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Manifestations: A fixed media microtonal octet

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I am submitting herewith a thesis written by Sky Dering Van Duuren entitled "*Manifestations*: A fixed media microtonal octet." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Music, with a major in Music.

Andrew L. Sigler, Major Professor

We have read this thesis and recommend its acceptance:

Barbara Murphy, Jorge Variego

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Manifestations

A fixed media microtonal octet

A Thesis Presented for the

Master of Music

Degree

The University of Tennessee, Knoxville

Skylar Dering van Duuren

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Dedication

I would like to dedicate this piece of music and document to the following individuals, in no particular order.

To my father, Anton. You are a paragon of dignity, intellect, ethic, and humanity, and the finest man I have ever known.

To my brother, Alex. Thank you for playing an immense role in shaping me into the person I am now. I would not be where I am without you.

To my wife, Nicole. You give me strength every day and it will be my greatest joy to spend the rest of my life with you.

To my mother, Carolyn. I miss you and I know you would be very proud.

Acknowledgements

I must recognize the influence and support of my primary professor of composition, Dr. Andrew Sigler. What began as my flippant suggestion in our first lesson of what I would like to work on turned into a significant and important undertaking over the last two years with Dr. Sigler's guidance and encouragement. It is hard to believe how much I have developed as a composer in this all-too-brief span of time.

I also owe a debt of gratitude to Dr. Barbara Murphy and Dr. Jorge Variego for lending their expertise and invaluable experience to me, not only by serving on the committee for this project, but through their respective classes which contributed so much to my graduate education and which I thoroughly enjoyed.

Lastly, I extend my sincere thanks to the Thomas family for providing the fellowship funds with which I was able to record my piece with live musicians and quality equipment, and to Dr. Brent Mallinckrodt for selecting my proposal for the fellowship. Without this support, my concepts would have remained theoretical artifacts. It is an incredible honor to have been chosen for the opportunity to bring my ideas to life, and I shall always remember it.

Abstract

Manifestations is a composition in three movements, scored for an octet comprising the following instruments: flute (doubling piccolo), clarinet in B♭ (doubling bass clarinet), trumpet in C, tenor trombone, piano, marimba, violin, and cello. This piece serves as a vehicle for demonstrating the use of pitch adjustment software to incorporate microtonal aspects into a fixed-media piece. By utilizing this software, acoustic instruments may accurately provide pitches outside of the traditional twelve-tone chromatic scale in ways that impart expressiveness and/or provide structural significance without any physical alteration or extended techniques.

The microtonal elements of this piece are incorporated via three primary techniques, which I call controlled beating, linear inflection, and centstonic modulation. In my paper, I describe what each of these techniques entails and how they relate to and inform the piece. I also outline the workflow I used for producing a recording of this piece so that this process may be applied to works with similar concepts in the future.

The aim of *Manifestations* is to invite acoustic instruments into the novel pitch territory of microtonal music. However, despite the relatively new pitch elements, this piece is not entirely reliant on the novelty of these elements for its musical substance. Rather, it was my intention to build upon the contemporary repertoire by applying the techniques described herein to conventional compositional principles. For a majority of the piece there

are other forces at work that are the primary focus, such as the durational pattern in the first movement and the "diamond" motive in the second, which are articulated and clarified by the microtonal elements. It is this careful synthesis that I believe will strengthen my mission of advocacy.

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Chapter 1: Introduction

Manifestations is so named because it is the product of all my research in composition, particularly in the field of microtonality. The concepts and techniques I will describe were designed as an answer to the questions prompted by prototypes created during an initial phase of experimentation and discovery.

Description of project

Manifestations is an electronic, fixed-media piece in three movements and is approximately seventeen minutes in duration. The sources of the electronic sound are eight acoustic instruments, recorded and processed with software to inflect their natural acoustic sounds with various degrees of pitch alterations while maintaining their characteristic timbre.

The instrumentation is as follows:

Flute (doubling piccolo)

B♭ Clarinet (doubling bass clarinet)

Trumpet in C

Tenor trombone

Piano

Marimba

Violin

Cello

Background

Due to the somewhat technical nature of parts of this document regarding microtonality and tuning, it will be useful to briefly define some basic concepts and terminology before proceeding.

"Microtonality" refers broadly to music that does not conform to a standard system of pitch temperament. Microtones are intervals that are smaller than the semitone or half step, the smallest distance between two adjacent notes in the chromatic scale in Western classical music – such as C and C♯. This can be further deconstructed into cents; one semitone is equivalent to 100 cents. Confusingly, a "microtone" may also denote melodic or harmonic intervals that are larger than one semitone, but not an even multiple of one semitone. The term "macrotonal" to describe such intervals is occasionally used, but this usage is problematic because the same term has been proposed by Glenn Spring and Jere Hutcheson in the context of musical form.[1] "Xenharmonic" (from the Greek *xenos* for "foreign") was coined by Ivor Darreg,[2] but this term is less commonly used. Imperfect as they are, the umbrella terms "microtonal" and "microtonality" will be used throughout this document.

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[1] Glenn Spring and Jere Hutcheson, *Musical Form and Analysis: Time, Pattern, Proportion* (Long Grove: Waveland Press, 2013), 83.

[2] John Chalmers and Brian McLaren. "Darreg, Ivor." *Grove Music Online*. *Oxford Music Online*. Oxford University Press, accessed April 6, 2017, http://www.oxfordmusiconline.com/subscriber/article/grove/music/51516.

Microtonality is compelling and seems to have much compositional potential for a number of reasons. Notes beyond the Western standard of twelve divisions of the octave provide new possibilities for organization of harmony and melody. The spectrum of consonance to dissonance, thoroughly explored by composers from the Romantic era to the present day, may now be widened to accommodate more pristine consonance (see explanation about tuning below) and more aggressive dissonance, enabling a more colorful palette of emotion and character.

Unfortunately, the advancement of microtonality has been impeded by several issues. Western orchestral instruments have been built according to the twelve-tone chromatic scale for many years now. As a result, it is difficult to produce microtones on standard instruments with adequate accuracy. Orchestral musicians receive virtually no training in the performance of microtones during their education, and any instructor who wished to provide such training would find extremely few resources. Some efforts have been made, particularly by the composer and theorist Harry Partch, to build instruments for performing microtonal music. Ingenious as they may be, these instruments have not received widespread acceptance or acclaim. Some ensembles, such as the Kepler Quartet, were formed specifically to tackle the technical challenges posed by performing microtonal music on traditional instruments (in their case the music of composer Ben Johnston). The Kepler recordings are outstanding examples, but music of that caliber is rare and so far has been restricted to "gradient-pitch" instruments, e.g., fretless strings, voices, and trombones, so named for their innate ability to produce a seamless glide between semitones.

Very little effort has been made to expand the family of gradient-pitch instruments because performers usually do not require the ability to play between semitones. Pitches between semitones are usually only mentioned when discussing matters of intonation, or what is "in tune." However, the term "in tune" itself is cause for confusion. One definition might be "precisely matching frequency with a reference pitch," and arguably this is the most common application for most circumstances in the performance of music. For instance, when orchestras and other ensembles "tune" their instruments, they adhere to a reference pitch in order to match one another's pitch on all notes of the chromatic scale.

A competing and less common definition of correct intonation might be "two or more pitches sounding without producing beats." "Beating" is perceived as a rough, repetitive disturbance between two frequencies when their wavelengths are not synchronous. When two pitches are perfectly "in tune" with one another, the result will be a smooth, resonant sound devoid of any beats. This beatless sound is generally considered desirable. Any system of tuning in which all intervals are pure in this way is called "just intonation." This definition is echoed by Oxford Music Online, which describes just intonation as "the consistent use of harmonic intervals tuned so pure that they do not beat."[3]

[3] Mark Lindley. "Just intonation." *Grove Music Online. Oxford Music Online.* Oxford University Press, accessed February 12, 2017, http://www.oxfordmusiconline.com/subscriber/article/grove/music/14564.

However, to achieve this level of purity, one pitch will usually need to be adjusted by less than a semitone; that is, on the level of cents. The adjustment required to produce a pure interval or harmony changes based on the context, and in the context of acoustic instruments, it is often difficult, impractical, or impossible to make such a change, especially in the brief amount of time allotted in a performance situation. Moreover, it would be extraordinary for a performer even to be aware of every adjustment required in a major work such as a symphony, much less make all the adjustments accurately and in time. Such an accurate performance is an ideal rather than a goal. Still, every professional performer would benefit from a thorough understanding of just intonation and how it applies to his or her instrument. As it stands, this unfortunate discrepancy between systems of tuning used in modern music has resulted in a great deal of music that is at times rather out of tune by standards of the second definition.

Because pitches between semitones are not often called for, performers are not used to making such minute adjustments. In contrast, the microtonal pitch language described in this research is very particular and precise and would require a performer to have extremely fine control of the instrument for the intention to be fully realized. To make this project feasible, I turned to a solution from technology.

