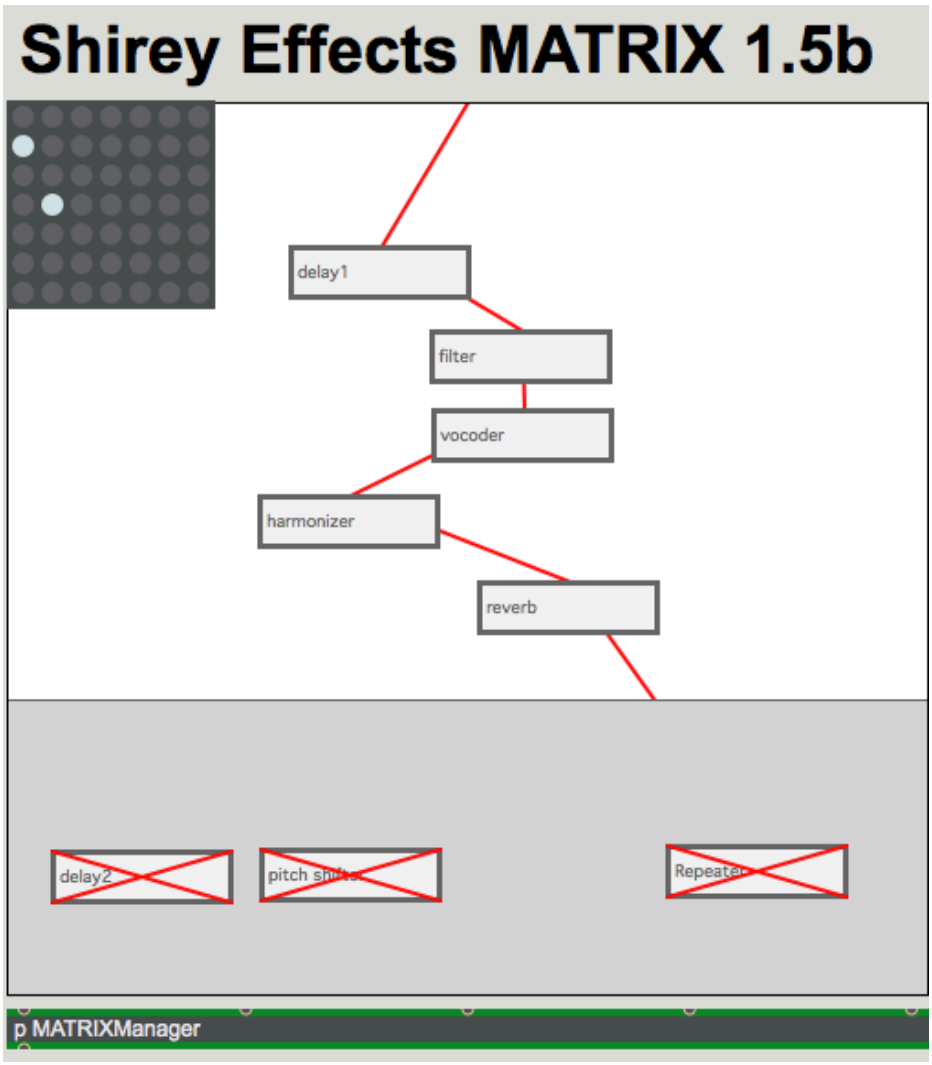

Figure 4.8 Multi-effects manager

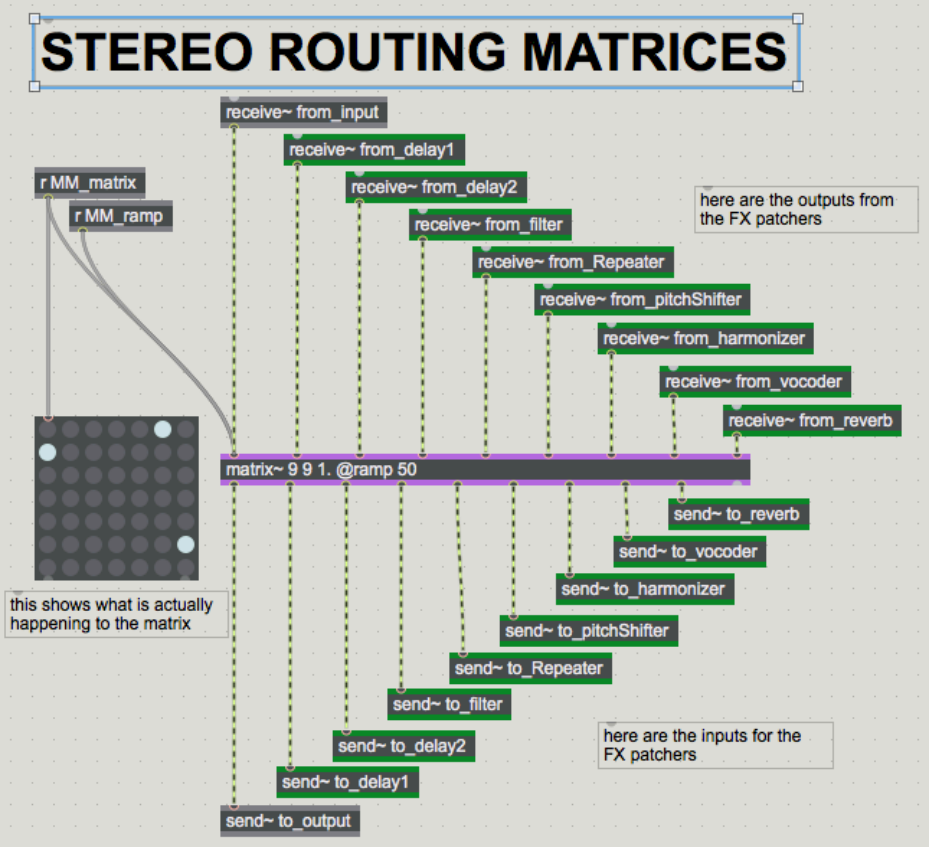

Figure 4.9 Muli-effects routing matrix

This Patch allows one operator to operate multiple effects simultaneously with presets but also allows for live improvisation and re-patching with ease. This multi-effect patch is primarily used for vocal processing and resides on Computer 1.

Computer 2 also houses a GUI that functions as the hub for the two MIDI driven instruments attached to that computer and houses the patches used for the nanoKONTROL and the MIDI drum pads. Figure 3.10 and 3.11 below illustrate aspects of Computer 2's GUI.

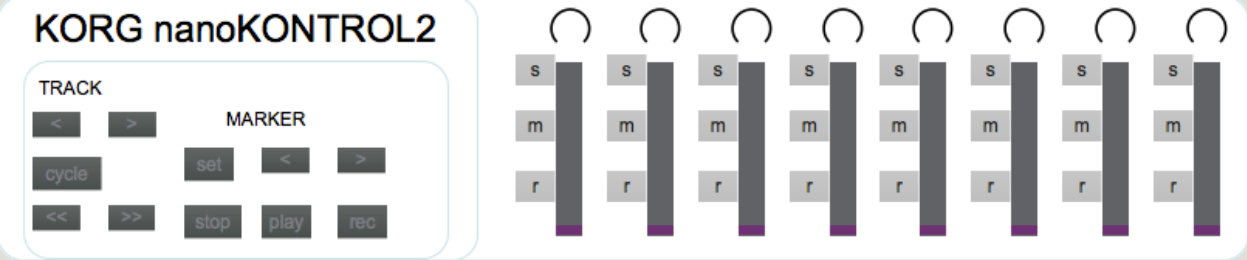

Figure 4.10 Subpatch for KORG nonoKONTROL2

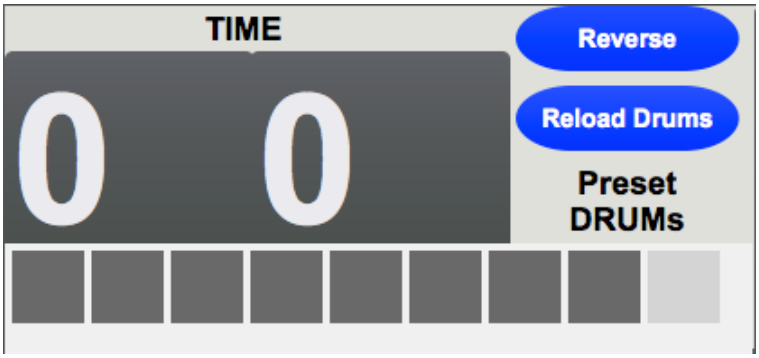

Figure 4.11 Drum pad subpatch

The third computer also has a GUI however; it is very minimal as this computer typically functions as a “plug-and-play” autonomous system. However, if desired a third operator can control the patch via Mira as mentioned previously.

CHAPTER 5The Stage and Multimedia Production

Introduction

While the audio portion of *Transient Delete* was of primary concern, the piece also incorporates dance, video projections, and a variety of theatrical elements including acting, lighting, props, and costume design. Ben Macpherson in his *Embodying the virtual: "Digital Opera" as a New Gesamtkunstwerk?* discusses the integration of new (digital) media into live operatic performances. Macpherson proposes that by combining the physical traditional performance space with the virtual digital space, digital opera can transcend an audience's preconceptions of the stage and performance space and ultimately become a new *Gesamtkunstwerk*.[32]

Referencing Fischer-Lichte's work in *The Transformative Power of Performance: A New Aesthetics*[33] Macpherson discusses how neuro-scientific research demonstrates that a spectator's sense of presence is directly related to live human interaction more that that of virtual interaction.[34] However, this perception of space can be can be expanded or augmented through the use of the virtual means, the digital space. Macpherson discusses how the live stage combined with the virtual screen can serve to create a hyperreal performance environment. In order to facilitate the 'live stage' aspect of this concept, I chose to incorporate projection screens as a prominent element in the live performance of *Transient Delete*.

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32. Ben Macpherson, "Embodying the virtual: 'Digital Opera' as a New Gesamtkunstwerk?" *International Journal Of Performance Arts And Digital Media* 8, no. 1 (January, 2012): 51-55, accessed July 3, 2014, doi: 10.1386/padm.8.1.49_1
33. E. Fischer-Lichte, *The Transformative Power of Performance: A New Aesthetics,* trans. S. I. Jain, (London and New York: Routledge, 2008).
34 . Macpherson, 52

Projection and Video Processing

The video projections in *Transient delete* can be divided into two categories: projections for the foreground (to be projected on mesh panels) and video for the background (background screens). These two different types of projections are very similar in visual aesthetic but take on different functions within the piece. The video projections for the foreground employs several mesh projection panels that are really the only use of set and prop design for *Transient Delete*. These panels provide the foreground for the opera landscape and function as the primary stage where the drama of the opera unfolds.

To build these panels I used several wood frames ranging from 4x5' to 8x4' and stretching common window screen mesh over the frames. The window screen mesh works well as projection screen but has one unique quality. While the mesh can be projected on the material it is not opaque and some of the projection bleeds through, shining onto whatever is behind the mesh. In Transient Delete the bleed through will be shining on the dancer and the vocal performers. This helps to blend the virtual and visceral even more by combining the different spaces. Using these panels helps to create a multidimensional space for the dancers and performers to interact within and also allows the dancer the ability to dance in and amongst the projections rather than just along side or in front of as is typical in dance projection works.[35] Figure 5.1 below illustrates these projection panels.

35. It is common for dance and projection works of this nature to feature a traditional projection screen. Often the dancers will dance in front of the screen (or in front, but just below) creating a counterpoint between the two visuals. One drawback to this arrangement is that larger screens can easily overpower dancers. Another issue can arise if the dancer's proximity casts shadows on the screen.

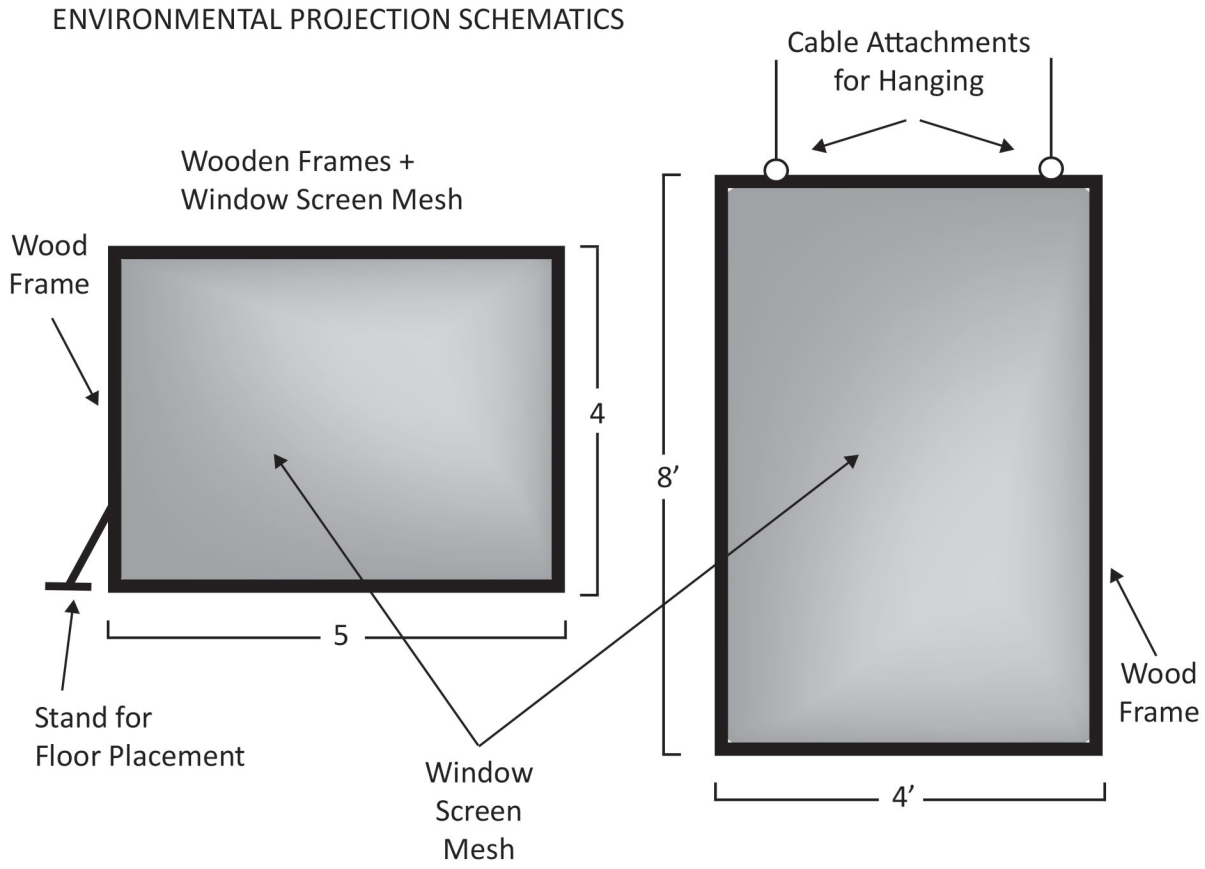

Figure 5.1 Environmental projection schematics

For video processing I am utilizing a combination of Processing, a JAVA based programing platform, and Jitter, a video processing component within MaxMSP. The video projections to be mapped onto the panels are a variation on a Jitter patch that I created for another dance work in which the patch takes a raw live camera feed and manipulates it using various delay lines and distortion effects. The figure below shows part of the GUI and effects processing within the jitter patch.

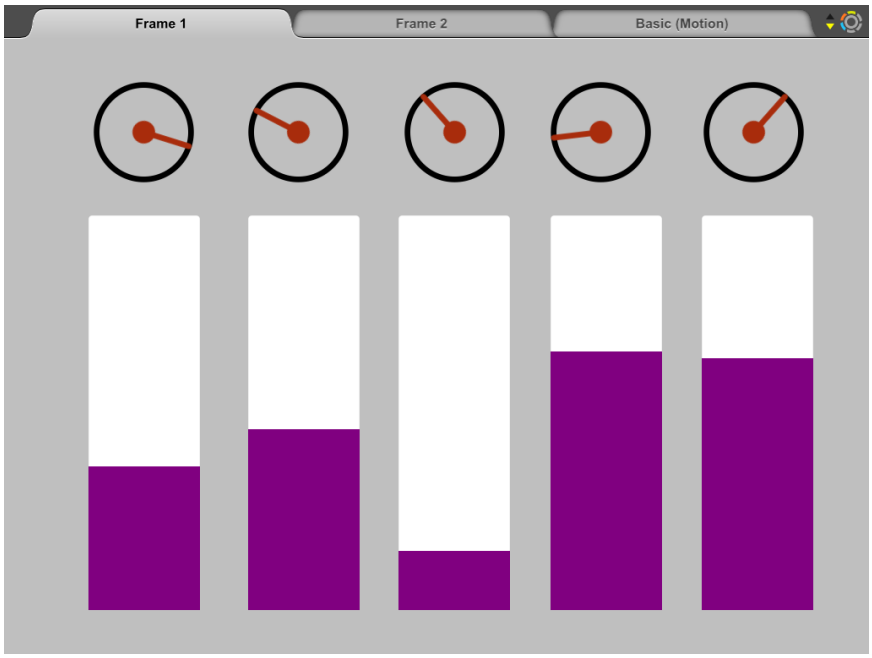

Figure 5.2 Video processing controls frame-1

Figure 5.3

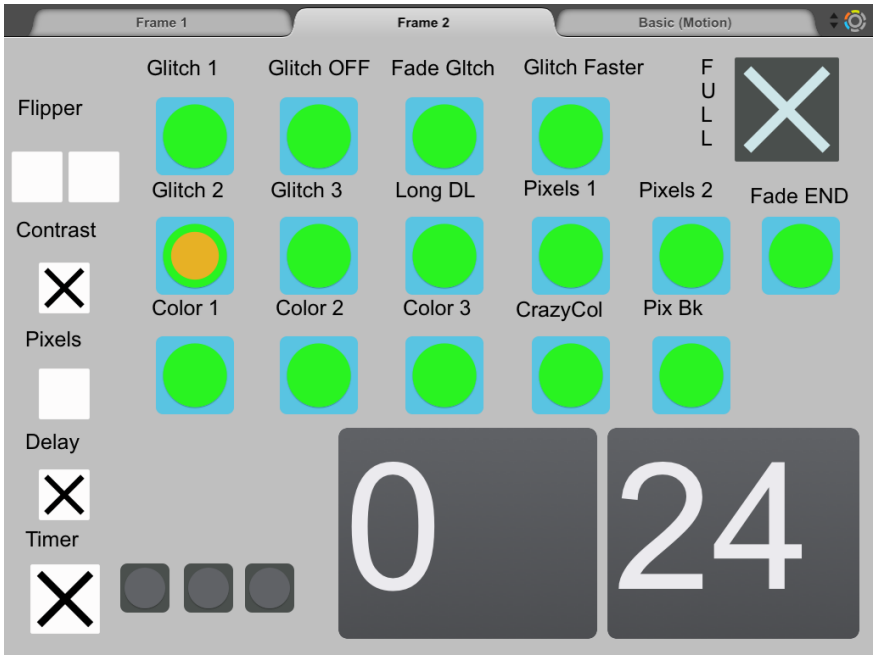

Figure 5.3 Video processing controls frame-2

The processed footage is then projected back onto a screen, in effect doubling the dancer, which results in an eerie doppelganger effect. In *Transient Delete,* this patch was adapted to process the images extensively, exaggerating them to the point of abstraction. So, instead of projecting a doppelganger the image processing creates abstract textures that move and evolve based on the motions of the dancer. When projected on the mesh panels these adaptive textures allow the dancer to improvise in a pseudo interactive environment.

Kim Vincs and John McCormick in their *Touching Space: Using Motion Capture and Stereo Projection to Create a "Virtual Haptics" of Dance* discuss how gesture based interaction and motion capture technologies allow a dancer to interact directly with the computer, creating an entirely new type of human-computer interface. They state that this approach to computer dance interactivity allows the performance to emphasize more of the subtle qualities embodied in the nuances of whole-body performance as in dance performances.[36] This type of interfacing is exactly the type of human computer relationship that I am exploring through many of the concepts and techniques utilized in *Transient Delete.*

Mira

Computer 3, the video computer in *Transient Delete,* can be set to function autonomously or it can be controlled through the use of another motion capturing device called Mira. Mira is Cycling 74's iOS application for iPad, which automatically connects wirelessly to

36. Kim Vincs and John McCormick, "Touching Space: Using Motion Capture and Stereo Projection to Create a "Virtual Haptics" of Dance." *Leonardo* 43, no. 4 (2010): 359-361, accessed May 24, 2015https://muse.jhu.edu/journals/leonardo/v043/43.4.vincs.html N1.

MaxMSP creating “mirror” sub-patches within the Max interface. Transforming the iPad into a motion capture device, Mira allows a performer to control max wirelessly through an ad-hoc computer-to-computer network. Utilizing the iPad’s native touch screen, internal gyroscope, and accelerometer sensor Mira provides multiple input sources for processing in Max. Figure 5.2 below shows a Mira frame that charts the input from the gyroscope calculating the rate of rotation and the tablet’s x, y, and z-axis orientation. Mira also charts input from the accelerometer and compass.

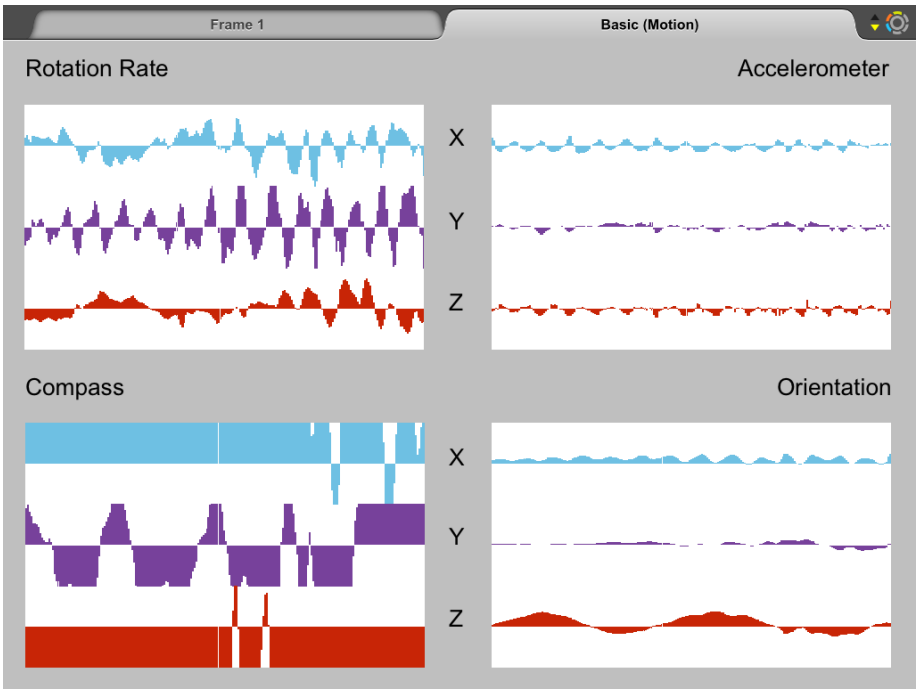

Figure 5.4 Mira frame-1 demonstrating motion capture

Mira is very convenient in that it automatically handles all the network communications. Without the need for any additional Max objects or externals, Mira directly interfaces with

patches inside Max.[37] Also, a single MaxMSP patch will work with multiple instances of Mira, allowing for multiple performers to collaboratively control a single patch in live performance. This provides great flexibility and enables the creation of complex instruments and effects that require more than one person to perform. Figure 4.2 below shows an iPad screen-shot of one of the Mira frames I built for *Transient Delete*. In this frame there are eight touch sensitive button objects, four touch activated dial objects and four touch sliders. There is also a keyslider object at the bottom of the frame for pitch-based triggers.

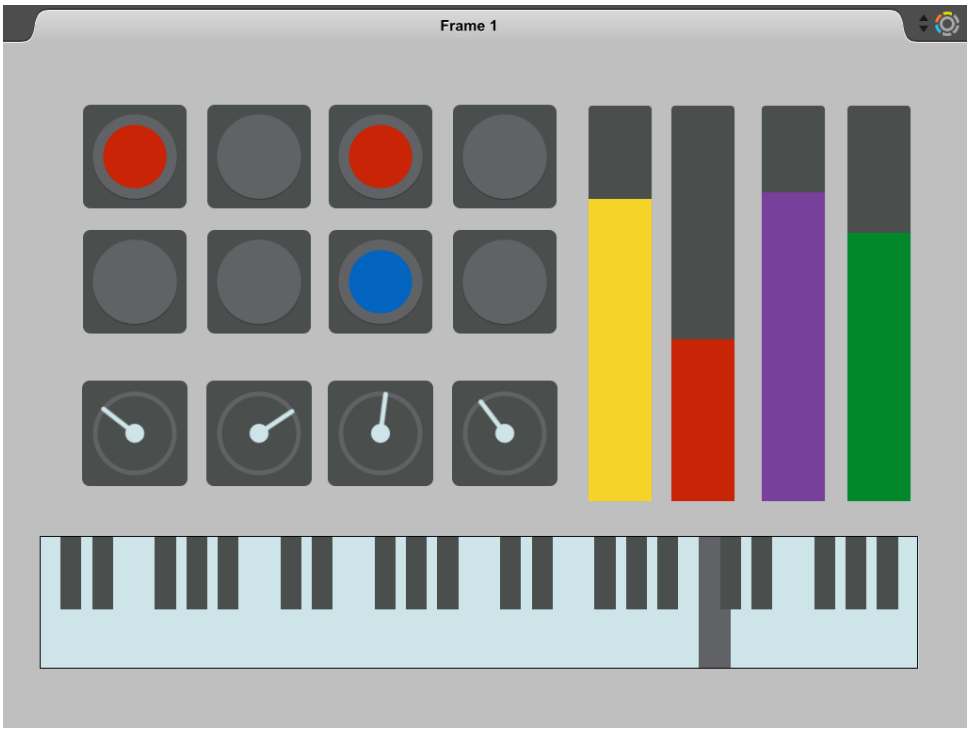

Figure 5.5 Mira frame-2: additional controls

The projection panels also have LED lights installed in and around them. These lights help to create an immersive performance space. The lights are controlled through the use of a

37. "Mira," An iPad app that automatically connects to Max and mirrors your interface, last revised November 20, 2015, accessed November 20, 2015. https://cycling74.com/products/mira/

relay system that interfaces with MaxMSP through an Arduino microcontroller. Available at a low cost[38], Arduino microcontrollers have become the standard microcontrollers used in experimental art and hobbyist circles. Arduino microcontrollers allow users to send and receive both analogue and digital signals back and forth between a computer and specific hardware including motors, buttons, lights and much more. For *Transient Delete* I am using the Adruino MEGA 2560 chip to bridge the gap (with the assistance of the software Fermata[39] and Maxuino[40]) between MaxMSP and an 8-channel 120v relay system that I built for controlling 8-chanels of LED lights connected to the panels. These lights are controlled by Max and synced to various elements within the piece. Below is a diagram illustrating the lighting relay system.

38. “Arduino Mega,” A microcontroller board based on the ATmega1280, last modified November 20, 2015, accessed November 20, 2015. https://www.arduino.cc/en/Main/arduinoBoardMega
39. “Firmata Library,” Firmata library implements the Firmata protocol for communicating with software on the host computer, last revised November 20, 2015, accessed November 20, 2015. https://www.arduino.cc/en/Reference/Firmata
40. “Maxuino,” Max/MSP to Arduino communication made easy, last revised November 20, 2015, accessed November 20, 2015. http://www.maxuino.org

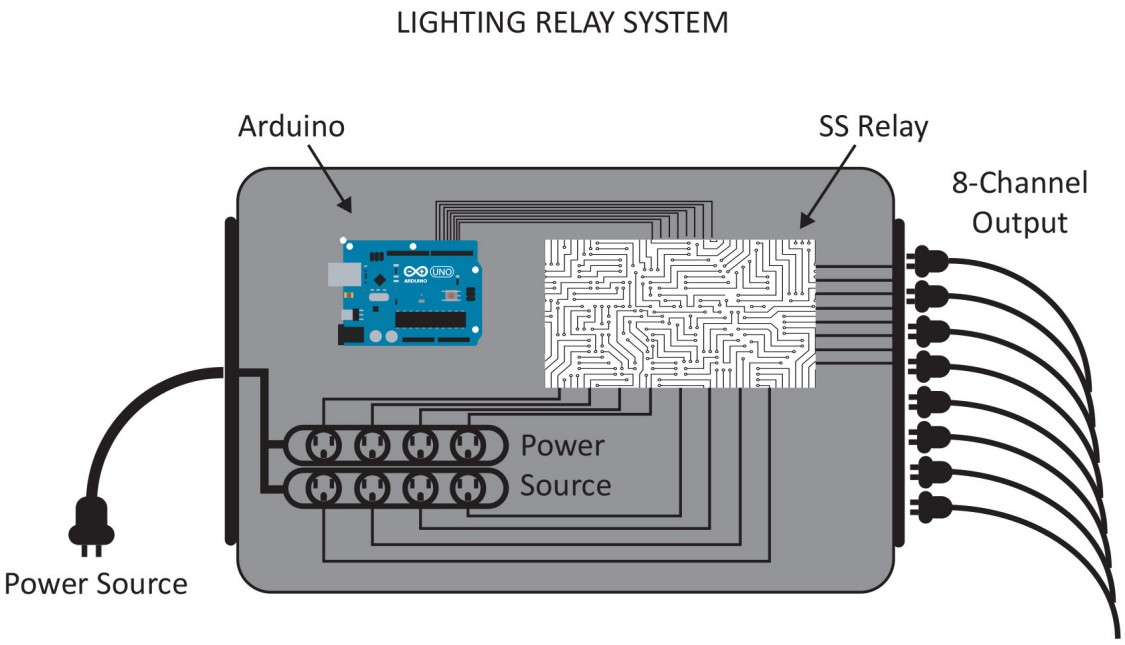

Figure 5.6 Lighting relay system diagram

These lights combined with the projections mapped onto the mesh panels create a bright immersive environment for the dancer and vocal performers to interact with each other on the stage.

