UNIVERSITY OF CALIFORNIA

Santa Barbara

Part One:

Musical form as an interaction of algorithmic and manual compositional strategies: An analysis of Curtis Roads's *Never*

Part Two:

A Portfolio of Compositions

A supporting document submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy in Music

by

Christopher Jette

Committee in charge:

Professor Clarence Barlow, Chair

Professor Curtis Roads

Professor JoAnn Kuchera-Morin

June 2012

The supporting document of Christopher Jette is approved.

_____
Curtis Roads

_____
JoAnn Kuchera-Morin

_____
Clarence Barlow, Committee Chair

June 2012

Part One:

Musical form as an interaction of algorithmic and manual compositional strategies:

An analysis of Curtis Roads's *Never*

Part Two:

A portfolio of compositions

by

Christopher Jette

ACKNOWLEDGEMENTS

I would like to thank all three of my committee members for their mentorship, guidance, patience and friendship. You each have posed changing and engaging questions and helped me to grow as an artist and person. JoAnn has helped me to justify my intentions as a composer and taught me to push beyond the notes into the larger social context of my work. Curtis has been a steadfast supporter, source of inspiration and an excellent crew aboard any sailing vessel. Clarence has helped me to be honest about my dreams and to identify and transcend boundaries.

VITA OF CHRISTOPHER JETTE

June 2012

EDUCATION

Bachelor of Arts in Music, University of California, Berkeley, May 1994 (summa cum laude)

Master of Arts in Music, University of California, Irvine, June 1996

Doctor of Philosophy in Music, University of California, Santa Barbara, June 2002 (expected)

PROFESSIONAL EMPLOYMENT

2007-2010: Teaching Assistant, Department of Music, University of California, Santa Barbara

Summer 2012: Electronic Music Instructor, Palo Alto Children's Theater

2010-2011: Teaching Associate in Beginning and Intermediate Music Composition, Department of Music, University of California, Santa Barbara

PUBLICATIONS

Jette, Christopher. "Decompartmental: Conversing with Clarence Barlow." The Computer Music Journal. Volume 33, Issue 4 (2009) pp.10-22.
"Methodological Issues in Timbre Research," *Journal of Music Cognition Research*, XIV (1997), 56-68.

Bakht, Salman & Jette, Christopher. "WWW.LOVELYWEATHER.COM: A WEB-BASED INTERACTIVE AUDIO-VISUAL ENVIRONMENT", Proceedings of the International Computer Music Conference, Stony Brook, USA, 2010.

Jette, Christopher. "In Vitro Oink: A Composition for Piano and Wii-Remote", eContact!. Volume 13.2, April 2011.

Jette, Christopher & Kirchoff, Keith. "WII PLAY PIANO: COMPOSING FOR PIANO AND WII-REMOTE", Proceedings of the International Computer Music Conference, Huddersfield, England, 2011.

Jette, Christopher. “In Vitro Oink: A Case Study in Manual and Algorithmic Compositional Approaches”, Proceedings of The 13th Biannual Symposium in Technology and Aesthetics, Connecticut College, March 2012.

AWARDS

Graduate Division Dissertation Fellowship, University California Santa Barbara, 2011

Doctoral Student Travel Grant, University California Santa Barbara, 2011

Humanities & Social Sciences Research Grant, University California Santa Barbara, 2011

Artistic Residency, High Concepts Laboratory, Chicago IL, 2011

Composition selected for performance, Italian Association of Musical Informatics XVII, 2010

Artistic Residency, Kimmel Harding Nelson Center for the Arts, 2009

Interdisciplinary Humanities Center Media Arts Award, University California Santa Barbara , 2009

Corwin Chamber Music Competition 1st Prize, University California Santa Barbara, 2008

Corwin Chamber Electronic Music Competition, University California Santa Barbara, 2007

Piano Department Contemporary Music Competition 1st prize, New England Conservatory, 2005

Merit Award, New England Conservatory, 2003-2005

FIELDS OF STUDY

Major Field: Music Composition

Studies in Music Composition with Professor Clarence Barlow

Studies in Microsound with Professor Curtis Roads

ABSTRACT

Part One:

Musical form as an interaction of algorithmic and manual compositional strategies:

An analysis of Curtis Roads's *Never*

Part Two:

A Portfolio of Compositions

by

Christopher Jette

Part One:

This research will illustrate a musical analysis system where the formal design of a composition is described in terms of the algorithmic and manual compositional strategies. The goal is an analysis that describes the perception of the work from the perspective of discovering algorithmic patterns and manual anomalies. The composition *Never*, by Curtis Roads, is analyzed in detail to exemplify this analysis system and provide a thorough consideration of the work.

Part Two:

A Portfolio of Compositions

A portfolio of compositions, including scores of

- *anOtherTwo* for a chamber ensemble of flute, oboe, bass clarinet, piano, violin, viola and cello

- *Fish Affected by Dreams* for viola, fixed electronics and live processing

- *In Vitro Oink* for piano, wii remote and electronics

A DVD of

- *SoundLines* for dancer and live electronics

A data cd of

- *www.lovelyweather.com* an interactive web-based audio-visual work

A compact disk including

- *ToLEtFony* a stereo fixed electronic work

- *Inter* a stereo fixed electronic work is also included.

All works are available at the authors website www.cj.lovelyweather.com.

TABLE OF CONTENTS

Part Two

LIST OF FIGURES to do

I. Never: An Analysis

"We become aware, I believe, of the past by what we do. What we do throws a light on the past" – John Cage 1964

This document is an analysis of the composition *Never* by composer Curtis Roads. This novel analysis approach contrasts the composer's use of algorithms and direct composition as perceived by the listener. The opening chapter will provide and overview of the work, a list of the objectives of this document, a description of the analysis technique including a graphical version of the analysis of *Never* and a description of the Sweeping Q Granulator, a program that is an integral part of the composition being analyzed. The second, third and fourth chapters will provide a detailed analysis of the three movements of *Never* in support of the authors classification conclusions. This detailed analysis will highlight the algorithms, direct composition as well as many of the salient technical aspects of *Never*.

A. Never: An Overview

The defining sound of *Never* is an impact whose decay energy is sculpted into an elaborate and hyper-real diffusion of energy. Roads carefully sculpts these seemingly impossible reverberant spaces. The exploration of components of the spaces by bringing features to the foreground constitutes a major tenant of the compositional process. The use of granulation and other electronic music techniques, such as

equalization, filtration and spatial positioning are combined through montage in order to render this sonic adventure. Because the impacts and resulting reverberation play such an important role in the syntax of the composition and the impacts are so perceptually salient, they often serve as the main markers for delineating sections of this analysis.

The composition *Never* by Curtis Roads began in 2004 and was completed in 2010. The work uses material from *Now* (2003) which is regranulation of previously granulated textures. The composer states, "Never is the result of a third-order granulation process, being a regranulation of Now, which was itself a regranulation of Volt air, part III (2003). The granulation process was, however, merely a starting point for composition. I then edited the granulated textures in detail over a long period to make the finished work" (Roads, 2010). This description provides the listener with a basic understanding of the material that is used in constructing the piece. This analysis will explore the boundaries between the algorithms such as granulation and the manual interventions on the part of the composer.

The reuse of material pervades this work on an even deeper level, with the initial regranulations being extended and recycled through further processing. The composer's notes state, "Never is not only the product of recycling of pre-existing material, it is also to a large extent made out of replications of parts of itself. That is, in building a basic skeleton for all three movements I used up all the original granular material. However, it was obvious that I would need more sound material to complete the piece. Thus I began to extract fragments from the skeleton–both small

and large–to create new sounds by means of various transformations. The final work is replete with internal redundancies, replications of material rearranged so as not to be literal repetitions" (9). The variation of and reuse of material is a time honored compositional tradition and with the use of analog and digital computation devices the techniques can be formalized as algorithms. Using algorithms and direct manual composition to refine and rework material, a narrow palette of source material emerges. This material, developed from a heterogeneous source, helps to unify the sound world. The detailed reworking and exploration of the latent sonic potentials of each sound accounts for the rich diversity. The unique morphology and sonic characteristic of each sound shapes the output and the formal character of each movement.

The tools that the electronic composer employs inevitably impact the final sound of the work. In the case of composing *Never* Roads employed ubiquitous electronic music tools and a specialized tool. The digital audio workstation Pro Tools serves as the composer's canvas for combining and mixing the sound fragments into a completed composition. In the DAW, mixing and montage techniques are used to unify sounds and construct an evolving sonic form that this analysis will dissect. In order to work with the sounds on a sample level, manually cutting, pasting and arranging micro and meso structures, the Peak audio editor is used. Peak also offers a platform for implementing convolution reverb, an important part of this composition. *Never* seldom uses exclusively one reverberant tail and the mixing of multiple tails into one conglomerate sound occurs in Pro Tools. The processing of each sound and

the stereo channels with an equalizer plays an important role in *Never*. Roads employed the Millenia Media TD-1 analog equalizer to shape *Never*. The composer notes "I also used tones from an analog sine wave generator (part 2) and digital synthesizers (part 1)" (9). At the core of many compositions of Roads is the use of granular synthesis. For *Never,* the Sweeping Q Granulator is used to create unique granular streams. This software and the unique controls that it provides the composer with will be addressed in detail in a later section.

In each movement Roads leverages different material and granulation strategies thereby promoting micro and meso sonic characteristics to macro design components. This approach provides the composer with unmatched control, as Risset notes in speaking of granular strategies, "By bridging gaps between traditionally disconnected spheres like material and structure, or vocabulary and grammar, informatics creates a continuum between microstructure and macro- structure. It is no longer necessary to maintain traditional distinctions between an area exclusive to sound production and another devoted to structural manipulation on a larger temporal level. The choice of granulation, or of the fragmenting of sound elements, is a way of avoiding mishaps on a slippery continuum: it permits the sorting of elements within a scale while it allows individual elements to be grasped. The formal concern extends right into the microstructure, lodging itself within the sound grain." (7). The control that Risset notes a composer can exhibit over elements, on the micro and macro scale is leveraged in *Never* to sculpt highly refined spectral shapes. The

use of a filter in the granulation process, as enabled by the Sweeping Q Granulator, provides this control.

Each movement has a different profile that is achieved by a unique emphasis in the temporal, spectral and spatial planes. The first movement is filled with long spacious reverberation tails that are contrasted by dense eruptions of impulse-like granular streams and tight rhythmic figures. The second movement is a driving stream of material where the composer shifts both fluidly and abruptly between granulation strategies, moving elements of the sonic landscape in and out of auditory focus and across the stereo field. The concluding movement marries earlier compositional strategies and posits the joining of material reminiscent of earlier movements, here sonically brought together in increasingly impossible architectural spaces. Throughout this work the unique and intuitive manual operations of the composer are woven in counterpoint with formalized electronic music algorithms. Discovering and following these threads reveals some of the lineage of how the inimitable sound of *Never* came to be.

B. Document Objectives

This document serves two purposes, an exemplification of an analysis technique and an in depth analysis of *Never.* The analysis technique contrasts algorithmic and manual compositional approaches as elements of the formal design. The analyst is responsible for diving the work into sections and then reporting that the section is predominantly algorithmic or manual. The verbose description of each section in the chapters two through four is the author's supporting evidence of a judgment made

one way or the other. While this analysis technique is presented exclusively in this document, it could be used in conjunction with other analytical methods.

Electronic music is a hybrid discipline, with roots in classical and avant-garde musical practices, computer science, mathematics, psychoacoustics and philosophy among others. Analysis techniques from these various fields have been adapted in the analysis of electronic music. In 1998 Lelio Camilleri and Denis Smalley traced the history of analysis techniques, beginning with the work of Pierre Schaeffer and related work by John Dack and Michel Chion and later Francois Delande, Andrew Lewis, Stephane Roy and the co-author Dennis Smalley. The emphasis in their article is tracing a line from the Schaefferian concept of the sound object to Smalleys notion of spectro morphology. Smalleys approach has been a significant contribution, developing "the concepts and terminology of spectromorphology as tools for describing and analysing listening experience. The two parts of the term refer to the interaction between sound spectra (spectro-) and the ways they change and are shape through time (-morphology)." (11). In 2005 Laura Zattra reported on the evolution in the field of analysis, casting analysis into categories of analysis by listening, spectrograms, multimedia representations, genetic analysis and computational analysis. The analysis technique described in this paper can be located in Zattras classification system as analysis drawing from analysis by listening and spectrograms (13). The novel contribution is a classification system based on the listeners perception of the compositional process.

Notions of analysis must adapt to the new and enlarging scope of practice.

Electronic music provides the listener with a unchanging sonic document that the listener can study in great depth. Alessandro Giovanucci points out "in my opinion, scant attention has been given to a rather important aspect: intimacy with sound." (5). This intimacy enables the listener to perform analysis through the act of listening. With listening in the foreground and the document no longer occupying the paper, the analyst must discover means of noting and communicating discoveries. The goal of this analysis is to base observations in sonic structures observable through listening. The electronic music literature provides many descriptions of patterns formalized as algorithms. This analysis inherently ignores the direct compositional input of the composer. A comment by Miranda notes, "How can software aid composers in making aesthetic choices during the compositional process? And, how do composers make aesthetic choices when composing music with the aid of the computer?" (6) This statement caused the author to reflect on a discussion with the composer Curtis Roads where he emphasized the role of the caprice in the compositional process of electronic music. From this background an approach to analysis began to emerge.

A unique value of this type of analysis is that the formal description is inherently removed from the language of the material, enabling a generalization of compositional strategy. This generalized higher order description allows for clear comparisons across works where the analysis is still located in unique language of the work. The goal of this document is a verbose illustration of this analysis, with the

expectation that later analyses will be more concise as the author refines the technique.

Reading through the General Descriptions of each section will provide the reader with an overview of the work. The Formal Design analysis provides the reader with a near blow-by-blow description of the techniques and materials used, in support of the author's conclusion as to the nature of each section. While the description is detailed, it is not an account of every detail, rather the author attempts to highlight the elements that support why each section is labeled as dominantly Manual or Algorithmic. Each moment of a composition is a combination of manual and algorithmic procedures, this analysis attempts to highlight which element is more salient in each section, tracing how these compositional aspects shape the resulting work.

The narrow focus on the composition *Never* reflects the desire of the author to consider deeply the compositional, technical and aesthetic mechanisms of this specific work for three reasons. First, this is a significant work by the composer that exemplifies an artistic and technical mastery of fixed electronic music. Second, *Never* was completed during the author's tenure as a teaching assistant to the composer. The author has heard the work in different forms and enjoyed the privilege of discussing technical and aesthetic details with the composer. Additionally, the composer has graciously provided supporting documents in the form of code for the Sweeping Q Granulator, notes from the compositional phase and in conversation has addressed aspects of the work. This knowledge is inherently

incomplete and not the focus of this investigation, still it does provide a unique insight that informs the analysis of *Never.* Finally, and most importantly, the author was at the premiere of the work on April 29, 2010 in Lotte Lehmann Concert Hall at the University of California in Santa Barbara and was captivated by the work. Three years and hundreds of hours of listening later, the work continues to captivate as new layers of intricacy reveal itself. *Never* has posed many questions for the author and this analysis attempts to reflect and encapsulate some of what the author has learned from this composition.

C. Analysis Technique: Contrasting Algorithmic and Manual Compositional Techniques

This analysis illustrates where algorithms are used to generate material and where human decisions are used to generate material. There is a good deal of overlap and often the division point is faint. The decision to classify a gesture or a portion of a gesture as either algorithmic or manual is ultimately a decision on the part of the author. This decision is a result of detailed listening and familiarity with the tools and the material. The perception of the composition is the ultimate litmus in classification. For instance, there are moments when the composer has used multiple sound files to comprise a single sound. When these can not be segmented in a focused listening to the final piece, they have been classified as a single sound, not a montage, because the montage is not the salient perceptual feature. The point at

which an element ends or a change in paradigm occurs is not always a precise moment in time, hence time points should be understood as regions.

The segmentation and categorization of material into *sections* and *components* is an adaptation of the Gestalt theory classification system that Tenney presents in *Meta-Hodos*. "Clang – to be understood to refer to any sound or sound-configuration which is perceived as a primary unit musical unit. … For the subordinate parts of a clang, I shall continue to use the word *element*" (12). Tenney seeks to abstract the grouping systems of function harmony in a way that encompasses a wider range of material. This is a useful point of departure for this research as the terminology is grounded in perceptual phenomena, but the emphasis in this is on the perception of the compositional strategy. Therefore, a distinct and more generalized terminology has been chosen, where the movement is divided into *sections*, which are comprised of *components*.

This research begins with the supposition that computers enable completely automated composition, yet, there are invariably different levels of manual intervention. In spite of the ability to automate a multitude of the aspects of decision-making, "Most composers, however, are keen on shaping the generation process of composition software according to their aesthetic preferences." (1). In this context, the notion of algorithmic is cast as a formalized procedure that is implemented with a digital or analog tool. Put another way, material is identified as algorithmic when it clearly follows the logic of a given paradigm and there is no singularity or indication that there was intervention on the part of the composer.

The manual compositional method, as perceived in the resulting piece is the moment where anomalies in a predictable unfolding sonic event occur. Tools such as a computer offer the composer a means of formalizing procedures, but not all decisions can or should be formalized. “The dividing-line between composer and automaton should run in such a fashion as to provide the highest degree of insight into musical-syntactic contexts in the form of the program, it being up to the composer to take up the thread - metaphorically speaking - where the program was forced to drop it, in other words: to make the missing decisions which it was not possible to formalize.” (5). The compositional choices of the composer inherently serve to structure a composition, as Koenig points out, “Composition is the application of a grammar which generates the structures of a piece, whether the composer is aware of an explicit grammar or not.” (5).

Music is a process that unfolds in time and sonic space, and the skilled listener can detect what is an anomaly in an unfolding process. This analysis seeks to provide a partial explanation for how a listener hears a work. This is an analysis where the human ability for pattern recognition is leveraged to partition the work into perceptual segments which can be understood as a formal architecture that the listener experiences. The research is inspired by the spectrographic analysis of Robert Cogan, as presented in “New Images of Musical Sound.” While this analysis does not continue the analysis of tone color, the spectrogram as a tool and the notion of “a theory of oppositions” where “ the different sonic morphologies interrelate; and out of these interrelationships emerges a spectral pattern, design, or shape that is an

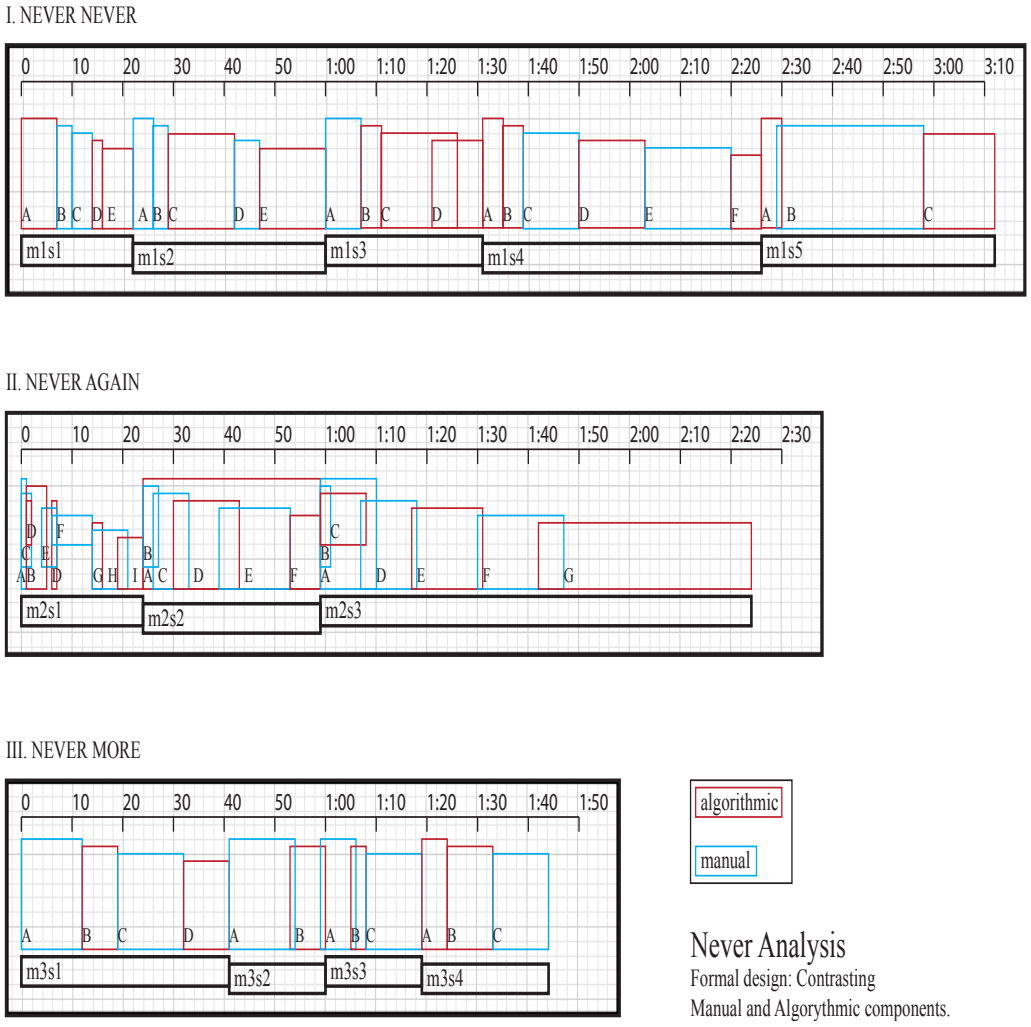
entire musical piece." (3). The morphologies that Cogan is tracing are tone color and herein the morphologies are cast as algorithmic and manual compositional techniques, still the emergence of a sonic design is the a common tenant.

With a composition as detailed as *Never* the temptation to analyze every microsecond is alluring. Preparatory analysis has indeed been extremely detailed, yet this information has been distilled and will be presented in a fashion that highlights the manual and automated components. While many of the parts are sequential, there are also overlapping components. The goal is to provide a comprehensive view of the structure of how the manual and algorithmic strategies are deployed in order to form the piece. The result of this map of segmentations can be understood as a form, a formal design that defines this particular piece in terms of the composer's interaction with the material as perceived by the listener. The result of this illustration is to provide a map for the listener where both the highly formalized tools and the caprice of the composer serve as polarities that delineate the space.

The formal design of *Never* can be summed up in one graph (see Figure 1). Each of the three movements is presented in the same temporal scale. Across the top of each movement time runs left to right and a light grey grid extends from this set of divisions. The red and blue boxes indicate components that have been judged either algorithmic (red) or manual (blue). The horizontal span of these boxes is proportionally relative to their temporal length. The top border of these boxes descends from left to right, within the confines of one section. The lower boundary of some boxes has been raised so it does not interfere with the letter that defines a

different component. Each movement has been divided into sections, *Never Never* has five sections, *Never Again* has three and *Never More* has four sections. The black boxes along the bottom indicate the length of each section and serve to group the smaller components. The vertical displacement of the section boxes is strictly a visual cue for ease length recognition. Inside each box a label is applied that indicates the Movement and Section, hence m2s3 is movement two section three. Extending this labeling convention, the components are appended to the movement/section label; hence m3s2_C is movement three, section two, component C. This convention will populate the later text of this document. Figure 1 is an analysis of *Never* displayed in a graphical format. The second, third and fourth chapter will detail each of the three movements of the work and provide support for the author's categorization of each section.

Figure 1. The formal design of *Never*.



D. The Sweeping Q Granulator

Granulation offers the composer access to sound at the atomic level. This high degree of precision can be combined with other synthesis techniques to enable novel explorations of sonic material. Roads has experimented with many different ways of extending granular synthesis which are detailed in *Microsound* (8). In *Never* the band pass filter is used in conjunction with granular synthesis to create filtered granular streams. Roads states, "The granulation processor was my Sweeping Q Granulator program developed in 2002 and 2003" (9).

The Sweeping Q Granulator (sQg) is an extension of an earlier synthesis technique, the Constant Q Granulator (cQg), which Roads developed in the nineties. The graphical user interface for the cQg allows the user to control the granular and filter parameters with sliders. The cQg uses a band pass filter on each grain that is scheduled. The sQg uses this same granulation architecture as the cQg, with the ability to add a sweeping motion to the center frequency of the band pass filter. The sQg user is able to control the amount of sweeping motion and could therefore emulate the cQg. Because the sQg encompasses the cQg functionality and it is the granulator used in the creation of *Never*, the following analysis will examine the sQg.

The sQg program is written in SuperCollider 1, which operates on the Macintosh OS 9.2. The code can be broken into five steps and the user controls the granular stream through a series of sliders. The sliders offer the user control over higher order granular and filter parameters in four categories; pitch, time, grain and filter. The

sQg creates a continuous stream of grains once it has been initialized and with each update of the slider, the user influences the grain stream. The sQg provides the user with thirteen sliders with which to shape the grain stream. Figure 2 is a screen shot of the graphical user interface (GUI), with sliders on the left hand side and labels on the right hand side. Afterward, a description of the functionality of the parameters is provided (see Figure 3).

Figure 2. The graphical user interface for the Sweeping Q Granulator.

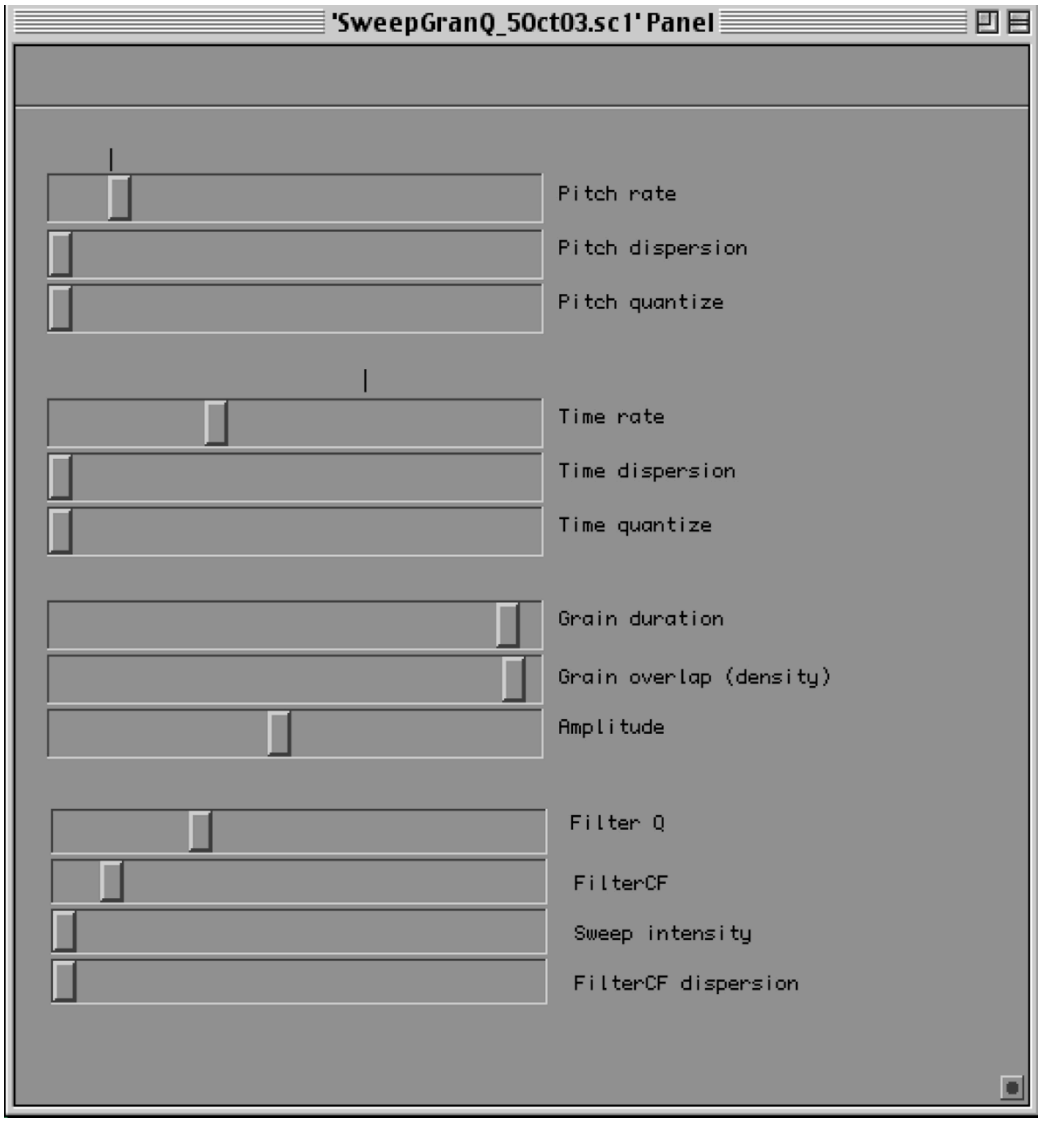


Figure 3. The thirteen sliders of the Sweeping Q Granulator explained.

PARAMETER	DESCRIPTION
Pitch Rate	The rate at which pitch of the granular stream is altered. Note: pitch is different than center frequency of the band pass filter, as pitch is a grain argument.
Pitch Dispersion	The amount of random variation in pitch rate changes.
Pitch Quantize	The degree to which the pitch changes are restricted to a prescribed degree of values, or the amount to which they are rounded.
Time Rate	The rate at which the readhead advances through the buffer being granulated. The available range is -5 to +4 and normal is 2.
Time Dispersion	Amount of random variation that is included in the Time Rate.
Time Quantize	The degree of rounding temporal values.
Grain Duration	The length of each grain in the granular stream. Grain Lengths are typically between 20 and 200 microseconds (Roads Microsound)
Grain Overlap	The amount of overlap from one grain to the next in the granular stream.
Amplitude	The loudness of the granular stream. (note, the sQg amplifies low frequency grains in order to compensate for their low perceivable value)
Filter Q	The center frequency of the filter divided by the bandwidth, with a range of 0.1 to 20. When bw = 0.1 of CF, then Q = 10 When bw = 1 of CF, then Q = 1
FilterCF	The frequency over which the band pass filter centered.
Sweep Intensity	The amount of sweeping action applied to the center frequency of the filter.
FilterCF Dispersion	The amount of random deviation applied to the sweeping of the center frequency of the filter.

The core audio routine is a loop where each iteration produces a new grain. The code can be deconstructed into five main steps: variable declaration, instrument definition and loading, a DSP loop, next grain planning and grain scheduling. The variables that are declared allocate memory space for the audio samples. SuperCollider 1 requires that the programmer declare the audio buffer that will be granulated, the default audio output and define the table that will be used for oscillator controlling the sweeping. After these are initialized the instrument function is called and the declaration variables of that instrument are read. The instrument definition reads the initialization variables for the sliders, or with later iterations, the current updated values and reports those to the instrument code. The instrument code has six steps

1. Left or Right channel is randomly chosen.
2. The time parameters are collected and the time point for the next grain is computed.
3. Pitch parameters are collected and the pitch of the next grain is computed. The `Acpgrain` unit generator (peak centered grain) has a frequency input, which uses this value.
4. The center frequency, Q, bandwidth and deviation are collected and used to compute the center frequency and bandwidth for the band pass filter, which uses the `Abpf` unit generator.

5. The filter sweeping function is defined and applied to the center frequency of the band pass filter. The `Koscil` unit generator is used to generate sliding motion away from the center frequency.
6. The grain is generated.

After the instrument has been used to complete these six steps and compute the necessary values a DSP loop is invoked, which filters the grain. Here the computed filter values are used for the currently scheduled grain.

The next task is to compute time position for the next grain. The next grain is a function of the duration per the Grain Rate slider and the amount of overlap per the Grain Overlap slider. Finally, the scheduler is called and the next grain is scheduled. This process is then repeated continuously until the program is halted. The output of this program is rendered in real time and can be recorded to an audio file.

II. Movement One: Never Never

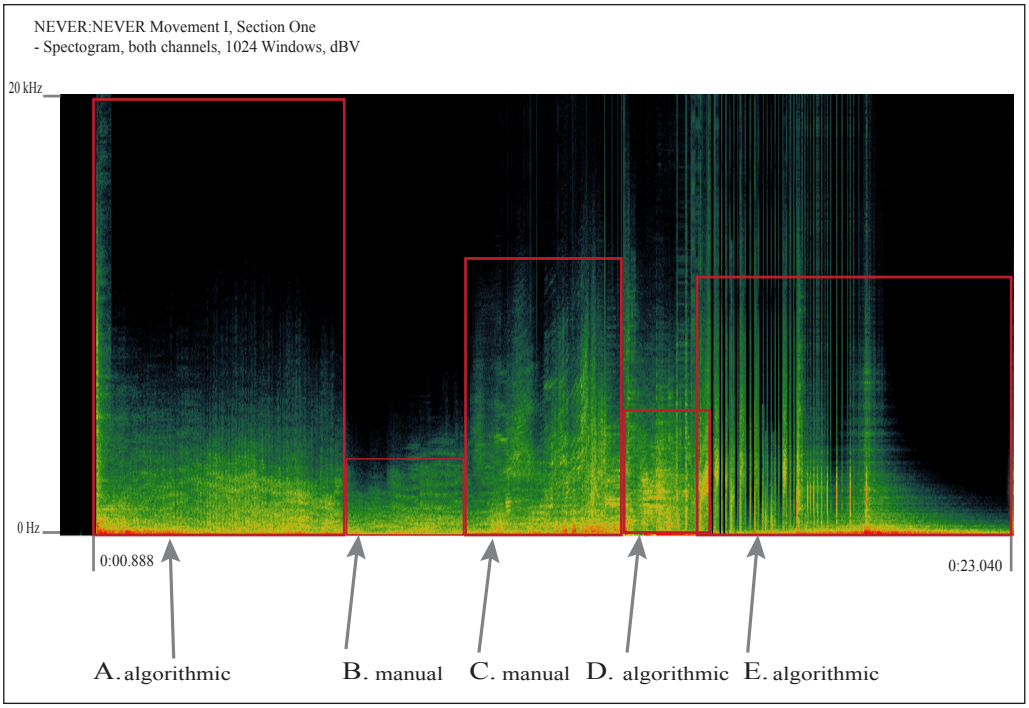
The first movement emphasizes temporal extremes, with short impulses and long expansive resonant spaces. There are interpolations between these extremes, but the majority of musical gestures are articulated within these two temporal areas. The impact followed by a long resonance acts as a point of departure and arrival at both the beginning and ending of gestures throughout this movement. There are two categories of resonance that populate this movement, those where the composer extends the resonance through the addition of material, such as the opening, and those that are allowed to naturally decay, such as the ending of the movement. In contrast to these long decays are short impulse-like grains used to present tightly constructed rhythmic patterns. Each instance of the impulse-like grains has a different character because of the grain density, spectral profile and periodicity or aperiodicity of the stream. Bridging these two extremes are clouds of granular material that extend reverberant resonances, create sweeping movements toward and away from impacts, punctuate and highlight moments of percussive patterns, add a textural counterpoint and propel/decelerate the pace of the work. As will be illustrated, this movement has a large amount of juxtaposed granulations one after another, changing the character of the underlying material by means of granulation. An important feature of this movement is the various ways the bass line is presented. There are short punctuations that reinforce rhythmic figures and long held tones that act as a pedal to otherwise frenzied movement.

A. Section One (of movement one)

1. General Overview (see Figure 4.)

This opening section concisely presents the different types of material that will populate the first movement. The movement opens with an impact, whose resonance is extended through the addition of other granular material. This extension of the resonance is achieved by layering an undulating sound that finishes with an upward sweeping gesture, moving the rhythmic density and spectral trajectory upward toward a series of percussive grains. These grains are underpinned with longer, more infrequent grains that create a secondary rhythmic stream on a slower timescale. Additionally there is a low amplitude and low frequency reverse decay that gradually fades in and creates motion toward the section ending impact and resonance.

Figure 4. m1s1



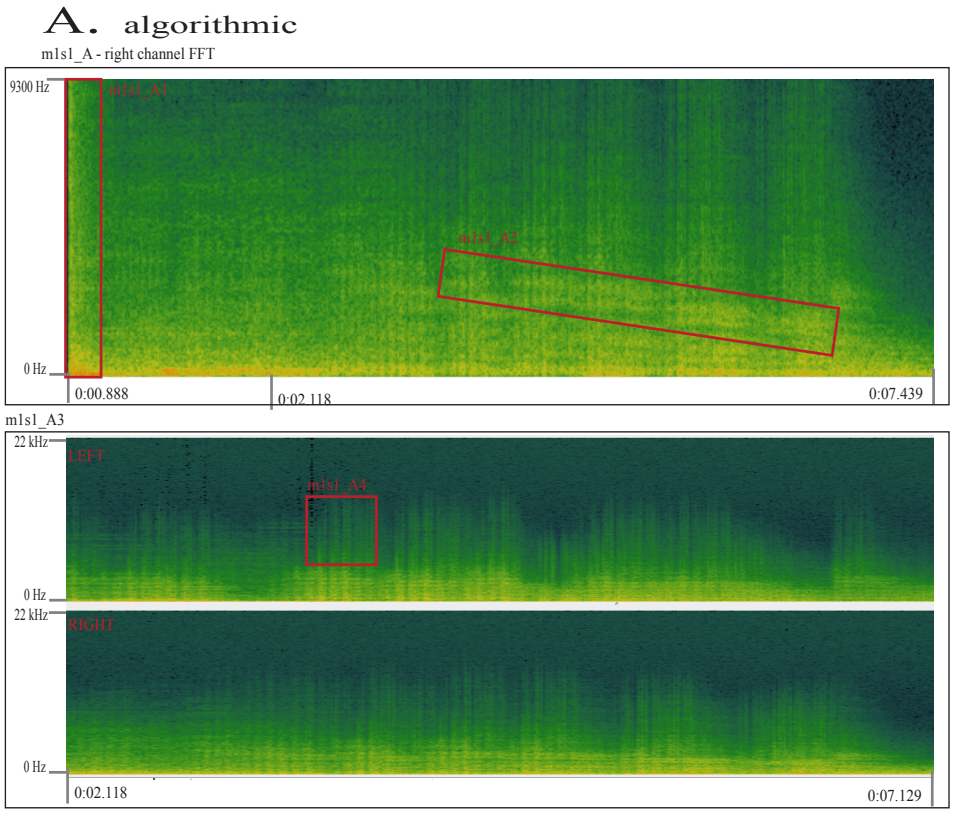
2. Formal Design

A. Algorithmic (see Figure 5.)

The movement begins with an impact that abruptly dissolves into a granulation (m1s1_A1). The algorithm that defines this granulation progressively decreases the playback speed of the grains and increases the length of the window. This creates a downward pitch trajectory that is reinforced by the use of a filter. Section m1s1_A2 encapsulates a section where the downward motion of the filter is in the foreground.

Two other aspects of this granulation propel the motion forward. First, the panning continually shifts back and forth, creating a flowing sound mass that shifts back and forth, emphasizing different components of the sound in each channel (m1s1_A3). The panning is likely the result of a hard left and right randomization on the part of the granulator that was enhanced and refined by the composer during the compositional phase. Second, the use of a grain rate, between 5–8 Hz, creates a flutter effect in the audio material. The flutter can be observed visually in the pillars that extend upwards in m1s1_A4.

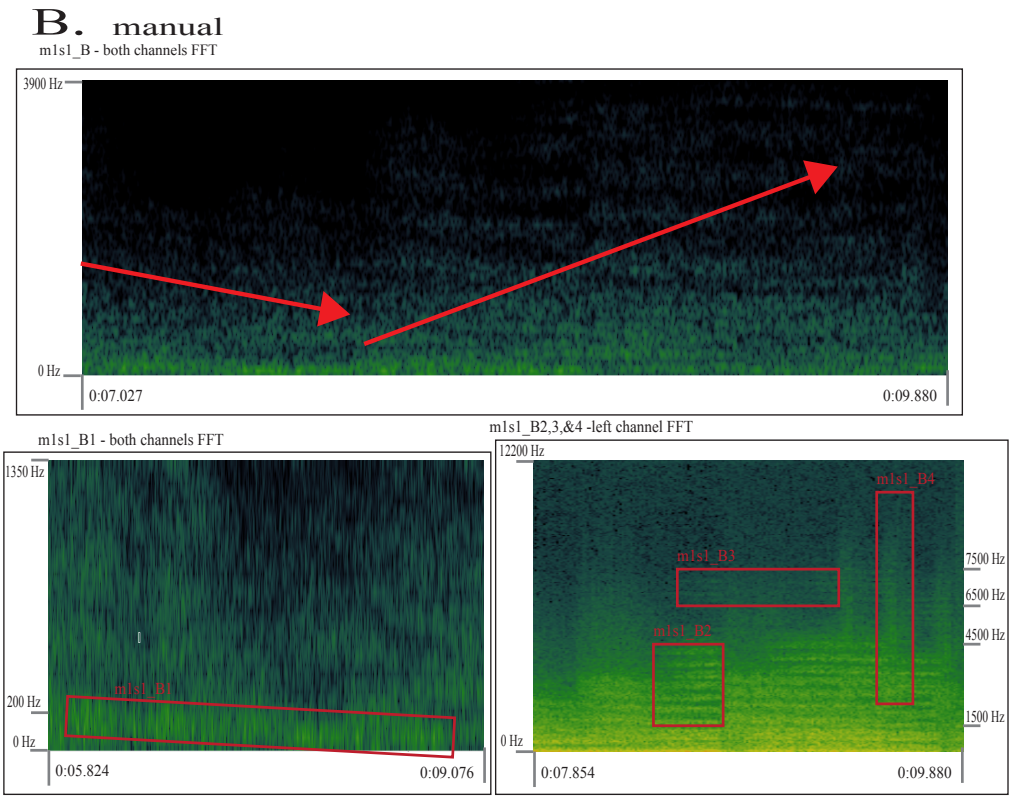
Figure 5. m1s1_A



B. Manual (see Figure 6.)

This entire section resolves the downward motion of the opening and uses echoes of the higher material from m1s1_A to begin an ascent in pitch. Arrows highlight the descent and ascent of this section in m1s1_B. The 0 to 200 Hz range is the most salient component of the first portion of this section. The continuation of the slowing grain playback rate and longer windowing of m1s1_A culminates in low frequency material of m1s1_B and this can be seen in the box m1s1_B1 that traces the descent through the end of m1s1_A into m2s1_B. The low material established, bands of mid frequency material are manually layered on in the second half of this section. First bands between 1500 and 4500 Hz emerge (m1s1_B2) and then greater intensity between 6500 and 7500 Hz is evident (m2s1_B3). Lightly echoing the high material of m1s1_A, groupings of transient grains are also employed.

Figure 6. m1s1_B

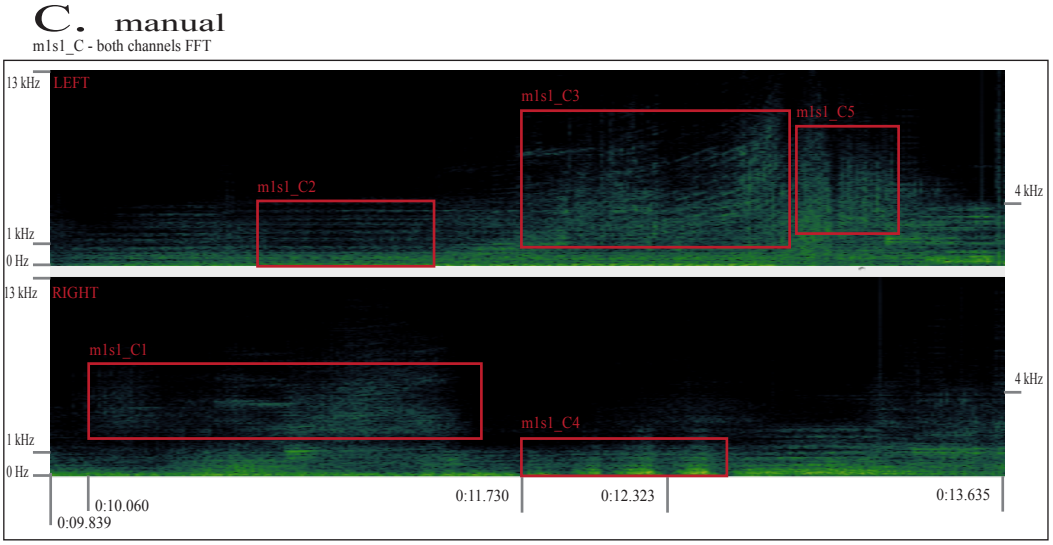


C. Manual (see Figure 7.)

This section moves the spectral frequency focus upward toward the impact that begins a percussive section. This section is the final component of the continuous tapestry of sound that was begun with the opening. The composer has woven together multiple streams of material to create a transition from continuous sounds to percussive material. Separating out the channels reveals some of the multiple layers. The opening of the higher spectral space is first accomplished in the right channel with a cloud of granulation material brought in at 0:10.060 (m1s1_C1). In contrast

the left channel remains in the lower frequency range and the use of stuttering repeated grains prepares the listener for the rhythmic nature of the next section (m1s1_C2). The roles of the channel are reversed in the second half of this section. The left channel continues the ascending cloud of m1s1_A1 around 0:11.730 and the upward sweep of the filter is visible at 0:12.323 (m1s1_C3). Meanwhile, the right channel is used for more salient percussive material in the low frequency range (m1s1_C4). All of this upward motion is combined with a percussive attack and followed by several stuttering grains (m1s1_C5) to create a mass of sound between 0 and 4000 Hz, in contrast to the 0 to 1000 Hz sustained mass that began the section.

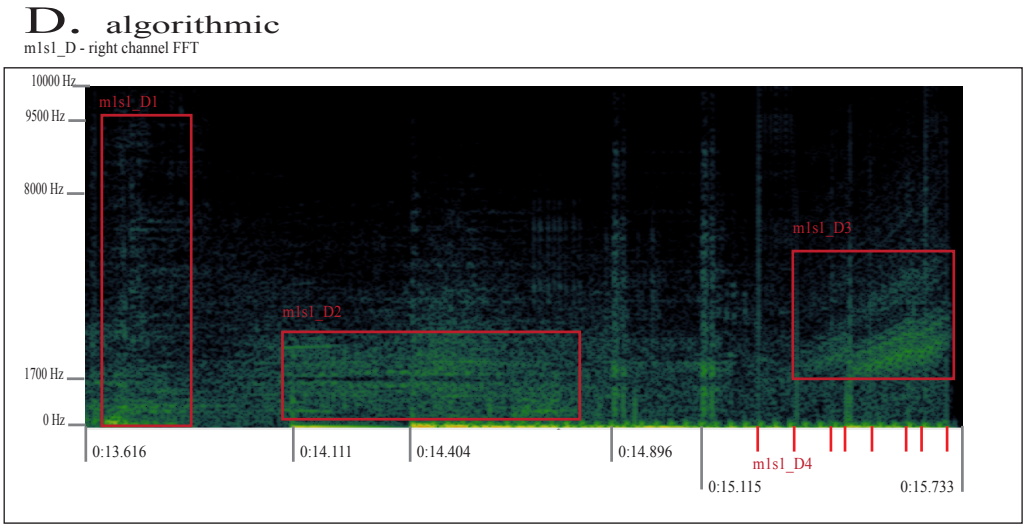
Figure 7. m1s1_C



D. Algorithmic (see Figure 8.)

Sharp percussive attacks arrest the forward movement, giving the listener the impression that they have collided with a sound mass. The first of these employs a granular strategy that uses temporal jitter in placing the read head for the material that will be granulated. This read head randomness creates a degree of smear in the initial impact that combines with relatively diffuse spectral energy to form a shimmering mass, similar to a cymbal (m1s1_D1). The second and third percussion hits, at 0:14.111 and 0:14.404, share a granular cloud reflected around a silent band at 1700 Hz (m1s1_D2). This granular band unifies the two bass hits. Following the bass hits there are a series of brief, high amplitude, wide spectral range percussive hits. The second bass hit at 0:14.404 has a brief attack that extends to 8000 Hz, similar to the percussive hits that will follow. Repeated grains at 0:14.896 and 0:15.115 use a similar material, grain length and window type to create percussive hits with nearly identical spectra. The section concludes with an upward sweeping gesture that uses a repeated grain whose formant is progressively shifted upward with each repeat (m1s1_D3). Layered above this sweep are a series of aperiodic percussive grains whose grain rate increases (m1s1_D4).

Figure 8. m1s1_D

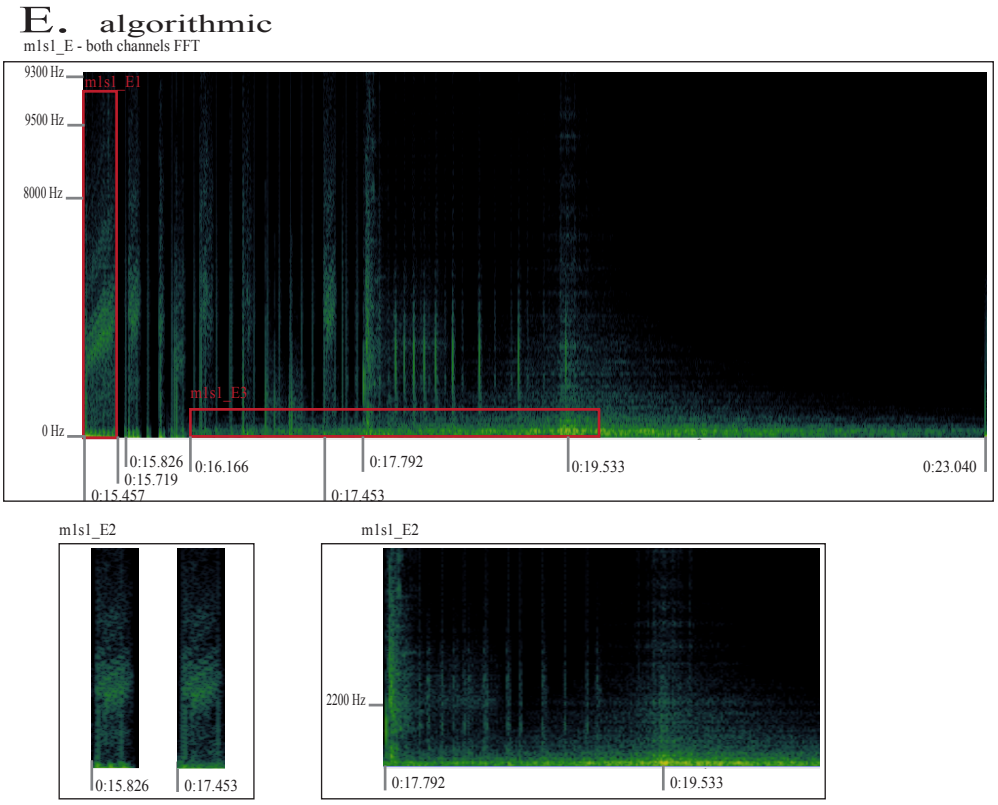


E. Algorithmic (see Figure 9.)

The final portion of the first section uses two algorithms for source material for a series of short percussive bursts, not unlike a drum solo. The first of the two algorithms is the ascending sweep that ended m1s1_D, between 0:15.457 and 0:15.719 (m1s1_E1). Two percussive bursts, 0:15.826 and 0:17.453, illustrate the use of the m1s1_E1 sweeping ascent material (m1s1_E2). The second algorithm that provides material for the percussive grains is a snare like sound with a long reverb tail, present at 0:19.533. This second sound source is visible in the left channel with

an attack point at 0:17.792 extending a band at 2200 Hz to the apex at 0:19.533 (m1s1_E2). This apex also serves as the point for the beginning of the natural decay of the highly reverberated attack. Beginning at 0:16.166 a reversed reverb decay underpins the percussive attacks until the apex at 0:19.533 (m1s1_E3). This section presents the first silences in the piece, between 0:15.719 and 0:16.166 and the solitary decay of a single attack in a large reverberant space between 0:19.533 and 0:23.040.