The role of technology

To address the issues posed by the competing definitions of intonation, difficulty of executing just intonation, and the fact that most instruments are not well equipped or not at all equipped to play accurately between semitones, one solution is to use computer technology. For this piece, I recorded each instrumental part of the octet separately and processed it with the pitch adjustment software, Melodyne. This software allows one to adjust the pitch of every note down to the cent, but minute and customized adjustments can only be performed after recording, not in live performance. In my score, I specified the adjustments to be made in post-production to each note or passage, which will be reflected in the recording. A graphic representation of the sub-semitone pitch layer follows each instrument's standard notation. Instructions for deciphering this graph are included in the front matter of the full score.

This method provides the security and precision of pitch demanded by the piece that is otherwise unattainable for performers of most acoustic instruments. The instrumentation of my octet was chosen in part to showcase the versatility of this method. The violin, cello, and trombone, being gradient-pitch instruments, can produce microtones, but a great deal of skill is required. The flute, clarinet, and trumpet are not gradient-pitch instruments, making minute adjustments very difficult, and for them this piece would be practically impossible to realize accurately. In an acoustic setting, the piano and marimba would not be able to make any adjustments during performance, making them wholly unsuitable for this music.

Overview of my microtonal language

Theoretically, between the standard twelve equal steps in the octave there exists an infinite number of distinct pitches, or at least as many as the human ear can distinguish. The microtonalist must confront some very daunting questions, in particular: how does one deal with so many choices? The plethora of ways in which merely twelve unique pitches can be combined and transformed has sufficed for thousands of composers and many years of great music. Any microtonal composer must have some policies or guidelines in place for choosing his or her pitch content from the vastness of available options.

The fundamentals of the microtonal language that I have expressed in this piece are as follows. I first used the traditional twelve-tone chromatic scale to write the basic composition to which microtonal adjustments were applied to create the final product. I firmly believe this initial step is critical. This ensures the piece has a solid foundation of convincing musical materials and flow. In fact, I am confident enough in the integrity of the piece even on this level alone that *Manifestations* may be performed live entirely independent of any microtonal elements and it would maintain most of its identity, much like a piano reduction of a concerto may be made for when it is not possible for a soloist to play with an orchestra.

This relationship between two "levels" consisting of a foundation of twelve equal divisions of the octave, which do not change, and the microtonal adjustments made to each note, which change from moment to moment, deserves proper acknowledgement, so I will at times use the terms "coarse" and "fine" to refer to these levels, respectively.

To further organize my pitch materials, I only use gradations of multiples of five cents, and more commonly gradations of ten cents. This gives a maximum of twenty gradations to the semitone, and 240 pitches to the octave. I have chosen five cents as a lower limit for two reasons. First, the human ear can only discern discrepancies of about two to three cents at best; any less is perceived as a unison. Second, a five cent gradient allows for any interval to be adjusted so that it is very nearly pure, e.g., a beatless major third is approximately 13.7 cents lower than an equal tempered major third, a mere 1.3 cents from the nearest gradation of minus 15 cents. At the very worst, an interval that requires an adjustment that is 2.5 cents away from the nearest gradation will still sound quite pure, as 2.5 cents is very close to the boundary of human perception.

To still further codify the manners in which the microtonal material will be handled, I developed three techniques to apply at different points in the music for expressive and structural purposes: linear inflection, controlled beating, and centstonic modulation. These techniques are intended to enhance, clarify, and lend more depth to the basic composition in ways that only the use of microtones will allow. These three techniques are the practical applications of my microtonal language.

The three microtonal techniques

I will now describe the three techniques used in this piece to convey a microtonal language, in no particular order. I make no pretense that these are entirely new techniques, although I have not encountered other pieces that make use of them.

I call the first of my three techniques controlled beating. It is conceivable, although it is not my goal exclusively, to use microtonality in a way that eliminates beating and make music that is perfectly in tune in the "vertical" sense – that is, in the context of a plurality of pitches sounding simultaneously. Rather than outlawing all beats as a rule, I controlled this element, which has so far been left relatively unchecked, save for a few microtonalists. Controlled beating therefore refers both to the creation of harmonies without beats and the deliberate addition of them for the purpose of coloring the harmony with varying degrees of intensity. This technique adds a new layer to the musical narrative. As the music undulates from dissonance to consonance, or tension to relaxation, this shift may be complemented by a change in the amount of beats in the appropriate direction, or the narrative may be complicated by a change in the reverse direction.

In contrast to the vertical nature of pure harmonies and intervals, the second technique, linear inflection, was conceived as a way of adding depth to passages of music of a more horizontal or linear nature. This technique involves applying one of two basic kinds of transformation to a series of pitches. Two such transformations could be called "microaugmentation" and "microdiminution." Microaugmentation takes a series of intervals and increases each interval by a factor that is not a multiple of a semitone. So, a 125% microaugmentation of a half step would result in a semitone plus 25 cents, or an eighth tone. Similarly, a "microdiminution" would be just the reverse: a 75% microdiminution of a half step results in 75 cents, or a quarter tone plus an eighth tone. Together, these may be categorized as "microtransformations." Figure 1.1 is a visualization of how microtransformations affect the pitch of a melody, where each point on the line represents a note and each note is equally spaced in time. The model consists of equal-tempered half steps from C to D♯ and back down. The model is then subjected to a microaugmentation such that each interval is 25% larger than as in the model, and then to a microdiminution so each interval is 25% smaller (see Figure 1.1).

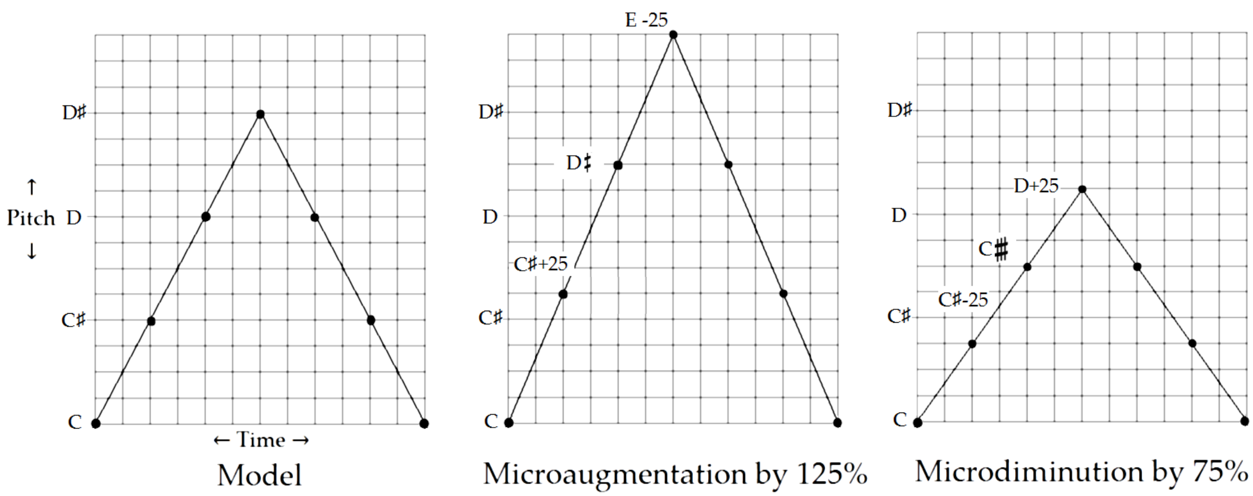

Figure 1.1: Theoretical microtransformations of a model.

It is important to understand that these transformations are only basic archetypes, and taken alone are not meant to represent every aspect of linear inflection. The successful use of any basic element of music theory, such as chords, scales, or formal structures, depends on the composer's creative application of that element in a composition. Similarly, I use these transformations in a more complex way than simply presenting a series of archetypes, combining and overlapping transformations to achieve an effective result.

Another application of the linear inflection technique may be called a "microtonal adjustment profile" (or "MAP") which denotes a particular adjustment assigned to each note in a scale, a fragment of a scale, or a motive. This profile imparts a characteristic color on the scale or motive that helps to define it (see Figure 1.2).

Figure 1.2: A microtonal adjustment profile (MAP).

In this piece, linear inflection serves primarily as an expressive or decorative effect, rather than having further-reaching implications on, for example, the formal structure or other compositional parameters.

The last technique, centstonic modulation, is a simple concept based on a traditional musical device. In the conventional twelve-tone chromatic scale, any of the twelve may serve as a tonic, a central pitch around which other pitches may be hierarchically oriented. It logically follows, then, that when we allow intervals of less than a semitone, increasing the number of tones to the octave, that any of the new pitches may be used as a tonic pitch as well. To label a microtone as a tonic, I use a nomenclature that specifies the number of cents from a standard note in the chromatic scale, and whether it is below or above that note. For example, "A♭-30" indicates that the current tonic is the pitch 30 cents below an equal-tempered A♭. This is the centstonic. It would be relatively uninteresting, however, simply to write an entire piece in a centstonic that lies between two semitones. Indeed, to hear that, one need only search for a recording of a piece of Baroque music in a historically accurate tuning of A4 as less than 440 Hz. The intriguing application of this technique lies in the distance between two centstonics that are not related by an even number of semitones, and the processes by which the key is changed; thus, the term "centstonic modulation."

