Portfolio Of Compositions

An Exploration Of The Manipulation Of Modes

by

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ABSTRACT

This thesis consists of a portfolio of compositions accompanied by a written commentary and audio recordings of the works. The commentary discusses each of the works within the context of how mode is manipulated and treated for neotonal purposes. Four techniques are presented and illustrated with examples from the portfolio: the application of added-tone sonorities modelled after the music of Eric Whitacre; the construction of synthetic modes that conform to the constraints of Dmitri Tymoczko's model of scale networks; the generation and application of rotational arrays based on a row that is derived from prior material and is a subset of the octatonic; and the generation of "Russian modes" and derivatives using ideas inspired by Russian music theorist Boleslav Yavorsky. Particular attention is paid both to methods of modulation and their musical significance and to the octatonic implications of the latter two techniques. Each example presented includes detailed analysis within the context of the applied technique and its relevance to the intended musical affect.

Dedication

Thank you, Maria Flurry, for your love, encouragement, and patience. Thank you for your faith in my art. Thank you for inspiring me.

Thank you, Anna and Nathan, for *your* love, encouragement, and willingness to sacrifice some Dad time this past year.

Thank you, Michael Zev Gordon, for accepting me into your program and for patiently guiding me through my research and growth.

Thank you, Dr. Rinna Saun, for trusting me with a commission for a piano concerto, for your feedback during the composition process, and for your careful preparation for its premiere.

Thank you, Christina Cuda Robertson, for learning, performing, and recording my piano solos. Thank you, Jonathan Best, for the timely birthday gift of a recording session of the piano solos.

Thank you, Dennis Houser and the Prescott Chorale, for learning and performing my choral work. Thank you, Daniel Boyce, for your editing advice on the same work. Thank you, Margaret Houck, for recording the reduction of the choral work.

Thank you, Birmingham Contemporary Music Group, for your reading and commentary on my chamber work.

Thank you to my students for your flexibility in scheduling this past year and for your support of my continued education.

Thank you to my community, Prescott, Arizona, for your support of me as a composer, for the opportunities you provide for public performances of my compositions, and for the local mentors (many already mentioned) I have the pleasure of knowing.

In keeping my acknowledgements confined to this Master's program, I am aware that I fail to recognize but a fraction of those I might thank. Please know that every day I have the opportunity to invest my heart into music, each of you who has contributed to that opportunity receives a quiet, deeply-felt thank you.

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Thesis: Portfolio of Compositions

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In the portfolio:

- *I Wish I Could Remember That First Day*
- *The Nightingale and the Rose*
- *Currents: A Piano Concerto*
  - I. "River"
  - II. "Breaking"
  - III. "Still"

In the addendum:

- *Song Without Words*
- *Seguirilla No. 1*
- *Seguirilla No. 2*
- *À la manière de la neige*

CD Containing Recordings of My Works

CD Track Listing

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   Piano reduction performed by Margaret Houck

2. *The Nightingale and the Rose*
   Performed by the Birmingham Contemporary Music Group
   University of Birmingham workshop of 28 April 2015

Currents: A Piano Concerto
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Chapter 1: Introduction

Context

Parallel to the twentieth century development of musical styles pushing far from tonality is a lineage of composers who continued to explore novel ways to assert tonality. Considering only the United States of America, there is a rich heritage of composers who embraced and defined styles grounded in tonality: Aaron Copland, Samuel Barber, David Diamond, Vivian Fine, Leonard Bernstein, and Gian Carlo Menotti each offered their most significant impact in the middle 50 years of the century. More recently, Ellen Taaffe Zwilich, John Corigliano, William Bolcom, Jennifer Higdon, and Lowell Liebermann have enjoyed acclaim for their tonal works.

Within this vein of tonal writing are a variety of approaches to harmony. Much of Copland's music found its voice with the open and quartal harmonies now so strongly associated with the "American" sound. Fine studied and successfully applied Henry Cowell's concepts of dissonant counterpoint.[1] Bolcom brazenly borrows elements of popular music to stretch the boundaries of art music. Liebermann often writes with 12-tone rows that are harmonized tonally.[2]

The initial proposal for this master's program was to explore ways for my composing to break beyond its strong common practice roots while maintaining a sense of "tonal" harmonic motion. The list of composers above is in itself evidence that one can perceive and appreciate tonality in ways well beyond common practice, yet my steps outside of common practice and modality had never been far.

[1] (Spilker 2010, 131)
[2] (Barrymore 2000)

There are practical reasons for my goals. I live in rural America where the ensembles and audiences for whom I compose are, on average, resistant to the avant-garde. However, in my experience as a programmer of concerts featuring contemporary Arizona composers, this same audience has a hunger for new musical ideas that are grounded in some application of tonal harmonic motion. The variety of musical approaches this audience has applauded is wide. Bruce Reiprich's *Water Leaves* for solo piano and *Moon in Blue Shadows* for flute and piano employ ethereal gestures that paint within modal collections without creating strong harmonic motion. James DeMars' *Tapestry IX* for solo violin begins with a simple germ that evolves into virtuosic lines while constantly shifting through fragments of modality. His *Colors Fall* for flute and saxophone echoes Native American flute motifs but chromatically avoids pentatonic suggestions. Douglas Gibson's *Awakening Within* patiently layers a web of instrumental voices over an ostinato, using modes reminiscent of the Near East. Roshanne Etezady's *Glint* for saxophone and clarinet weaves quick counterpoint between two highly chromatic lines, moving between periods of relative consonance and tight dissonance. Daniel Asia's *Shiru Ladonai* with soprano, flute, marimba, and piano sets the Hebrew text from Psalm 96 in dance rhythms and complex scales and harmonies reflective of Stravinsky. Rodney Rogers' *Alleluia, Sing the Stars* for choir creates dense and dynamic added-tone sonorities from multiple independent lines of counterpoint. All of these works approach tonality very differently, yet my community consistently responded to concerts featuring these composers with comments such as "a breath of fresh air" and "water for a parched soul".

As starting points for my research, I used three composers with whom I was familiar, whose scores were easily accessible, and who represented different ways of approaching tonality: Eric Whitacre, Claude Debussy, and Igor Stravinsky. The

study of Whitacre's music provided a model of expanding the harmonic colours available to a style firmly grounded in the tradition of common practice. The works of and academic papers on Stravinsky and Debussy were the beginnings of multiple threads of exploration that led to a study of many composers, diverse approaches to music theory, novel modes, and different ways to manipulate these modes. By the end of my research period, I was writing music where the execution of harmonic motion was based more on the progression of pitch class sets and less on the motion of one harmony to another harmony.

This commentary is not a complete account of how I composed each piece. Instead I will reveal some of the harmonic-syntax explorations that allowed me to develop my musical language. Each piece uses techniques and ideas gleaned from specific academic writings, and I will highlight relevant papers and ideas before discussing examples from my works. The examples I offer present harmonic relationships specific to the syntax I'm using and relate the intended affect.

I will discuss four of my explorations in harmony and mode: my application of added-tone sonorities; the construction of new modes that conform to the constraints of scale networks; rotational arrays based on short rows created from a subset of a parent mode; and the generation of modes and their complements using ideas inspired by Russian music theory.

Standardizing Names for Synthetic Modes

I have not discovered an established or standard way of naming modes or synthetic scales. There are well-known names for common practice modes (e.g., major or harmonic minor), the traditional church modes (e.g., Dorian or Phrygian), and a

handful of synthetic scales (e.g., overtone or Neapolitan minor).[3] The most universal way to define an arbitrary mode might be to use pitch class set notation, yet pitch class set notation is both cumbersome to use in prose and, by definition, an "unordered collection"[4] that would not imply a tonic.

For the purposes of writing in prose, I have adopted a naming convention for seven-note modes that combines descriptive names[5] (sometimes shortened) for each of the two tetrachords that comprise the mode. The tetrachord that begins at the first note of the mode is given first, and the tetrachord that ends at the octave is given second. A few modes will be referenced by their universal names (e.g., melodic minor) or a more descriptive name I have assigned.

[3] (Persichetti 1961, 31-49)

[4] (Roeder)

[5] Some of the less common names are derived from the following web page: (Solomon 2005)

Tetrachords I use in naming my modes are listed below:

Table 1: Tetrachord Names Used

Pitch Classes	Name Used	Full Descriptive Name, if Different[6]
0 2 4 5	Major	
0 2 3 5	Minor	
0 2 4 6	Lydian	
0 1 3 5	Phrygian	
0 1 4 5	Arabian	Arabian Tetramirror
0 2 3 6	Harmonic	Harmonic-minor Tetrachord
0 1 4 6	All-1	All-interval Tetrachord.1
0 3 5 6	Blues[7]	Perfect-fourth Diminished Tetrachord
0 3 5 7	Minor-5[8]	Perfect-fourth Minor Tetrachord
0 1 2 3	Chromatic	BACH / Chromatic Tetramirror

[6] (Solomon 2005)

[7] This tetrachord is the first four notes of a blues scale. I find *Blues* more descriptive than *Perfect-fourth Diminished Tetrachord*.

[8] I use "5" in the name "Minor-5" to reflect the added interval class of a perfect fourth.

Below are the names I use for the seven-note modes used in my portfolio:

Table 2: Mode Names Used, Part 1

Pitch Classes[9]	**Derived Name**[10]	**Alternate Name**
0 2 4 6 7 8 T	Lydian Phrygian	Whole-Tone Quint (WTQ)[11]
0 2 4 6 7 8 E	Lydian Arabian	
0 1 4 5 7 9 E	Arabian Major	
0 2 4 6 7 9 T	Lydian Minor	
0 1 4 6 7 8 T	All-1 Phrygian	
0 3 5 6 7 9 E	Blues Major[12]	
0 2 3 6 7 8 T	Harmonic Phrygian	
0 2 3 5 7 9 E		Melodic Minor
0 1 3 5 7 8 E	Phrygian Arabian	
0 3 5 7 9 T E	Minor-5 Chromatic[13]	

Some of the transformations applied to my modes generate blues scales with an added seventh tone. These scales are named "Blues" with a suffix indicating the added interval:

[9] "T" and "E" represent the pitch classes ten and eleven.

[10] Derived names are not offered if there already exists a very common name for the mode.

[11] This is the parent mode for the derived modes used in much of the music discussed here. It is constructed from the whole-tone scale with an added tone at the perfect fifth above Î. The name Whole-Tone Quint is given to this mode to reflect this construction.

[12] Blues Major is mode two of the All-1 Phrygian.

[13] Only once do I use this: the E Minor-5 Chromatic scale [E G A B C♯ D D♯ E] in bars 81 and 83 of *"River"*. While I treat this collection with similar harmonic and melodic figures as other scales in nearby bars, I do not think that this collection analytically stands on its own as a true scale: the listener perceives the notes of the top tetrachord as either mixture or chromatic passing tones within some variant of an E minor scale.

Table 3: Mode Names Used, Part 2

Pitch Classes	Name
0 1 3 5 6 *7* T	Blues + 1
0 2 3 5 6 *7* T	Blues + 2
0 3 5 6 *7* 8 T	Blues + 8
0 3 5 6 *7* 9 T	Blues + 9

When a tonal centre is perceived within a given scale (e.g., G Whole-Tone Quint), that tonal centre is usually the first scale degree (e.g., G).

When convenient, I notate the expected diatonic note spellings within my modes to help clarify the scale degree of each note. However, a higher priority is given to readability for the musician, and alternate note spellings are commonly used. For example, within the A♭ Blues Major mode, a vertical harmony of scale degrees [1̂ 3̂ 6̂] would be spelled diatonically as [A♭ C♯ F], but in a piano part I would spell it as [A♭ D♭ F] to ease readability.

Background Works

Prior to beginning my master's program, my music reflected a strong grounding in common practice or diatonic modal harmonies. In the addendum of this thesis are four piano works, written early within my master's time frame, that reflect this history.

The piano work *Song Without Words* is a pastiche work I wrote to demonstrate my most comfortable style of writing. It is of a mid-romantic and lyrical style demonstrating traditional harmonic and phrase structures typical of that period.

Seguirilla No. 1 and *Seguirilla No. 2* are two works inspired by the Flamenco *seguirilla*[14] rhythm and style. The foundation of the Flamenco *seguirilla* rhythm is its 12 beat *compás* which, when notated in western style notation, is typically subdivided and accented thus:

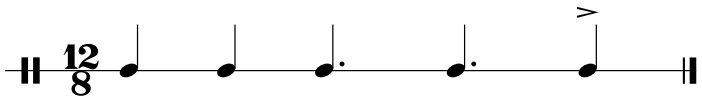


Figure 1: Seguirilla *Compás*

Seguirilla No. 1 is written over a $\frac{12}{4}$ ostinato that outlines the *compás*. While the work makes use of chromatic harmonic motion near the middle, as a whole the piece clearly is in B♭ minor.

Seguirilla No. 2 also is written in $\frac{12}{4}$, but it dispenses with the ostinato and experiments with ways to imply the *compás* melodically. The work stays largely within the Spanish Phrygian mode and briefly visits the octatonic.