Dance

The dance portion of *Transient delete* evolved through a collaboration with Dancer/Choreographer Erika Record[41] and myself. Our collaborative relationship actually began a year before I began work on *Transient Delete*. During this time, we collaborated on three separate projects before beginning work on *Transient Delete*. In these projects we worked with both fixed music, fixed projections and set choreography. However, In *Transient Delete* we

41. Erika Record, http://www.erikaleighrecord.com

wanted to take these elements one step future by incorporating live, aleatoric, and improvisatory elements within the music, dance, and projections. Our goal was to blend these together in such a way that each aspect of the music, dance, and projections informs or even helps to generate aspects of the other parts. To accomplish part of this we utilized the motion capture technology discussed previously to capture the dancer's motion and drive the video projections.

Another important element of the Dance was the incorporation of improvisation into the choreography. Curtis Carter in his *Improvisation in Dance* states that the primary means with which dance improvisation is facilitated is through a body and its interaction with other bodies. [42] On the surface this seems obvious and even insignificant. However, this is one of the primary aspects that distinguishes dance improvisation from improvisation within other art mediums. In mediums such as sculpture the improvisation is bound to the medium itself. In mediums like music or painting improvisation is limited by the use of a specific tool or device with which the body interacts such as a musical instrument or a paintbrush. In dance the body is both medium and device allowing live improvisation the full range of expression including physical, conceptual, and social. This leaves a virtually limitless range of concepts available for live improvisation within dance.[43]

Aili Bresnahan in his Improvisational Artistry in Live Dance Performance as Embodied and Extended Agency identifies what he claims are the three primary types of improvisation in dance:

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42. Curtis L. Carter, "Improvisation in Dance," *The Journal of Aesthetics and Art Criticism* 58 no. 2, (Spring 2000), 182, accessed November 20, 2015, doi:10.2307/432097
43. Ibid., 182-183

1. Embellishments left to the individual artists upon an existing fixed choreography
2. Creative improvisation of spontaneous free movement used as a tool with the purpose of generating or inventing new original movement intended to be utilized within a set choreography
3. Improvisation performance for its own sake[44]

The first type, Embellishments left to the individual artists upon an existing fixed choreography, is the basis for the dance improvisation in *Transient Delete*. While the majority of the dance is fixed it is only fixed as a framework for smaller improvisatory embellishment on set choreography. These embellishments also serve to provide generative material that the laptop ensemble observes and improvises upon.

Disembodiment

Part of the goal in *Transient Delete* was to create an abstract form of theatrics between the vocalists and the dancer. I wanted to blend the vocalist particularly the soprano role Iméra and the dance into one character, together evolving throughout the story. During the entire performance the vocalists are hidden behind the panels, obscured (at least partially) from the audience's view, engaging the audience only through aural means. On the other hand, the dancer engages the audience purely from a visual/kinesthetic approach. This disembodiment of the voice creates a gap in the performance element that is then fulfilled by the dance. This encourages the audience to engage in transference, or the projection of attributes of the

44. Aili Bresnahan, "Improvisational Artistry in Live Dance Performance as Embodied and Extended Agency," *Dance Research Journal 46 no. 1 (April 2014)*: 86, accessed October 10, 2015, doi: 10.1353/drj.2014.0003

singing/speaking character onto the dancer, which in turn helps to further blend virtual and physical aspects of the performance space.

CHAPTER 6 The Composition

Sample playback, MIDI controlled instruments, and live vocal processing together make up the primary live electronics utilized in *Transient Delete*. As mentioned in chapter 2, the overall form and structure of the piece is mostly influenced, and ultimately governed by the libretto. *Transient Delete* is divided into ten distinct sections as follows:

Section I	Overture	0:00-2:45
Section II	Dance Solo I	2:45-4:30
Section III	Birth	4:30-6:00
Section IV	Proclamation	6:00-7:40
Section V	Praise	7:40-9:00
Section VI	Lament	9:00-9:45
Section VII	Dance Solo II	9:45-12:45
Section VIII	Anointing	12:45-14:15
Section IX	Caution	14:15-14:30
Section X	Finale	14:30-15:15

Table 1 *Transient Delete* Formal Structure

Though the composition is approximately 15 minutes in duration, it is possible for the piece to be much longer due to the types of notation used throughout the piece.

Within this larger structure the six different sections of the libretto (See Appendix A) make up the majority of the dramatic sections of *Transient Delete* while the dance sections serve as transitional improvisational interludes. The overture, and finale function as ancillary

movements to the body of the piece. *Transient Delete* can be divided into three primary types of material.

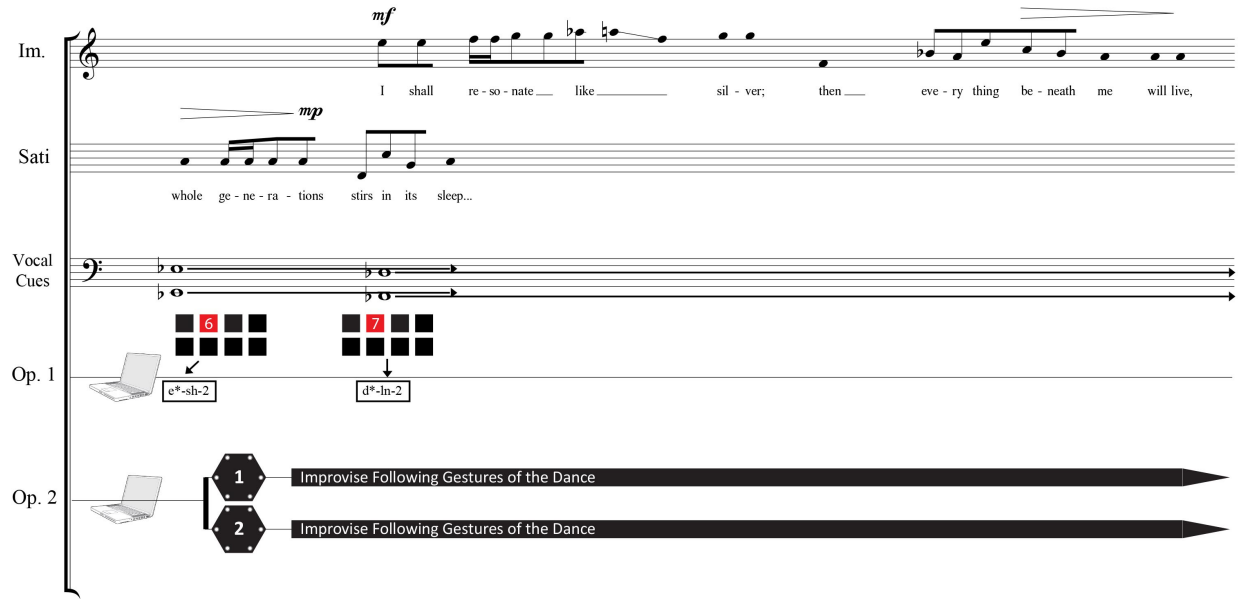
1. Dramatic Vocal Sections
2. Dramatic Instrumental Sections
3. Instrumental Non-dramatic Sections

Each type presents its own challenge when creating the score. One particular challenge was scoring for the laptop ensemble for both dramatic instrumental sections and dramatic vocal sections.

Scoring for the Laptop Ensemble

Devising a sufficiently clear notational paradigm for the laptop ensemble became an integral aspect of the compositional process of *Transient Delete*. In order to provide the flexibility required by varying levels of aleatoric choices throughout the opera, the score utilizes a form of spatial notation. While some sections are highly improvisational, other sections are very synchronized, albeit without the assistance of meter. Figure 6.1 below show an excerpt from *Transient Delete* illustrating the spatial notation used throughout.

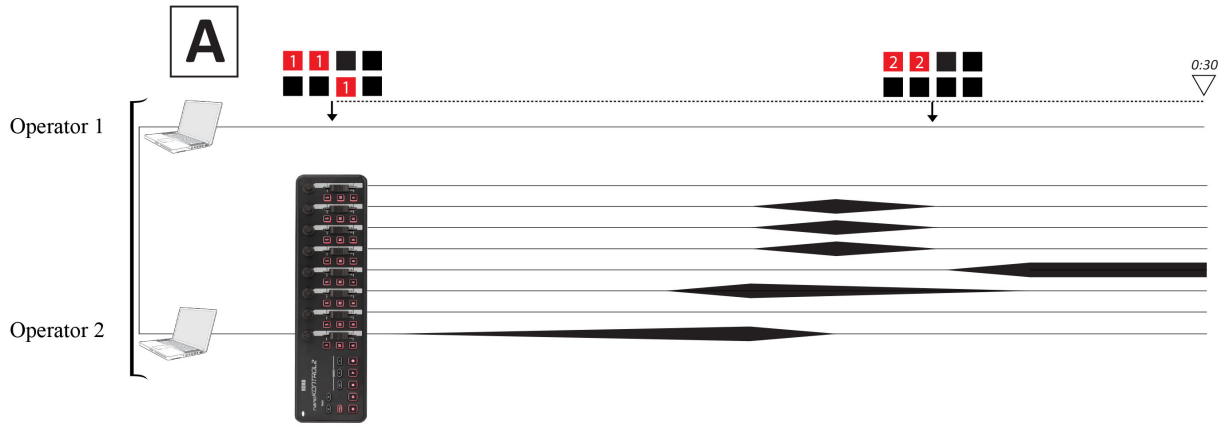
Figure 6.1 Excerpt from *Transient Delete:* Section VIII (Anointing)



The notation utilized for the nanKONTROL was inspired largely by Dan Tramte's notation for the nanoKONTROL in his work GR!ND.[45] In the notation for GR!ND, Tramte uses a graphic and spatial method to instruct the performer to move the eight faders to different positions using gradients of line thickness to indicate fader position. Figure 6.1 below is an excerpt of the first system of the Overture (s. 1) of *Transient Delete*, which includes a sample of this nanoKONTROL notation.

45. "G®¡ND," A work Commissioned by Patchwork Duo, accessed November 20, 2015, http://www.dantramte.com/gregiexclnd.html

Figure 6.2 Excerpt from *Transient Delete*: Section I (Overture)



Scoring for a Laptop ensemble can be particularly challenging to adequately distinguish between multiple devices that include both data input and signal output coupled with a single computer. As mentioned in Chapter 3, each computer operator has several physical interfaces or instruments as well as a computer to control. Operator 1 controls the LEAP Motion, the AKAI MPKII, and the KORG PadKONTROL, while the second operator utilizes the nanoKONTROL2 and two MIDI drum pads. Indicating different functions specific to a certain piece of hardware needed to be clear and concise within the notation, as to avoid confusion and cluttering of the score. Consequently, I utilized brackets to visually connect disparate devices to a single parent computer. Figure 6.3 below shows five different devices associated with computer operators 1 and 2.

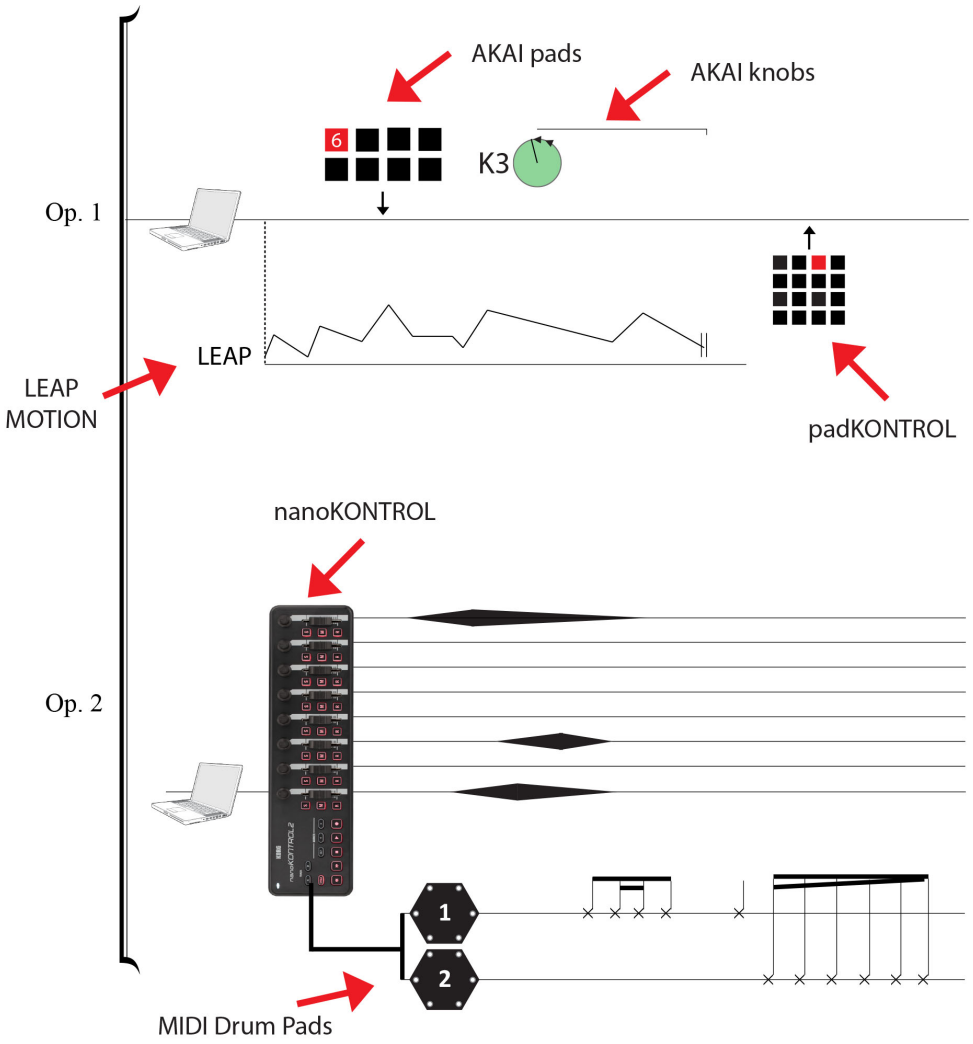


Figure 6.3 Graphic elements within *Transient Delete*

In the example above Figure 6.3 visually depicts one of the AKAI pad controllers with boxes that correspond to the eight pads on the AKAI controller. The red boxes indicate that the corresponding pad should be pressed. The numbers inside the red boxes indicate how many times that particular pad should have been pressed/used during the current movement of the piece. The max-patch GUI should reflect the same number as the score. This allows the performer to check at any point to see if he/she has missed any queues. This also provides the

operator with precise control of midi messages and keeps track of where the sample playback should be at any given moment. Figure 6.4 below is a snapshot of the Max-patch GUI for sample playback.

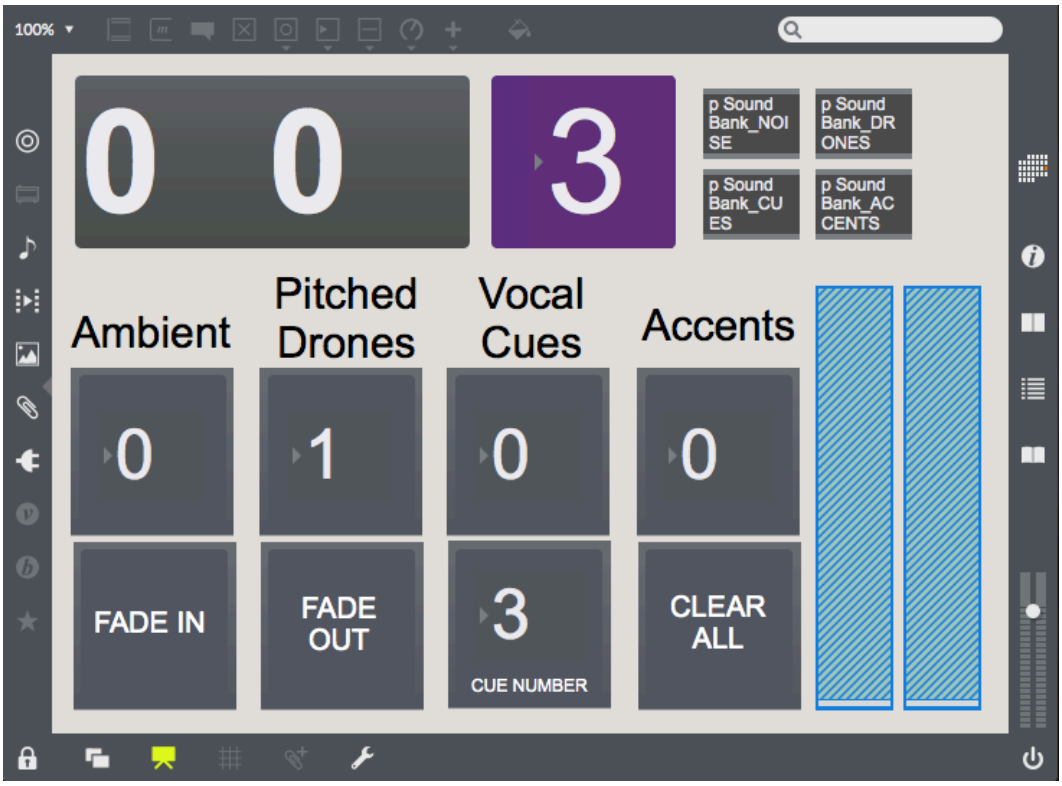


Figure 6.4 Sample playback GUI

Overture & Finale

The instrumental overture functions as an open-form improvisation for the two computer operators. Although the majority of the music in this section is improvised using LEAP motion and the three MIDI controllers, some fixed-media sample playback persists, guiding the improvisation and creating a sonic textural background throughout the overture. These samples also help to maintain continuity within the texture and the overall sound of the piece.

The overture is initialized by the chief operator (Operator 1) through the use of the Max-patch that communicates with the AKAI. This not only triggers the first sample playback but also serves to synchronize all the different instruments attached to that computer. One of the primary functions of this section is to allow the operators a chance to perform without the vocals. This allows the audience to see the laptop ensemble and start to build a reference for gesture-sound association. Although the instrumental ensembles generally are hidden from the audience in opera, *Transient Delete* exposes and even illuminates the ensemble in order to bring attention to the fact that the electronic music is live and not fixed. Although some sounds are prerecorded samples, their usage is not fixed and is brought into the piece only when triggered by the operators in live performance.

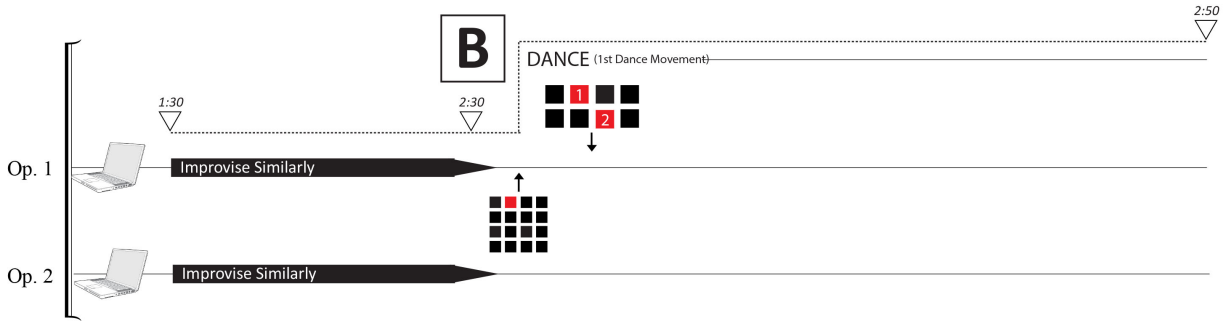
Dance & Ensemble Improvisation

Although the dance sections of the piece are instrumental they continue to provide dramatic content. In *Transient Delete* the two dance movements are designed as visual abstract interpretations embodying the concept and essence of the main character Iméra. This abstract visual embodiment creates an environment for the vocalist to build upon both conceptually and physically. The two dance sections of *Transient Delete* are solo sections for the dancer and the computer operators improvise based upon the choreography. However, during the vocal sections the roles of the dancers become subsidiary to the vocalists. While the vocalists perform the dancers improvise using minimal gestures.

The music for the solo dace sections include both prerecorded samples and live improvisation. The two operators are instructed to improvise gestures mimicking the dancers

motion. Nearly half of the audio during the dance sections is comprised of sample playback. This provides very stable and reproducible foundation for the dancer. Below is an excerpt from the first dance movement.

Figure 6.5 Excerpt from *Transient Delete:* Section II (Dance Solo I)



Improvisation

Transient Delete includes a wide variety of aleatoric elements. These elements range from the generally spatial or proportional nature of the score to the largely improvisational sections within the piece. Consistent with the findings of Michele Biasutti's and Frezza Luigi's research in *Dimensions of Music Improvisation, t*he improvisation utilized in *Transient Delete* is a complex multidimensional concept that includes a required level of musical, technical, expressive, and social elements.[46] Designed as a networked system of feedback loops between the musical performers and the Dancer, the piece is constantly reinterpreting visual motifs into sonic motifs and visa versa.

According to Michele Biasutti, and Frezza Luigi, the most important characteristic of a successful improvising performer is a heightened ability in cognitive effort toward long-term

46. Michele Biasutti and Luigi Frezza, "Dimensions of Music Improvisation," *Creativity Research Journal* 21, no. 2/3 (April 2009): 240, accessed October 8, 2015. Academic Search Complete. *doi*: 10.1080/10400410902861240

foresight for musical anticipation. In essence, being able to mentally visualize the solo or part as a whole.[47] However, this notion of foresight being the primary skill necessary for successful improvisation assumes that the improvisation is the primary focus within a solo or ensemble. While the primary focus of improvisation may be given to a particular performer at a given point, the improvisation in *Transient Delete* is typically following, mimicking, or embellishing upon existing fixed musical or choreographed material. The foundation for the improvised sections is the fixed background audio. These fixed tracks are very minimal and intentionally sparse in order to leave room for improvisation. The choreography is created to work in conjunction with the fixed audio and is largely fixed in form with minimal improvisational embellishment or ornamentation. Example 6.6 below illustrates the relationship between the dance and the music.

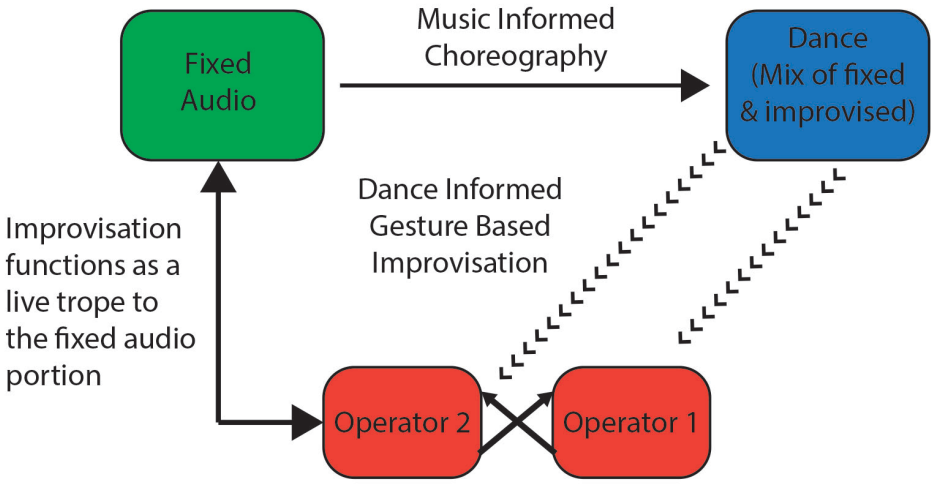


Figure 6.6 Improvisational relationships

Michele Biasutti and Frezza Luigi also discuss the tendency for musical improvisers to rely more

47. Ibid.

heavily on the aural and proprioceptive cues rather than visual cues.[48] However, proprioceptive cues can be communicated visually from one body to another, as is often the case in collaborative dance improvisation. Enforcing the musical improvisers to take cues from the dancers motions enables heightened kinesthetic proprioceptive awareness, which in turn helps to integrate the audio and visual aspects of *Transient Delete.*

Similar to the improvisational approach used in *Telepathic,* a piece by BEER: The Birmingham Ensemble for Electroacoustic Research,[49] *Transient Delete* utilizes a common formal trajectory and likely behaviors imposed on the performers through the use of tempo. In *Telepathic* much of this process is handled through the use of computers interpreting and facilitating rhythmic interaction based on a shared pulse. *Transient Delete* utilizes a similar approach but with one primary difference, the computing processes are not bound to a shared master pulse but are rather determined by the computer operators. Varying rhythmic patterns, polyrhythms, and poly-tempi are synched not to a master clock as in *Telepathic*[50] but to the choreography.

Augusto Monk in his article *Improvisation between Sound and Music* discusses several common issues that arise within collaborative improvisation. One of these deals with inconsistency and limitation of material. Specifically, improvisers often have a tendency to "travel" through musical material too quickly, visiting too many motives without fully developing their musical ideas. Monk states, "it is analogous to chitchatting without ever

48. Ibid.
49. Scott Wilson, et al. "Free as in BEER: Some Explorations into Structured Improvisation Using Networked Live-Coding Systems," *Computer Music Journal* 38, no. 1 (Spring 2014): 56-58, accessed September 27, 2015, https://muse.jhu.edu/journals/computer_music_journal/v038/38.1.wilson.html N1
50. Ibid., 58.

finding a substantial topic to discuss." [51] To remedy this Monk suggests a sequence of trading off the lead role between improvisers. In this paradigm, the lead improviser returns to the original motif and reworks the material, exploring it further and not introducing new material but rather reinterpreting the initial motif through the lens of their collaborators motives and improvisational choices. According to Monk this creates an underlying structure more akin to traditional musical form. *Transient Delete* deals with this issue of inconsistency and limitation of material similarly by binding the improvisers to fixed portions of audio. The improvisers are instructed to use the fixed audio as an inspiration for the motivic material, allowing them to embellish upon or ornament but not to introduce new motivic material.

Monk is also concerned with what he coins "simultaneous monologues," stating that individuals in group improvisation contexts are often more concerned with their individual solos than with the texture of the whole.[52] *Transient Delete* addresses this concern through the use of the same fixed background samples that provide the textual backdrop for the piece. *Transient Delete* also does not allow for any improvisational lead. Switching the performers' role from improviser to follower allows for more continuity between the improvisers.

The improvisational elements within *Transient Delete* strives to help create the since of space and time, heightening the dramatic space for the theatrical portion of the opera. By utilizing musical improvisation with live electronics and dance my hope is to invoke what Richard Teitelbaum describes in his *Improvisation, computers and the unconscious mind*:

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51. Augusto Monk, "Improvisation between Sound and Music," *Canadian Music Educator / Musicien Educateur Au Canada* 53, no. 4 (Summer 2012): 43, accessed October 8, 2015, Academic Search Complete.
52. Ibid.

> "Musical improvisation within the medium of live electronics can have the effect of further objectifying and detaching the perceived, sounding image; the image becomes detached both from its unconscious source and from the physical actions employed in its production. The 'electronic double' takes on a life of its own—physically displaced in space, often amplified larger than life, perhaps costumed in new modulations, distortions and syntheses." [53]

Scoring for the Vocalists

In addition to the laptop ensemble *Transient Delete* also incorporates an SATB vocal ensemble that is processed electronically. However, in an effort to enable the vocalists to focus more exclusively on singing the composition places the technical burden of controlling the processing is given to the laptop performers. This has the advantage of creating an environment that does not require the vocalists to learn technologies with which they may not be familiar. This pragmatic concern for performers of new music concurs with Elizabeth McNutt, who observes in her article *Performing Electroacoustic Music: A Wider View of Interactivity*:

> "Electroacoustic music, even more than traditional composition, presents the composer with a complex world of aesthetic and technical considerations that often are given precedence over the performer's needs. Such stressful difficulties as crashing computers, skipping disks, unreliable software, bad cables, feedback, noise and clipping can make composers lose sight of other aspects of the music even during the critical dress rehearsal. Careful consideration of the performer's experience of a work, from the planning of instrumental and electronic resources through the final stage set-up, can dramatically improve the interaction between composer and performer, performer and work, and above all between performer and audience."[54]

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53. Richard Teitelbaum,"Improvisation, computers and the unconscious mind," *Contemporary Music Review* 25, Iss. 5-6, (October/December 2006): 497, accessed November 10, 2015, doi:10.1080/07494460600990026

54. Elizabeth McNutt, "Performing electroacoustic music: a wider view of interactivity," *Organised Sound*, 8, (2003): 297, accessed October 12, 2015, doi:10.1017/S135577180300027X.

With the many different technologies utilized in within *Transient Delete*, it was my goal to be as considerate of the needs of the vocal performers as possible. McNutt in the same article outlines several of the most predominate issues that cause problems between the performer, composer, and audience relationship. This following section highlights some of the solutions implemented in *Transient Delete* to address these concerns.

Unlike the laptop ensemble materials that focus primarily on the electronics, the electrical and technological aspects of the vocal performance effects are more auxiliary and at times peripheral in nature. In order to create the clearest and most concise method for the interplay between the vocalist and the laptop ensemble, I chose to leave all of the vocal processing as part of the laptop ensemble's tool set and therefore accompaniment in nature. All the processing is initiated and controlled by the laptop ensemble, enabling the vocalist to focus exclusively on singing.