Although usage of the term modulation brings with it the implication of a tonal organization, I am using the term more loosely to simply indicate a change in the centstonic.[4] A change in centstonic can be accomplished with an immediate and unprepared change or as gradually as is desired through steadily increasing or decreasing the pitch of consecutive notes until the new centstonic is reached. It may be generally observed that a positive change in the centstonic will have a stimulating or nervous effect—fans of horror films will be familiar with the effect of a string section playing a slowly ascending *glissando* during a tense scene. A negative change in the centstonic can accomplish the reverse: a relaxing or comforting effect. These subjective effects, of course, depend principally on the character of the music on the coarse layer.

It is also well to note that, because a modulation to a centstonic one step away does not have the jarring effect as would a coarse modulation from, for example, C major to D♭ major, centstonic modulation is a more flexible device than traditional modulation, and so it

[4] When speaking of modulation in traditional music theory contexts, there is also the concept of closely related keys and tonicization, or treatment of a pitch other than the tonic as a temporary point of reference. I will, however, avoid continuing to draw parallels beyond this initial comparison to a traditional modulation, as the further the analogy is taken, the less applicable it becomes.

is used frequently for expressive as well as structural effect. Additionally, it is not necessary for all sounding instruments to be at the same fine pitch level to identify a centstonic. Repetition, phrasing, harmonic context, and other factors may inform the analysis.

The applications of these three techniques and other compositional elements of each individual movement in turn will be discussed in the following chapters.

Chapter 2: Movement I

The first movement, at a steady *Allegro* pace for the most part, is the most meticulously controlled movement of the three in terms of its pitch and rhythmic content as well as its form, and thus requires the most thorough explanation. The movement is presented in a series of nine sections. The first seven have an expository role and are greatly contrasting in character, despite that each section conforms to a sequence of sixteen bars in 4/4 meter followed by one bar in 5/4 (except for section 7, in which one beat is added to its final bar). This formal idiosyncrasy will be explained in the analysis of the first section. The eighth and ninth sections serve as a summation and integration of the material in the initial seven sections.

Rhythmic content

A durational pattern strictly governs the rhythm and form of the first seven expository sections and in some cases is reflected in the pitch content as well. This pattern has two layers, and there are two forms of this pattern: an "ascending" and a "descending" form, which are exact retrogrades of one another.

The patterns are based on consecutive odd numbers from 1 to 11, and each number is interpolated by the number 2 (see Figures 2.1 and 2.2). The numbers correspond to the number of eighth notes or rests that take place during that timepoint. I will refer to timepoints as "at1," "dt1," etc., for "ascending timepoint 1" and "descending timepoint 1." Additionally, the number 2 so frequently coincides with the onset of a pitch that I will refer to each appearance of 2 as "ao1," "do1," etc., with the letter "o" meaning "onset." Thus, the pattern lays a framework for six onsets of pitch over the course of six bars of 4/4 time. Between each onset in the ascending form, there is an increasing amount of time between each onset, and vice versa. (The odd numbers in this series manifest in different ways depending on the section; often they are simply rests.)

These relationships can be seen in the following diagrams.

	2	1	2	3	2	5	2	7	2	9	2	11
Timepoint	at1	at2	at3	at4	at5	at6	at7	at8	at9	at10	at11	at12
Onset	ao1		ao2		ao3		ao4		ao5		ao6	

Figure 2.1: The ascending form of the durational series.

	11	2	9	2	7	2	5	2	3	2	1	2
Timepoint	dt1	dt2	dt3	dt4	dt5	dt6	dt7	dt8	dt9	dt10	dt11	dt12
Onset		do1		do2		do3		do4		do5		do6

Figure 2.2: The descending form of the durational series.

Each pattern makes for six complete bars of 4/4 time. The first section integrates this duration pattern with the pitch collections assigned to the first section to create a longer form of two descending patterns followed by one ascending pattern. Instead of an eighteen bar section, however, the patterns are overlapped in a way that creates seventeen bars – sixteen of 4/4 and one of 5/4. I shall explain the reason for this particular configuration in the analysis of Section 1 below.

Pitch content of Movement I

Each of the initial seven sections in Movement I has a corresponding and unique arrangement of the twelve tones of the chromatic scale into two groups. I will call these groups the primary (P) and ancillary (A) collections. A number in parentheses that follows the P and A designations refers to the section, e.g., P(1) refers to the primary collection of the first section (see Figure 2.3). Enharmonic pitches are treated equally.

Relationships between pitch content of sections and octave dependency

Each of the primary collections is arranged in such an order that there are seven unique pitches, one of which is the center pitch. There are six pitches in each ancillary collection; five of these are unique and the duplicated notes are found at the beginning and end of the collection. There is always a tritone relationship between each pair of collections' primary center pitch and ancillary outer pitches. These pitches play different roles in each section, but there is always an accent in some way (whether by repetition, duration, climax, nadir, etc.) on the primary center pitch and/or the ancillary outer pitches.

In some cases, the identification of one pitch as a center is due to octave dependency of the collection. I will describe pitches as "octave-dependent" when they appear only in one octave in that section; e.g., the note C4 rather than any C. Assigning octave dependency to

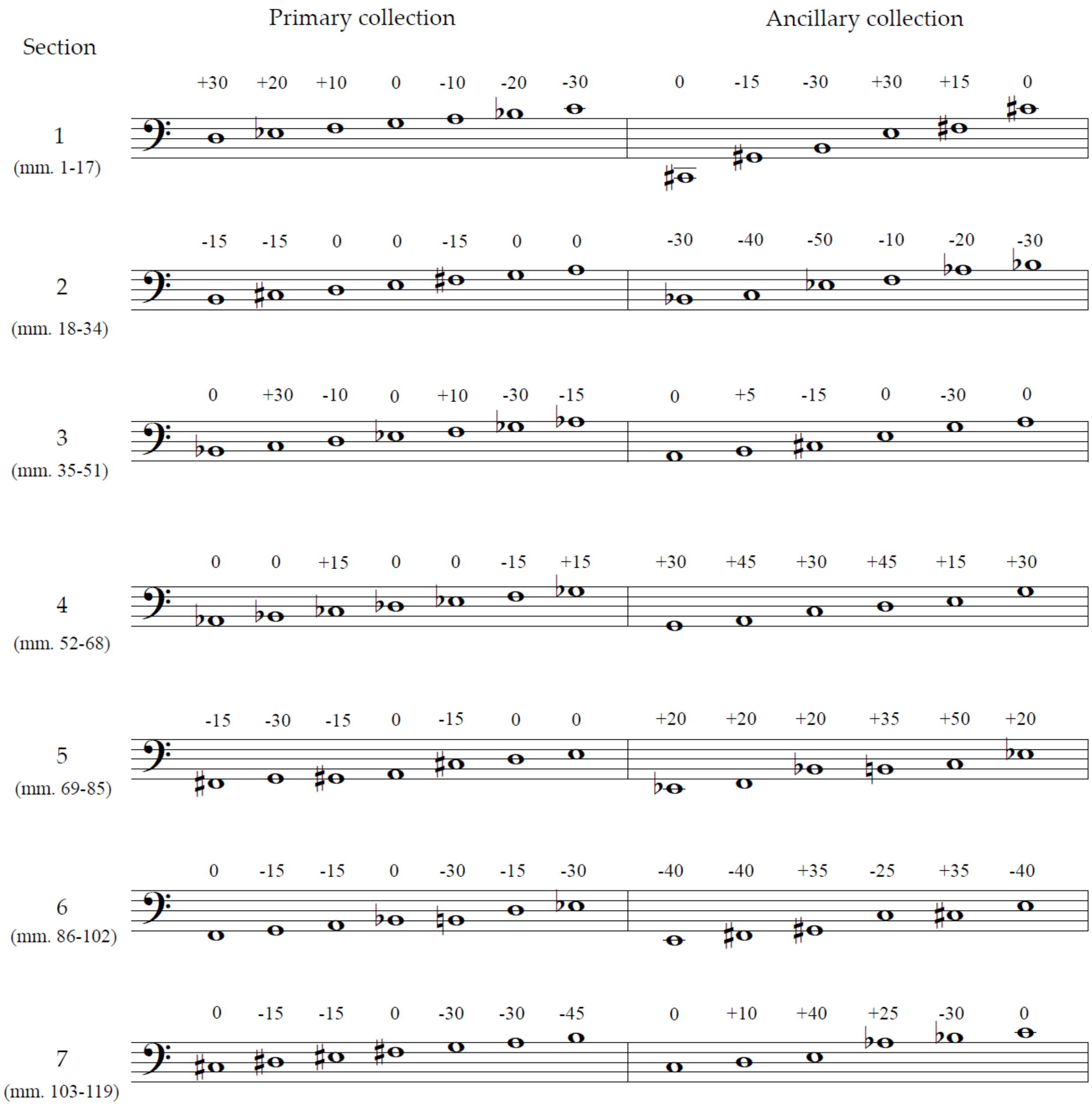

Figure 2.3: The pitch collections of Movement I and their microtonal adjustment profiles.

an odd number of ascending pitches naturally draws attention to the deliberate placement of pitches in the series, in particular the center pitch and two outer pitches. I use octave dependency at times in this movement to emphasize those center and outer pitches, creating a hierarchy of importance.