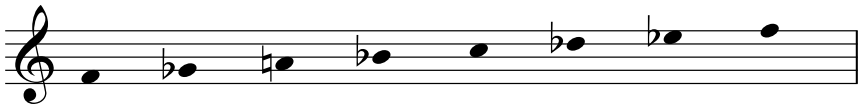


Figure 2: F Spanish Phrygian[15]

The fourth piano work in the addendum is *À la manière de la neige*, a work modelled after Debussy's piano prelude entitled *Des pas sur la neige*. *À la manière de la neige* marks the beginning of my wider experimentation with modes. Like Debussy's work, the context of the ostinato within *À la manière de la neige* continuously shifts as the colour of the musical layering moves through juxtapositions of one or more

[14] Also known as *seguiriya*.

[15] The Spanish Phrygian mode is equivalent to mode 5 of the harmonic minor scale. In the Flamenco treatment of the Spanish Phrygian mode, frequently $\hat{7}$ is raised, which creates a mode with two augmented seconds.

modes, both traditional (e.g., major and melodic minor) and synthetic (e.g., octatonic and acoustic).

Portfolio Works

There are three major works included within this portfolio:

1. *I Wish I Could Remember That First Day* – a setting of a Christina Rossetti poem for SATB divisi. The poem is an untitled sonnet that opens with the words "I wish I could remember that first day".[16] I will be discussing my use of added-tone sonorities in this work and its harmonic implications.

2. *The Nightingale and the Rose* – a chamber work for woodwinds, brass, strings, piano, and percussion (14 instrumentalists). It is the first work in this set to explore the idea of scale networks and to make heavy use of the Whole-Tone Quint mode.

3. *Currents* – a three movement piano concerto inspired by the complex relationship between New Orleans, my birthplace, and the waters that border and cross the city. This is my last and most substantial work of the portfolio. With this concerto, both my harmonic language and my orchestration rose to a new level of sophistication. The movements within this work are:

    a. "River" – inspired by the Mississippi River. This movement further develops the practice of creating synthetic modes from scale networks. Like *The Nightingale and the Rose*, "River" uses the Whole-Tone Quint mode as its parent mode.

[16] (Rossetti 1995, 330)

b. "Breaking" – a reaction to the flooding of New Orleans after Hurricane Katrina. This movement is almost exclusively written from material derived from rotational arrays. I will discuss how the initial row that I chose for this work derives from the material presented in "River" and how the octatonic implications of the generated arrays are utilized.

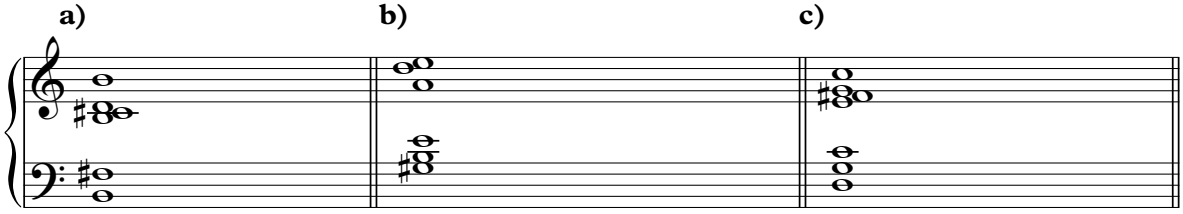
c. "Still" – a statement of hope built upon a reflection on both the beauty and loss created by standing water. This movement makes use of complementary pitch class sets generated by techniques derived from early 20th century Russian music theory. I will introduce Russian music theorist Boleslav Yavorsky, his concepts of modes, how his theories inspired my process, and the harmonic implications utilized within this movement.

Chapter 2: *I Wish I Could Remember That First Day*

Understanding Added-Tone Sonorities

Eric Whitacre is well known for his rich harmonic treatment of tonal music. In her dissertation "Added-Tone Sonorities in the Choral Music of Eric Whitacre", Angela Hall offers theories on how the harmonies of Eric Whitacre are perceived in a tonal framework. Hall's theories and her extensive documentation of how Whitacre uses specific sonorities offered me a strong foundation for understanding how to apply similar sonorities to *I Wish I Could Remember That First Day.*

To analyse Whitacre's vertical sonorities, Hall developed a notation that represents what she calls the *added-tone sonority*. I will use this notation in my examples. For a given vertical sonority, an added-tone sonority marking will indicate the diatonic triad deduced from the pitch class collection, what non-chord tones are added to this triad, and the bass note used for this sonority. Figure 3 demonstrates how to read added-tone sonority notation.



a)	b)	c)
Added-Tone Sonority‡	*Added-Tone Sonority*‡	*Added-Tone Sonority*‡
b(2)/0	E(5t)/4	C(26)/2
B minor triad	E major chord	C major triad
Added tone i.c. 2 (C♯)	Added tone i.c. 5 & 10* (A, D)	Added tones i.c. 2 & 6 (D, F♯)
i.c. 0 is in the bass	i.c. 4 is in the bass	i.c. 2 is in the bass
(i.e., is in root position)	*(i.e., a G♯ is in the bass)*	*(i.e., a D is in the bass)*

‡ All i.c.'s are relative to the root of the chord.
* i.c. t = i.c. 10; i.c. e = i.c. 11

Figure 3: Examples of Added-Tone Sonority Notation

While using added tones to enrich triadic harmonies is a well-documented compositional technique,[17] Hall's theories offer six specific factors used to help determine the perceived triad of the sonority within a tonal framework: [18]

1. The root of the triad must be included within the sonority;

2. Major and minor triads are the preferred interpretation;

3. Completeness of a triad within the sonority lends favour towards that interpretation;

4. If possible, the triad should include the bass note of the sonority;

5. Preference is given to triads where the bass note is the root of the triad;

6. When considering incomplete triads, preference is given to triads that include the third.

When all of these factors are considered, multiple interpretations of various confidence levels may arise. Typically the interpretation of the highest confidence level is chosen, but often the context lends credence to an interpretation of lesser confidence.[19]

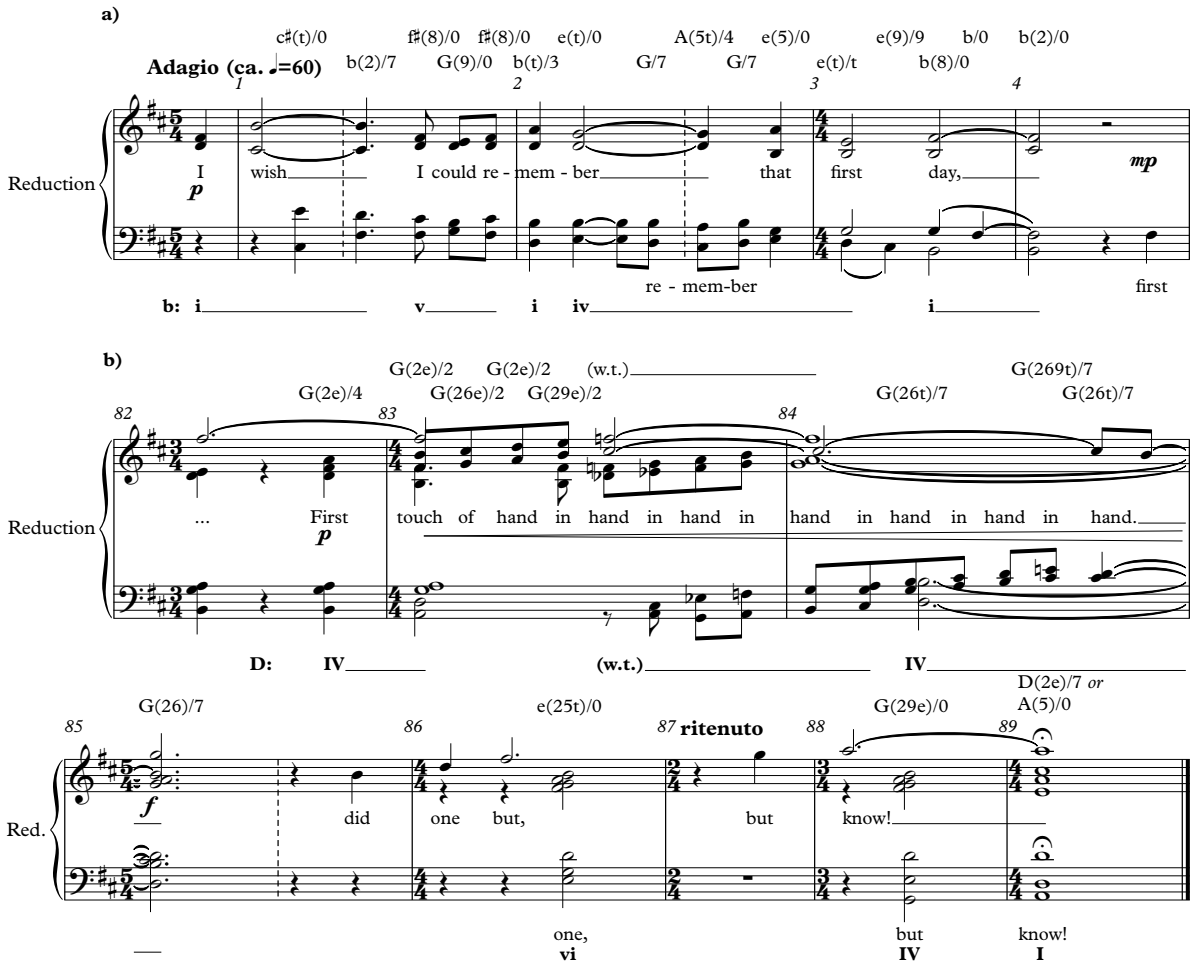
Context in Added-Tone Sonorities

Hall's theories on the perception of added-tone sonorities resonate with my aural interpretations. While writing *I Wish I Could Remember That First Day*, I remained

[17] (Persichetti 1961, 111-18)
[18] (Hall 2012, 71)
[19] (Hall 2012, 77)

aware of what harmonic context the listener would hear. When I sought a specific harmonic foundation for a line, I was able to construct sonorities that intentionally reinforced these harmonies. Hall's observations occasionally proved useful for conveying specific affects – e.g., tight and dark, or open and consonant. When I could not find a sonority to reflect my intention, Hall's categorization of added-tones[20] offered combinations I might not have considered.

The opening (Example 2a) and closing (Example 2b) cadences of *I Wish I Could Remember That First Day* are typical of this piece:



Example 1: *I Wish I Could Remember That First Day* bars 1-4, 82-89

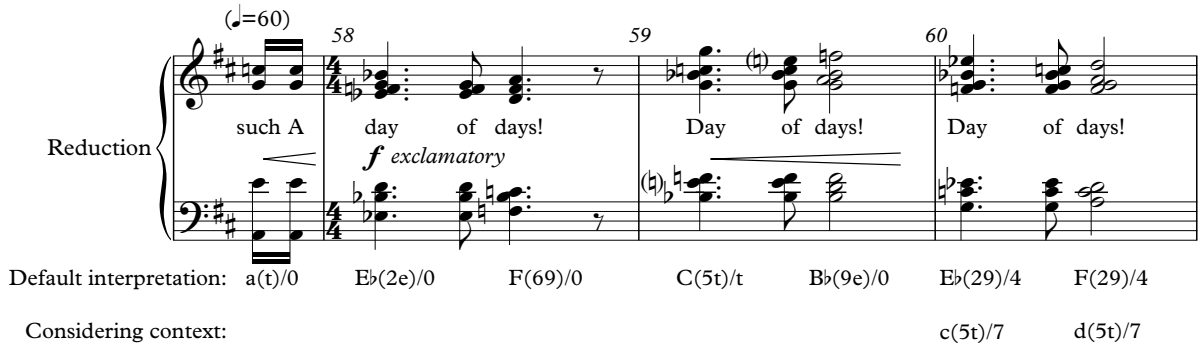
[20] (Hall 2012, 82-91)

As modelled in Hall's paper, I label each vertical sonority and the underlying harmonic movement. Vertical sonorities can be supportive of the underlying harmony or reflect decorative harmonies (e.g., bar 1, beat 5).

When determining the actual perceived triad within an added-tone sonority, Hall mentions multiple times the importance of considering the "tonal context", "musical context", or simply "context". Example 1 above includes several sonorities that I analysed as different from the default analysis of the vertical harmony. By a straight interpretation of Hall's rules, the harmony of bar 82, beat 3, looks like it should be based upon a B minor harmony [b(8t)/0] that is an extension of the previous phrase's harmonies, yet I clearly hear (and intended) a G major harmony. The G(2e)/4 interpretation falls neatly into a stacked third harmony (a GM^9 harmony in first inversion) and leads directly into the G harmony area that follows. The potential ambiguity of interpretation enabled by added-tone sonorities lends both beauty to the music and support for the underlying theme of misplacement in the poetry.