Figure 9. m1s1_E

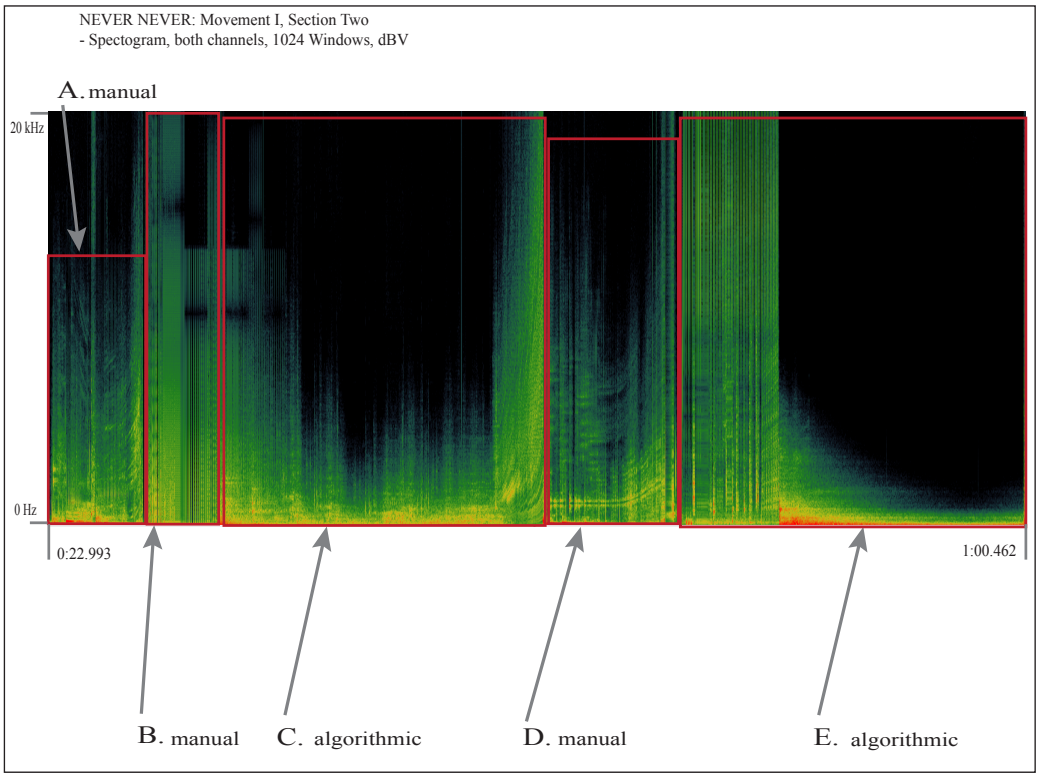


B. Section Two (of movement one)

1. General Overview (see Figure 10.)

A series of brief swaths of material are juxtaposed to begin this section, the final upward sweeping gesture leads to a rapid succession of impulse-like grains. These grains are organized into a periodic stream and a second layer is introduced, a multistage impact, akin to a metallic object falling into a reverberant space sending multiple reports back to the listener. The decay of this impact is extended with material that is similar to that used to extend the opening impact of the movement. The seemingly indefinite acoustic tumbling about is disrupted by a rapid ascent, executed with repeated grains, ending in a dry attack. A series of bass thuds underpin mid frequency attacks and fluttering sonic masses that eventually are organized into a continuous sound that modestly ascends. The ascent is achieved through the use of a very slowly moving play head that seems to create the repetition of a single grain. This is followed by a series of juxtapositions of repeated grains, on a timescale similar to that of the opening of this section, that is punctuated by high amplitude isolated attacks presented on a slower timescale. This material ends with a brief ascent to a single grain that actuates a long uninterrupted reverberator.

Figure 10. m1s2



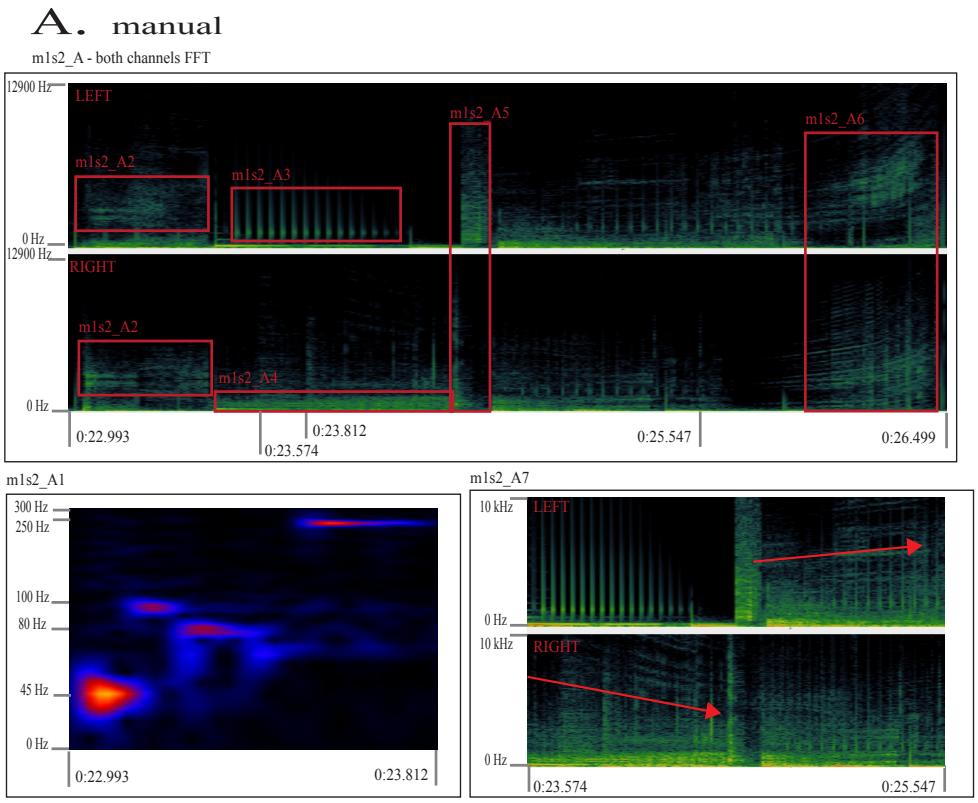
2. Formal Design

A. Manual (see Figure 11.)

In the same three and a half second span that the reverberation ending m1s1 occupied, there is an unprecedented density of differing material combined through collage to open m1s2. There is now an increased degree of autonomy of the stereo channels with sounds panned hard left or right and each channel employing a unique filter. The section begins with a series of bass hits (m1s2_A1) and a 1000 to 4000 Hz

sound mass (m1s1_A2). The final 250 Hz bass hit resonates in the left channel below a decaying repeated impulse (m1s2_A3) while the right channel mix has a series of percussion sounding articulations mixed perceptually below a sound mass that increases in amplitude (m1s2_A4). The sound masses m1s2_A2 and m1s2_A4 are narrowly banded noise that carry the motion forward in contrast to the percussive articulations. These intricately combined layers are interrupted by a large percussive attack, the first portion in the right channel and the remaining in the left (m1s2_A5). Where the previous material extends spectrally upward to 7500 Hz, these attacks reach 10 kHz. The low frequency material of m1s2_A4 continues after this interruption, as do percussive impulses. The final portion of this intricate array of material will be an upward sweeping gesture (m1s2_A6). The preparation for this gesture has been a low amplitude downward sweep in the right channel and upward sweep in the right (m1s2_A7).

Figure 11. m1s2_A

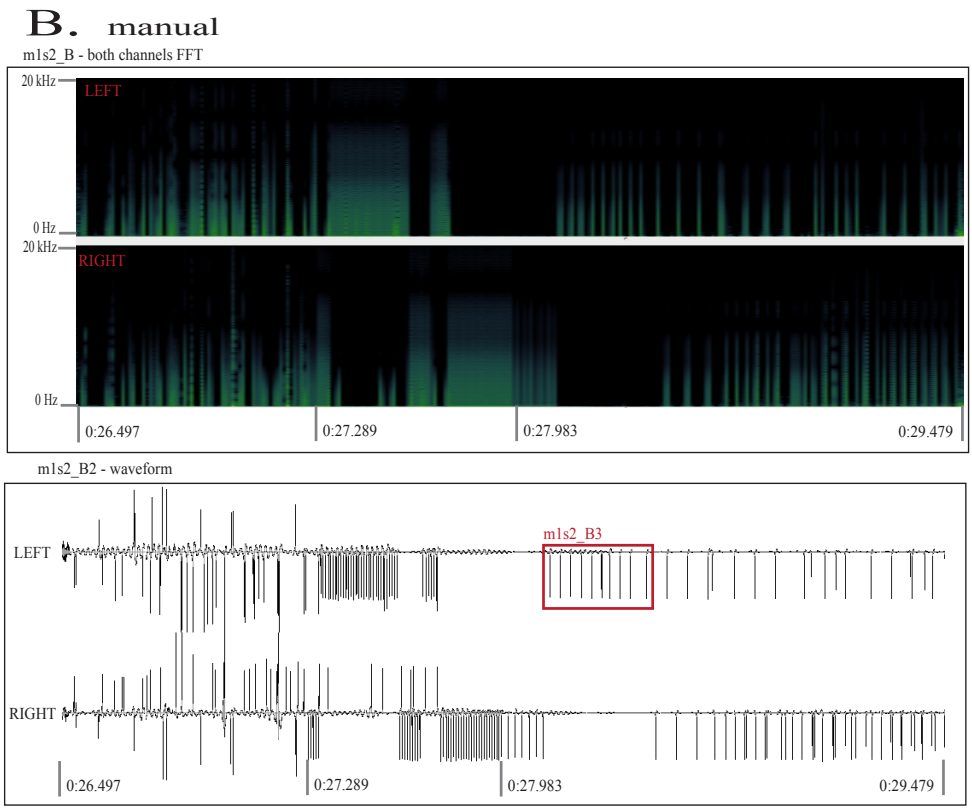


B. Manual (see Figure 12.)

Just as the swaths of sonic material of the previous section were painstakingly crafted and combined, the impulse-like grains of this section are meticulously organized. The stark isolated grains are a unique feature of this movement and the independence of channels and the tight groupings that transcend the rhythm/pitch boundary distinguish this group. Three loose groupings of the impulse-like grains are present in this section. First, a series of aperiodic variable amplitude collection of grains at an average rate of 15 milliseconds create a varied texture of independently

perceivable grains. This is followed at 0:27.289 with a far more periodic stream of grains of nearly equal amplitude every 7 milliseconds. It is important to note that these grains perceptually fuse into a pitched sound and the resulting blocks of sound are panned hard left and right. Additionally, while these grains are far more regular, there are still irregularities that are the result of a conscious manual decision to increase and decrease the grain rate, as well as inject anomalies into the stream. Finally, at 0:27.983 larger silences between impulses are reintroduced into the stream. The impulses directly after 0:27.983 exhibit 0.025 seconds between pulses (m2s2_A3). The grain rate and the variety of grains increases as time passes, so that the grain variety at the end and beginning of m1s2_B are similar.

Figure 12. m1s2_B

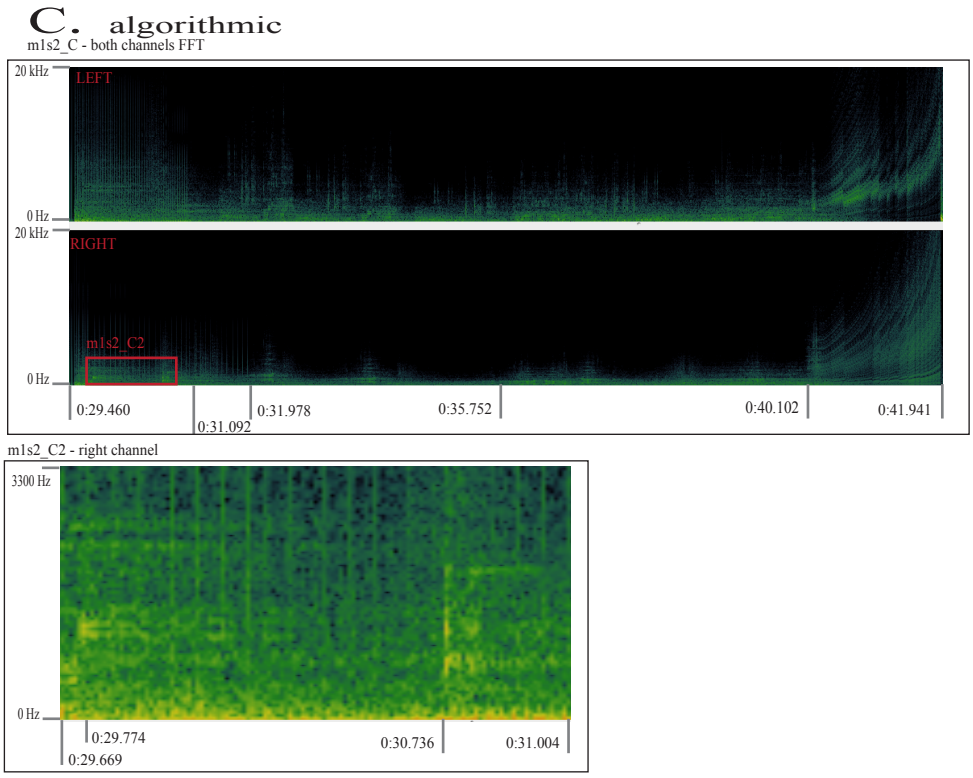


C. Algorithmic (see Figure 13.)

The impulse-like grains continue into this next section as the resonance from the impact that delineates the beginning is established as the main algorithm of the section. The periodic impulse-like grains are gradually faded out by 0:31.092 in the left channel and 0:31.978 in the right. These two streams are likely the same material temporally compressed in the left channel and expanded in the right and each with a different equalization strategy. The impact that initiates the section is strongest in the left channel, but very quickly afterward, at 0:29.774 and again at 0:30.736 there are

echoes in the right channel that differentiate the reverberant resonance of this impact. These lower amplitude impacts embedded within the resonance give the impression of an object tumbling through a reverberant space and colliding with boundaries, thereby sending out uniquely filtered sonic reports of its progress. The reverberation follows a logical decrease in amplitude until 0:35.752 where an increase in amplitude and the addition of higher frequency material gives the impression that the hypothetical object is moving closer to the listeners vantage point. This trend continues until the third and final algorithm of the section is established with a mid level impact at 0:40.102. Instead of decay, there is an ascending sweep of repeated grains organized into repeated blocks of material. The channels each have a unique equalization character, as is common in this movement, and the overlapped blocks of upward sweeping material get increasingly shorter creating drive to the end of the section.

Figure 13. m1s2_C

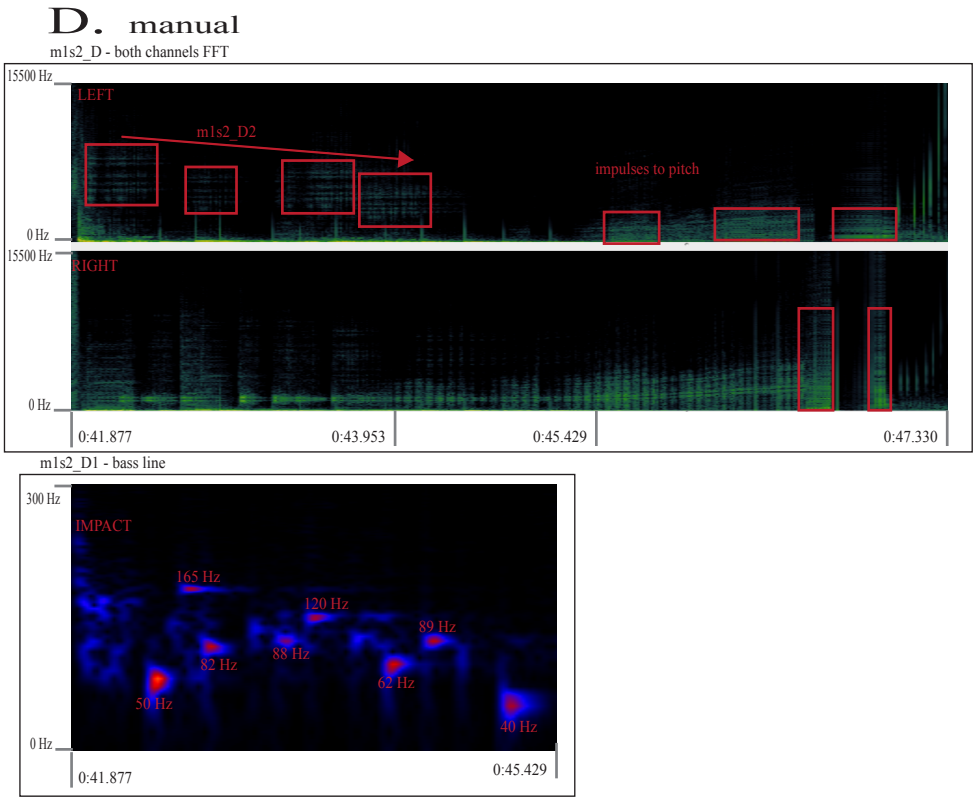


D. Manual (see Figure 14.)

Similar to m1s2_B, this section features an intricate manual collage of material that efficiently transcends a large spectral range. An initial impact gives way to a rapid bass line, whose aperiodic rhythm occurs on the note level timescale (m1s2_D1). Above these notes are two mid frequency materials. The left channel has four constant pitch granular masses, moving in a downward trajectory similar to the bass line, but on a slower time scale. The right channel has a resonant band between 1000 and 1500 Hz mirrored around 1200 Hz. This band is used for a series of events that are articulated at a faster rate than the bass part. At 0:43.953 a

fluttering granulation rate is added to this material and seemingly continuous material is faded in and out as the band begins to ascend upward. At 0:45.429, as the right channel begins to ascend, the left channel is used to present a compressed stream of impulses that fuse into a pitched sound mass. This material is moved back and forth across the channels as the pitch ascends until a series of narrowly frequency banded impulse-like grains, with 0.050 second long gaps between them, ascend upward finishing the section.

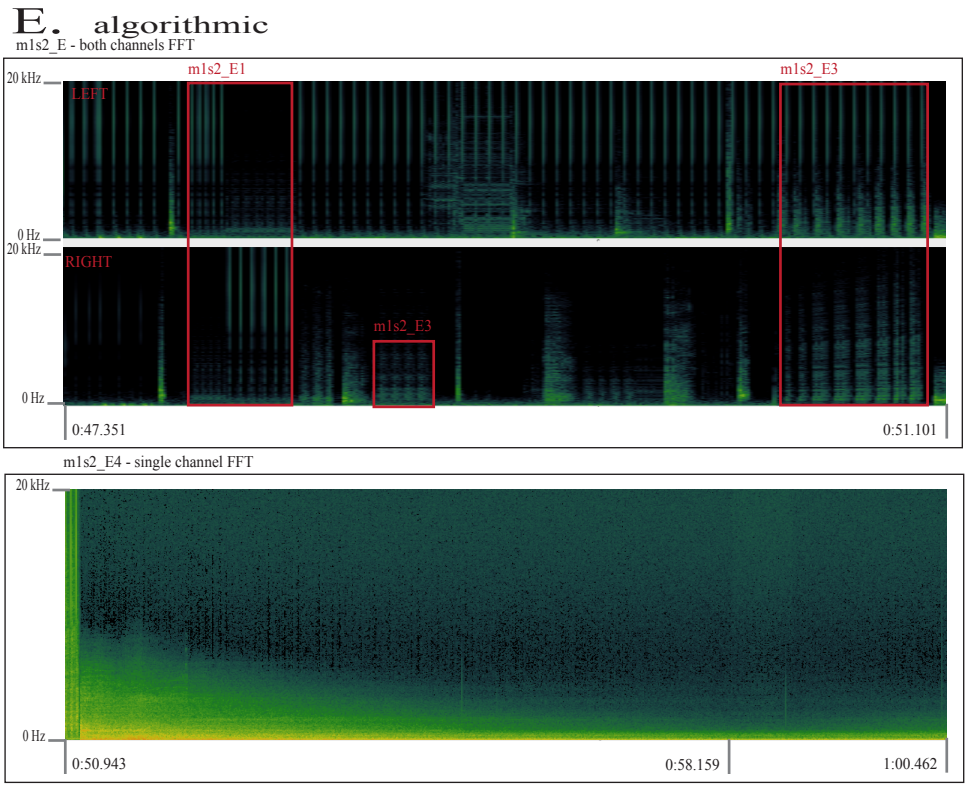
Figure 14. m1s2_D



E. Algorithmic (see Figure 15.)

This final component of the second section has three distinct algorithms, the first two are layered in the first half and the third is a long unfolding reverb that dominates the second half. The most constant component of the first half are the full spectral length impulse-like grains that are predominantly in the left channel. The regular grains are separated by 0.060 seconds with the exception of one section where the grain rate is sped up (m1s2_E1). These short impulse-like grains are combined with longer, uniquely filtered grains, often presented as single grains, which makes them similar to percussion hits presented in contrast to the continuous impulse-like grain stream. The sQg enables a high degree of filtering with a unique frequency for each grain. Additionally, the aperiodic grain stream and the hard panning left and right characterize this granulation algorithm. Manual repetitions of selected grains, such as those in m1s2_E2, provide a link between the stuttering repetitions of previous sections and those of m1s2_E3. The ascending grains of m1s2_E3 have the same morphology of those in m1s2_C with a slower grain rate and larger grain length. The large reverb decay that is the second half unfolds in an unedited fashion, similar to the reverb that ended the first section. In order to extend the reverb tail and create motion toward the next section through a subtle increase in amplitude, the last two seconds are reversed and joined to the end of the reverb tail (m1s2_E4).

Figure 15. m1s2_E



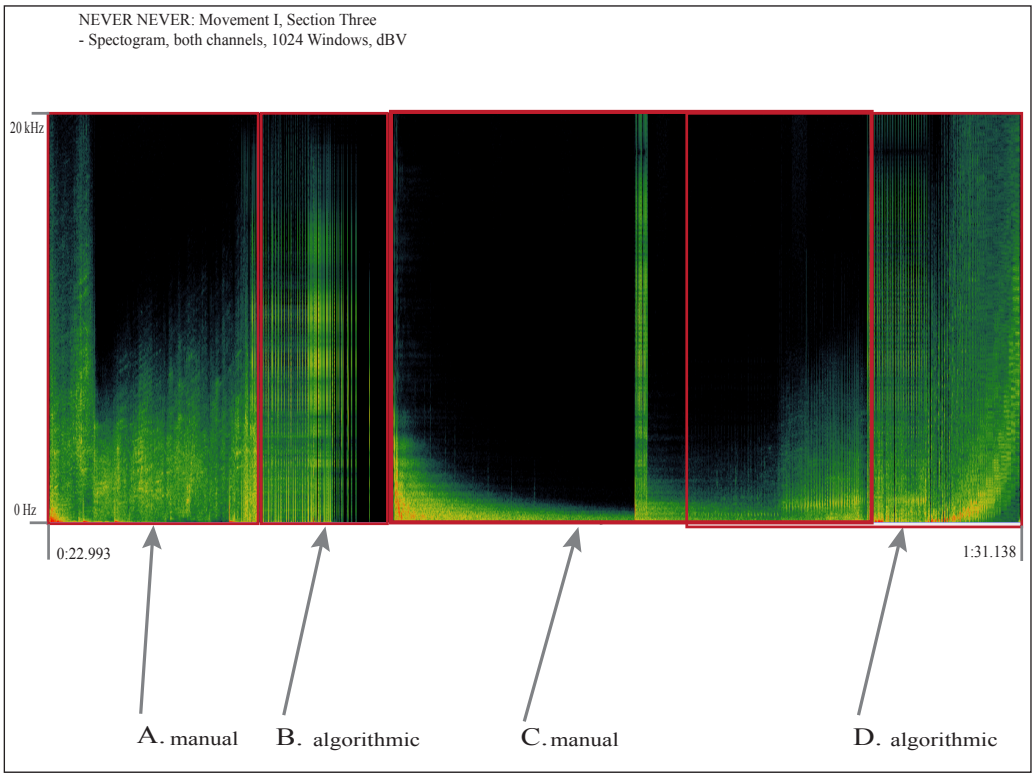
C. Section Three (of movement one)

1. General Overview (see Figure 16.)

This section begins with a large impact then moves via scintillating clouds between one dry impact and the next. The time scale of these impacts is similar to m1s2_D, but a layer of more rapidly moving material has been removed and what remains are austere low frequency thuds and dense shimmering clouds moving upward in frequency space. Similar to the last section a series of impulse-like grains follow, although their character is entirely different. The listener now encounters two

layers of material, a repeated periodic stream of grains in the background and aperiodic, spectrally diverse grains that are eventually organized into a tight mass where the grain rate pushes across the rhythm frequency boarder and then just as quickly dissolves into a few temporally isolated grains, the final one of which actuates a long spring like reverberator. The decay of this reverberation is abruptly disrupted by a short burst of grains and a low frequency impact, thereby actuating another reverberation. Three different means of ascending are then presented in succession to finish the section. Each successive strategy brings repeated grains closer together in temporal proximity, the final ascent moving the granular stream across the threshold between the rhythm and pitch, so the final upward sweep is a series of groupings that create a rapid flourish akin to an ascending piano figure.

Figure 16. m1s3



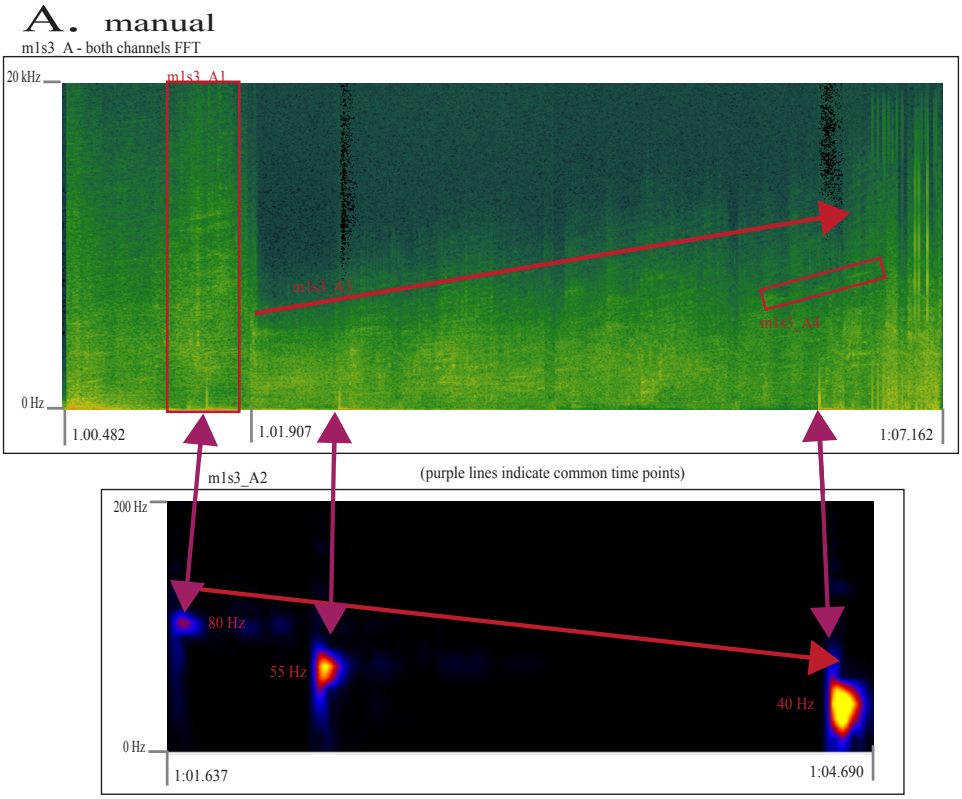
2. Formal Design

A. Manual (see Figure 17.)

Similar to m1s2_D, this section contrasts an ascending granular mass with a descending bass line and is followed by a series of short impulse grains. The section begins with a strong impact that ruptures the tranquility of the low frequency material ending m1s2_E. The sonic consequence of this impact is a secondary impact with an equally high amplitude and a large spectral range (m1s3_A1). This manually placed "consequence" is the first of three bass notes that form a descending

line that moves in contrast to the ascending upper frequency material. The spectral emphasis of the descending bass line pitches can be seen in m1s3_A2. The ascent of the high frequency material is created within the granular material through the use of a band pass filter, this creates visible ascending bands (m1s3_A4). Shaping the entire sound mass with a low pass filter begins abruptly at 1:01.907 and the filter cut-off ascends over the course of the section (m1s3_A3) until the granular material is supplanted by impulse-like grains.

Figure 17. m1s3_A

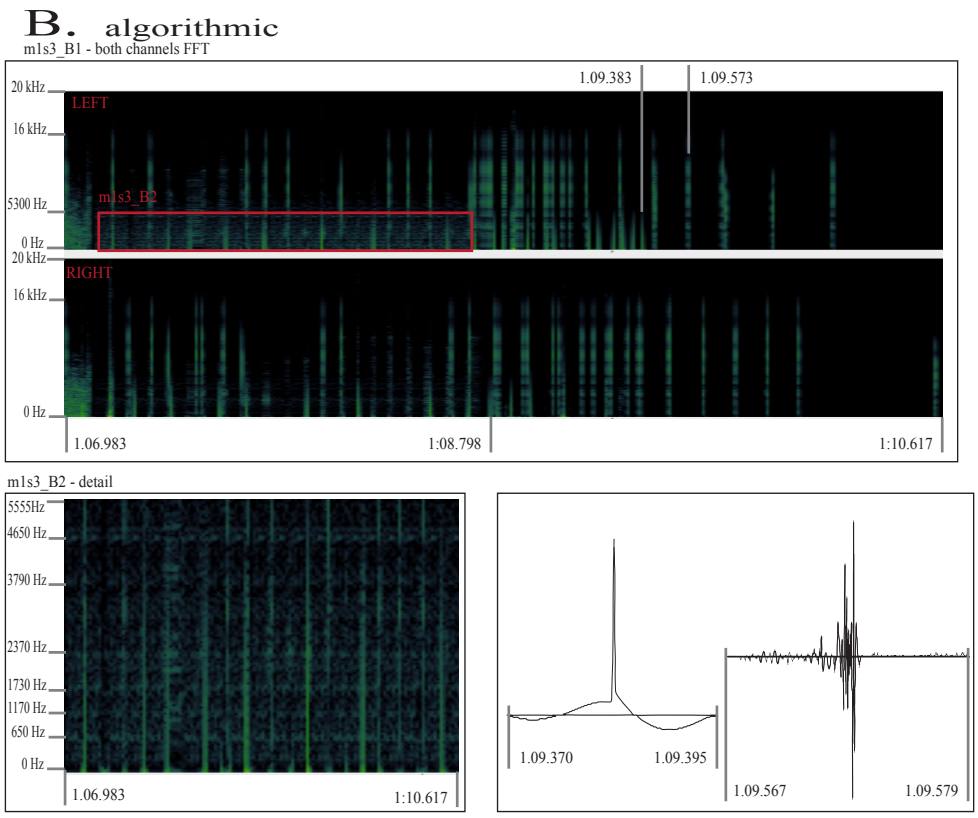


B. Algorithmic (see Figure 18.)

The similarity of m1s3_A to m2s2_D is continued with m1s3_B resembling m1s2_E, except for the ending gesture, which in this third section exhibits a sizable variation. There are three layers of material that have been combined to form this section; a low amplitude and low frequency filtered noise in the background of the mix, a series of grains that extends to 5300 Hz and a series of impulse grains that extend to 16 kHz. The background material is most dominant in the left channel of the first half of the section (m1s3_B1). This banded noise has strong spectral ridges that are a result of the algorithm that generated the material, such as FM synthesis or narrow band filters that suppress other components of the frequency space. It is likely that the additive method of synthesizing this banded spectrum is how the material was created, before being granulated and refined with filtering (m1s3_B1). Layered on top of this material are two streams of grains that increase in density, approaching but not transiting the rhythm pitch boundary, when the banded noise is removed at 1:08.798. The spectrally narrower of the two are low frequency grains that have a nearly uniform tapering of frequency toward the roll off at 4900 Hz. The waveform detail of a grain at 1:09.370 illustrates a grain length of 0.025 seconds and a waveform that is clearly a low frequency, the relatively longer grain length enabling the low frequency. In contrast, the shorter 0.012 second grain length of the grains that extend to 16000 Hz creates greater spectral height. The high frequency content is visible in waveform display of the detail at 1:09.567. The material that has likely been granulated with the sQg which alters the filter with each grain. There are

several dominant frequency bands that the grains consistently emphasize 6500, 8500 and 11200 Hz, which indicate the less aggressive filtering of the sQg in this section, relative to other sections. This section is unique within the movement because of the grain rate not transiting the rhythm pitch boundary when increasing the grain rate and the unique slow rate to which it decelerates afterward. The acceleration and deceleration are similar, but the slower overall rate is unique.

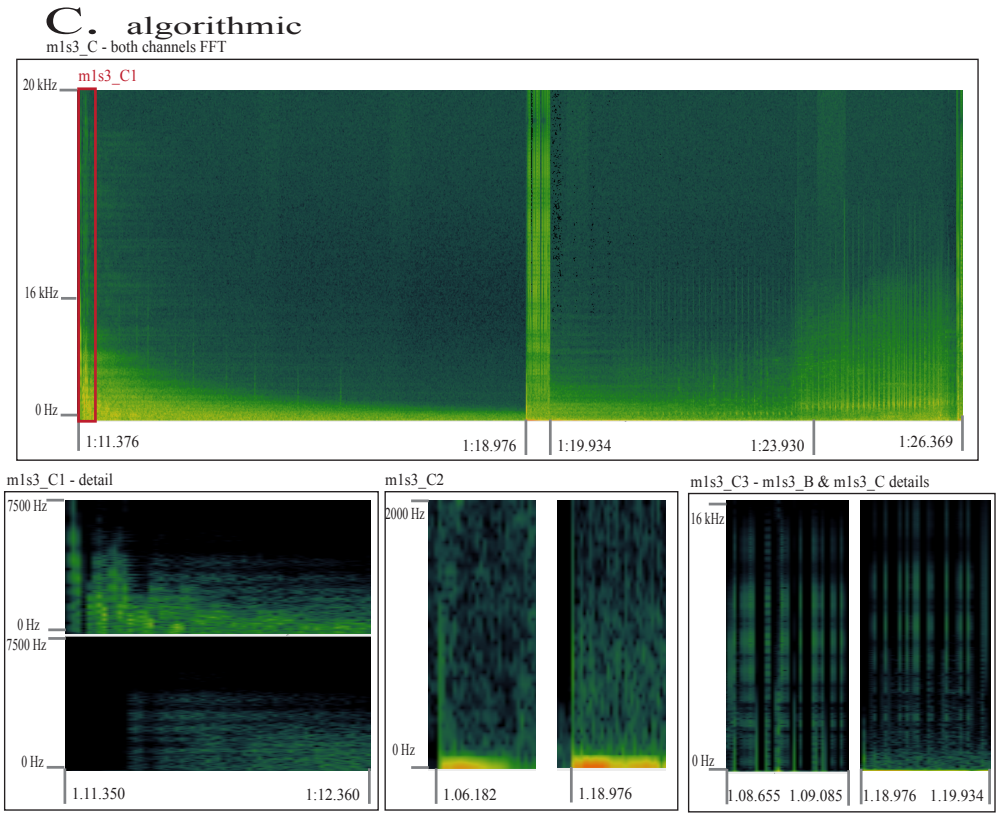
Figure 18. m1s3_B



C. Manual (see Figure 19.)

The large silent spaces that end m1s3_B slow the motion of the piece. This slowing is continued with two large reverberation decays. The material that activates the first reverb is comprised of an initial impulse grain and then a quick succession of sQg grains. This initial attack is only present in the left channel, the right channel impact having been manually removed (m1s3_C1). Unlike previous long reverb tails, this one is interrupted at 1:18.976. This interruption uses a single low frequency (40 Hz) attack, similar to that at 1:06.182 (m1s3_C2) except that it now sets off a reverberator that extends the low frequency material in time. The low frequency attack is followed by a series of impulse-like grains from the sQg that granulate the material that occurred during the highest grain rate section of m1s3_B (m1s3_C3). Finally, the long decay and extension through reversal and cross fade of tail that was used in the end of m1s2_E is again present in this section at 1:23.930. This time a layer of low amplitude impulses is layered over top, serving as the beginning of a crossfade to m1s3_D. The manual combination of materials already observed and with slight alterations, creates a fresh variation of this material.

Figure 19. m1s3_C

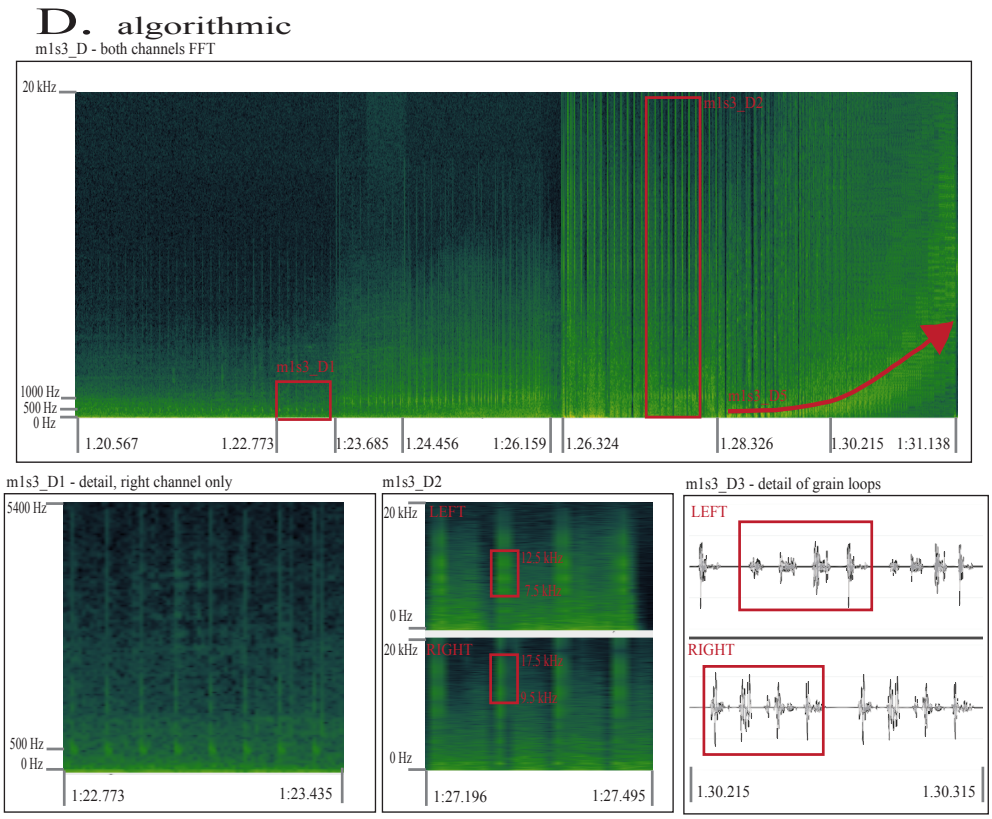


D. Algorithmic (see Figure 20.)

The propulsion toward the end of this section is comprised of four sections of granular material, each with a higher grain rate than the last. The first series of grains are focused on 500 Hz, are cross-faded with the tail end of the reverb decay of m1s3_C and are 0.100 seconds apart (m1s3_D1). Beginning at 1:23.685 a similarly brief grain type is used but there are several changes. The focal frequency of the grains is now 1000 Hz and after 1:24.456 the grains become more aperiodic as the rate is increased. A brief cessation of grains at 1:26.159 creates a brief pause before a

series of noisier full frequency range grains begin at 1:26.324. This third algorithm settles into a periodic grain stream that is in phase across the channels after six aperiodic opening grains. The 1000 Hz band remains but now there are ascending upper frequency formants, different in the two channels, that create a sense of ascent. The detail of m1s3_D2 highlights the unique formants in each channel and the tight phase relationship of the channels creates a more unified sound. The final algorithm that creates the most rapid ascent of the section crosses the rhythm/pitch boundary. Beginning at 1:28.326, a series of four grains in each channel (m1s3_D3) are looped, the loop being compressed with each iteration. The temporal compression raises the formant pitch, m1s3_D4 traces this ascent of the formant, which becomes less focused toward the end.

Figure 20. m1s3_D



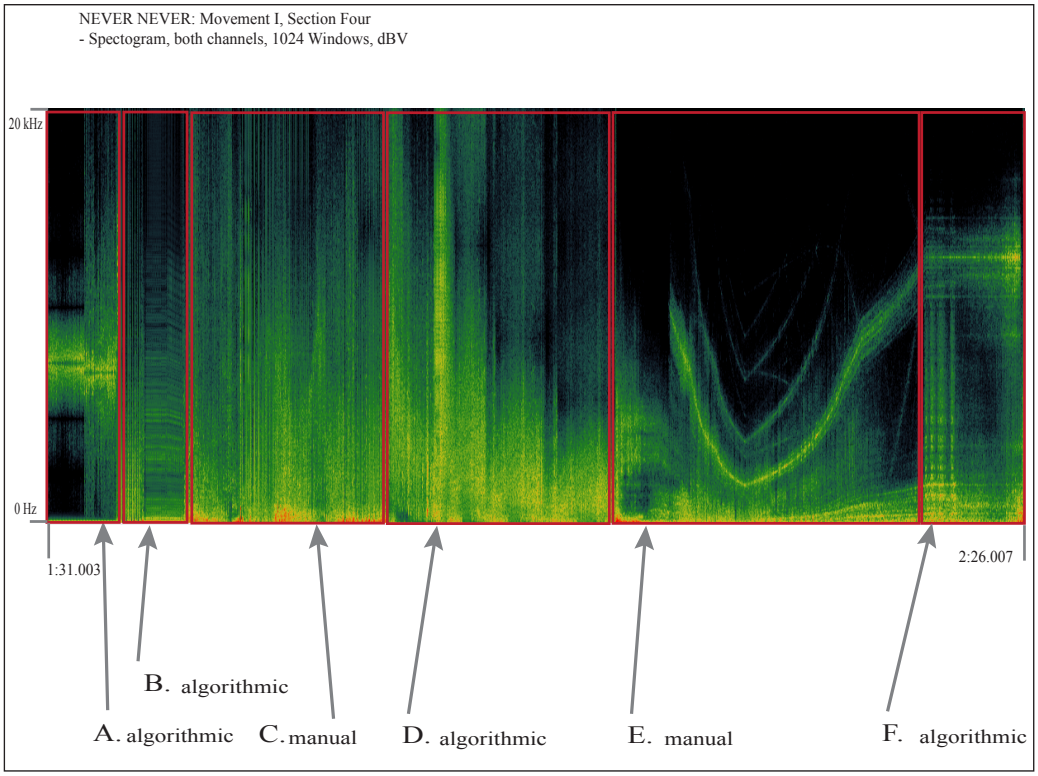
D. Section Four (of movement one)

1. General Overview *(see Figure 21.)*

The prevalence of the ascending gesture that has dominated the first half of this movement is now replaced with a gesture that arcs downward then upward. The first half of the section is constructed from a series of different materials, one after the other, similar to the beginning of the second section, but they now last several seconds instead of under a second. The section begins with a steady frequency focus and moves through four different granulation strategies until beginning a subtle

descent at the end of m1s1_B. After this descent until the impact that begins m1s1_E, the focal frequency band descends and ascends while moving through different granulation strategies. The impact is followed by a steady frequency focus that descends after one second and is then replaced by a highly filtered band that sweeps down and back up over the course of fourteen seconds, creating a very distinct and relatively long lasting gesture. The section and this gesture end with a spectral plateau of the narrow band, which expands and increases in amplitude while it is punctuated by several percussive impacts.

Figure 21. m1s4



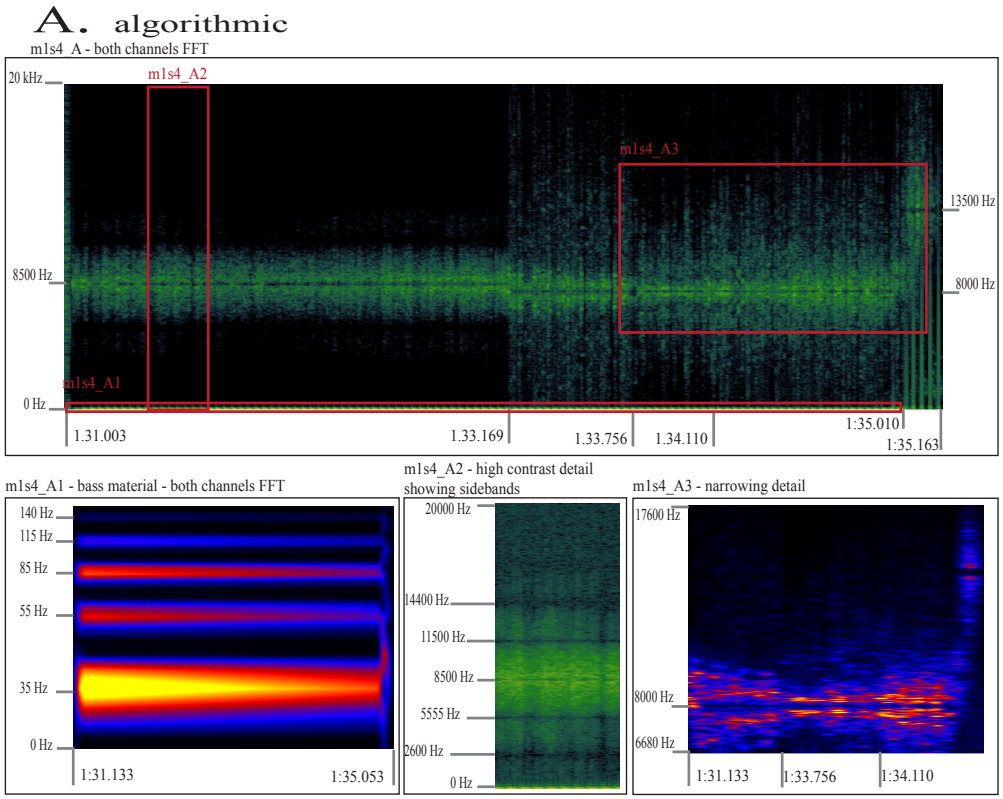
2. Formal Design

A. Algorithmic (see Figure 22.)

Two algorithms are combined to form this static section, a continuous low frequency pedal tone and three variations of a granulation strategy. The low frequency tone exhibits a rational overtone series, as m1s4_A1 illustrates, indicating a FM synth with a long envelope that decreases the amplitude over time. The three granulations that are above this bass tone each reflect around a silent center frequency, rolling off as the distance from the center frequency increases. The frequency range of the grains overtone series that extends outward from the silent center and the position of the center frequency are what distinguish the three granulations. The first is the most narrowly banded and reflects around 8500 Hz. Around the 8500 Hz center point sidebands at 11500 and 5555 Hz and 14400 and 2600 Hz indicate the bounds of filters (m1s4_A2). The second granulation strategy, reflected around 8000 Hz, has no side bands from filtering so the grains extend outwards towards the edges of the digital audio range. A compression of the spectral range between 1:33.756 and 1:34.110 changes the sound quality and is the result of the dominant frequency space being constrained more than in surrounding material (m1s4_A3). The expansion after 1:34.110 toward the end of the section creates drive toward the final granulation material. The final granulation algorithm combines traits of both of the previous strategies. The granulation is reflected around 13500 Hz and the top is allowed to extend to the upper boundary of digital audio space, similar to

the second granulation. The bottom has been filtered to carve out space for a cross fade with low frequency impulse grains that begin the next section.

Figure 22. m1s4_A

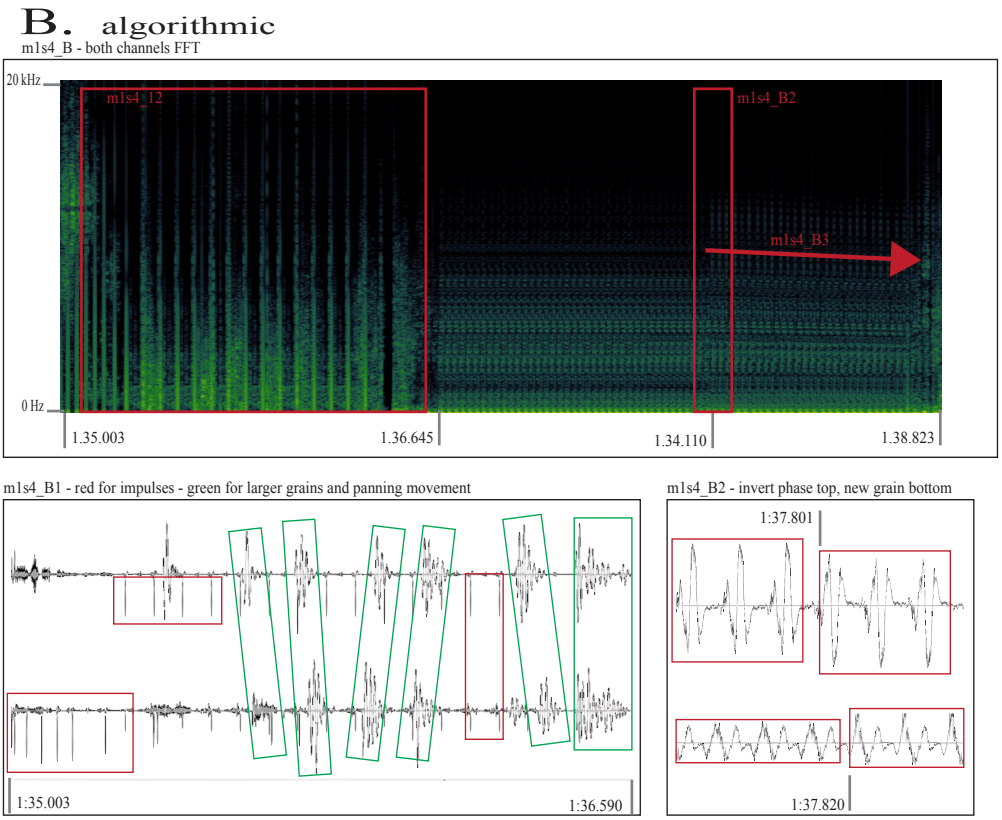


B. Manual (see Figure 23.)

The first portion is comprised of two simultaneous streams of granular material, impulse-like grains and larger panning percussive grains. The impulse-like grains, outlined in the m1s4_B1 in red, begin the section and are cross-faded with the end of m1s4_A. Once the cross fade is completed, these narrow grains stay panned predominantly to the left with half the power in the right channel. Layered on this

periodic stream of grains are a series a more spectrally varied and longer duration percussive like grains that pan from one side to the other with each iteration, the green boxes of m1s4_B1 outlines this motion. The panning indicates a mono stream of material manually panned and then each channel tuned with an equalizer. This layer of percussive grains terminates at 1:36.645 with a brief cross fade to a single grain looped in each channel. These two streams are both altered independently. At 1:37.801 the left channels grain is manually inverted. At 1:37.820 the grain is shortened, resulting in the upper frequency boundary of the grain raising and higher amplitude. Both of these alterations are outlined in m1s4_B2. Finally, the streams are gradually slowed during this last section, thereby lowering the pitch (m1s4_B3) toward the low frequency material that begins the next section.

Figure 23. m1s4_B

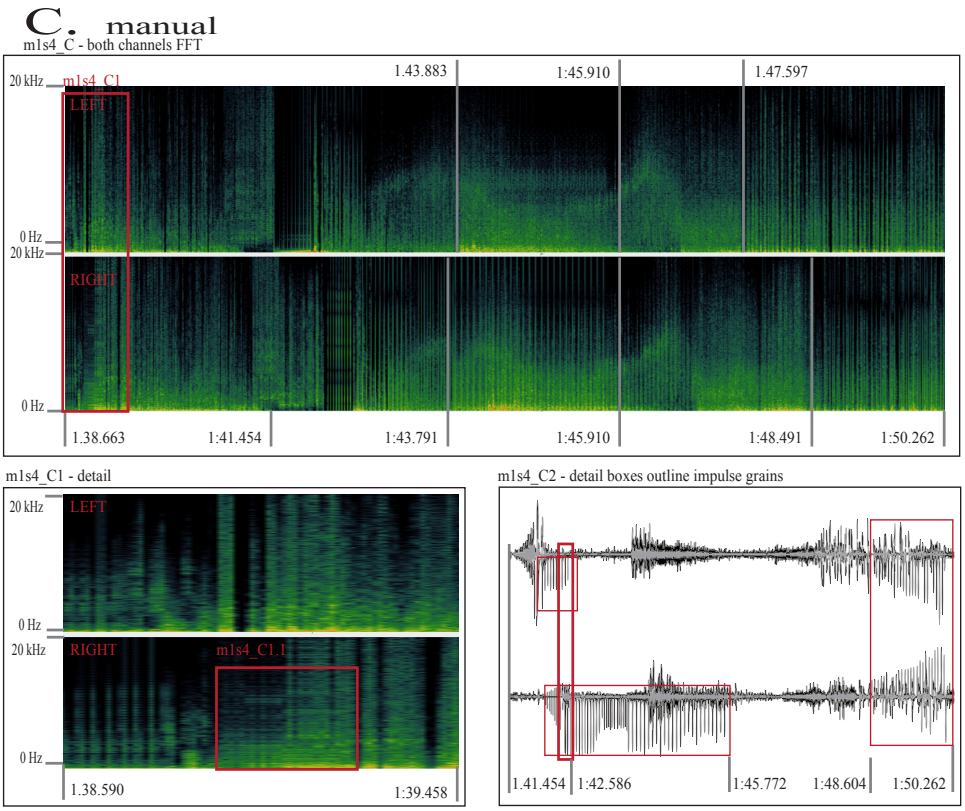


C. Manual (see Figure 24.)

While there has been independence of channels, the previous four sections have tightly paired the stereo channels. With this section an independence of left and right is established through manual interventions. Both channels have the same material layered one atop the other and the right channel is delayed by about 0.500 seconds. The right channel delay is established at the beginning of the section by looping a single grain several times (m1s4_C1.1) to create the initial delay. Once the right channel continues, the same material is granulated in both channels, with manual

adjustments to the amplitude creating movement in the stereo field. At 1:41.445 a secondary layer of material is introduced, short impulse-like grains. The initial grains fade in the left channel and are followed in the right. Similar grain lengths creates the impression of panning from left to right and being removed from the mix at 1:45.772. This layer is reintroduced at 1:48.604 and the handling again illustrates a manual phase offset and an amplitude increase toward the end of the section (m1s4_C2). The primary material of this section is generated by the sQg and serves a continuous bed on to which the impulse grain stream layer is added. The sQg uses four settings which are altered at different times in each track, creating a counterpoint of texture that operates against the delineations of the sonic material established by impacts and contours in amplitude and frequency. The manual changes in the sQg settings are abrupt and the each creates a subtle variation of the continuous sound material of this base layer. In m1s4_C the three changes in the left channel, 1:43.883, 1:45.910 and 1:47.597 and the three changes in the right channel, 1:43.791, 1:45.910 and 1:48.491 create compositional movement on the note level time scale.