<u>Microtonal aspects of Movement I</u>

Each member of each pitch collection is assigned a fine pitch adjustment throughout the respective section; each pitch collection thus correlates to a unique microtonal adjustment profile. As such, the microtonal technique most prominent in this movement is linear inflection.

The center pitch of each primary collection is assigned an adjustment of 0, i.e., it is not adjusted. The remainder of each MAP was constructed based on the coarse pitch content of each section. For example, in P(1), the pitches below G3, the primary center, ascend by ten cents per step, and the pitches above descend by ten cents per step. This profile creates a microdiminution of the coarse pitch collection resulting in a pitch span that is 94% of the original. More important is how the pitches in this collection are presented. In m. 1, the cello plays the center note (G3), then the next note below (F3), the next note above (A3), below, above, etc., in a “spiraling outward” contour, producing melodic microtonal intervals of 10 cents, then 20, 30, 40, 50, and finally 60 (more than half of a semitone). This ordering of increasingly detuned coarse pitches is intended to gently introduce and acquaint the listener to the fine pitch layer at the start of the entire work so that the subsequent microtonal events may be heard with a calibrated ear.

As another example, in section 4 (mm. 52–68), the profile of the primary collection was created to allow the initial piano arpeggios to be purely tuned. The D♭, E♭, A♭, and B♭ are all assigned an adjustment of 0, and when combined with a G♭ at +15 (m. 53) and C♭ also at +15 (m. 55), these sonorities will be nearly beatless and restful. This choice complements the relative tranquility of this section compared to the previous. However, the passage is not bereft of dissonance. Pitches in the ancillary collection were assigned values of +15, +30, and +45, so that the periodic interruptions of (and influence on) the piano by the instruments representing the ancillary collection are contrasting to the initial pure sonorities. This is one of many examples in which the profiles of a section's primary and ancillary collections create pure intervals without beating, or detuned intervals with additional beating. Therefore, this movement contains many examples of controlled beating.

With the basic elements of pitch and rhythm explained, we can now move into an analysis of how these elements combine to create the first movement.

<u>Section 1 (mm. 1–17)</u>

The manner in which the durational pattern and pitch collections are combined in the first section is the strictest of the initial seven. In fact, the composition of this section was the genesis for the pitch and rhythm materials used, albeit less rigidly, in the rest of the movement. Therefore, I will describe in particular detail the processes of the first seventeen measures that produce the blueprint by which the movement continually unfolds.

In measures 1-6, P(1) is introduced, one pitch at a time, according to the descending durational pattern. The cello begins on the center pitch of P(1), G3, and plays once every two eighth notes (i.e., one quarter note) during an odd number in the duration series. This allows the pitch G3 to sound six times at dt1, five times at dt3, four at dt5, and so on, until it sounds only one time for one eighth note at dt11.

At the first onset in the series, do1, the F3 directly below G3 is sounded for two eighth notes before the G continues. At the next onset, do2, A3 is played, again for two eighth notes, and then each consecutive note in the collection is presented, always below then above, creating a contour that is continually widening in either direction. The cellist is asked to accent each new pitch to emphasize the collection and duration pattern, and the marimba and piano assist by playing only new pitches when they appear. These pitches are octave-dependent.

As soon as each pitch in P(1) has been sounded, a descending durational pattern begins to introduce A(1) in the same fashion in m. 6, beat 4. The start of this new pattern concatenates with the previous descending durational pattern. Instead of simply sounding quarter notes between onset points, at this point the cello begins to play pitches from P(1) in a less strict rhythm. Meanwhile, and also in the cello, the pitches of A(1) are introduced in an outward spiraling fashion similar to the presentation of P(1), from E3 down to B2, up to

F♯3, and so on. These pitches, too, are octave-dependent. When in m. 12 the penultimate pitch of A(1) is sounded, C♯4, which is also the highest pitch of the passage, the cello immediately begins the ascending form of the durational pattern, concatenating again with the previous. After the last new pitch, C♯2, is played in measure 12, beat 3, the pitches of A(1) are then sounded in retrograde to how they were presented, coinciding with the onsets of the ascending durational pattern. Between onsets, the cello returns to playing the pitch center of P(1), G3, every two eighth notes (each quarter note), sounding first once, then twice, then thrice, etc., on a rhythmic pattern in retrograde to the descending pattern from mm. 1–6. In a final concatenation, the last pitch in the retrograde presentation of section 1's ancillary pitch collection, E, becomes the center of the next section's primary pitch collection, though not with octave dependence. This link between pitch collections of adjacent sections is present at the end of each section from sections 1 through 6, whether or not the linking pitch is octave-dependent.

Of note is the decision to extend the ascending durational series by one eighth note at m. 17, the end of section 1. This break in the pattern serves a dual purpose. For one, it rounds out the measure into a relatively agreeable 5/4, rather than some contrived grouping of 9/8; but more importantly, it provides a brief, but welcome, moment of surprise and suspense in an otherwise predictable rhythmic framework.

Section 2 (mm. 18–34)

From sections 2 through 7 (mm. 18–109), the pattern per section of sixteen bars of 4/4 followed by one of 5/4 is maintained, as is the sequence of forms of the durational pattern: descending, descending, ascending.

In m. 18, the flute and clarinet play a placid stream of eighth notes on pitches from P(2). The marimba provides harmonic support from the same collection. The cello simultaneously presents A(2), one pitch per onset of the descending pattern, in a widening contour similar to the first section, with octave dependency: first an E♭3, then the pitch above it, F3, then below the E♭ to C3, etc. The trombone doubles this presentation of A(2) with a cup mute for blend and balance. As each pitch of A(2) is introduced, it begins to appear in the flute and clarinet lines. Once all of A(2) has been sounded once, the cello plays pitches freely chosen from P(2) during the next pattern in m. 23, beat 4, to m. 29, beat 3. The cello echoes the rhythm from the first pattern of section 1: durations of two eighth notes at a time, interrupted rhythmically by onsets from the current pattern.

At the ascending pattern (m. 29, beat 3, to m. 35), which again shares its first onset (ao1) with an onset near the end of the second descending pattern (do5), the cello begins to sound the ancillary pitches in reverse order at each onset, as it had done in section 1, and otherwise continues with pitches from either collection. The trombone plays only A(2) in reverse order. The flute, clarinet, and marimba now play pitches from either collection, and as each pitch from A(2) is sounded, that pitch disappears from their repertoire. The woodwinds and marimba climb over the course of section 2 from a low tessitura to a high one, driving into the next section beginning at m. 35. On the downbeat of section 3, the last pitch of A(2) to be sounded in the reverse order, E♭3, becomes the center of P(3) and the pitch class heard most prominently at the beginning of section 3.

Section 3 (mm. 35–51)

Section 3 introduces a more aggressive texture and dynamic indication. The violin plays a soaring melody with pitches from P(3). The piano plays constant eighth note chords, also drawing its pitches from P(3). The rhythm is novel here: instead of adhering to the usual descending pattern, a simplified version of the pattern instead governs the onsets. This new pattern is based on the motive first heard in the first six bars of the movement: the cello's G sounding six times before the next primary pitch, then five, four, etc. In this case, the violin plays a note six eighth notes in duration, then five, four, etc. The piano, beginning with an aggregate of P(3), accents each onset in the violin and drops one note from the simultaneity each time as well. When in m. 37, beat 3, the violin reaches one eighth note in duration, the direction is reversed, and the piano simultaneity begins to build back up. Naturally, the order in which notes were removed from the simultaneity is reversed as it is reconstructed.

The original descending pattern seems to be lost for a moment, but only the usual onsets were momentarily ignored by the piano and violin in favor of the new subpattern; the structure the main pattern imparts remains. When the next descending pattern begins at m. 40, beat 4, each of the six remaining instruments begins to join the constant pulse of eighth notes at each onset, sounding the six pitches of A(3) in turn, beginning from C♯5 and again conforming to the spiraling outward contour seen in the first two sections, with octave dependency, and each in turn fades away, again in retrograde. As for the violin solo, like the woodwinds from the previous section, its pitches beginning in m. 41 are chosen from P(3) except when the other instruments introduce a new ancillary pitch class, and that pitch class becomes available for use in its line as long as that instrument is still sounding (the use of these pitches from A(3) in the violin line however is not octave-dependent). The first pitch of A(4) introduced and the last to remain, C♯5, becomes the center of P(4) and the note on which the piano grounds its harmonies in the coming section.