The final chord in bar 89 also is ambiguous. It mostly is heard as a D major harmony, even though the sonority contains the complete A major triad, an A is in the bass, and there is no third of the D major triad. If a D harmony were to follow this chord, then bar 89, beat 1, would no doubt be an A major harmony. Instead, its prominence as a final chord and the emphasis on the D within the sonority favours the D tonic interpretation.

Hall does not specifically mention melody as a factor to be considered when determining the interpretation of an added-tone sonority, but melody can play an important role.



Example 2: *I Wish I Could Remember That First Day*, bars 58-60

Example 2 presents a melodic sequence reflecting a brief moment of joy that, by bar 60, is slightly coloured by lingering regret. Bar 60 is shown with two possible interpretations of the sonorities. The ear favours the C minor to D minor interpretation over the E♭ major to F major interpretation partly because the melody outlines the chord tones of the C minor and D minor chords, continuing a pattern of outlining chord tones set forth in the prior two bars. The ambiguity of major and minor interpretations, with a clear leaning towards the minor, nicely reflects the poet's joy tinged with regret.

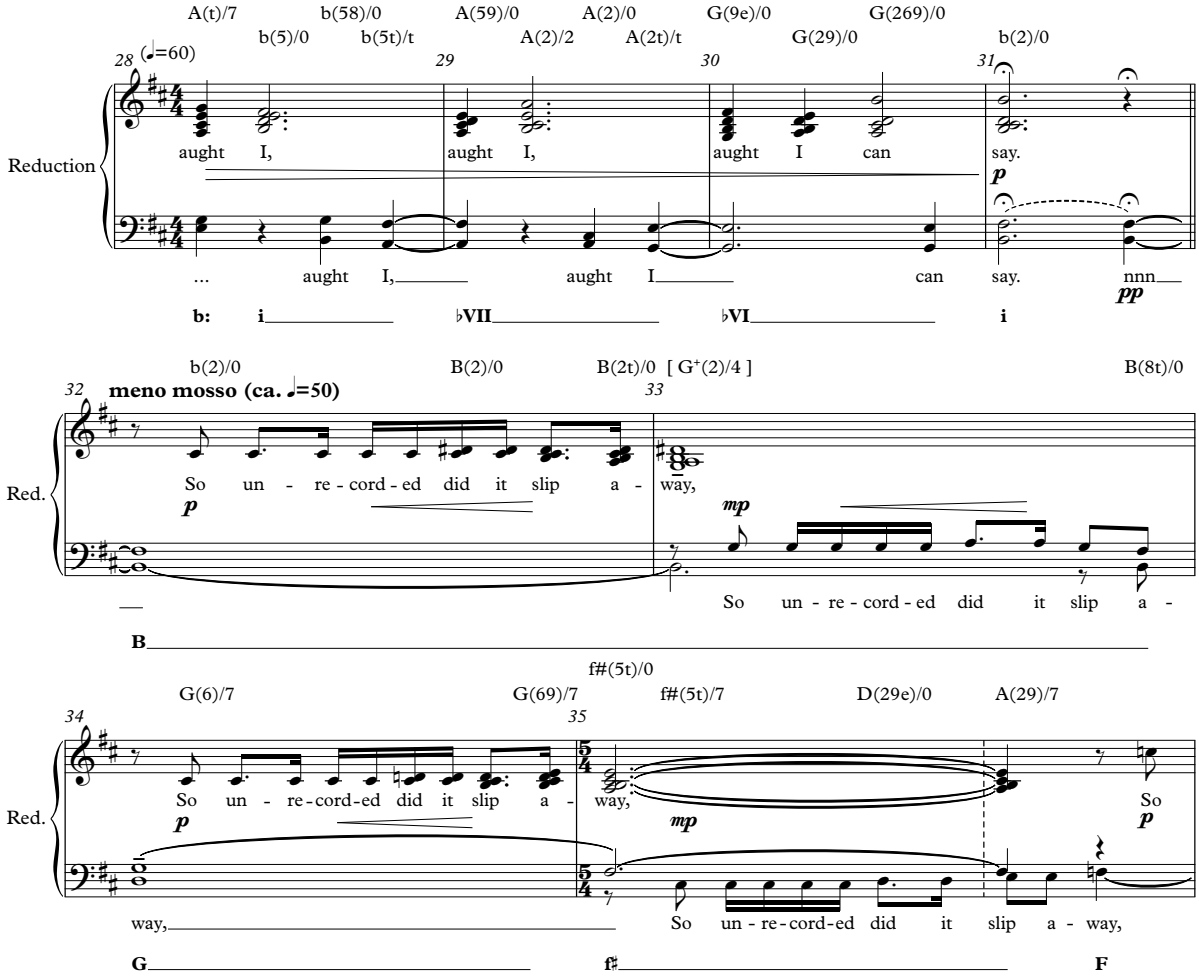
Clusters as an Outgrowth of Added-Tone Sonorities

Near the middle of *I Wish I Could Remember That First Day* are these words from Christina Rosetti's poem:

So unrecorded did it slip away,
So blind was I to see and to foresee,
So dull to mark the budding of my tree
That would not blossom yet for many a May.

In setting these words I use note clusters, melodic tritones, and a shifting harmonic base to paint a sense of blindness and missing details. While much of the middle section of *I Wish I Could Remember That First Day* does not fit neatly within Hall's

added-tone sonority model, the use of cluster harmonies flows organically from the complex harmonies generated by added-tone sonorities. Consider the transition into the text quoted above, where I begin my use of clusters to reflect the elusive nature of the speaker's memory:

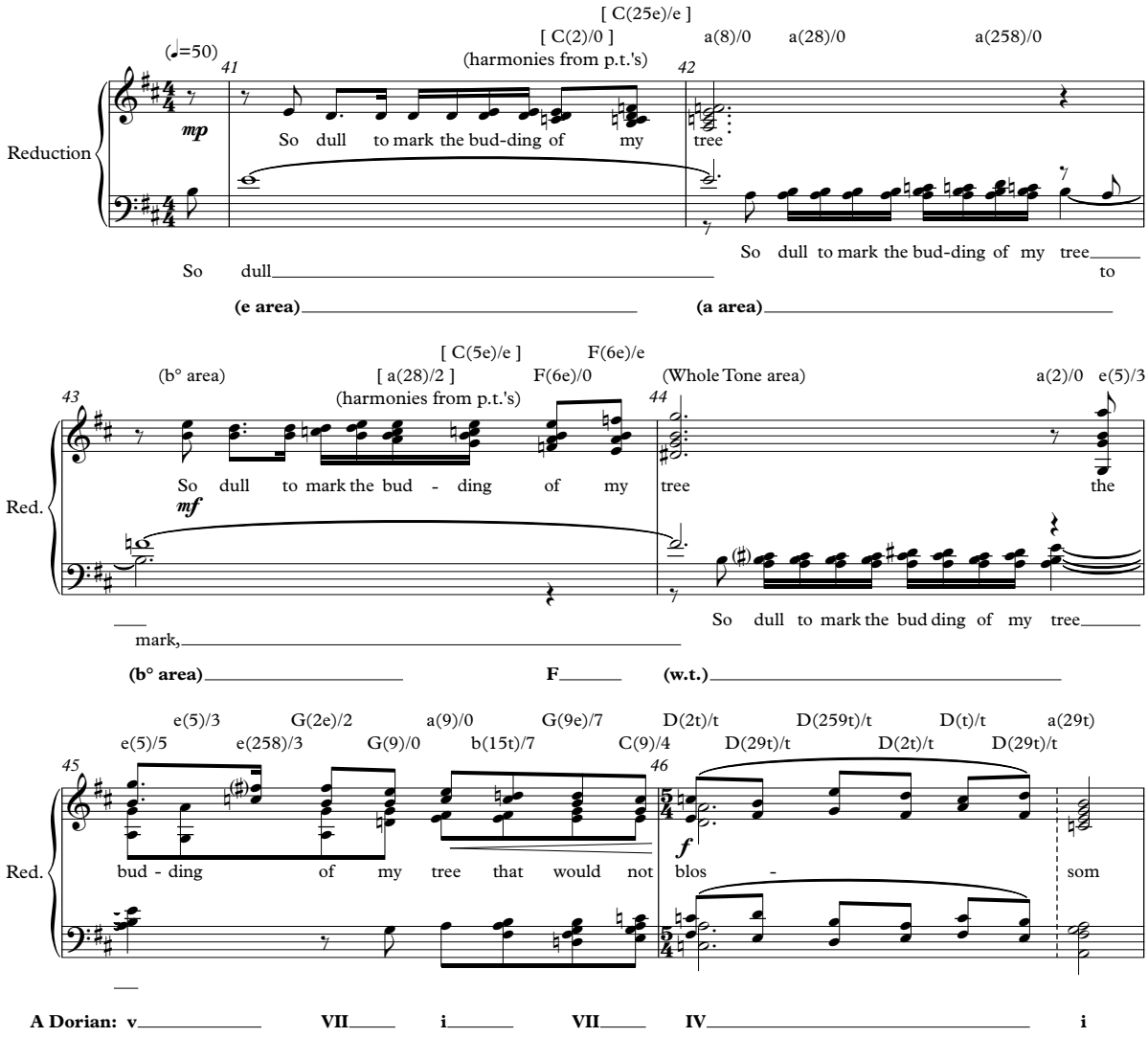


Example 3: *I Wish I Could Remember That First Day*, bars 28-35

The four-note clusters that evolve in bars 32 and 34 are clear paraphrases of bar 31's three-note cluster created by the C♯ within the B minor harmony.

The evolving cluster motif repeats throughout the middle section and leads towards a large-scale harmonic resolution on the word *blossom*. Just prior to this resolution, where the words *dull* and *budding* are key, the vocal lines repeatedly try to break out

of the clusters, and the harmonies devolve into ambiguity as the work enters a brief whole-tone section:



Example 4: *I Wish I Could Remember That First Day*, bars 41-46

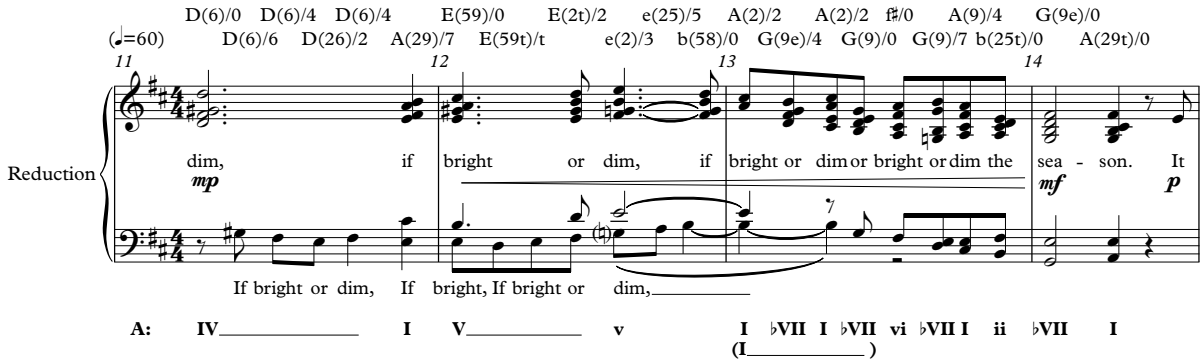
An important attribute to the text painting here is the blurring of the harmonies. Bar 41's pitch gravity is towards E, but the clusters in beat 4 obscure this. Likewise bar 43's harmonic centre of the B tritone is blurred by the sonorities within beat 3. Both areas create tension that is subsequently released: a fifth movement to the A minor in bar 42, and a near-fifth movement to the F in bar 43, beat 4. The whole-tone[1] area of bar 44 reflects a complete sense of being harmonically untethered. Only with the entrance of the alto's E♮ on beat 4, bar 44, can analysis of added-tone sonorities

once again be applied.[21] It is at this point in the music that harmonic clarity is reasserted, and there is a clear, melodically sequential, progression to the plagal cadence on the word *blossom*.

Balance in I Wish I Could Remember That First Day

While my study of added-tone sonorities has opened up a new harmonic richness within diatonic modes, I have come to the conclusion that in *I Wish I Could Remember That First Day* I could have created more balance and contrast by finding more space for open voicing and less dense harmonies. Within the 89 bars of the work, 61 bars contain five to eight voices, and 28 bars contain only four or fewer voices. Only 22 bars of the work contain no divided sections. Between bars 24 and 46, every bar contains five or more voices. From bars 72 to the end, only two bars (both comprised entirely of a rest and a pickup) have fewer than 5 voices.

There are many choral works written for 8 voices that have a sense of clarity and balance, so I believe other factors may contribute to the imbalance I sense. Consider the following bars using 6 independent voices:



Example 5: *I Wish I Could Remember That First Day*, bars 11-14

[21] The entrance of the E♮ very briefly throws this work into the A Whole-Tone Quint mode. The WTQ mode is of significant importance in the other works of this portfolio.