Figure 24. m1s4_C

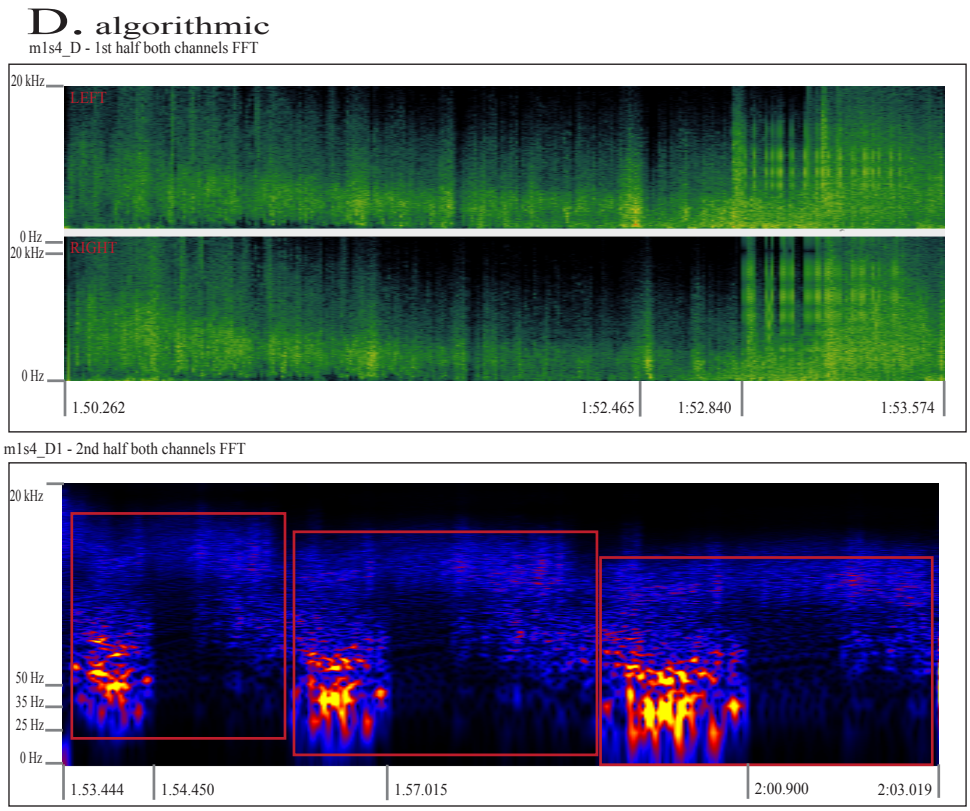


D. Algorithmic (see Figure 25.)

There are three algorithms that define this descending passage. The opening of the section uses the sQg to add randomization to a descending gesture, which ascends after a low frequency impact at 1:52.465, delayed in the right channel to 1:52.515 (m1s4_D). The delay of the right channel is now diminished to 0.050 seconds in this beginning of this section. The second algorithm to appear are the short impulse grains, at 1:52.840, that are layered on top of the sQg stream. The second half of this section uses the same algorithm and material repeated three times,

the playback speed of the material is slowed thereby lowering the frequency content (m1s4_D1). The three repetitions begin with a focus on low frequency material, which represents the highest amplitude section of the material, these are the bright yellow sections positioned at 50, 35 and 25 Hz respectively. The second portion of the repeated gesture is a single grain that is repeated and is successively shortened, raising the pitch. The three middle sections are located at 1:54.450, 1:57.015 and 2:00.900. The final component of the repeated gesture is a descending frequency band that connects the ascent of the middle portion with the beginning of the next gesture. This repeated gesture also reverses the temporal relationship of the channels, the left channel now progressively becoming more delayed as the section proceeds.

Figure 25. m1s4_D

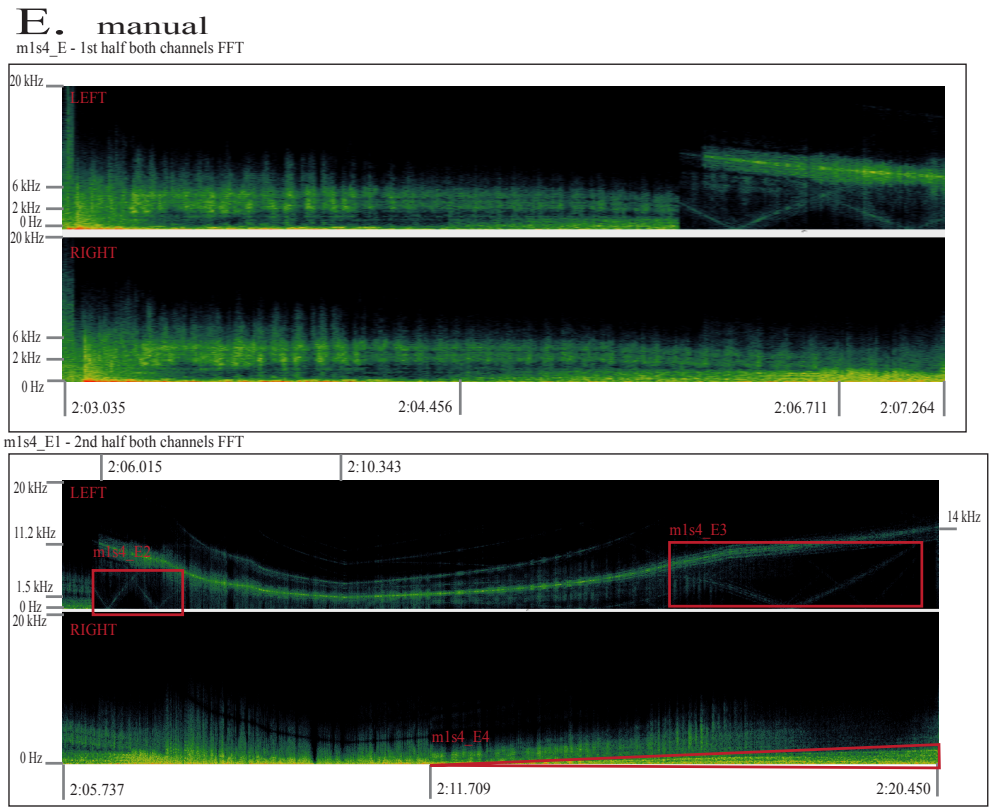


E. Manual (see Figure 26.)

An impact begins the next section, followed by a granulation that continues the grain rate of the previous section, thereby continuing the motion. As the reverbs resonance is established, a filter is used to carve out a gap between the prominent low frequency fundamental and the main resonance material above 2000 Hz. A formant is established between 2000 and 6000 Hz and after 2:04.456 the band begins a downward descent, while the fundamental material becomes less focused and expands upward to fuse with the descending material at 2:06.711 (m1s4_E). At

2:06.015 a radical manual intervention is the introduction of a descending narrow band in the left channel. This band begins at 11200 Hz, descends to 2000 Hz and then up to 14000 Hz. The narrowly banded high frequency material is the result of band filtering, the byproduct of which are faint aliased figures, m1s4_E2 and E3. The lower frequency material has been manually severed from this descending left channel band and placed in the right channel. At first this low frequency material is rich stuttering diffuse noise that fits underneath the frequency roof of the left channel material. At 2:11.709 a resonant band is established at 300 Hz creating a tighter sonic connection between the two channels. The ascent in the right channel combines a fluttering granulation and a prominent low frequency band.

Figure 26. m1s4_E

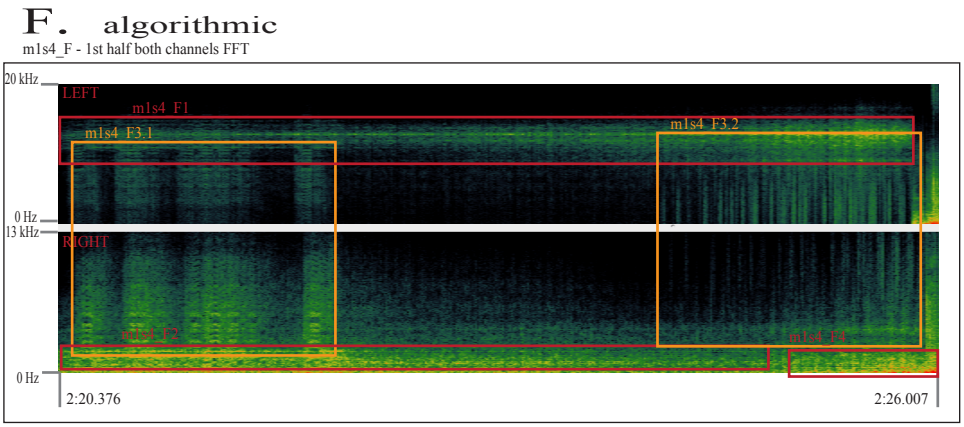


F. Algorithmic (see Figure 27.)

A steady frequency plateau is established as m1s4_E ends, the right channel providing high frequency material and the left, with low frequency. The ending of this section is propelled toward the next large impact through the layering of several algorithms. The base layer is the static frequency bands that result from m1s4_E. The higher left channel band increases in amplitude and expands its range slightly over the course of this section (m1s4_F1). The lower frequency right hand material decreases in amplitude over the course of this section (m1s4_F2) and at the last

minute when there is a build in the lower frequency toward the impact, there is an increase. On top of these bands are two series of events that bridge the frequency gap. The first set of events are dominated by low frequency material and happen on the note time scale (m1s4_F3.1). The second stream of events are a series of grains, whose lengths are on the microsonic timescale (m1s4_F3.2). The grains again cross the rhythm/frequency divide and nearing the end of the section and building toward the impact, the grain rate is increased. This increased grain rate and a reverse reverb in the low frequency (m1s4_F4) are used to build tension to the impact that begins the next section.

Figure 27. m1s4_F

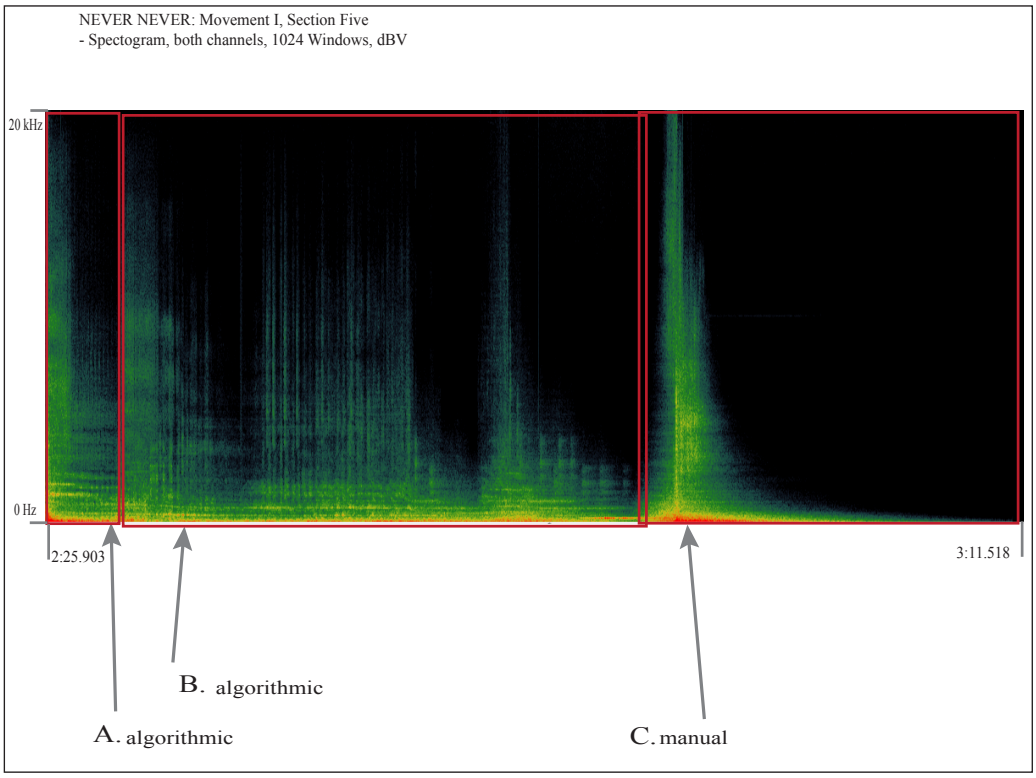


E. Section Five (of movement one)

1. General Overview (see Figure 28.)

The last section has two large impacts followed by reverberations. The material used to extend the first reverb lasts the entire duration of the section, gradually descending in pitch focus. This concluding section of the movement uses the unfolding of the first impact to slow the motion and recapitulate the different experiences of space. Previous sections have established independence of the channels, but here they are brought back together, creating closure. As the first reverb tails off to resonant pitches, a brief ramp toward the second impact occurs and the second impact of the section provides a large punctuation to close the movement, it's reverberant tail, falling off naturally to silence.

Figure 28. m1s5



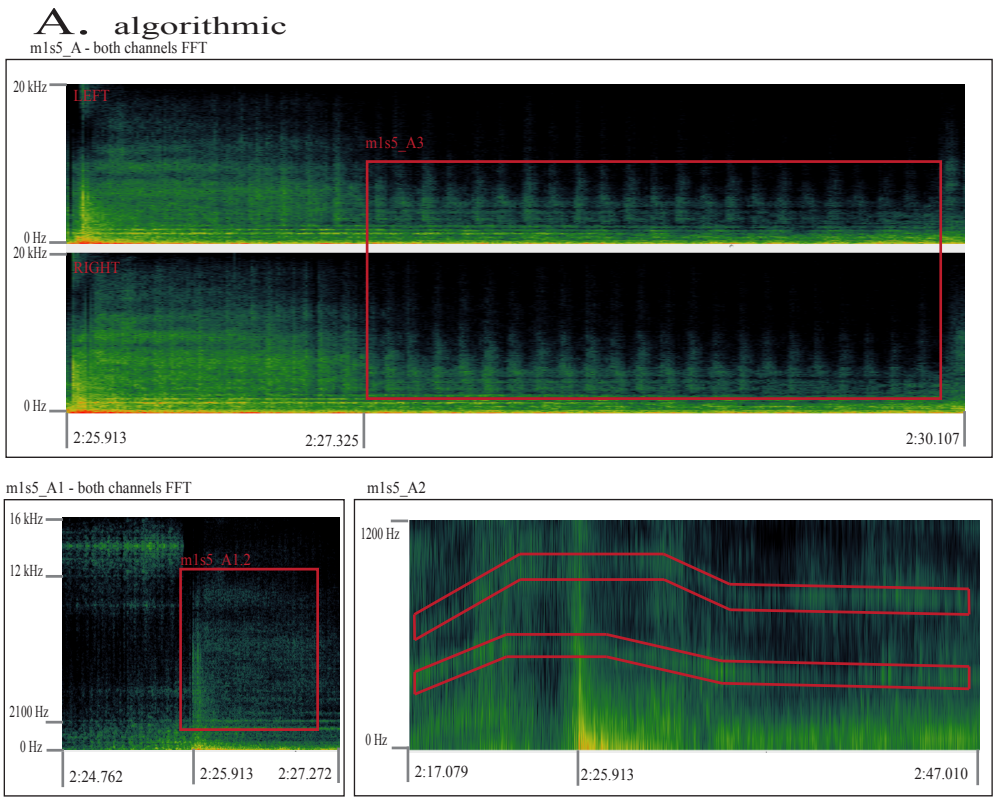
2. Formal Design

A. Algorithmic (see Figure 29.)

The impact that begins the sections provides a rich and equally distributed cloud of material within the gap that the ending of m1s4_F established. This cloud between 2100 and 12000 Hz is equally present in both channels, which serves to reinforce the sense of monophonic material, acting in contrast to the two independent streams of m1s4_F. The impact is most prominent in the low frequency material and there is a short reverb tail that fades out by 2:27.325. During the initial decay, two bands are

established, at 500 and 1000 Hz, which gradually descend and provide a continuous thread during this closing section. The upper band defines the top of a low frequency band of material that dominates the closing sections mix until the final impact of m1s5_C. The two filtered bands are the continuation of material presented in the right channel in the previous section. While s1s4_F had closed with an ascent then steady frequency material, this section presents those bands with a steep drop off and then a gradual descent (m1s5_A2). While the low frequency material has been filtered in order to create this descending motion, the frequency material above 1500 Hz has be been granulated in order to shape the higher frequency air portion of the reverb roll off. The granulation algorithm uses a grain rate that places 0.125 seconds between grains, a smooth overlapping window and presents the channels 180 degrees out of phase (m1s5_A3).

Figure 29. m1s5_A

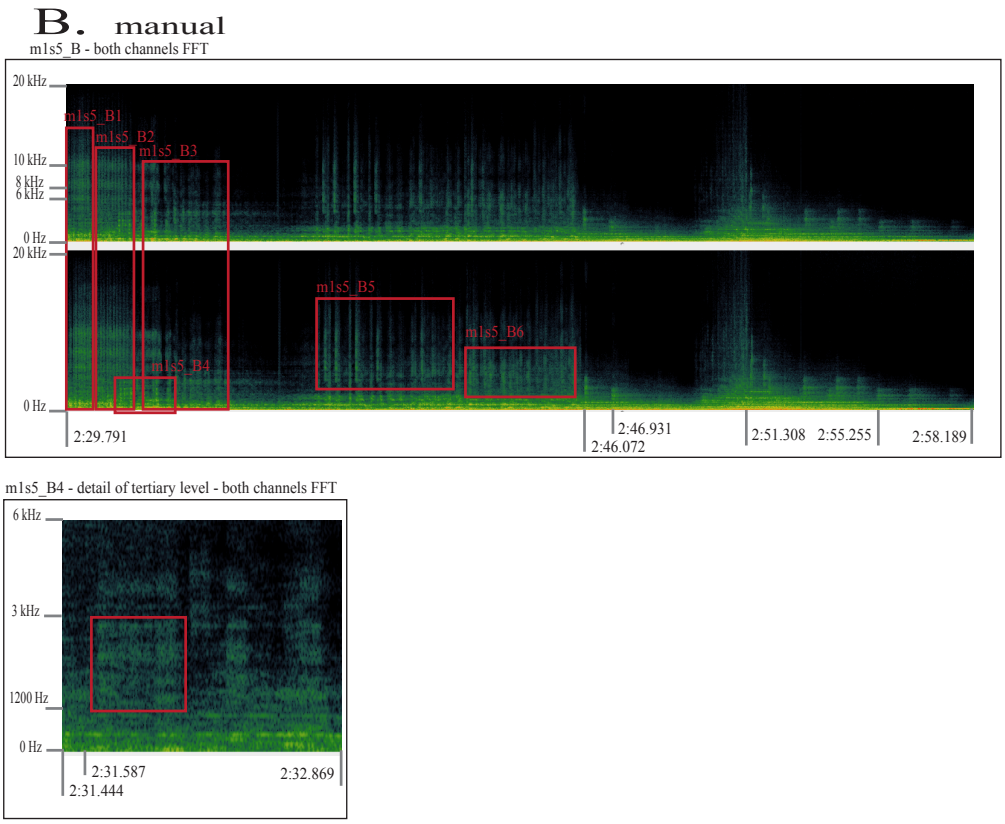


B. Manual (see Figure 30.)

The initial impact has established a long low frequency band reverb tail, with two prominent descending bands at the upper bounds. This low frequency base is maintained by mixing in granulations that extend the material. On top of this base, three different materials are manually placed, extending the reverb and presenting echoing reports from a fading sound mass, each reenergizing the low frequency resonance. The first block of material layered on top is a granulation that goes through three stages. The first stage is a continuous cloud of with bands at 6, 8 and

10 kHz (m1s5_B1). This grain rate is then slowed and spaces appear between grains while the three bands remain (m1s5_B2). During the third stage, the spaces become more significant and the top two bands dissolve (m1s5_B3). During this third stage, at 2:31.587, a tertiary layer of material is presented, a granulation between 1200 and 3000 Hz that dominates this decay. The second material to be layered on the low frequency band is a series of individual grains between 4 and 10 kHz. The delay of the right channel becomes apparent with this set of material as the large silences allow room for the hearing of individual grains (m1s5_B4). As this material continues the lower boundary sinks to meet with the low frequency band and a diffuse cloud of resonance fills the 2 to 8 kHz range (m1s5_B5). The third set of material in this section are mid frequency sound events, each with a slight amount of reverb to smear the ending. The first two of these sound events are at 2:46.072 and 2:46.931, combining with the end of the second set of material. These two sound events are used to set of a shift in the descending bands, which are shifted down a perfect fifth in conjunction with the second sound mass at 2:46.072. Several more of these sound events are presented, the one at 2:51.308 being built toward with a reverse decay envelope. Several more of these events populate the following decay of this section, the one at 2:55.255 co-joined with a final descent of the resonance band to a hollowing 300 Hz.

Figure 30. m1s5_B

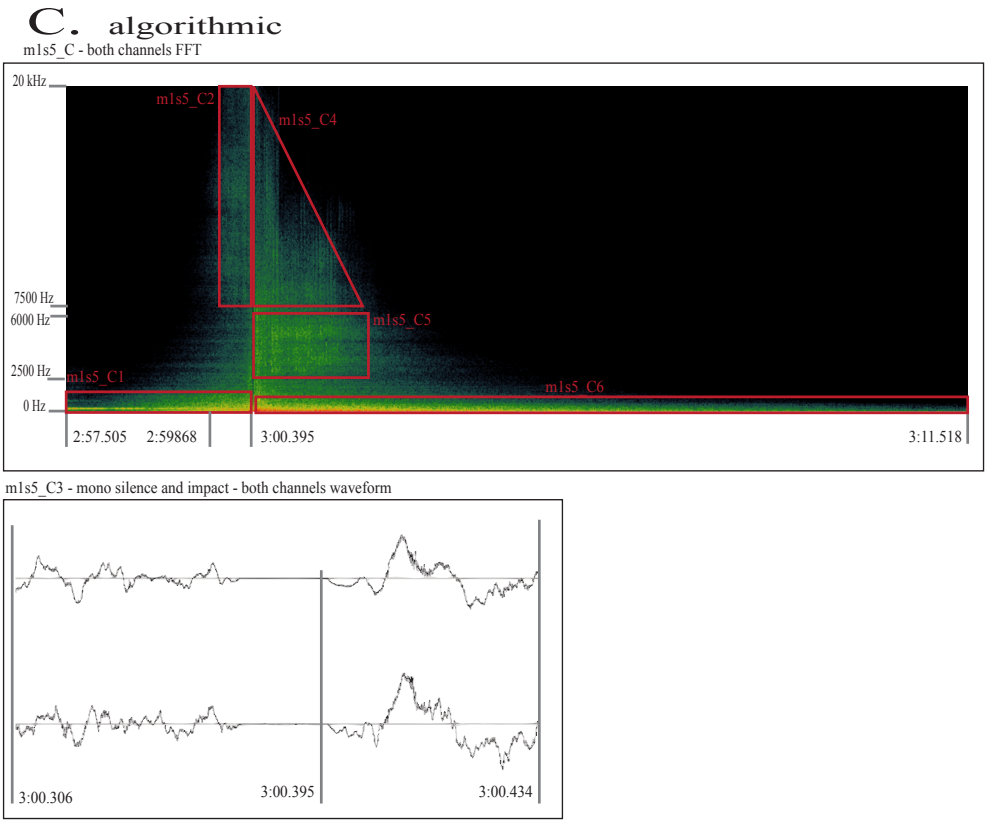


C. Algorithmic (see Figure 31.)

The final impact of the movement is the combination of several reverbs, moving the algorithm to the forefront of the listener's attention. This impact is preceded by a reverse decay envelope, first beginning in the low frequency band (m1s5_C1). At 2:59.868 a second layer of material, with the same increasing envelope, is added above 7500 Hz (m1s5_C2). While the right and left channel have been more tightly aligned than other points in the movement such as m1s5_B, the aligned silent gap and impact that conclude the work with a monophonic statement unify the two

streams (m1s5_C3). The waveform illustrates that there are still differences in the frequency material of the channels, but that the timing is synchronized. The impact and the relatively rapid decay employed use three streams of material. The frequencies above 7500 Hz are strong during the impact and a logical drop off in amplitude of frequencies over time is observed and this material exhibits the tall narrowly banded impulse-like granulation shimmering with a unique formant in each iteration (m1s5_C4). Contrary to the vertical nature of the upper frequencies, the diffuse noise with resonant bands of a different reverb algorithm dominates the 2500 to 6000 Hz range (m1s5_C5). Finally, the longest tail and most prominent reverb algorithm emphasizes the low frequency band, a gradual decay of the deep low tones dissolving is where the movement ends (m1s5_C6).

Figure 31. m1s5_C



III. Movement Two: Never More

The second movement has three main sections that are defined by high amplitude impacts that segment the movement. The overall sonic design suggests a palindrome, although there are many components that counteract a precise reversal of material. This movement features a series of continually evolving and mutating granular processes brought together through montage that occurs on multiple timescales. There is a continuous sense of movement that is achieved by heavily filtered ascending and descending sound masses and a nearly continuous rhythmic driving implemented by slowly speeding up and slowing of the grain rate. Accelerating and decelerating periodic grain streams move to the foreground several times in this movement, allowing the process to be observed. Gone are the long reverb tails of the first movement, which indicate a sound dissipating within a space and brought to the fore is an immediacy, wrought through morphing granular processes. Even when the meso time scale motion of the movement slows in the last third, the granular activity provides a rich tapestry of material to hold the interest of the listener. The continuity of the movement is a result of deft mixing, evolving granular processes, a continuously pushing pulsation and a lack of silence.

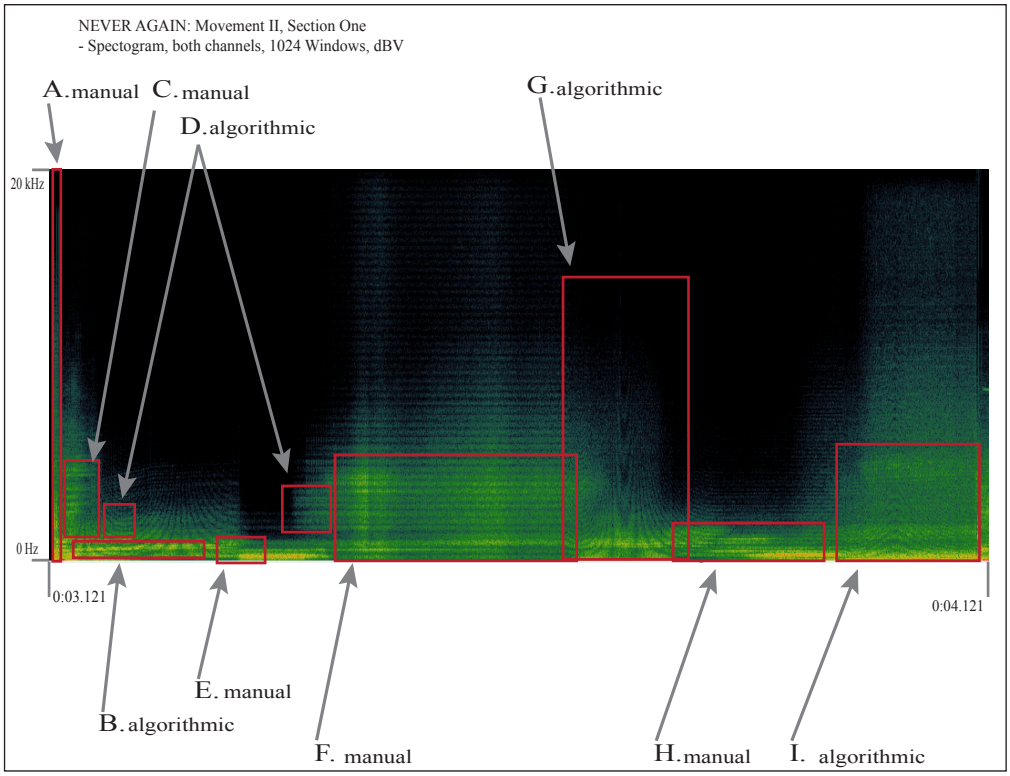
A. Section One (of movement two)

1. General Overview (see Figure 32.)

The first section of movement two is the shortest in length. It is the only section that does not employ a slowly descending sine tone. Relative to the two later sections

the movement through granular masses is more abrupt and the cross fades more abrupt. This quick pacing brings the composer manual interventions to the foreground of attention.

Figure 32. m2s1



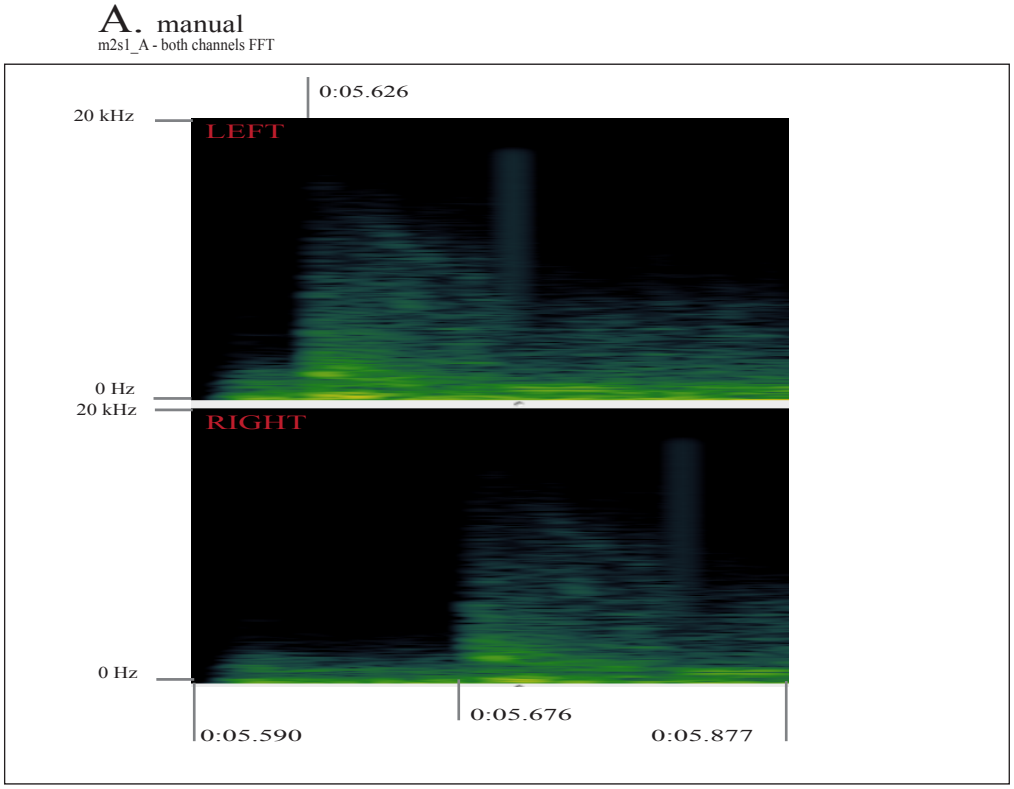
2. Formal Design

A. Manual (see Figure 33.)

The opening of the movement is an impact that rolls off to 13,000 Hz with a second and third component that is delayed by 0:0.050 seconds in the right channel.

In contrast to algorithm of the unfolding reverb, the temporal delay of the right channel is a manual adjustment on the part of the composer.

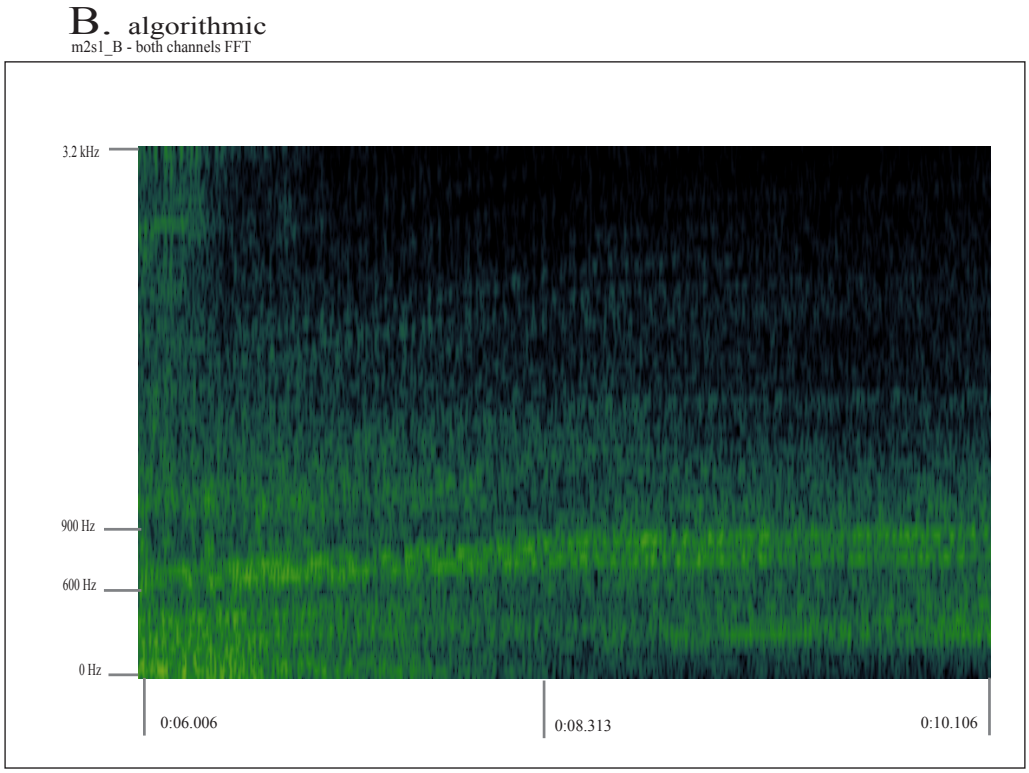
Figure 33. m2s1_A



B. Algorithmic (see Figure 34.)

Slowly ascending from the dominating low frequency energy of this impact is a granulation that is striated by narrowly constrained spectral bands. The dominant spectral band of 600 to 700 Hz emerges into the foreground of the mix at 0:06.006 and ascends to 750 to 900 Hz at 0:08.313 where it stays until being replaced later in the work at 0:10.296.

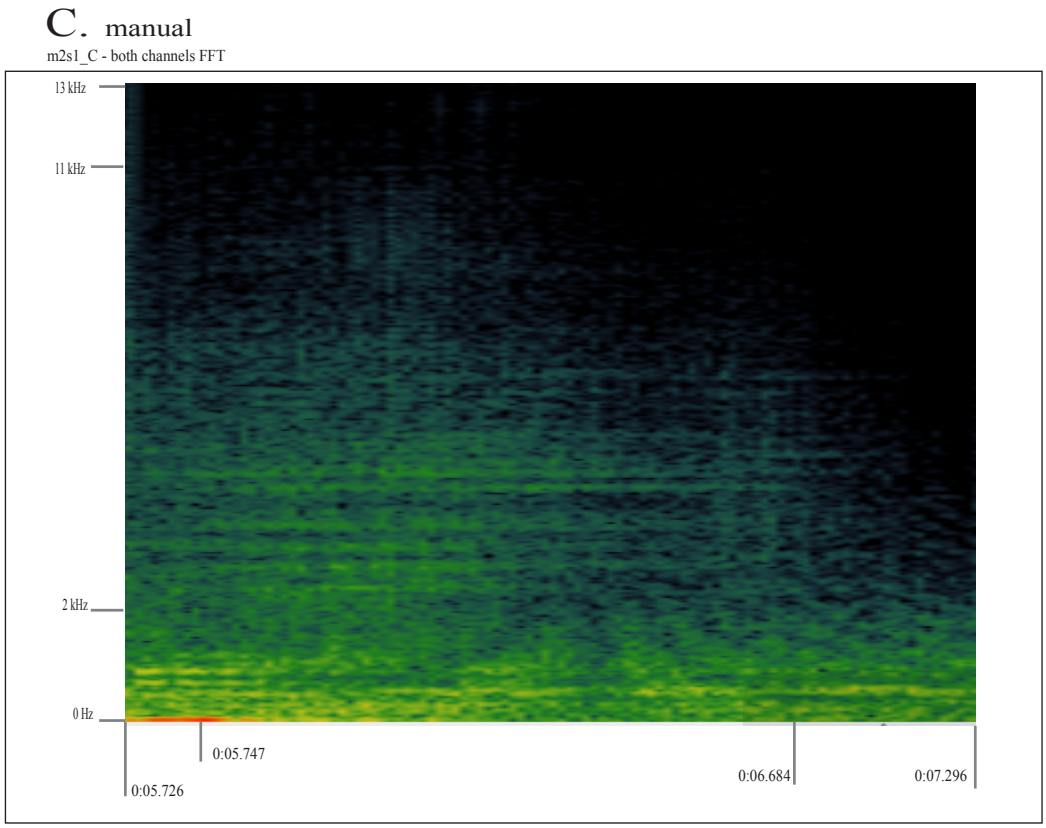
Figure 34. m2s1_B



C. Manual (see Figure 35.)

The manual mixing of various streams of granulation happens both sequentially and vertically. Above the opening ascending gesture are a series of short grains in the 2000 to 11,000 Hz range. These grains imply a rattling plastic type sound whose articulations are faded in around 0:05.747 and back out near 0:06.684.

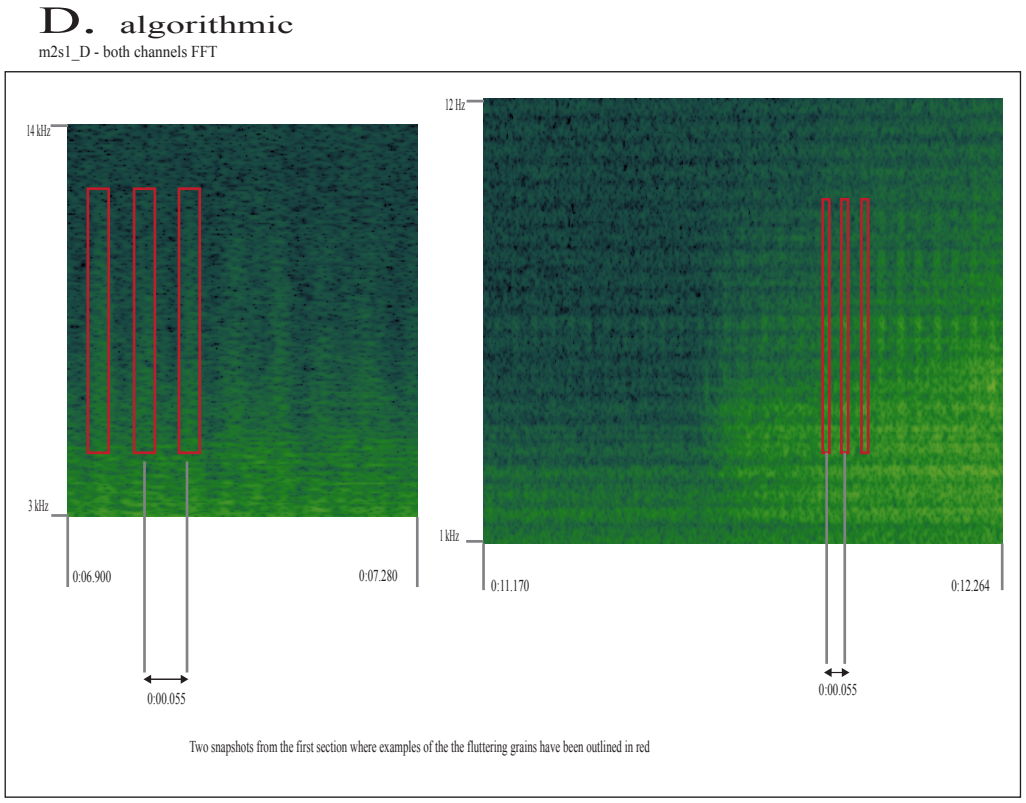
Figure 35. m2s1_C



D. Algorithmic (see Figure 36.)

One of the defining features of this movement is a seemingly continuous fluttering at a rate of roughly 0:0.055. This driving rhythmic force is imbedded in the different granulation strategies and is not often in the foreground of the mix. M2s1_D illustrates two instances where this pulsation moves to the foreground.

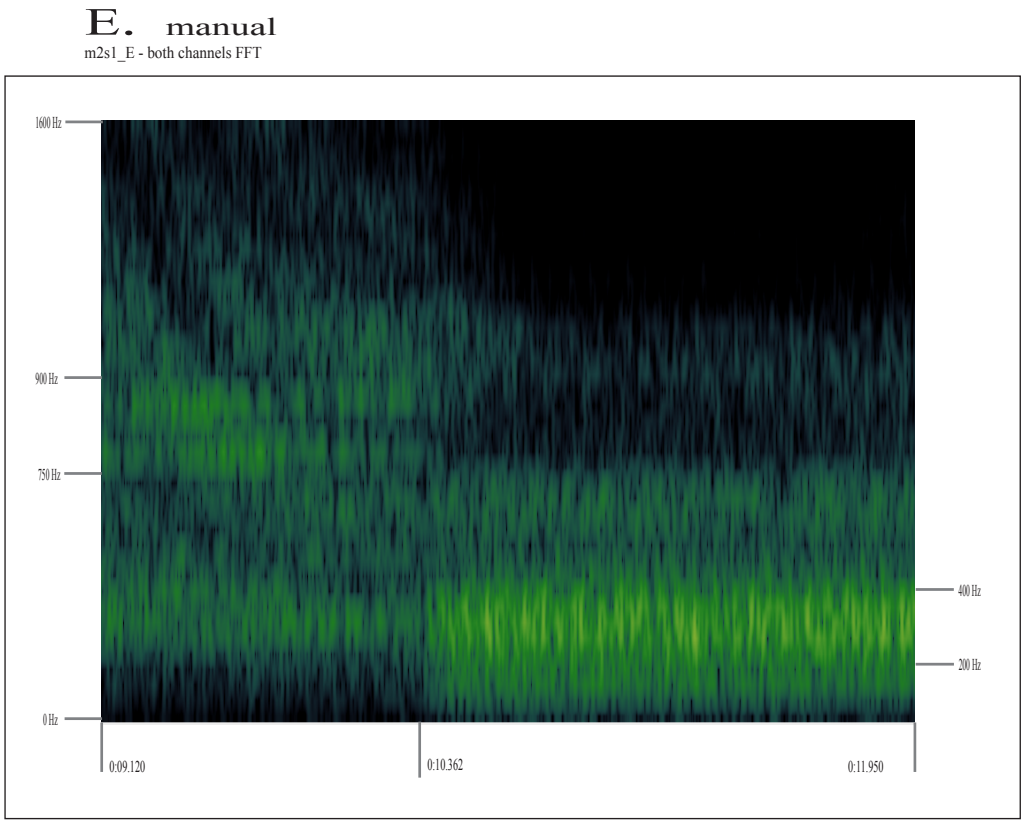
Figure 36. m2s1_D



E. Manual (see Figure 37).

The abrupt manual adjustment at 0:10.362 continues the same horizontal sonic gesture with a different filter strategy. The dominant 750 to 900 Hz band is replaced by a higher amplitude 200 to 400 Hz.

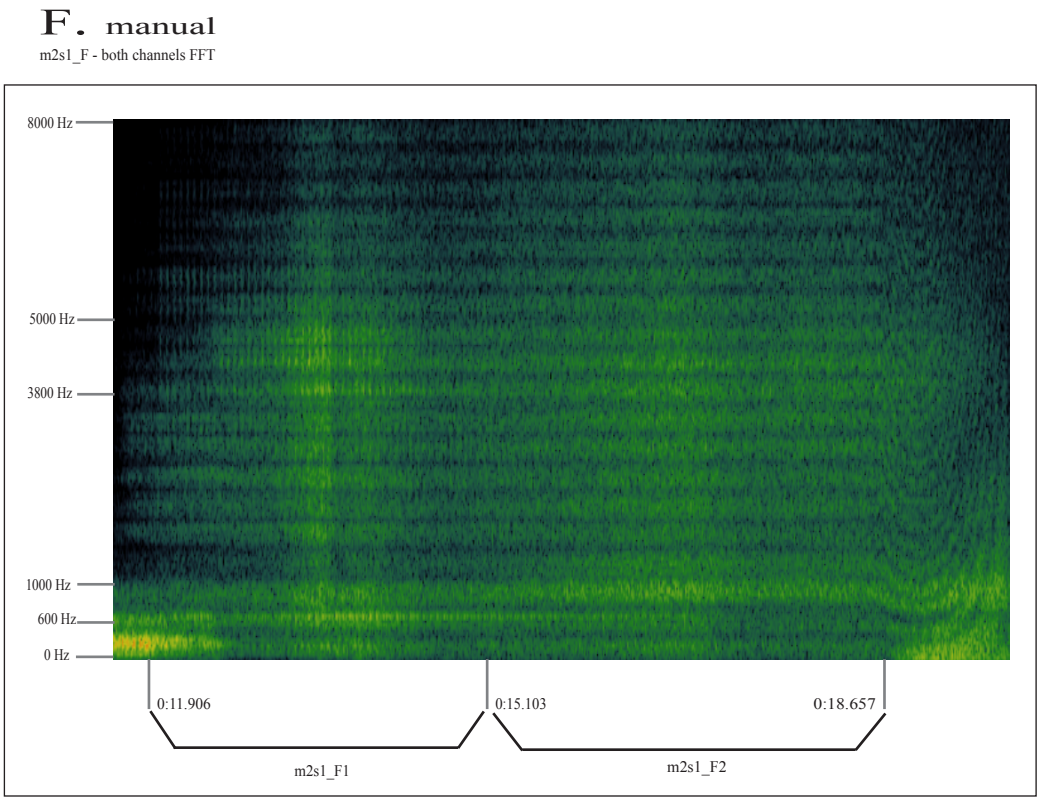
Figure 37. m2s1_E



F. Manual (see Figure 38.)

Following this manual intervention, implemented through a filter, a series of different granulations are layered on top of and adjacent to each other. The first of these continues the rhythmic pulsation shifting the dominant bands to; 600 to 1000 Hz and 3800 to 5000 Hz (m2s1_F1). This emphasis of a higher band gives way to a cross fade to a diffuse cloud where the rhythmic pulsing is obscured and the bands, while still present, are more diffuse, particularly the top one (m2s1_F2).

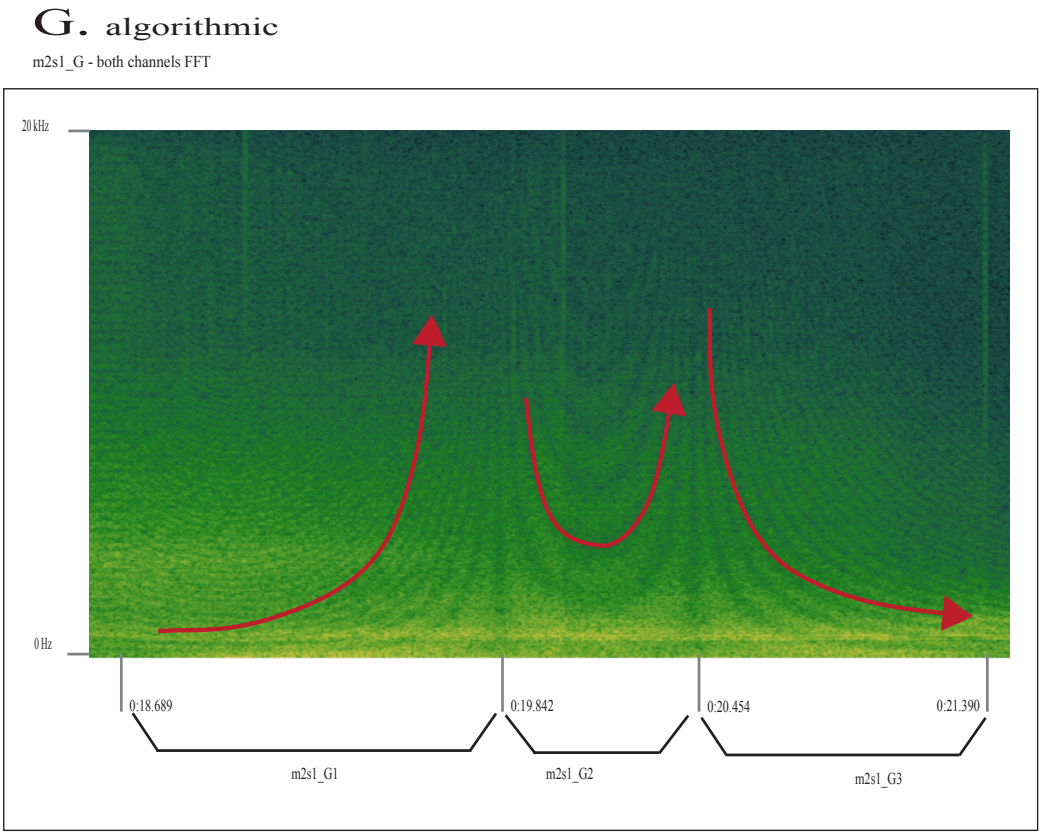
Figure 38. m2s1_F



G. Algorithmic (see Figure 39.)

Following the diffuse cloud the use of the sQg is clearly visible, first ascending (m2s1_G1) later descending (m2s1_G3) with a rapid downward then upward sweep in the middle of the two (m2s1_G2).

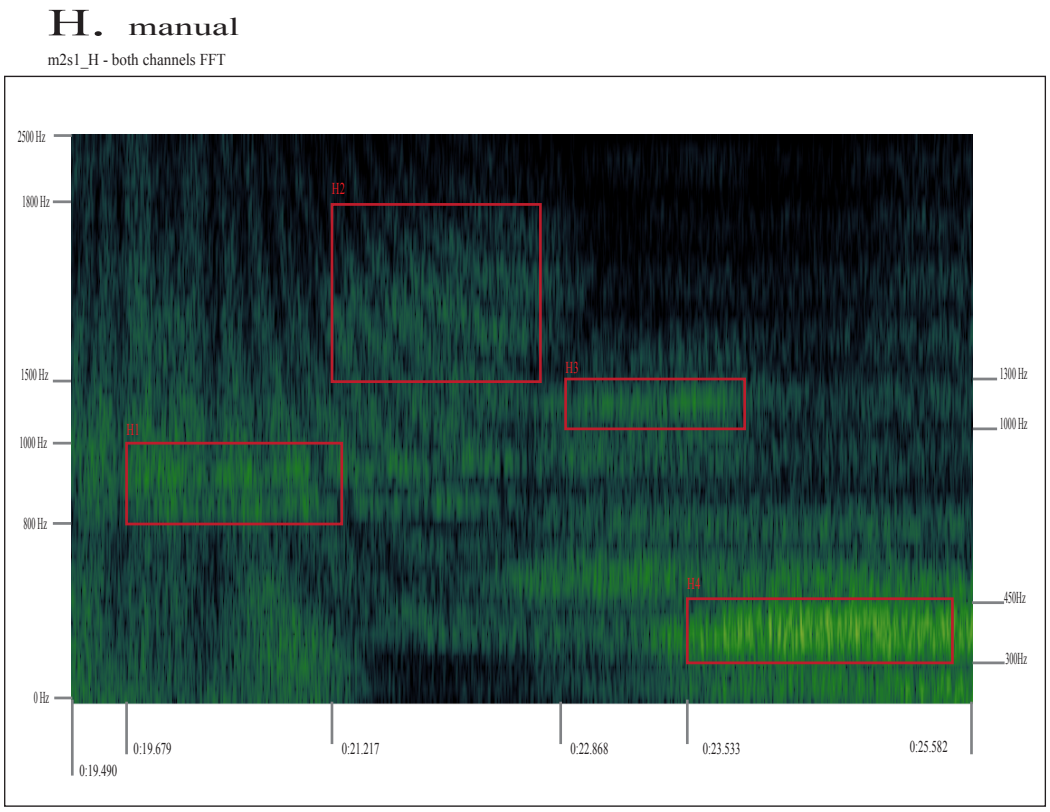
Figure 39. m2s1_G



H. Manual (see Figure 40.)

This algorithm in the foreground is followed by a succession of four granulations that sequentially emphasize; 800 to 1000 Hz (H1), 1500 to 1800 Hz (H2), 1000 to 1300 Hz (H3) and 300 to 450 Hz (H4). The mixing of these different points of spectral emphasis creates a bridge between the granulation strategies of m2s1_G and m2s1_I.