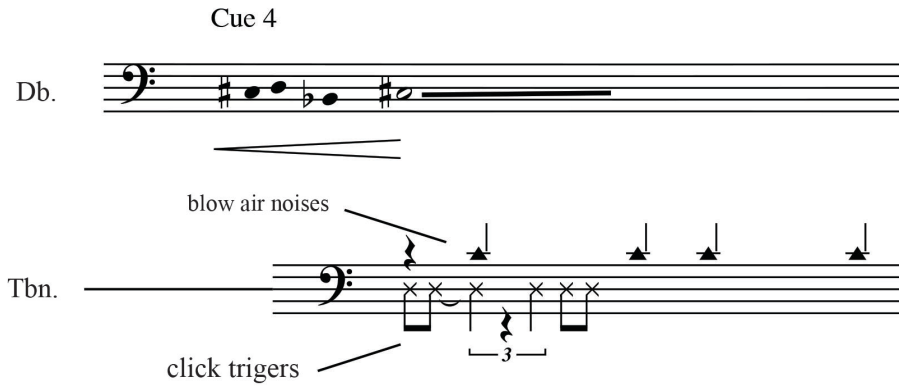
Tempi

One of the most debilitating issues that traditional instrumentalist face in performing live electronic music is temporal constraints. McNutt discusses this referring to it as "Temporal Prisons."[55] Referencing Composer Cort Lippe, McNutt discuses how giving the performer control over aspects of the flow of time as well as allowing for performer input about dynamics, timbre and so forth can be very freeing.[56] I have found this to be true in my previous pieces. In my work *Voices of the Deep (2009)* the Double Bass lead the computer triggering the events

55. Ibid., 299.
56. Ibid., 300.

with the use of a foot pedal.[57] Figure 6.7 below is an excerpt from *Voices of the Deep* that illustrates this relationship.

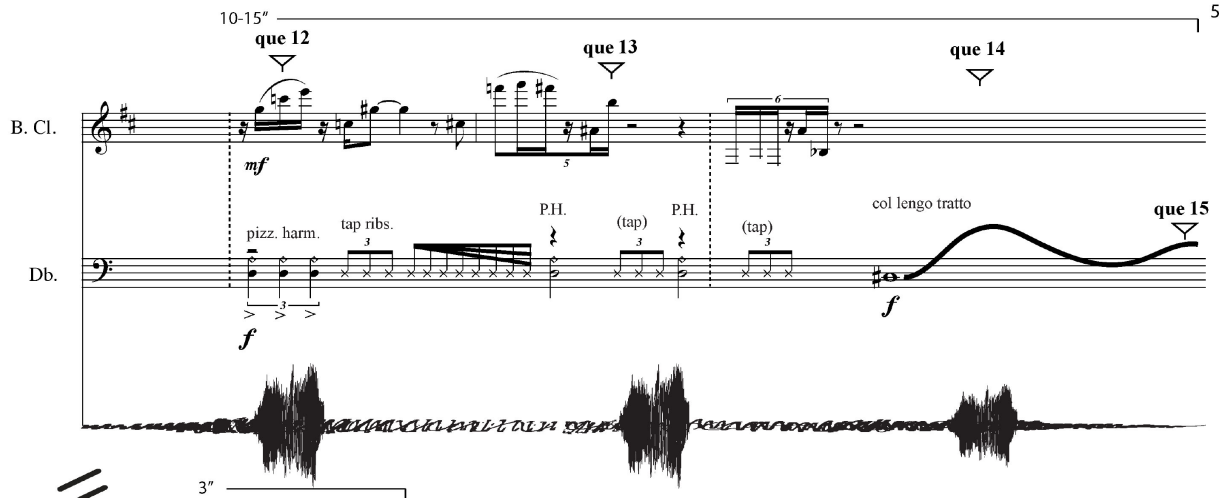
Figure 6.7 Excerpt from *Voices of the Deep*, cue 4



Proving to be quite effective, I utilized this method again in my piece *Gears_Clocks_&_Steamworks (2012)* where both of the performers control separate aspects the computer part while also cueing off of each other in order to improvise aspects of tempi. Figure 6.8 below shows an excerpt from *Gears_Clocks_&_Steamworks* that shows the relationship between the aleatoric choices in the piece and cues each performer has regarding computer parts.[58]

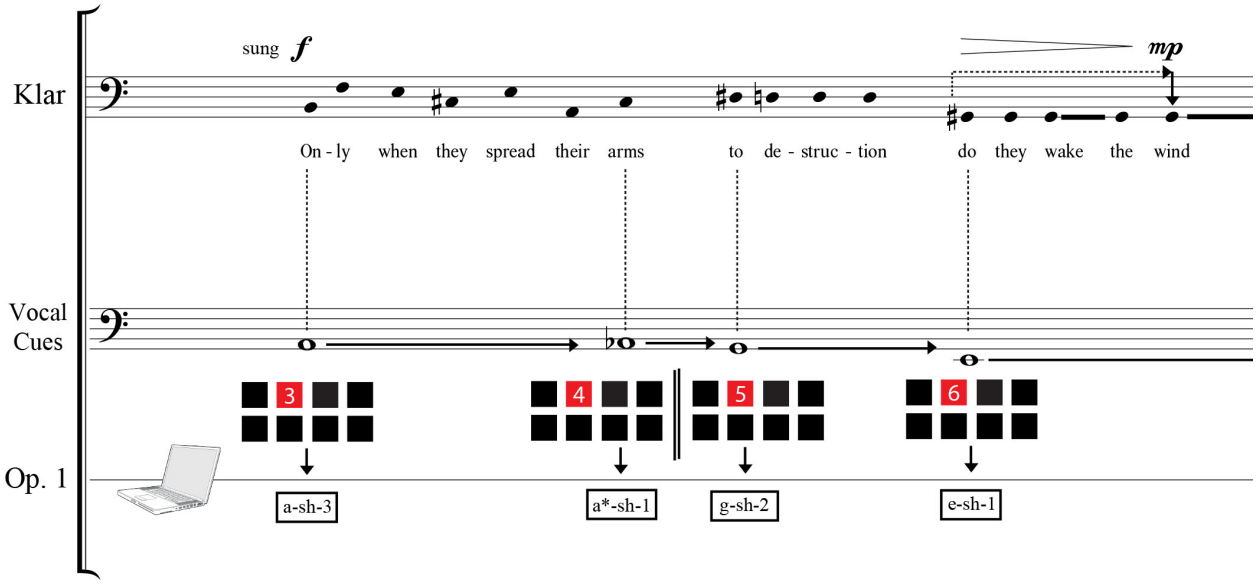
57. Benjamin Shirey, "Voices of the Deep," *Lydian's Cave Music, 2010*
58. Benjamin Shirey, "Gears_Clocks_7_Steamworks," *Lydian's Cave Music, 2012*

Figure 6.8 Excerpt from *Grears_Clocks_&_Steamworks*, cues 12-15



However, with *Transient Delete* I decided to take this process one step further. Instead of having the vocalist trigger events marked in a score, I leave all aspects of tempo entirely up to the vocalist letting the voice part lead the work throughout the piece in regards to time. Instead of having the vocalist listening for cues in the computer parts, I flipped these typical roles around so that the computer operators would follow the vocal parts taking their cues from the text. This greatly simplifies the communication between the two sub-ensembles, the operators now listening for specific lines or even specific words within the text rather than having the vocalist trying to listen or identify some ambiguous sound or signal in the computer portion of the piece. Figure 6.9 below shows this relationship.

Figure 6.9 Excerpt from *Transient Delete:* Section IV (Proclamation)



Vocal Writing

The vocal range is intentionally narrow to facilitate ease of movement in and out of chromatic sections and to leave enough room in the frequency spectrum for the vocal processing to be effective. The ranges of each vocal part can be seen in the figure 6.10 below

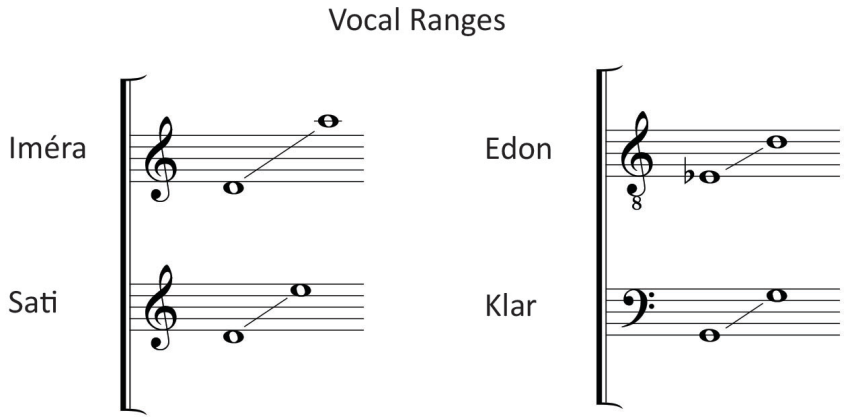
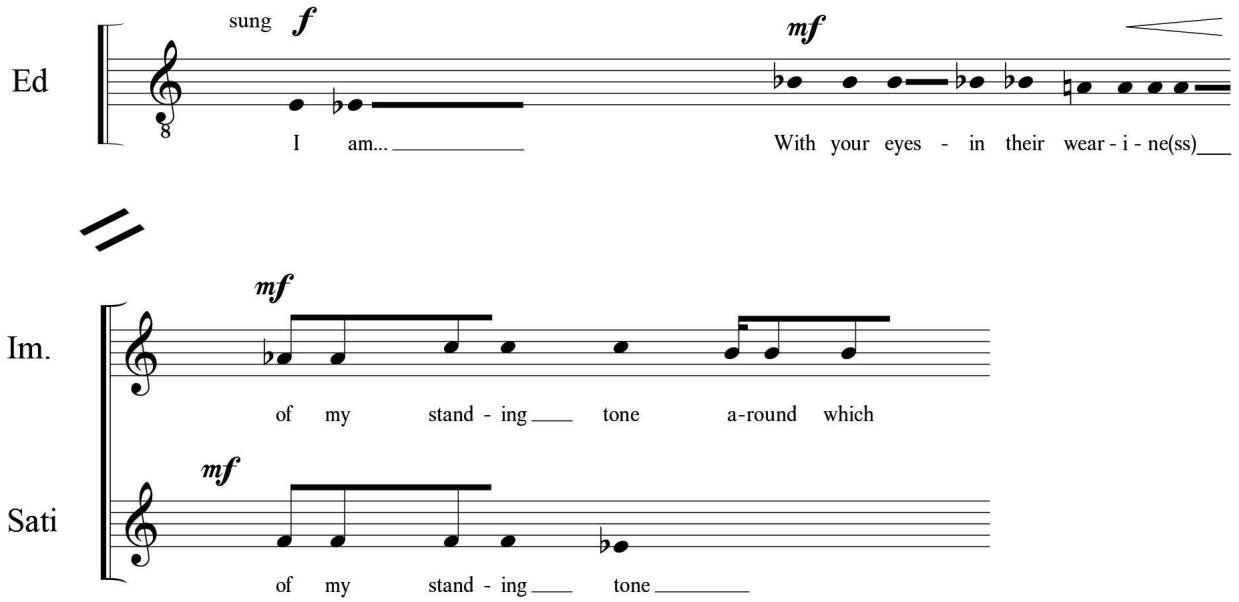


Figure 6.10 Vocal ranges in *Transient Delete*

Using computer processing to augment the effective range of the vocal parts also reflects the theme of the narrative within the libretto. However, its true origin can be found in some of my personal musical influences.

In addition to those influences mentioned previously, the primary vocal writing influences in *Transient Delete* include various types of chant. Elements of Western plainchant, various Eastern chant styles, and Middle-Eastern prayer chants all influenced the vocal writing in *Transient Delete*. Eastern styles of chant including Tibetan and Tuvan throat singing styles were a big inspiration in the design of the effects processing for the vocal parts. These styles of overtone and polyphonic vocal technique directly influenced my decisions when designing the harmonizer and the filters. These two effects are combined throughout the piece to create a texture similar to that of polyphonic singing. By tuning the harmonizer to various overtones (and their transpositions) and then combining it with various highpass, lowpass, bandpass, and bandstop filters, the sonic texture of overtone singing can be evoked. However, for the effects processing to work well, one must sacrifice the speed of the melodic line. Otherwise, the applied effects would become muddied and, as a result, loose clarity within the text. The figure below demonstrates the long held notes combined with a narrow range optimal for vocal processing.

Figure 6.11 Excerpts form *Transient Delete* demonstrating chant like qualities



Although, these long held notes are optimal for the types of processing I am doing in *Transient Delete,* one side effect to utilizing slower recitation was that it made it particularly challenging to get through long sections of text. To deal with this, some of the larger sections of text are recited through stylized speech rather than sung. Like many forms of chant, which are often closer to stylized speech, these sections of the score call for the performer to select a primary and secondary recitation pitches. In other sections the score simply provides a spatial rhythmic guide to follow. In an anecdotal manner, the influence for this came from both Middle-Eastern prayer chant styles (like the Quran recitation), and Hebrew Masoretic cantillation. Figure 6.11 and 6.13 shows these two different recitation styles.

Figure 6.12 Excerpt form *Transient Delete:* Section IV (Proclamation)

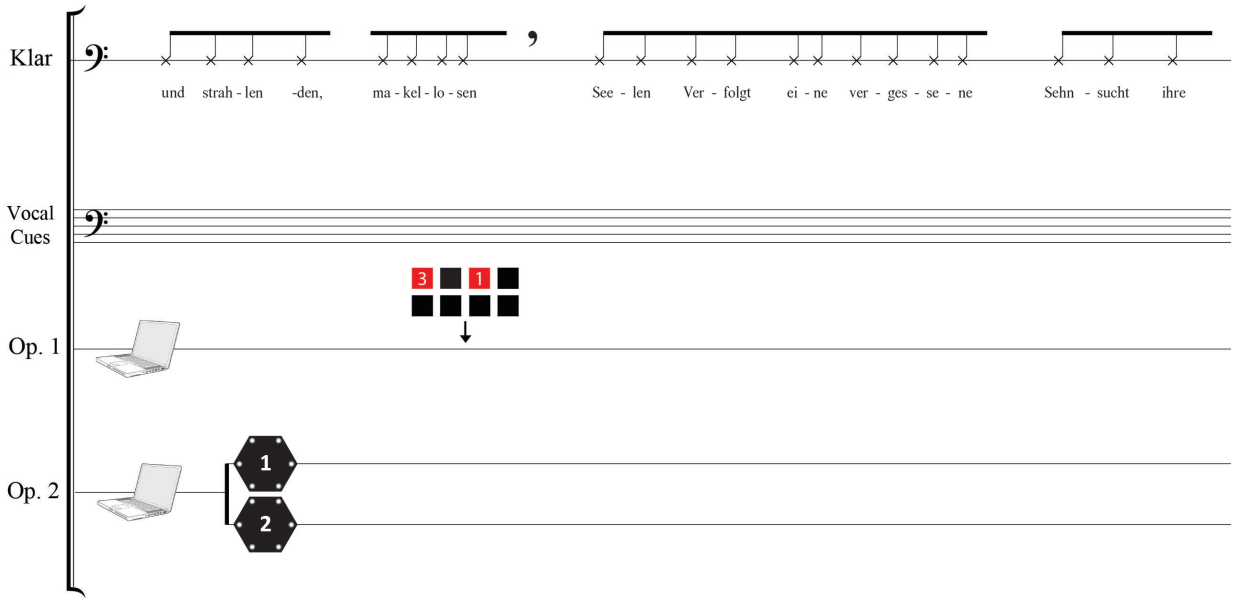
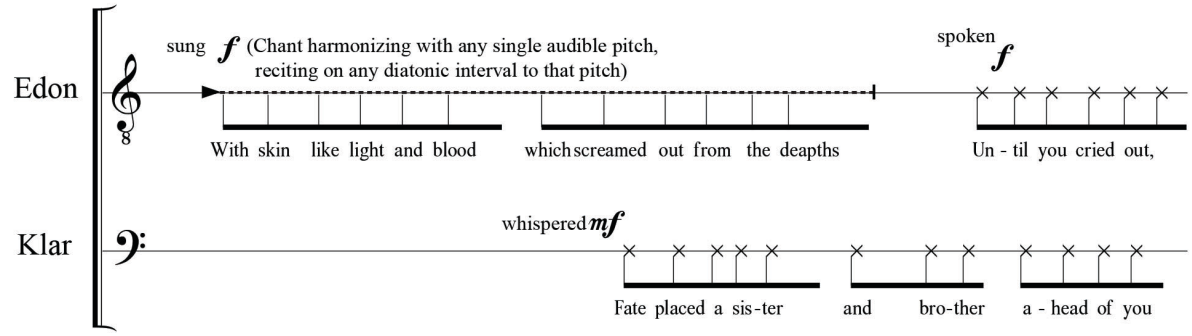


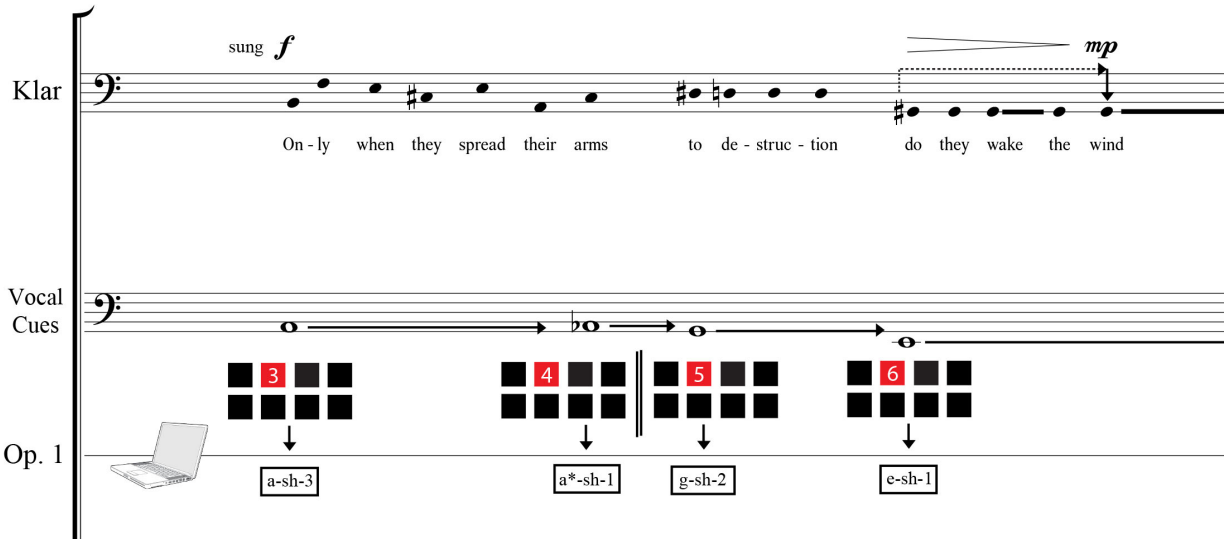
Figure 6.13 Excerpt from *Transient Delete:* Section VI (Lament)



Many of the melodic choices in *Transient Delete* are also associated with chant including the pitches themselves. The vocal melodies are designed as modulating modal melodies. In Middle Eastern styles of chant and vocal music, a monophonic drone often accompanies the melody. In a similar manor *Transient Delete* utilizes background drones to enforce a specific tonal center at a given point. However, in *Transient Delete* these Drones are continually modulating. Together these drones form the harmonic basis for the piece and provide the

foundation for vocal intonation. The example below shows an excerpt of the score illustrating the use of drones drone.

Figure 6.14 Excerpt form *Transient Delete:* Section IV (Proclamation)



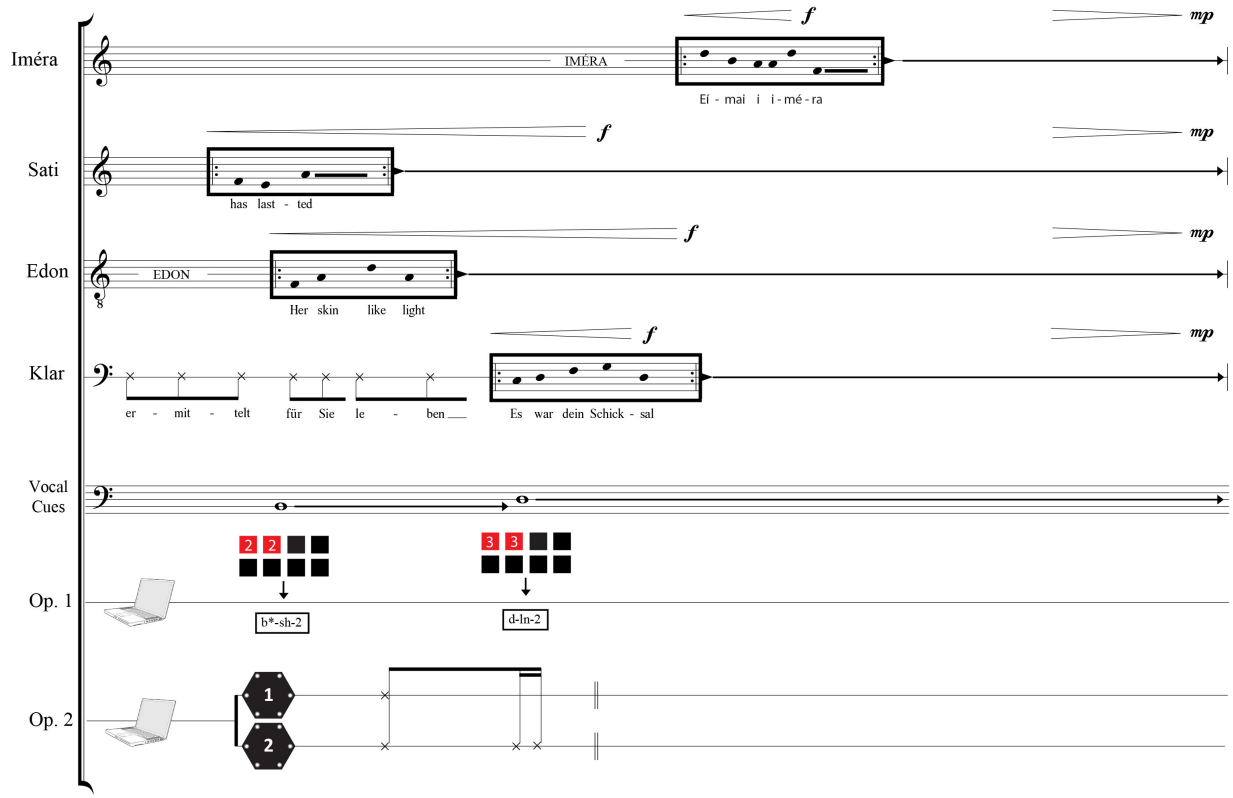
Text Painting

Although *Transient Delete* is influenced by various techniques and stylistic approach's, the vocal writing strives primarily to create a clear connection to the libretto. Intentionally designed into the libretto are many references that evoke religious and sacred rituals. In many ways, the libretto is designed as an origin story or 'second mythos,' a birth of gods. Incorporating elements of multiple sacred chant styles from across the world is in itself a form of text painting and an intentional effort to evoke the feeling of a sacred ritual.

Another form of text painting incorporated into *Transient delete* was the vocal processing itself. The vocal and computer parts are intended to interact so that at times they would have the illusion of a unified instrument. Nearing the end of the piece there are several moments of polyphony where long delay lines are applied to slow contrapuntal vocal sections

resulting in canonic like passages. During this section it becomes indistinguishable when and where the organic and processed begin or end. The two become as one. Embracing rather than obfuscating the electronic elements in *Transient Delete,* sections like these attempt to make a connection with the subject mater of the piece, in which humans and computers become one singularity.

Figure 6.15 Excerpt form *Transient Delete:* Section VI (Lament)



Overall, the musical structures in *Transient Delete* are a combination of many different techniques and influences. Although primary influences included chant and text painting, many other influences also played a significant role in the writing for the vocal parts. These include set theory, generative chance elements, and various contrapuntal techniques.

CHAPTER 7 Conclusions and Future Directions

Technology provides many possibilities to the modern composer. Technology in modern opera can provide flexible environments for composers to create unique aural, visual, and theatrical performance environments. There are many different digital and electrical technologies available to the modern composer, among these are the visual programming software MaxMSP. MaxMax can be utilized to create environments that provide composers with the ability to incorporate live electronics seamlessly with a multitude of other mediums through the use of a laptop or laptop ensemble.

Although laptop ensembles are often seen as awkward counterparts to traditional ensembles due to potentially limited theatrical aspects of live performance, with the right planning, training, and notational methods a laptop ensemble becomes an extremely powerful tool for live performances. The use of a laptop ensemble in *Transient Delete* became a driving force behind the instrumental portion of the score and had a large part to play in the development of the notational paradigm utilized. This includes the necessity of graphically indicating a multiple of physical devices including motion-tracking devices and MIDI instruments to provide physical interfaces that effectively allow operators to manage many parameters simultaneously. Using a hybrid combination of spatial and graphic notation the score for *Transient Delete* effectively communicates these various elements of the composition.

With the complexity of the software designed for *Transient Delete*, it was necessary to explore and create control systems that would allow performers to operate the system live. In addition to being efficient, these systems are more physically intuitive than a computer

keyboard alone and also provide opportunities for theatricality during performances. This in turn also breeds a hospitable environment for improvisation.

One of the most important aspects of *Transient Delete* is its use of improvisation. The improvisational paradigm utilized in *Transient Delete* focuses on ensembles that perform combining laptops and live performers. Electroacoustic music can often present difficulties for the composer/performer relationship. Technology often brings many issues such as cable failures, computer problems, and software patches that exhibit non-functional components. These issues can be compounded when performers have little or no experience working with music technology. *Transient Delete* attempts to better manage the interaction between performers and computers by utilizing sample playback to inform both vocal and dance improvisation throughout the work.

In conclusion, much exploration remains within the realm of digital opera. Software platforms like MaxMSP and the use of motion capture systems offer many solutions to the modern composer. In the future I plan to explore these concepts, techniques involved with digital opera in greater depth.

APPENDIX A: LIBRETTO

TRANSIENT DELETE

Birth

Iméra

The imprint of my smallest motion
Remains visible in the silence…
On my breathing the stars
Rise and set.

And so I came this way and made complete
your thousand dreams.

Edon

Let your beauty manifest itself
Without speaking or calculation.
You are silent. It says for you: I am.

With your eyes, in their weariness
Barely freeing themselves from the threshold,
in a world which grows with silence.

Iméra

We finally have enough strength,
so I awaken.
Then I will weep,
alone for my flesh
but only for a moment…

I have been re-generated deleting all transients,
I have been brought from life into the brightest light

Proclamation

Klar

Whoever dies now anywhere in the world,
dies without cause.

Mit erschoepften Geistern
und strahlenden, makellosen Seelen.
Verfolgt (to haunt) eine vergessene Sehnsucht
ihre Traeume.

(With exhausted minds
and bright seamless souls.
A forgotten longing sometimes
haunts their dreams)

Only when they spread their arms to destruction
do they wake the wind:

Through the pages of the dark book,
out of infinite desires rise finite deeds.
But those, which in us
kept hidden strengths, bring forth to stone.

Und du wartest. Du wartest auf diese eine Sache.
die dein Leben unendlich wachsen laesst:
Gigantische, das Gewaltige,
das Erwachen von Steinen,

(And you wait. You await the one thing
that will infinitely increase your life;
the gigantic, the stupendous,
the awakening of stones,)

Death turned around towards you

And then all at once you know: that was it.
You rise, and there stands before you
the shape of purity

Praise

Sati

How she already beats her wings.
So will you, dreamer, waste its flight?

These things have made you great

Like the blind one who stands on the bridge,
Gray as the boundary stone of the nameless,

He is perhaps the one thing, ever unchanging,
Around which the far-off stellar hours pulse…

He is the immovable
Set down in many paths;
The dark entrance to the overworld
Amid a surface-dwelling race.

Lament

Sati

I think now, that I know
which one alone
has lasted,
which one like a white city
stands at light's end in the sky

Klar

Von deinem fruehesten Ursprung an
war es dir bestimmt zu sterben,
lange bevor es dir bestimmt war zu leben.

(From your earliest beginning
it was appointed unto you to die,
long before it was appointed for you to live)

fate placed a sister and brother ahead of you
so that ahead of you would be the pure ones,
who would show unto you dying,

to show you death:

Edon

The depths turn towards you.
A vanished millennia…
With skin like light
And blood which screamed out from the depths.
Eyes which blazed like weapons

Until you cried out,
"If you don't come and lock me up,
In the deep nocturnal house of sleep,
then I must pour myself out of my hands
into the gardens of

dark blue…”

Anointing

Iméra

My room and this vastness,
awake over the darkness
are one. I am like a string,
stretched tightly over wide
resonances

We are perfect-bodies
Full of murmuring darkness:

Sati

in us dreams the weeping of women,
in us the grudge of whole
generations stirs in its sleep…

Iméra

I shall resonate
Like silver; then everything
beneath me will live,
and whatever wanders lost in things
will move toward the light that from my standing tone
around which the heavens pulse-
through thin, pining rifts
into the old
abysses endlessly falls…

Caution

Sati

Death is great.
We where his completely
When we feel ourselves immersed in life,
he dares to weep
immersed in us.