While the added-tone sonorities change on each moving voice, bars 11, 12, and 14 maintain a harmonic rhythm of roughly two structural harmonies per bar. In contrast bar 13 suddenly jumps to a harmonic rhythm of every quaver. This combined energy of the harmonic rhythm and the added-tone sonorities contributes to a complexity that is not well-balanced. Bar 13 might have been better balanced with slower harmonic rhythms or thinner sonorities.

Compare this to Example 2, page 15, where seven voices are active. The slow musical rhythm, slower harmonic rhythm, and pseudo-sequential nature offer the listener a chance to "taste" each sonority, successfully counter-balancing the complexities of the harmonies.

Chapter 3: *The Nightingale and the Rose*

Tymoczko's Constraints in Scale Construction

In his paper "Scale Networks and Debussy", Dmitri Tymoczko presents concepts of scale construction and scale networks that I used to create new modes and relationships for *The Nightingale and the Rose* and "River", the first movement of *Currents*. Below I define some of Tymoczko's terminology that I will be using in my discussions of my works.

Tymoczko notes that, in the early twentieth-century, there was a composition tradition of composers such as Rimsky-Korsakov, Debussy, and Ravel who wrote music using new scales and harmonies while retaining a traditional hierarchy among those harmonies and scales. He labels this composition tradition the *scalar tradition*.[22] I consider my works *The Nightingale and the Rose* and "River" to be of a similar tradition.

Within this scalar tradition, Tymoczko observed a number of potential constraints in how scales are constructed:[23]

- DS (Diatonic Seconds) – the chromatic interval between two consecutive notes of a scale are either one or two ascending semitones.

- NCS (No Consecutive Semitones) – scales do not have two or more consecutive semitones.

- DT (Diatonic Thirds) – the chromatic interval of the "thirds" of a scale (the outer interval defined by three consecutive notes of a scale) is either three or

[22] (Tymoczko 2004, 219-20)
[23] (Tymoczko 2004, 222-26)

four semitones. This is a given if the constraints of DS and NCS are satisfied. However, it is possible to have the DT constraint satisfied while failing DS. For instance, the harmonic minor scale contains only major and minor thirds, but it also contains an augmented second, which violates DS.

While much early twentieth-century music uses scales that satisfy all of the above constraints, few of the modes I use satisfy the NCS or DT constraints, and a few do not satisfy the DS constraint. I will discuss some of the implications of this further on.

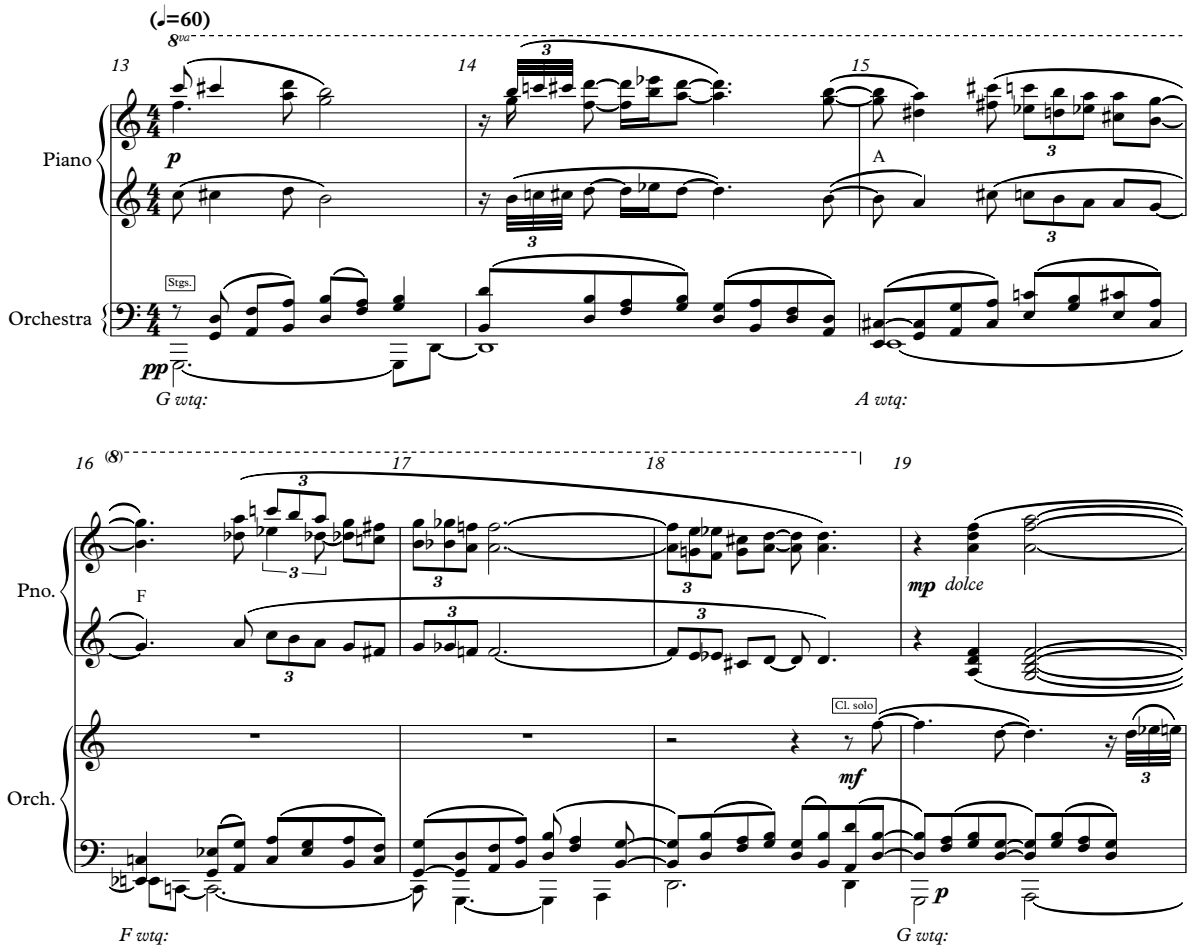
Intersecting Collections and Modulation

Tymoczko borrows nomenclature from set theory to describe relationships between scales while cautioning that the "sets" and "collections" being discussed are still scalar in nature: pitch classes within these objects are ordered, are cyclical at the octave, and define their own intervallic relationships (e.g., scalar seconds, thirds, etc.).[24]

When discussing common-tone modulation between scales, Tymoczko defines a few more terms. The collection of common tones between two scales is, by definition, the intersection of the two collections. Two sets *maximally intersect* when all but one of the smaller set intersect with the other set. C major and A harmonic minor maximally intersect; the two scales have 6 tones in common. By design, many of the scales I use maximally intersect. For example, the C Whole-Tone Quint [024678T] and the C Lydian Arabian [024678E] maximally intersect.

[24] (Tymoczko 2004, 233)

A set class *maximally intersects itself* when two distinct transpositions of that set class maximally intersect. [25] Each diatonic collection can maximally intersect itself twice: C major and G major differ by only one note, as does C major and F major. Each of my Whole-Tone Quint collections maximally intersects itself five times. The G wtq and F wtq have in common the six tones of the whole-tone$_{[1]}$ scale, but for the seventh tone (ŝ) G wtq has a D♮ and F wtq has a C♮. G wtq has similar intersections with A wtq, B wtq, C♯ wtq, and E♭ wtq. This makes shifting between related WTQ collections relatively gentle, a trait useful in communicating the quiet flow of water in the example below from "River":



Example 6: "River", bars 13-19

[25] A set class, by definition, contains all transpositions *and* inversions of a set. Tymoczko expressly states in footnote 13 that he is considering only transpositions when speaking of classes. (Tymoczko 2004, 283)

The intersection between two collections is only concerned with common tones and not with the voice leading between the scales. This is different from the typical treatment of common-tone modulation in earlier tonal practice. When modulating from C major to A harmonic minor, the ♯$\hat{5}$ of C major becomes the $\hat{7}$ of A harmonic minor, and the function of each of the scale degrees within C major shifts up by two scale degrees. $\hat{1}$ in C major becomes $\hat{3}$ in A minor, $\hat{2}$ in C major becomes $\hat{4}$, ♯$\hat{5}$ becomes $\hat{7}$, and so forth. This strictly linear shift of scale degree numbers through a modulation is called *maximally-smooth voice leading*. Maximally-smooth voice leading is not a requirement of Tymoczko's approach, and my music frequently employs common-tone modulation where scale degrees do not align so neatly. Consider the relationship between F♯ wtq and E wtq, two scales used in *The Nightingale and the Rose*:

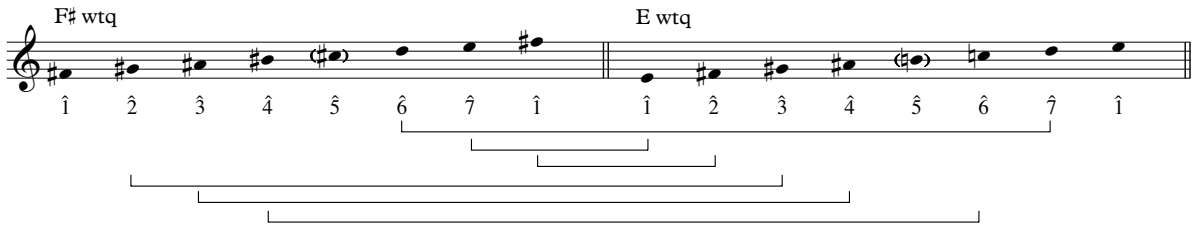


Figure 4: Intersection of F♯ wtq and E wtq

The $\hat{5}$ of F♯ wtq is a C♯, and it is substituted with a B to become the $\hat{5}$ of E wtq. The substituted tone retains its previous scalar functionality. The other scale tones shift in functionality differently. The [$\hat{6}$ $\hat{7}$ $\hat{1}$ $\hat{2}$ $\hat{3}$] of F♯ wtq become [$\hat{7}$ $\hat{1}$ $\hat{2}$ $\hat{3}$ $\hat{4}$] of E wtq, a shift of one scalar degree. However, $\hat{4}$ of F♯ wtq shifts by two scalar degrees to become $\hat{6}$ of E wtq.

It is possible to have modulations that are ambiguous until more of the destination scale is revealed. From F♯ wtq, the appearance of a B♮ might indicate the arrival of the B melodic minor scale. Consider the intersection of these modes:

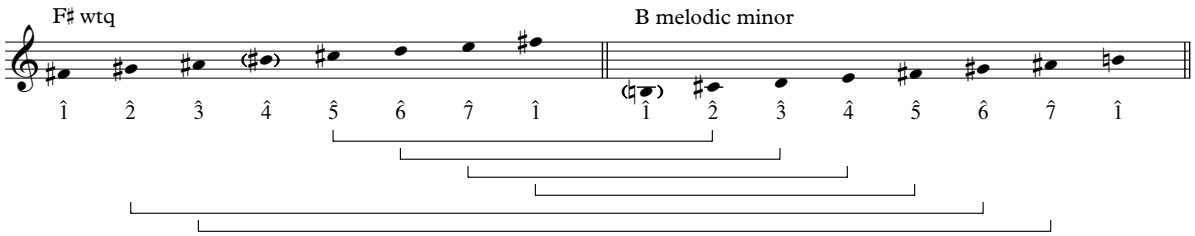
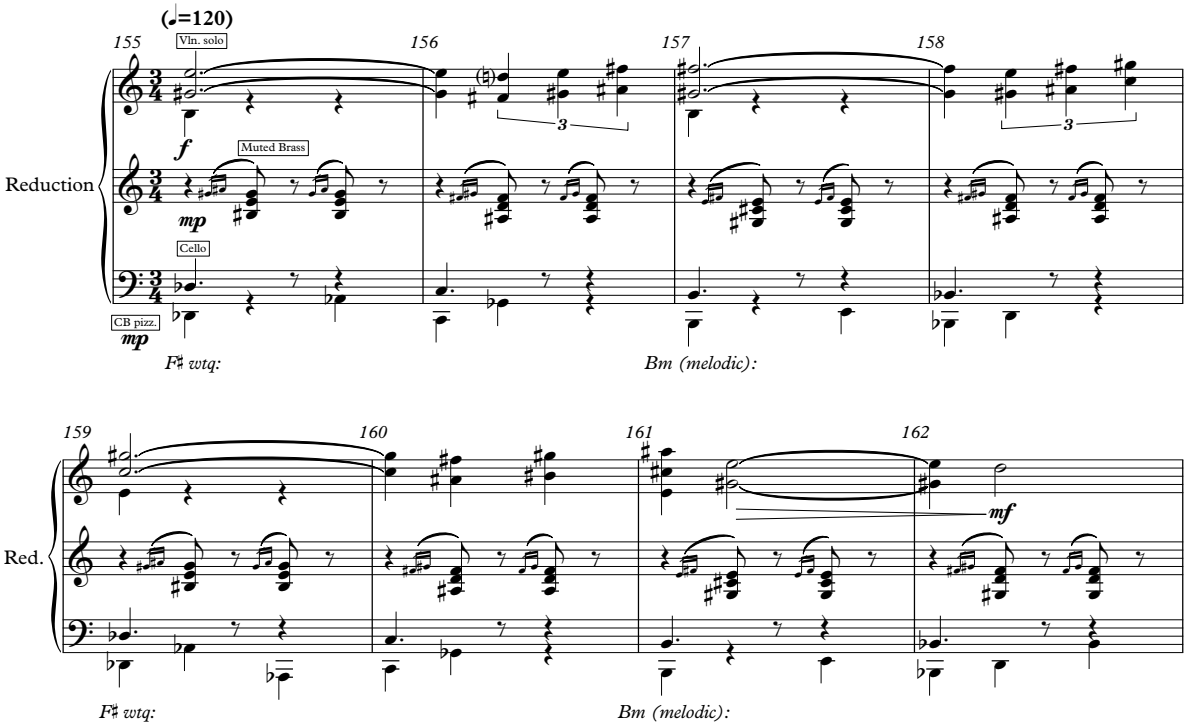


Figure 5: Intersection of F♯ wtq and B Melodic Minor

Unlike in Figure 4, this modulation offers maximally-smooth voice leading. When leaving F♯ wtq, the arrival of pitch class eleven is ambiguous in its destination until a C♯ indicates B melodic minor or a C♮ indicates E wtq.