Figure 40. m2s1_H

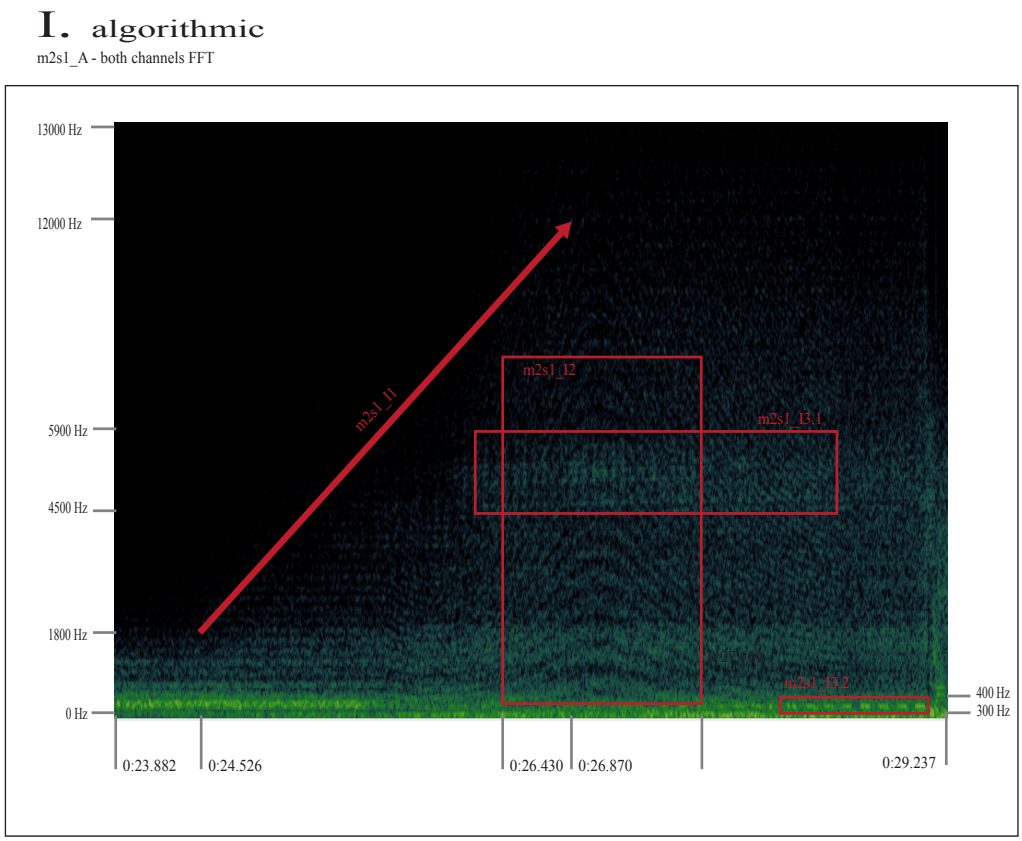


I. Algorithmic (see Figure 41.)

Completing the first section is a granular algorithm that results in a diffuse cloud whose upper boundary ascends from 1800 Hz at 0:24.526 to 12,000 Hz at 0:26.870 (m2s1_I1). The algorithm that shapes this ascent is the result of using the sQg program (m2s1_I2). Similar to m2s1_G, there is an ascent and descent of the filter, but here in m2s1_I there is no manual intervention such as m2s1_G2 being inserted between m2s1_G1 and m2s1_G3. The rhythmic pulsations that underpin this movement are a component of the foreground mix in this section and can be seen

between 4500 and 5900 Hz (m2s1_I3.1). Just before the impact that initiates the second section at 0:29.128, the upper rhythmic bands amplitude is lowered and the rhythmic pulsation is brought to the foreground between 300 and 400 Hz (m2s1_I3.2). The pulsation is a series of clearly delineated blocks of sound, with silence between each. These blocks will show up transformed after the impact, beginning section two and playing an important role in defining the sound of the second section.

Figure 41. m2s1_I

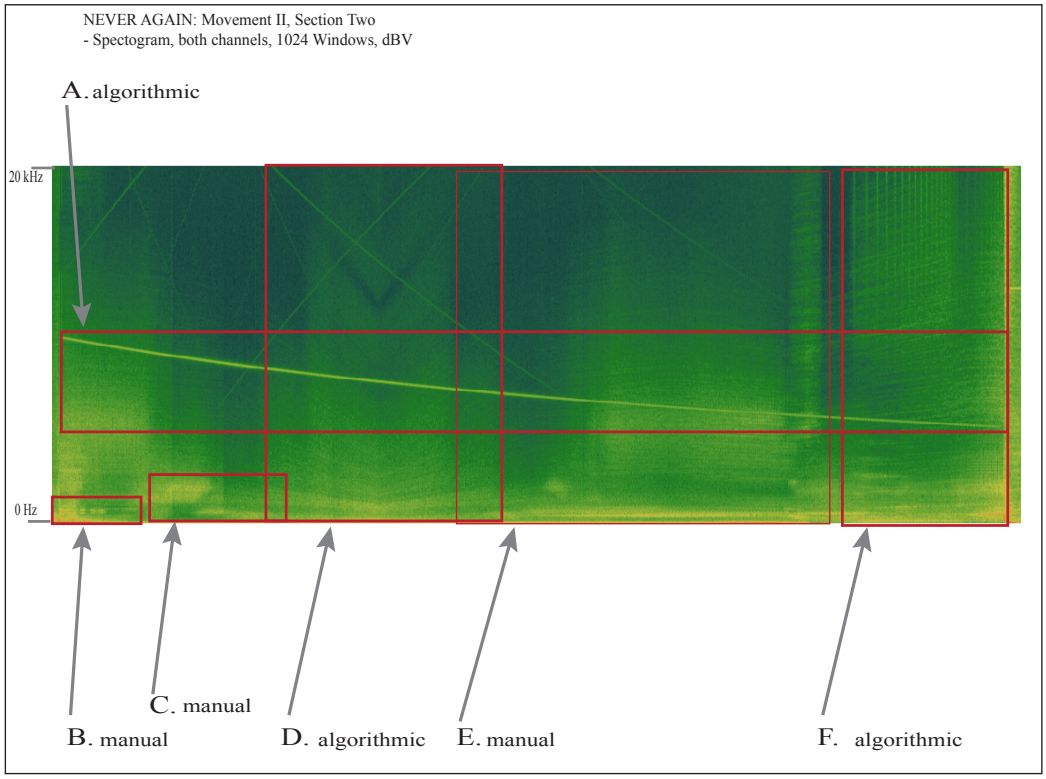


B. Section Two (of movement two)

1. General Overview (see Figure 42.)

The most salient feature of the second section is a descending sine tone that continues the rhythmic pulsation that the composer has established. This dominant narrow frequency descending gesture is underpinned by a series of overlapping clouds that generally descend in frequency focus and then ascend. These mid level clouds local movement is varied both in the direction of the from cloud to cloud and in the material that constitutes those clouds. These more focused mid level clouds are set atop a full spectrum sound mass that descends and then ascends. Contrapuntal motion is created by alternating between the large sound mass and the mid level material in the foreground of the mix. The interplay of these layers and the material present at both the note-level and micro-level time scales provides a range of interactions on multiple timescales.

Figure 42. m2s2

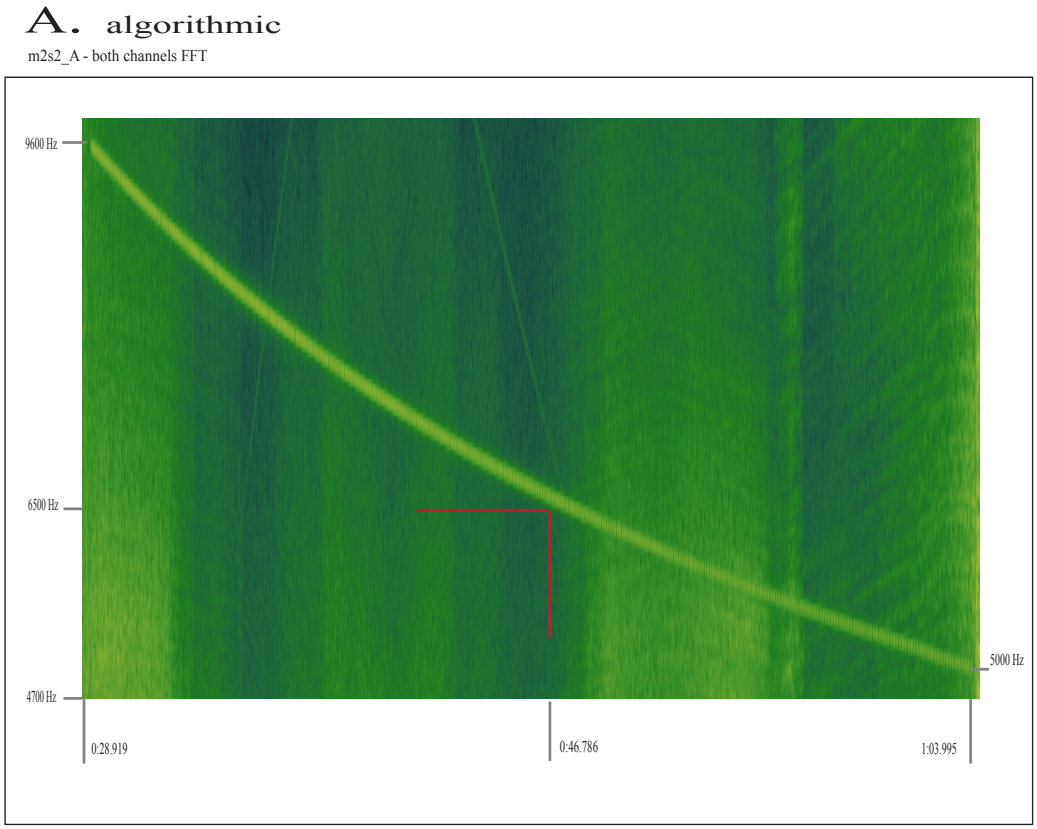


2. Formal Design

A. Algorithmic (see Figure 43.)

A descending sinusoidal grain dominates the foreground of the entire section. This simple algorithm is present in both channels. At 0:20.314, just after the impact, the sine tone grain appears at 9600 Hz and gradually descends. At 0:46.786, when the frequency is 6500 Hz, the sound gradually begins to fade into the mid layer of the mix. The second section ends at 1:03.995 and the frequency at this point is 5000 Hz.

Figure 43. m2s2_A

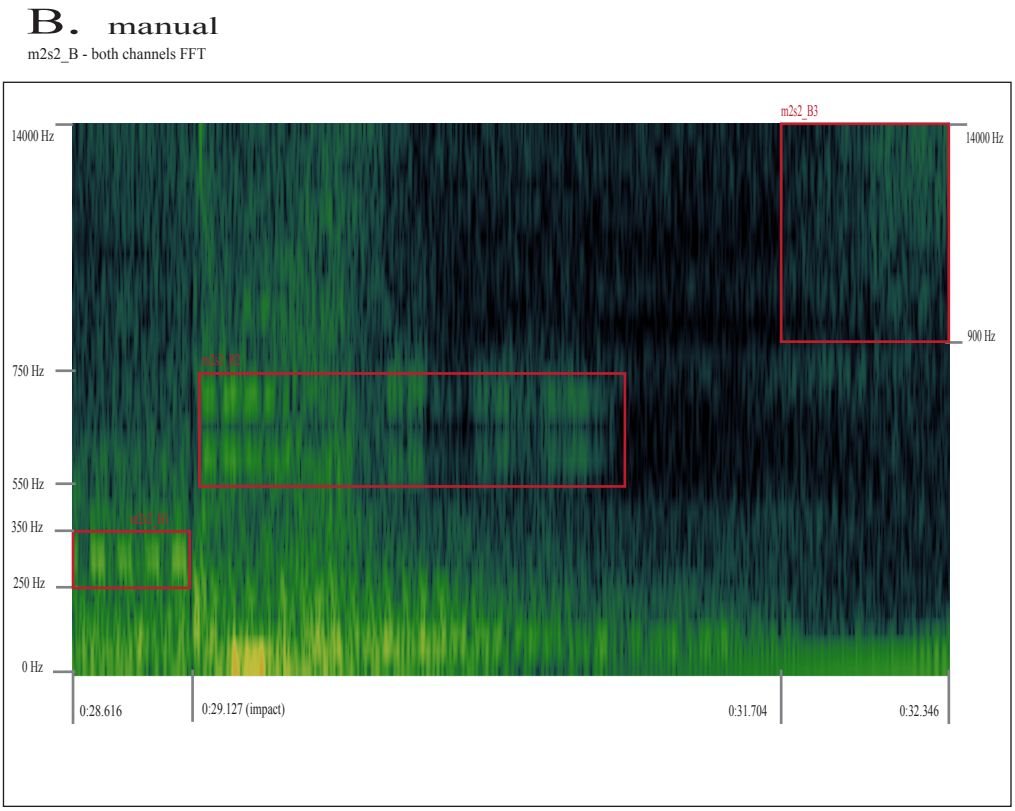


B. Manual (see Figure 44.)

Just after the impact that begins section two, there are a series of 550 to 750 HZ grains (m2s2_B2) placed manually in the foreground of the mix. These grains continue the pulsation that was in the foreground of the mix just prior to the impact (m2s2_B1). These grains are unique because while they are locally continuous, they are segmented into groups with different intervals of silence between the groups. The aperiodic stuttering effect suggests a morphology to the listener where the grains

sputter into oblivion and the rhythmic motion is replaced by a high granular cloud at 0:31.704.

Figure 44. m2s2_B



C. Manual (see Figure 45).

Continuing after the initial impact of the second section, the most prominent components of the mix are the descending sine tone of m2s2_A and low bass rumble around 80Hz. The mid layer of the mix is dominated by a series of granular clouds are manually mixed together. In contrast to the abrupt juxtapositions that dominate the first section of the movement, the clouds of the second section smoothly

penetrate each other. The clouds in m2s2_C illustrate this supple nature and successively descend, 1000 to 2500 Hz in m2s2_C1, 500 to 800 Hz in m2s2_C2 reaching 250 to 600 Hz in m2s2_C3. This manual mixing of material reinforces the descending trajectory of the full frequency range algorithm in the back of the mix and that will come to fore next in m2s2_D.

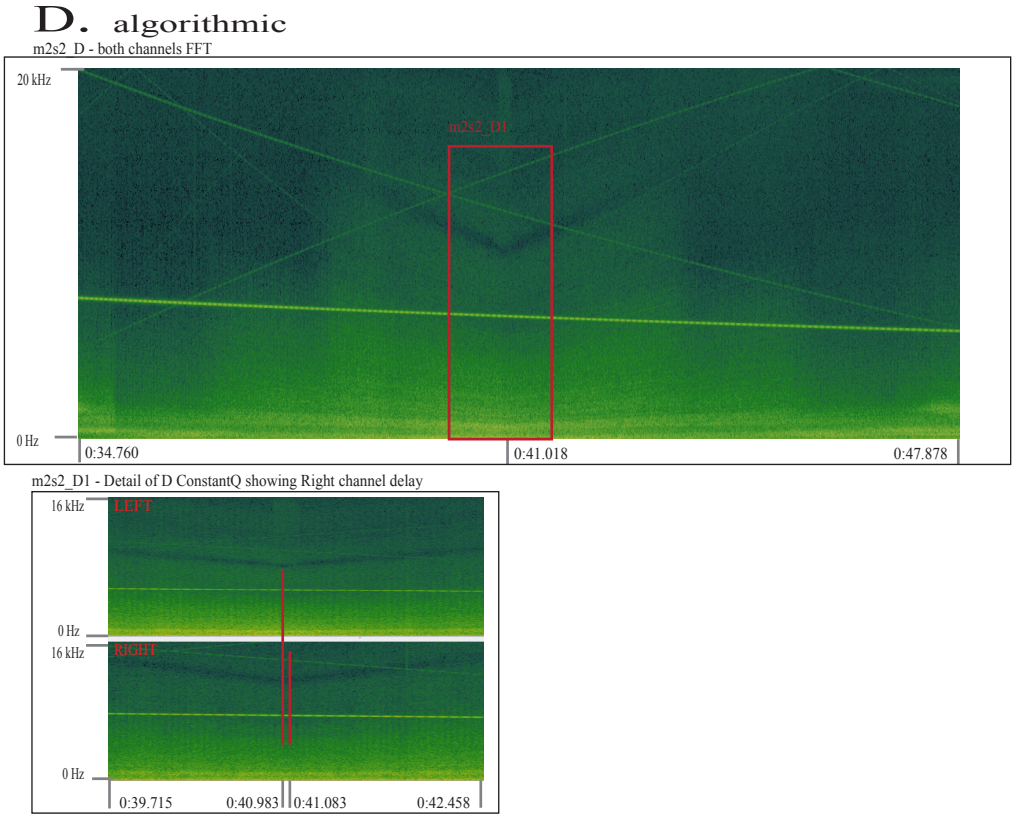
Figure 45. m2s2_C

D. Algorithmic (see Figure 46.)

The centrally located second section of this movement features an algorithmic apex point that is descended toward and then away from. The granulation algorithm

used to achieve this movement is the sQg. In contrast to the ascent and descent motion of the first movement, the second movement's descent and ascent is far more gradual. The diffuse cloud that has been in the back of the mix and has now moved forward occupies the entire range and the descent and ascent of the filter is clearly visible. Reinforcing the sweeping motion is a manual adjustment of the material; the descent is emphasized in the left channel and the ascent in the right channel, achieved with stronger amplitude in the left channel and by delaying the signal in the right channel by roughly 0:00.100 seconds. The delay is visible in the m2s2_D1.

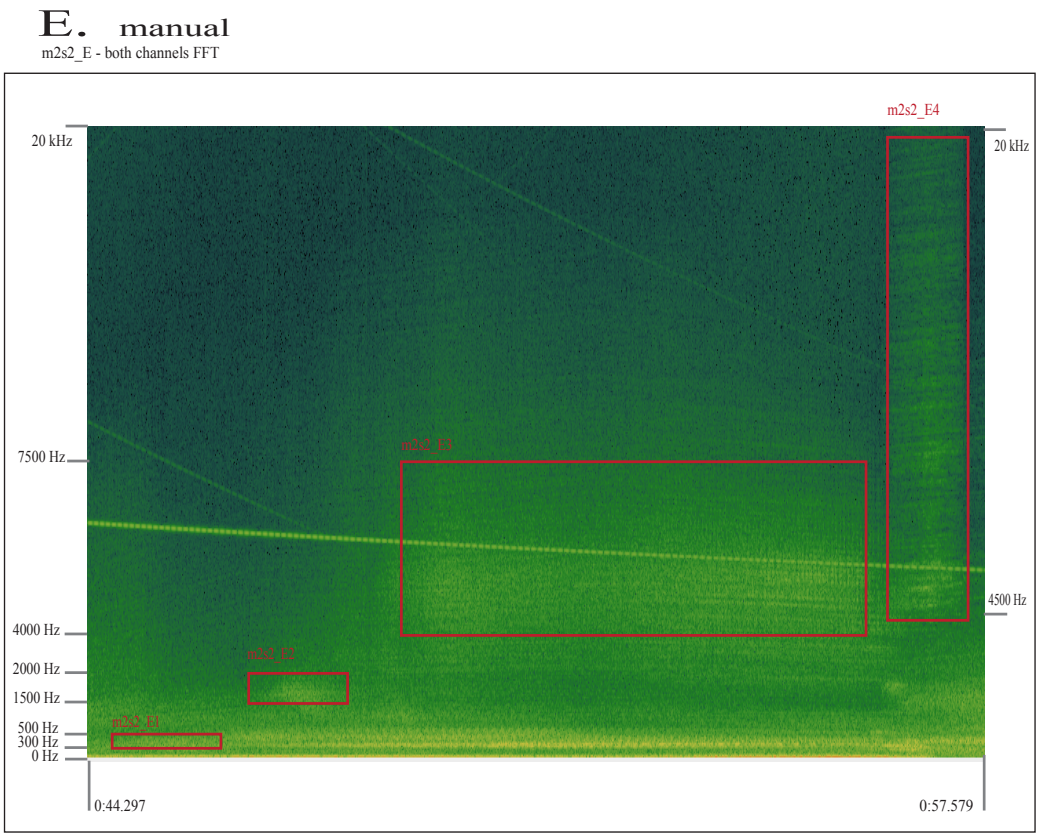
Figure 46. m2s2_D



E. Manual (see Figure 47.)

The algorithm of m2s2_D stabilizes in frequency movement around 0:44.297, this steadiness is most evident in the prominent 400 to 700 Hz band. In a mirror of the descending clouds manually assembled in m2s2_C, four clouds (labeled E1 through E4) emphasize an ascent during m2s2_E. The granular clouds are more diffuse than those of m2s2_C and the ascent takes roughly 6 seconds more than before.

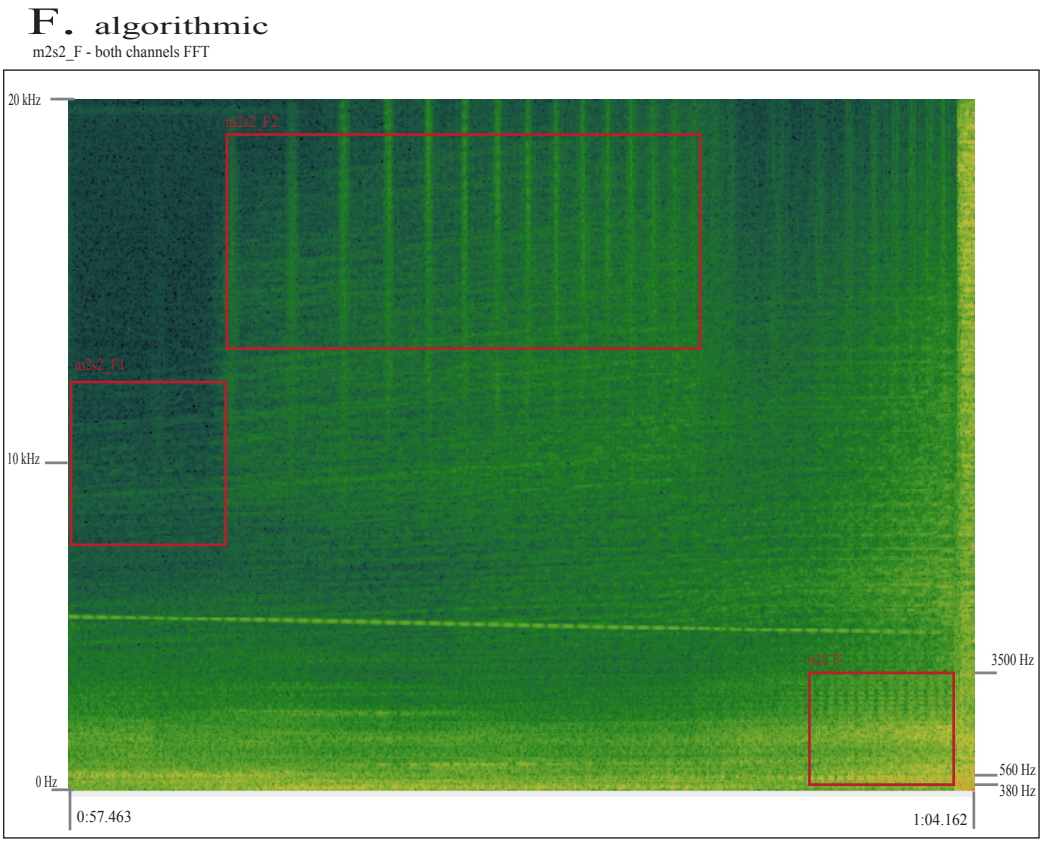
Figure 47. m2s2_E



F. Algorithmic (see Figure 48.)

The ending of the second section overlaps two different algorithms raising the spectral trajectory, creating motion toward the broadband impact that begins the third section. The layered algorithms are a diffuse cloud with a gradual upward sweep and an overlaid series of impulse like grains whose rates exponentially increase toward the impact that begins the third section. The diffuse ascending cloud features very short aperiodic grains at a high grain rate and low amplitude. These grains reveal striation of the filtering used to shape the sound. An example of this is evident in box m2s2_F1. The impulse-like grains that define the second algorithm present in this section are clearly evident in m2s2_F2 and m2s2_F3. The impulses in m2s2_F3 reinforce the symmetry of the section, mirroring the individual grains of m2s2_B2. While the rhythmic pattern is different and the frequency range not precisely the same, both of these sets of grains move to the front of the mix and occupy a similar focal point in the mix.

Figure 48. m2s2_F



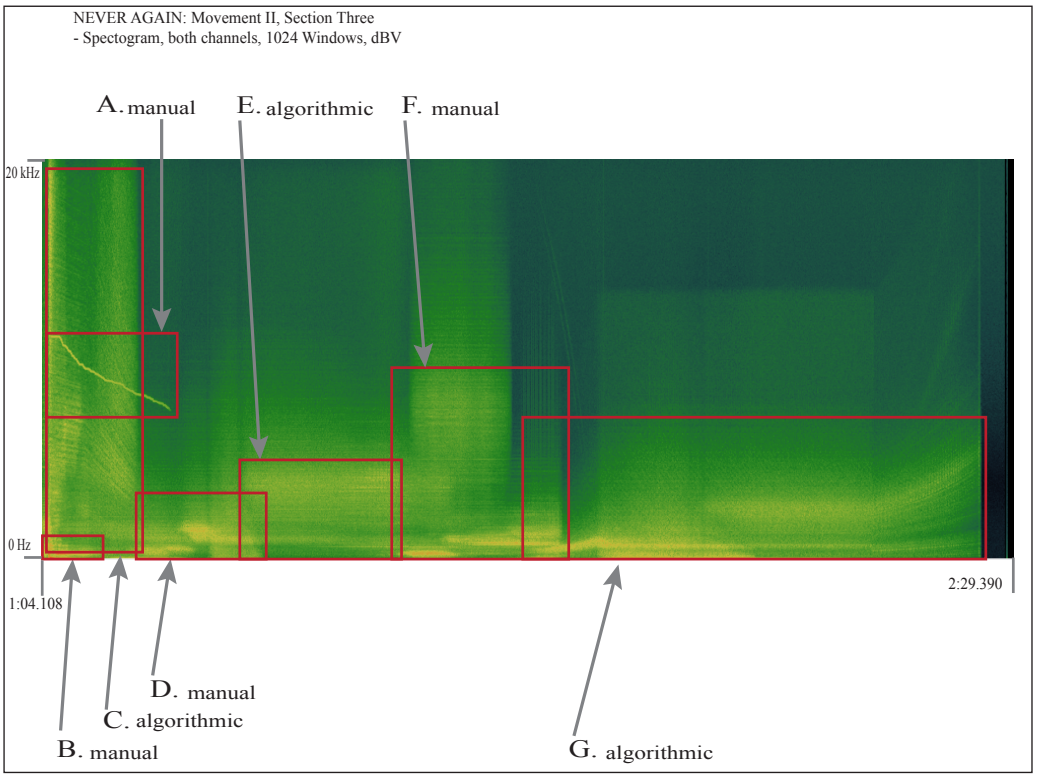
C. Section Three (of movement two)

1. General Overview (see Figure 49.)

Longer in length than the two previous sections combined, the third and final section of the second movement is a series of overlapped granulations where the change in granulation strategies and slow pacing dissipate the intense energy of the movement. A wide variety of granulation strategies and frequency emphasis are achieved through the overlapping and local inner penetration of long sound masses creating shifts between materials that are more gradual than previous sections. This

series of manually combined sound masses uses a range a granulation strategies, the components delineated by their unique spectral position and granulation profile.

Figure 49. m2s3



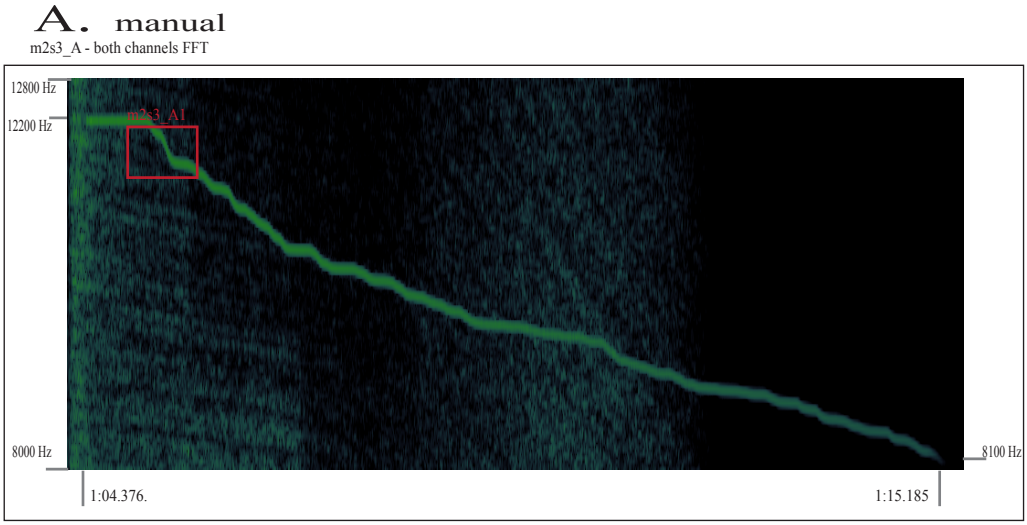
2. Formal Design

A. Manual (see Figure 50.)

The most easily identifiable feature after the impact that begins the third section is the gradually descending sine tone. There is a similarity in sine tones between this and the previous sections in the gradual nature of the descent and the presence in both channels. The most immediate difference is the continuity of the tone, where

there had been rhythmic pulsation in the second section the tone is now continuous. The other major difference is the spectral position of the tone, which now begins at 12kHz and descends to 8kHz. The tone does not persist for the entire length of the section and the dissent is not mechanically precise (m2s3_A1), suggesting a manual control of the frequency.

Figure 50. m2s3_A

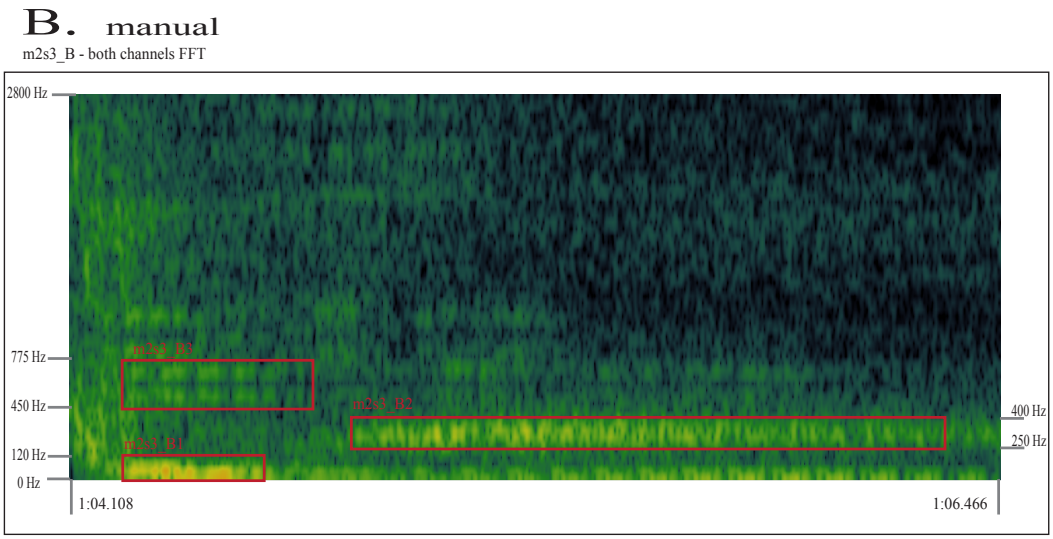


B. Manual (see Figure 51.)

The initial impact and immediately following material is a complex of manually layered sounds. The most dominant spectral band is the low frequency, first in the 0

to 120 Hz band (m2s2_B1), which is replaced by a 200 to 380 Hz band (m2s3_B3). Embedded in this mass of sound are a series of stuttering grains similar to those of m2s2_B2, a manually applied sonic feature that reinforces the palindromic design of the movement.

Figure 51. m2s3_B

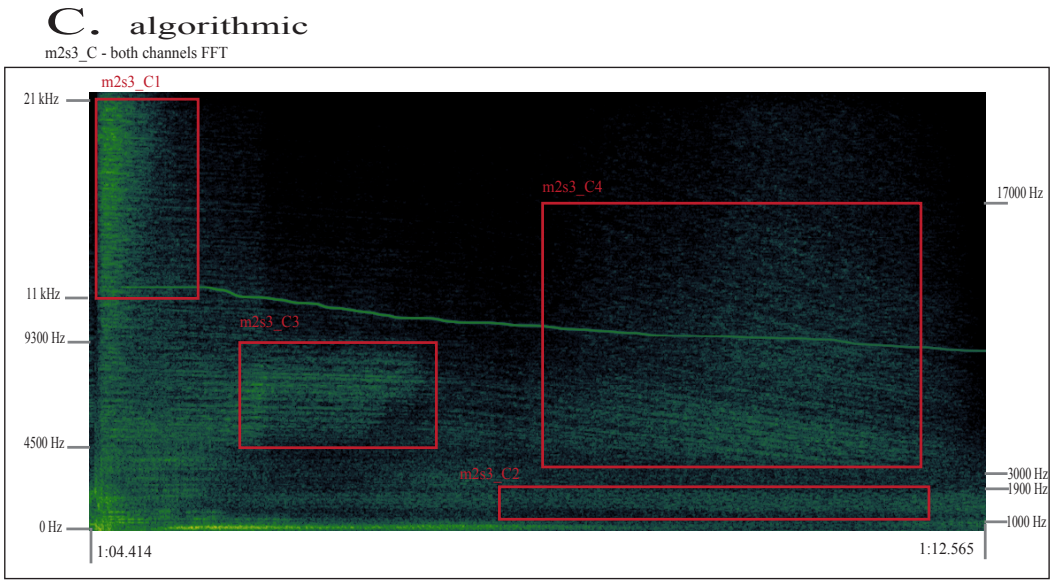


C. Algorithmic (see Figure 52.)

The algorithms that define the granulations of this section constitute a constellation of material that move the listener away from the impact. Above the low frequency material described in m2s2_B, there are two types of granular strategies

that convey a descent in frequency focus; diffuse clouds and sQg striated bands. The diffuse clouds of granular material are constrained by filters. m2s3_C1 creates a high frequency focus in the unfolding of the impact which rivals the low frequency dominance of m2s3_B, while m2s3_C2 can be heard as an extension of the low frequency material. Contrasting these pitch-stagnant clouds are the descending sQg clouds of m2s3_C3 and m2s3_C4. These clouds use a bank of filters to striate the granulation creating a different texture using similar grain lengths and cloud densities.

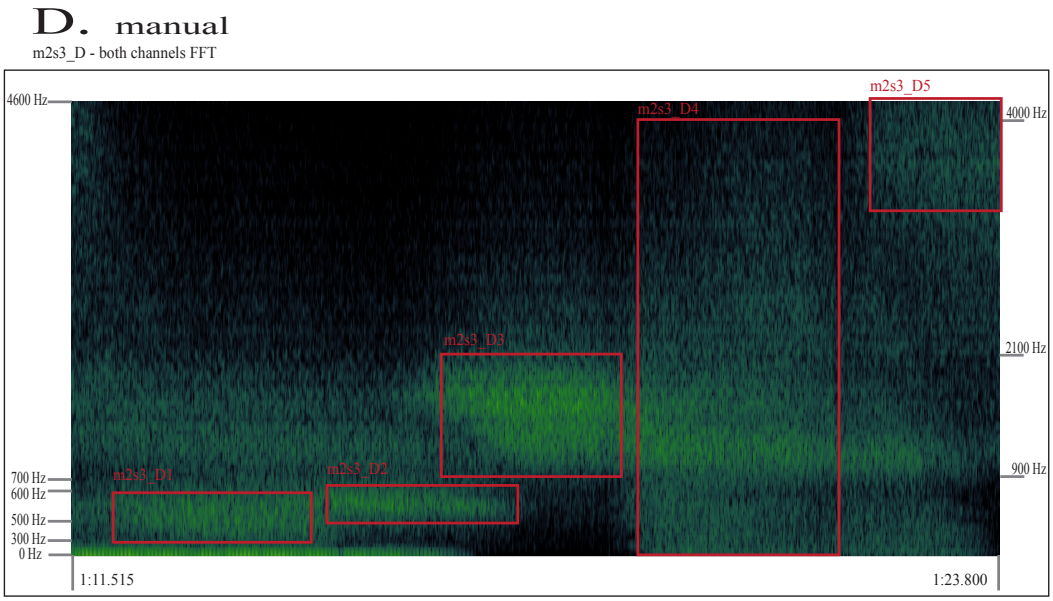
Figure 52. m2s3_C



D. Manual (see Figure 53.)

The pacing of the third section is much slower than that of previous sections. This is the result of long clouds that occupy the middle portion of this section, m2s3_E through m2s3_F. The transition to this slower pacing is accomplished in m2s3_D. Moving through four sound masses in twelve seconds, four seconds longer than the same process in m2s3_C. This strategy is a compositional choice that uses progressively ascending pitch focal points, illustrated in m2s3_D1 through m2s3_D4, with clouds that exhibit a downward trajectory internally. While the different clouds have been segmented, audition reveals a fluid transition from one cloud to the next, each sonic mass inter-penetrating the next. The cloud labeled m2s3_D5 indicates the beginning of m2s3_E.

Figure 53. m2s3_D

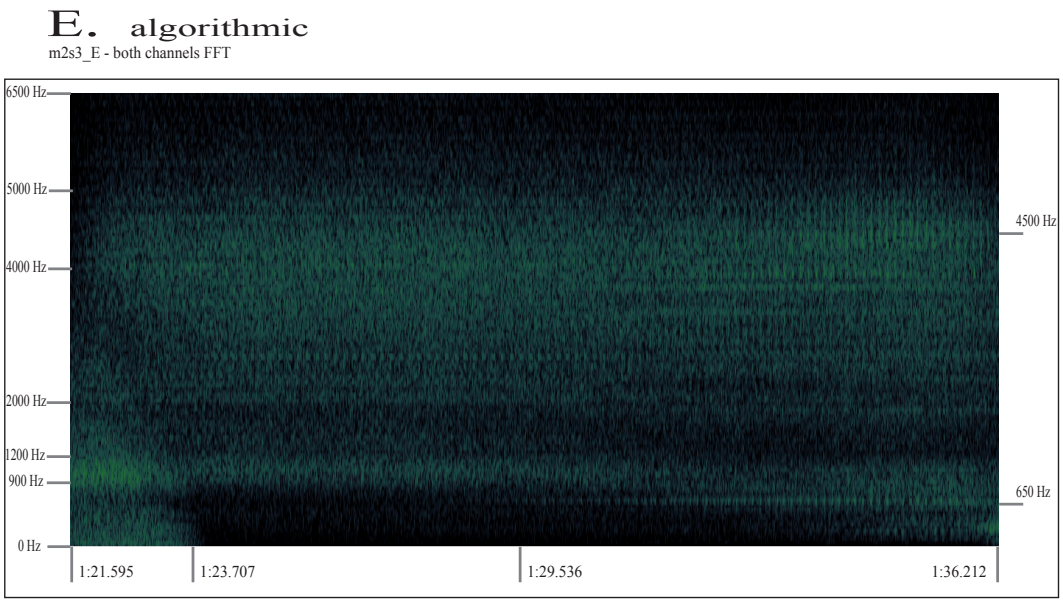


E. Algorithmic (see Figure 54.)

Three seconds greater longer and with only two blended sound masses, this part slows the motion of the movement to an even greater degree than m2s3_D. The two granulations that are blended are layered one atop the other, the change in density, the different granular parameters and the subtle shift in spectral emphasis are what distinguishes them. The two granular strategies extend horizontally into the previous and following sections. The 900 to 1200 Hz band that defines the lower edge at 1:23.707 lasts the entire length of the section with the same granulation parameters.

The frequency of the diffuse upper cloud between 2 and 5 kHz is centered around 4 kHz in the first half, while 4.5 kHz is the focal point of the second half. The cloud in the first half is composed of diffuse aperiodic grains, while the periodic grain stream at 650 Hz that emerges near 1:29.536 brands the cloud in the second half with a periodic grain stream.

Figure 54. m2s3_E

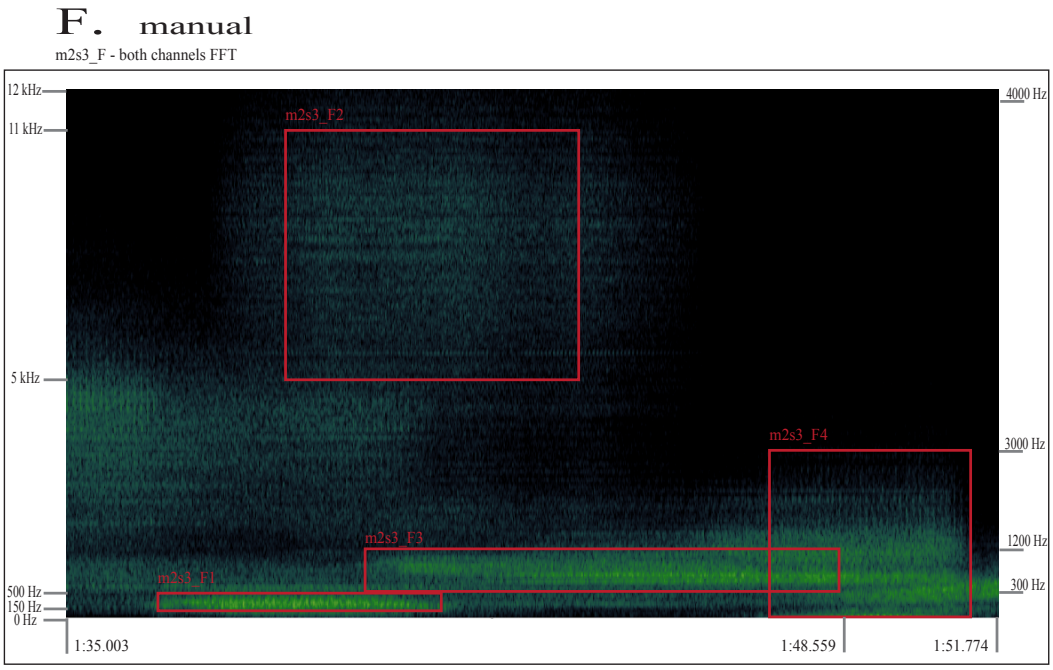


F. Manual (see Figure 55.)

This middle movement of *Never* is replete with palindromic design, in material and gesture. The manual montage of band-limited clouds that constitutes the material

of m2s3_D is mirrored in the granular clouds of m2s3_F. The 650 Hz stream of percussive grains begun in m2s3_E continues into this section and a 150 to 500 Hz cloud appears first and a 4000 to 11000 Hz cloud is quickly added, enclosing both the lower and upper boundaries of the cloud of the previous section. The tension between slow grain rate of the lower cloud, m2s3_F1, and the fast rate of the upper cloud, m2s3_F2, is resolved in m2s3_F3 which uses a grain rate, grain length and frequency position between that of m2s3_F1 and m2s3_F2. The relatively narrow 300 to 1200 Hz m2s3_F3 cloud seems to expand as m2s3_F4 is faded in. At 1:48.559 the ascending band that begins the last section of the movement is faded in.

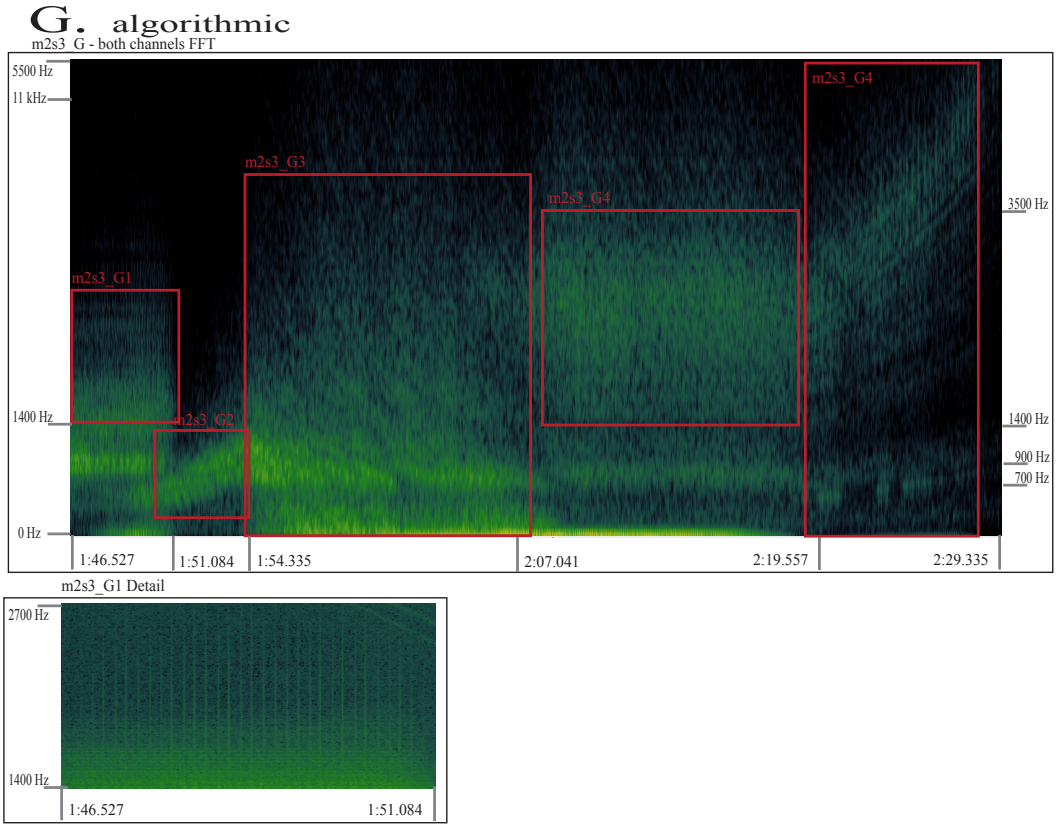
Figure 55. m2s3_F



G. Algorithmic (see Figure 56.)

The type of granulation being used moves to the perceptual foreground in m2s3_G, beginning with impulse grains at 1:47.527. The pulsation which has created a drive forward for the movement is reasserted with short periodic grains (m2s3_G1). Under this spectrally stable section, slightly longer glisson grains emerge. A narrow cloud between 400 and 800 Hz constrains these sliding grains while all other streams of material are removed and the cloud ascends to 700 to 900 Hz between 1:51.084 and 1:54.335 (m2s3_G2). This narrow band continues while a wider cloud engulfs it until 2:19.557. The range of the frequency slides of each grain as well as grain lengths are increased in m2s3_G3. As the cloud persists the grain lengths and density diminish. A new granulation strategy is introduced at 2:07.04, a diffuse cloud of shorter grains between 1400 and 3500 Hz. The second movement ends with a sweeping upward gesture that carries the upper cloud of m2s3_G4 and the lower 700 to 900 Hz clouds upward while the amplitude decreases. The narrowly banded striation of sQg returns and the pulsation rate quickens as the frequency rises, giving the impression of an evaporating sound mass. A final quick burst at 2:29.335 ends the movement, the short length and higher amplitude causes a colored click, akin to the clicking off of an entertainment appliance, such as a stereo or television.

Figure 56. m2s3_G



IV. Movement Three: Never Again

This final movement is the shortest and most tightly composed movement of the work. There are four large amplitude impacts beginning that begin each of the four sections of the movement. The decaying of these impacts function as the main sonic morphology of the movement. These long reverberant decays are extended with granular clouds and impulse-like grains. Here, swirling granular clouds, like those of the second movement, are woven together with and interrupted by impulse-like grains, reminiscent of the first movement. This material creates a sonic ride through

a seemingly fluctuating physical space that extends the reverberant resonance that follows the attacks. The journey through different resonances drives toward the last third of the movement, where strong transients opening the fourth section, begins a dissipation of energy. These transients are followed by predominantly uninterrupted reverberation resonance leading to a final reiteration of the opening metallic sonic figure. The transients have been anticipated by the extensive use of impulse-like grains in m3s1_D, in the similarity of underlying materials and the pairing of exposed grains with lower frequency impacts. The relationship of event and consequence plays a key role in this movement. A recurring consequence of impacts after an initial decrease in amplitude and then an increase are a series of grains that act as initial report echoing back.

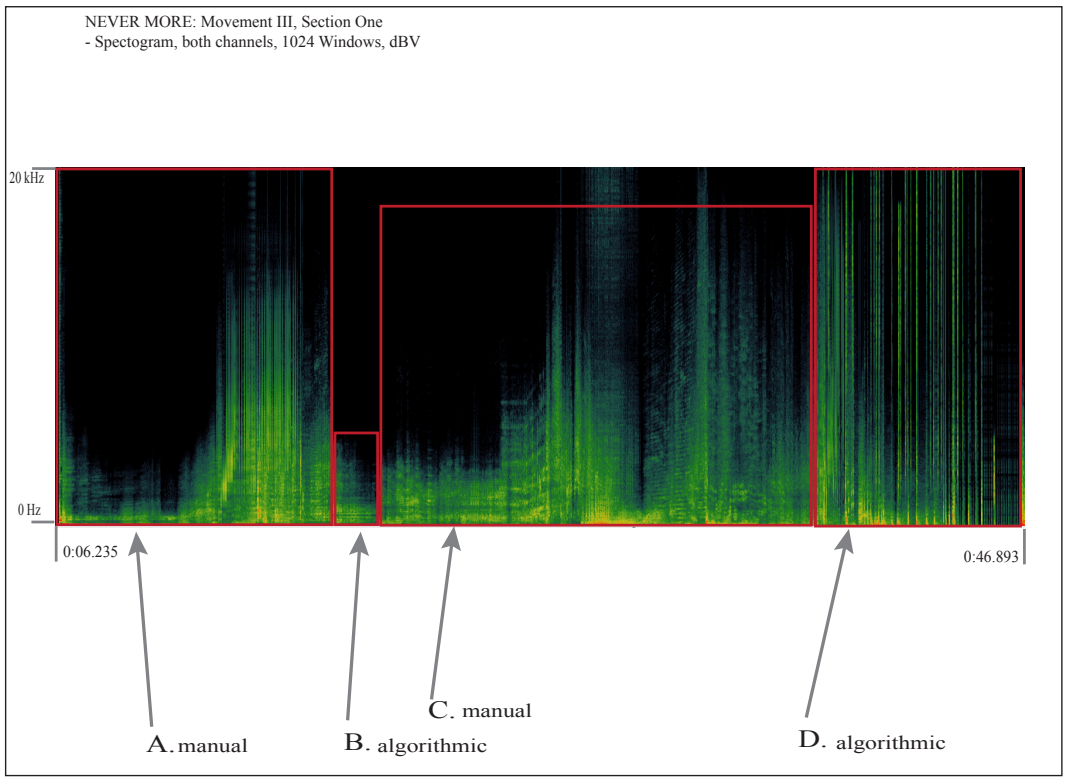
A. Section One (of movement three)

1. General Overview (see Figure 57.)

The first section begins with a metallic percussive attack that will also conclude the movement. The resonance from this attack is extended with the use of dense clouds of granulation that leads to a series of impulse-like grains, first in the end of the m3s1_A and then the end of the section in m3s1_D, the second series lasting longer than the first. The opening attack and subsequent undulating resonance builds to the first set of impulse-like grains, a dense series that is punctuated with several attacks imbedded in the middle level of the mix. A significant impact disrupts the grain series and the resulting resonance is woven between a granular cloud and

stuttering repeated grains. The stuttering grains ascend and descend as in m3s1_C and eventually give way to the impulse-like grains of the final component of this section. The impulse-like grain stream is combined with low frequency, high amplitude transient-like grains that punctuate the section. As the grain rate is slowed some of the frenetic energy that the opening has generated is dissipated.

Figure 57. m3s1



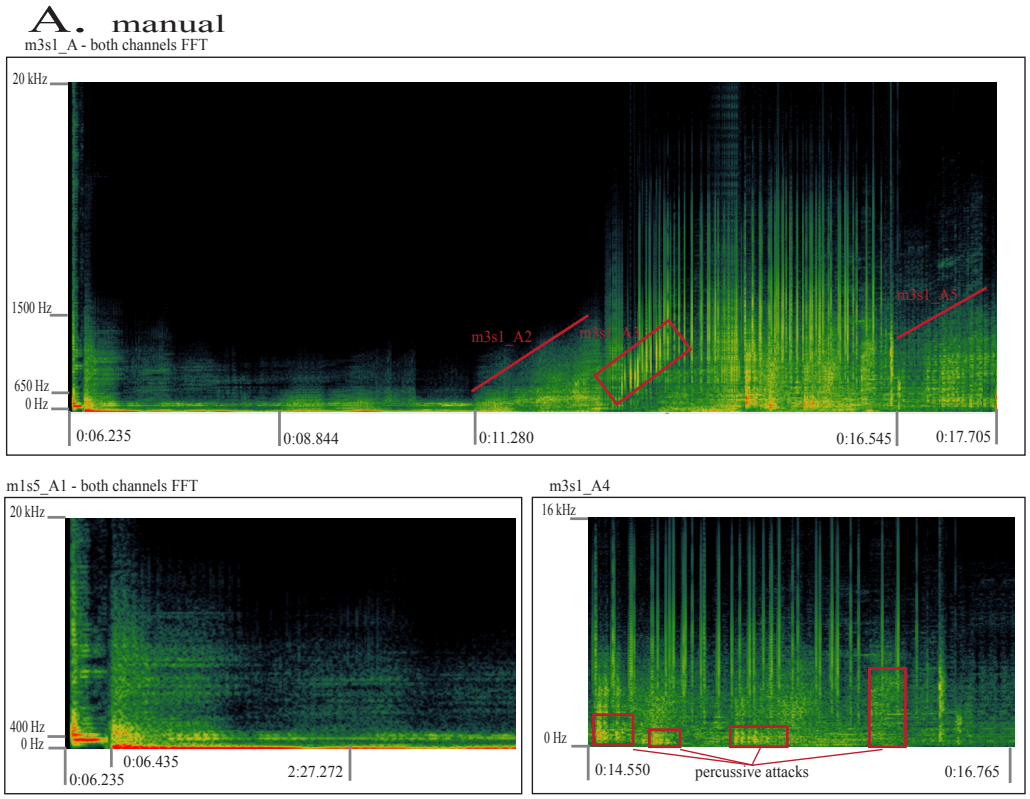
2. Formal Design

A. Manual (see Figure 58.)

The movement begins with a near field impact that has two components, a pitched metallic hit followed by a low frequency that is present while the energy of the reverberation dissipates. The impact has been sculpted by means of montage, combing the metallic impact and 0.200 seconds later a lower frequency and lower amplitude secondary impact that results in an the reverb tail with a primary spectral band in the bass and resonant formant at 400 Hz (m3s1_A1). During this dissipation, granular clouds are faded into the foreground to manually extend the reverb tail. These clouds are faded into the foreground at 0:08.844 and 0:11.280, the second entry pushing the upper boundary of the low frequency band from 650 Hz band up to 1500Hz (m2s3_A2). This ascent of a foreground granular cloud leads to a series of transient grains layered on top of the diffuse cloud. These grains reassert the ascending gesture (m3s1_A3) and lead to a section where three materials have been manually combined. This lowest frequency layer of material is a low amplitude granular cloud occupying the 75 to 450 Hz range. Punctuating this clouds low amplitude and spectral space are percussive attacks, which expand the spectral range upward. Some of these attacks align with the transient grains and serve to perceptually bring the different layers together. The transient grains occupy the upper space and exist on a micro timescale, in contrast to the slower note level material of the percussive events (m3s1_A4). The section concludes with a stuttering

granulation at 0:16.545, achieved by a slowly advancing read head and a high degree of overlap in the grains. The material being granulated again ascends in frequency (m3s1_A5), reinforcing the ascent trajectory of the section.