<u>Section 4 (mm. 52–68)</u>

In contrast to the incisive nature of the preceding section, the character of section 4 is more expansive and serene, though it takes place at the same tempo. Starting at m. 52, the piano maintains its constant eighth note pulse from before, but now on top of it are gentle arpeggios rather than strident block chords. Punctuating its phrases at the end of both descending patterns in this section (m. 56, beat 4, and m. 62, beat 3) are the four wind instruments, which altogether play all of A(4) twice and in no particular order. The texture in these punctuations is homophonic to contrast the piano's broken harmonies. Once A(4) is introduced, those pitches begin to appear in the piano, starting in mm. 59. The violin and cello take over for the winds during the third part of the section (mm. 63–68), the ascending pattern, this time in a linear fashion. As they sound pitch classes from A(4) in various octaves, those pitch classes disappear from the piano's palette. The last remaining pitch class from A(4), A, becomes the center of P(5) and is the first pitch the cello and marimba play in the next section.

Section 5 (mm. 69–85)

Section 5 features the marimba. Unlike previous sections, the marimba's monophonic line of pitches from the primary collection remains unadulterated by other instruments playing ancillary pitches. This monophonic line is accompanied by chordal figures from P(5) in the piano, violin, and cello, with their onsets corresponding to the main durational pattern. The ancillary collection in this section appears only in responses from the brass, which in turn do not sound any pitches from P(5). As in section 2, the marimba line and the accompanying harmonies climb, and interruptions from the brass become more frequent, briefly becoming a rush of sound before section 6. In this case, there is not a direct link between the last ancillary pitch of A(5) and the center of P(6), because A(5) is not presented linearly. However, the center of P(6), B♭, also present in A(5), is avoided in the brass during its last presentation of that collection, so that it may be completed by the coming B♭ in the flute in the next section.

Section 6 (mm. 86–102)

A trio consisting of flute, clarinet, and violin, which will become a common combination in the orchestration of the following movements, plays calm, lightly contrapuntal melodies with pitches exclusively from P(6) at a slower tempo. In contrast, the piano speckles the landscape with pitches from A(6). The piano accompaniment was composed more systematically than the trio, so I will turn my focus to it for this section.

The pianist is asked to play precise durations, because there is a secondary durational device which dictates the length of each note (but not its point of onset). Each pitch class in A(6) is assigned a duration in units for the entire section (see Figure 2.4). These units show the basic proportion of durations; the duration to which these units correspond changes throughout the section.

Pitch of A(6)	E (↓)	F♯	G♯	C	C♯	E (↑)
Units	1	10	6	8	4	2

Figure 2.4: Durations, in units, of the pitch classes in section 6.

For the initial three presentations of A(6), the duration unit is equal to one sixth of a quarter note, or one partial of a sixteenth note triplet. During the first presentation in m. 87, the pitches and their respective durations are arranged in such a way that the spiraling outward motive is observable; here it manifests as duration rather than pitch as before. This arrangement yields a unit pattern of 4 – 6 – 2 – 8 – 1 – 10. In the second time through A(6), in m. 89, the order is retrograded so that the durations “spiral inward” instead. By the third, m. 91, the restrictions on ordering are removed.

In m. 94, the duration unit is doubled to one-third of a quarter note and A(6) is presented four times with up to two pitches beginning simultaneously and many of the notes overlapping. When two pitches share an onset, they also share a duration, and the duration of that dyad is decided by the assigned duration of the higher pitch. After four pitches into the final run through A(6), the duration unit is doubled again (m. 100) and the remaining two pitches are played with the unit being equal to two-thirds of a quarter note. Unlike the transition from section 5 to section 6, the ancillary collection is not left incomplete. The last pitch class of A(6) to sound, F♯, becomes the center of P(7), providing the final connection between the ancillary and primary pitch collections of adjacent sections.

Section 7 (mm. 103–119)

The final of seven expository sections is governed relatively loosely by the original durational pattern, other than the fact that onsets of notes continue to tend to coincide with the onsets in the pattern. The musical function of this section is more to build tension from the soft ending of section 6 to the climax of the movement in section 8. The usual assignments of pitch collections to instruments is still in effect: the cello and violin play only pitches from P(7), and the piano plays only those found in A(7). The section begins almost triadically, but moves gradually into more unstable combinations of pitches from each collection. As the other instruments enter, the culmination grows more and more dissonant. Instead of a 5/4 bar at the end of the section, one more beat is added to m. 119 as well as a *ritardando*, simply to increase the suspense.

Section 8 (mm. 120–128)

Section 8 is the first of the two summary sections. Its texture, consisting almost entirely of simultaneities, is in sharp relief to the more linear or gradual presentations of pitch content in the expository sections. Both the primary and ancillary collections of each of the preceding seven sections are presented once through in retrograde to their original order, e.g., the collections of section 7 are heard first, and section 1 last. Each pair of pitch collections, representing their respective expository sections, begins on an onset of the descending durational pattern. Additionally, the order of the two changes at each onset. For section 7 (the first pair), the ancillary is heard first, then the primary; for section 6, the primary, then the ancillary, and so on.

Due to the highly vertical nature of this section, the collections are distinguished by orchestration: one collection is first played by the clarinet, trumpet, trombone, violin, lower piano, and lower marimba, then that collection's paired collection by higher piano and marimba. Only in m. 125, when the onsets become too close together to accommodate this separation do the two collections sound simultaneously. The flute (highest pitch) and the cello (lowest pitch) are always either a primary center pitch or ancillary outer pitch; because these pitches have always been a tritone apart, the flute and cello move in parallel tritones throughout the section. Upon reaching the pair of pitch collections of section 1, there is a written-out fermata with a flourish on the piano, and then the main durational pattern is broken; this is the last formal appearance of the durational pattern in this movement.

Section 9 (mm. 129–150)

The final section in this opening movement begins with flute and clarinet softly echoing the outer pitches of the previous progression of simultaneities. The flute plays its own line from section 8, transposed down by two octaves, and the clarinet mimics what the cello played. They then reverse the ordering in another retrograde as well as switch lines.

Finally, the octet plays a somber progression, built on a final pair of collections. The first collection consists of all the previous primary center pitches, and the other, rather than all ancillary outer pitches, the chromatic aggregate complement of the first set (see Figure 2.5).

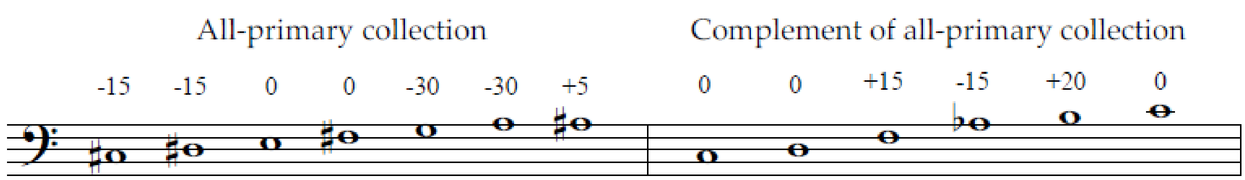

Figure 2.5: The all-primary collection and its complement, forming a complete set of chromatic pitches.

The all-primary collection, like each of the primary collections, has a center pitch, in this case F♯, and its complement as well has two outer pitches of the same pitch class, in this case C. The all-primary collection is nearly identical to an octatonic scale, namely Oct 01, except without the C, because C is reserved for the complement collection to maintain the tritone relationship between primary center and ancillary outer pitches. Both of these pitches, C and F♯, are octave-dependent in this closing progression. The all-primary center is sounded only by the cello and marimba on F♯2; the rest of the collection is played by woodwinds, brass, and marimba. This leaves the piano to sound the entire complement alone. The scale pattern of whole and half step, like the octatonic scale, lends itself to stacking in minor thirds, so the flute and clarinet, trumpet and trombone, and violin double-stopped all play minor thirds. Likewise, the piano plays the fully diminished seventh chord that is outlined in the complement collection, then sounds the two outer pitches in the extreme outer ranges: C1 and C6 (doubled at C7 merely for added color).

As the ensemble sounds the aggregate of twelve tones, there is a final hint at the descending durational pattern, though it is not strictly presented. Mimicking section 1, in m. 141, the cello plays its F♯ *pizzicato* six times, then five, four, three, and two, stopping short of one.