Example 7: *The Nightingale and the Rose*, bars 155-162

In Example 7, the accompaniment figure alternates between 2 bars of F♯ wtq and B melodic minor. When the B♮ is introduced at bar 157, beat 1, the shift to B melodic minor and not another mode is only confirmed when the C♯ is played on beat 2. If C naturals had been used instead of the C sharps, I would have modulated to the sonically similar E wtq. The harmonic gist would remain, but the modal colour of

the music would have changed subtly: there would not have been as much contrast between bars 155-156 and bars 157-158.

Scale Networks As Preparation for Composing

Tymoczko creates what he calls *scale networks* to help analyse the relationships between scales used in Debussy's music. A scale network is a collection of scales used within a work that are graphed along maximally intersecting relationships. Optimal modulations between scales can be traced along the graph.

For *The Nightingale and the Rose* and "River", I decided to reverse Tymoczko's analysis process by defining my scale networks *first* and then writing music that used the graph as a map for potential modulations. I opted for these constraints:

- All of the scales in my networks are 7 note collections.
- Each network uses a Whole-Tone Quint as a *parent scale*.
- Each scale in the network is no more than two steps away from the parent scale.
- My shifts do not require smooth voice leading between scales.

Figure 6 shows the scale network I initially created for *The Nightingale and the Rose*:

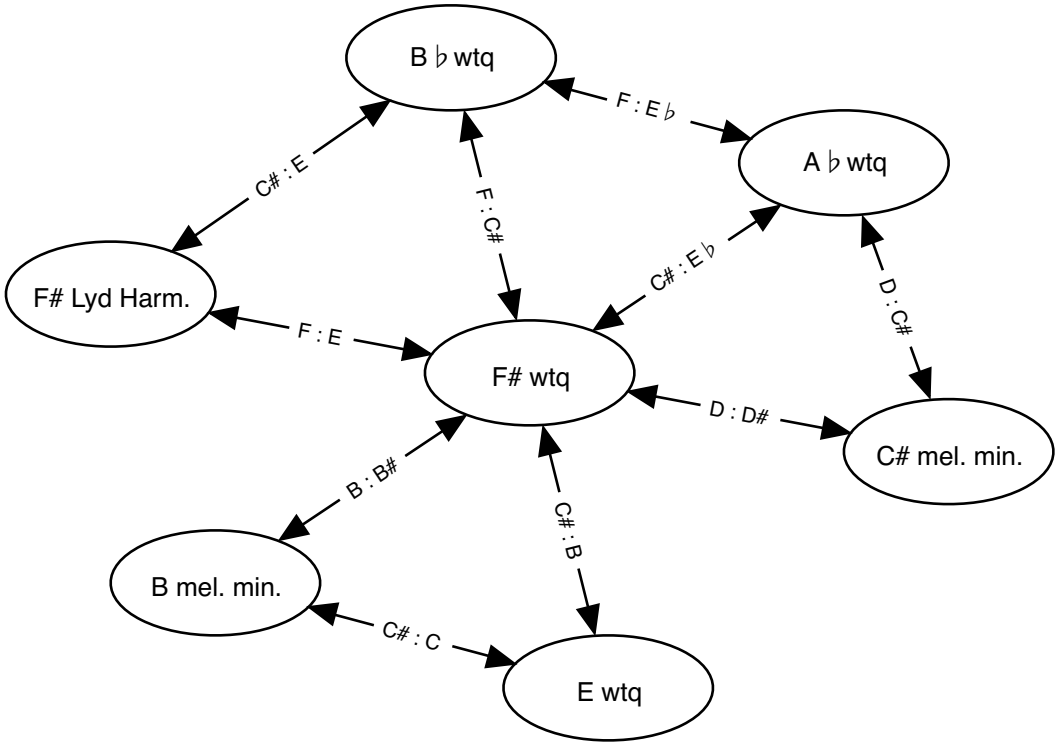


Figure 6: Initial Scale Network for *The Nightingale and the Rose*

In this scale network, the parent mode is the F♯ wtq, and all other scales are only one step away. In the paths between the nodes I mark the notes that need to be exchanged to modulate from one scale to another. The F# wtq needs to replace its D with a D♯ to modulate to the C♯ melodic minor. The reverse transformation modulates back to F♯ wtq.

Figure 7 represents the final set of scales used in the piece:

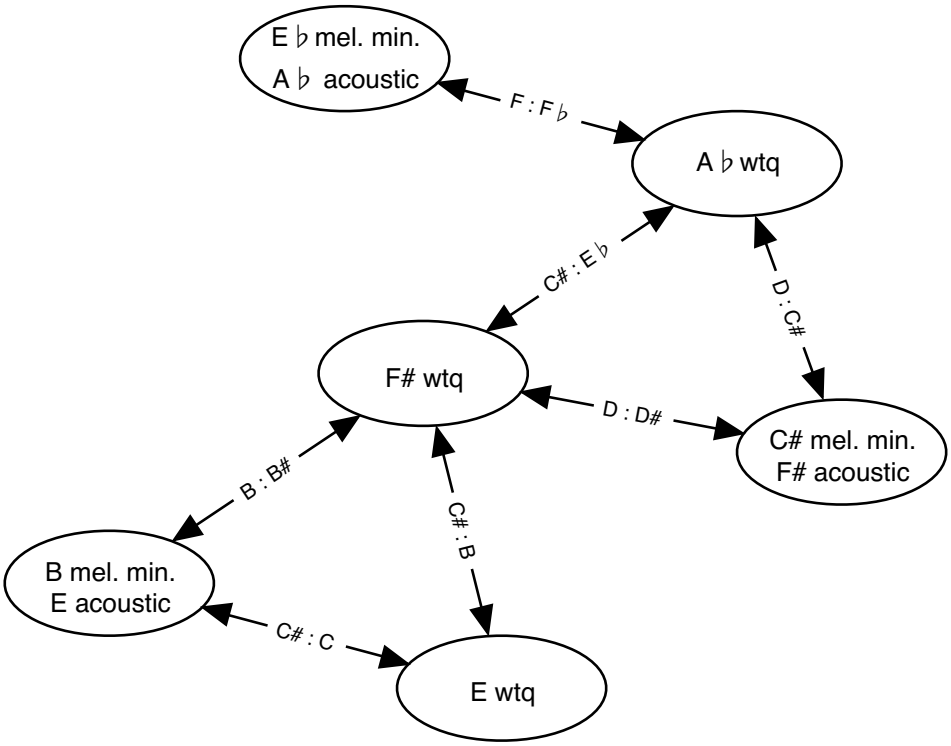
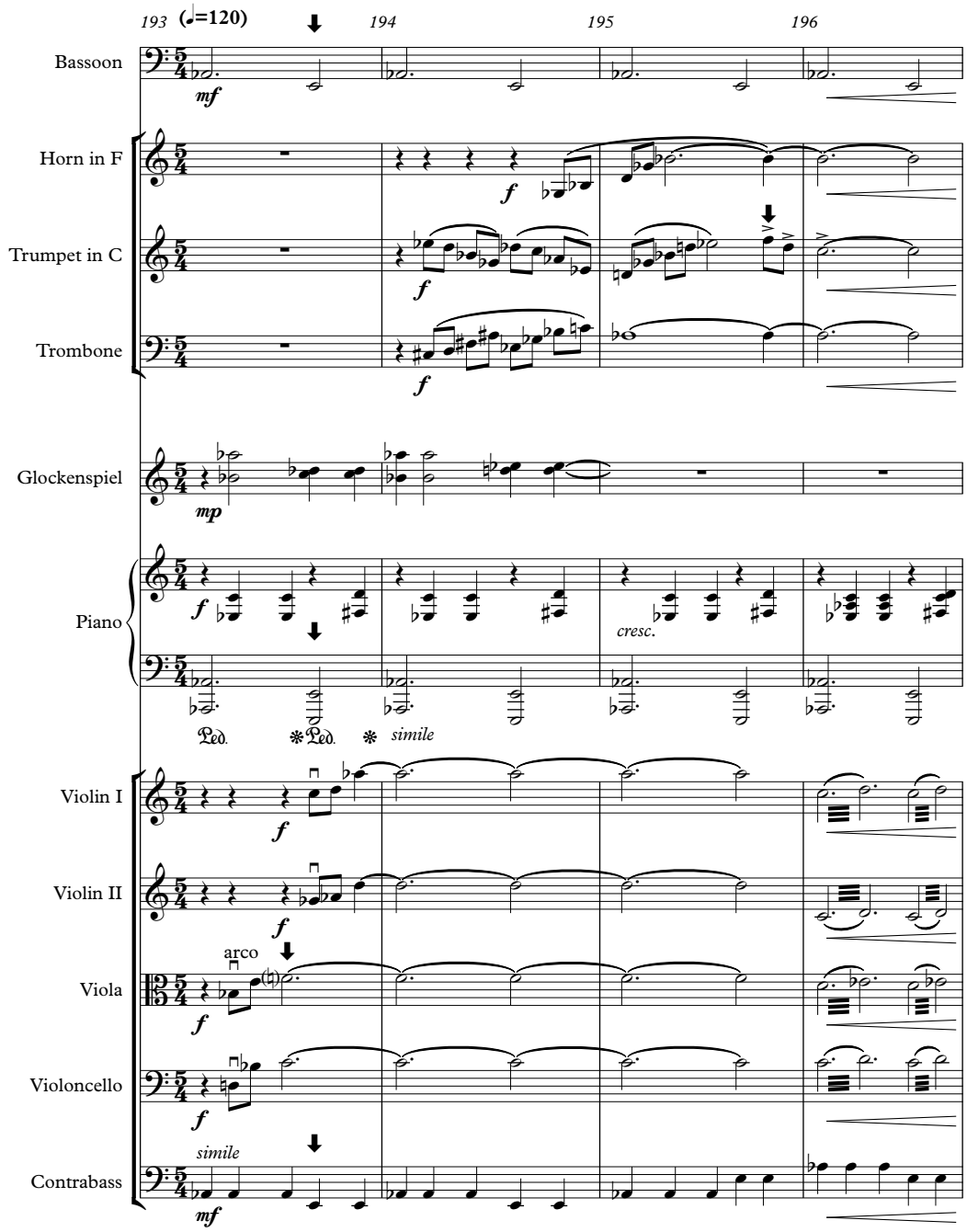


Figure 7: Final Scale Network for *The Nightingale and the Rose*

My work did not visit F♯ Lydian Harmonic nor B♭ wtq, but it did visit A♭ acoustic, a scale not in the original network and the only scale two shifts away from the parent scale. Most of the work is set in one of the WTQ scales. The visits to the melodic minor or acoustic scale areas tend to provide one of two important harmonic functions: alternating harmonic sections of two closely related scales (e.g., F♯ wtq to B melodic minor, as in Example 7 above), or mode ambiguity when a scale degree and its chromatic alteration are present at the same time. Consider the following example:



Example 8: *The Nightingale and the Rose*, bars 193-195

Here the music is within A♭ wtq and is entering the climax. The black arrows indicate the sources of the scale ambiguity between A♭ wtq and A♭ acoustic. For three bars the viola asserts an F♮ from what would be A♭ acoustic against the E♮ (a respelled F♭) from A♭ wtq. This is the last and most assertive conflict of modes within the work. At bar 196, the ambiguity is resolved to leave the music in A♭ wtq. Shortly after this climax the work ends.

Harmony in The Nightingale and the Rose

I chose the Whole-Tone Quint mode as my primary mode within *The Nightingale and the Rose* and "River" for two reasons:

- The Whole-Tone Quint is a peculiar scale that surprises the listener with its ability to find stable points on the tonic and fifth yet lose its grounding when its whole-tone heritage is emphasized.

- While the "whole-tone plus one" has been used by various composers (I have found analyses of Bartok, Reich, and Berg mentioning this scale), I find it a relatively underexplored scale within the scalar tradition of composition.