Figure 58. m3s1_A

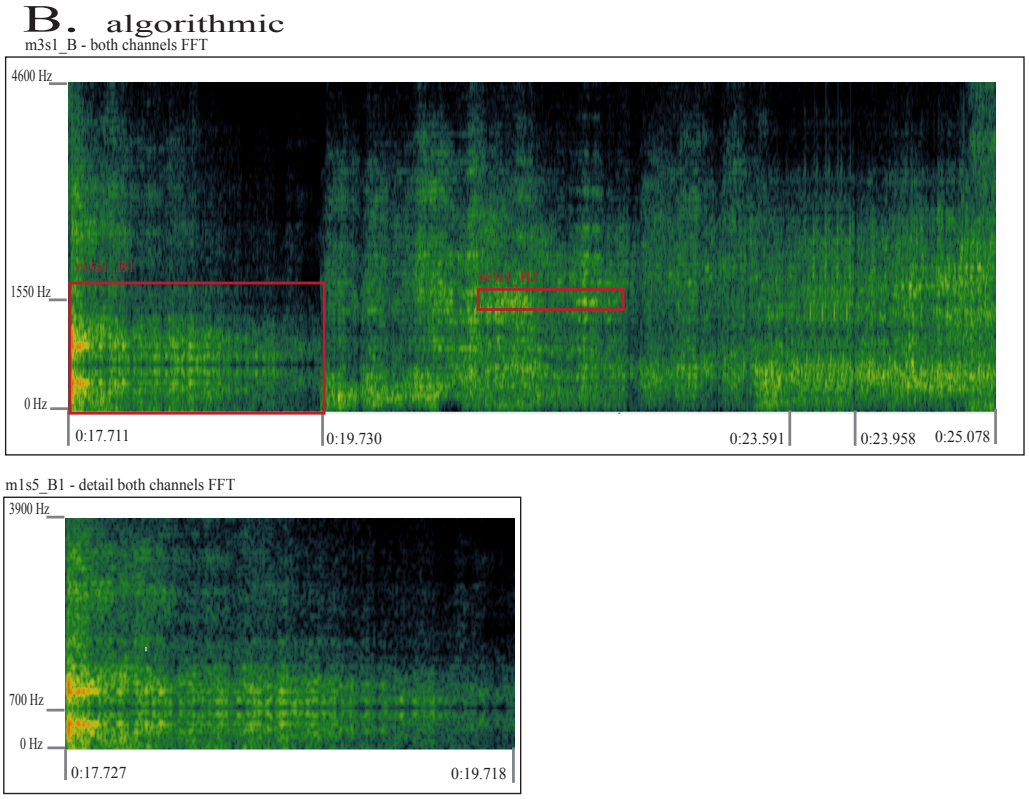


B. Algorithmic (see Figure 59.)

Three different algorithms are combined one after another, the changes in texture creating movement on the note level timescale. The first algorithm operates on an impact sound, similar to a snare. The impact and decay exhibit a common tailing reverb, the unique feature is the inverted spectral impact, symmetrically reflected

around a silent band at 700 Hz (m3s1_B1). At 0:19.730 a second granulation strategy is introduced, with a higher upper spectral boundary and a more diffuse granulation with a dominant band emerging at 1550 Hz (m3s1_B2). The final algorithm is introduced at 0:23.591, where a stuttering repetition of a single grain occurs. At 0:23.958 the stuttering grain is combined with the previous diffuse algorithm.

Figure 59. m3s1_B

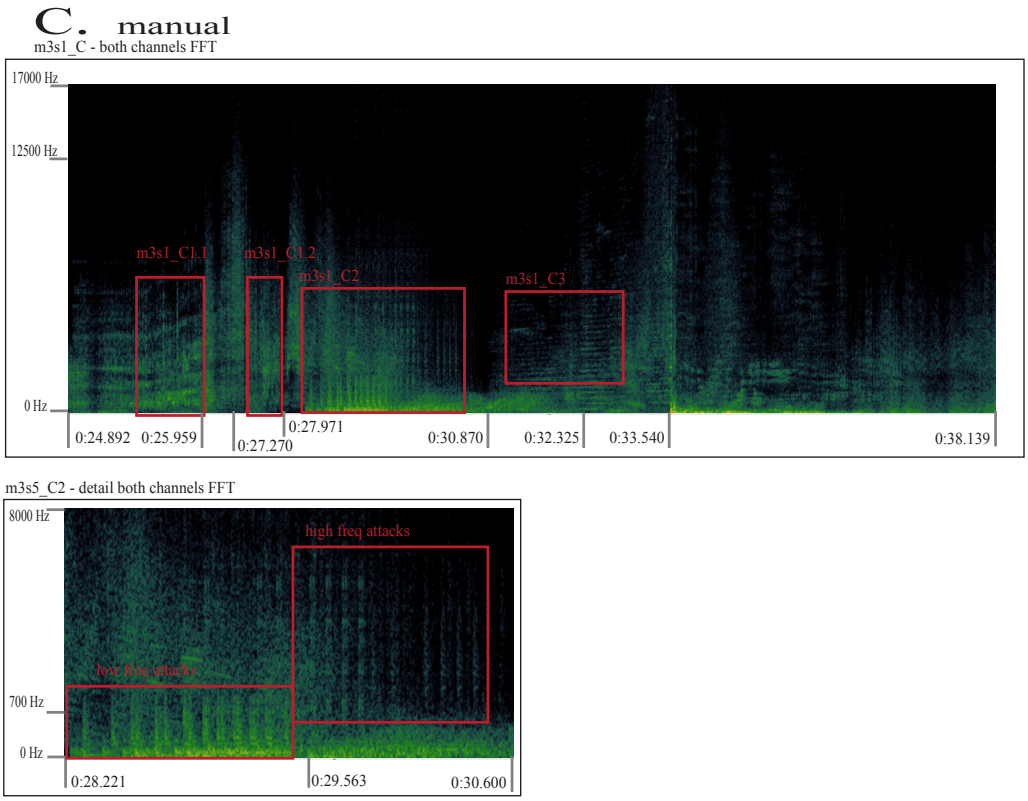


C. Manual (see Figure 60.)

This section features two spectral apexes, moved toward and away from with a series of manually interwoven materials. Movement upward toward the first apex begins with a granulation that establishes formant bands at 450, 1300 and 2300 and 3800 Hz (m3s1_C1.1). At 0:25.959 the bands are altered to ascend upward toward an impact that occurs between 250 and 8500 Hz. The result of this impact is a new granulation strategy, more diffuse and with less low frequency emphasis. This new granulation continues to the ascent toward the first apex at 0:27.270, which ushers in another more segmented grain stream, the frequency emphasis indicating that this is a continuation of the ascent material that was interrupted by the impact and apex material (m3s1_C1.2). The diffuse apex granulation material is then reasserted at 0:27.971 and is layered upon. The low frequency gap has left room for a series of low frequency attacks that accelerate toward 0:29.563 where they are replaced by higher frequency attacks and a rich bass granulation (m3s5_C2). The low frequency granulation begins the ascent toward the second apex of this section. Beyond 0:30.870 a second stream of granular material is added above the low frequency band. Resonant bands increasingly delineate this new granulation while the low frequency diffuse granulation is faded out by 0:32.235 (m3s1_C3). This material continues an ascent toward the apex at 0:33.540, with the more diffuse granulation making one more brief entrance. The apex at 0:33.540 is a low frequency thud that extends upwards to 17 kHz. From this apex the dissent in frequency and amplitude to the end of the section is dominated by a low frequency band and shifting diffuse

granulation that weaves different textures in and out of the foreground. The final cloud grows in density toward the impulse grains of m3s1_D that rupture this spacious sonic tapestry.

Figure 60. m3s1_C

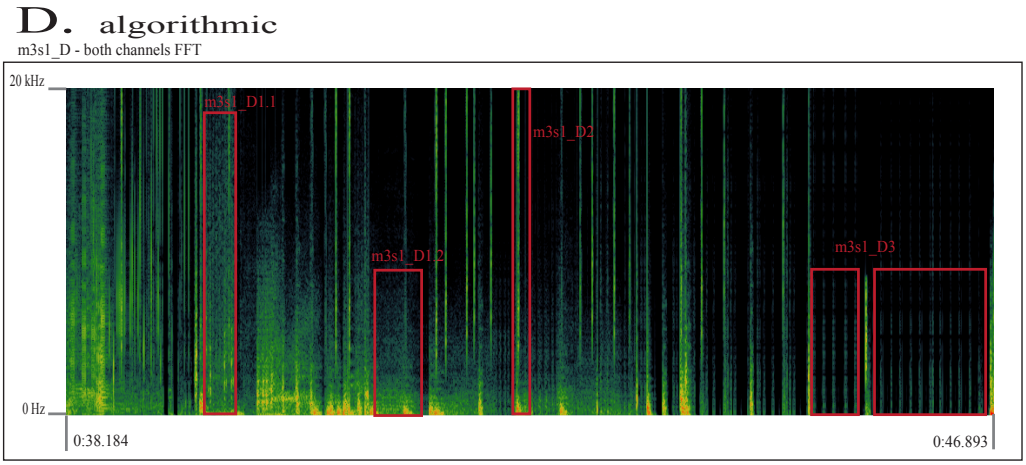


D. Algorithmic (see Figure 61.)

The material in this section is a cross fade between two different sounds, that of m3s1_C and m3s2_A, which have both been granulated differently. The material from m3s1_C is sustained by using a granulation that favors synchronous, overlapped, grains with a readhead that is advancing slowly, examples of this stream

of material are m3s1_D1.1 and m3s1_D1.2. Layered on top of this decaying sound and increasingly dissipating granulation is a second granular stream that features transient grains. This granular stream was created with the sQg, used to create an aperiodic stream and a short grain length, thereby increasing the spectral distribution. The material being granulated, which will become m3s2_A, has a dominant low frequency and this manifests in this granulation as well as the later (m3a1_D2 – example of a single grain). The section ends with a periodic series of highly similar grains, resolving the tension created by the aperiodic stream (m3s1_D3s).

Figure 61. m3s1_D

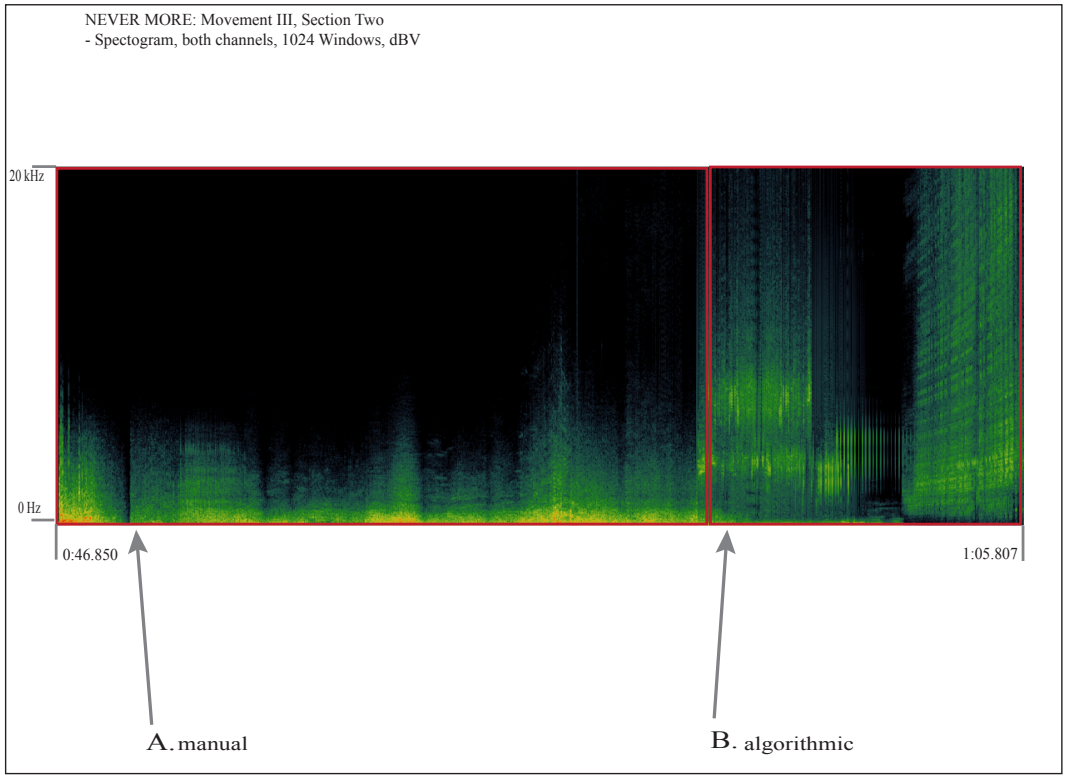


B. Section Two (of movement three)

1. General Overview (see Figure 62.)

An isolated impact opens the section and immediately a large undulating granular cloud is combined with the resonance. This granular cloud grows and shrinks in amplitude and two materials are combined with it to propel it forward. First, a stuttering grain of noisy material near 49 seconds provides a sort of delayed consequence to the initial impact, followed by another less defined version at 52 seconds. Another significant extension is provided by the swell near 56 seconds that leads to an attack that seems to implode upon itself. The sonic fallout of this event begins to tail off and is displaced with m3s2_B, a high frequency and high grain rate granulation that eventually thins and tapers off to a single decaying grain stream. Finishing the section is a rapid grain stream that is used to create an ascending arc, with striated filter bands providing a frequency ascent.

Figure 62. m3s2



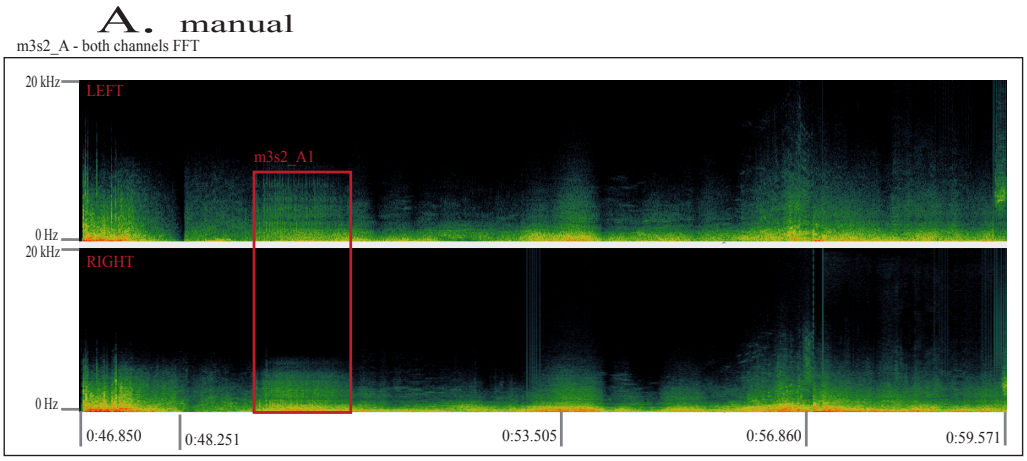
2. Formal Design

A. Manual (see Figure 63.)

An impact results in an undulating sound mass and through a series of manual interventions. By mixing in more material and in shaping the amplitude envelope, the sound mass approaches and recedes from the foreground. A fade to silence in the left channel at 0:48.251 is followed by a subtle rise in amplitude. A series of impulse grains reactivate the reverberator (m3s2_A1) resulting in a color change in the sound mass. Moving the mass to the foreground is accomplished by increasing

the amplitude and the introduction of higher frequency material to the sound mass, both at 53.505 and 56.860, the second increase is set off with an impact.

Figure 63. m3s2_A

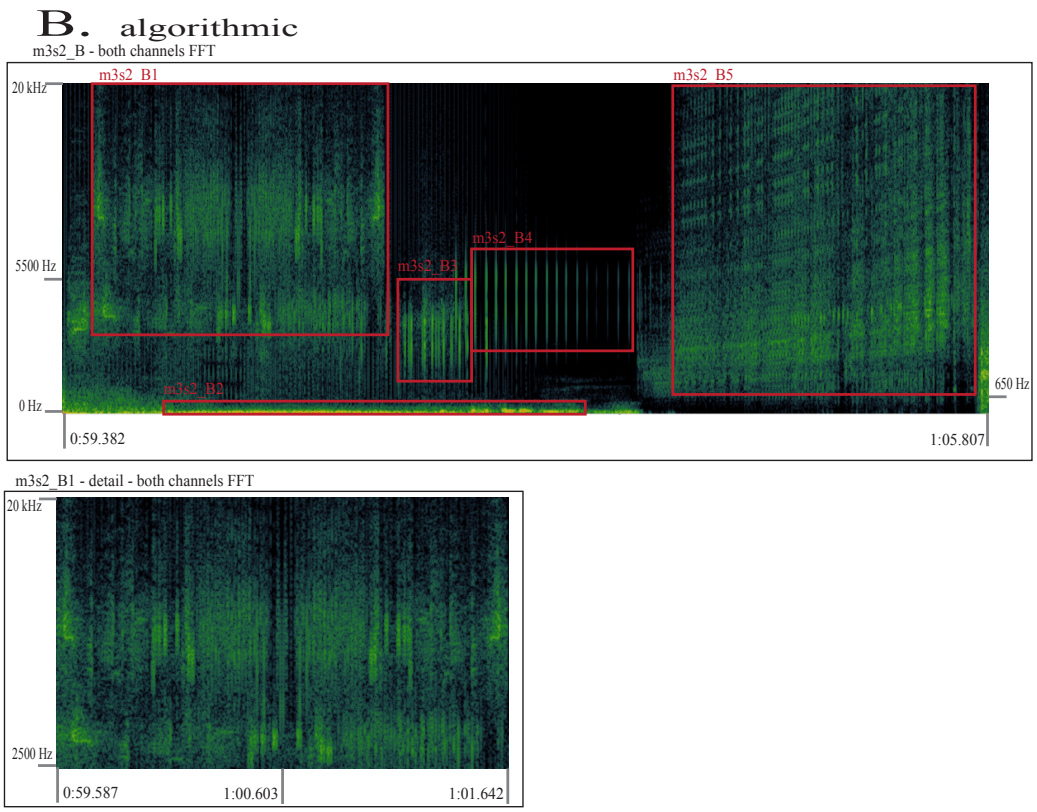


B. Algorithmic (see Figure 64.)

Three distinct algorithms are successively employed, creating bocks of material that contrast the undulating sound mass of m3s2_A. The section begins with an abrupt shift of the dominant spectral energy from material below 1500 Hz to material above 2500 Hz. The sQg shifts the format frequency, the grain density increases over time and the grain rate is increased between 0:59.587 and 1:00.603. This initial

granulation is mirrored around 1:00.603 (m3s2_B), while a low frequency band moves to the forefront and provides a transition to the next set of material (m3s2_B2). The next algorithm is a dense cloud of grains similar to m3s2_B1, except that is not mirrored and is rolled off above 5000 Hz (m3s2_B3). A sparse, periodic and decaying grain stream is combined with the low frequency band of m3s2_B1 to create a gesture that fades to silence (m3s2_B4). This silence is replaced with an ascending granular mass that uses a high degree of grain overlap, slow read-head, and resonant bands to create a shimmering ascent of material above 650 Hz (m3s2_B5).

Figure 64. m3s2_B

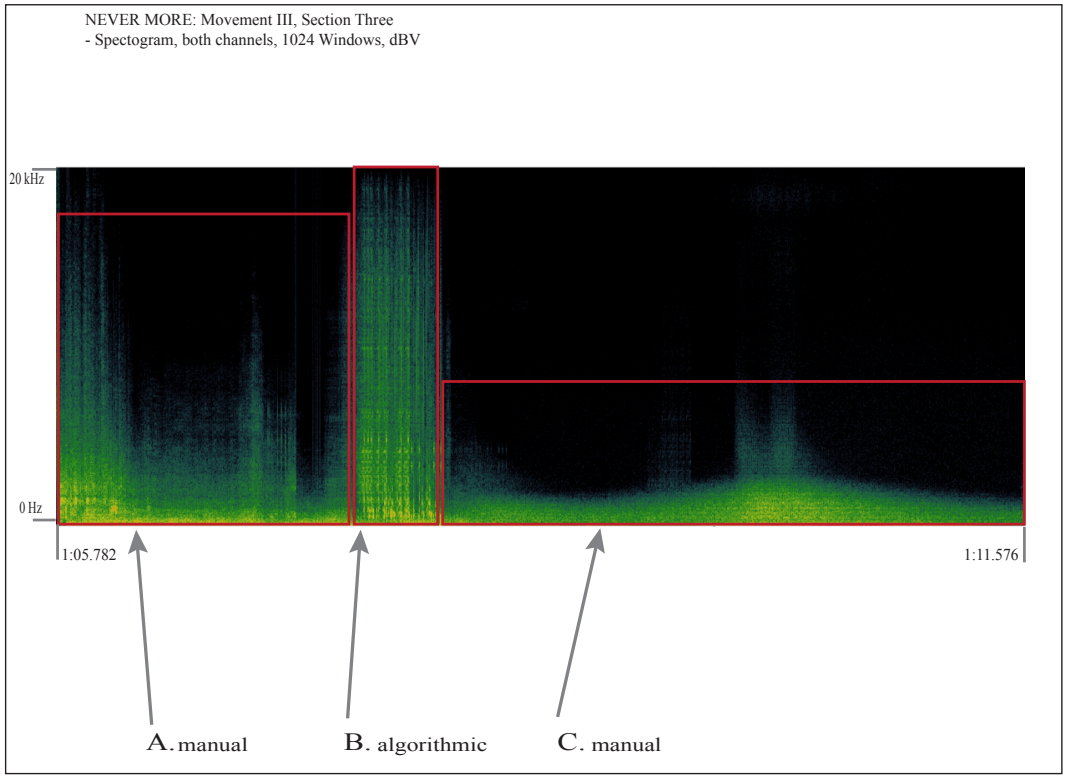


C. Section Three (of movement three)

1. General Overview (see Figure 65.)

Section three presents an even more economical version of the material of section two, shorter in duration and the gestures having less intricacy in moving between different granulations. The large impact that begins the section seems to rattle as if a spring reverb amplifier has been dropped, many reports echoing loudly before settling into a voluminous resonance. Relative to earlier upward swells in resonances, a less prominent amplitude increase occurs and is followed by several low level impulse-like grains in m3s3_A. The seeming consequence of the initial impact of the section is m3s3_B, a series of relatively dry impulse-like grains, higher in spectral focus and rebounding across the stereo space. The stuttering granular stream fades out and the low noise of the reverberation resonance is again in the foreground of the mix. This low frequency band's upper boundary arcs upward as a swell in amplitude leads to two very diffuse sounding reports echo back to the listener, before the reverb naturally trails off to end the section.

Figure 65. m3s3



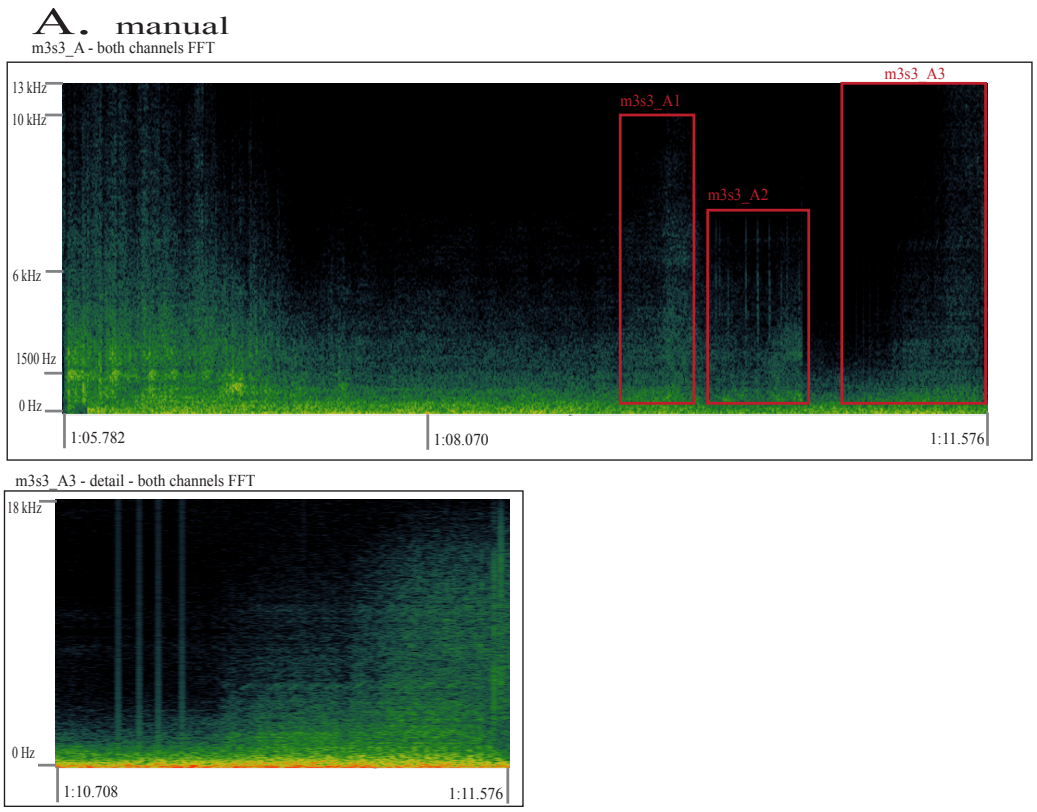
2. Formal Design

A. Manual (see Figure 66.)

Akin to the high frequencies crackling across the vast planes of the Midwest, followed by a low booming frequency report of a thunderclap, the opening impact of this section unfolds. The dominant material following the impact is a band around 1500 Hz. A low frequency band is amplified toward a first apex at 1:08.070, where the higher frequency cutoff has descended too. This low frequency rumble continues while three high frequency clouds are faded in and abruptly cut out, as if they are

reversed reverb decays offering a different color. The first reaches 10 kHz with a significant component of the material between 6 and 10 kHz (m3s3_A1). The second is focused much lower, not extending beyond 6 kHz and is preceded by impulse grains, placed low in the mix (m3s3_A2). The final cloud faded in reaches 18 kHz at its completion is preceded by four low level impulses (m3s3_A3).

Figure 66. m3s3_A

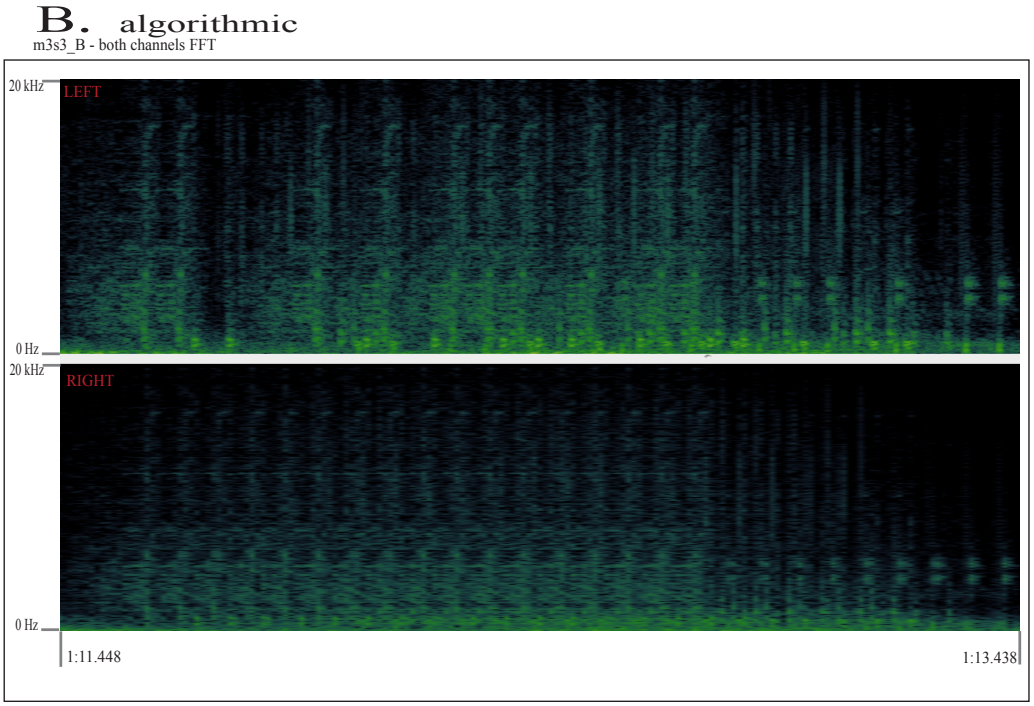


B. Algorithmic (see Figure 67.)

A rapid succession of grains creates a brief fluttering percussive report. The algorithm used to create this material combines a slow moving read head with a high

degree of overlap in the grain stream. The stereo channels are out of phases, creating movement across the stereo field and fluttering arises from successive alteration in emphasizing frequency bands.

Figure 67. m3s3_B

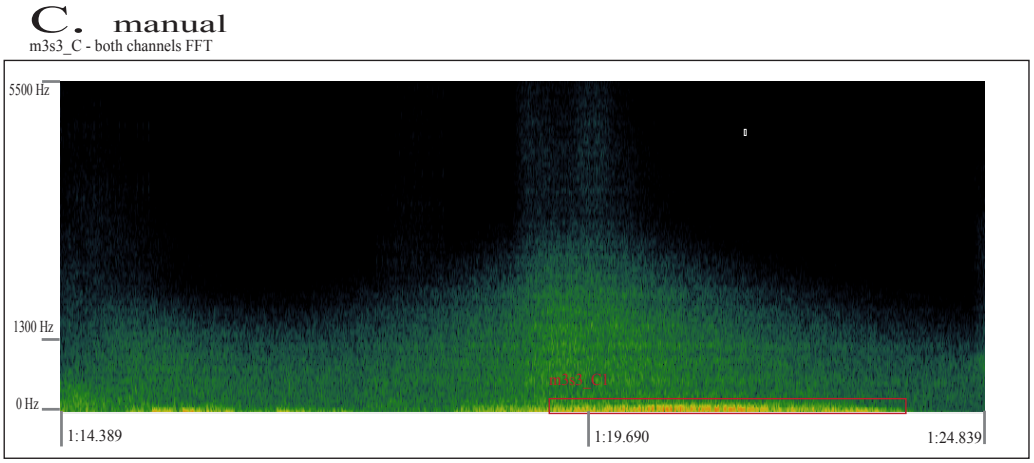


C. Manual (see Figure 68.)

The tail end of the low frequency energy of m3s3_A is resolved in this section. A diffuse reverberant cloud rolled off above 1300 Hz is combined with swell which reaches it's apex at and is used to activate a reverb that tails off to the end of the section. Following a similar morphology as the high frequency material, the

dominant low frequency material below 170 Hz is used to create a delayed version of the swell (m3s3_C1).

Figure 68. m3s3_C



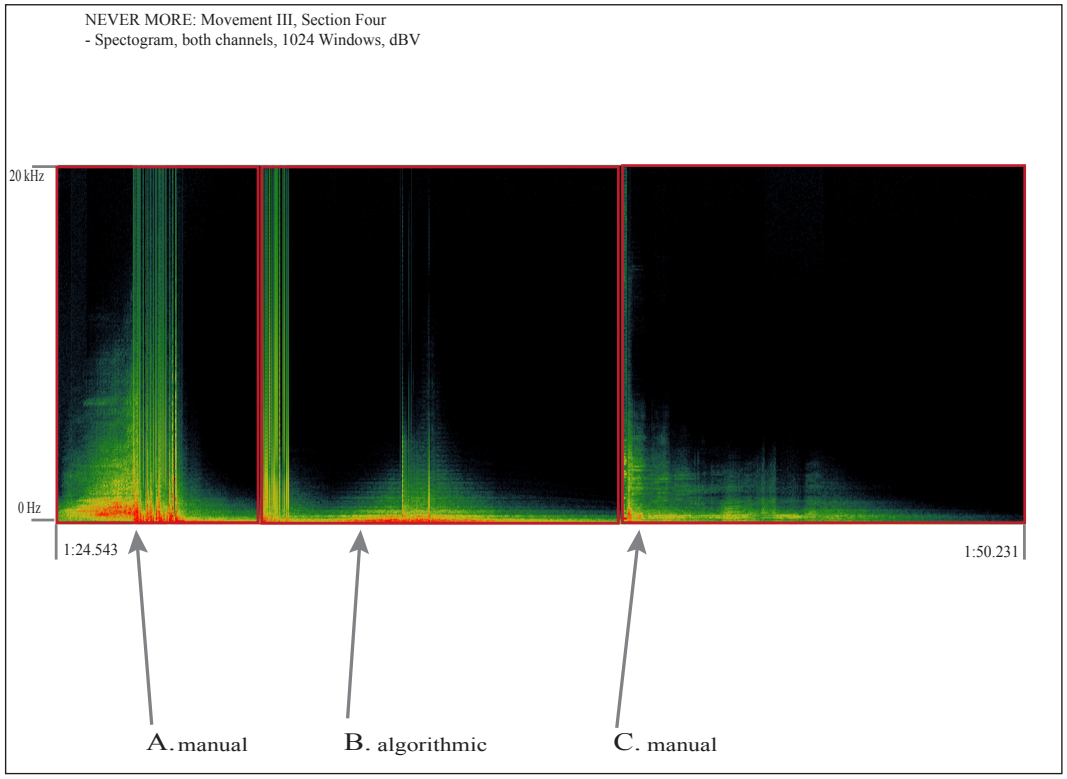
D. Section Four (of movement three)

1. General Overview (see Figure 69.)

The closing of the movement and of the piece is comprised of four distinct events and their resonances. A rapid increase in amplitude of a granulated band of noise leads to a series of transient-like grains. The high amplitude grains are the most prominent of the movement due to their high amplitude and significant low

frequency component. The last grain is used to actuate a reverberation tail that naturally decays until being interrupted by a series of impulse-like grains. These impulse-like grains have a high spectral focus while the low frequency of the continuing decay underpins them. The seemingly uninterrupted reverberation decay continues after these grains, now with more high frequency energy in the mix. A reverse decay envelope increases the amplitude toward two low frequency thuds, which reactivate the resonance, before it is allowed to finally decay. The ending gesture is the same metallic attack that began the movement and now after a slight surge in amplitude is allowed to decay to nothing.

Figure 69. m3s4



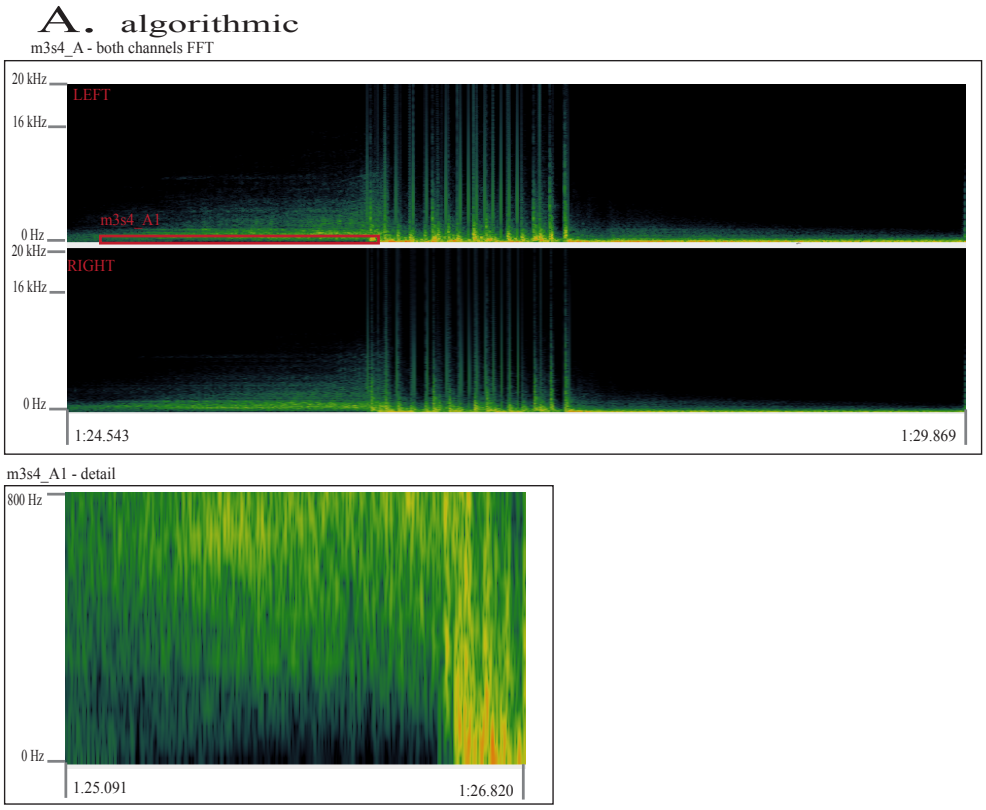
2. Formal Design

A. Algorithmic (see Figure 70.)

Two algorithms that have dominated the movement are presented one after the other, the reverberant tail and a series of transient grains. The reverberant tail is presented in reverse, sweeping upward in amplitude and frequency content, leaving a gap below 150 Hz, which the next algorithm will emphasize (m3s1_A1). A series of transient blasts erupt from the mounting tension of the reverse decay envelope. The

sQg is then used to produce an aperiodic grain stream with a shifting formant frequency and short grain lengths. The right channel of this material is delayed by 0:00.005 seconds, tightly coupling the events, while opening the sense of space. The final transient grain is used to activate a reverberator, tailing off into a cavernous space dominated by low frequency energy.

Figure 70. m3s4_A

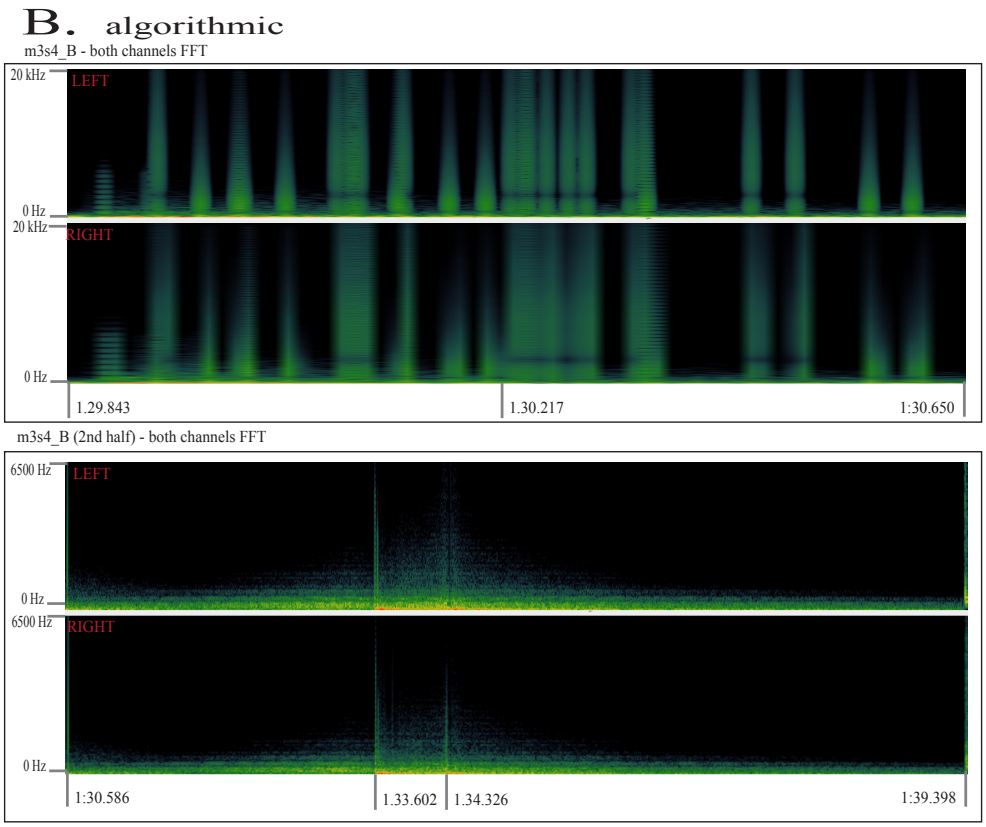


B. Manual (see Figure 71.)

The same basic material is reordered and used in to construct a variation of the previous section. A series of transient grains begin at 1:29.860 and similar to the

previous grains, both channels are the same material and the right channel is slightly delayed. At 1:30.217, the grain rate is so high that the grains briefly cross the boundary from rhythm to pitch. The transient grains are followed by a reverse decay envelope that builds to be reversed around 1:34.326. The upward sweep in amplitude and frequency content is disrupted by an impact at 1:33.602. This impact is the manual combination of two transient impulses and a low frequency impact. The impact is cross faded with the continuation of the reverse envelope to a point of reversal at 1:34.326 where a transient grain in the right channel and low impact energy in both channels activate the reverberator.

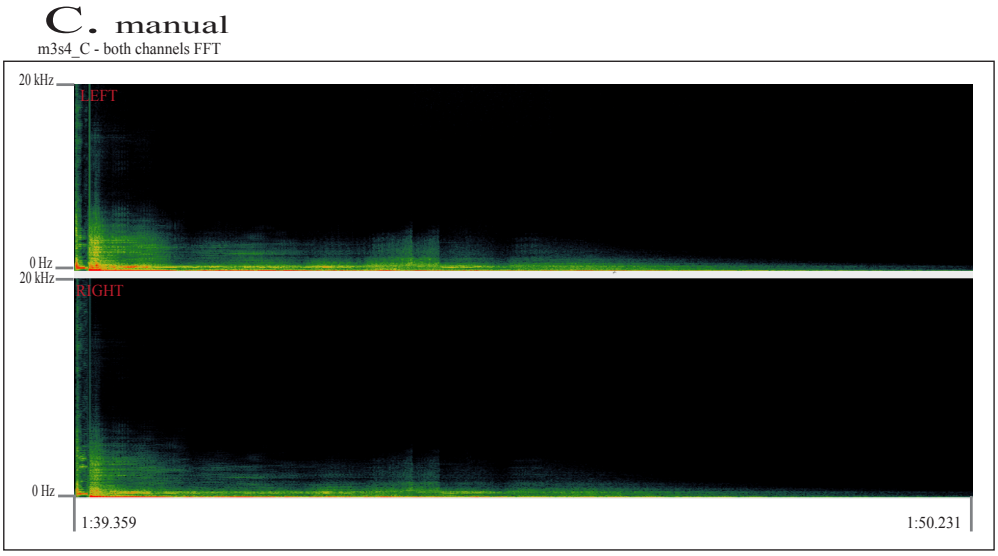
Figure 71. m3s4_B



C. Manual (see Figure 72.)

The movement ends where it began with a metallic attack followed by a resonant low frequency reverb tail that is brought to foreground of the mix several times by layering a granular mass atop the decay. The difference is that instead of the ascending granulation that leads into the piece of m3s1_A2, the decay is allowed to drift away, ending the piece with a smoothly decaying reverb tail.

Figure 72. m3s4_C



V. Concluding Remarks

The goal of this work is the analysis of the work *Never* using a classification strategy that is useful to author as a listener and as a composer. The task of illustrating form in terms of action, the actions of the composer and the actions of the tools the composer used, provides a window into the compositional process. This analysis system provides one stream of information marking the compositions locations in the parametric space of manual and algorithmic compositional strategies. Each analyst is a product of their bias and in this case, the author is a composer who is searching for the proverbial hand of the composer in works.

The analysis reveals that *Never* is dominated by al alteration between algorithmic and manual compositional strategies, particularly the last movement with six of each. The first movement is marked by a greater use of algorithmic procedures in both quantity and duration, used to articulate different textures in each of the temporal extremes of movement (see Figure 76**)**. The composers direct management of the continually mutating granular processes of the second movement is structurally significant (see Figure 75). This significance arises from the quantity, which exceeds the quantity of algorithmic procedures and position of the interventions. While the algorithmic processes occupy a greater duration of the movement, nearly double the length of manual, this is the result of long unfolding processes such as m2s2_A and m2s3_G, which together account for 1:18 of the total 2:18 (see Figure 74). The third movement, which balances material from both of the previous movements, also balances the quantity of manual and algorithmic procedures. This movement also

exhibits sequential alteration between manual and algorithmic procedures with one exception in the fourth section (see Figure 73). The data totals illustrate how much time is spent in each of the compositional approaches and importantly, where the changes in approach occur. The relatively longer lengths of m1s5_B and m2s3_G near the end of both of the respective movements contrast the short lengths of the opening components. This elongation of the end material in the first and second movement is contrast by the nearly balanced components of the last movement.

Figure 73. All components

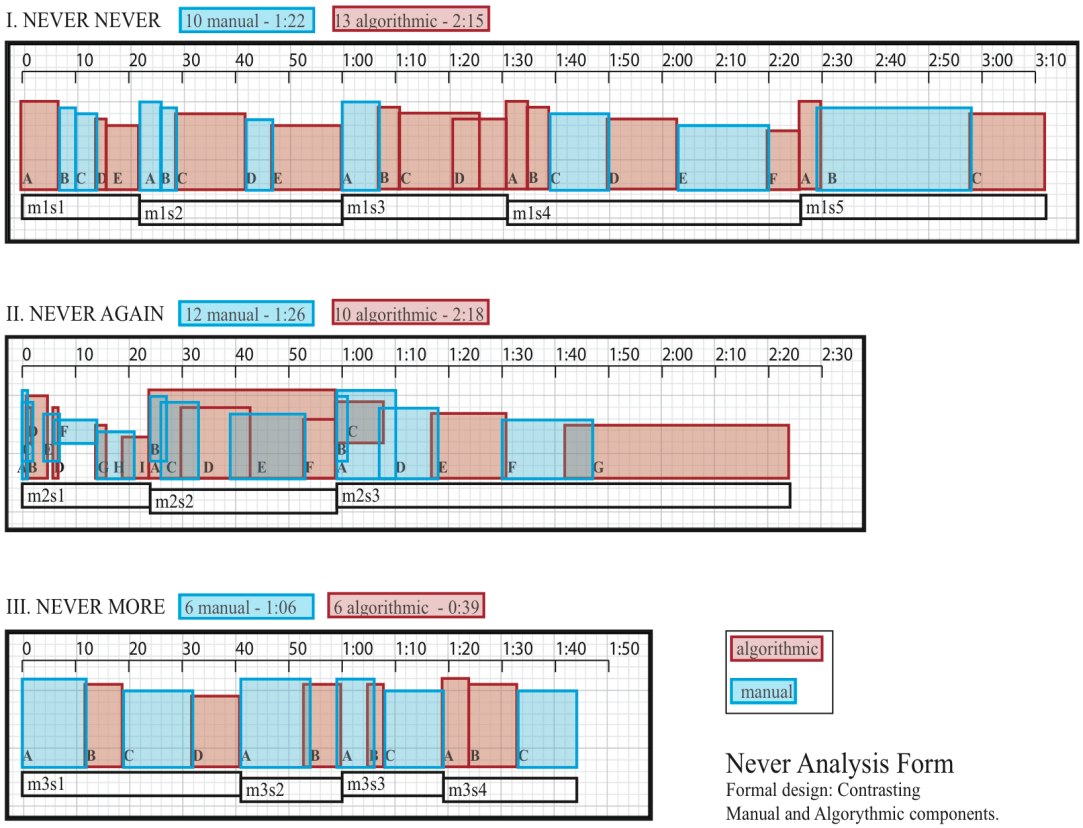


Figure 74. Algorithmic components

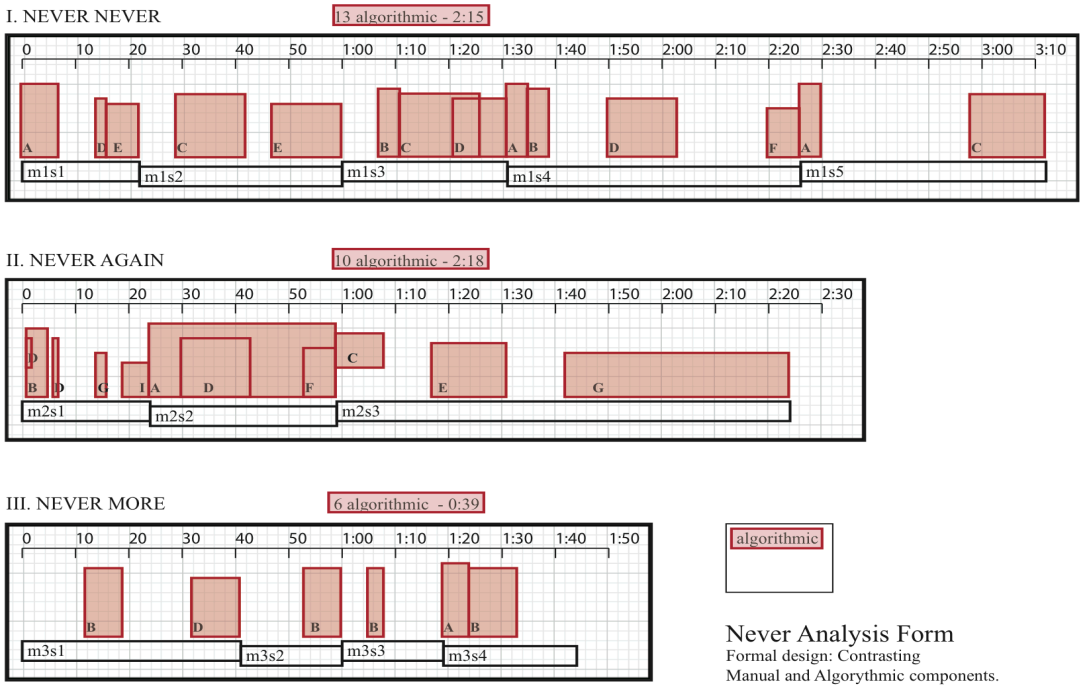


Figure 75. Manual components

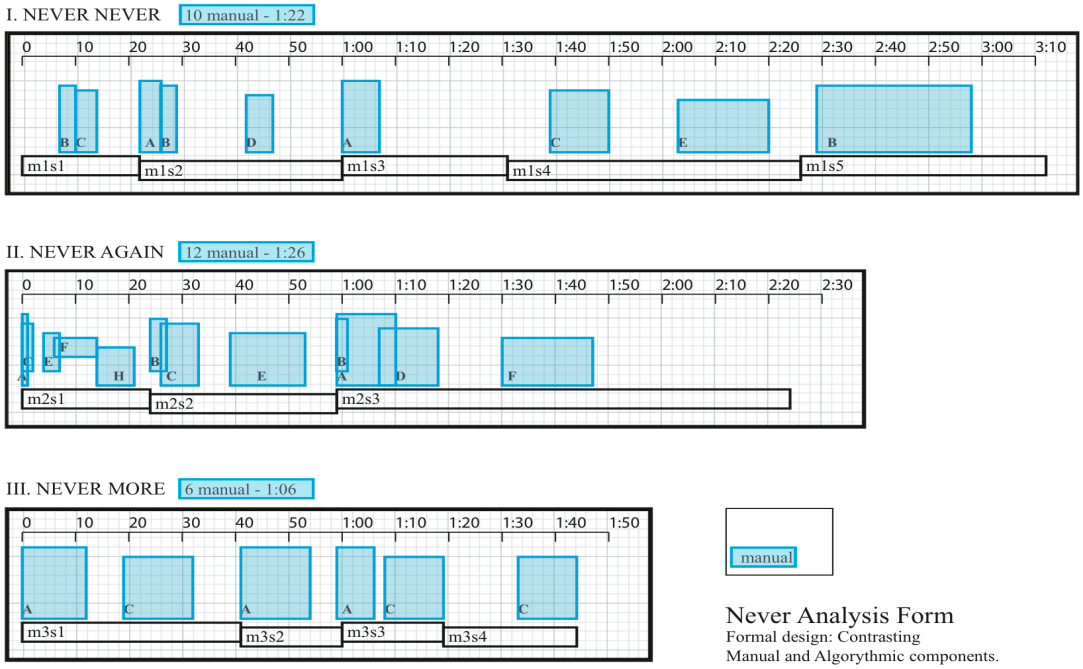


Figure 76. Never analysis data

I. NEVER NEVER

MOVEMENT ONE		10	1:22	13	2:15	0:00	3:12	3:12
		m	m time	a	a time	begin	end	length
Section 1		2	0:07	3	0:17	0:00	0:23	0:23
	A			a	0:07	0:00	0:07	0:07
	B	m	0:03			0:07	0:10	0:03
	C	m	0:04			0:10	0:14	0:04
	D			a	0:02	0:14	0:16	0:02
	E			a	0:08	0:15	0:23	0:08
Section 2		3	0:11	2	0:28	0:23	1:00	0:37
	A	m	0:03			0:23	0:26	0:03
	B	m	0:03			0:26	0:29	0:03
	C			a	0:13	0:29	0:42	0:13
	D	m	0:05			0:42	0:47	0:05
	E			a	0:15	0:45	1:00	0:15
Section 3		2	0:22	2	0:13	1:00	1:31	0:31
	A	m	0:07			1:00	1:07	0:07
	B			a	0:03	1:07	1:10	0:03
	C	m	0:15			1:11	1:26	0:15
	D			a	0:10	1:21	1:31	0:10
Section 4		2	0:28	4	0:27	1:31	2:26	0:55
	A			a	0:04	1:31	1:35	0:04
	B			a	0:04	1:35	1:39	0:04
	C	m	0:11			1:39	1:50	0:11
	D			a	0:13	1:50	2:03	0:13
	E	m	0:17			2:03	2:20	0:17
	F			a	0:06	2:20	2:26	0:06
Section 5		1	0:14	2	0:50	2:26	3:12	0:46
	A			a	0:21	2:26	2:47	0:21
	B			a	0:29	2:29	2:58	0:29
	C	m	0:14			2:58	3:12	0:14

II. NEVER AGAIN

MOVEMENT TWO		12	1:26	10	2:18	0:05	2:29	2:24
		m	m time	a	a time	begin	end	length
Section 1		5	0:19	4	0:17	0:05	0:29	0:24
	A	m	0:01			0:05	0:06	0:01
	B			a	0:04	0:06	0:10	0:04
	C	m	0:02			0:05	0:07	0:02
	D			a	0:05	0:07	0:12	0:05
	E	m	0:03			0:09	0:12	0:03
	F	m	0:07			0:12	0:19	0:07
	G			a	0:02	0:19	0:21	0:02
	H	m	0:06			0:19	0:25	0:06
	I			a	0:06	0:23	0:29	0:06
Section 2		3	0:25	3	0:56	0:28	1:04	0:36
	A			a	0:36	0:28	1:04	0:36
	B	m	0:04			0:28	0:32	0:04
	C	m	0:07			0:31	0:38	0:07
	D			a	0:13	0:35	0:48	0:13
	E	m	0:14			0:44	0:58	0:14
	F			a	0:07	0:57	1:04	0:07
Section 3		4	0:42	3	1:05	1:04	2:29	1:25
	A	m	0:11			1:04	1:15	0:11
	B	m	0:02			1:04	1:06	0:02
	C			a	0:09	1:04	1:13	0:09
	D	m	0:12			1:12	1:24	0:12
	E			a	0:14	1:22	1:36	0:14
	F	m	0:17			1:35	1:52	0:17
	G			a	0:42	1:47	2:29	0:42

III. NEVER MORE

MOVEMENT THREE		6	1:06	6	0:39	0:06	1:50	1:44
		m	m time	a	a time	begin	end	length
Section 1		2	0:25	2	0:16	0:06	0:47	0:41
	A	m	0:12			0:06	0:18	0:12
	B			a	0:07	0:18	0:25	0:07
	C	m	0:13			0:25	0:38	0:13
	D			a	0:09	0:38	0:47	0:09
Section 2		1	0:13	1	0:07	0:47	1:06	0:19
	A	m	0:13			0:47	1:00	0:13
	B			a	0:07	0:59	1:06	0:07
Section 3		2	0:17	1	0:02	1:06	1:25	0:19
	A	m	0:06			1:06	1:12	0:06
	B			a	0:02	1:11	1:13	0:02
	C	m	0:11			1:14	1:25	0:11
Section 4		1	0:11	2	0:14	1:25	1:50	0:25
	A			a	0:05	1:25	1:30	0:05
	B			a	0:09	1:30	1:39	0:09
	C	m	0:11			1:39	1:50	0:11

DATA LABELS KEY

m = manual (?) quantity
m time = manual time
a = algorithmic (?) quantity
begin = beginning time point
end = ending time point
length = length of component
algorithmic
manual

Never Analysis Data

There are several future directions this research can be continued. The form that has been documented can serve as a container that other composers can reconstitute with their own material and sensibilities. To enable this use of the formal design the analysis would benefit from scaled classifications as opposed to binary classifications. Instead of simply being algorithmic or manual, a quantification of manual and algorithmic, within each component would be useful, such as m2s3_A is 40% algorithmic and 60% manual. This would enable a higher degree of precision in reporting classification. The analysis, which herein is presented in verbiage, could then be cast as a table of events that are numerically declared and justified. This

numerical abstraction would enable the data to be handled in the digital domain. This paper is a first attempt to present this research and the verbose reporting was chosen in order to provide the reader with a clear trail of the decision making process.