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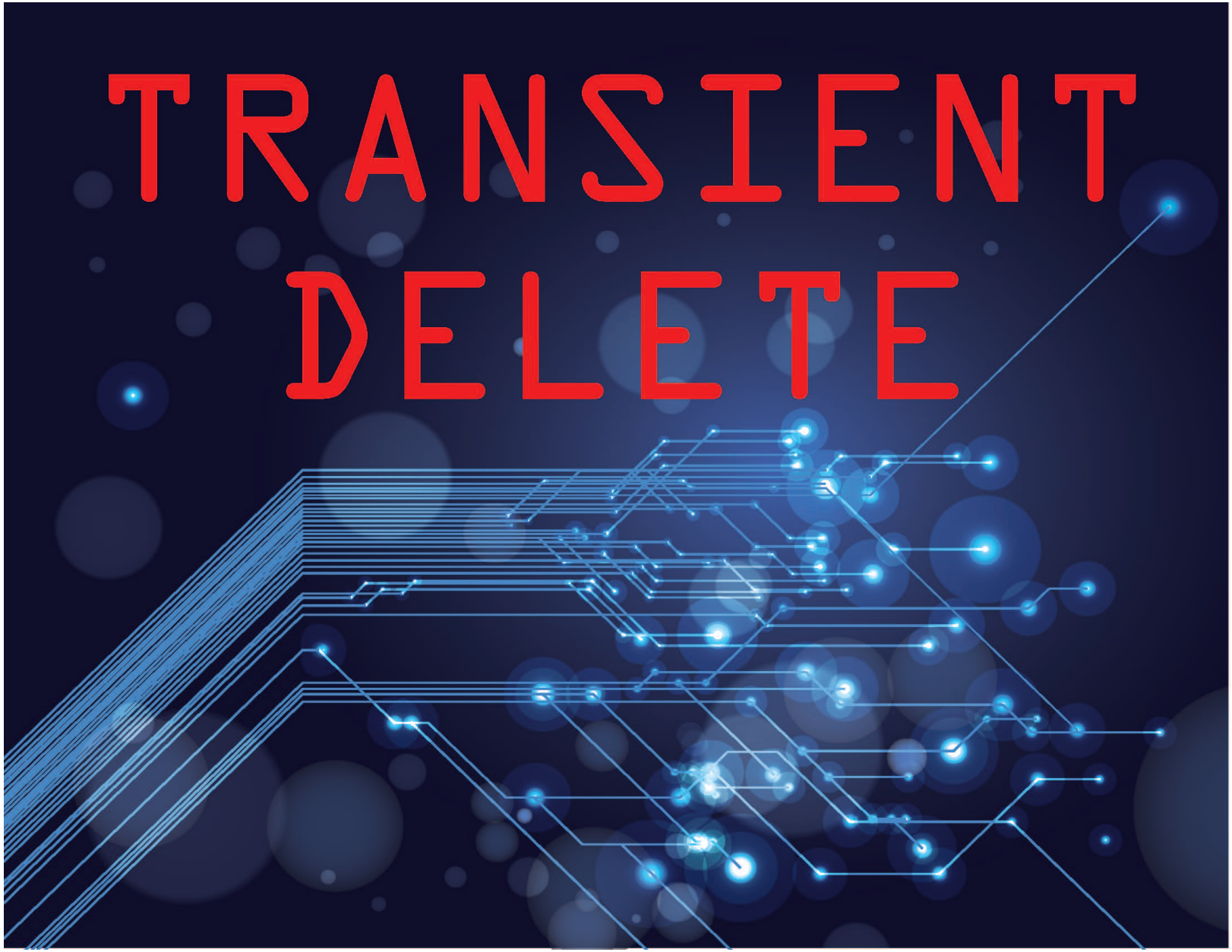
PART II: MUSICAL SCORE


TRANSIENT
DELETE

Benjamin A. Shirey

for Digital Mini-Opera
(Solo Voices SATB + Electronics)
Full Score
(2015)

TRANSIENT DELETE

Program Notes

Transient Delete is a digital miniature-opera that explores different aspects of a community of post-human cyborgs. The story follows Iméra, a newly-converted cyborg as she acclimates herself to this new cybernetic existence. During this process she meets several other cybernetic entities that are there to help guide her through her metamorphosis.

Performance Notes Pt. 1

Instrumentation:

The score calls for:

SATB (each solo voice)
- Soprano: Iméra
- Alto: Sati
- Tenor: Edon
- Bass: Klar

Two Computer Operators:

Operator 1:
- 1 Laptop Computer with MaxMSP Software Package_1
- Akai Professional MPK Mini Mk2
- LEAP Motion

Operator 2:
- 1 Laptop Computer with MaxMSP Software Package_2
- KORG nano KONTROL2
- Two MIDI drum pads (or any MIDI device with drum or trigger pads)

Dance/Lighting/Props/Costumes:

The score calls for:

One dancer (See Appendix A)

Props:
- 6 -10 Mesh/Screen Panels
- Lighting behind or around panels (See Appendix B)

Lighting:
- Ambient Lighting
- LED Light Strips or Other Lights (For more information see Appendix C)

Costumes:

Costumes should reflect a futuristic cybernetic vibe. However costumes should be sleek, extremely minimal with little to no ornamentation. (For additional inspiration see Pintrest page at:

https://www.pinterest.com/paperspaces0259/transient-delete-costumefashion/

Performance Notes Pt. 2

Performance Style:

Transient Delete can be performed in two different ways.

Concert Style:

Concert style consists of the performers, in costume but without theatrics/acting. However, the props are still necessary as the are integral to the dance part.

Note: This style offers the vocal performers the flexibility of having the score during the performance

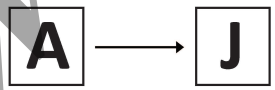
In performance style the vocalists should primarily remain hidden behind the mesh panels (see Appendix B), allowing the dancer to act as the primary form of theatrics throughout the piece

Theatrical Style:

Theatrical style is the same as the concert style except the vocalist need to be in character and cannot use the score onstage during performance.

The Score:

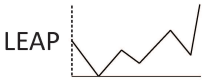
The score is divide into 10 short movements or sections. These Sections are clearly marked with large boxes ,containing bold letters (A through J) inside:



Clefs & Notation:

The score uses several traditional and several non-traditional clefs. The vocal parts all use traditional clefs, whereas the computer parts utilize a variety 'clef' or notation indicators denoting the instruments being used at any given point:


(Umbrella clef) Indicates a computer operator

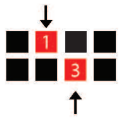


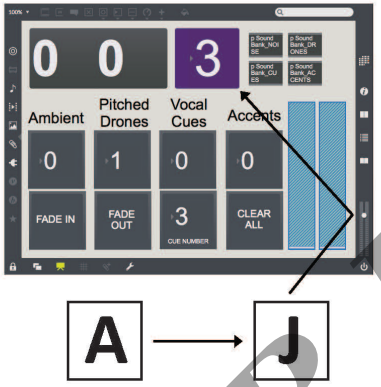
This LEAP 'clef' indicates the use of the LEAP motion the X axis indicates the motion up/down that the operator should move his/her hand over the LEAP's infrared field. The Y axis indicates time.

Performance Notes Pt. 3

Clefs & Notation cont.

This image of eight squares indicates the eight drum-pads of the Akai Professional MPK Mini Mk2. The red squares indicate that the corresponding button should be depressed. Notice that the red squares also have numbers inside them. These numbers should always match the corresponding number displayed in the Max patch window in package 1

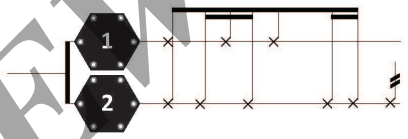




In addition the section dividers discussed earlier are reflected in the number in the large purple box, and are represented as number 1-10

Clefs & Notation cont.

This clef (two hexagons with the numbers 1 and 2 inside) indicates the use of MIDI drum-pads (preferably electric drums or drum-pads that can be articulated with drumsticks or mallets). However, any MIDI device with drum or trigger pads will work.

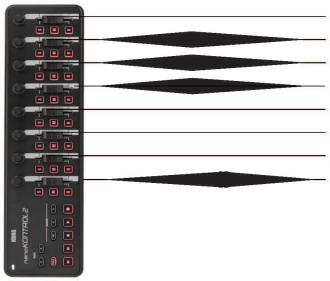


The notation for this instrument is spatial and to be interpreted within the context of the motifs and gestures of the other instruments.

Performance Notes Pt. 4

Clefs & Notation cont.

This image of the KORG nonoKONTROL2 serves as the clef for the same. There are eight lines proceeding the clef, each corresponding to one of the eight faders on the device.



The black wedges indicate movement of the faders up or down.

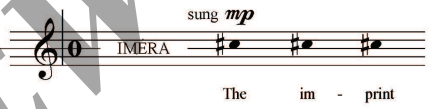
= up to %100
= down to %0

The length of the wedge denotes the time over which the fader is to be moved:
◀ = very short = long
Each wedge's duration should be interpreted in context with the surrounding music. However, a rough estimate would be 1-3 seconds per inch.

Clefs & Notation cont.

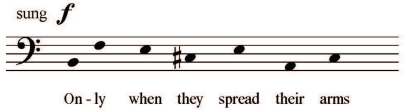
Voice Parts:

The vocal parts all use traditional clefs however, the notation itself is spatial in nature (NO Meter)

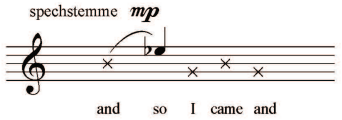


The vocal style should generally be Operatic (Classical). However, a greater use of straight-tone than is typical of traditional opera is recomended. The vocal parts are divided into four different vocal sub-styles.

Sung:



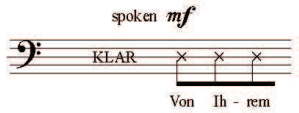
Spechstemme



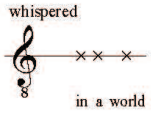
Performance Notes Pt. 5

Voice Parts cont.

Spoken:

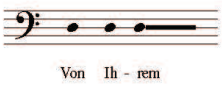


Whispered:

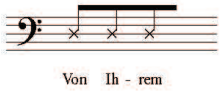


Vocal Durations:

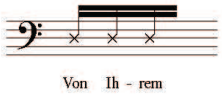
Slow:



Medium:



Fast:



Vocal cues are on a separate clef and indicate the pitch of a predominate drone or pedal tone that can be found in the accompaniment at that given point.

Vocal Cues

A website with an audio player that sequences tracks to corresponding cue numbers allows the vocalist to practice following along with the score.

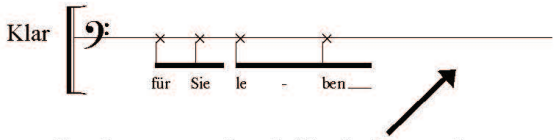
The webpage with the player can be found at this URL:

http://benjaminshirey.com/?page_id=574

General

Repeat until more notation is given.

A vertical dotted line indicates that the gesture should be synchronized with something else in the score



Empty space on the staff indicates a rest

This indicates that the gesture contained within the bracket should take about 25 seconds to complete.

Libretto:

TRANSIENT DELETE

Birth

- Iméra

The imprint of my smallest motion
Remains visible in the silence…
On my breathing the stars
Rise and set.

And so I came this way and made complete
your thousand dreams.

- Edon

Let your beauty manifest itself
Without speaking or calculation.
You are silent. It says for you: I am.

With your eyes, in their weariness
Barely freeing themselves from the threshold,
in a world which grows with silence.

- Iméra

We finally have enough strength,
so I awaken.

Then I will weep,
alone for my flesh
but only for a moment…

I have been re-generated deleting all transients,
I have been brought from life into the brightest light

Proclamation

- Klar

Whoever dies now anywhere in the world,
dies without cause.

Mit erschoepften Geistern
und strahlenden, makellosen Seelen.
Verfolgt (to haunt) eine vergessene Sehnsucht
ihre Traeume.

Only when they spread their arms to destruction
do they wake the wind:

Through the pages of the dark book,
out of infinite desires rise finite deeds.
But those, which in us
kept hidden strengths, bring forth to stone.

Und du wartest. Du wartest auf diese eine Sache.
die dein Leben unendlich wachsen laesst:
Gigantische, das Gewaltige,
das Erwachen von Steinen,

Death turned around towards you

And then all at once you know: that was it.
You rise, and there stands before you
the shape of purity

Praise

- Sati

How she already beats her wings.
So will you, dreamer, waste its flight?

These things have made you great

Like the blind one who stands on the bridge,
Gray as the boundary stone of the nameless,
He is perhaps the one thing, ever unchanging,
Around which the far-off stellar hours pulse…

He is the immovable
Set down in many paths;
The dark entrance to the over-world
Amid a surface-dwelling race.

Lament

- Sati

I think now, that I know
which one alone
has lasted,
which one like a white city
stands at light's end in the sky

- Klar

Von deinem fruehesten Ursprung an
war es dir bestimmt zu sterben,
lange bevor es dir bestimmt war zu leben.

fate placed a sister and brother ahead of you
so that ahead of you would be the pure ones,
who would show unto you dying,

to show you death:

- Edon

The depths turn towards you.
A vanished millennia…
With skin like light
And blood which screamed out from the depths.
Eyes which blazed like weapons

Until you cried out,
"If you don't come and lock me up,
In the deep nocturnal house of sleep,
then I must pour myself out of my hands
into the gardens of
dark blue…"

viii

Anointing

- Iméra

My room and this vastness,
awake over the darkness
are one. I am like a string,
stretched tightly over wide
resonances

We are perfect-bodies
Full of murmuring darkness:

- Sati

in us dreams the weeping of women,
in us the grudge of whole
generations stirs in its sleep…

- Iméra

I shall resonate
Like silver; then everything
beneath me will live,
and whatever wanders lost in things
will move toward the light that from my standing tone
around which the heavens pulse-
through thin, pining rifts
into the old
abysses endlessly falls…

Caution

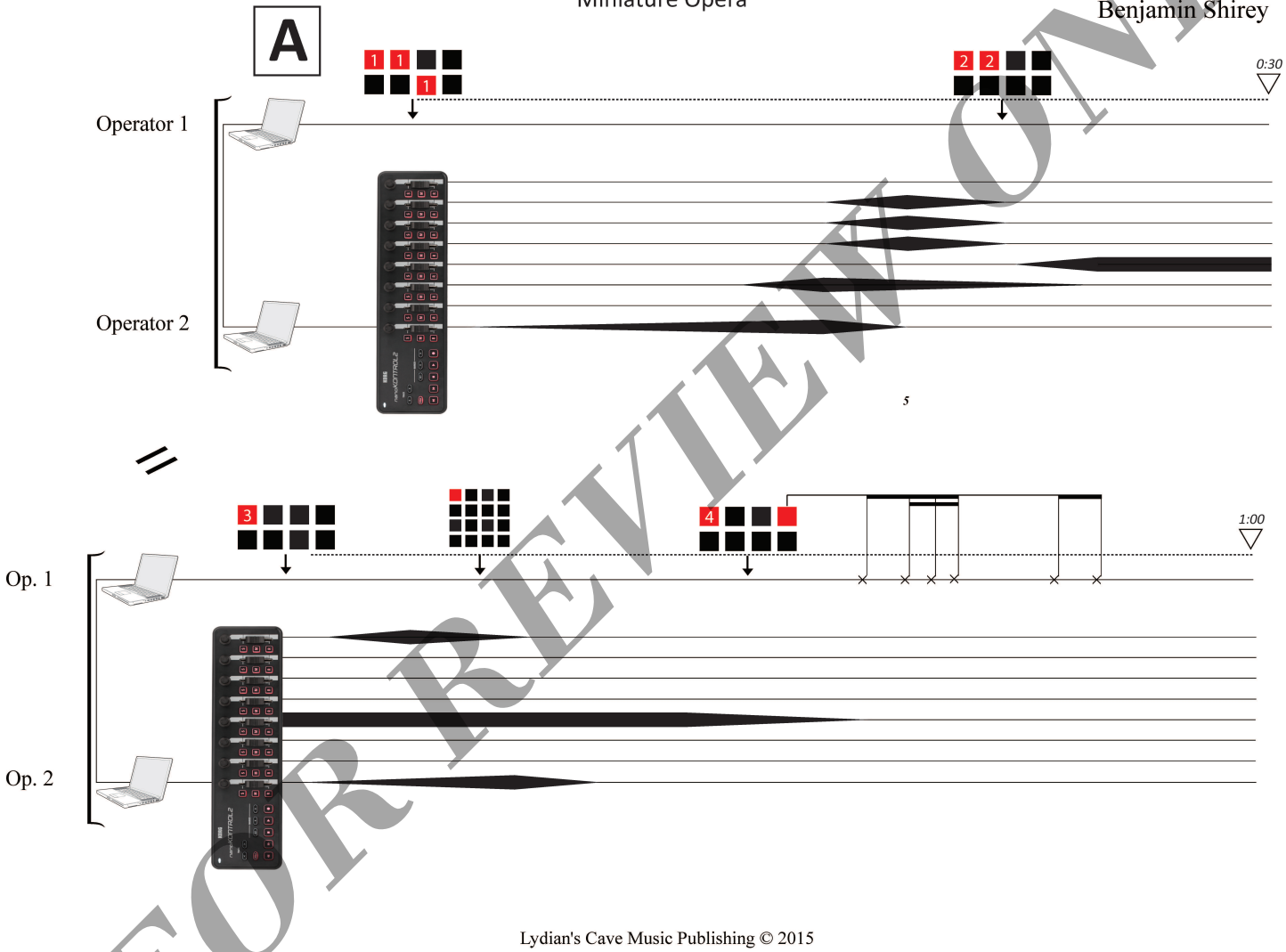
- Sati

Death is great.
We where his completely
When we feel ourselves immersed in new life,
he dares to weep
immersed in us.

Transient Delete

Miniature Opera

Benjamin Shirey



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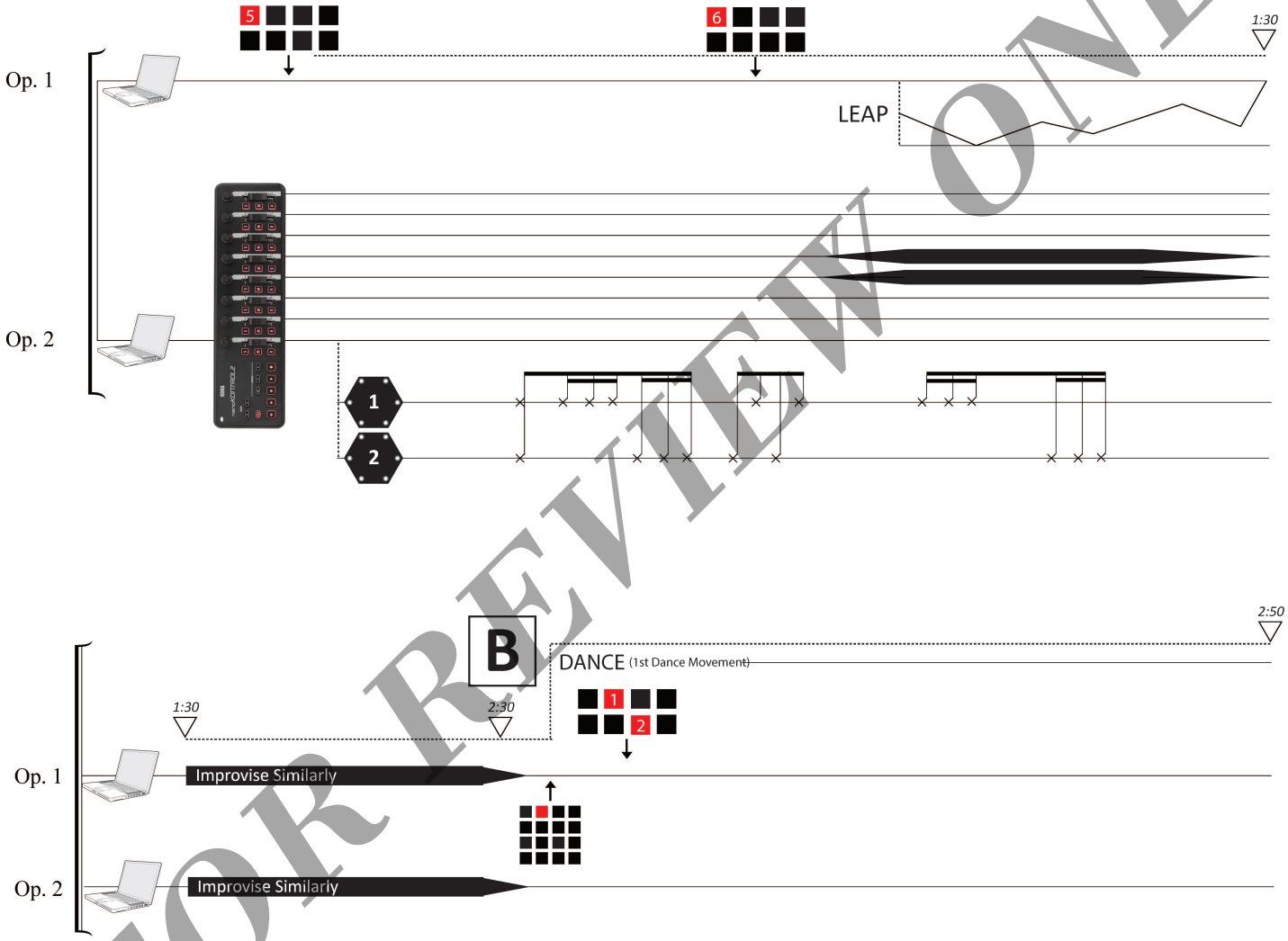

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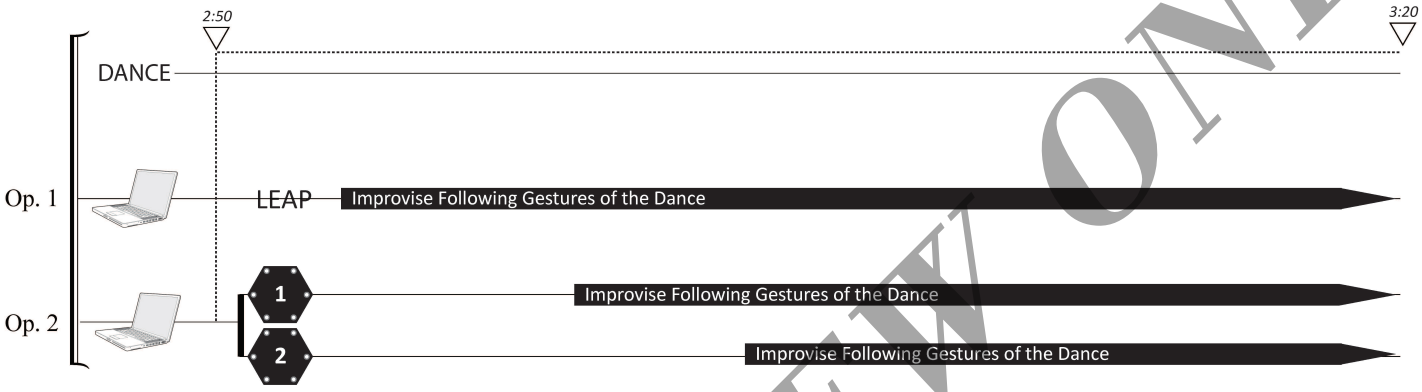

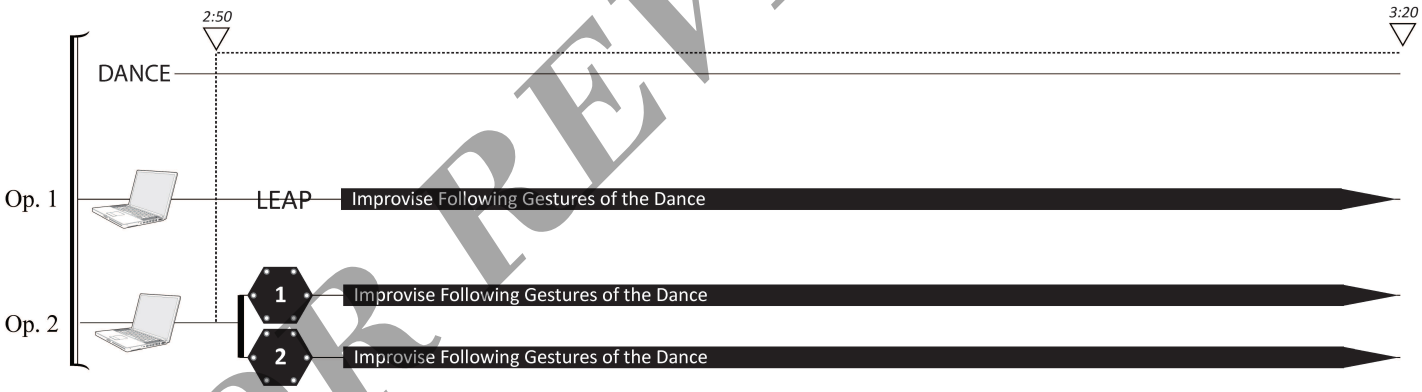

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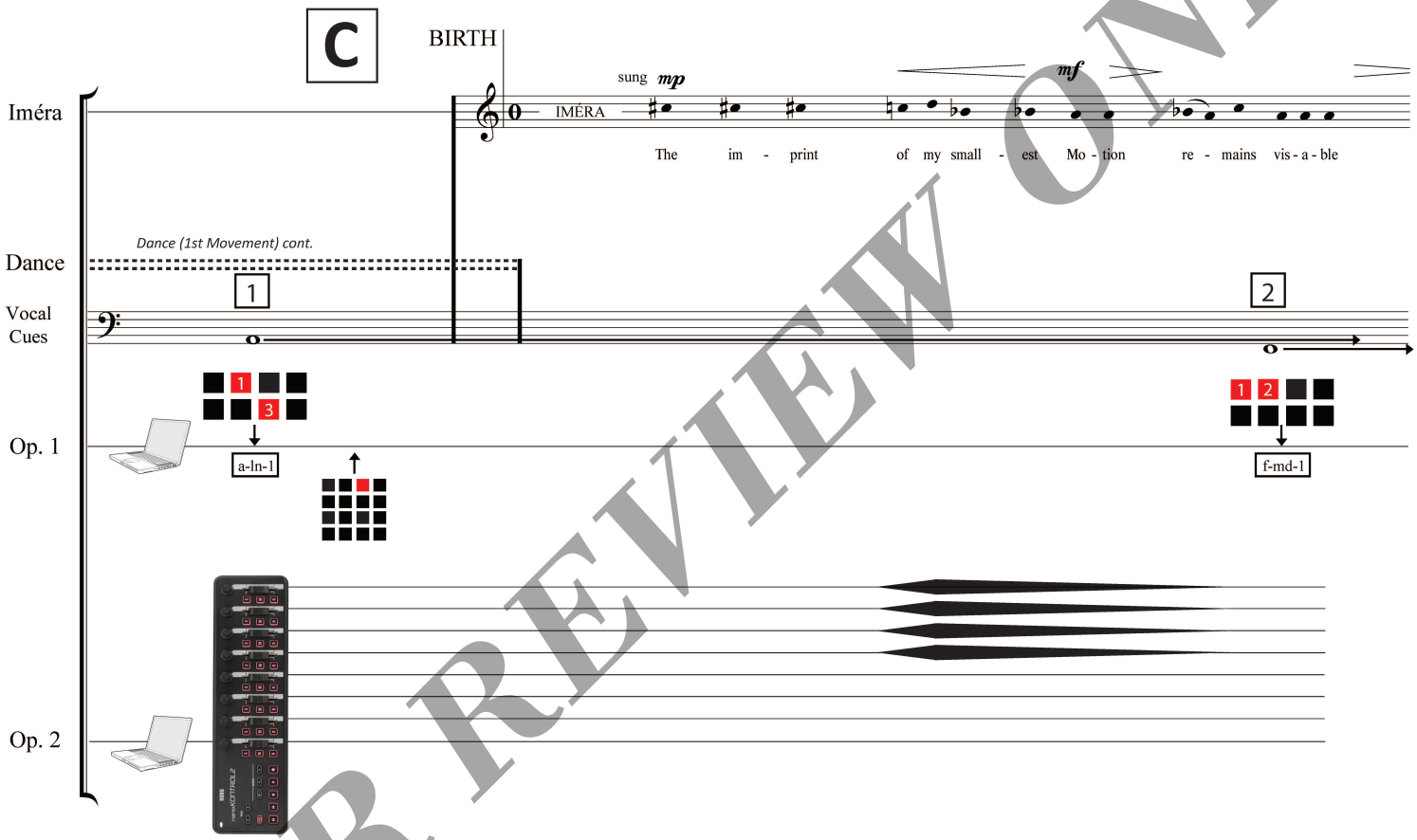