It might be reasonable to analyse a WTQ area as fundamentally of the whole-tone mode, but Tymoczko points out that the "whole-tone plus one" scale is one of several important twentieth-century scales that, depending upon analytical context, may need to be analysed on its own merits.[26] I believe my treatment of the WTQ, where $\hat{5}$ (the added tone) plays a prominent role in both colour and in asserting the tonic, justifies analysing the WTQ as a fundamental scale rather than a superset of the whole-tone scale.

In his section on scale construction, Tymoczko mentions that scales used by Debussy typically are DS and NCS compliant. Tymoczko also offers two observations that are relevant to understanding my modes of choice:

- Any scale satisfying both DS and NCS are *locally diatonic*, meaning that any three consecutive notes in this scale can be found in traditional diatonic

[26] (Tymoczko 2004, 227)

scales. For example, within the octatonic scale, which satisfies both DS and NCS, any three consecutive notes could also be found in a major scale.

- Any stack of scalar thirds from a scale satisfying the DT constraint will by default sound "tertian" – meaning that they will be stacks of either major or minor thirds.

Consider the Whole-Tone Quint and the harmonies created by stacked scalar thirds:

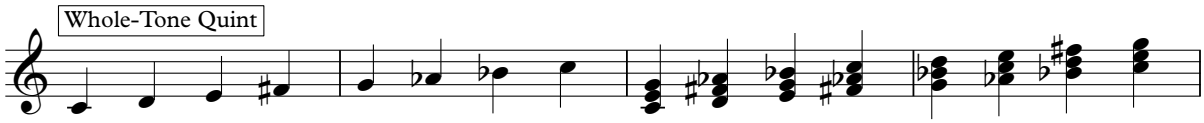
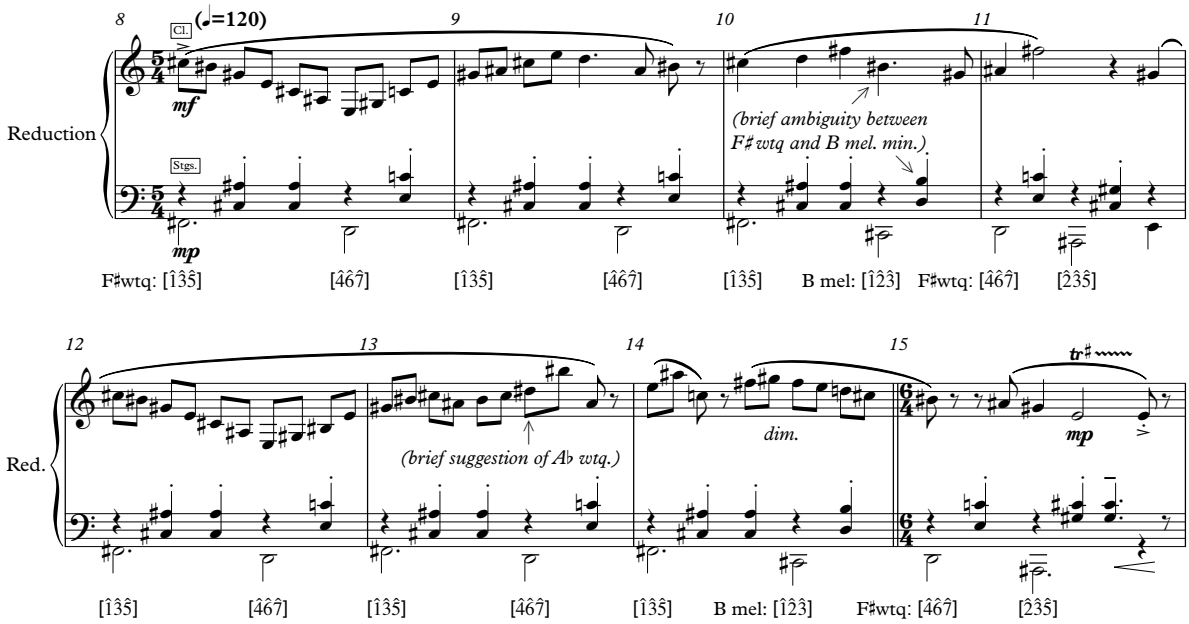


Figure 8: Whole-Tone Quint and Scalar Triads

The WTQ is neither NCS nor DT compliant. It is not completely locally diatonic, nor are all its harmonies tertian in nature. This gives the WTQ its previously mentioned ability to float between stability and a lack of grounding. It also explains why it would be difficult to use exclusively the stacked-third harmonies shown in Figure 8. Using harmonies not based upon stacked thirds unlocked harmonic options suitable to the affect I was seeking within *The Nightingale and the Rose*.

Consider the opening theme of *The Nightingale and the Rose*:

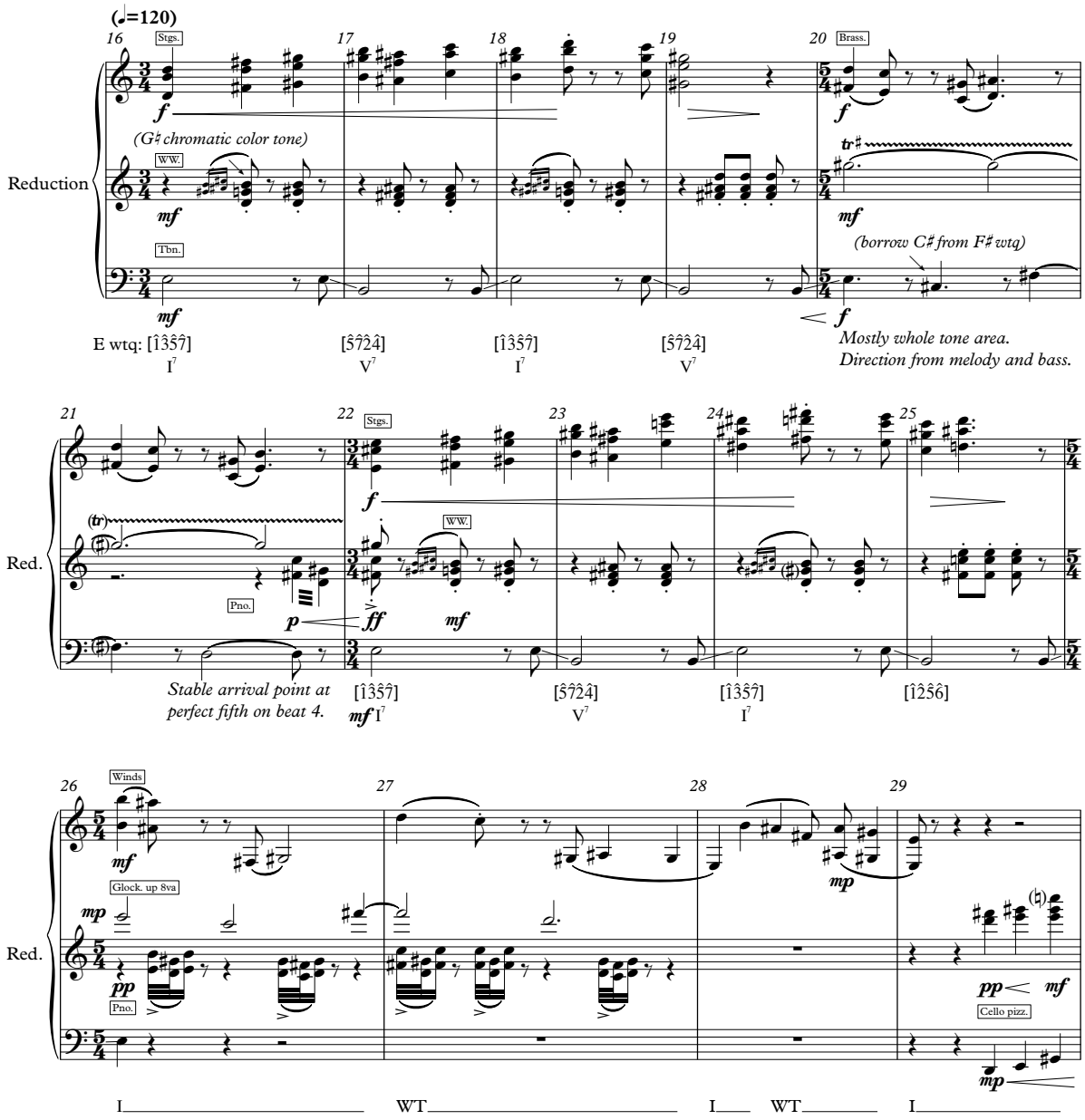


Example 9: *The Nightingale and the Rose*, bars 8-15

In Oscar Wilde's *The Nightingale and the Rose*, a young student seeks to escort a professor's daughter to an upcoming ball, and a nightingale decides to help the student by obtaining a red rose demanded by the woman. A key theme of the story is the skewed impression of what "true love" is by the three main characters: the student, the woman, and the nightingale. I relate that skew within my music with clear but warped references to nineteenth-century waltz clichés. Example 9 states the A theme in the first introduction of my "waltz". $\frac{3}{4}$ bars are compressed into $\frac{5}{4}$, bass movements of fourths and fifths are adjusted to near-fourths and near-fifths, and the harmonic motion slips in and out of a diatonic centre.

For each harmony outlined by the accompaniment figure I note the component scale degrees. While the tonic of the section is tertian – [$\hat{1}$ $\hat{3}$ $\hat{5}$], F♯ major – all of the other harmonies are non-triadic, and most are a stacked scalar third and second. A paper analysis of the work might suggest that the stacked thirds and seconds are

incomplete seventh chords that fit within some modal hierarchy of triads,[27] but this is neither the case nor the intention. Instead, I hear only hints of hierarchy from the movement of the bass underneath voice leading between a stable triad (the F♯ major triad) and open voicings of stacked major and minor seconds that deviate from diatonic expectations.



Example 10: *The Nightingale and the Rose*, bar 16-29

[27] Persichetti, for example, proposes a hierarchy of primary and secondary triads within the church modes. (Persichetti 1961, 32)

The B theme of *The Nightingale and the Rose* (Example 10) demonstrates a contrasting approach to harmony within the WTQ. This section is set in the E wtq scale, which is maximally intersecting with the previous section's F♯ wtq. The harmonic shift from F♯ wtq to E wtq is smooth yet distinct in character from a more traditional diatonic shift. The core harmonic treatment here is between tonic and dominant, unabashedly emphasized by the portamento trombone. Yet, within the WTQ there is room to slip into pure whole-tone sections (bars 27 and 28) that offer contrast and satire.

While "River" is diverse with its modulation techniques, *The Nightingale and the Rose*'s modulations, both at local and structural levels, are constrained to the paths defined by the scale network in Figure 7 above.

The interlude (bars 85-154, not shown) offers a more varied treatment of my modes. At this point in Wilde's story, the nightingale is able to create a red rose from a white rose bud by pressing the rose's thorn into her heart. The nightingale sings her most beautiful night song ever while the lifeblood is drained from her and infused into the rose, which ultimately blossoms beautiful and red. Through this journey, the modulations between the modes navigate a triangle from my scale network:
E wtq → F♯ wtq → B melodic minor → E wtq → E acoustic → F♯ wtq.