This report has been limited to a single work and as further works are analyzed the technique will evolve. Comparing the form of multiple works has the potential to illustrate similarities across works where they might not otherwise be perceivable. The higher order description of the work removes the formal description from the material at hand. Indeed, while this analysis looks at algorithms that are implemented in a computer, this need not be the case. Systems employed by composers for the purposes of constructing and organizing material are ubiquitous and with a composition's formal system described, there is no reason that this same approach could not be used on non-electronic works. The 12-tone method is an example of a formalized logic that that could clearly be analyzed as a series of algorithms, to be contrast with the composer's direct composition. This removal from the substance is also a limitation of the analysis; it is not concerned with illustrating similar sonic designs, characteristics or morphologies and therefore is of little use in discovering the unique language and syntax of a composition.

Finally, this research is a single parametric space and only accounts for a portion of the substance of a composition. Further refinement of the analysis and increased concision will enable the introduction of more variables. The use of other analysis techniques, such as a computer-matching algorithm that locates proposed algorithms would further enrich this research.

References

1. T. Anders & E.R. Miranda, Interfacing Manual and Machine Composition, Contemporary Music Review, 28:2, 133-147 (2009).

2. L. Camilleri & D. Smalley, "The analysis of electroacoustic music: Introduction," Journal of New Music Research, 27:1-2, pp. 3-12 (1998).

3. R. Cogan, "New Images of Musical Sound," Harvard University Press, Cambridge, Massachusetts (1987).

4. Giovanucci, "Luc Ferrari's *Exploitation des concepts:* the case of an auto-generative archive," *Website: http://lucferrari.blogspot.com/2011/06/luc-ferraris-exploitation-des-concepts.html,* accessed April 2012 (June 2011).

5. G.M. Koenig, "Composition Process," Computer Music reports on an International Project, UNESCO Rapport, Ottawa (1980).

6. E.R. Miranda, "Preface: Aesthetic Decisions in Computer-Aided Composition," Contemporary Music Review, 28:2, 129-132 (2009).

7. J.C. Risset, "Horacio Vaggione: Towards a Syntax of Sound," Contemporary Music Review Vol. 24, No. 4/5, pp. 287 – 293 (August/October 2005).

8. C. Roads, "Microsound," MIT Press, London (2001).

9. C. Roads, "Never Notes," Composer's private collection, Santa Barbara California (2010).

10. C. Roads, "Microsound," MIT Press, London (2001).

11. D. Smalley, "Spectromorphology: explaining sound-shapes," Organised Sound, Vol. 2 Issue 2, pp. 107-126 (August 1997).

12. J. Tenney, "Meta + Hodos and META Meta + Hodos," Frog Peak Press, Oakland, California (1986).

13. L Zattra, “Analysis and Analyses of Elctroacoustic Music,” Proceedings Sound and Music Conference, (2005).

Part Two

Portfolio of Compositions

VI.

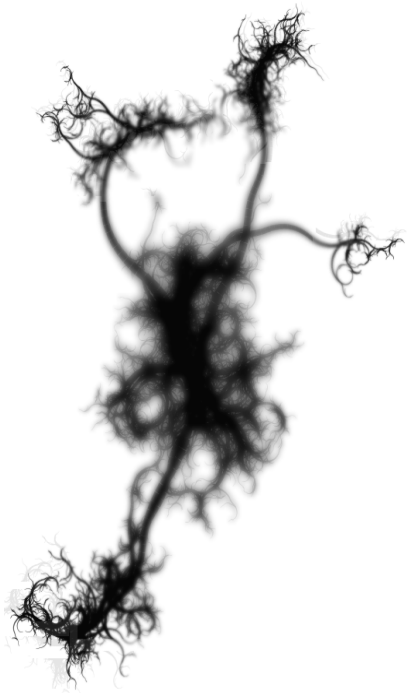
anOtherTwo:

for violin, viola, cello, flute, oboe, bass clarinet and piano

anOtherTwo

for violin, viola, cello, flute, oboe, bass clarinet and piano

by Christopher Jette



Notes for anOtherTwo

X note heads in the piano indicate silently depressed keys. The held continuation is notated with standard note heads for clarity of duration.

Glissando are continuous over the rests while the arrival and departure note lengths are notated.

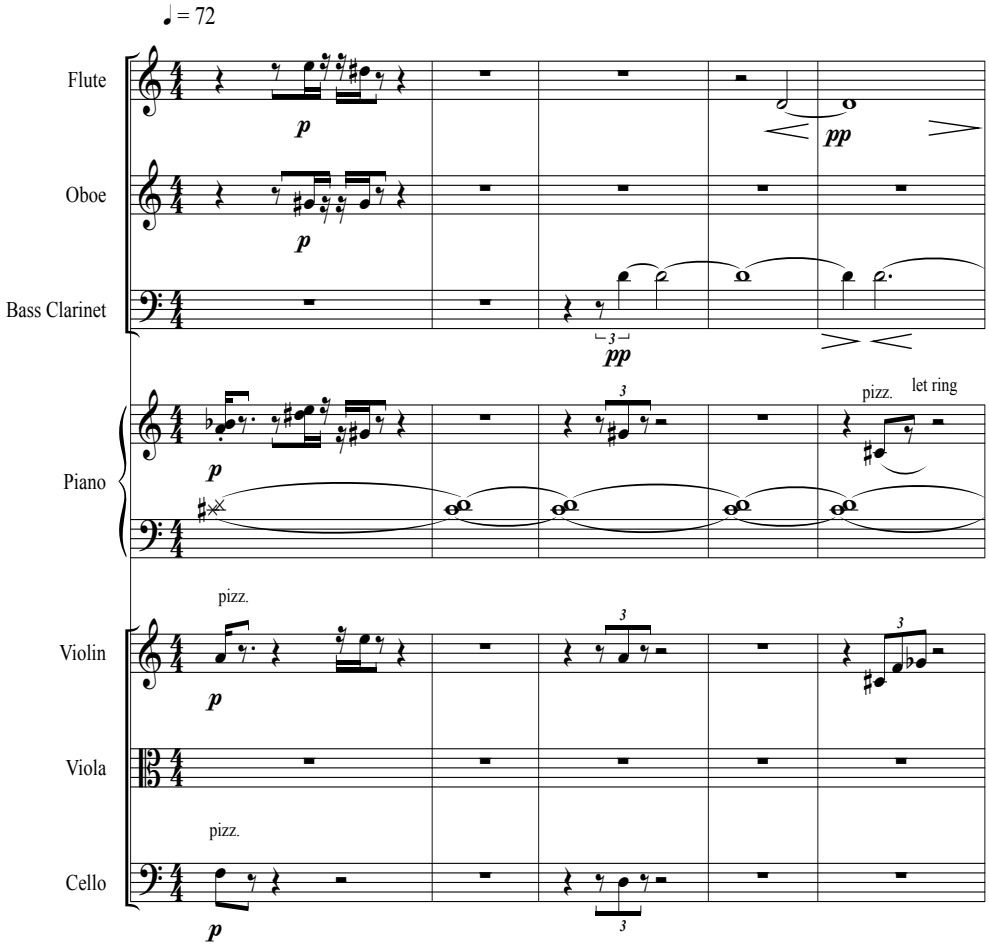
X note head in the viola indicates overpressure/crunch tone.

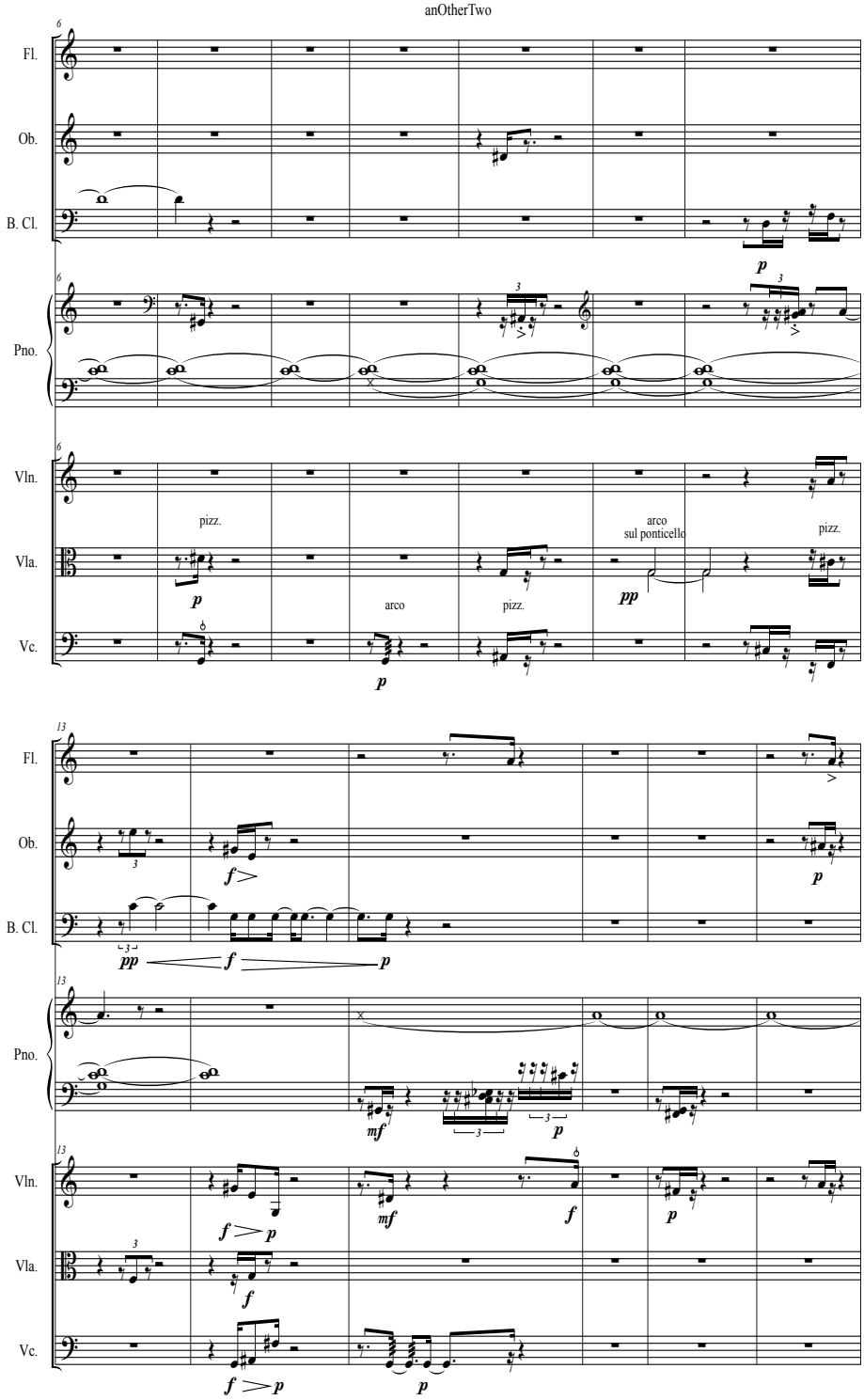
The pitch for each trill is a 1/2 step above the pitch unless indicated otherwise by a letter name.

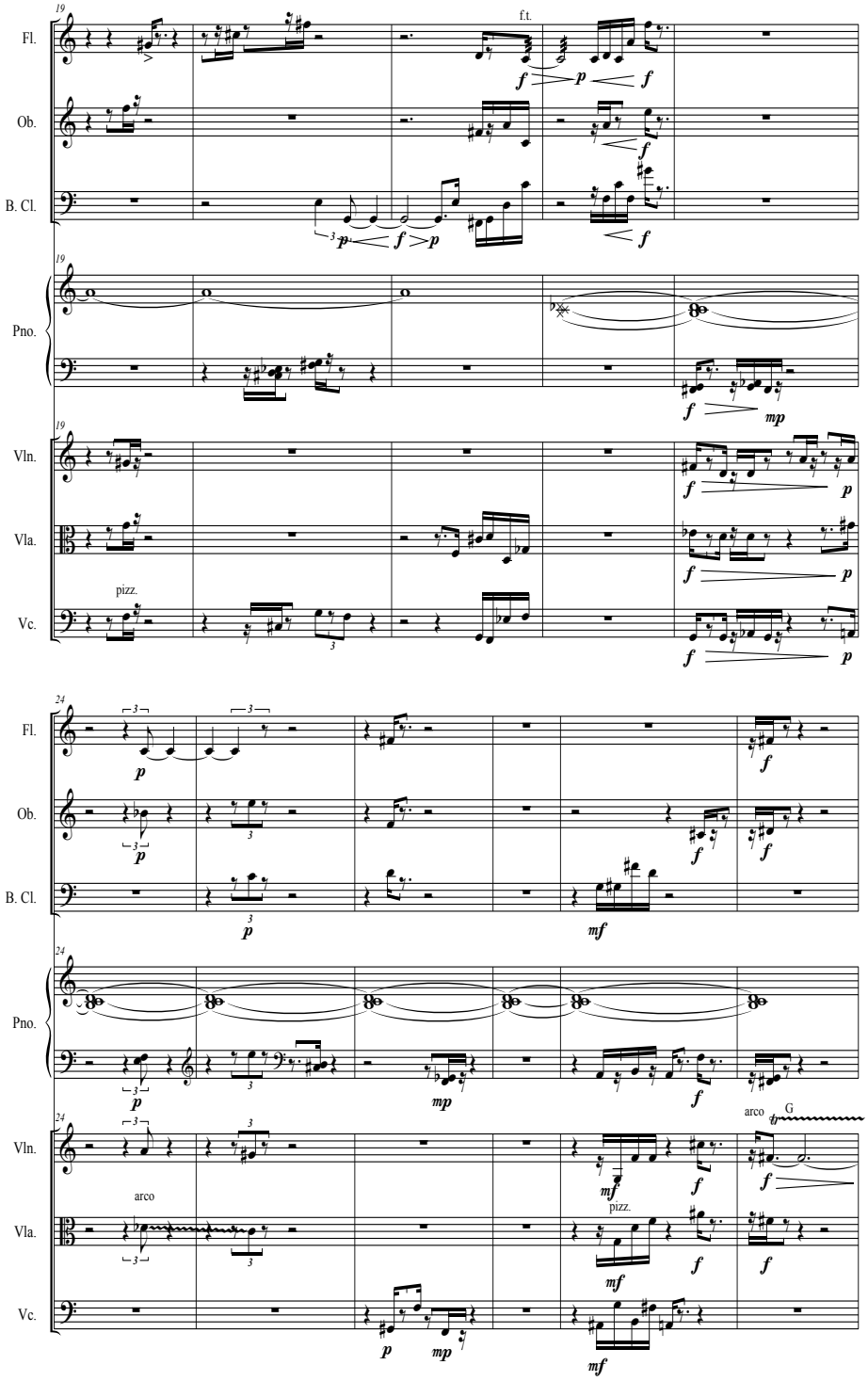
The score is presented at concert pitch.

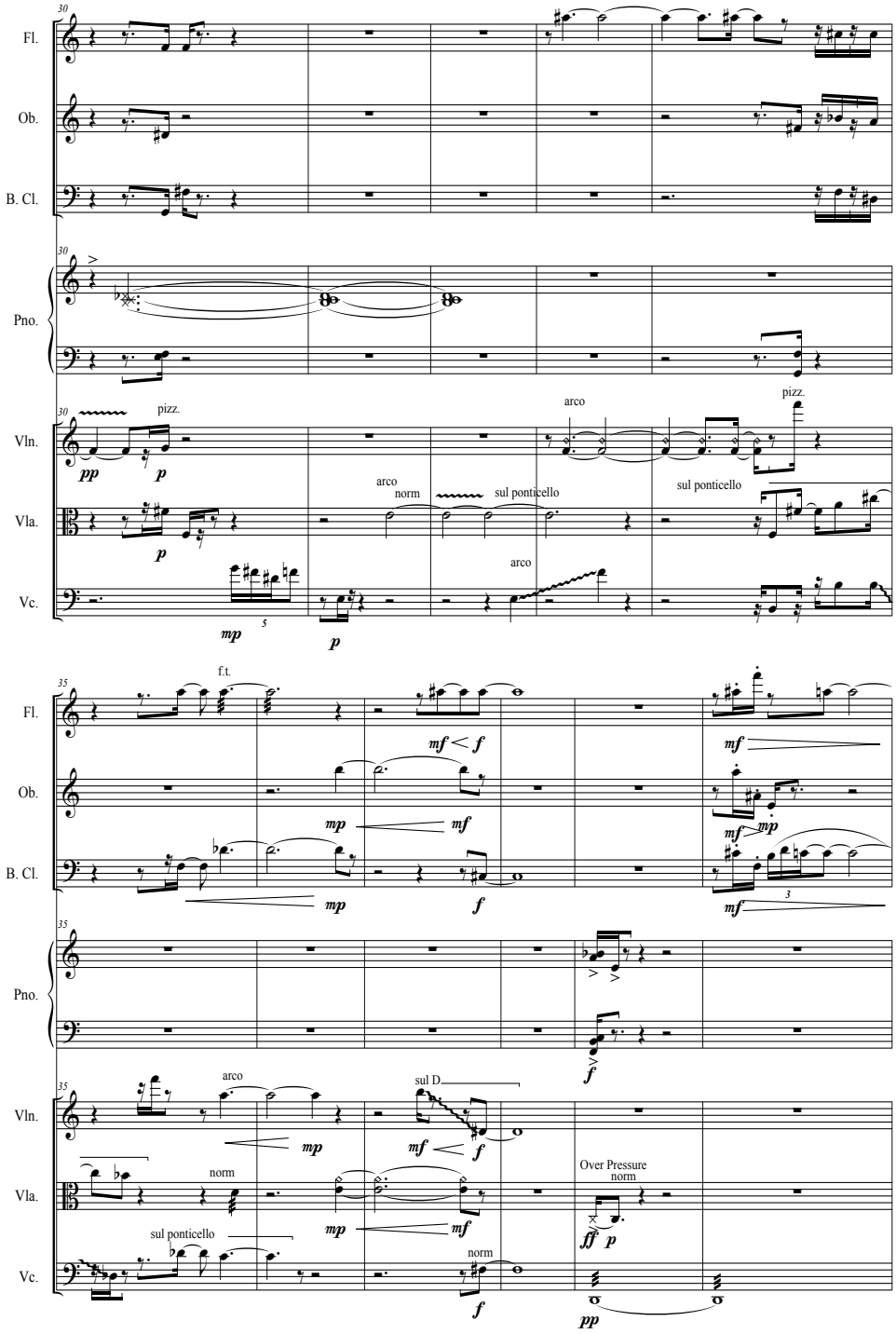
anOtherTwo

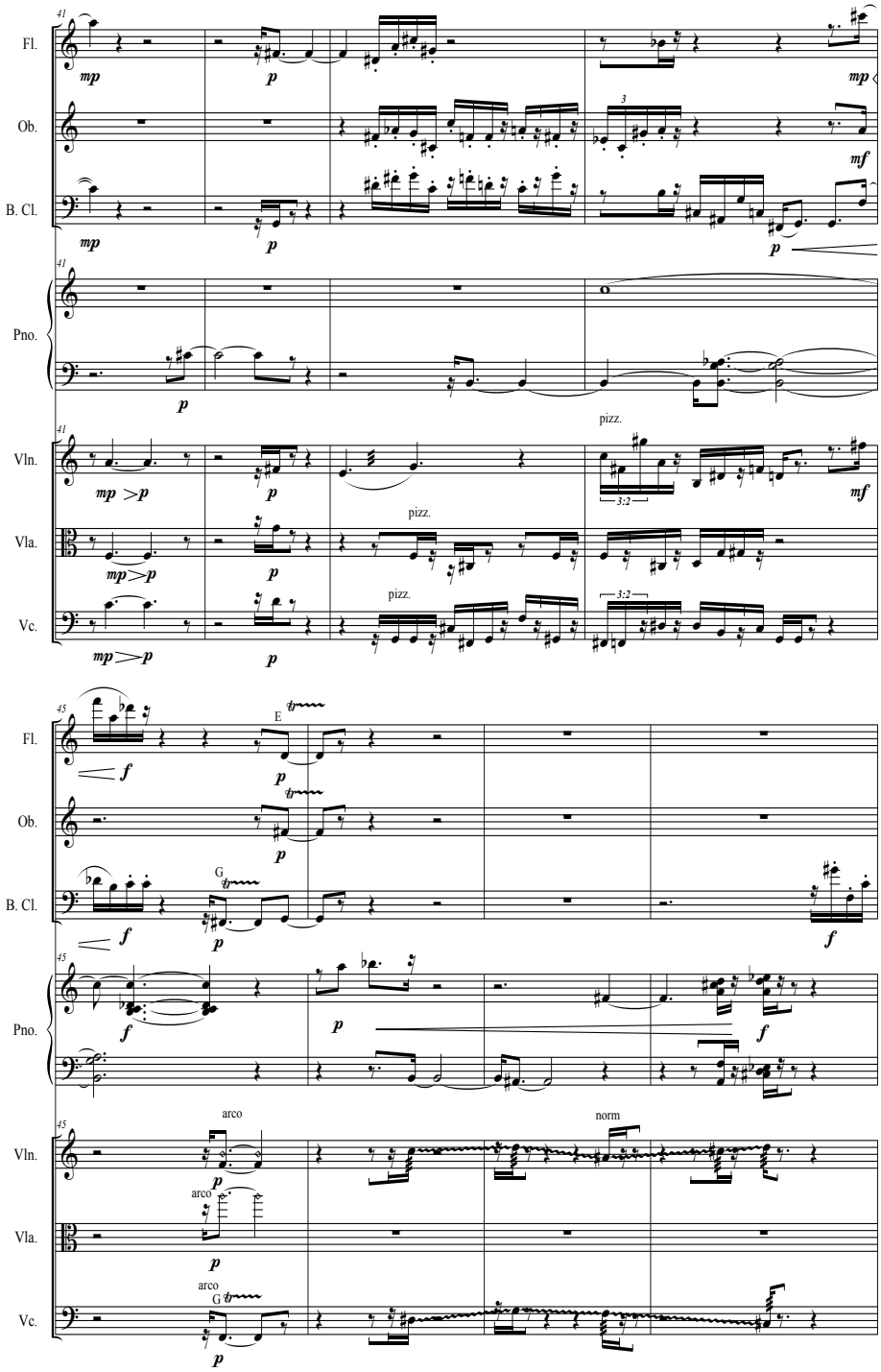
Jette

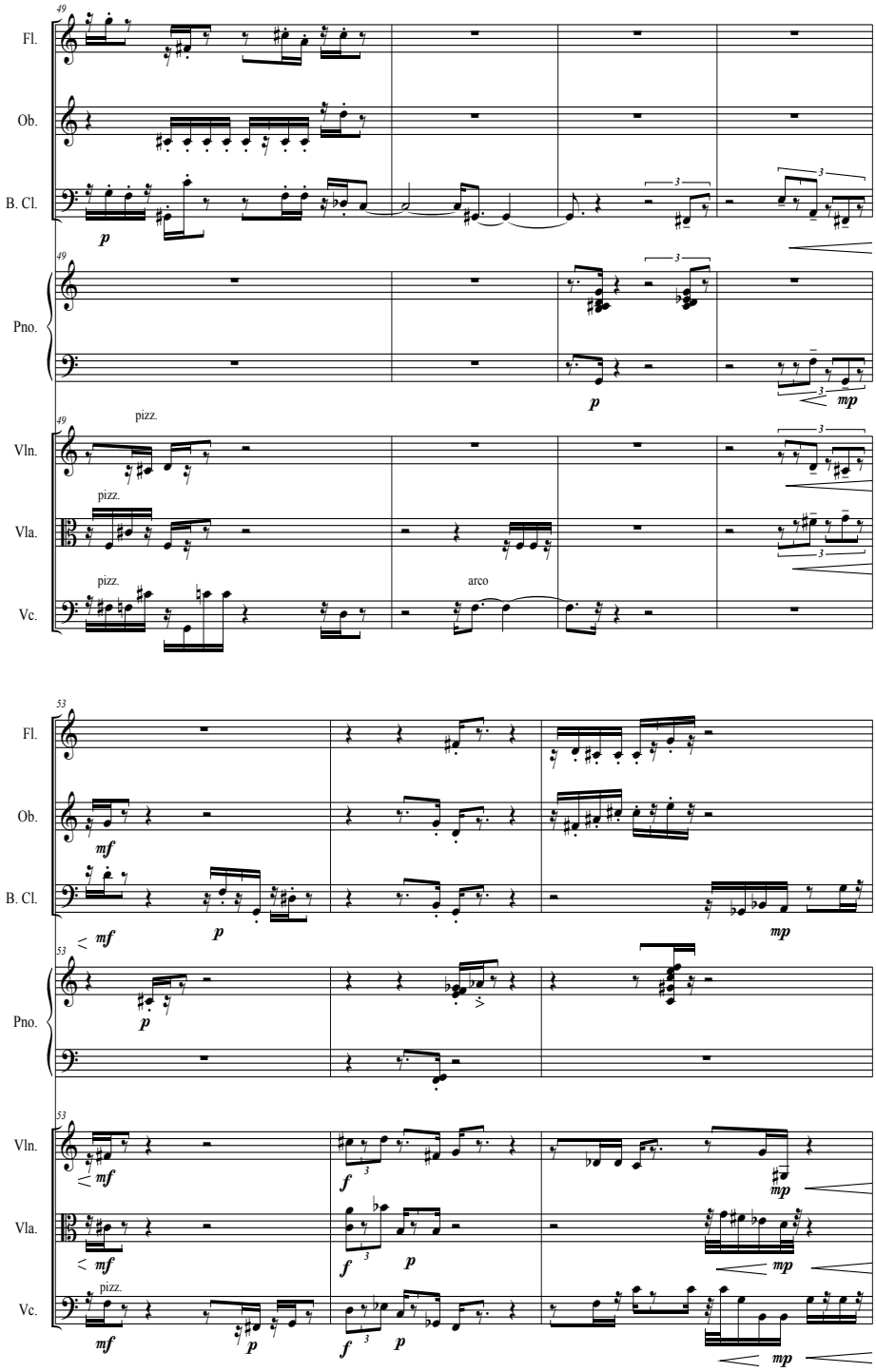


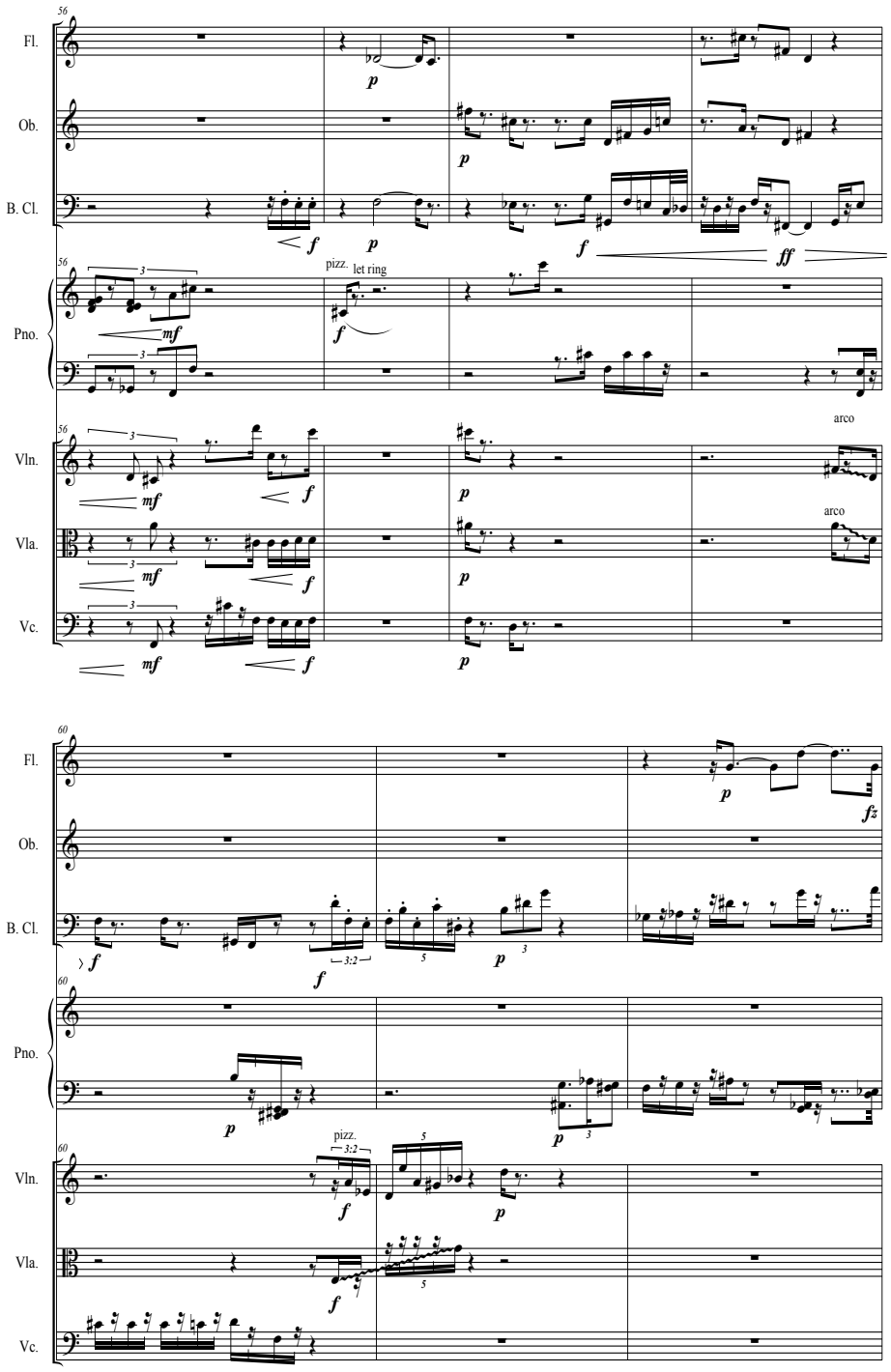

Fl.
Ob.
B. Cl.
Pno.
Vln.
Vla.
Vc.
pizz.
arco
pizz.
arco
sul ponticello
pizz.

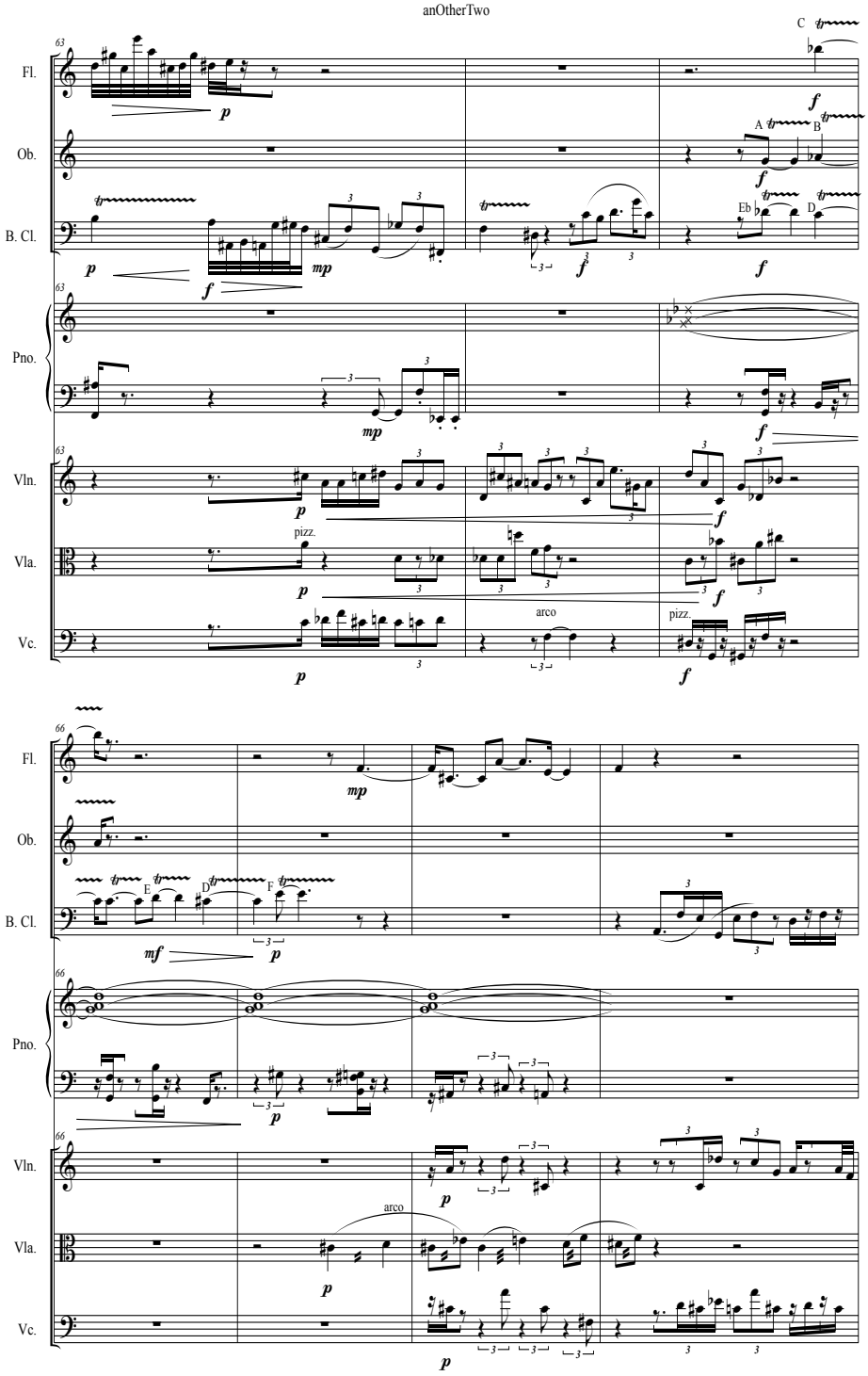

19
Fl.
f.t.
Ob.
B. Cl.
Pno.
Vln.
Vla.
pizz.
Vc.
24
arco
G

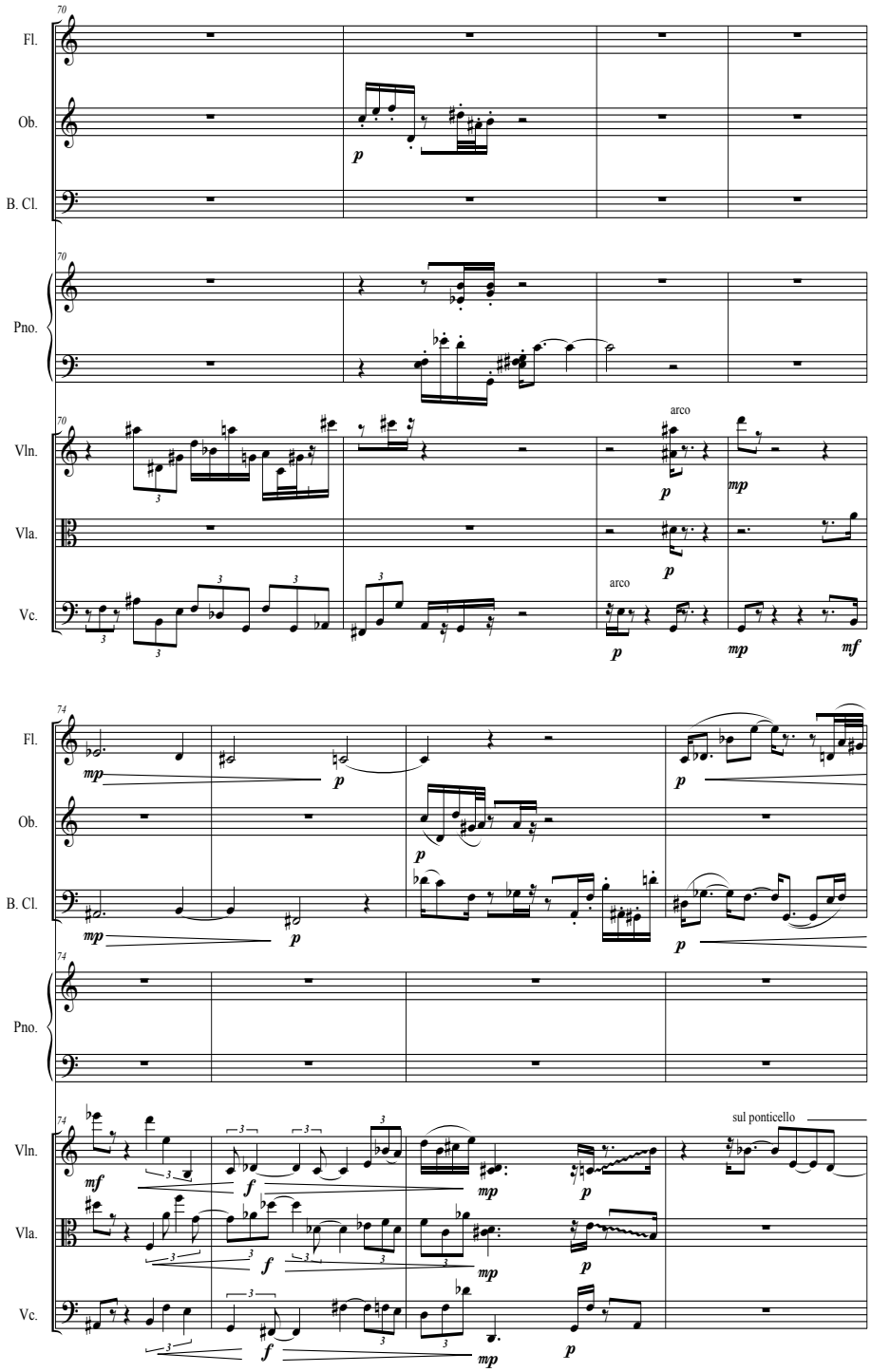

30
Fl.
Ob.
B. Cl.
Pno.
Vln.
Vla.
Vc.
pizz.
pp
p
arco
norm
sul ponticello
mp
5
35
f.t.
mf
f
3
sul D
Over Pressure
ff

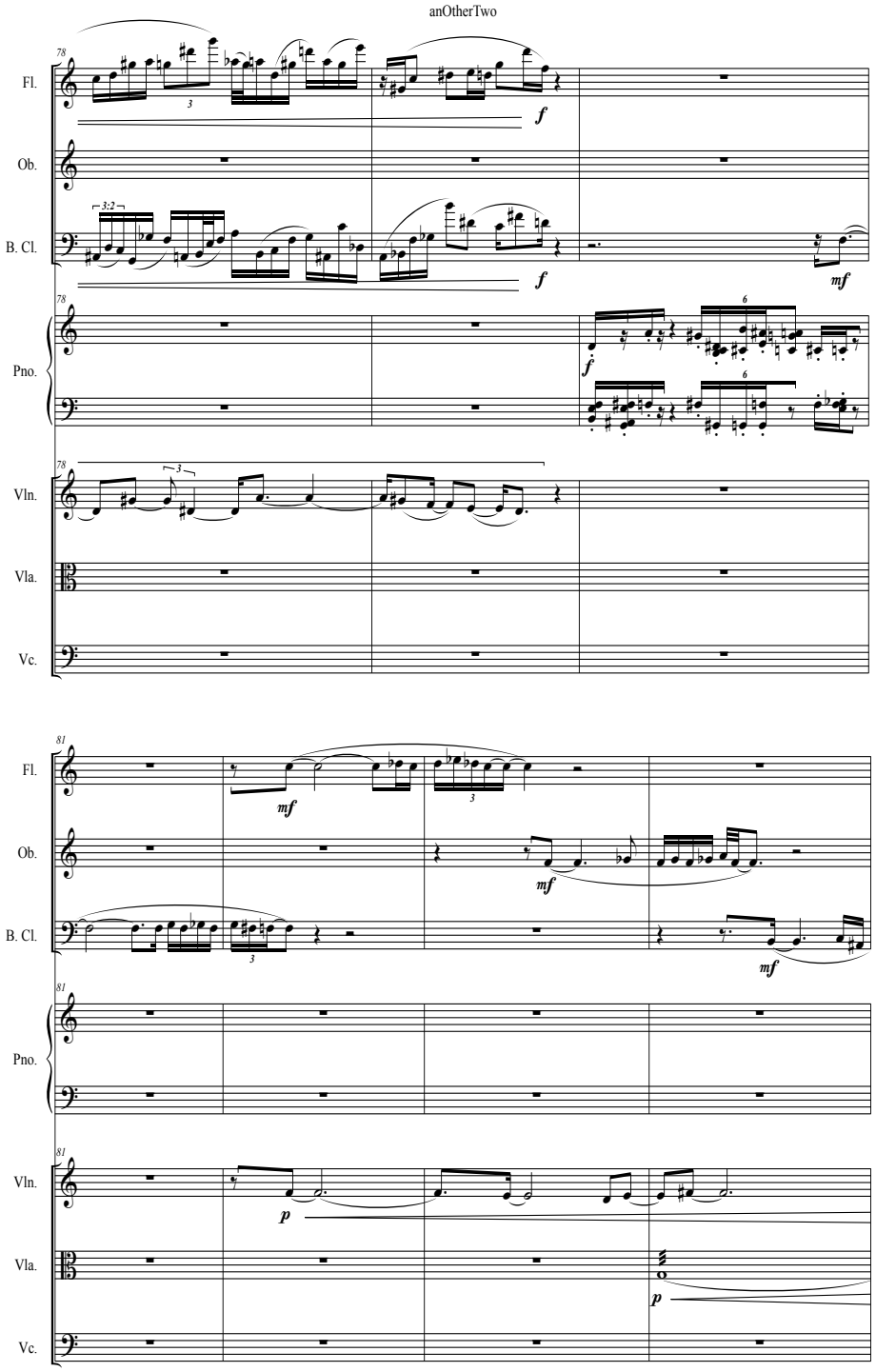

41
Fl.
Ob.
B. Cl.
Pno.
Vln.
Vla.
Vc.
pizz.
3:2
45
E
G
arco
norm

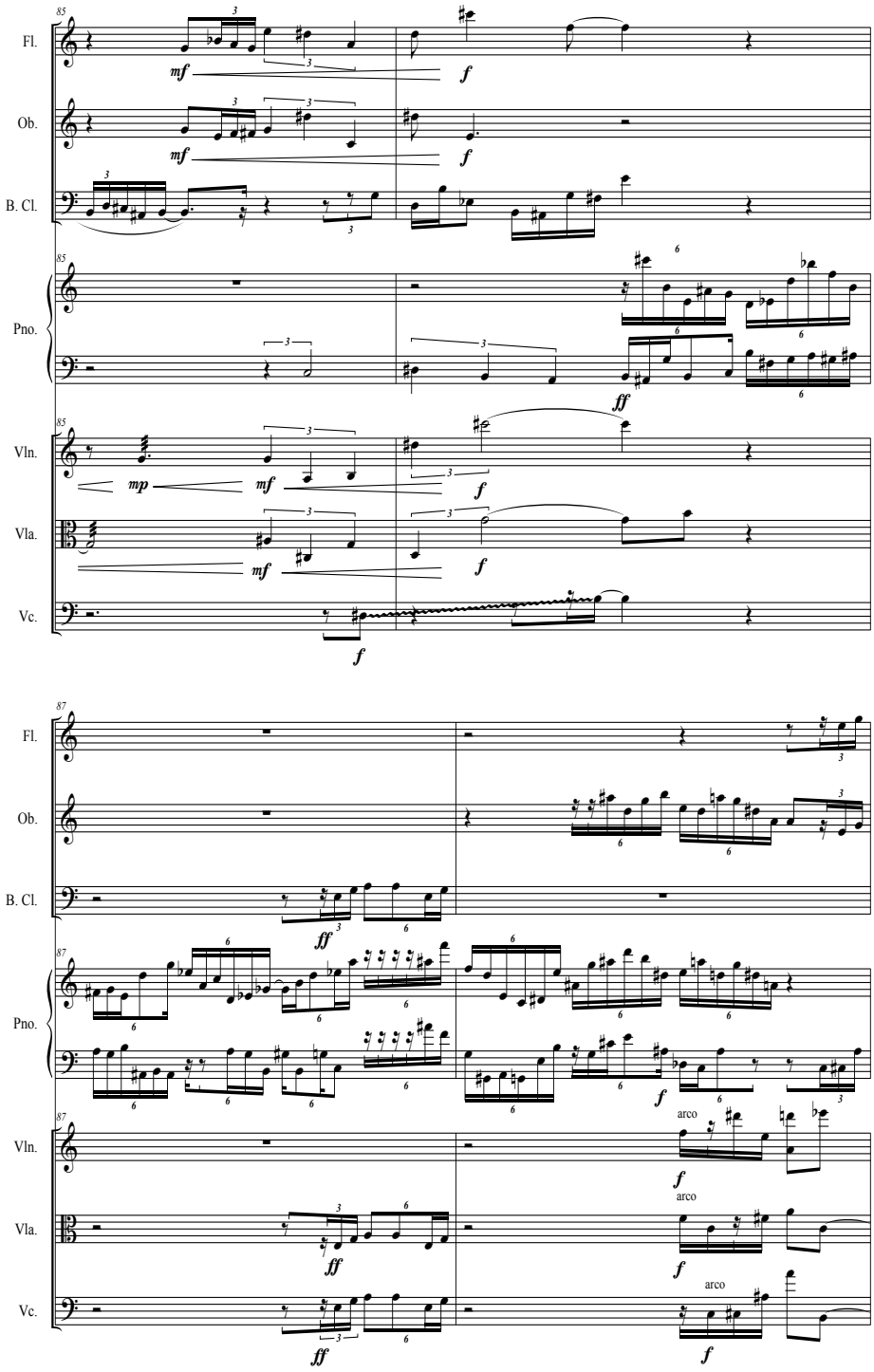

49
Fl.
Ob.
B. Cl.
p
Pno.
p
mp
Vln.
pizz.
Vla.
pizz.
Vc.
pizz.
arco
53
Fl.
Ob.
mf
B. Cl.
mf
p
mp
Pno.
p
Vln.
mf
f
mp
Vla.
mf
f
p
mp
Vc.
pizz.
mf
p
f
p
mp