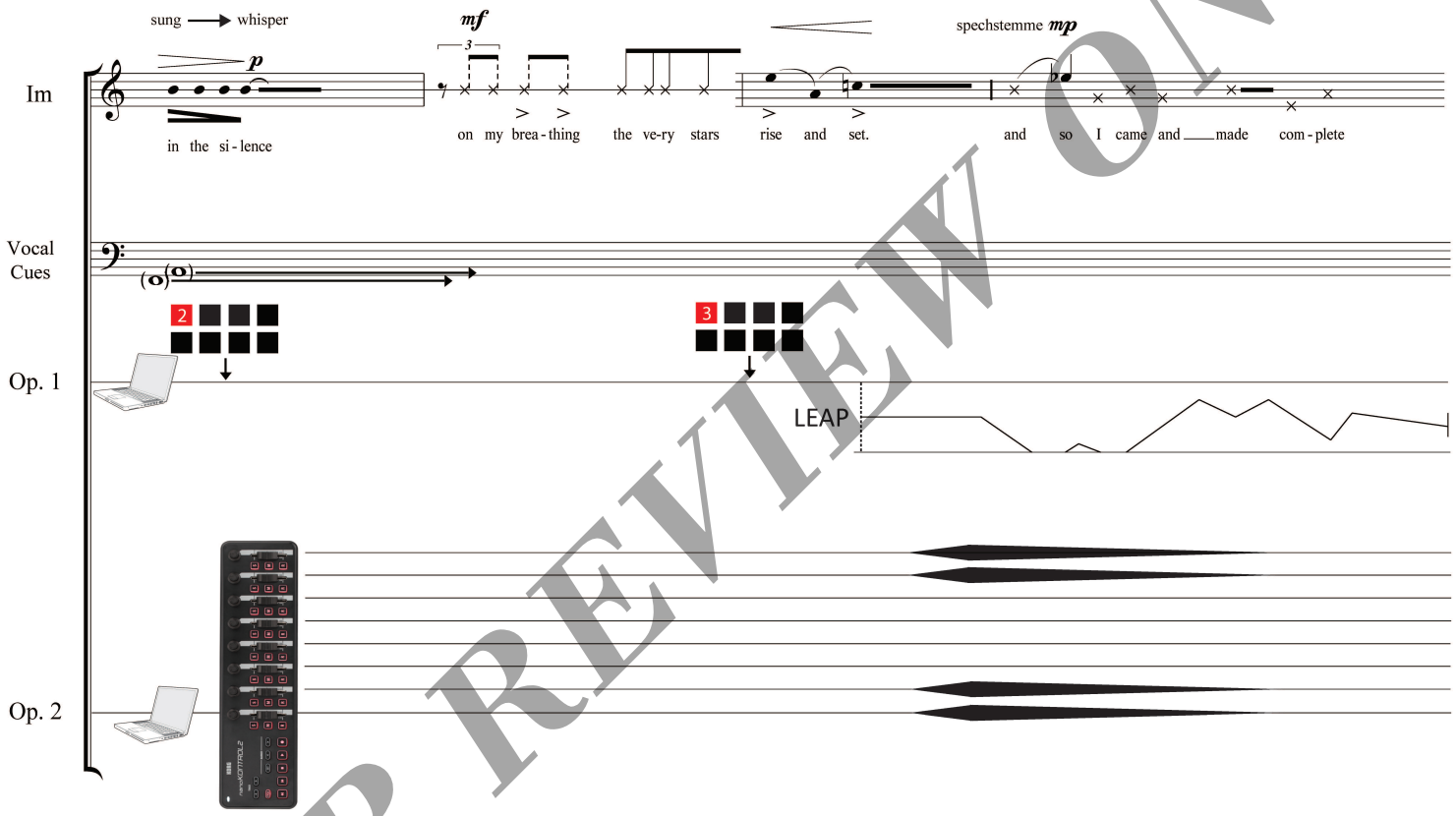

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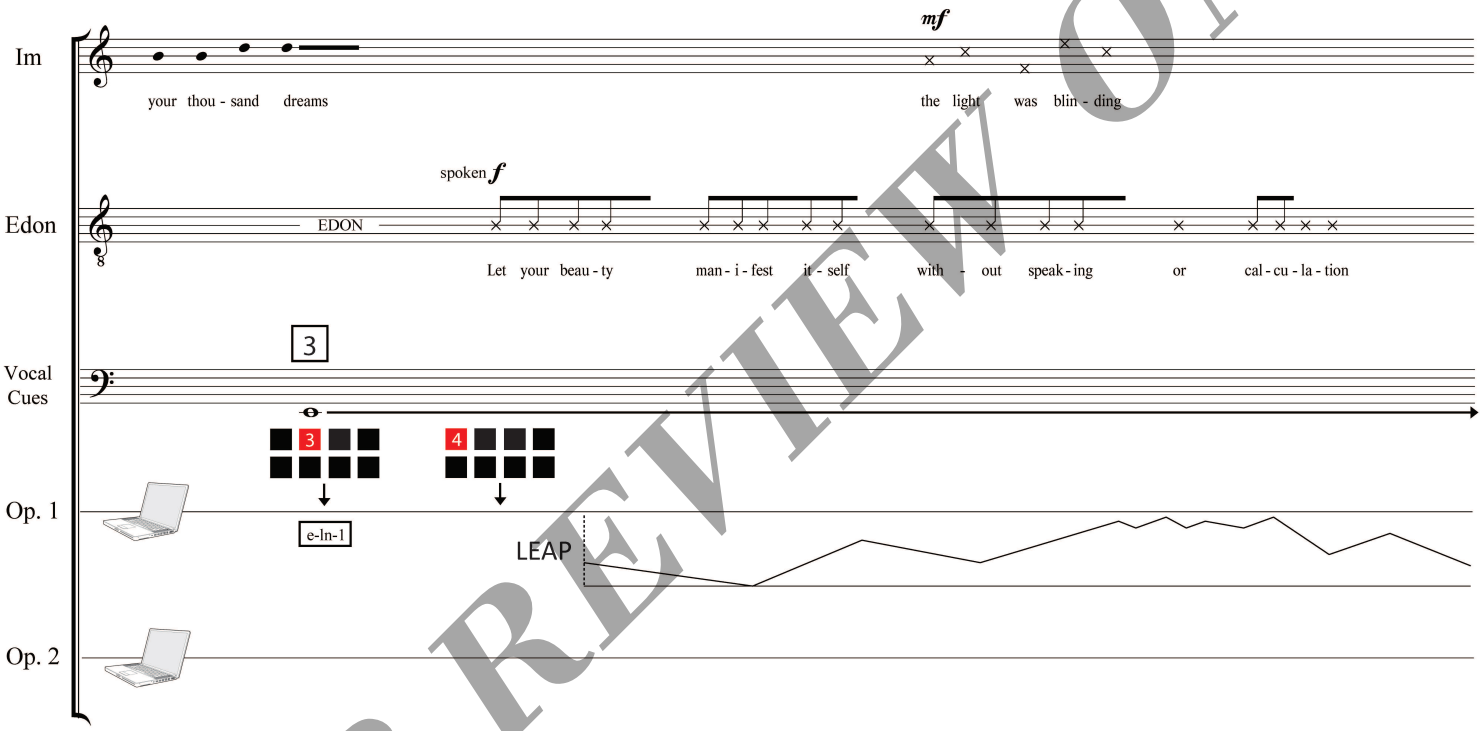

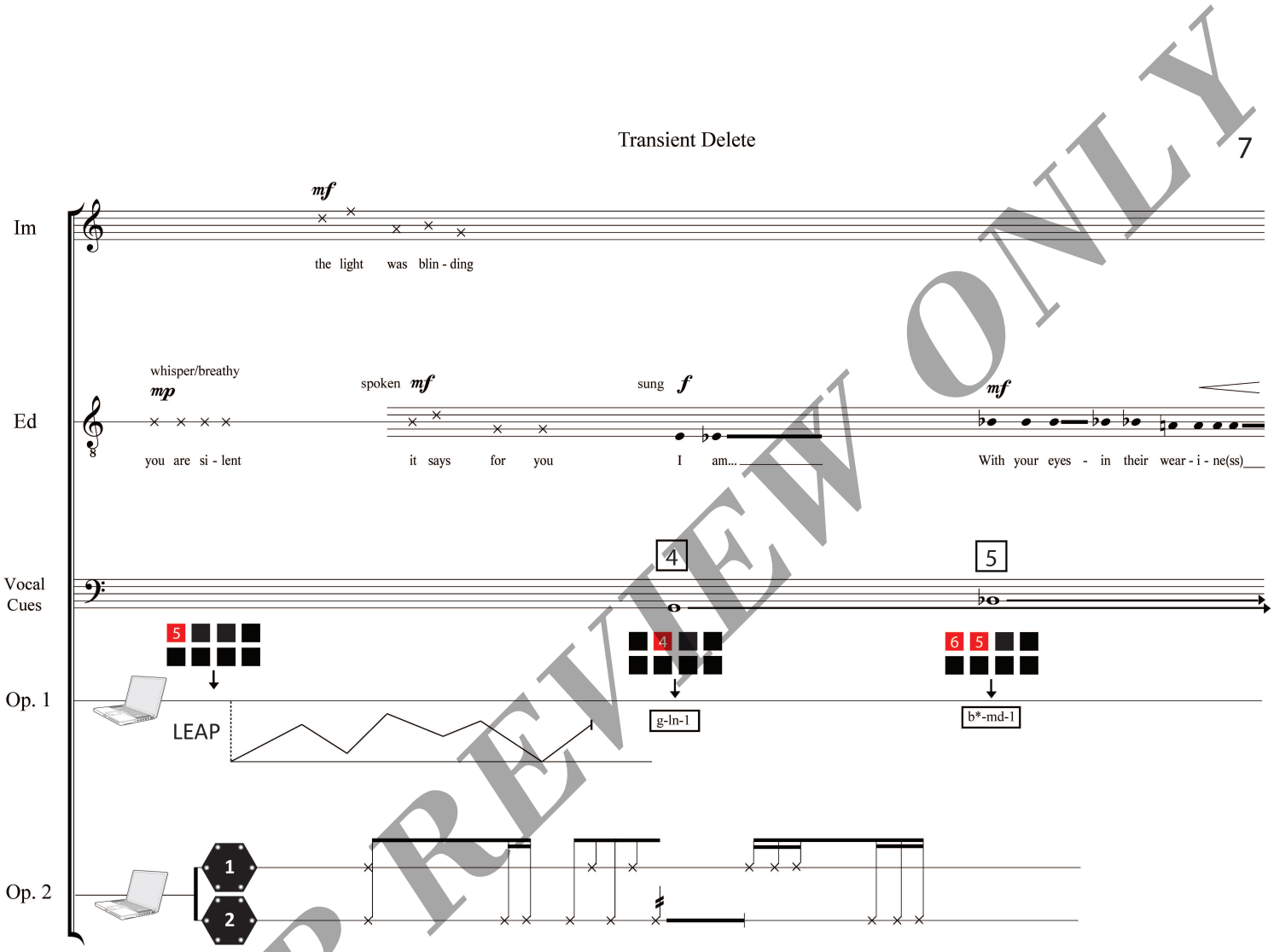

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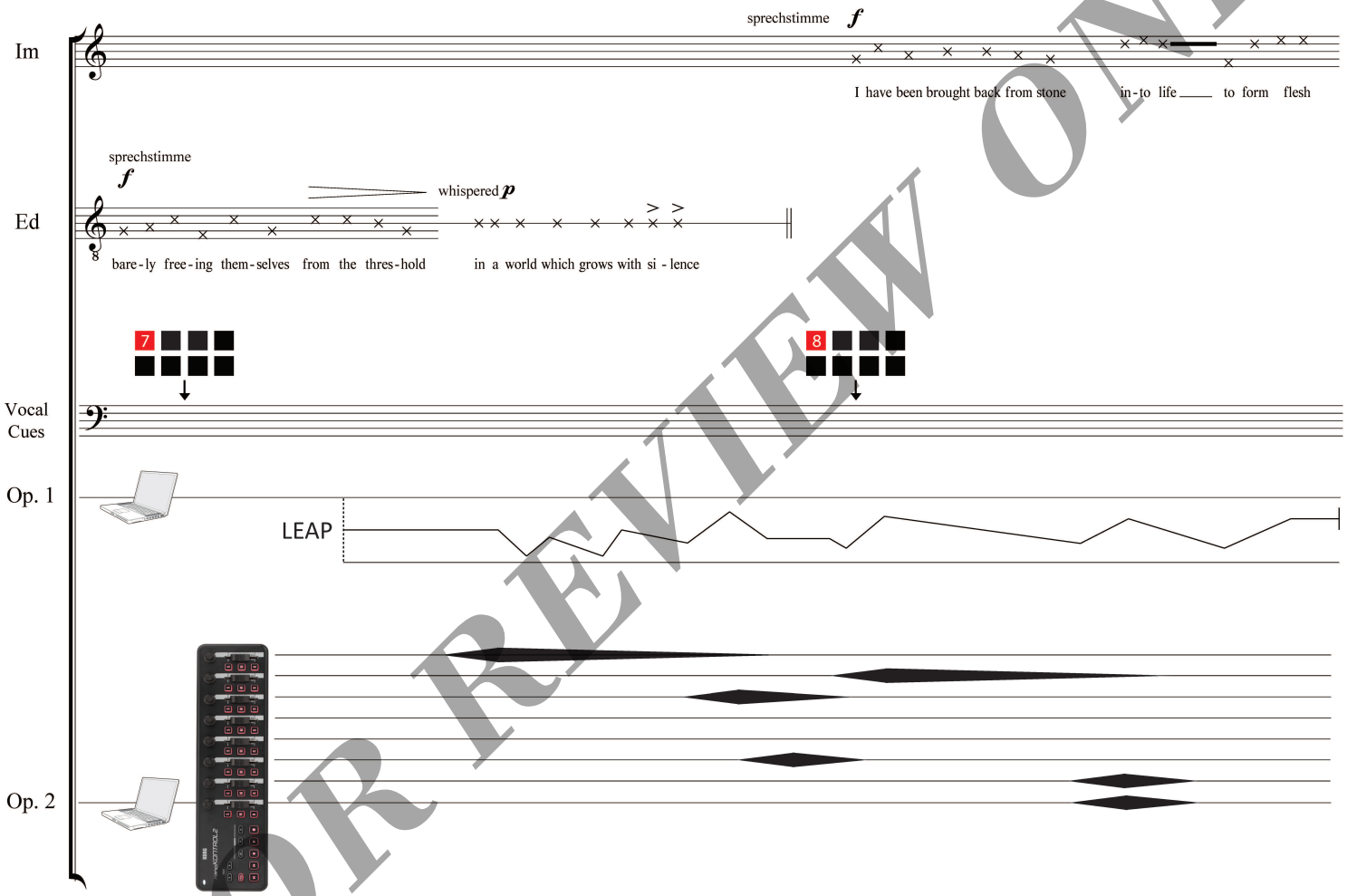

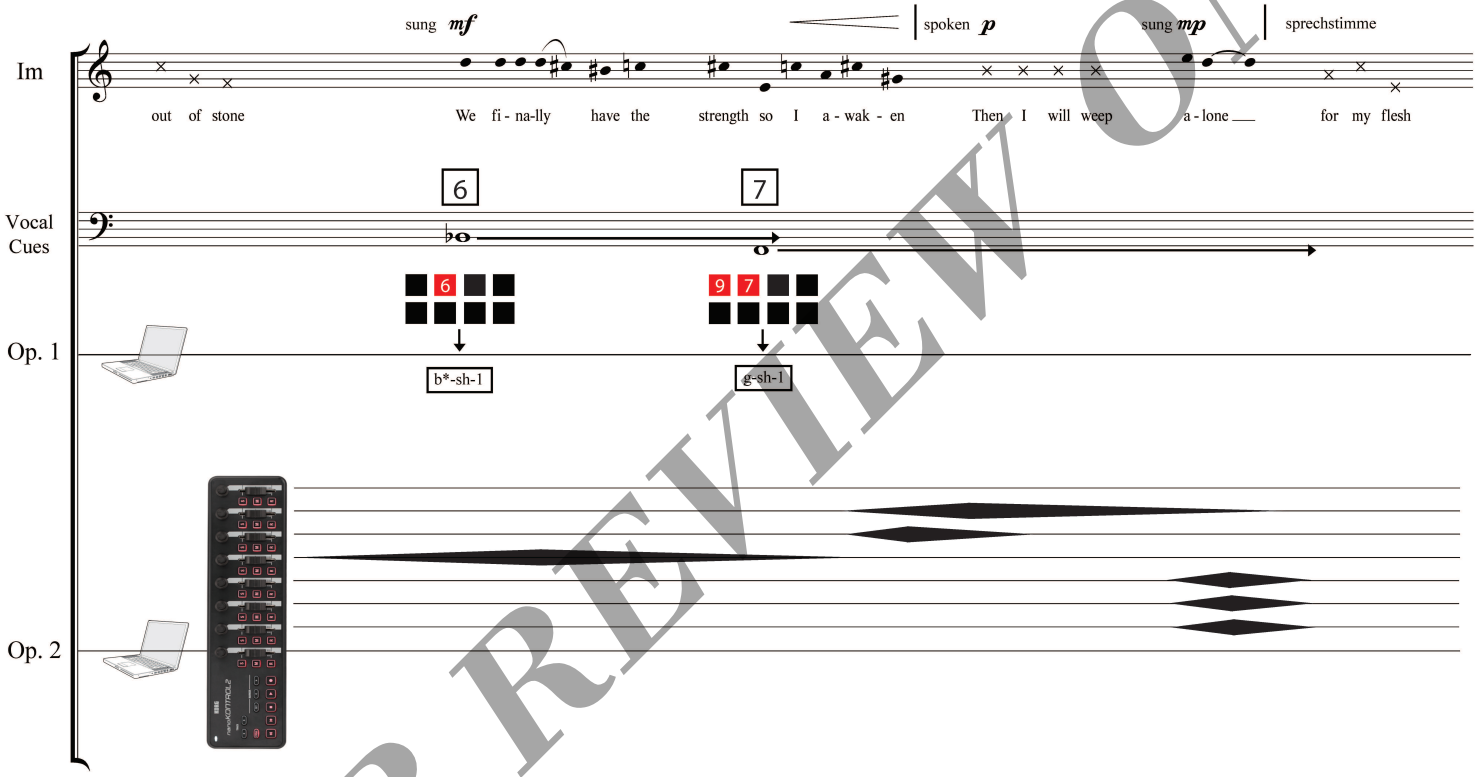

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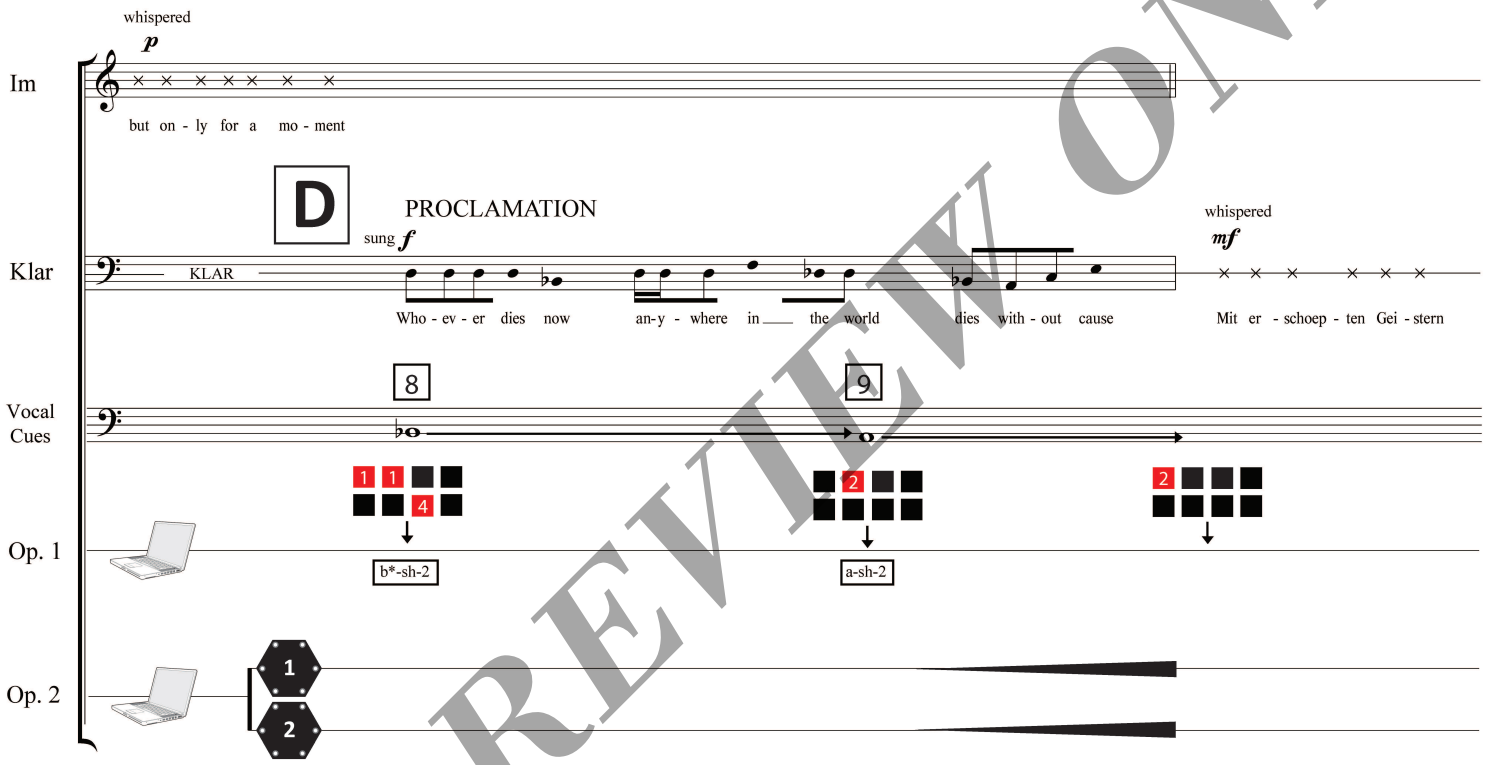

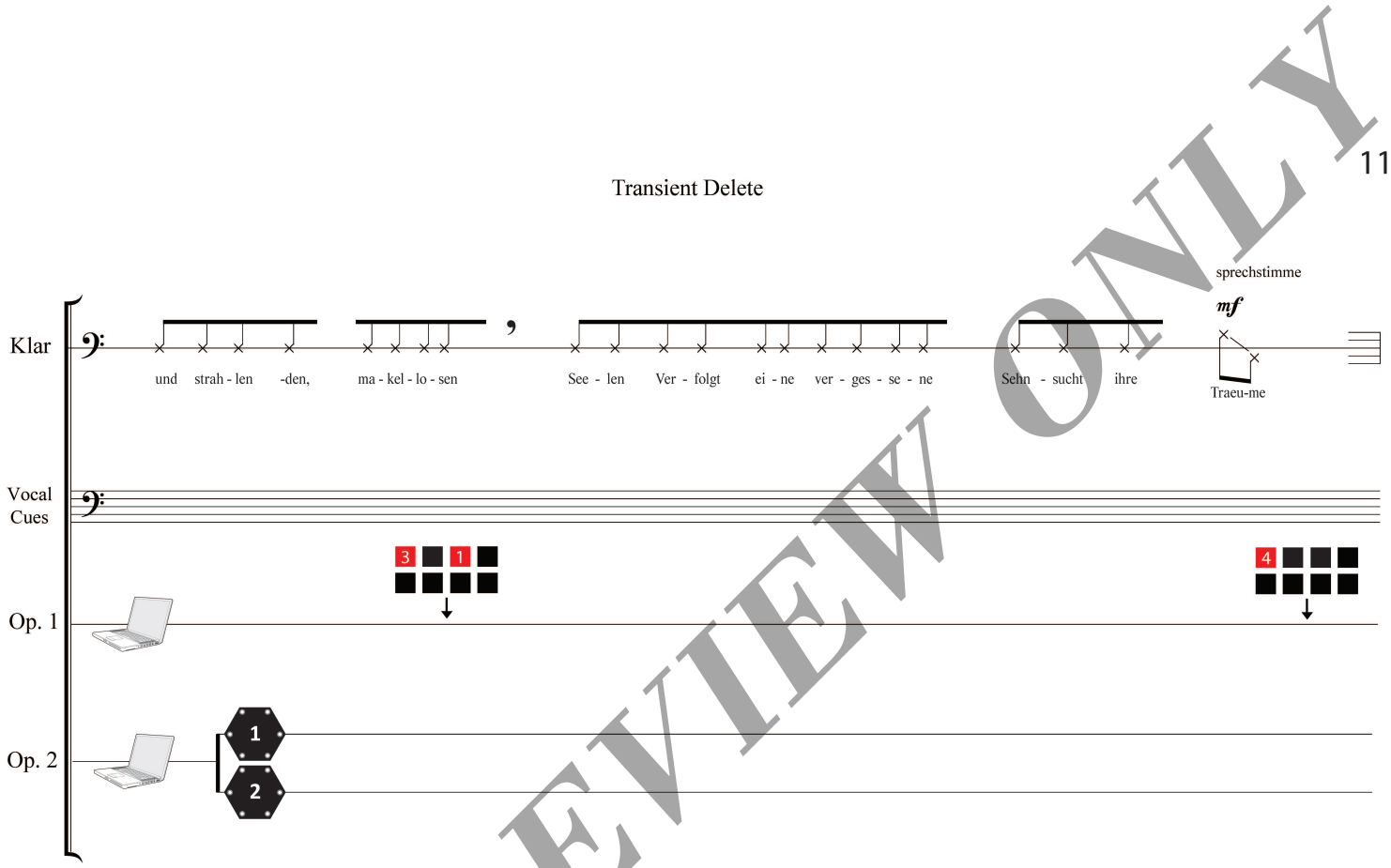

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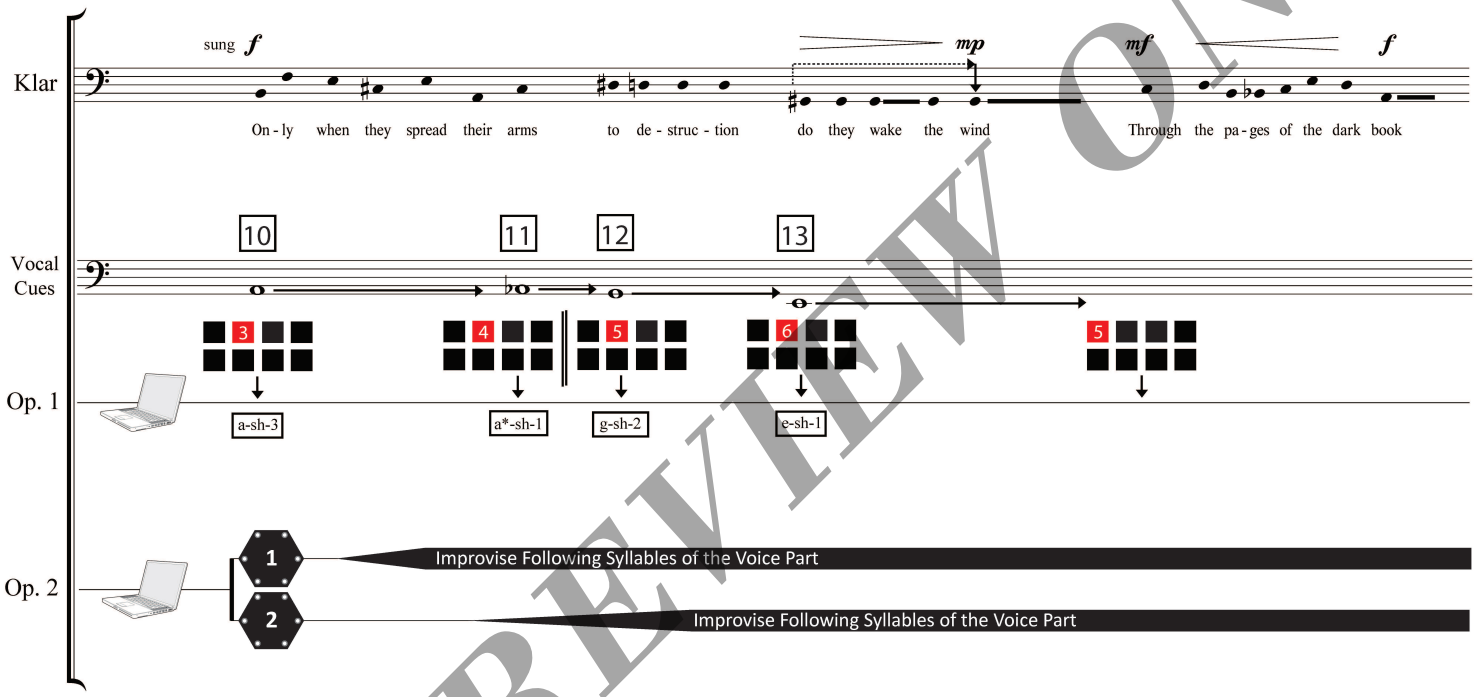