Chapter 3: Movement II

The second movement is built on a much less exacting foundational plan than the first. I have instead preferred a more traditional and intuitive approach to composition. In this movement, an abstract motive informs the particular structure and phrasing that define the character of the movement in various ways for purposes of color, direction, and coherence. This "diamond motive" is so named for its general shape of being narrow on the left- and right-most points and wide in the middle. In short, the diamond motive interfaces with the occurrence of irrational meters and fine dissonance, as well as shapes the parameters of registral spread, textural density, volume, and to an extent the orchestration as well. It shapes the movement on a large scale, and there are numerous small-scale occurrences as well. As an example, Figure 3.1 shows an outline of the large-scale diamond motive that is represented by successive peaks and nadirs of pitch per major section of music. The middle horizontal line represents Middle C (see Figure 3.1).

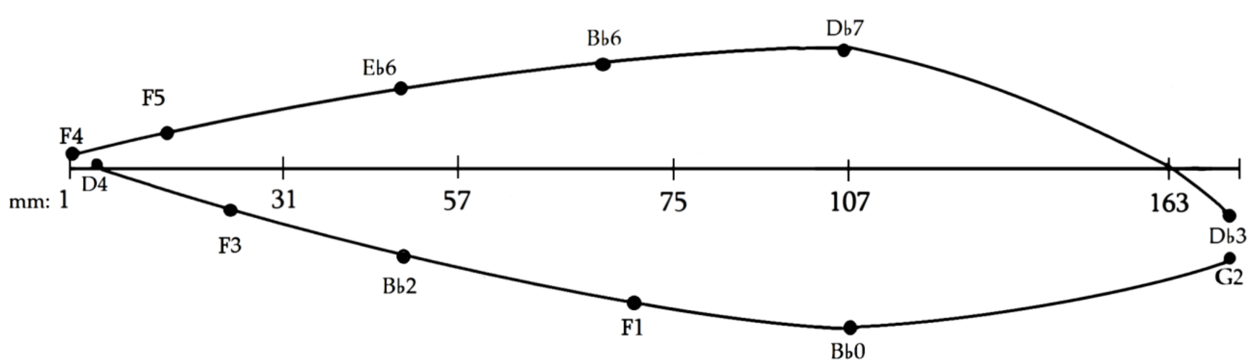

Figure 3.1: The diamond motive represented across the movement in pitch.

I will further describe how the diamond motive is employed, in addition to detailing more local elements that comprise the moment-to-moment dialogue of the movement.

The second movement begins with a tentative, atonally contrapuntal duet between the flute, which is the leading voice throughout most of the movement, and the clarinet. This slow passage serves as a canvas to introduce the first instance of the diamond motive on a smaller scale, combined with the first microtonal pitch technique: controlled beating. Each appearance of an irrational time signature (i.e., those with denominators other than 1 or powers of 2) coincides with an increase and proportionate decrease in the amount of dissonance on the fine level (i.e., beating). This motion of dissonance on the fine level is accomplished by deliberately detuning intervals during the irrational measures and tuning the surrounding "rational" measures (see Figure 3.2).

As the movement progresses and more instruments are added, the gesture of an increase and decrease in dissonance begins to include coarse dissonance as well, reducing the incidence of consonant intervals and somewhat eclipsing the fine dissonance, so the opening section (mm. 1–30) is where the relationship between irrational time signatures and fine dissonance can be heard most clearly.

Additionally, the irrational time signatures are informed by the diamond motive, creating a cycle. The numerator of each time signature begins at 2 and increases by one until reaching 5, then returns to 2. For example, in m.2, 2/6 time appears. The next irrational time signature is 3/6, followed by 4/6 and eventually 5/6 in m. 19, before descending again

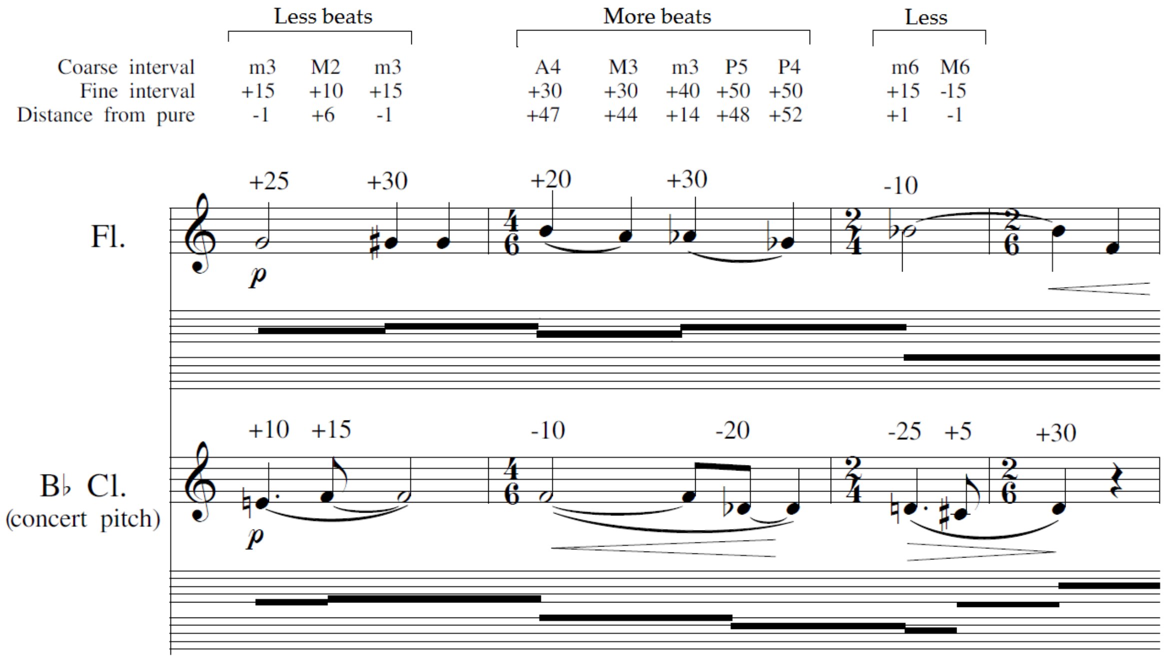

Figure 3.2: One example of the "diamond motive" as a gesture linking fine dissonance and irrational time signatures in mm. 8–10; a crescendo and decrescendo of beats.

through 4/6, 3/6, and 2/6, completing the gesture and the introductory section. This basic directionality does not, however, preclude other irrational time signatures that have already been used taking place again during the pattern. This allowance is for purposes of shaping the timing of a phrase in a satisfying way and was handled on a case-by-case basis.

At rehearsal A, the cycle of irrational time signatures begins again, and soon, the violin joins the clarinet and flute, then piano. Each new instrument begins by playing the motive first played by the flute at the beginning, which is given the same linear inflection every time it appears (see Figure 3.3). The violin, which enters in m. 38, begins at a similar pace as the others, mostly in half and quarter notes, but soon begins to branch out into eighth note triplets. This is to develop a unique rhythmic identity that will distinguish the violin aurally throughout the increasingly contrapuntal and dense textures. This identity is hinted at throughout this section, mm. 31–56, but will be fully realized in the next section.

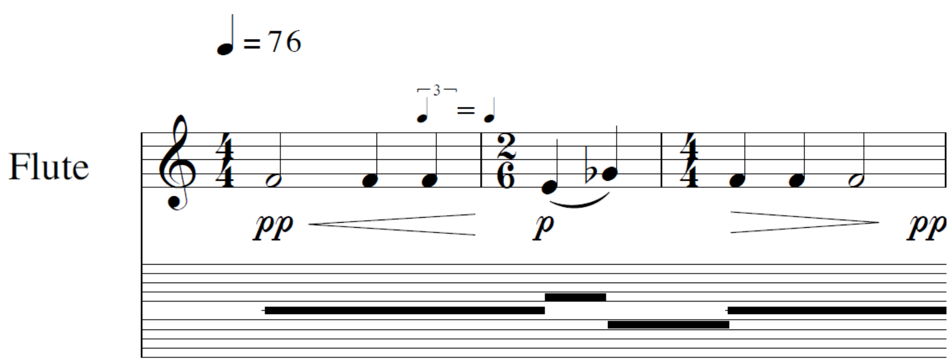

Figure 3.3: Linear inflection on the main motive; this inflection is maintained in each occurrence.

In this section, the diamond motive is also clearly represented in the elements of pitch range, textural density, and volume. When the piano plays, the left hand begins on a C♯4, moves down to the lowest pitch heard so far, an A♯2, and back up to a B4. At the same time, the flute is climbing upwards, and concurrently with the nadir in the piano in bar 45, the flute jumps to an E♭6, the highest pitch heard thus far, and then retreats. Likewise, the textural density and dynamics reach an apex at approximately this point, and they are gradually pared down to only a few longer, softer notes at the end of this section.

Rehearsal B marks a turning point in the movement as patterns begin to break down. Another cycle of irrational time signatures begins, but the usual order of instruments is not preserved. The violin begins first with its aggressive new rhythmic identity of primarily triplets, then piano, clarinet, and lastly the flute join. The relationship between irrational time signatures and fine dissonance is still in effect, but as the density increases, coarse dissonance begins to be more prominent. The marimba joins the piano to add timbral coloration to the harmony.