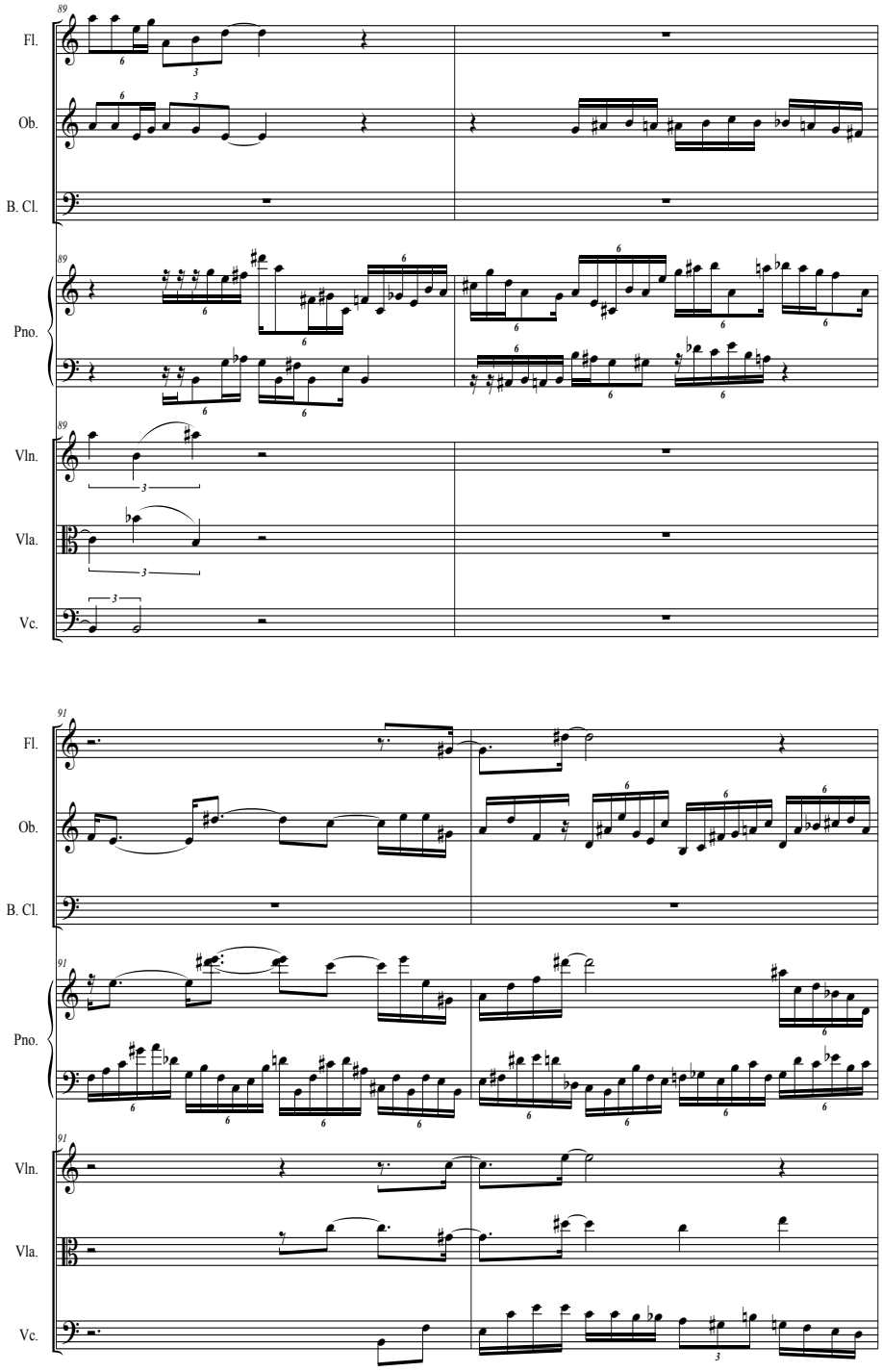

56
Fl.
Ob.
B. Cl.
Pno.
Vln.
Vla.
Vc.
pizz.
let ring
arco
60
3:2

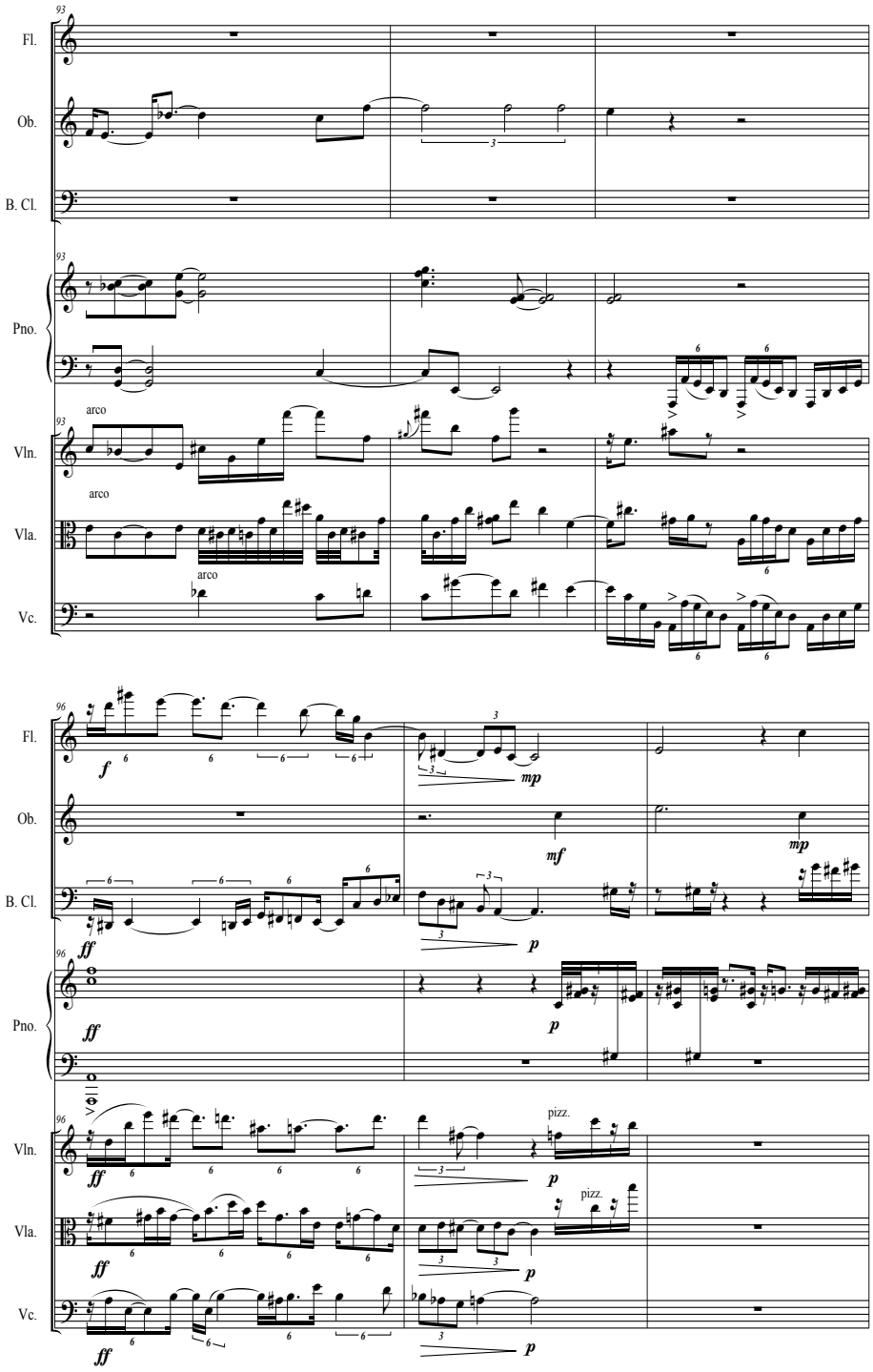

Fl.
Ob.
B. Cl.
Pno.
Vln.
Vla.
Vc.
pizz.
arco
pizz.
arco

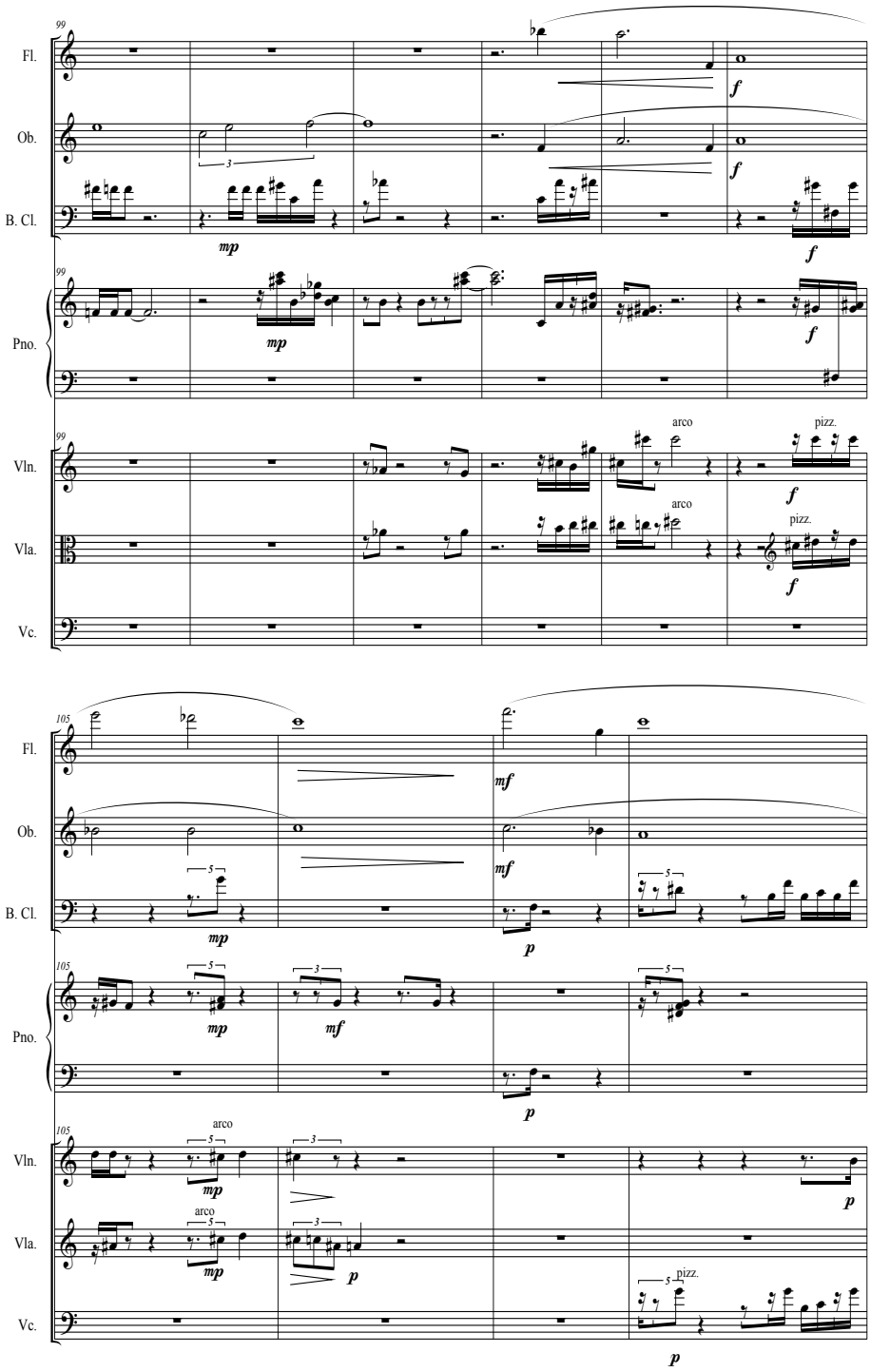

70
Fl.
Ob.
B. Cl.
Pno.
Vln.
Vla.
Vc.
arco
p
mp
mf
74
f
sul ponticello

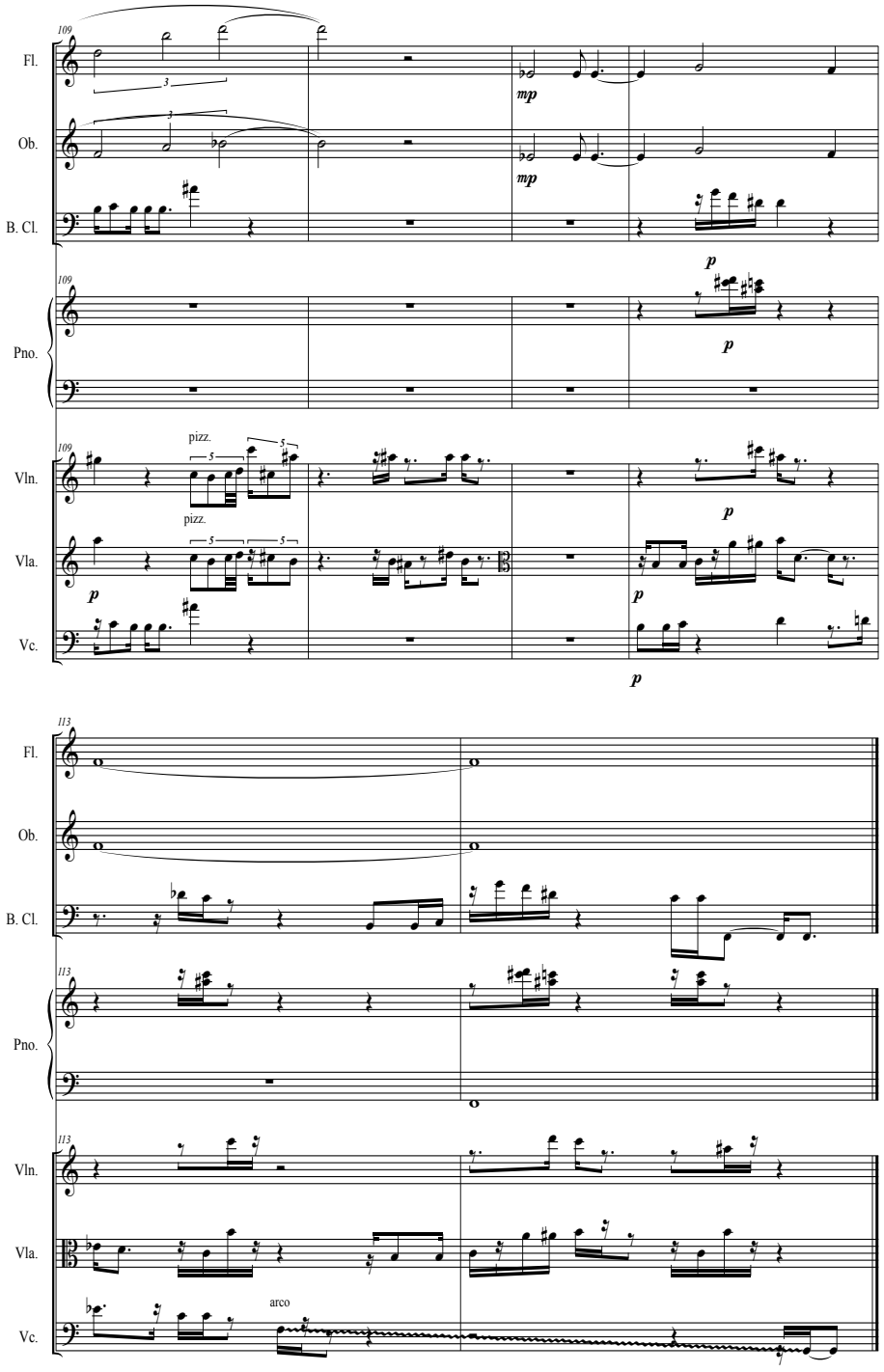

anOtherTwo
Fl.
Ob.
B. Cl.
Pno.
Vln.
Vla.
Vc.
78
81
f
mf
p


85
Fl.
Ob.
B. Cl.
Pno.
Vln.
Vla.
Vc.
mf
f
mp
ff
87
arco


89
Fl.
Ob.
B. Cl.
Pno.
Vln.
Vla.
Vc.
91
Fl.
Ob.
B. Cl.
Pno.
Vln.
Vla.
Vc.


93
Fl.
Ob.
B. Cl.
Pno.
Vln.
arco
Vla.
arco
Vc.
arco
96
f
mp
mf
mp
ff
p
ff
p
ff
pizz.
p
pizz.
p
ff
p


99
Fl.
Ob.
B. Cl.
Pno.
Vln.
Vla.
Vc.
arco
pizz.
105


109
Fl.
Ob.
B. Cl.
mp
mp
p
Pno.
p
Vln.
Vla.
Vc.
pizz.
pizz.
p
p
p
p
113
Fl.
Ob.
B. Cl.
Pno.
Vln.
Vla.
Vc.
arco

VII.

Fish Affected By Dreams:

for viola and electronics

Fish Affected By Dreams

by Christopher Jette

for viola and electronics

: Title : Fish Affected by Dreams

: Composer : Christopher Jette

: Duration : 17 minutes

: Program Notes :

Fish Affected by Dreams utilizes live viola, processed viola and fixed electronic material. The fixed material is made from recorded viola sounds and synthesized sounds. The viola material is set within and accompanied by the electronic material. Composed between 2009 and 2011.

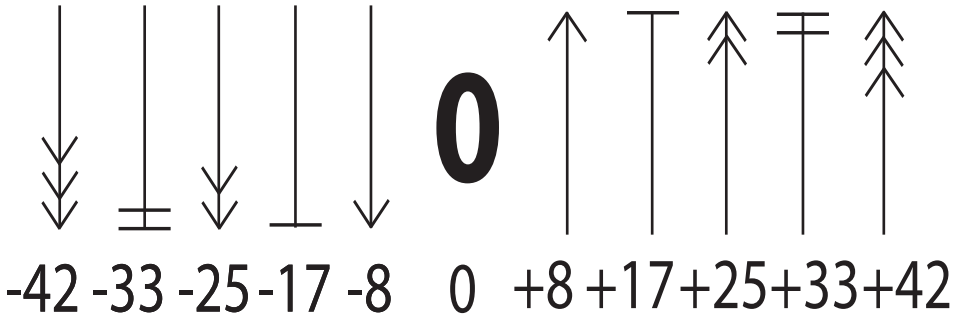
Since dreaming is the free association the brain goes into during the phase of sleep where nutrients are being loaded into the brain, fish do indeed dream. Fish dream about the things they see, smell, taste, fear and enjoy while being awake. Dreaming that you go to a fish market means pleasure and joy. Seeing decayed and rotting fish at the fish market indicates distress that will come in the disguise of happiness. Fish dreaming about boundless fields of kelp means pleasure and joy. Dreaming of rotting and decayed humans floating in the ocean indicates distress that will come in the disguise of happiness.

: Detailed Technical Information :

This piece uses live viola with a single microphone, for live processing. The electronics are controlled with a foot pedal by the violist. The microphone and foot pedal are connected to a computer which uses a MaxMSP patch to both playback fixed electronic material, process the live viola sound and provide a small amount of amplification of the viola. The person diffusing the electronics balances the unamplified viola with the amplified, the processed viola and the fixed electronics.

christopherjette@gmail.com!

This is the cent deviation key for FABD, solo viola and elcetronics
Christopher Jette 2010.



These symbols can be applied to any accidental and
divide the space between a 1/2 step (50) cents as indicated.

The zero in the center represents nothing being applied.

Fish Affected by Dreams

For Shannon McCue

jette

can start @
1,2,3,4,6,7,10

♩ = 60

Viola

Electronics

t1
beat 1

II

f

sffz

p ff p

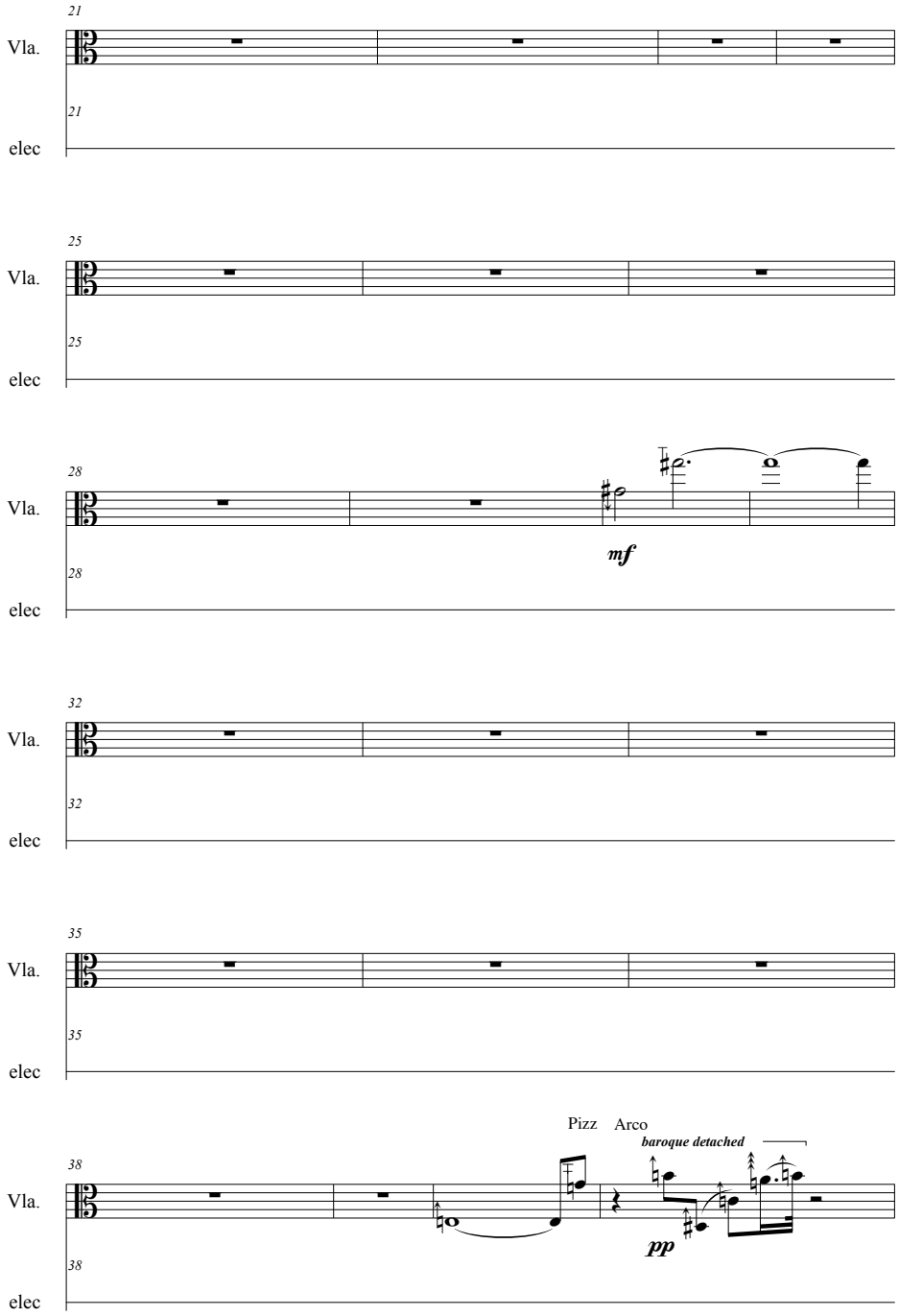
Vla.

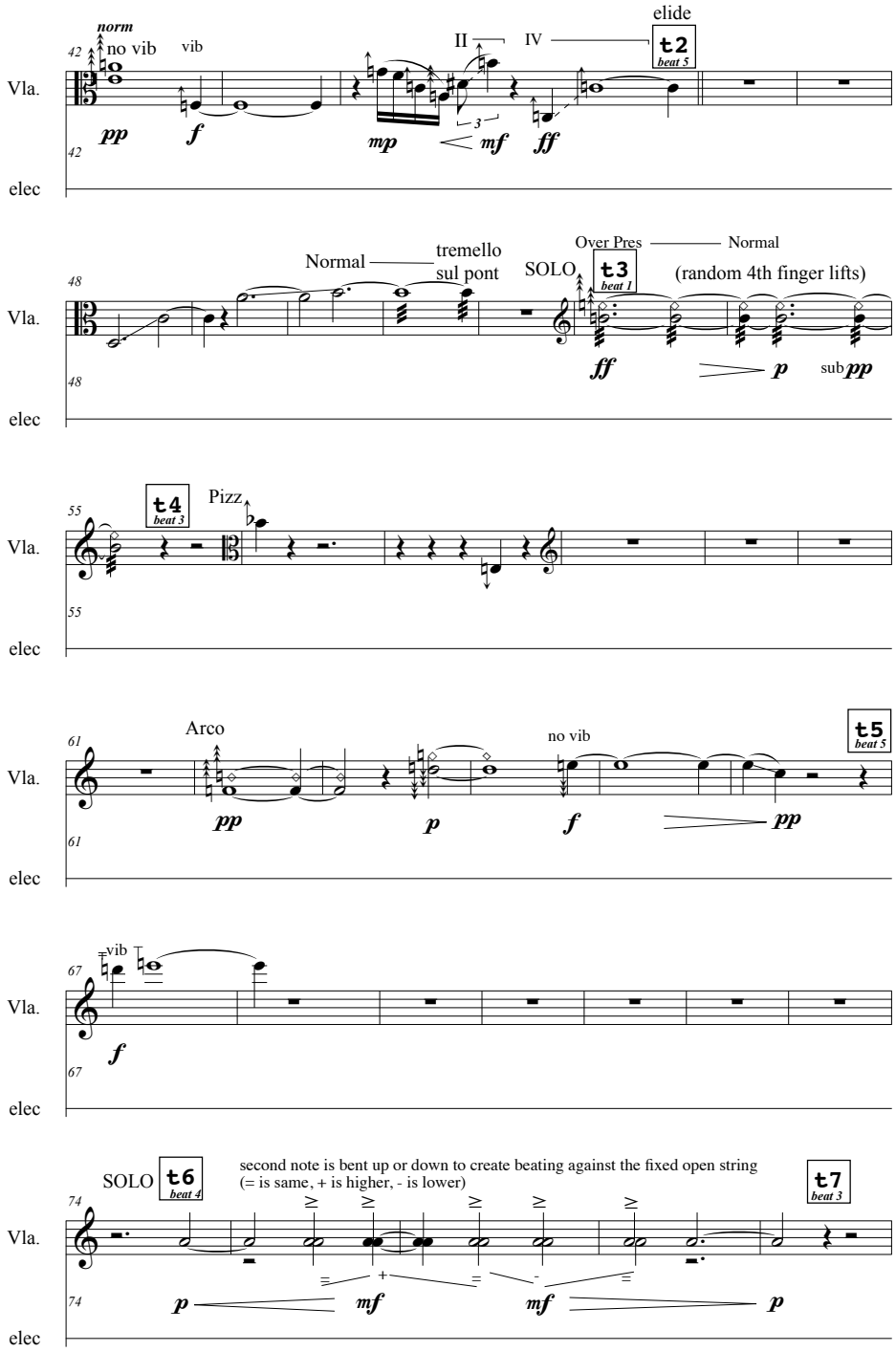
elec

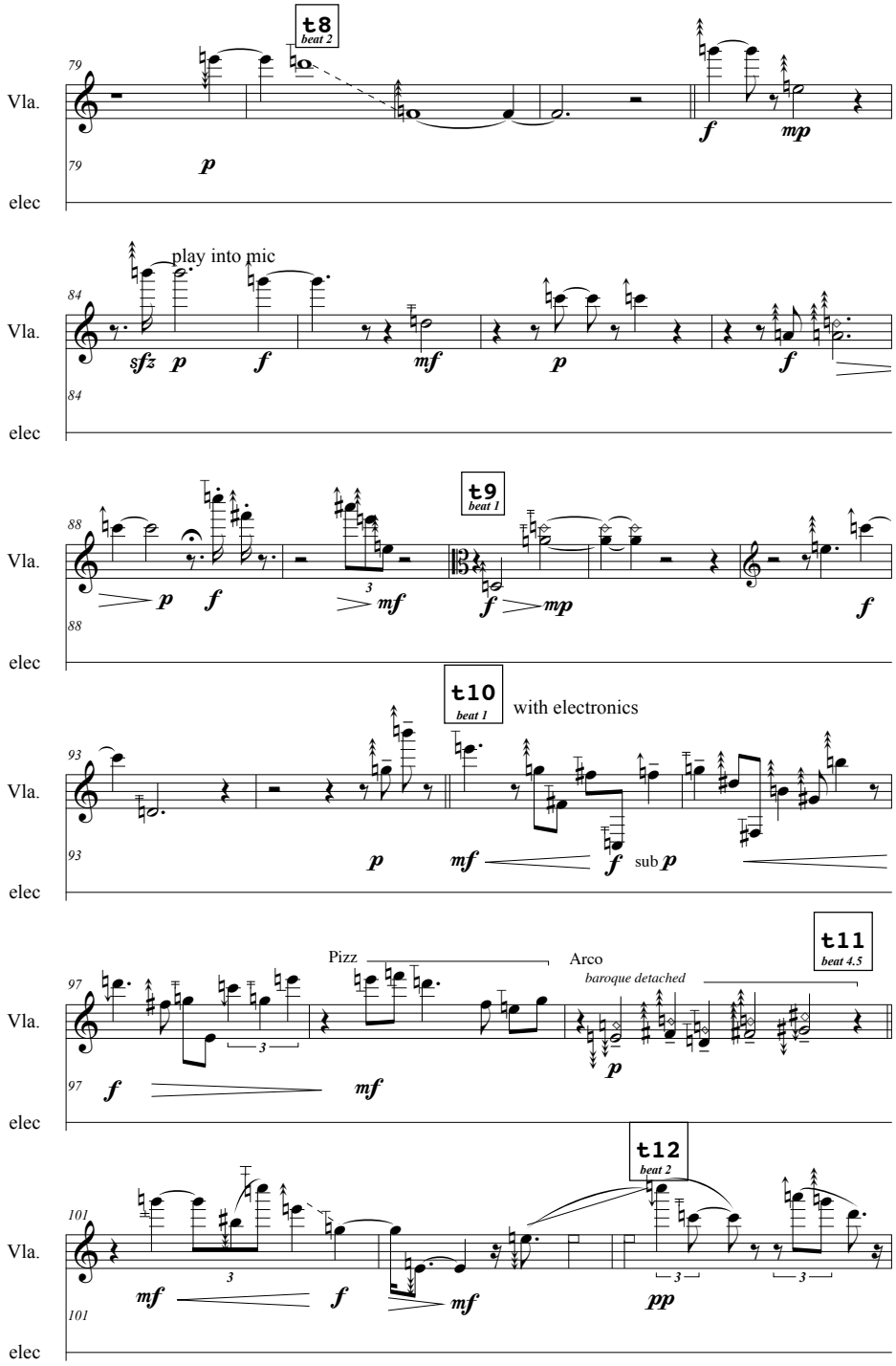
mp mf

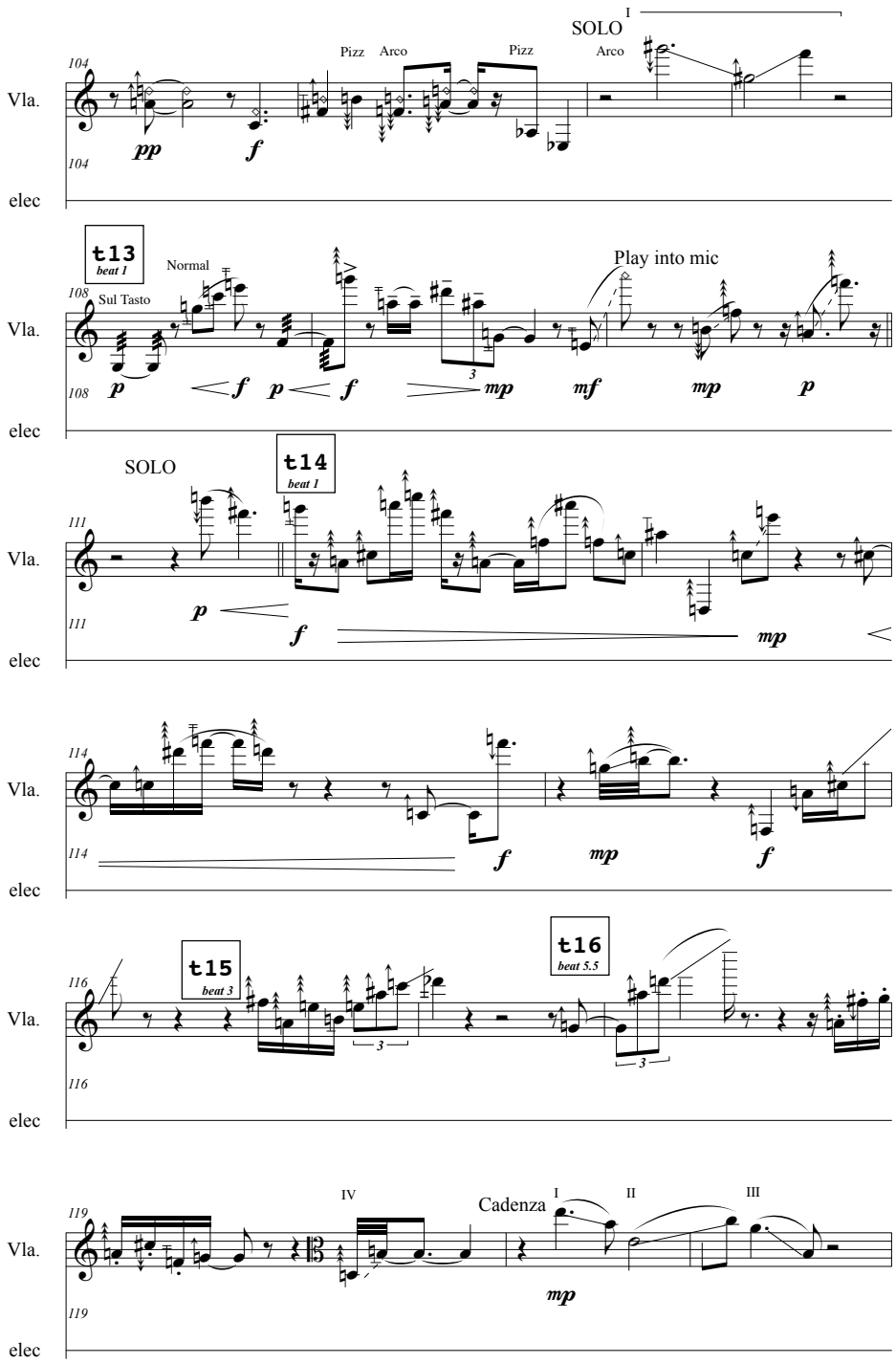
p

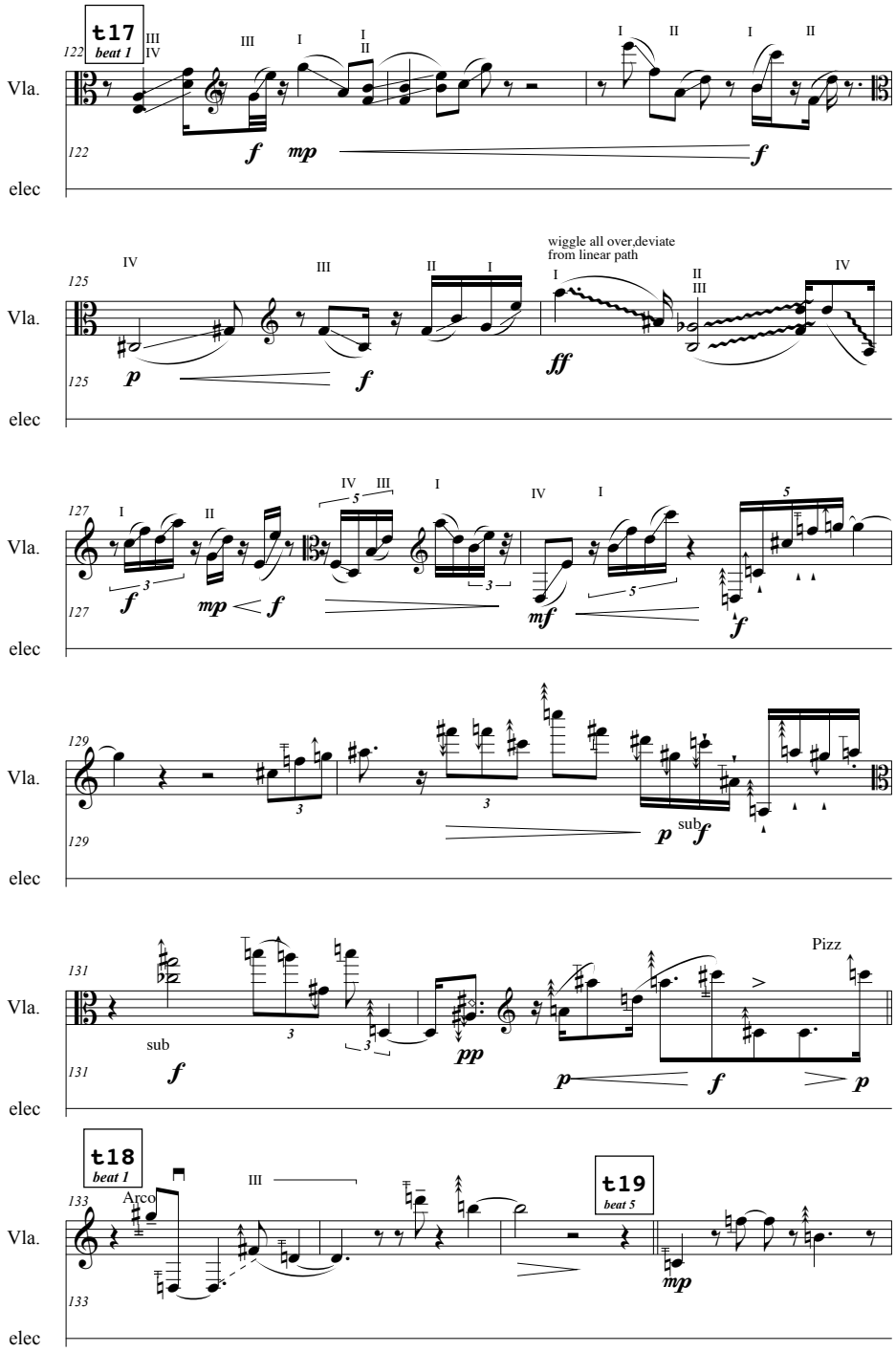
©2010

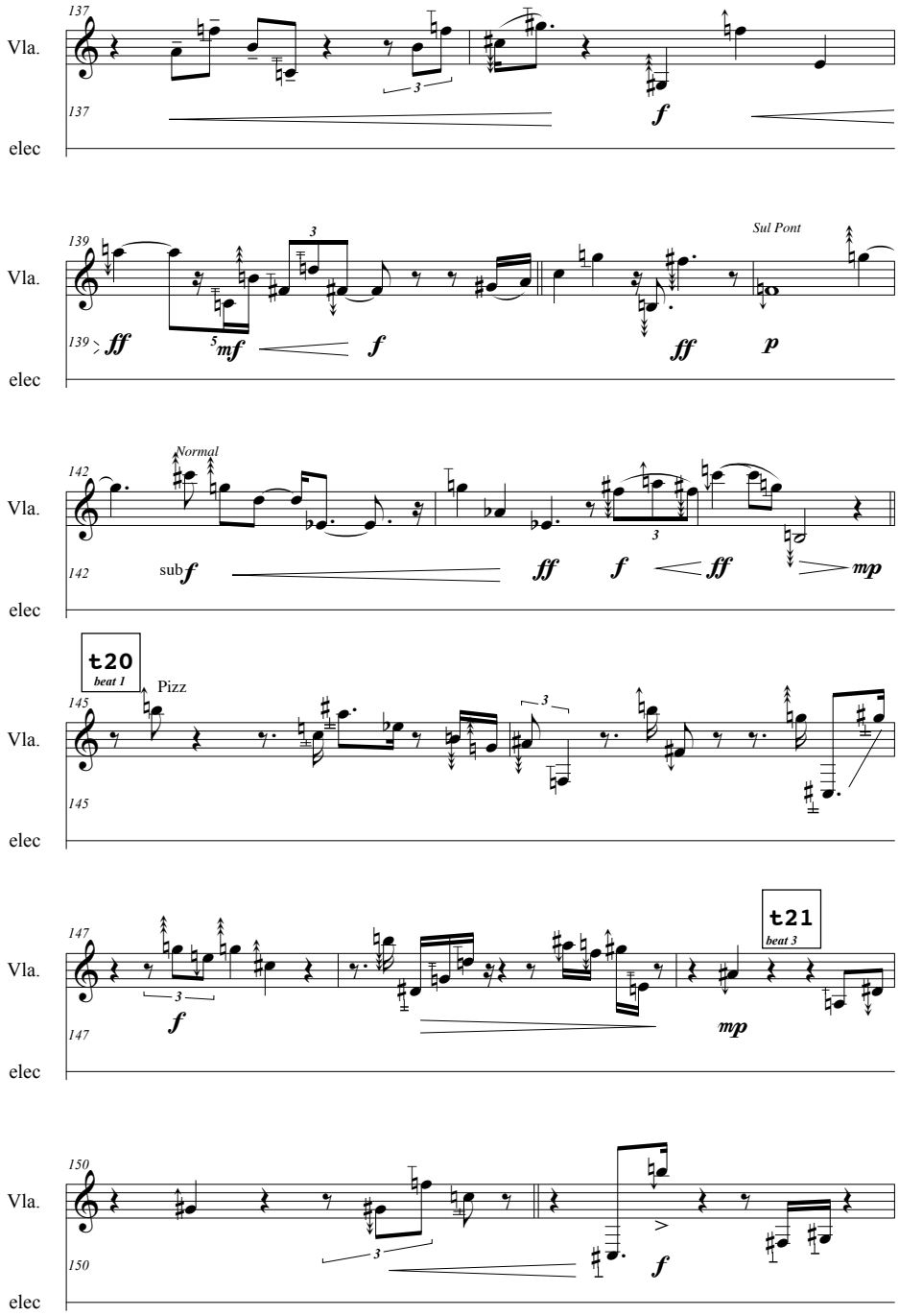

21
Vla.
21
elec
25
Vla.
25
elec
28
Vla.
mf
28
elec
32
Vla.
32
elec
35
Vla.
35
elec
Pizz
Arco
baroque detached
38
Vla.
pp
38
elec

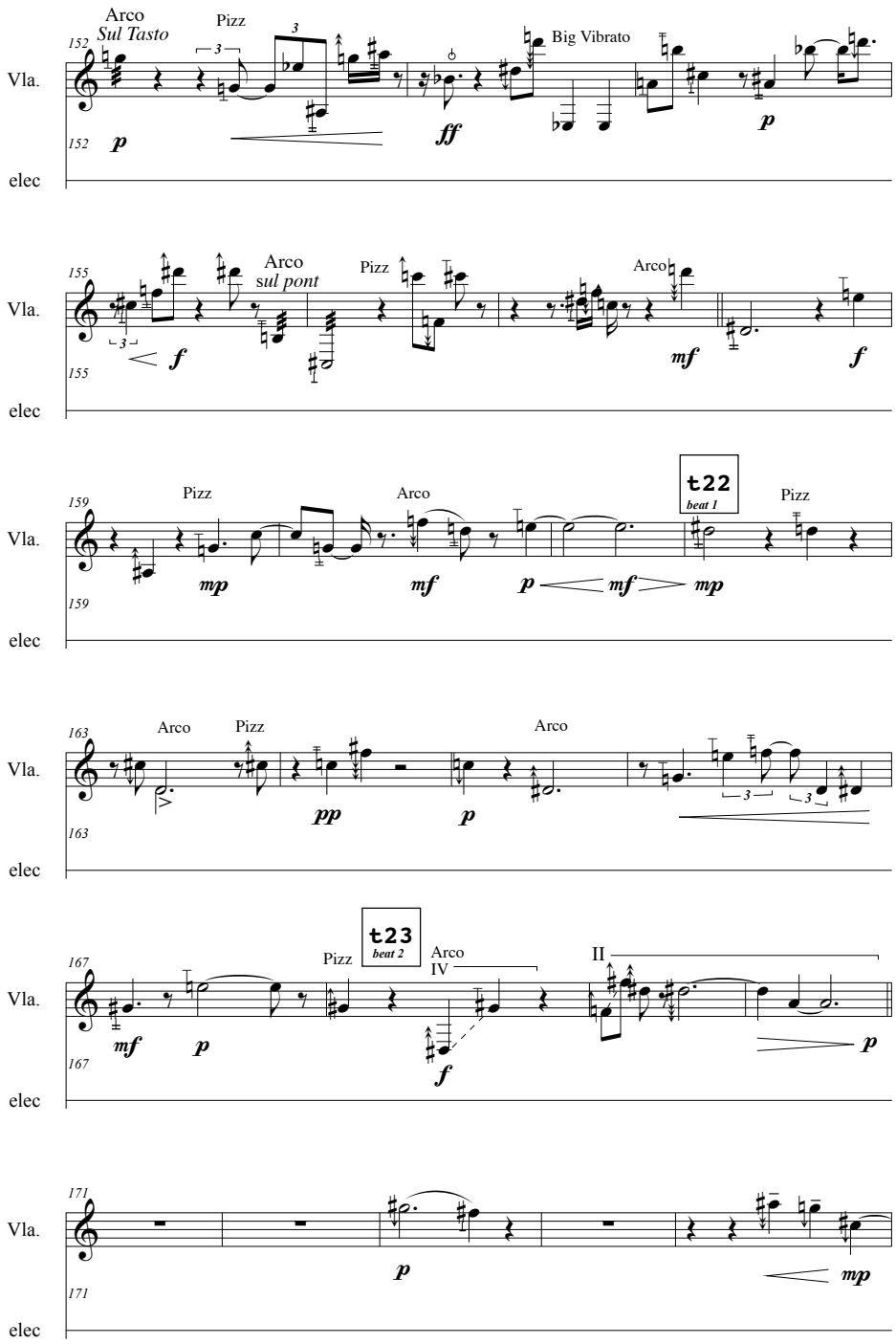

norm
no vib
vib
II
IV
elide
t2
beat 5
Vla.
elec
Normal
tremello
sul pont
SOLO
Over Pres
Normal
t3
beat 1
(random 4th finger lifts)
sub
t4
beat 3
Pizz.
Arco
no vib
t5
beat 5
vib
SOLO
t6
beat 4
second note is bent up or down to create beating against the fixed open string
(= is same, + is higher, - is lower)
t7
beat 3

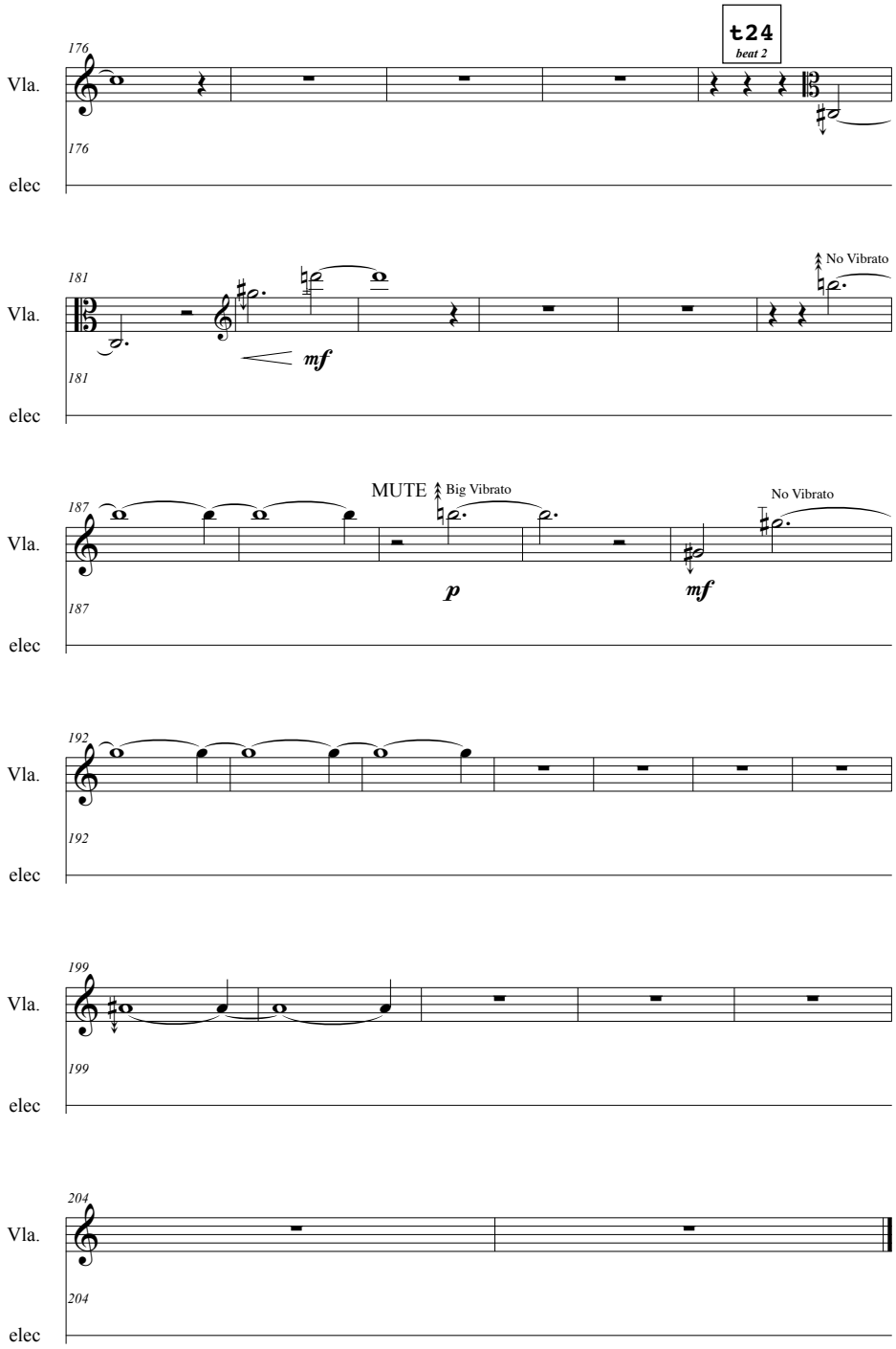

t8
beat 2
Vla.
elec
play into mic
t9
beat 1
t10
beat 1
with electronics
sub p
Pizz
Arco
baroque detached
t11
beat 4.5
t12
beat 2


SOLO
I
Pizz
Arco
Pizz
Arco
Vla.
elec
t13
beat 1
Normal
Sul Tasto
Play into mic
SOLO
t14
beat 1
t15
beat 3
t16
beat 5.5
IV
Cadenza
I
II
III


t17
beat 1
Vla.
elec
wiggle all over,deviate
from linear path
sub
Pizz
t18
beat 1
Arco
t19
beat 5


137
Vla.
137
elec
f
139
Vla.
139
ff
5mf
f
ff
Sul Pont
p
142
Normal
Vla.
142
subf
ff
f
ff
mp
elec
t20
beat 1
Pizz
145
Vla.
145
elec
147
Vla.
147
f
t21
beat 3
mp
elec
150
Vla.
150
f
elec


Arco
Sul Tasto
Pizz
Big Vibrato
Vla.
elec
Arco
sul pont
Pizz
Arco
Pizz
Arco
t22
beat 1
Pizz
Arco
Pizz
Arco
t23
beat 2
Pizz
Arco
IV
II


t24
beat 2
176
Vla.
176
elec
181
Vla.
mf
181
elec
No Vibrato
187
Vla.
MUTE
Big Vibrato
p
mf
No Vibrato
187
elec
192
Vla.
192
elec
199
Vla.
199
elec
204
Vla.
204
elec

VIII.

In Vitro Oink:

for piano and wii remote with live processing fixed electronics

In Vitro Oink

for piano, wii remote and live processing
with stereo diffusion

christopher jette
2009

GENERAL REMARKS

in vitro oink is designed for solo piano and electronic accompaniment (both precomposed and sampled live) that is triggered by a wii remote mounted on the left arm of the pianist and a midi pedal. The movement of the pianist triggers envelopes allowing the electronic part to be heard. The electronic part is unique with each performance, but is based on the same material so that there is continuity across performances.

To perform this composition the pianist needs to acquire the Max/MSP patch that is used to generate the electronic accompaniment in real time and link the gestures of the performer via wii controller and midi pedal to the electronics. Please email the composer for the patch and supporting materials.

There are 4 prerecorded electronic solos that begin sections III, IV, V and VII that are labeled "PILLARS" in the score. The length in seconds is indicated and the Max patch provides a countdown timer. The performer should wait until the majority of the electronic solo is completed and there is a suitable point for the entrance of the piano to begin playing the next section. Note that the wii remote and foot pedal will continue to function during these PILLARS so that the performer may contribute sound via gestural input.

INTERPRETATION

Each performance will be unique, depending on the pianos possibilities, the pianists' movement and the response of the generative system. The performer is encouraged to embrace these differences and adapt their interpretation of the piece in order to suit the given situation.

The tempi that are indicated are a suggested point of departure for the performer.

In addition to the score, it is suggested that a performer taking this piece up consult the video recording of Keith Kirchoff http://vimeo.com/9849204.

Pedal markings have been indicated in some places in order to achieve a specific sound. The performer shall not be limited exclusively to these indications unless it suits their interpretation.

PREPARATION

The pianist should thread a single piece of canning jar rubber between the strings of the top C of the piano. The sound when playing the note should be akin to the knocking of the piano.

NOTATION

There are seven sections in total, each is indicated with a roman numeral in a box.

There are arrows above each section indicating which movements of the wii are tracking the performers action in that section. There are occasional gestures indicated within the sections, these have been found to be useful in articulating the piece.

The double-barlines are used to indicate when the score is moving between one stream of material and the other. This is included as it may be useful to some performers.

The "A" button on the wii remote is used to advance through the different sections. This is notated in the score with a large A inside of a circle. The performer need not observe the rest(s) in these measures, but rather enter the next section at a point that is deemed appropriate.

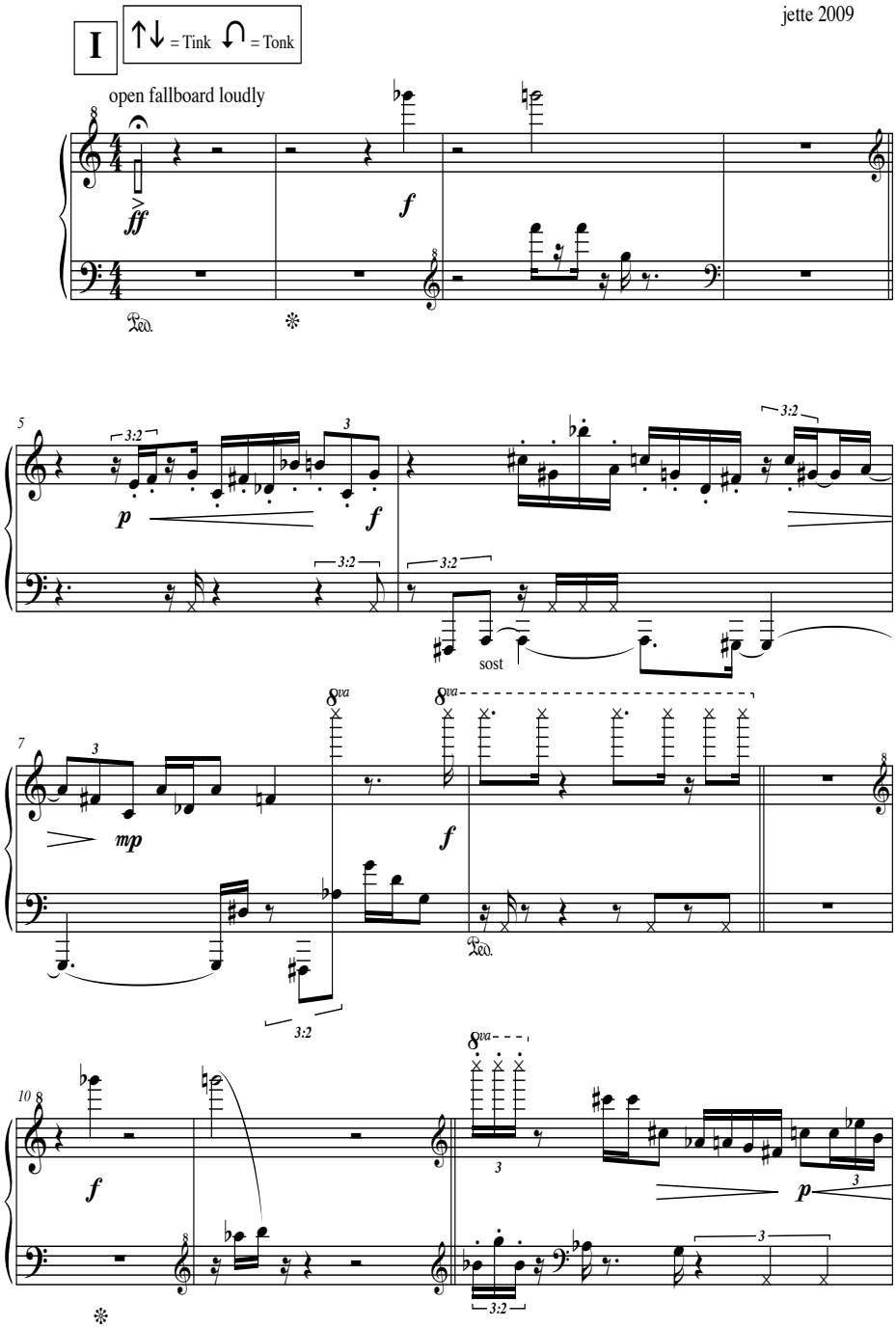
In addition to playing the indicated pitches on the piano, the pianist will also knock/slap the piano in different places as well as triggering audio files of knocking the piano.