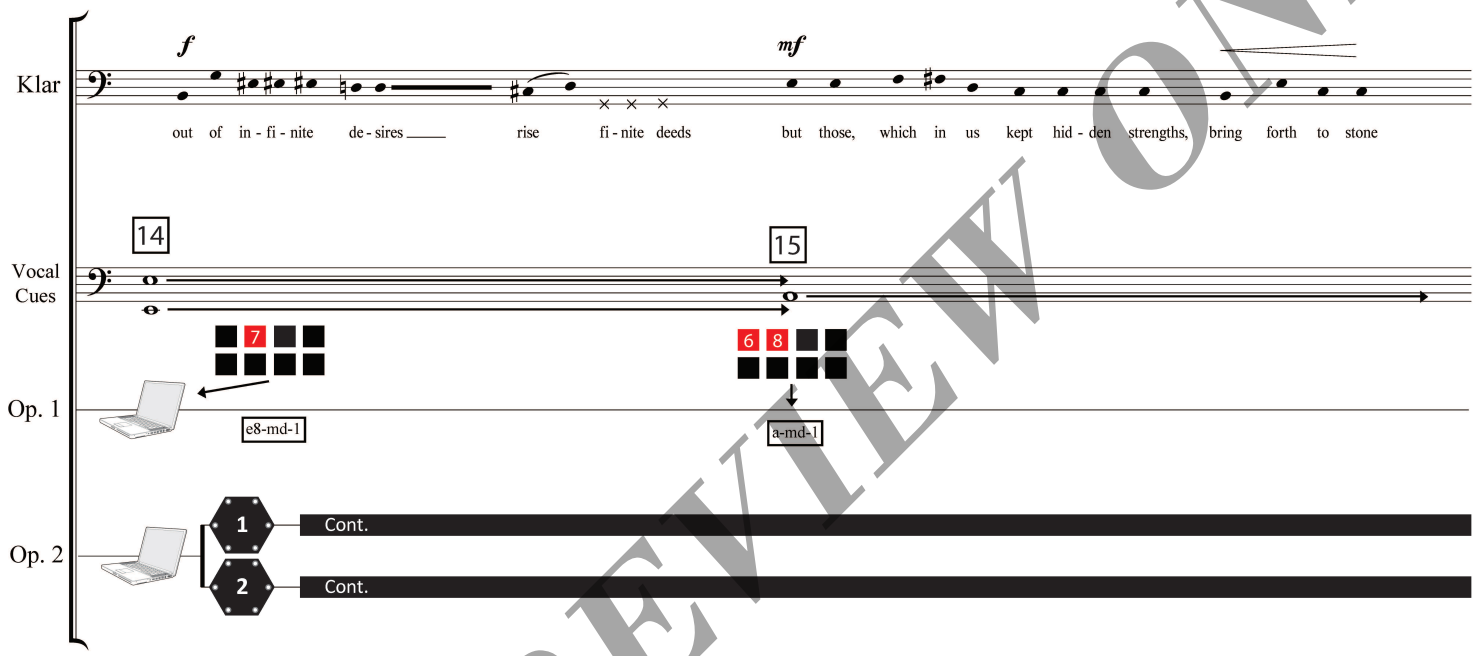

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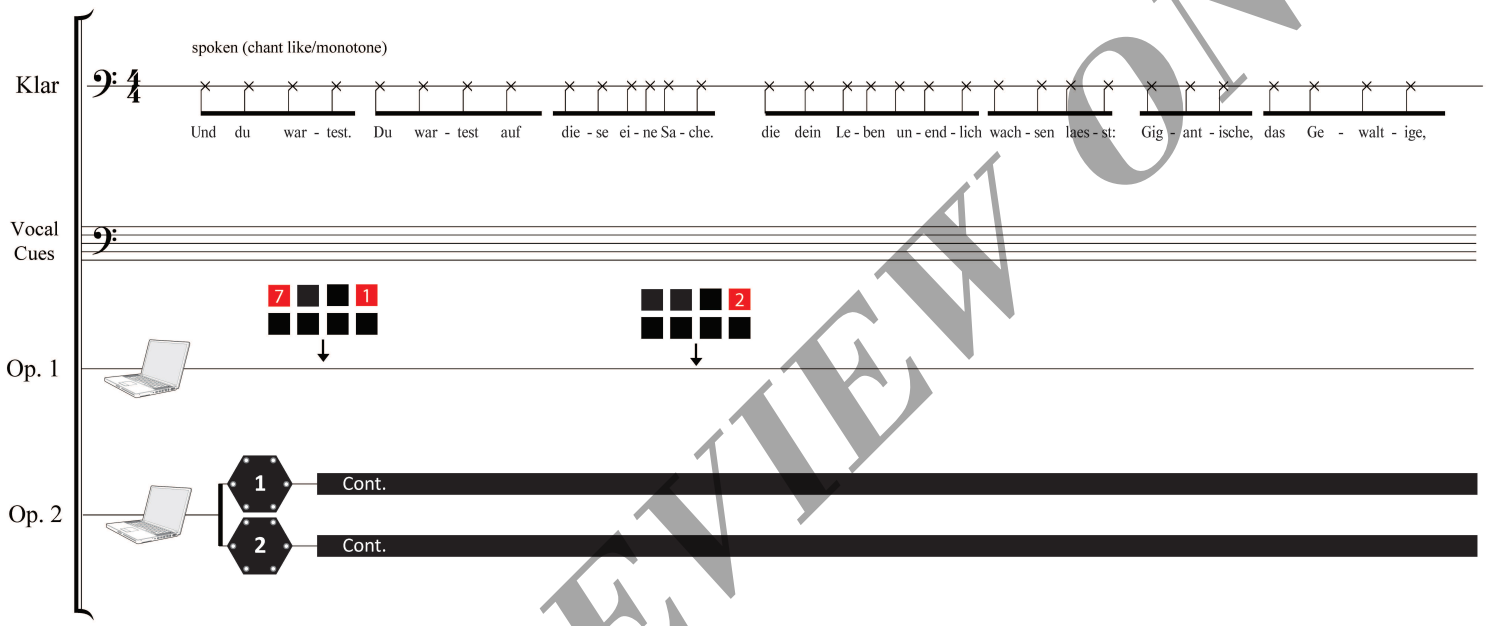

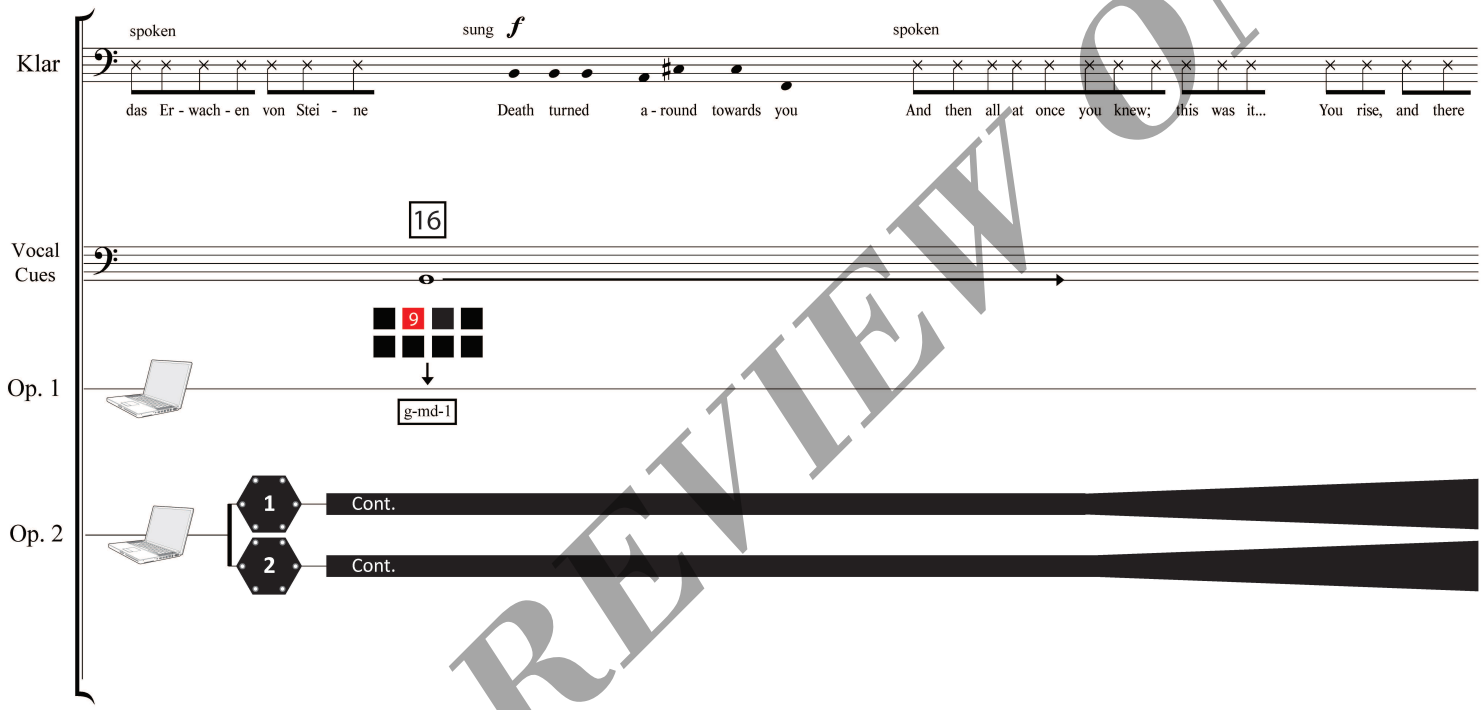

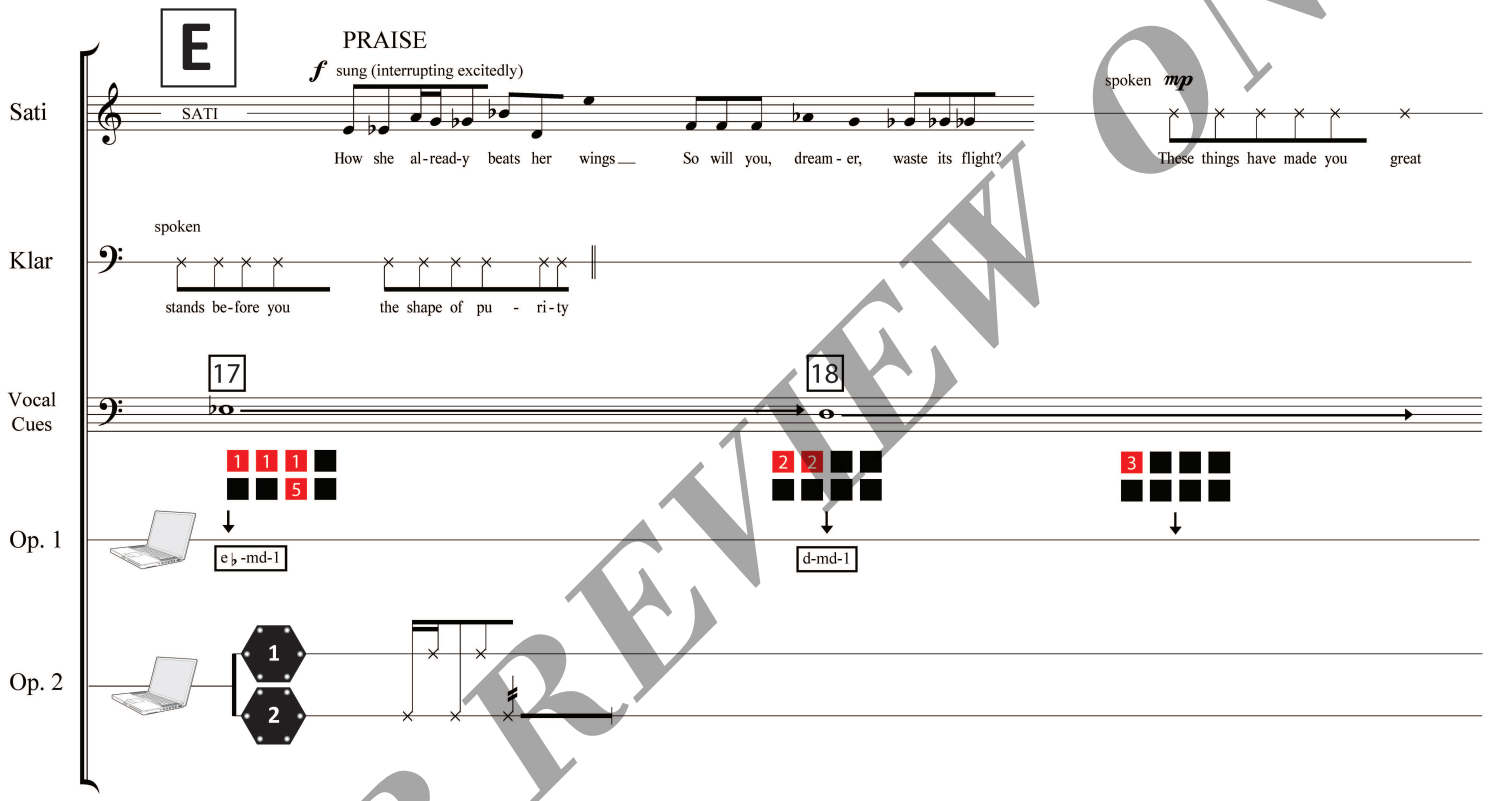

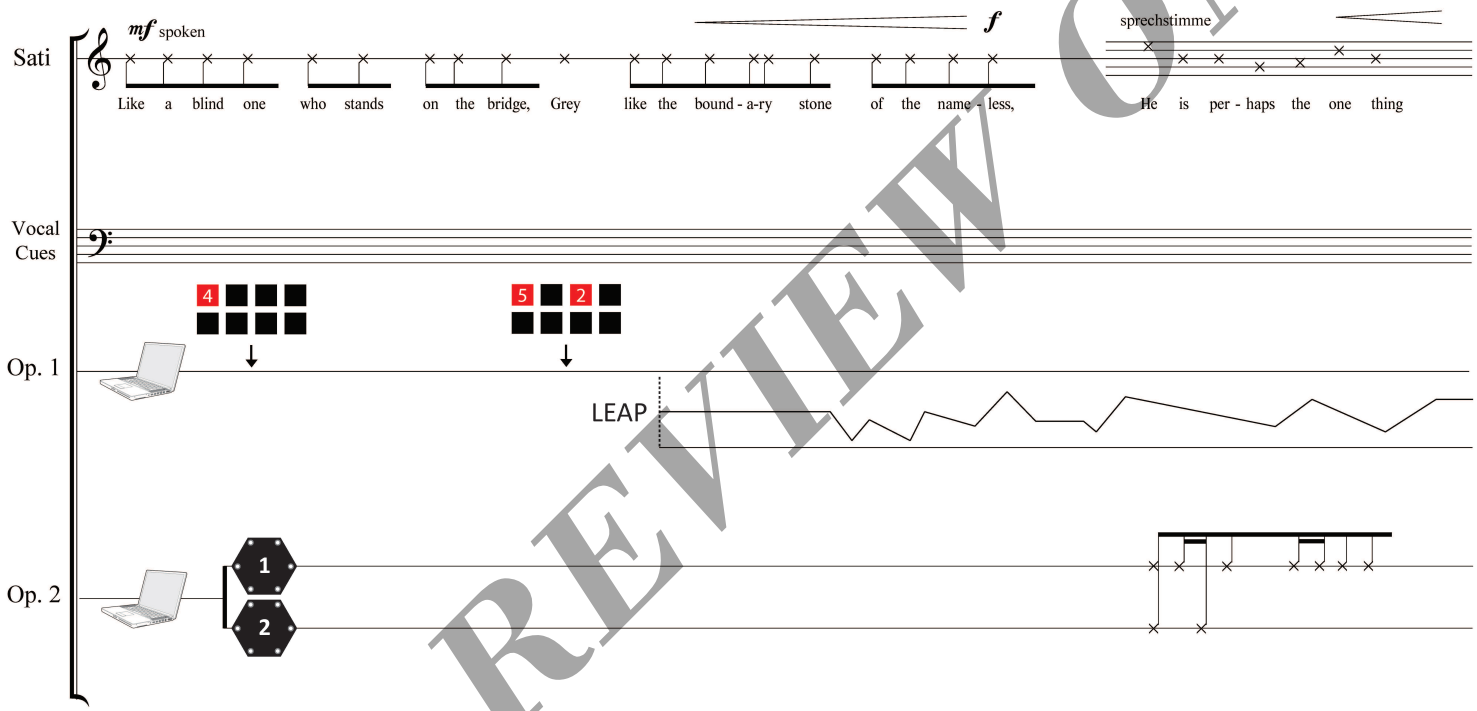

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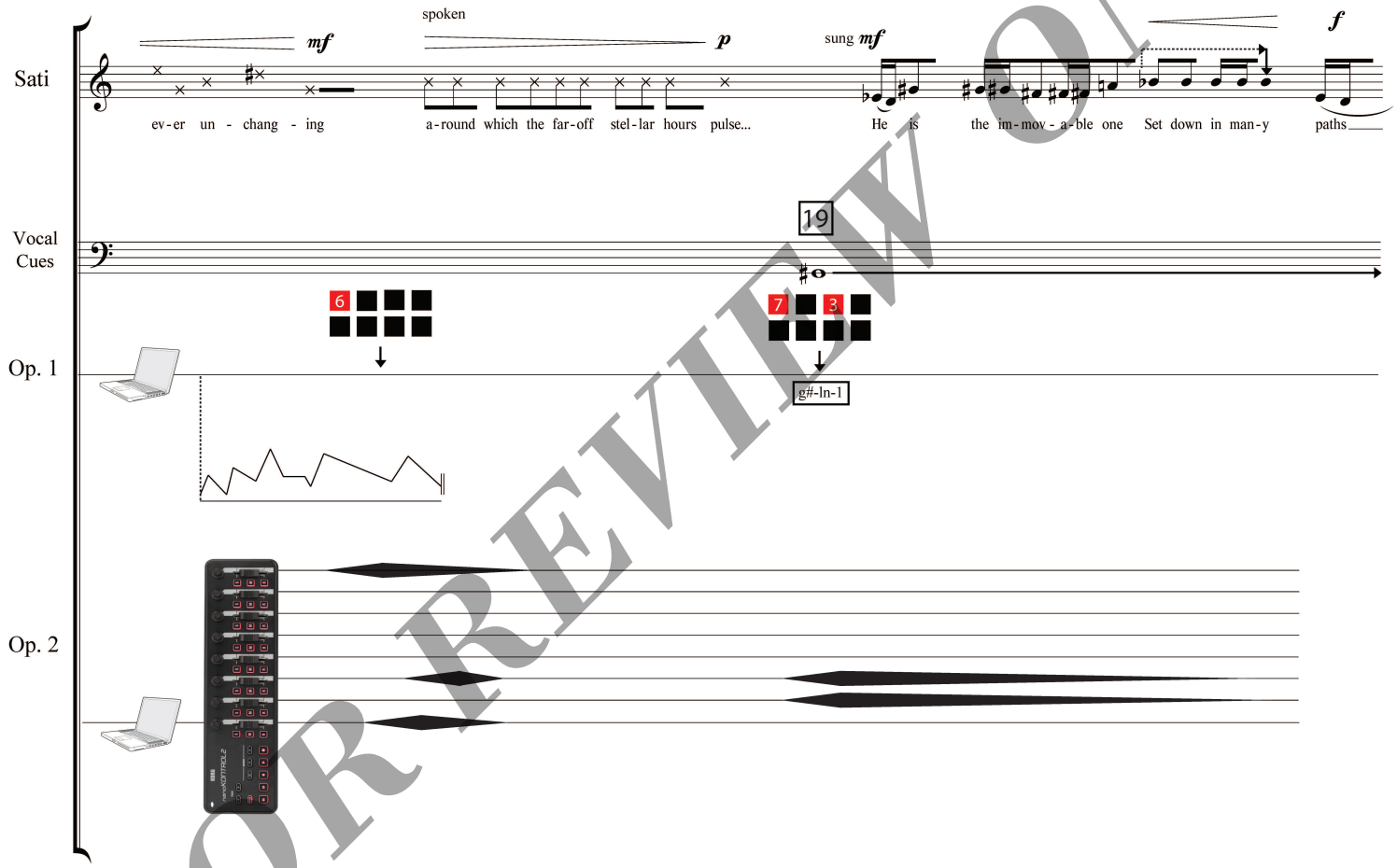

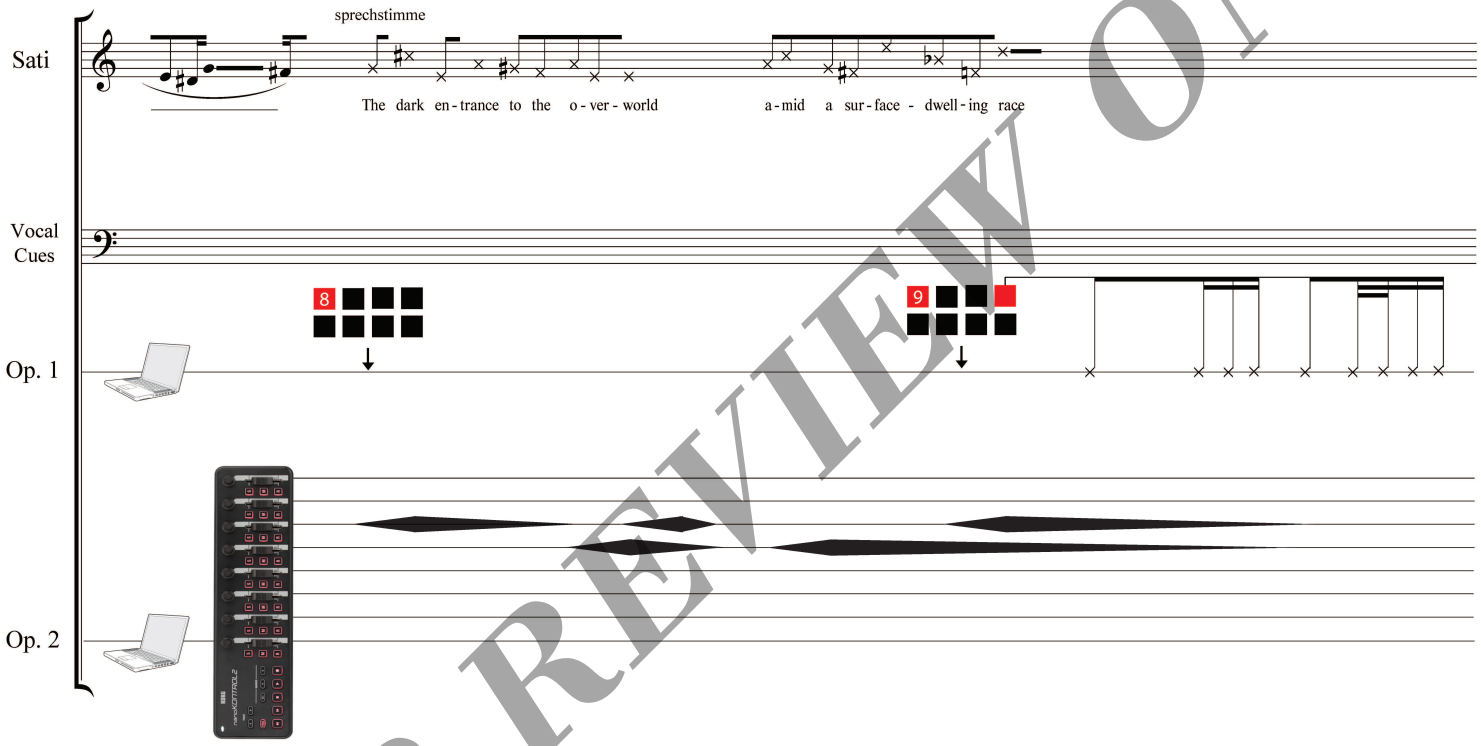

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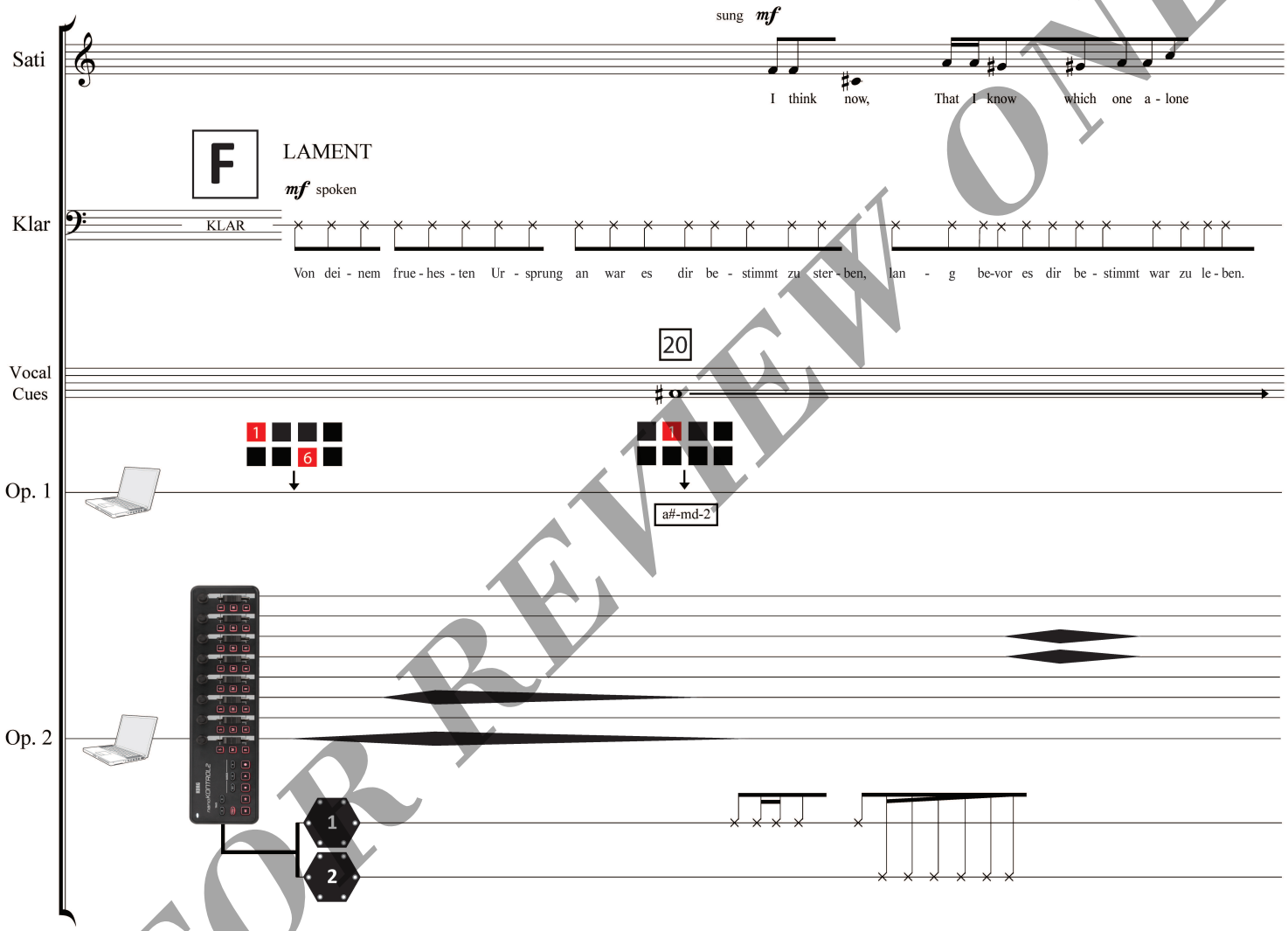

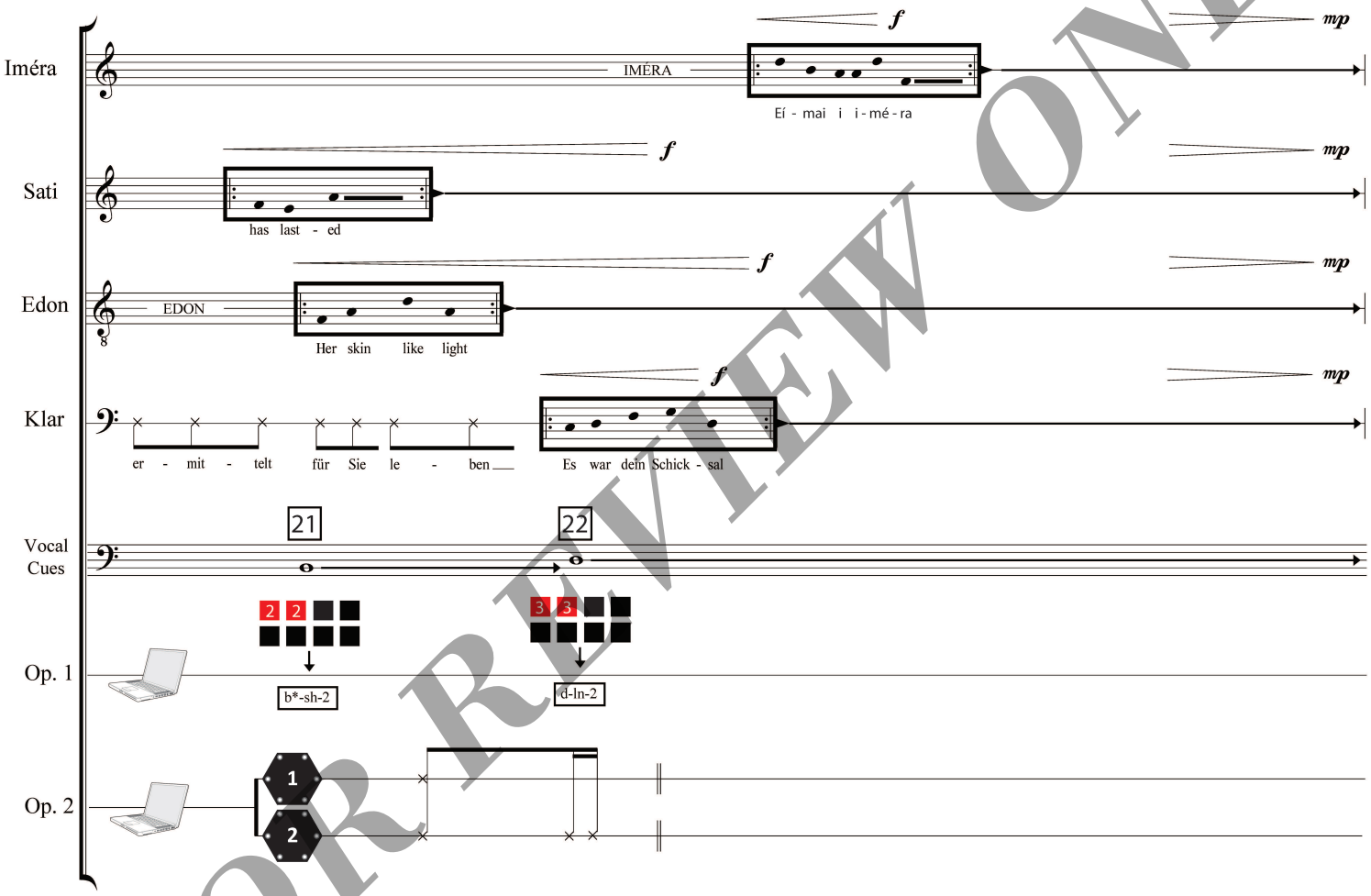

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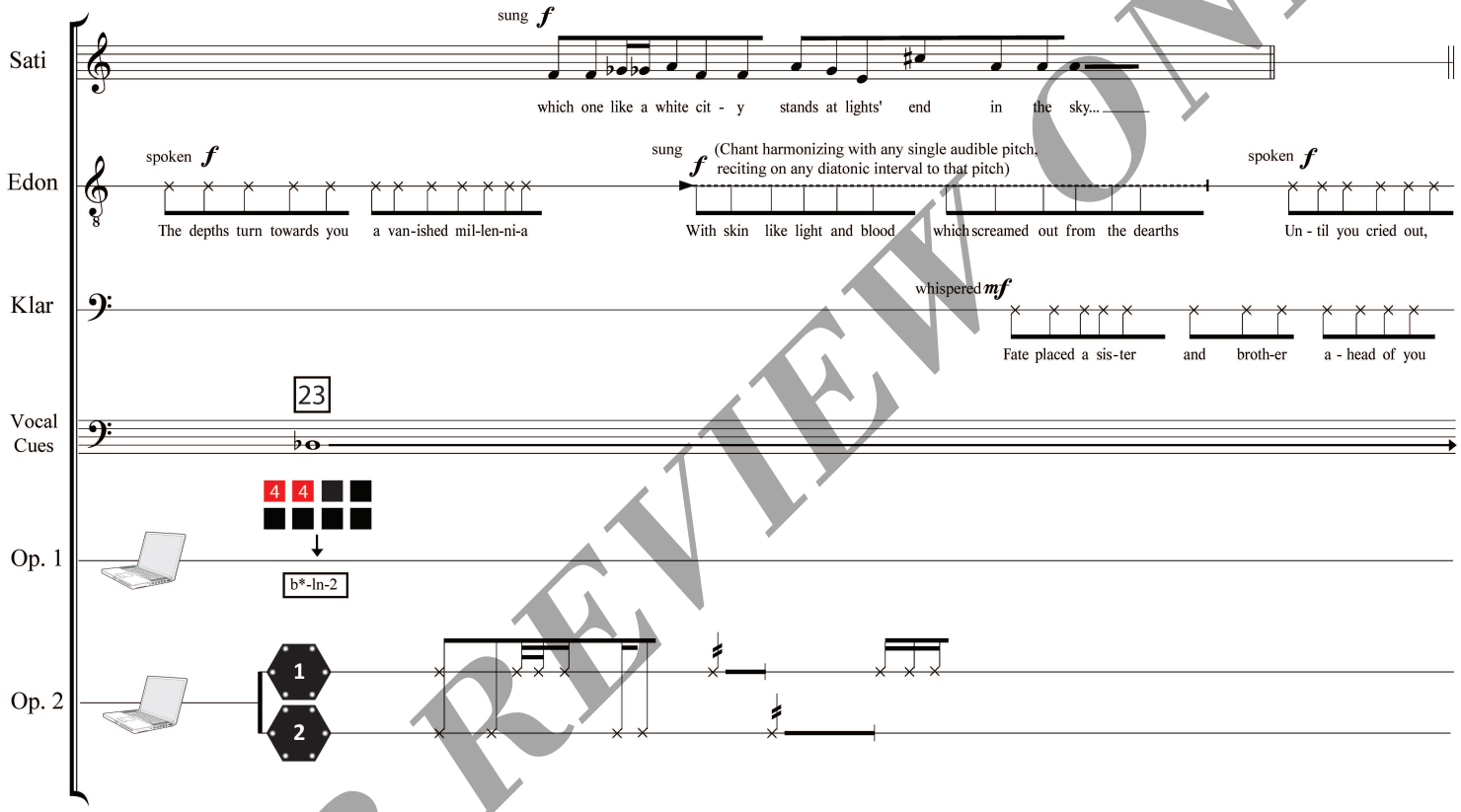