There are mode conflicts representative of the nightingale's life struggle. In bar 111 the nightingale song in the piccolo begins to assert B melodic minor with a repeated B♮ that clashes with the B♯ (of F♯ wtq) in the bass line. In bars 126 and 128 the piccolo firmly holds onto the D♮ of B melodic minor while the bass line clashes with a D♯ (a chromatic passing tone hinting at B major). In bar 129, at the height of the nightingale's song, and just before her death, the harmonic tension is released with a

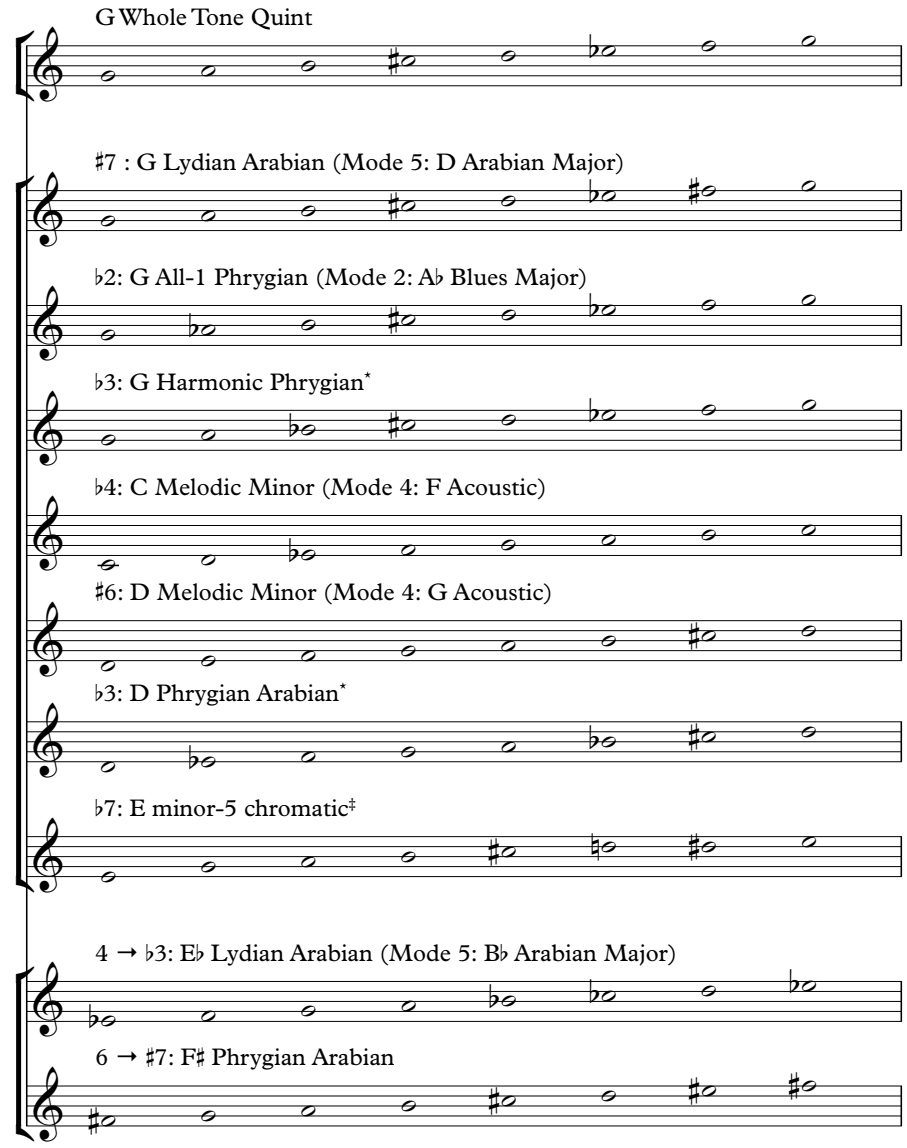
clear modulation to E wtq and a resolution to an E^7 [$\hat{1}$ $\hat{3}$ $\hat{5}$ $\hat{7}$] chord. Bar 138 modulates to E acoustic, the solo violin blossoms into the red rose, and the D theme returns in F♯ wtq.

With *The Nightingale and the Rose* I discovered new harmonies and relationships within the context of the WTQ mode, and I experimented with "mixture" in non-diatonic modes. Although there are steps outside of tertian territory, harmonic motion within *The Nightingale and the Rose* remains defined by clearly delineated chord movement. In "River" I explore novel synthetic scales and harmonic motion defined more by modulation and less by chord motion.

Chapter 4: The Modes of "River"

Generating the Scales and the Scale Network

In my continued exploration of modes and scale networks, I sought a palette of diverse colours that would offer me a breadth of character for "River". Using G wtq as the parent, I determined what maximally intersecting scales I might use. I included both well-known scales and previously unfamiliar scales that seemed to offer potential:



* Not used in the final work.
‡ Not on the initial list of scales, but added while composing.

Figure 9: Maximally Intersecting Scales of "River"

Of this list, only the WTQ and the melodic minor / acoustic scales were previously familiar to me. The brackets demarcate the parent scale from the two types of modulations: those that are maximally-smooth voice leading and those that are not. For maximally-smooth voice leading, the adjustment of the G wtq's scale degree is given. To modulate from G wtq to G Lydian Arabian, ♯$\hat{7}$ indicates that $\hat{7}$ must be raised (F → F♯). When a modulation causes a displacement of a scale degree, the complete transformation is noted. To modulate from G wtq to E♭ Lydian Arabian, $\hat{4}$ → ♭$\hat{3}$ indicates that $\hat{4}$ must be substituted with the equivalent of ♭$\hat{3}$ (C♯ → B♭). In some modulations, notes of the scale will need to be respelled. In moving from G wtq to E♭ Lydian Arabian, the B of G wtq is respelled as a C♭ in E♭ Lydian Arabian.

Absent from the list above are the maximally intersecting modulations between G wtq and the five other WTQ scales derived from the same whole-tone[1] scale: A, B, C♯, E♭, and F wtq. To modulate to any of these scales, $\hat{5}$ of G wtq must be substituted with the quint from the new scale's tonic. Modulating from G wtq to B wtq requires the transformation $\hat{5}$ → ♯$\hat{7}$ (D → F♯). None of these modulations offer maximally-smooth voice leading.

I also wanted to invoke the sound of the blues scale within the movement. To modulate from G wtq to a blues scale requires a minimum of two steps. A pure blues scale comprises six notes, but my transformations result in seven-note collections: a blues scale with an added-tone.[28] The extra note adds an unexpected twist to the blues character and reinforces the connection to the parent scale. The blues scales to which I could modulate are shown below.

[28] See Table 3, page 7 for the nomenclature of the blues scales with an added tone.

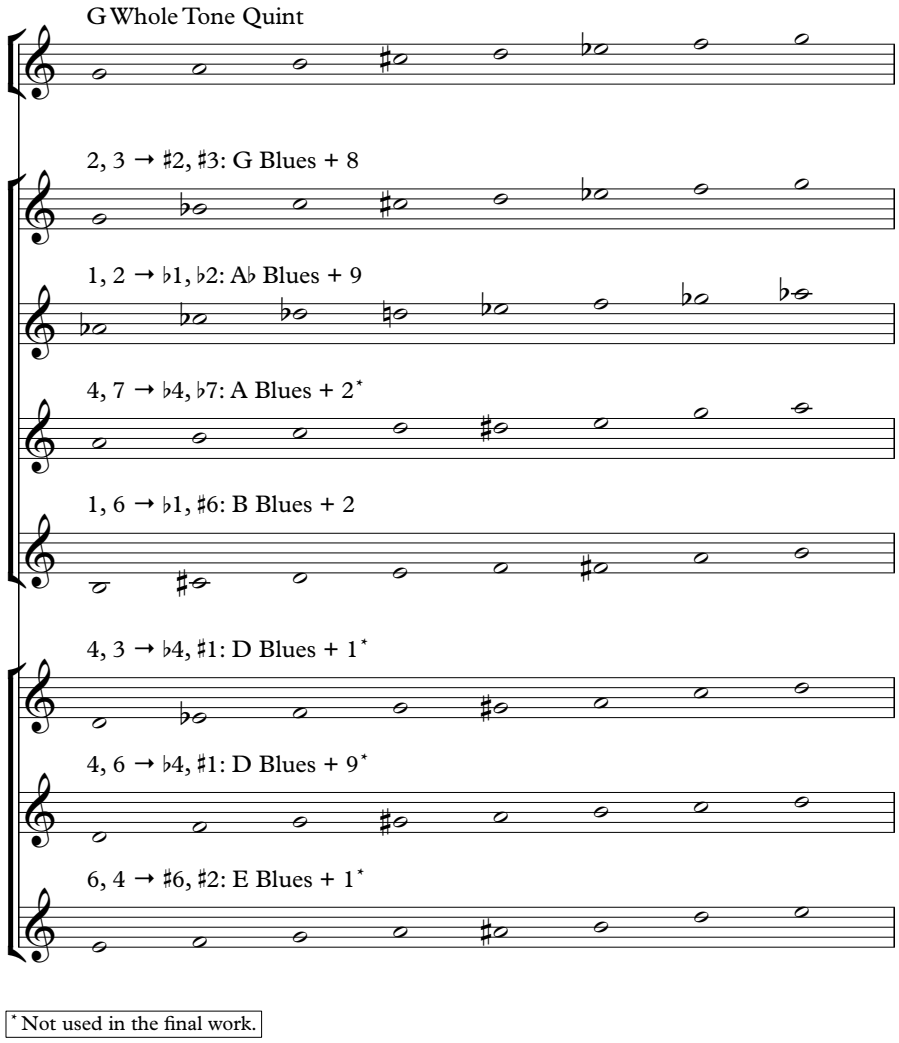


Figure 10: Blues Scales Two Steps from G wtq

The brackets again demarcate the G wtq from modulations with maximally-smooth voice leading and modulations that displace scale degrees. All transformations are shown in their complete form.

Figure 9 and Figure 10 both mark with an asterisk each scale that was not used in the final version of "River". The seven-note scales that were used, including all of the maximally intersecting WTQ scales, are mapped into this scale network:

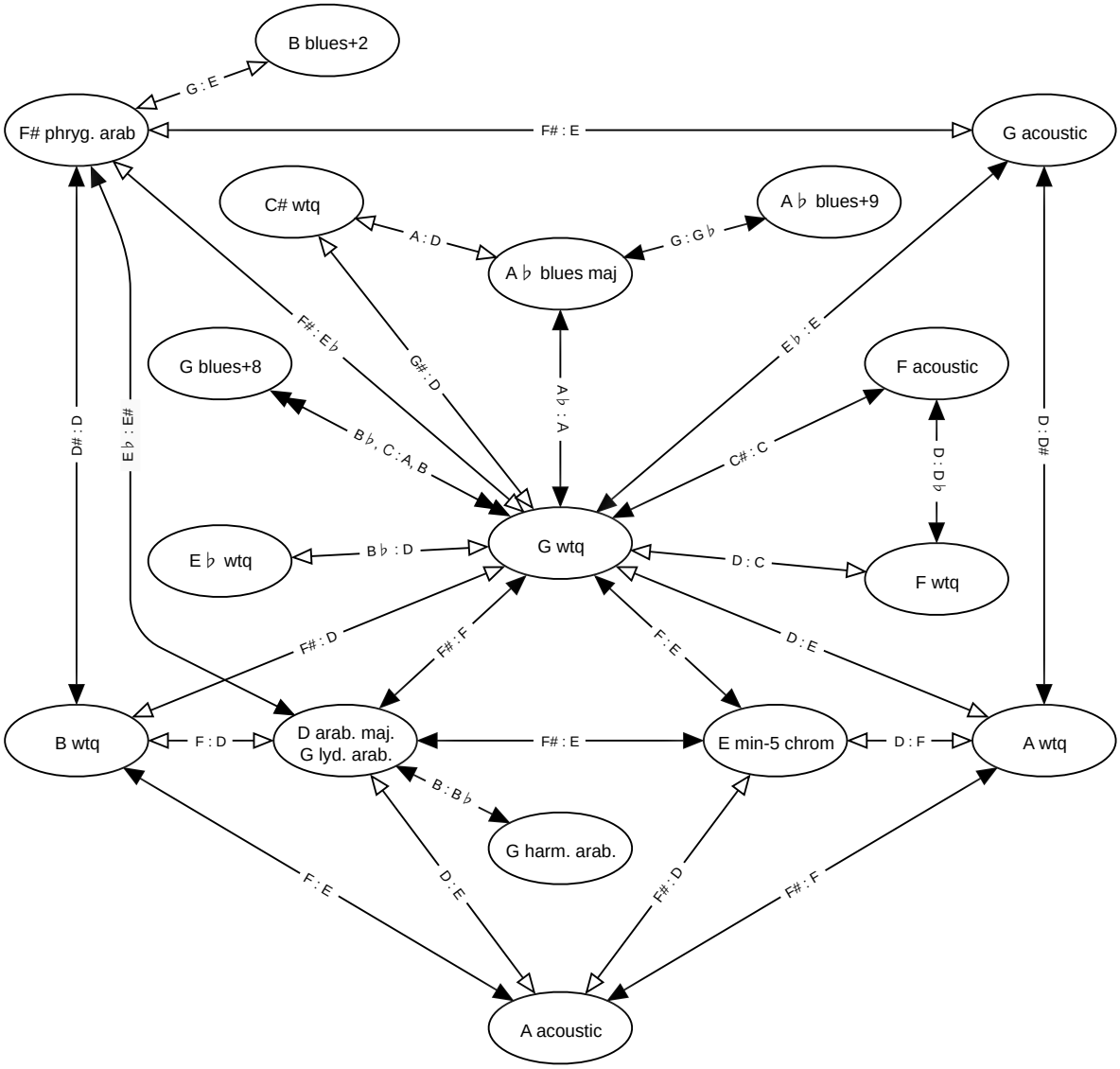
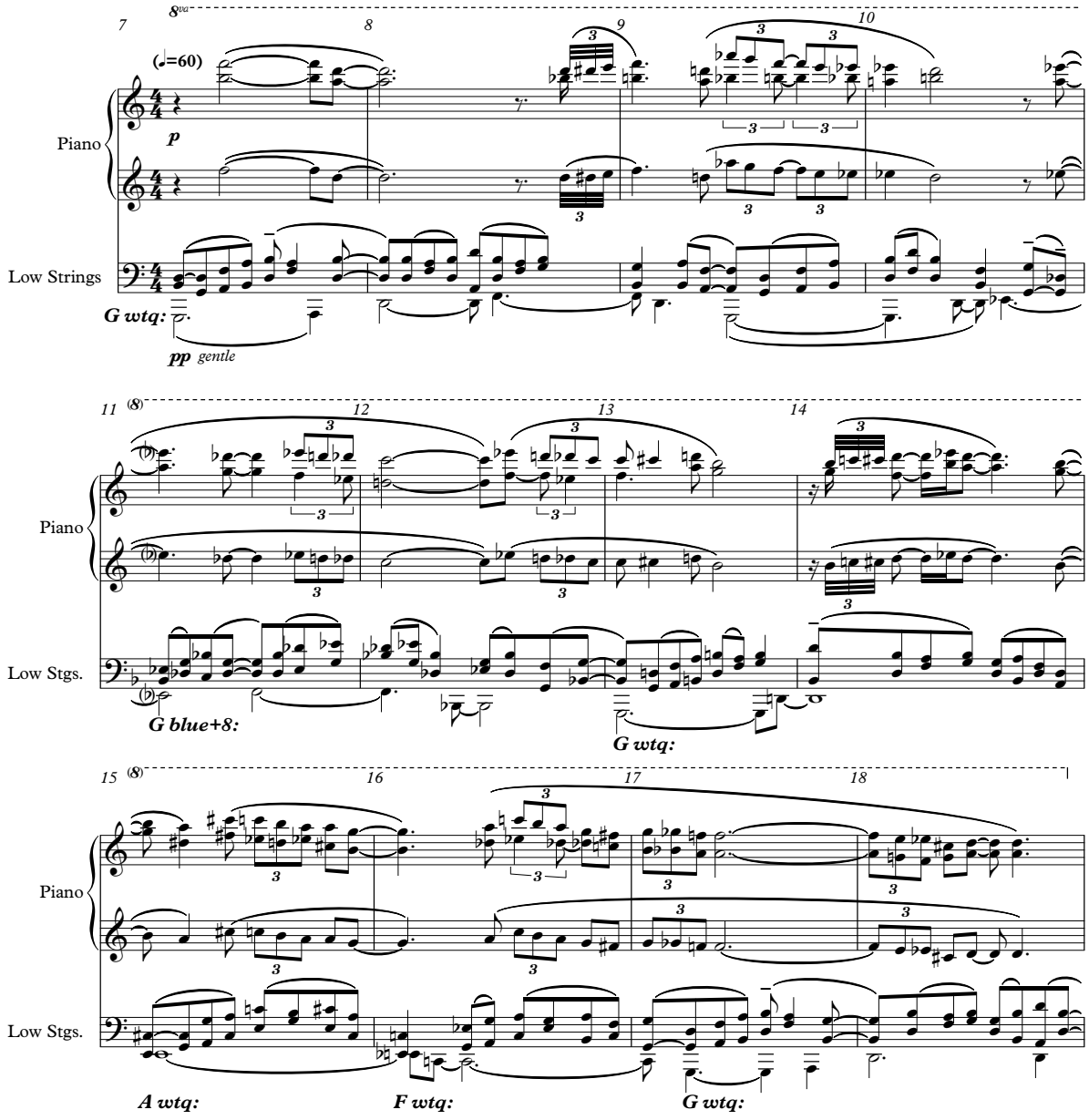