When the cycle of irrational measures reaches 5/6, a metric modulation takes place that begins a similar cycle nested within the first. The beat in 5/6 (the sixth note) becomes the beat in 5/4 (the quarter note) in m. 68, and at this new faster tempo, the cycle restarts with 2/6, then 3/6, etc. Once this new cycle reaches 5/6, the cycle breaks, coinciding with a dramatic change in texture and *subito piano* at bar 88. This frantic passage instead begins with 6/12 and moves through 5/12, 4/12, 3/12, and finally 2/12 time, the dynamic growing all the while, until rehearsal D, another major turning point of the movement and its climax. In this passage from mm. 88–106, the diamond motive is observable in the fine pitch layers of the ensemble. The flute and piano's pitches drop to -45 and the clarinet and marimba rise to +45, reaching their respective extremes simultaneously in m. 99 before reversing direction and reconvening at the centstonic of 0 at m. 107, rehearsal D.

Rehearsal D marks the "widest" part of the overall diamond shape of the movement in terms of pitch range, instrumentation, textural density, and volume, and so is the beginning of the second "half" of the diamond, although it is not exactly halfway through the piece. While the first part of the movement was characterized by tentative yet orderly motives arranged contrapuntally, the mood of this half is portrayed by aggressive, chaotic gestures accompanying a central theme. The absolute highest and lowest notes of the movement, D♭7 and B♭0, are reached in the flute and piano respectively on the downbeat of m. 107. The texture is at its busiest, as flute, clarinet, piano (right hand), marimba, and violin all play rapid, overlapping gestures that are linearly inflected. All instruments are marked *forte* or *fortissimo.* The remaining members of the octet are now deployed: trumpet, trombone, and cello play a chorale based on the main motives of the movement, along with the left hand of the piano.

The homophonic progression of harmonies in the trumpet, trombone, and cello at D is in stark relief to the contrapuntal textures found in most of the second movement. The top line of this progression, played by the trumpet, is a melody that is almost identical to that heard from the flute in the first fifteen bars of the movement. Irrational time signatures are no longer used after this point, but the proportions of each note duration to the meters mimics their use in the opening section without complicating the meters for the accompanying instruments (see Figure 3.4).

Figure 3.4: Theme in flute in mm. 1–6, and in trumpet in mm. 107–118.

Although the section at m. 107 begins with a strong B♭ minor sonority, it is not indicative of an emphasis on B♭ minor as key center. To produce the non-tonal harmonies that support the melody, I found inspiration in a chapter of Vincent Persichetti's text, *Twentieth-Century Harmony*, that categorizes chords into categories by the intervals they contain: chords that contain a sharp dissonance (a minor 2nd or major 7th plus any number of octaves) and those that do not, and subdivided into chords that contain at least one tritone and those that do not.[5] With deference to Persichetti, for my purposes I slightly altered his formula and considered three categories: those with no dissonance, those with mild dissonance, and those with sharp dissonance. These are the categories of harmony that form the three-voice chorale in mm. 107–161 (see Figure 3.5).

The main instruments of the first half – flute, clarinet, and violin – eventually fade away, in the same order that they were introduced in this movement. The piano and marimba die away, too, and the instruments that were deployed at D carry the movement into its final bars. As the movement started with a duet, it ends with one as well, this time between the trombone and cello. A very low perfect fifth in the piano provides an ominous aura as the duet fades away.

[5] Vincent Persichetti, *Twentieth Century Harmony: Creative Aspects and Practice* (New York: W. W. Norton, 1961), 20.

Figure 3.5: Chorale, trumpet, trombone, and cello, m. 107. Harmonies are labeled according to one of three groups: C (consonant), M (mild dissonance), S (sharp dissonance).

Chapter 4: Movement III

The musical content of the third movement of *Manifestations* is presented within a more traditional framework, and the manipulation of materials is accomplished in a more conventional way. Unlike the first and second movements, there is not a pre-compositional plan or an abstract principle that governs the formal structure. Instead, there are primary and secondary themes, based on motives which are developed in various ways to form the narrative of the movement. In the sense that motives combine to create themes and are developed to form a musical narrative, it is not unlike a sonata-allegro form, although there is not a specific classical form within which the movement could be categorized. It has the character of an ebullient scherzo with a dramatic finale.

The third movement takes place on a primarily linear plane, with only a few moments in which verticality or harmony assumes greater importance. So, linear inflection is the primary microtonal technique in this movement. Almost every melodic line in this movement is inflected in some way, so for brevity, I will discuss only the most pertinent.

Main theme and motive transformations

The main theme of this movement is a simple, diatonic melody with a characteristic rhythmic structure; it is usually played by the piccolo. Its initial phrase spans only a major sixth. The association with the piccolo, diatonicism, and limited range lend the theme a simple, unpretentious quality, as if it were a folk melody played on a tin whistle. Different elements of the main theme are utilized later in the piece in different ways. This theme is associated with a microtonal adjustment profile that establishes an irregular, organic character that is generally preserved in each appearance of the motive. This quality will assist the listener in identifying the theme as it is subjected to transformations (see Figure 4.1).

Figure 4.1: The main theme of the third movement and its microtonal adjustment profile.

The most commonly used motive is that of the first two bars of this theme, or even the first four notes. I will be, non-exhaustively, discussing some of the ways that this motive is reworked. It appears in developmental and transitional passages, usually transposed and often altered in some other way. The first time it is heard after the thematic sections is during the transition to H: the bass clarinet and cello play an altered version of the familiar first two bars, then the trombone joins in as they further distort the original tetrachord and repeat it in an overlapping fashion, building tension (see Figure 4.2).

Shortly after the previous example from the middle section, the main development section of the movement begins. The piccolo begins to play the main theme, on the same coarse pitches, so it seems at first as though it will be a recapitulation of the main theme. The theme is interrupted by the rest of the ensemble. The interruption is all the more surprising

Figure 4.2: Distortions of the primary tetrachord, marked in brackets, of the main theme in mm. 185–188.

because the theme is originally only accompanied by cello and marimba on steady eighth notes without syncopation. These two bars are then mimicked at a higher pitch level (see Figure 4.3). In this excerpt, we see a centstonic modulation and microtonal adjustment profile interacting. The microtonal adjustment profile at I is transposed by -15 cents. At rehearsal I, instead of D5 being assigned a fine pitch of 0, as it was before, it is now -15; C is now -35 instead of -20, etc. At the new coarse pitch level, the profile is transposed back up by +15. The centstonic continues to rise in the bars after this excerpt.

There is never a "true" recapitulation in this movement, in the sense that the main theme is repeated in full. Instead, continuity in the rest of the movement is created by reworking the main motive and connecting its various motive-forms, to borrow an idea from Arnold Schoenberg's *Fundamentals of Musical Composition*.[6] In the final, raucous reworking of motive-forms, just prior to the closing chords, the flute, clarinet, violin, and piano play while the rest of the ensemble supports harmonically. Throughout the melody line, the microtonal adjustment profile is preserved from the main theme, but the coarse pitches are transposed a perfect fourth higher (see Figure 4.4).

The main motive appears in background elements as well. After the primary and secondary themes are stated twice, the rhythmic cell of a quarter note and two eighth notes is repurposed as the basic figure that energizes the harmonic accompaniment by the

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[6] Arnold Schoenberg, *Fundamentals of Musical Composition*, ed. Gerald Strang (London: Faber and Faber, 1967), 8.

Figure 4.3: False recapitulation to begin the development section, mm. 211–215.

Figure 4.4: The final "reworking" of motive-forms, flute, mm. 300–313.

woodwinds during the middle section. This figure is the most pervasive when trombone and trumpet play their respective versions of the theme of this section (see Figure 4.5).

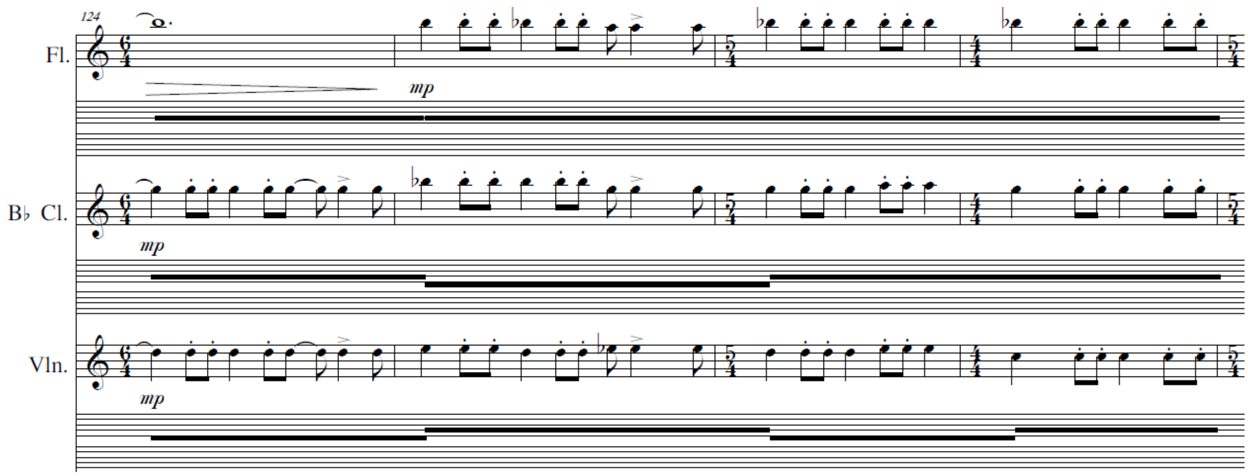

Figure 4.5: The main rhythmic motive as accompaniment figure during trombone solo. Flute, clarinet, and violin, mm. 124–127.