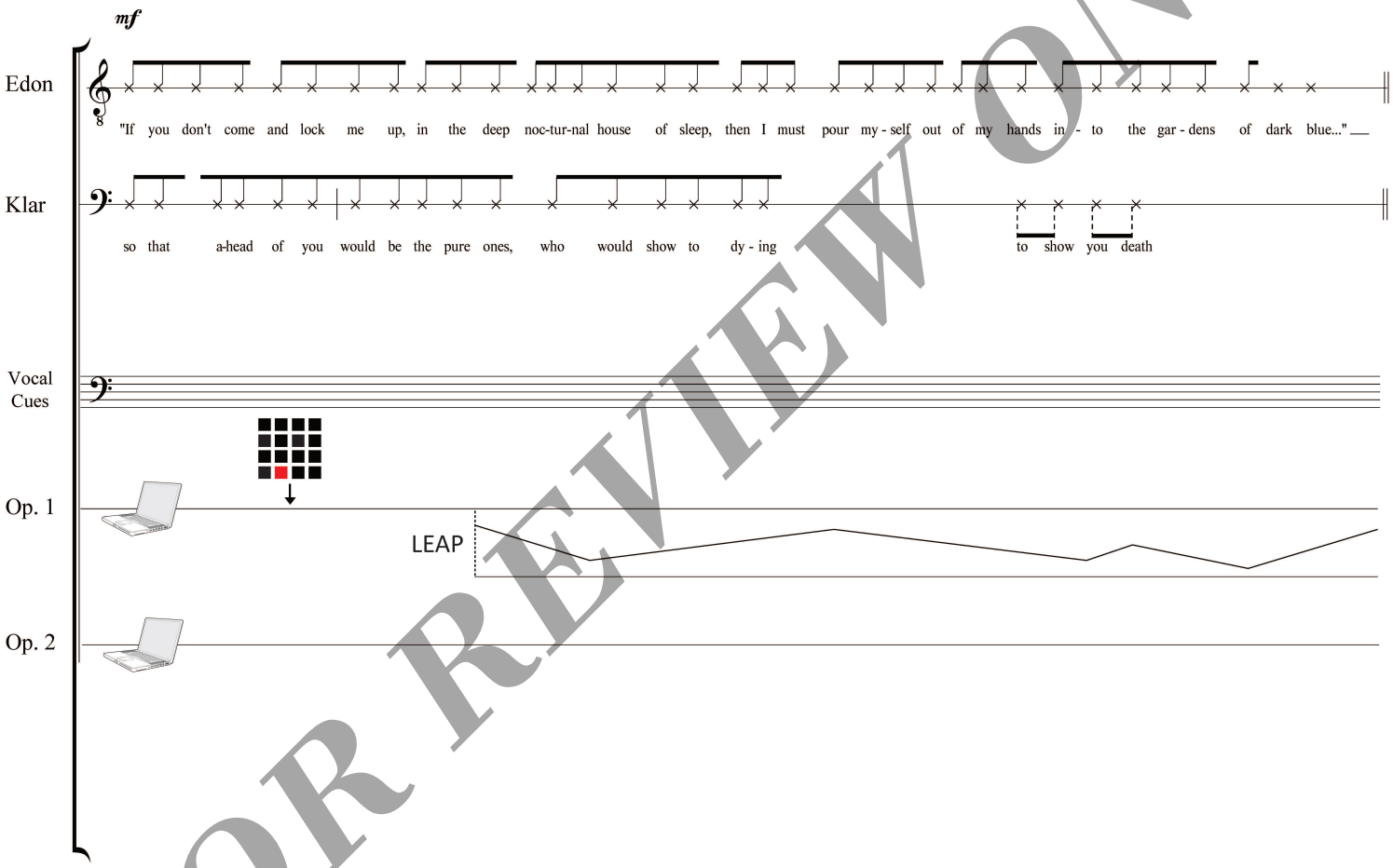

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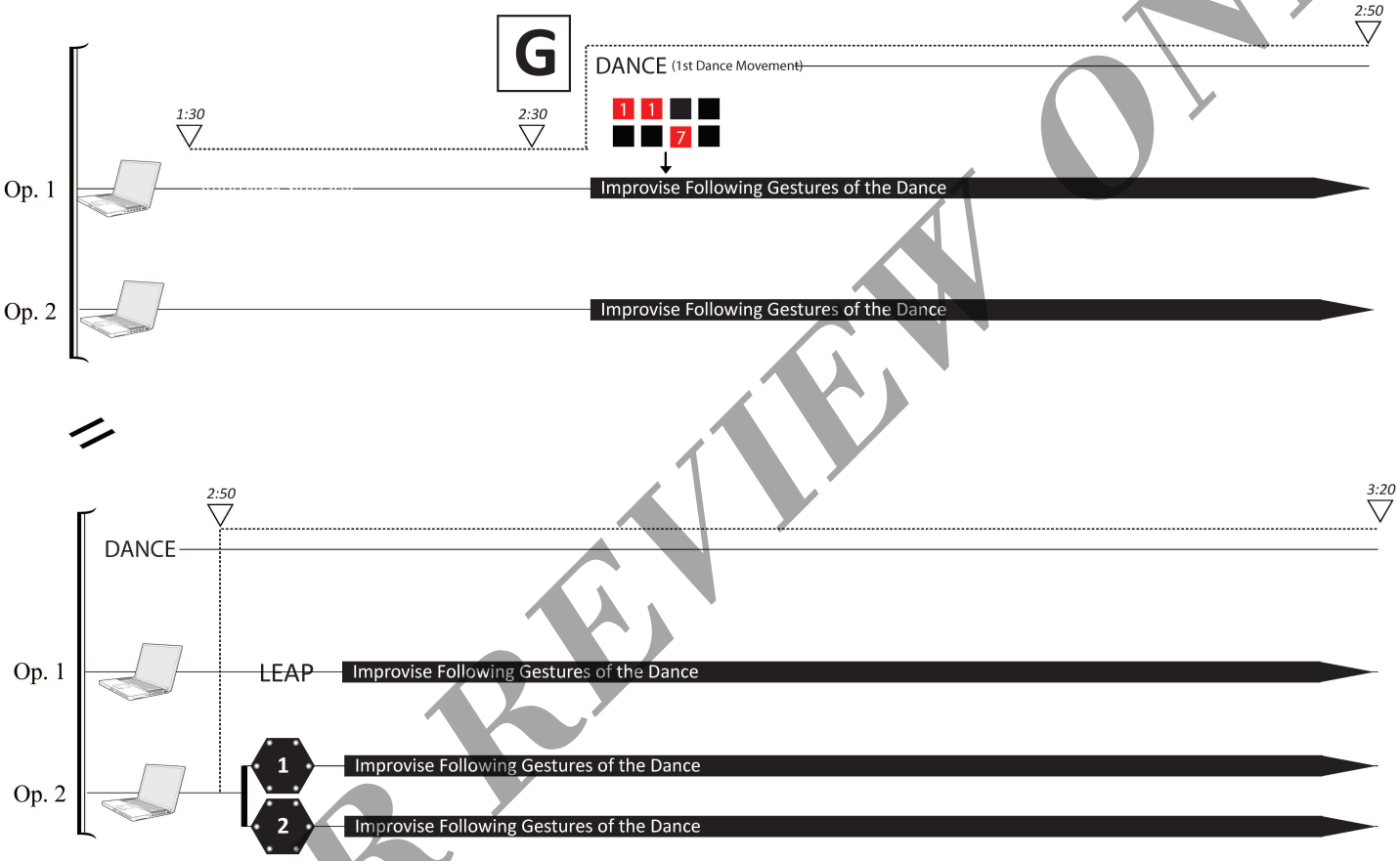

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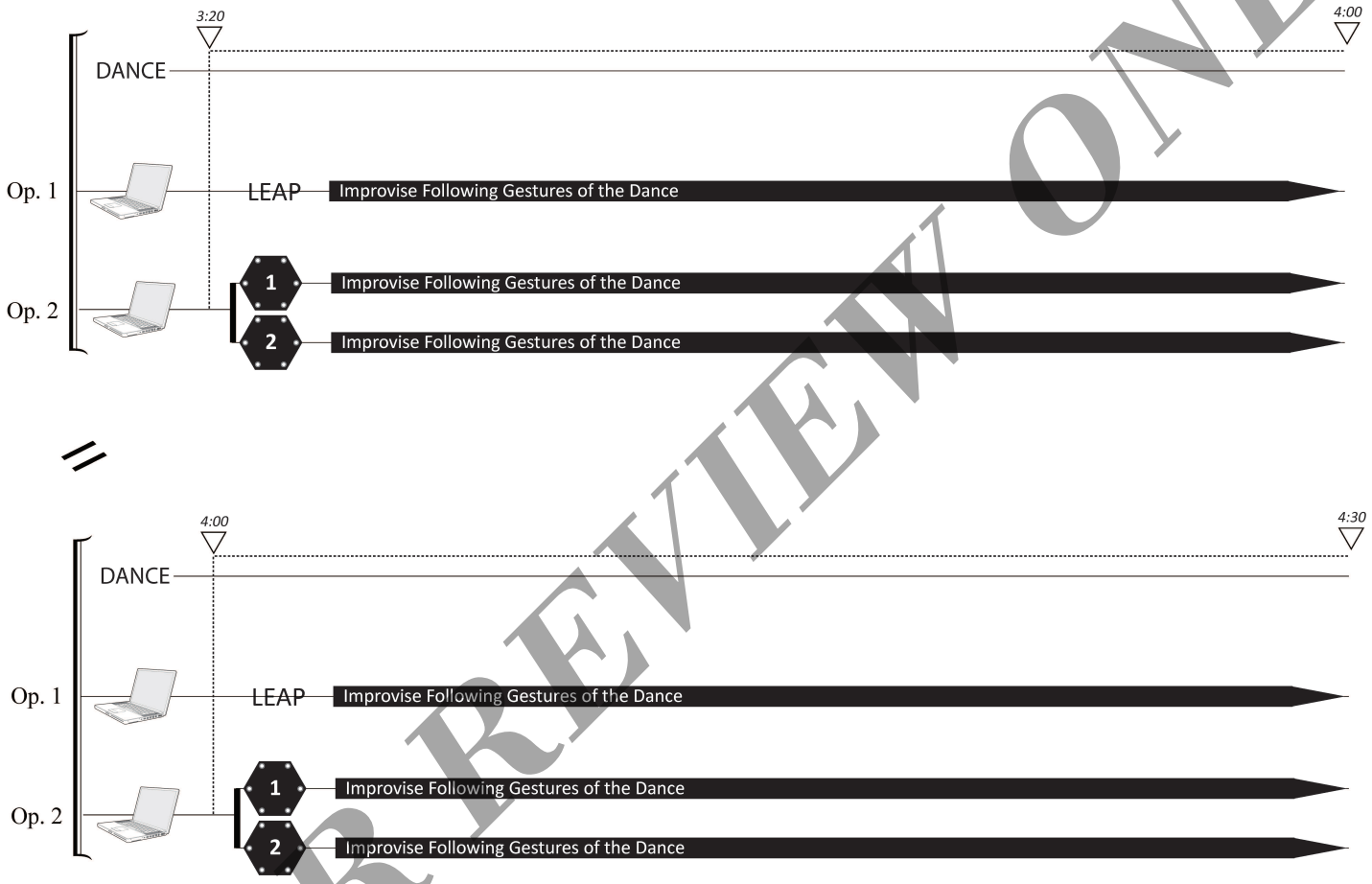

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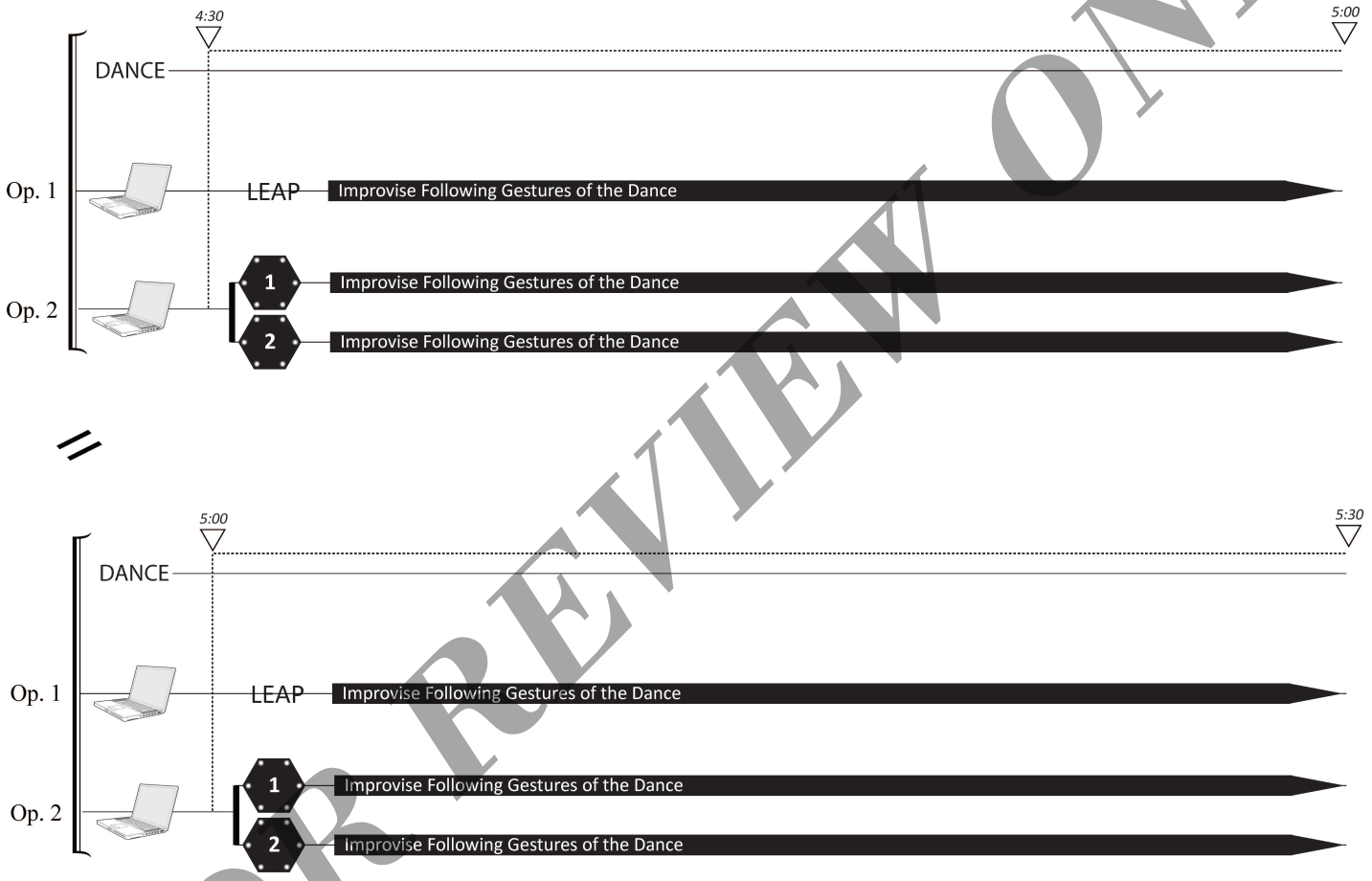

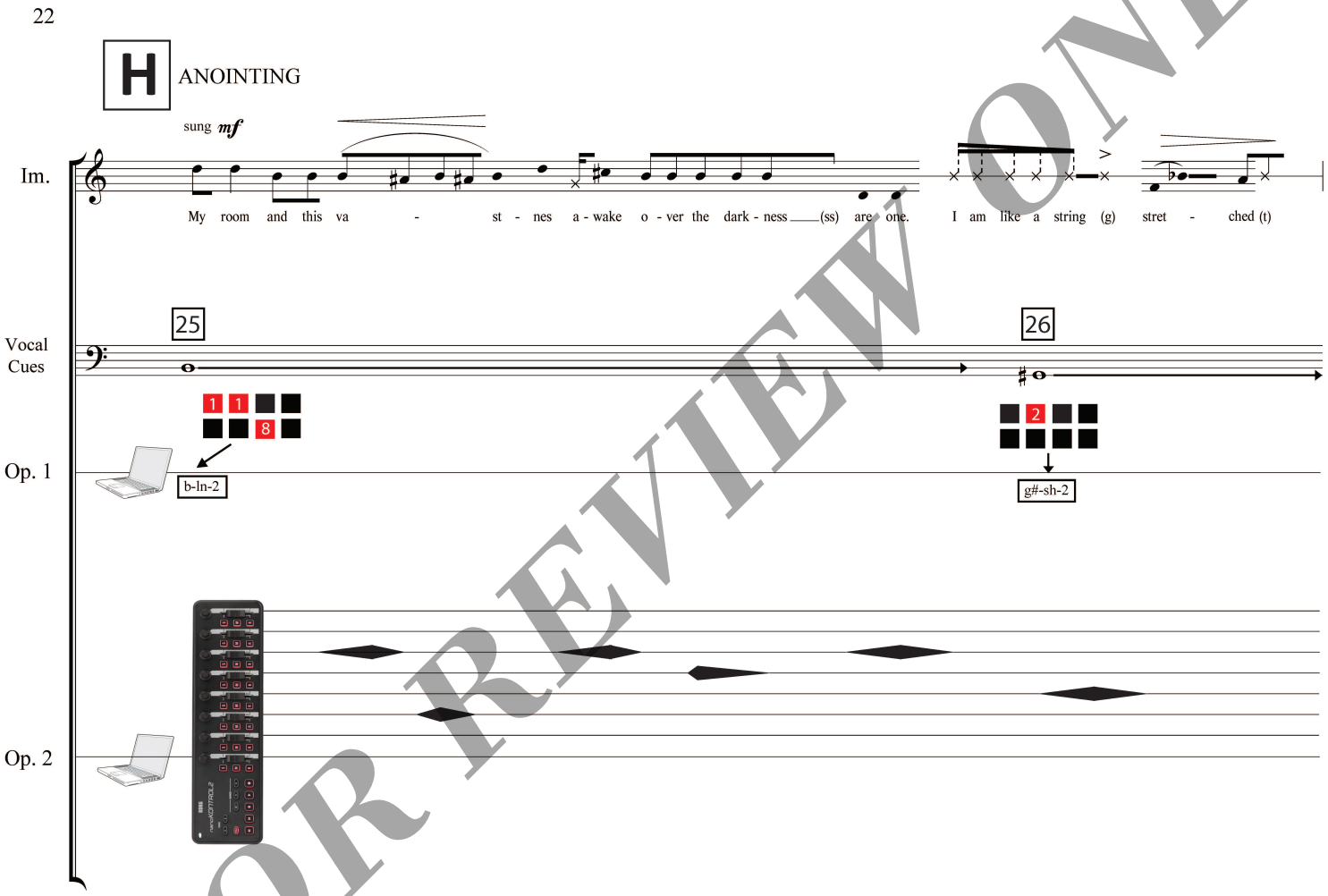

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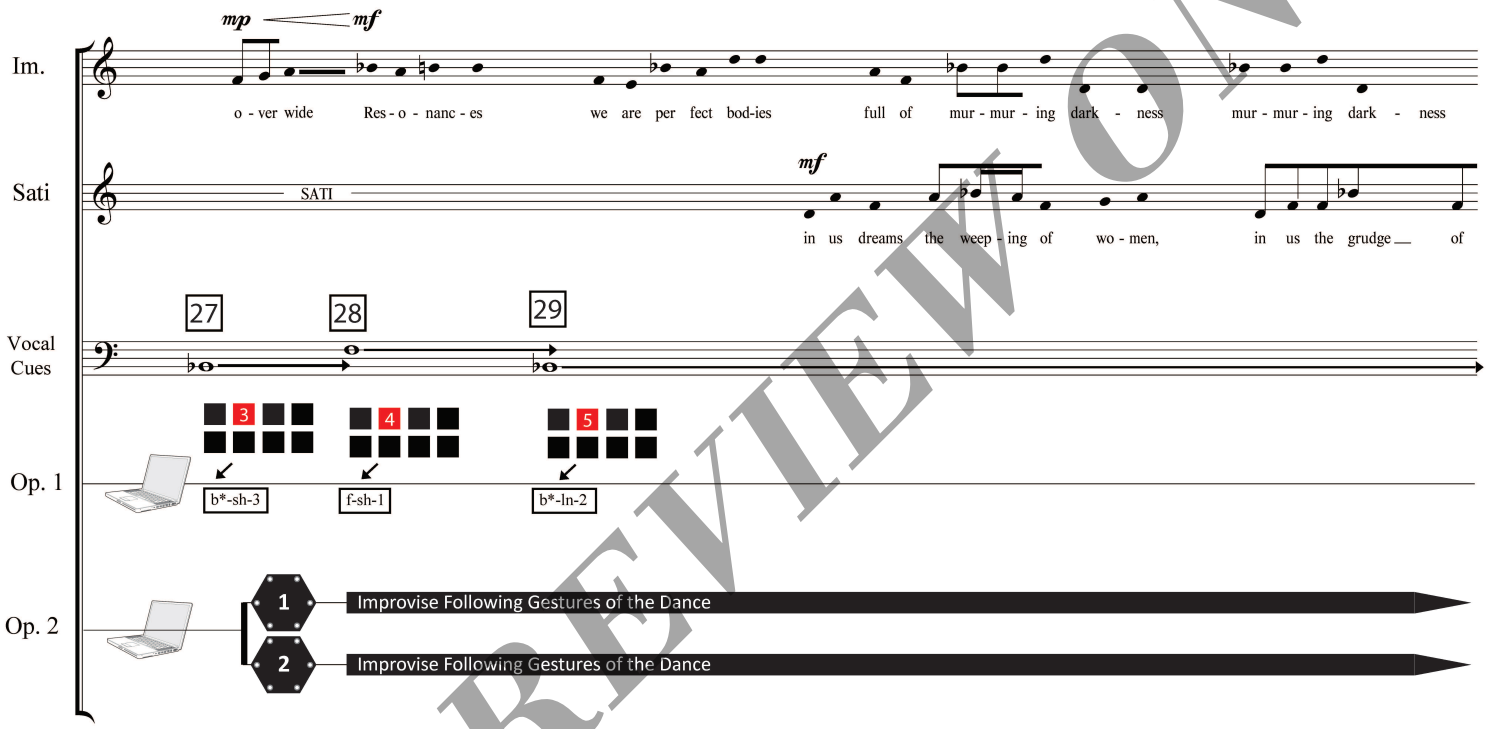

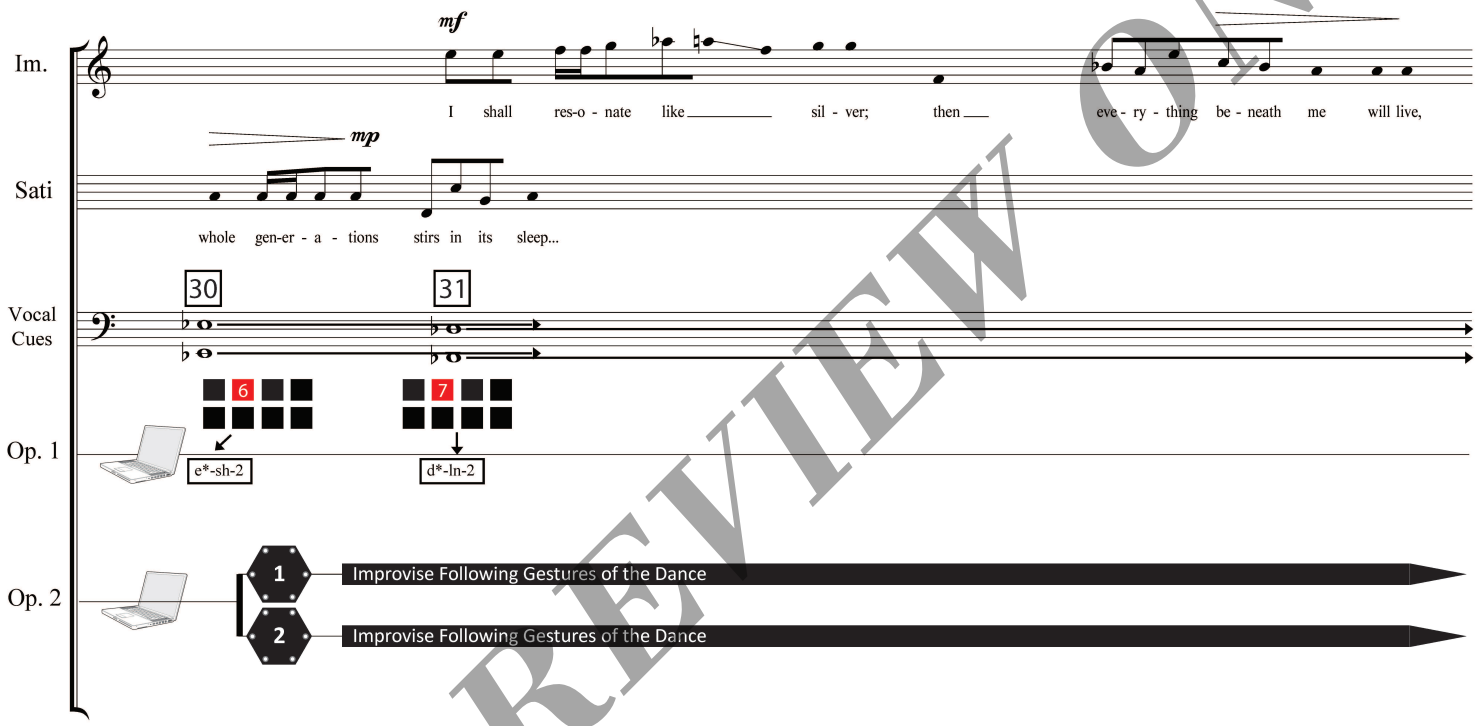

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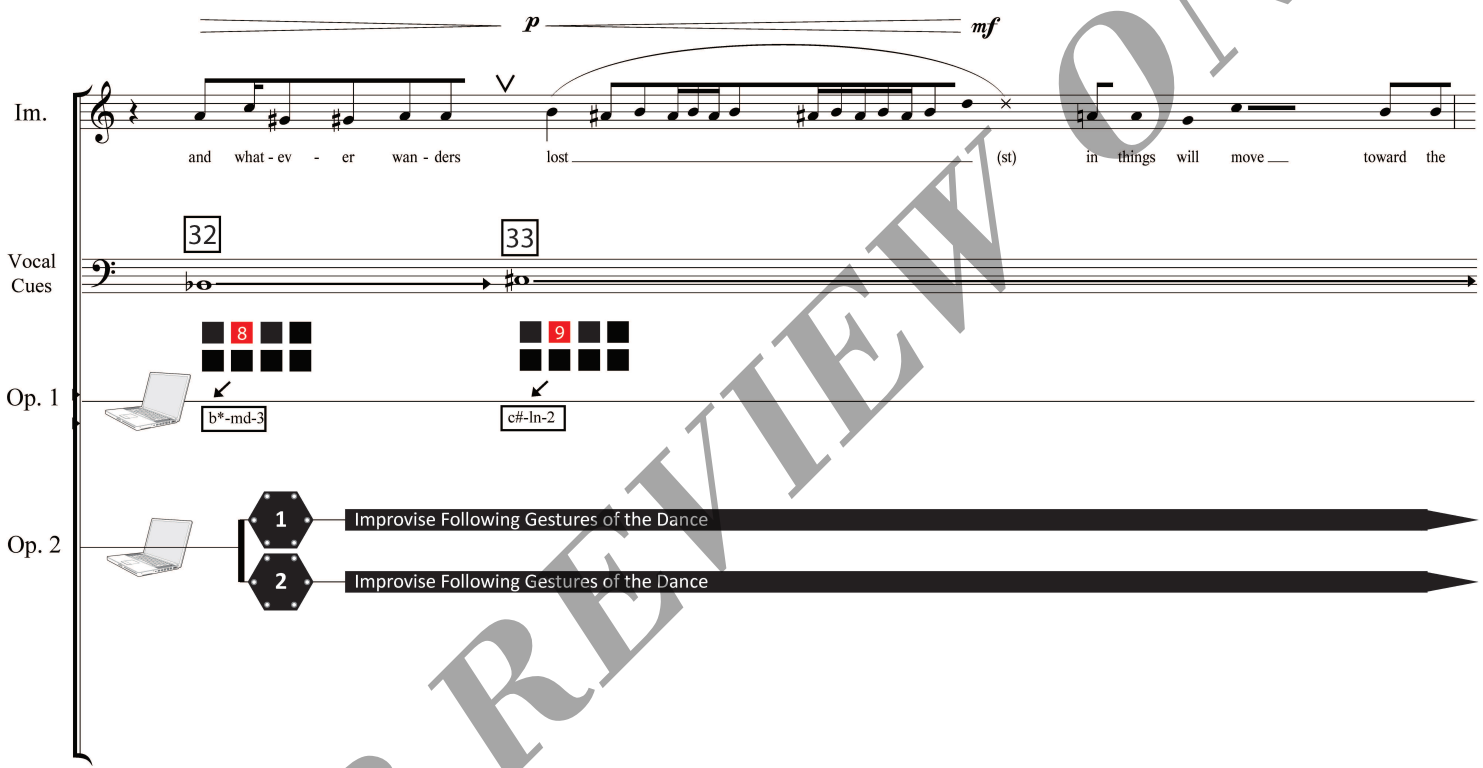