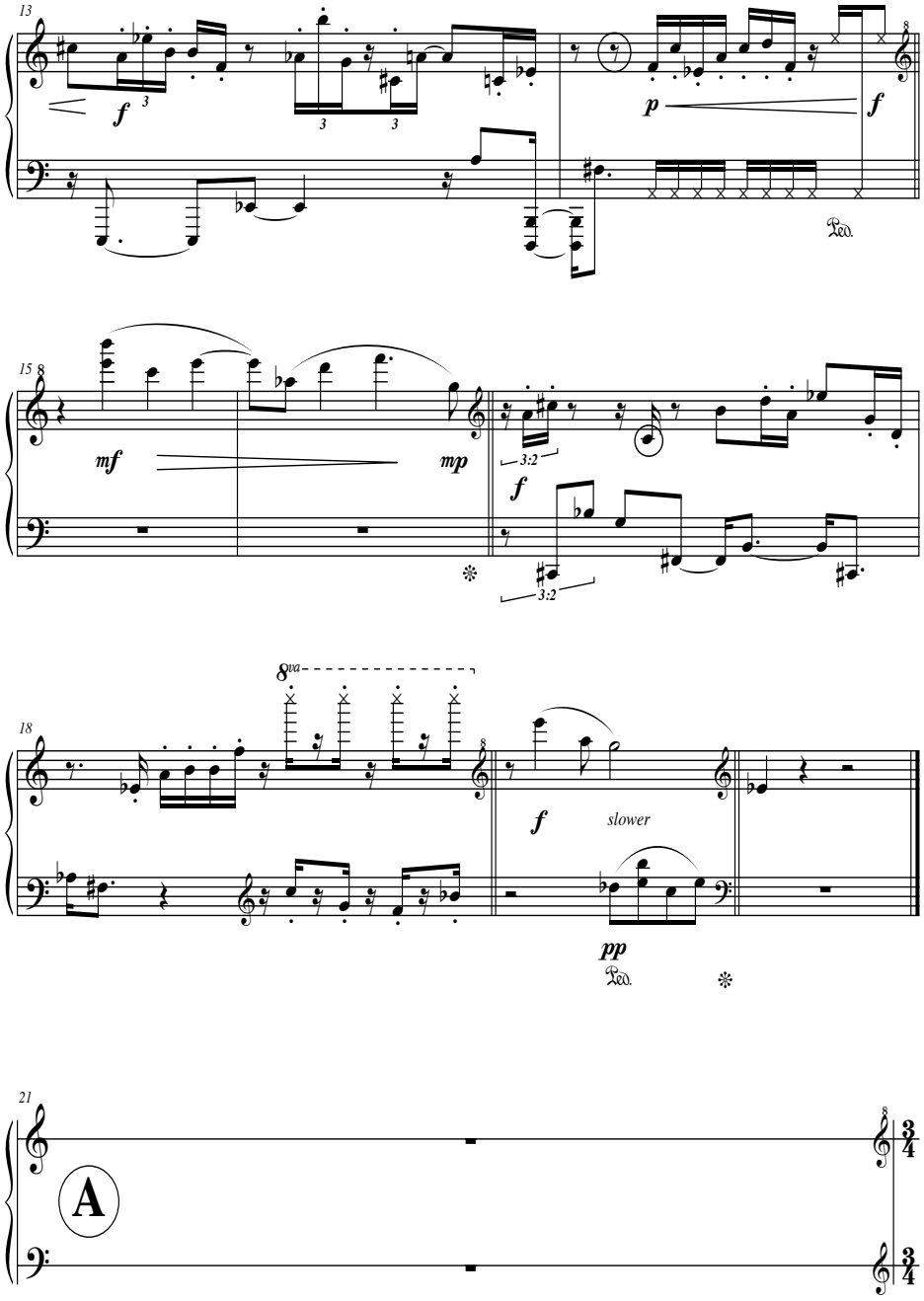
An "x" notehead indicates slapping the piano. The right hand is notated in the treble clef and the left hand is indicated in the bass clef. When the "x" is in the top space slap on top of the piano, when the "x" is in the bottom space, slap underneath the keybed. A circled notehead or rest is an indication to press the MIDI pedal in addition to playing the note.

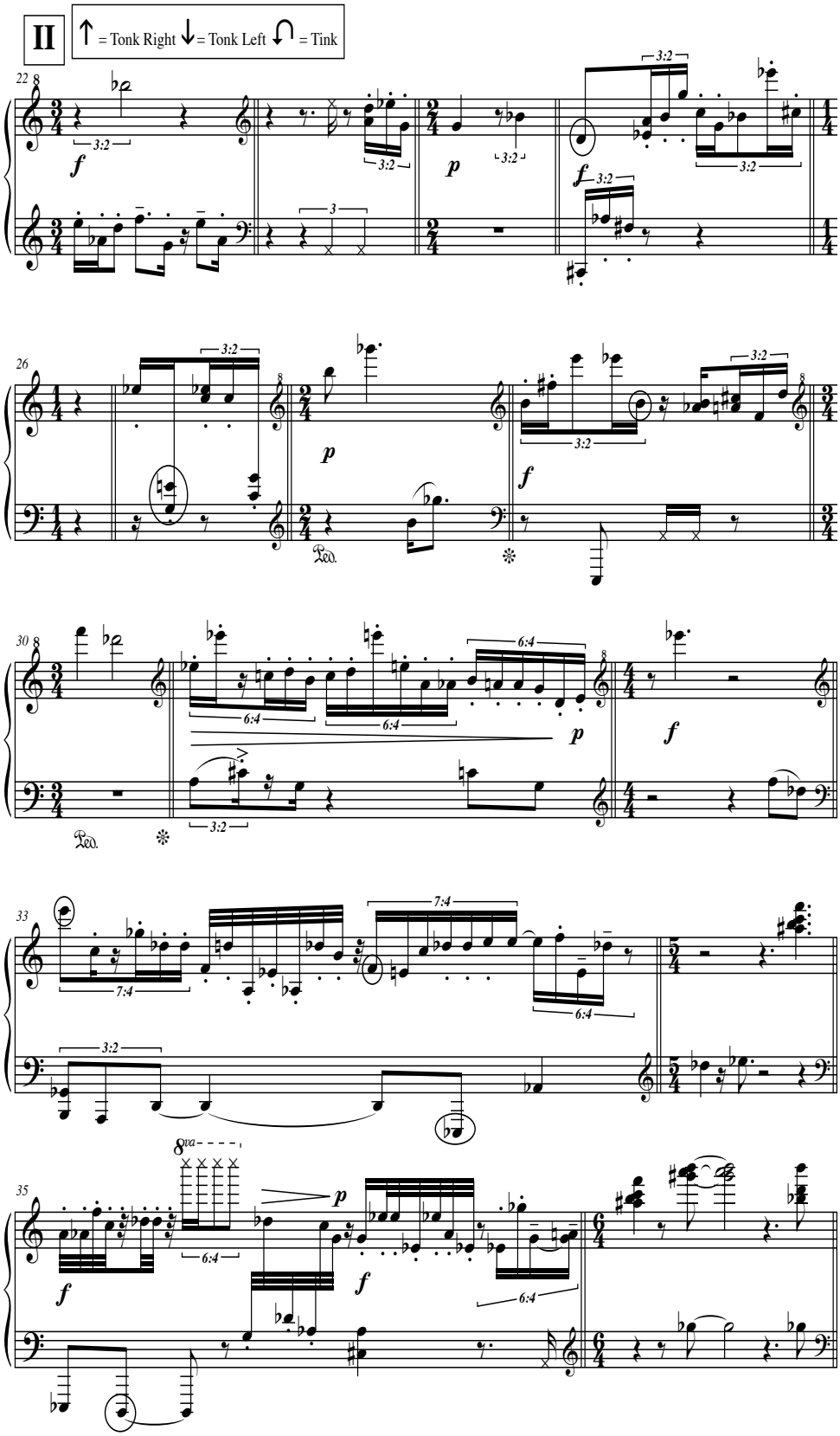
Christopher Jette
December 2009
christopherjette@gmail.com
www.cj.lovelyweather.com

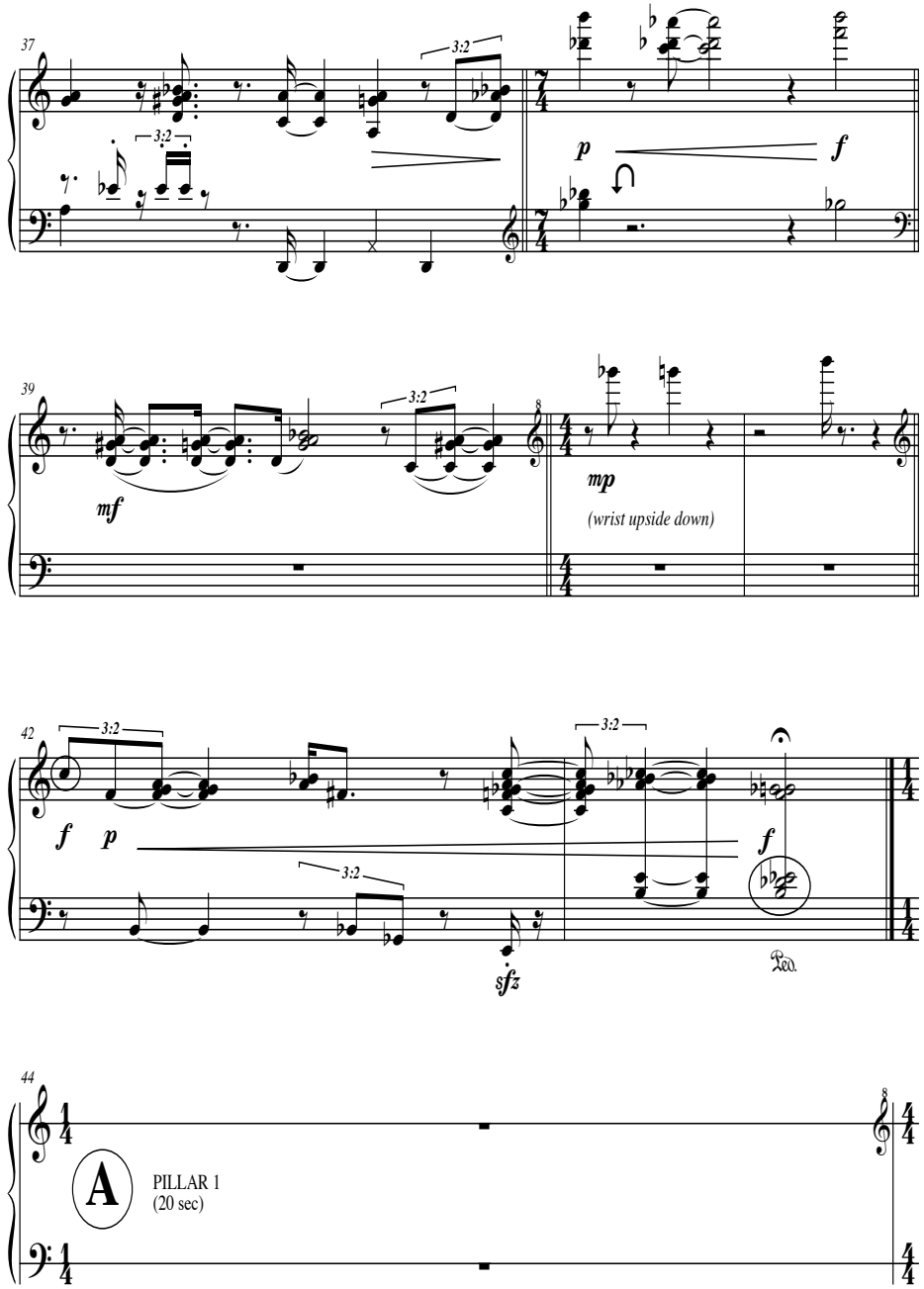
in vitro oink

jette 2009




13
f
p
f
Ped.
15
mf
mp
3:2
f
3:2
18
8va
f
slower
pp
Ped.
21
A


II
↑ = Tonk Right ↓ = Tonk Left ∩ = Tink
22
26
30
33
35
8va


37
3:2
p
f
39
mf
mp
(wrist upside down)
42
f
p
sfz
Ped.
44
A
PILLAR 1
(20 sec)

= Tink Right/Tonk Left = Tink Right + Tink Left = Stop

III

B

45

p *f*

8va

3:2

sost

48

fp *f* *f* *p* *p* *f* *f* *p* *fpf* *p* *mf*

51

f

53

p *mf* *p* *f* *p* *f* *mp* *f* *mp*

54

sub. p calm

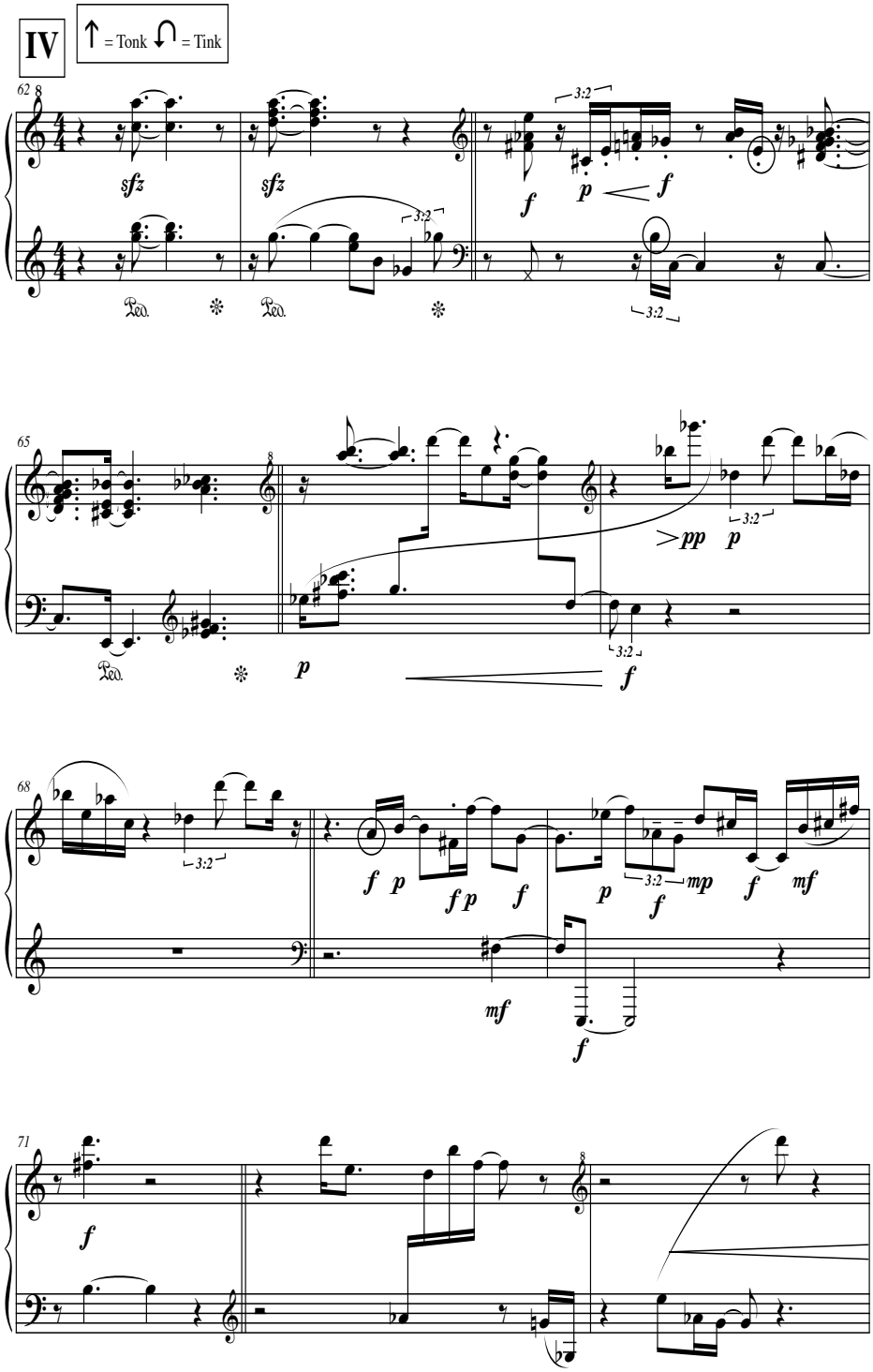
a tempo

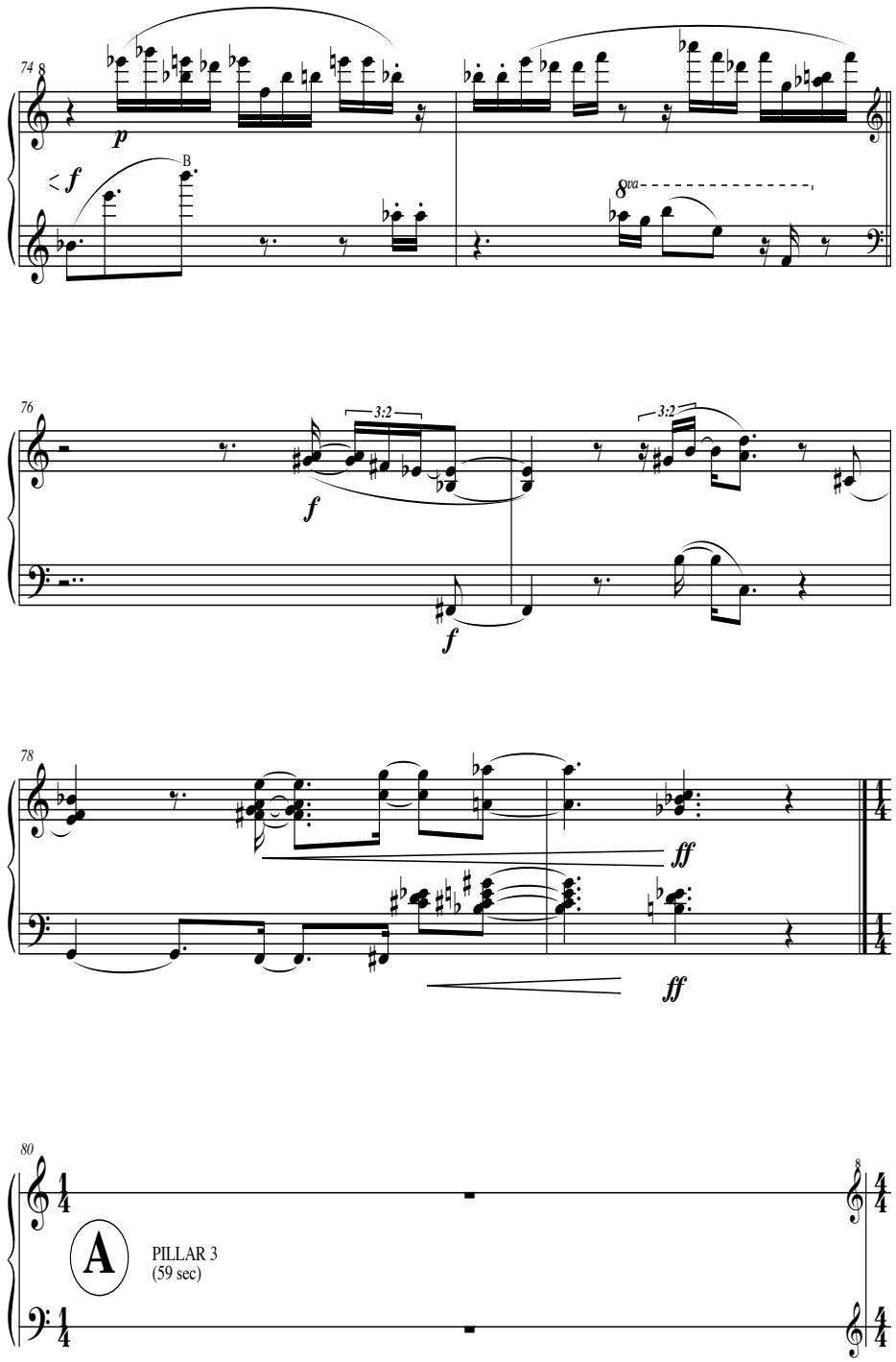
56

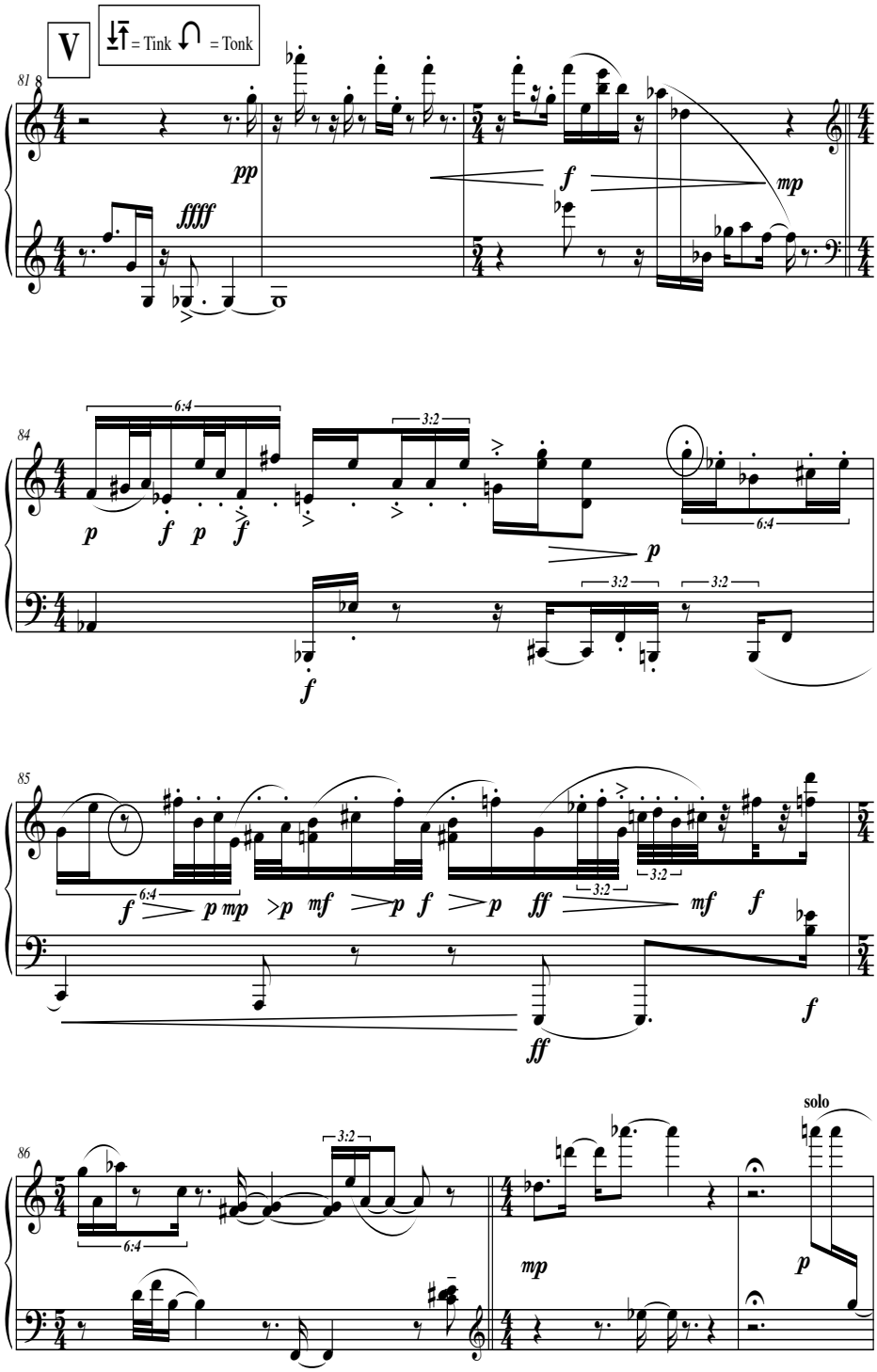
59

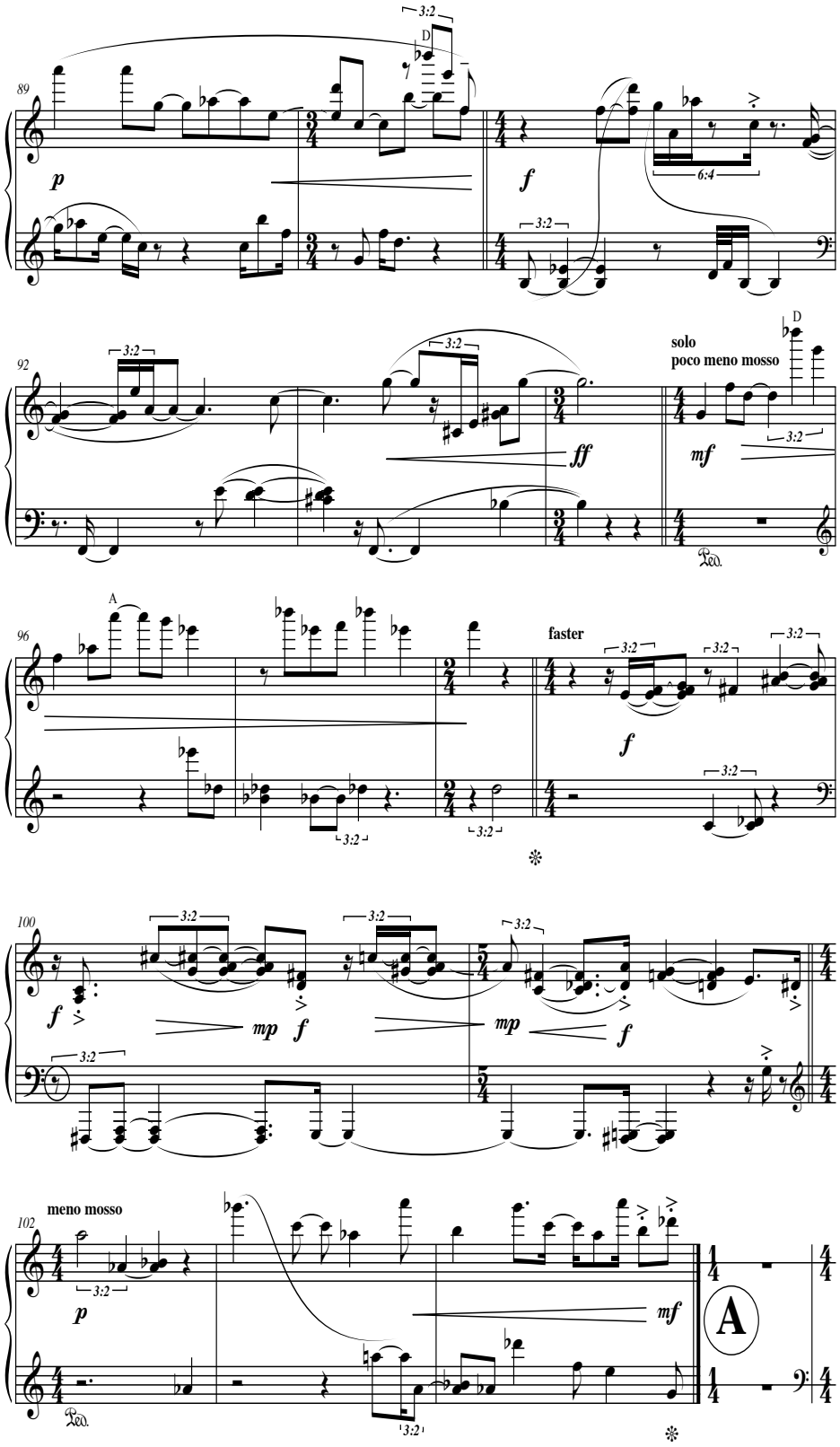
60

A PILLAR 2 (30 sec)


IV
= Tonk = Tink
62
sfz
sfz
f
p
f
3:2
Ped.
65
pp
p
f
68
f p
f p
f
p
mp
f
mf
mf
f
71
f


74
p
< f
B
8va
76
3:2
f
3:2
f
78
ff
ff
80
A
PILLAR 3
(59 sec)


V
= Tink
= Tonk
81
pp
ffff
f
mp
84
6:4
3:2
p
f
p
f
p
f
p
6:4
3:2
3:2
85
f
p
mp
p
mf
p
f
p
ff
mf
f
ff
f
86
6:4
3:2
mp
solo
p


89
D
p
f
6:4
3:2
92
solo
poco meno mosso
ff
mf
96
A
faster
100
mp
102
meno mosso
A

↑ = Tonk Right [long] ↓ = Tonk Left ⋂ = Tink [long]

VI

106

f

3:2

cresc. molto

109

f

mf *mp*

calando

f

a tempo

Ped.

112

3:2

mf

f

115

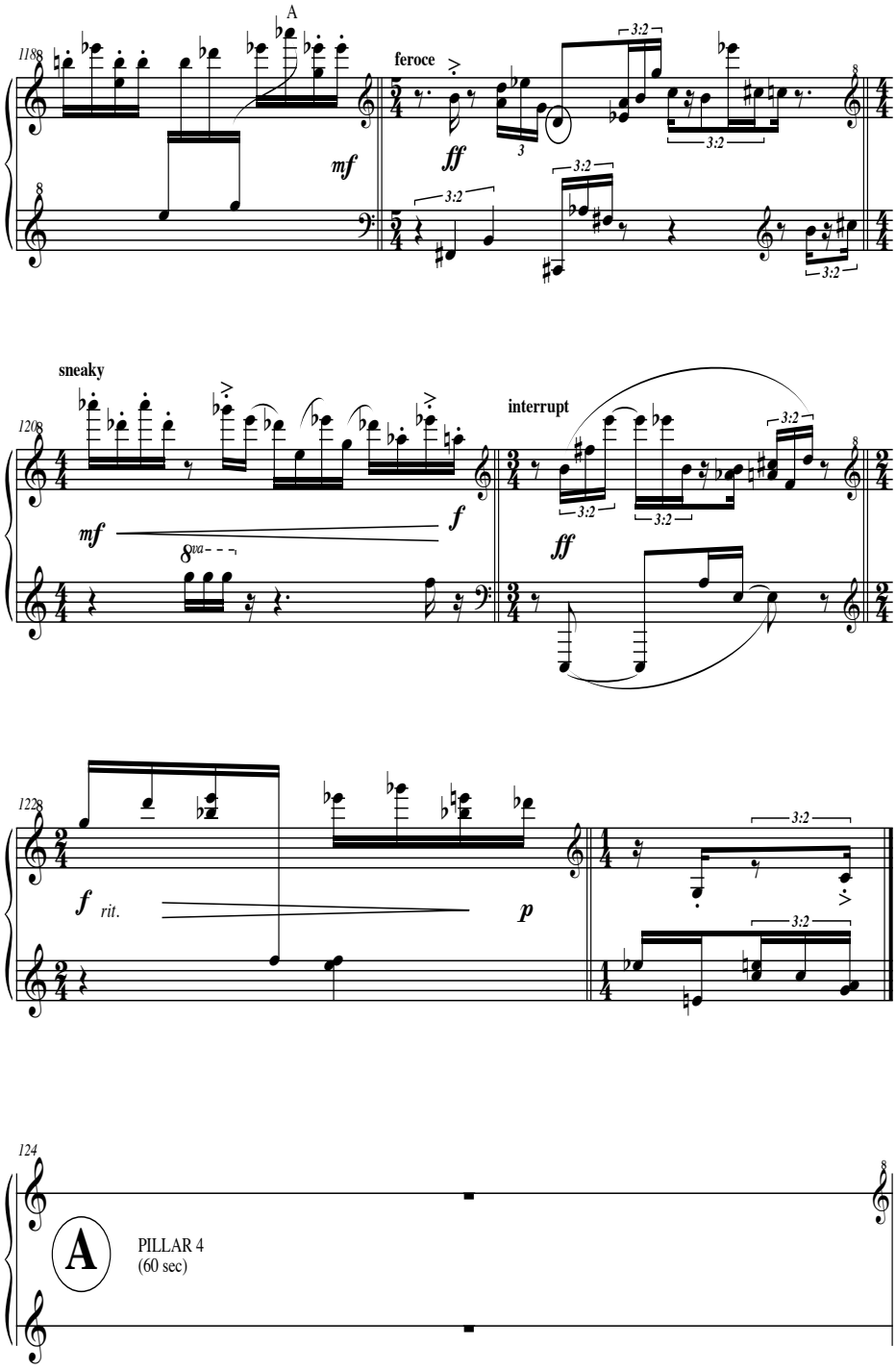
dim.

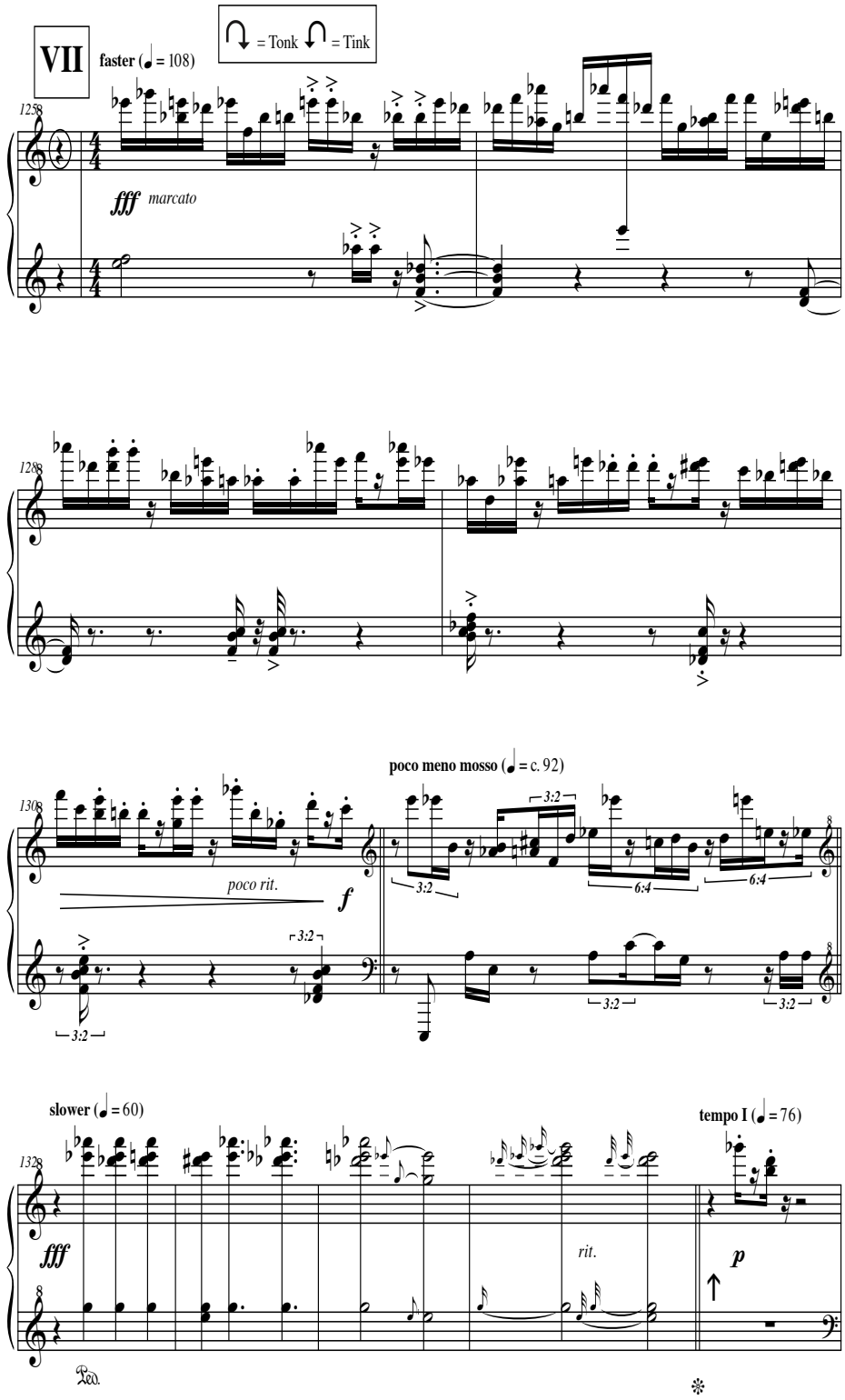
mp

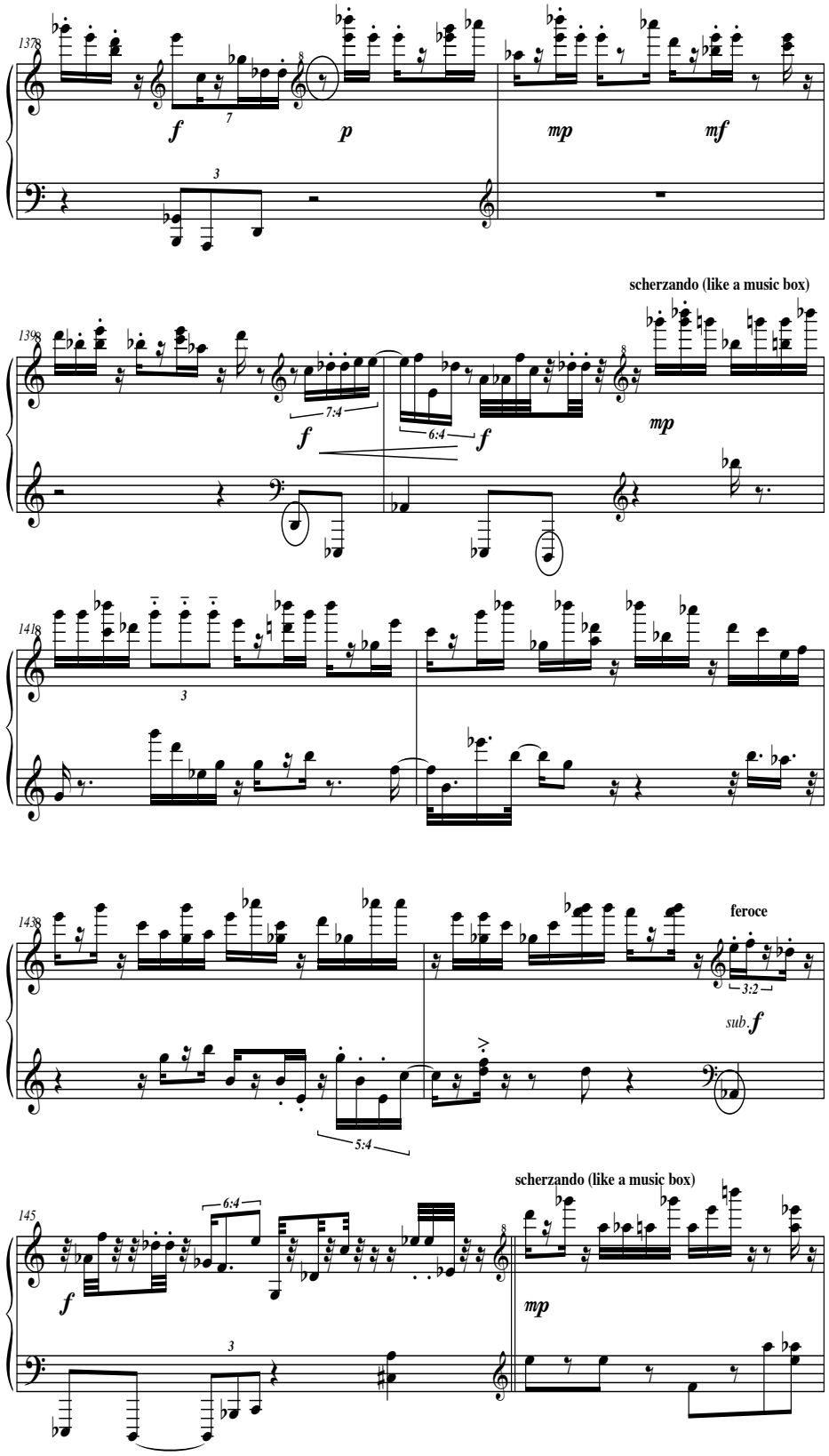
sneaky

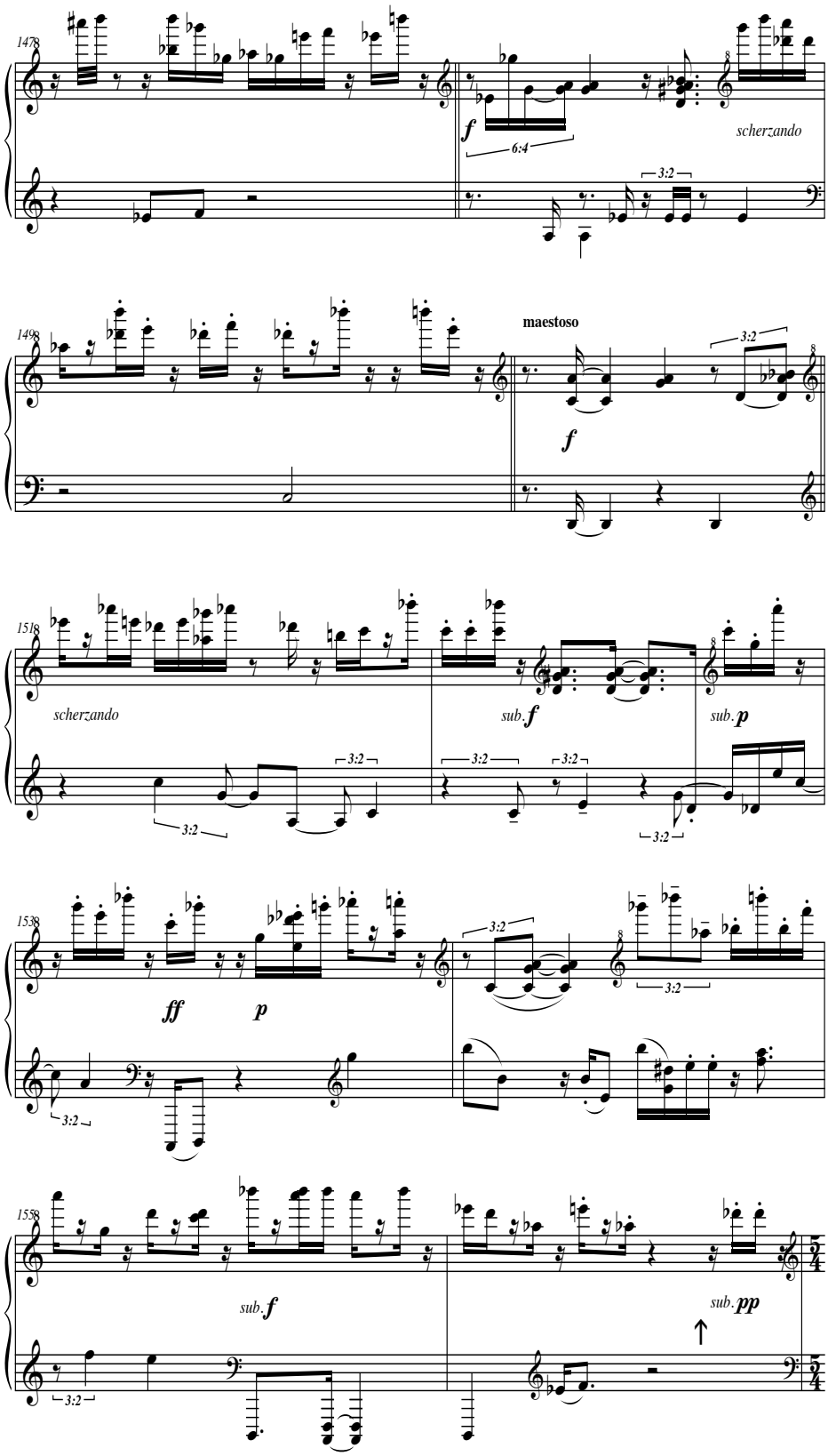
cresc.

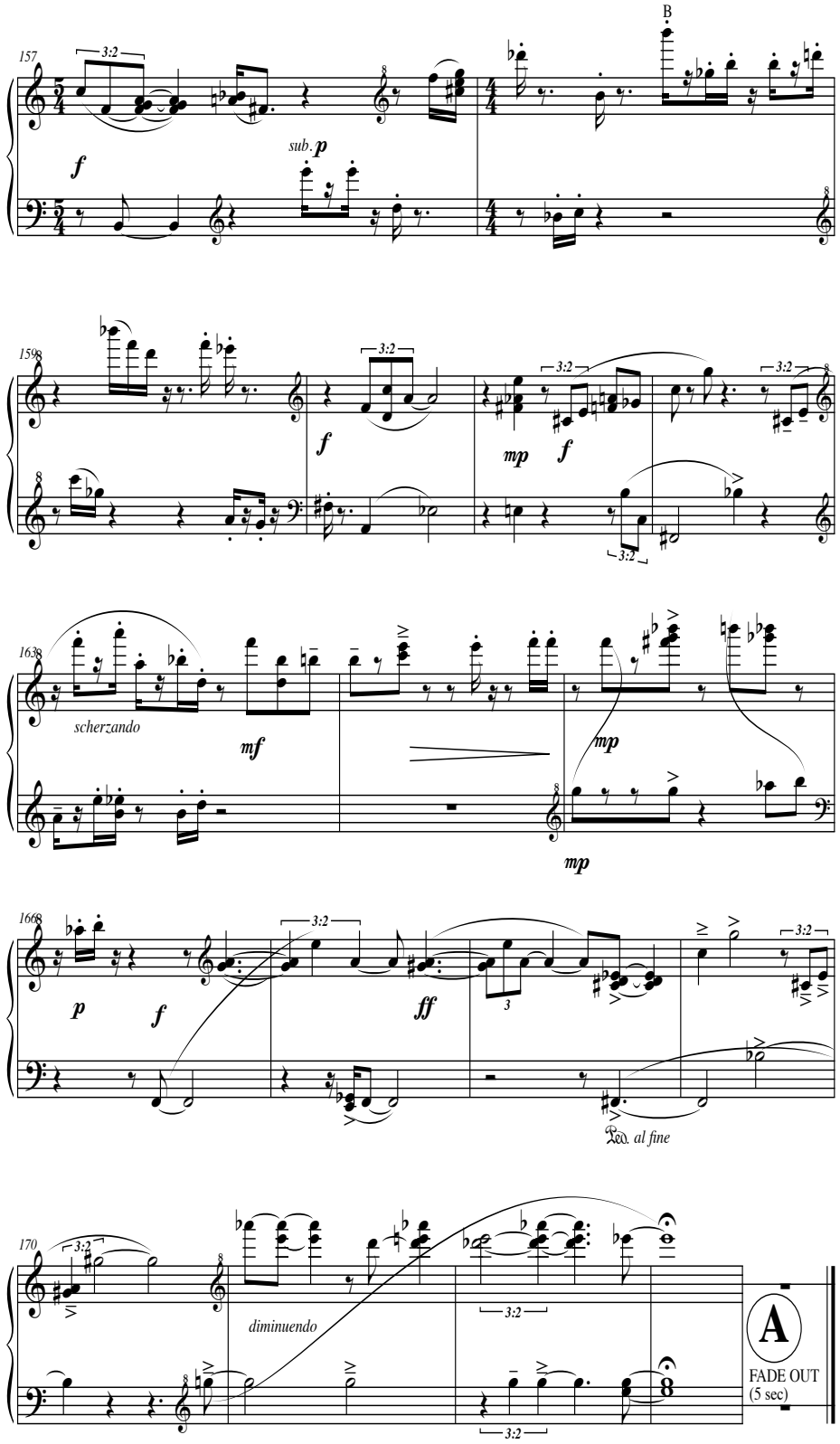
p


A
118
feroce
mf
ff
3:2
sneaky
120
interrupt
f
ff
8va
122
f
rit.
p
124
A
PILLAR 4
(60 sec)


VII
faster (♩ = 108)
= Tonk = Tink
fff marcato
poco meno mosso (♩ = c. 92)
poco rit.
f
slower (♩ = 60)
fff
rit.
tempo I (♩ = 76)
p


137
f
p
mp
mf
138
scherzando (like a music box)
7:4
6:4
f
f
mp
141
142
feroce
3:2
sub. f
5:4
145
6:4
f
scherzando (like a music box)
mp


147
f
6:4
scherzando
3:2
148
maestoso
f
3:2
151
scherzando
3:2
sub. f
sub. p
3:2
153
ff
p
3:2
155
sub. f
sub. pp
3:2
5/4


157
B
3:2
f
sub. p
159
f
mp
f
163
scherzando
mf
mp
mp
166
p
f
ff
3
Ped. al fine
170
diminuendo
A
FADE OUT
(5 sec)

IX.

SoundLines:

live electronic sound and dance

SoundLines - 2010

(Duration 16 minutes 25 seconds)

DVD

SoundLines is a collaborative work created by composer Christopher Jette and dancer Katherine Hawthorne. A live video feed of the dancer's movement is used as the basis for the sound. Two lines from the video matrix are used as the waveform for two streams of audio. This waveform is sent continuously, when there is a change between video frames or a user specified mixture of these two parametric extremes. The waveform is read both in it's raw form or as the input to an oscillator that can be either a; sine, triangle, square or sawtooth wave. Each of the two streams of audio is fed to a series of processing effects, an equalizer, a modulating digital delay and a reverberator. The composer uses a usb interface with sliders and knobs to control the mix and all of the parameters of processing effects.

The work has eight sections and each performance is unique because of how the light and the setting effect the sonification. The composer and dancer exchange

leading and following rolls through the course of the work. SoundLines explores the human body interacting with digital space and reveals the implied forces that, like gravity and resistance, constrain movement. There is both a stereo and eight-channel version. The work was first presented in San Francisco in December 2010 and then was the focus of a residency at High Concept Laboratories in Chicago during the June of 2011.

X.

www.lovelyweather.com:

web-based interactive audio-visual installation

www.lovelyweather.com - 2009

(Any Duration)

www.lovelyweather.com

www.lovelyweather is a web-based interactive audio-visual installation. This work uses a database of field recordings and digital photographs taken along a nature walk in the Ellwood Mesa area to form a virtual audio-visual space navigable by computer mouse. www.lovelyweather.com examines the relationship between the methods of navigation used in web-based media and the process of exploration that an artist and audience experience in the creation, presentation and interpretation of an artiwork.

In this work, the user is presented with a collage of environmental sounds and a rectangular frame containing a set of irregularly distributed images. Larger background images overlap and blend with each other, while smaller more distinct foreground images move in front of the background. The sound layers function similarly, with a set of distinct foreground sound objects played over a consistent

although changing background sound field. Clicking on an image transports the user to a different location as images and sounds fade out and new ones are introduced. As the user travels to various locations, the user is presented with a varied level of abstraction so that their attention shifts focus between the natural environment represented and the virtual, composed quality of the project itself.

www.lovelyweather.com draws inspiration from the field of soundscape composition (particularly the *Presque Rien* series by Luc Ferrari), interactive computer works (*riverIsland* by digital poet John Cayley), and theoretical works on the continuum of representational and abstract art including Wassily Kandinski's *Concerning the Spiritual in Art*. The project is sponsored by the UCSB Interdisciplinary Humanities Center Visual Performing and Media Arts Award. The work is was conceived collaboratively by Christopher Jette and Salman Bakht and created by Christopher Jette, Salman Bakht and Alejandro Casazi. This work was presented at ICMC 2010 in New York.

XI.

ToLEtFony:

ToLEtFony - 2011

(Duration 8 minutes 53 seconds)

CD Track - 1

The primary sound materials are recordings of Tape Loop Echo Feedback of an analog impulse generator. The Studer tape machine and the impulse generator were controlled by Christopher Jette while the mixing and the equalization were controlled by Curtis Roads. This source material was processed and formed to create a range of sonic landscapes.

XII.

Inter:

Inter – 2008

(Duration 7 minutes and 40 seconds)

CD Track – 2

This composition is a means of exploring the various means of moving between layers of sounds. The sounds can be divided into several realms; transients, drones repeating gestures and gestures that are obscured. The compositional goal is to explore how the different layers of sounds, juxtapositions of sounds and the various morphologies can provide the listener with the indications of a continually altering virtual space.