<u>Other thematic relationships</u>

First relegated to the brass, the secondary theme is similar to the first in metric profile. Both themes begin with one bar each of 4/4, 8/8, 4/4, then 7/8. The secondary theme always follows a statement of the first, but this theme is juxtaposed against a more active accompaniment. This increase in activity coincides with a raising of the centstonic to +20 to build tension, indicated by the arrows in the following figure (see Figure 4.6). This can be observed by the placement of +20 as a fine pitch to which the line repeatedly returns for the first two bars. After a brief digression on the fine pitch level, the phrase ends on +20 once again. Even though the pitches on the fine level are changing, the anchoring of +20 at the beginning and end of the phrase helps orient the listener in the new centstonic.

Figure 4.6: The secondary theme in the brass, at a centstonic of +20, mm. 58–63.

The introduction of more chromatic motion and more motion in the contour is another way in which this theme builds excitement after the primary theme. The melody becomes non-diatonic by the end of the second bar before launching into a chromatic sequence with a downward trend. This highly active contour is in contrast to the relatively static nature of the main theme.

Although not exactly classifiable as a microtonal adjustment profile, the fine pitch layers during each statement of this theme bear similarities to one another. In the first two bars, the linear inflection highlights the neighbor tones by shifting them away from the main pitches, emphasizing the syncopation in an otherwise constant pulse of eighth notes. This is indicated by the superimposed boxes in Figures 4.6 and 4.7. When this theme is restated, it appears in the violin and cello with a similar pattern of linear inflection, but an altered metric pattern (see Figure 4.7). This discrepancy from the first statement of this theme is taken further when the centstonic of +20 does not reappear at the end of the phrase. Instead, at the end of the antecedent phrase, the cello breaks into a transitional line that recalls a figure from the primary theme, beginning on +50 as the violin cadences on 0. This fine level dissonance increases the need for resolution in the consequent phrase.

The C section, at m. 114, consists of three parts: a trio of woodwinds and violin, a trombone solo, and a trumpet solo. Each plays a similar melody (see Figure 4.8). It may be more accurate to say that these melodies are all variations of a theme that is never explicitly

Figure 4.7: The secondary theme again, now in strings, centstonic of +20, mm. 91–96.

Figure 4.8: Three forms of the melody at rehearsal E: flute, trombone, and trumpet, mm. 114–141.

stated, rather than a statement of the theme by the flute and variations by the brass instruments.

In addition to the continually evolving theme, the centstonic rises throughout this section. During the flute solo, the centstonic is 0; during the trombone solo it is +20, and during the trumpet solo it is +40. In the transitional section that follows, some of the motives of this theme are echoed, and the centstonic begins to fall precipitously with each successive figure (see Figure 4.9).

The C theme appears again in the finale beginning at m. 258, but in a contrapuntal texture, and beginning with trombone, followed by trumpet, and finally woodwinds (sans the violin). It is this texture that connects to the final form of the primary theme and coda.

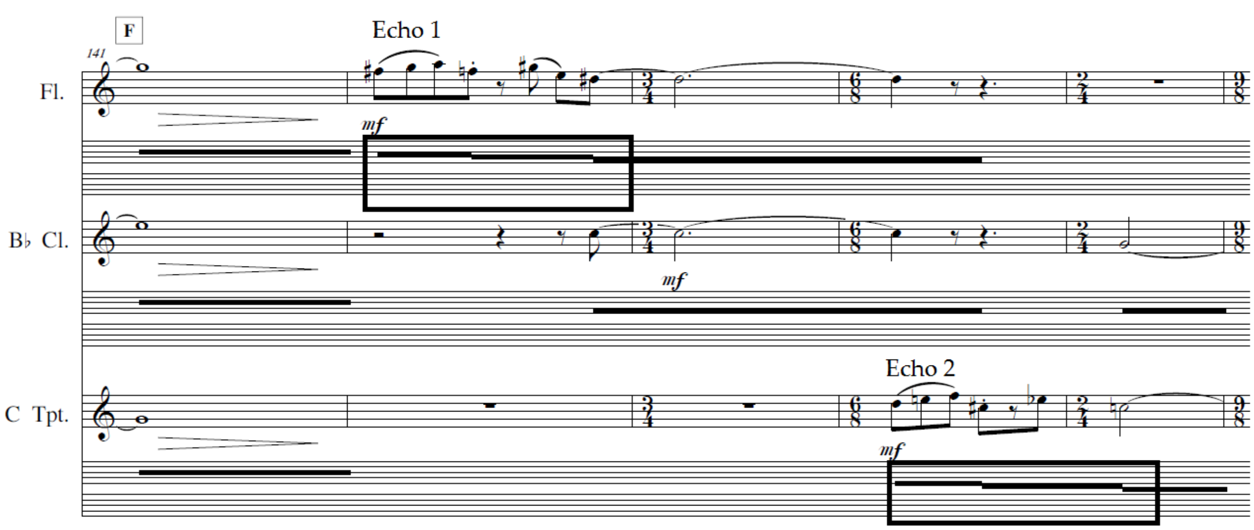

Figure 4.9: Development of the C theme as the centstonic falls.

Chapter 5: Conclusion

In this age, in which digital music is more ubiquitous than ever, and access to the greatest musical works in the repertoire is as close as the nearest computer or mobile device, the tendency to think of recorded music as a disposable or subsidiary art form is a tempting one. I believe, however, that any medium of art bears only as much fruit as the innovations and labor of its devotees. I would like to advance and promote the cause of recorded music as a viable form of art, especially as the world around us moves ever further into this digital era. If our sonic environments are increasingly likely to include electronic sound, then it is the duty of the technologically conscious artist to embrace this trend and beautify it.

Recent technology represents more than just a trend, however. The toolbox of the electronic musician presents a staggering array of resources for sculpting sounds. Still, comparatively few of these resources have been used in the creation of microtonal music or music in alternate systems of intonation. This curious branch of music has remained relatively obscure for decades perhaps in part because in both sonic territories, this music is met with obstacles. In an acoustic setting, microtonality tends to be imprecise or inflexible, and electronically, it tends to lack the warmth and naturalness of human expressivity. By bridging the two worlds, one may be able to achieve the best of both. The integration of technology into microtonal music holds much promise that is still, in the author's opinion, yet to be fully realized.

It is my hope that by combining conventional acoustic instruments and traditional musical materials with new techniques, the music remains accessible and approachable, while still offering something novel and intriguing. And it is my belief that in the method I have discussed of incorporating recording and pitch adjustment technology, there is great potential of creating a new kind of fixed-media, microtonal music in which any instrument may participate, adding more tools to the toolbox with which we can make the most of the compelling possibilities of this new world of pitch.

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Appendix

Manifestations

A fixed media microtonal octet

Full score

(see attached file)

Vita

Skylar van Duuren was born in Waynesboro, Pennsylvania in 1990 to Anton and Carolyn van Duuren, the youngest of four. During his education, he relocated to Connecticut and Florida before moving to Sylva, North Carolina, and attending Smoky Mountain High School. He holds a Bachelor of Music degree, *summa cum laude,* from The University of Arizona. Mr. van Duuren's teachers of composition include Andrew Sigler, Jorge Variego, Daniel Asia, Alejandro Rutty, and Mark Engebretson. His compositions have been performed in academic and sacred venues in Knoxville, Tennessee; Tucson, Arizona; and Sylva and Greensboro, North Carolina. In 2014, he was honored with the Marion Richter American Composition Award and first prize in the Emil and Ruth Beyer Composition Contest. His newer work has explored just intonation, microtonality, and other alternative tuning systems in the contexts of fixed media and live performance.

Mr. van Duuren will graduate in August 2017 with a Master of Music degree with concentration in composition from The University of Tennessee, where he is the recipient of a Graduate Teaching Assistantship and a Thomas Graduate Fellowship, and teaches classes in aural skills. He intends to pursue a doctorate degree in composition and teach at the collegiate level.