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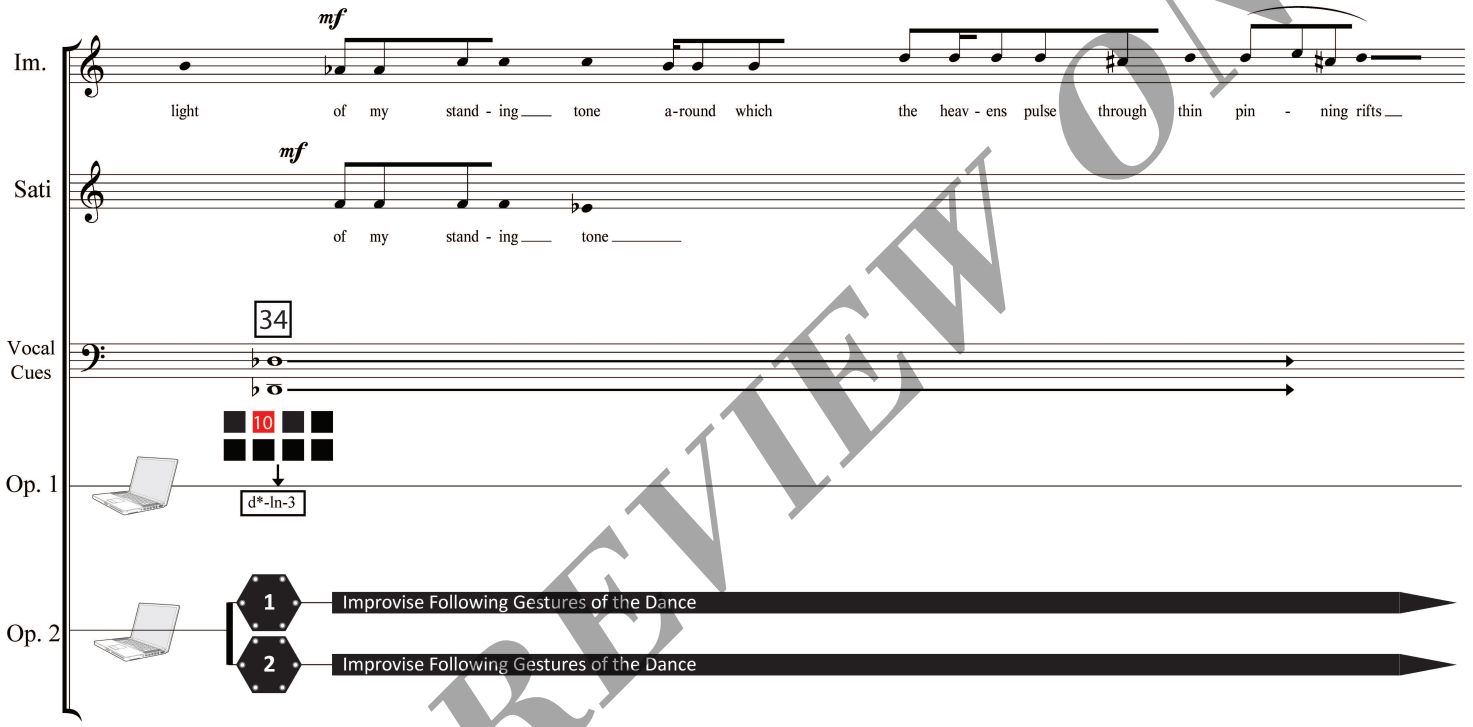

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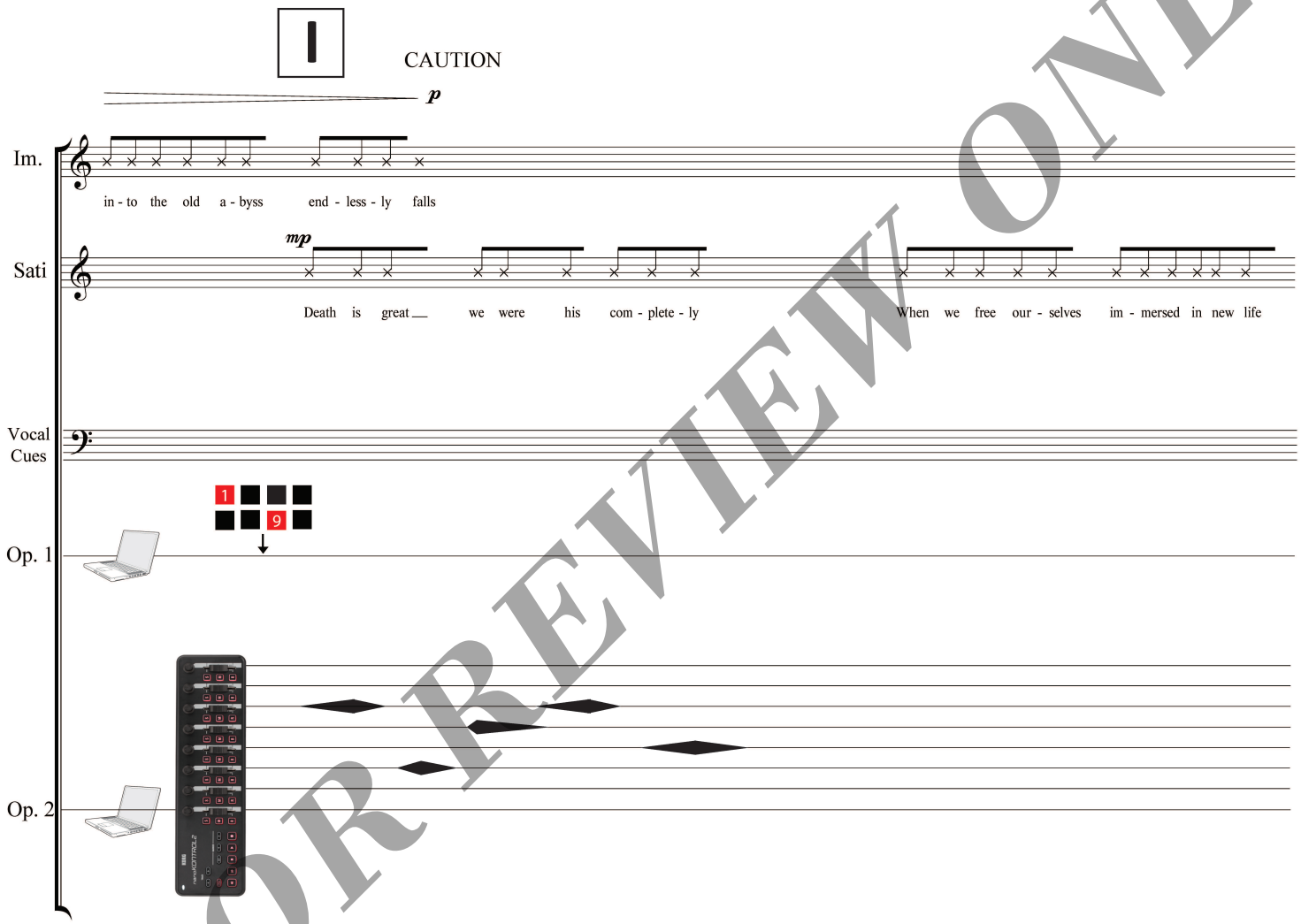

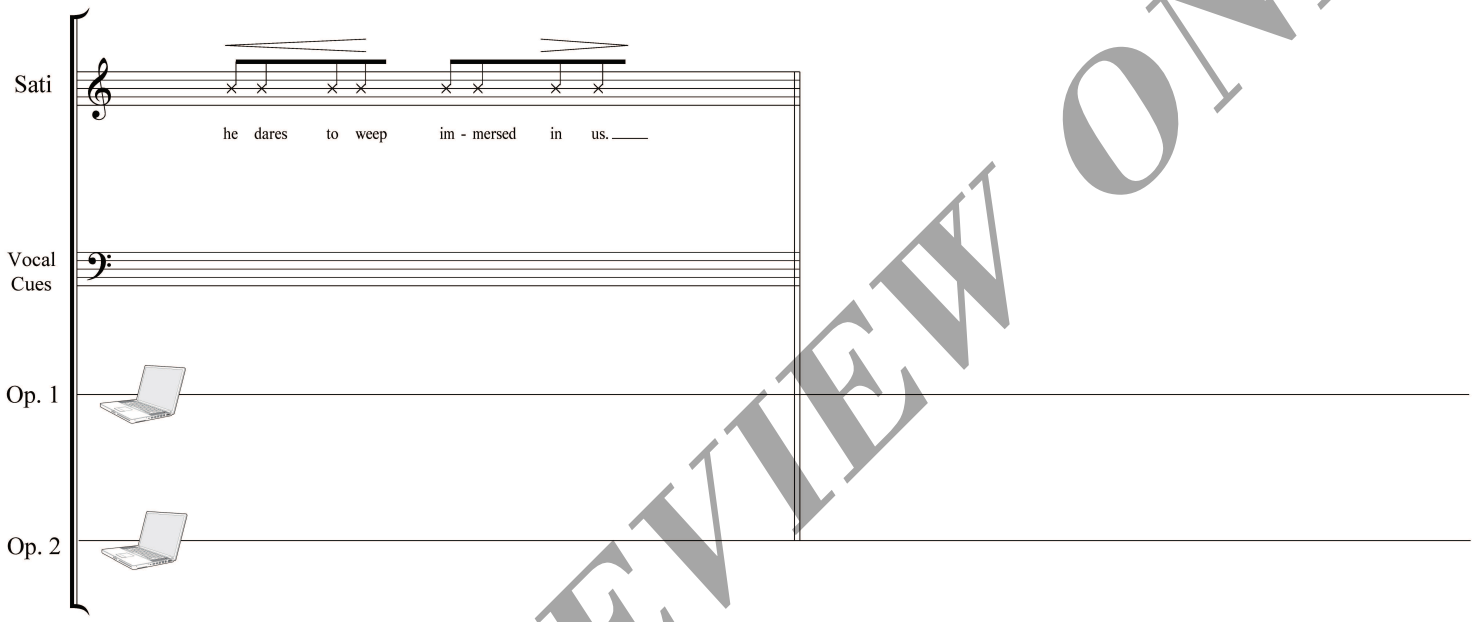

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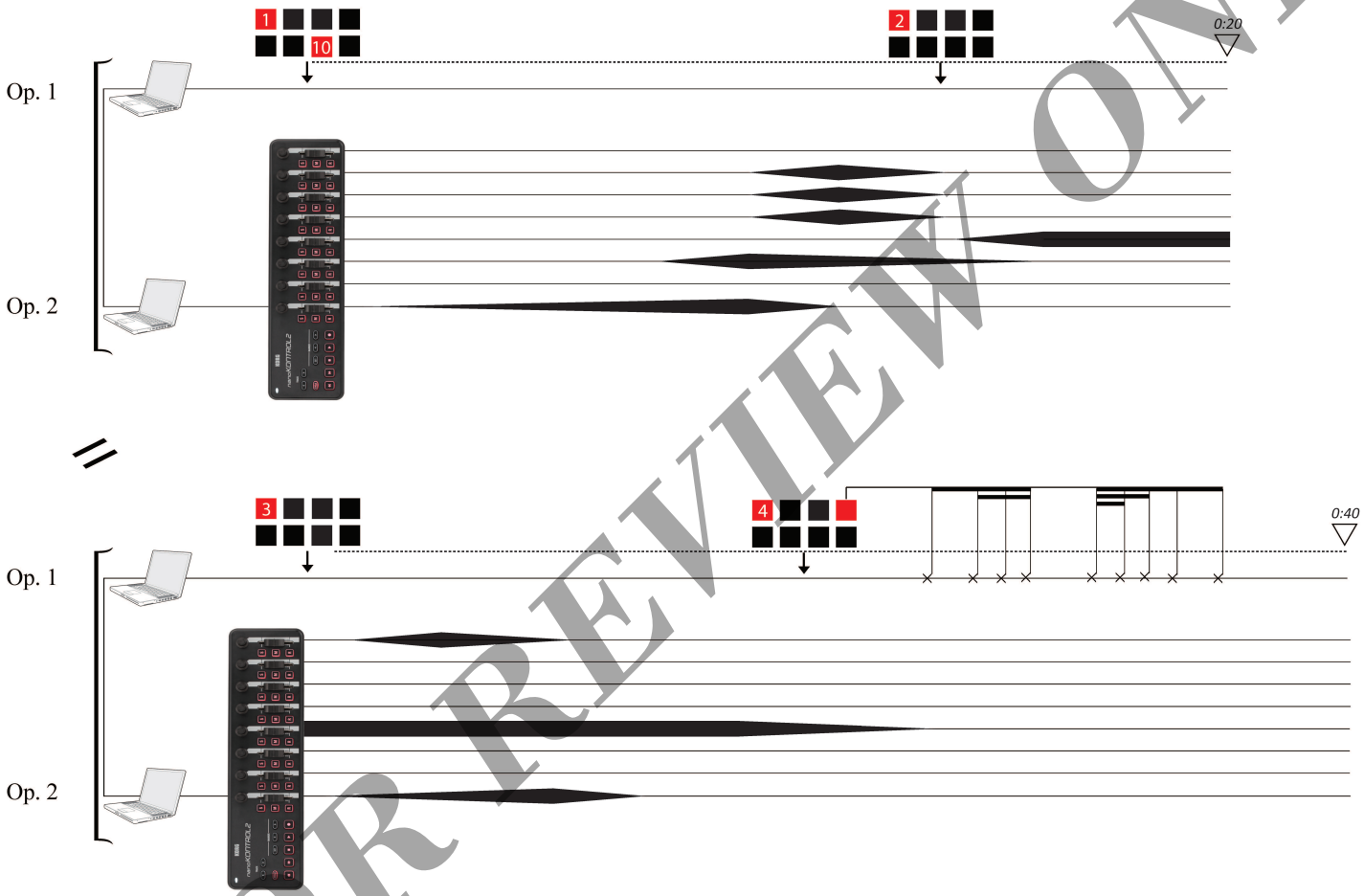

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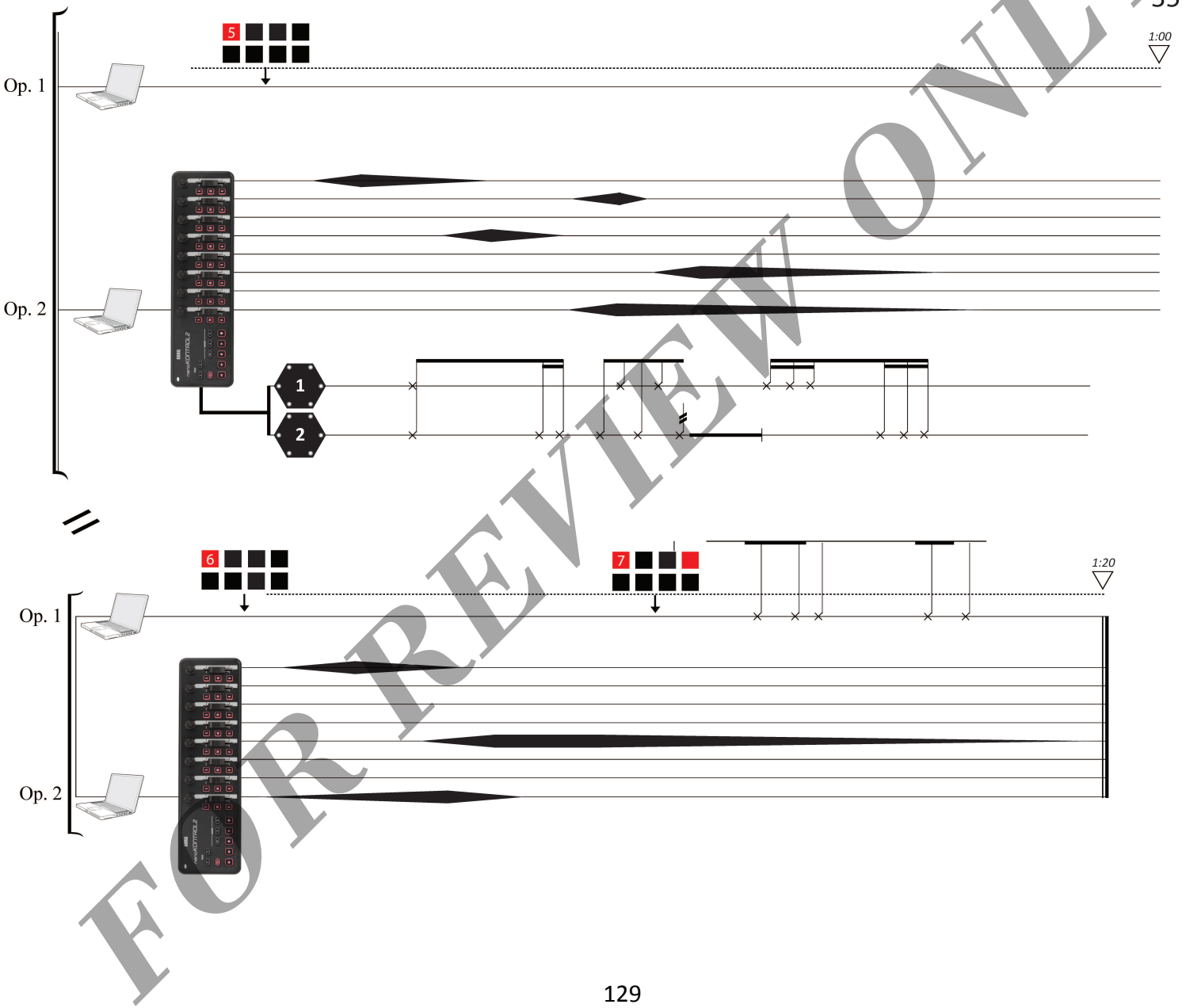


APPENDIX A

Dance:

The dance portion of *Transient delete* evolved through a collaboration with Dancer/Choreographer Erika Record and myself. In *Transient Delete* we wanted to incorporate live, aleatoric, and improvisatory elements within the music, dance, and projections. Our goal was to blend these together in such a way that each aspect of the music, dance, and projections informs or even helps to generate aspects of the other parts. To accomplish part of this we utilized motion capture technology to capture the dancer's motion and drive the video projections. Software Package 3 contains all the necessary instructions for setting up the motion capture system.

Hardwar Requirements:

1x X-Box Kinect
1x HD Web-cam
1x Computer with 2 or more video outputs

Improvisation:

Another important element of the dance in *Transient Delete* is the incorporation of improvisation into the choreography. Curtis Carter in his *Improvisation in Dance* identifies what he claims are the three primary types of improvisation in dance:

1. Embellishments left to the individual artists upon an existing fixed choreography

2. Creative improvisation of spontaneous free movement used as a tool with the purpose of generating or inventing new original movement intended to be utilized within a set choreography

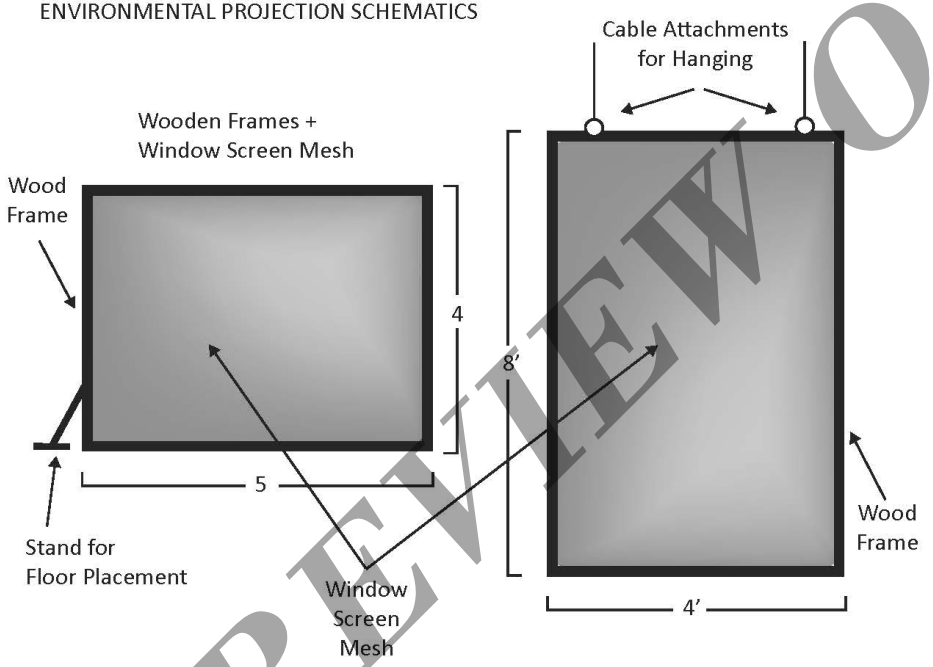
3. Improvisation performance for its own sake***

The first type, 'Embellishments left to the individual artists upon an existing fixed choreography,' is the basis for the dance improvisation in *Transient Delete*. While the majority of the dance is fixed it is only fixed as a framework for smaller improvisatory embellishment on set choreography. These embellishments also serve to provide generative material that the laptop ensemble observes and improvises upon.

*** Carter, Curtis L. 2000. "Improvisation in Dance." The Journal of Aesthetics and Art Criticism 58(2): 181–90.

APPENDIX B

ENVIRONMENTAL PROJECTION SCHEMATICS



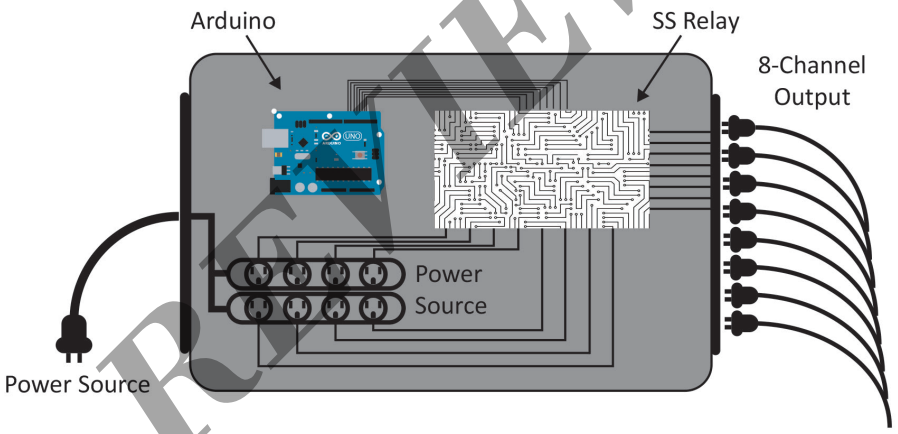
To build these panels used several (light) wood frames ranging from 4x5' to 8x4'. Tightly stretch common window screen mesh over the frames. The window screen mesh works well as projection screen but has one unique quality. While the mesh can be projected on, the material it is not fully opaque and some of the projection bleeds through, shining onto whatever is behind the mesh. In Transient Delete the bleed through will be shining on the dancer and the vocal performers. This helps to blend the virtual and visceral even more by combining the different spaces. Using these panels and helps to create a multidimensional space for the dancers and performers to interact within and also allows the dancer the ability to dance in and amongst the projections rather than just along side or in front of the projections

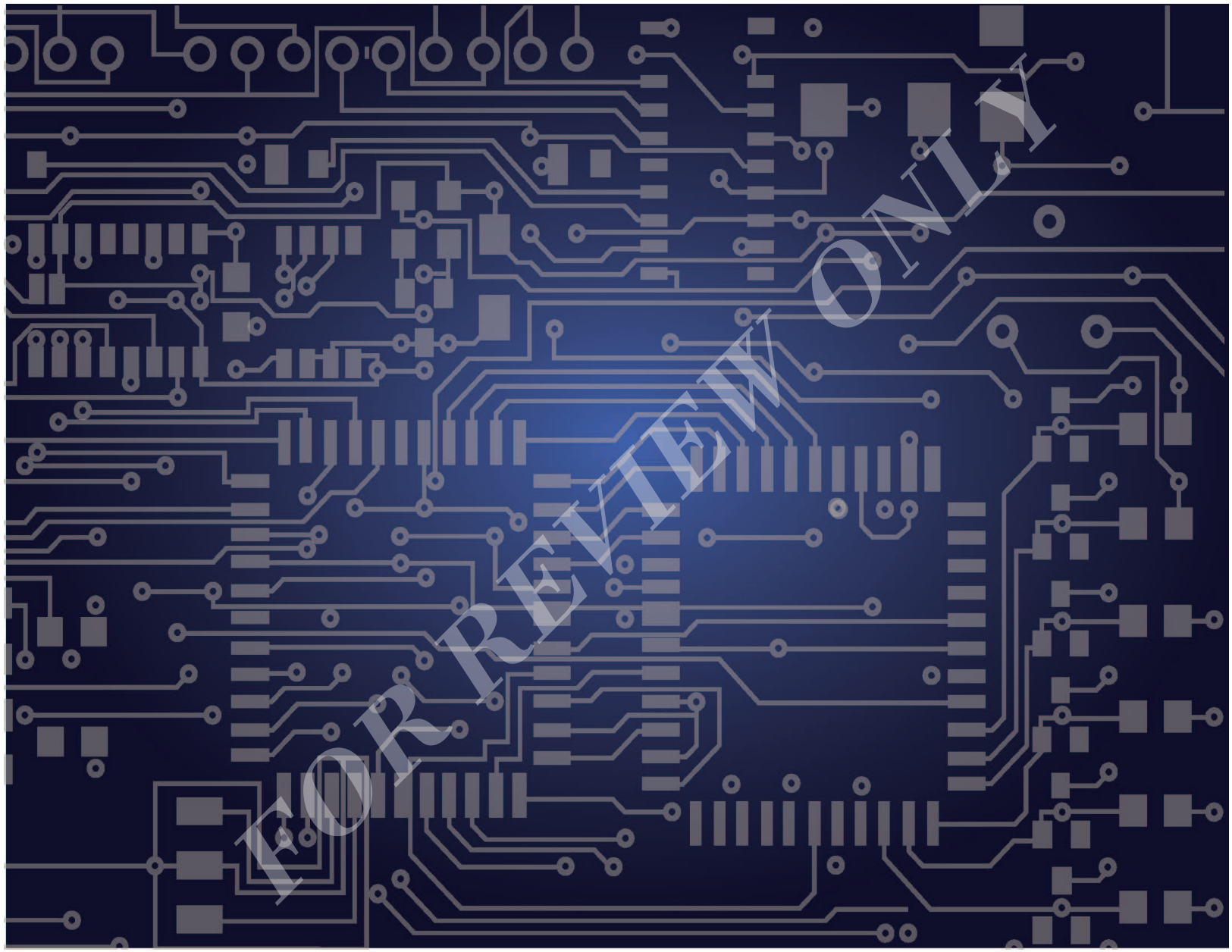
APPENDIX C

The projection panels also have LED lights installed in and around them. These lights help to create an immersive performance space. The lights are controlled through the use of a relay system that interfaces with MaxMSP through an Arduino microcontroller. For T*ransient Delete* I am using the Adruino MEGA 2560 chip to bridge the gap (with the assistance of the software Fermata and Maxuino) between MaxMSP and an 8-channel 120v relay system that I built for controlling 8-chanels of LED lights connected to the panels. These lights are controlled by Max and synced to various elements within the piece. Below is a diagram illustrating the lighting relay system. These lights combined with the projections mapped onto the mesh panels create a bright immersive environment for the dancer and vocal performers to interact with each other on the stage. For more information about the LED lighting system please contact he composer at:

benjamin@paperspaceship.audio

LIGHTING RELAY SYSTEM

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