Figure 11: Scale Network for "River"

The network summarizes the relationships between the scales. Each line with a single arrowhead on the ends represents a maximally intersecting relationship. A double arrowhead means that the modulation requires two steps and results in an intersection of only five notes. Black arrowheads indicate maximally-smooth voice leading in the modulation. White arrowheads indicate that a scale degree is displaced in the modulation. The text on each line indicates the transformation required to modulate. Modulating from G wtq to A♭ blues major requires the transformation A → A♭. Modulating back from A♭ blues major to G wtq requires the inverse transformation: A♭ → A.

Types of Modulation in "River"

"River" employs scale modulations mostly of three types: maximally intersecting modulations; modulations between parallel modes; and modulations involving tonics related by fifths. A few modulations fall outside of these categories. The following example demonstrates parallel and maximally intersecting modulations:



Example 11: "River", bars 7-18

This first entrance of the soloist is after a gentle G dominant ninth accompaniment figure that is evocative of the slow and deep rolling of the Mississippi River. The piano theme was composed with this underlying structure in mind:

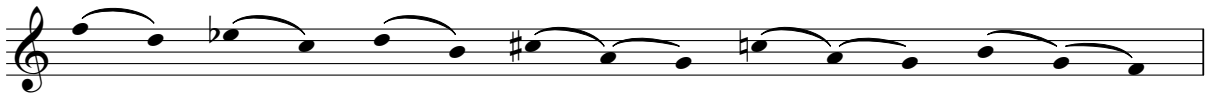


Figure 12: "River" Theme Structure[29]

Despite the decorative chromatic figures, the G wtq scale can be discerned from the underlying structure. The parallel modulation from G wtq to G blues+8 is a two-step shift executed by the addition of the B♭ and C♮ and loss of the A♮ and B♮. G wtq returns in bar 13, and a series of maximally intersecting modulations occur in bars 15, 16, and 17: to A wtq, then F wtq, and returning to G wtq.

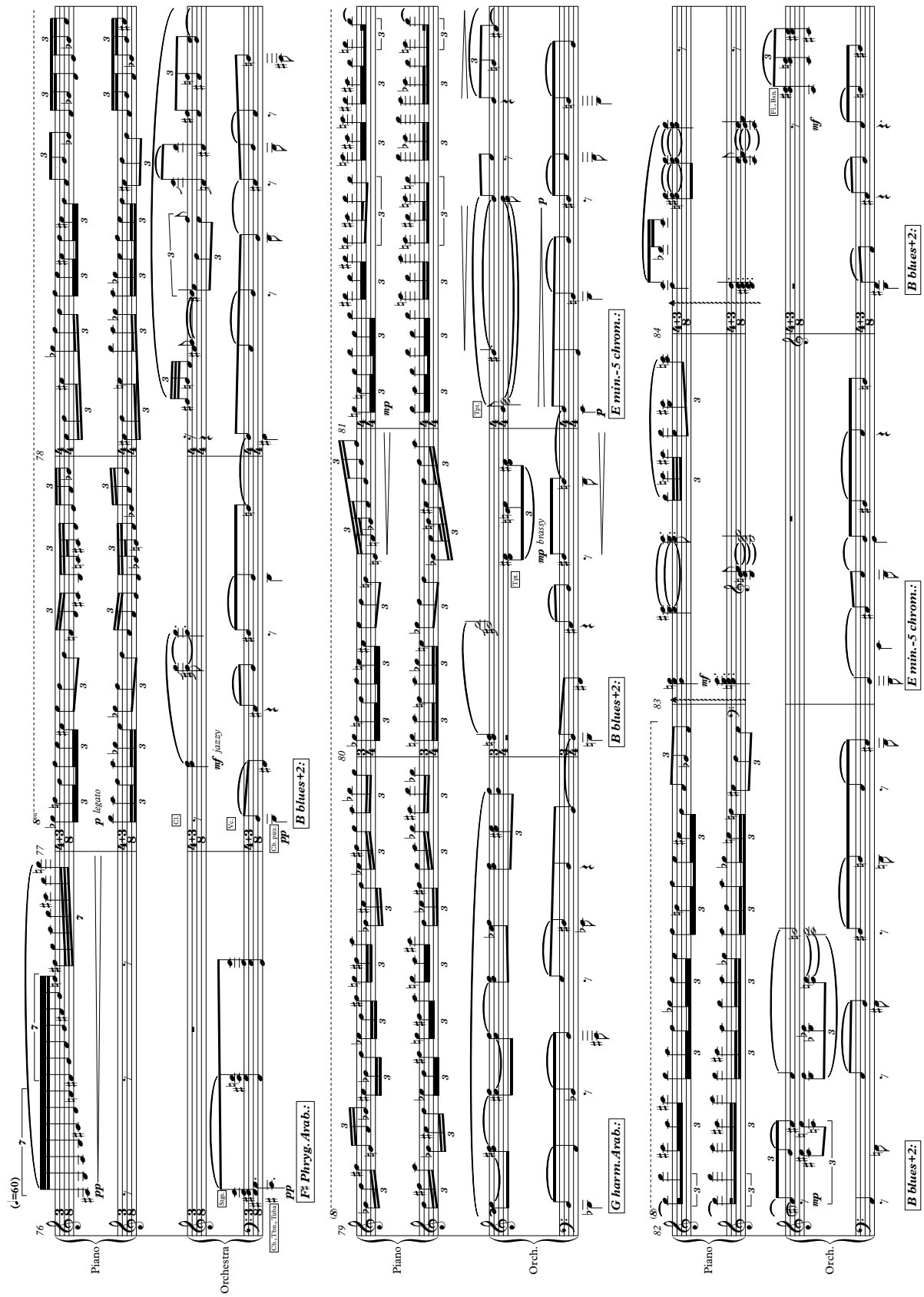
The treatment of modes in Example 11 differs from the treatment of modes in *The Nightingale and the Rose*. Rather than create harmonic movement with clearly delineated chords moving within a single mode, here each mode acts as a single harmonic wash, and each harmony change is marked with a modulation. Because the majority of tones within each mode are available to define this harmonic wash, I can create lines in the accompaniment figure that move easily and independently, shaping a sense of water currents. The unhurried harmonic rhythm evokes my impressions of the slowly changing river. The piano solo – chromatic, figurative, and a bit jazzy in nature – is slightly unpredictable and lazy in its movement. It takes 10 slow bars to traverse an octave and reflects the unhurried pace of life associated with the Deep South.

[29] Elements of this structure are used as the seed for the rotational arrays of "Breaking".

Example 12 below demonstrates modulation connected by harmonic or tonic relationships. Here I imagine a typical New Orleans street corner near the Mississippi River, where incongruent sounds mingle. The pizzicato contrabass, swooping clarinets, and bright trumpets parody the easy jazz paradigm underneath a busy triplet piano figuration of questionable industriousness. The cello echoes the river motion of the opening. The complexity of the scales and their modulations contribute to the sense of conflicting noises, yet there is a clear connection between the scales that harmonically unifies the section.

The piano run in bar 76 is an F♯ Phrygian Arabian scale that leads to bar 77's B blues+2 mode, the "home scale" for this section. This is the only maximally intersecting modulation in this example. The rest of the modulations are three-step modulations whose relative distances in common tones is appropriate to the incongruent mingling. Outside of this example, there is only one other three-step modulation in "River".

Bar 79 modulates to the G Phrygian Arabian scale with a treatment of the scale that is unique at multiple levels. This modulation is one of the few multiple-step modulations that are neither parallel nor related by fifth: the G minor tonic is heard as home within this scale. However, within the G Phrygian Arabian scale is a respelled F♯ major triad, [B♭ C♯ F♯], that asserts itself. In addition, the E♭ of the scale ($\hat{6}$) is at times clearly heard. The result is a complex mixture – a dominant triad and four chromatic neighbours (B♭ C♯ E♭ and G♮) to the B minor triad – striving to resolve to the tonic of the B blues+2 scale in bar 80.



Example 12: "River", bars 76-84

The modulations to and from the E minor-5 chromatic scales[30] in bars 81 and 83 are straightforward reflections of the tonic (B) and subdominant (E) relationship. Even though the modulations are three-step, the fifth relationship between the tonics strongly connects the two scales.

Octatonic Hexachord Subsets in "River"

The scale network of Figure 11 contains only seven-note scales, and the majority of "River" stays within these scales. However, there are three sections of "River" written with hexachord and octatonic approaches borrowed from my harmonic explorations for "Still". Scale networks may contain scales of all sizes, but in these sections I treat modulation differently than that assumed by a scale network.

Consider the relationships between the G wtq and six specific hexachords:

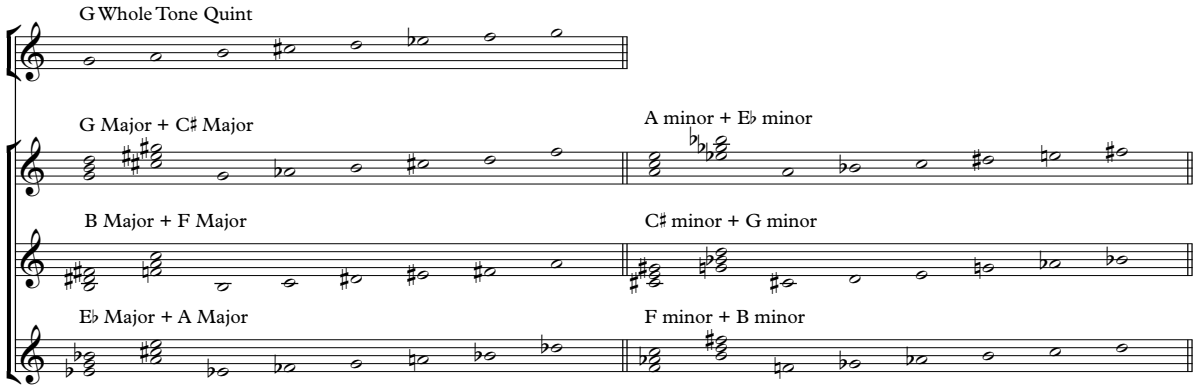


Figure 13: Hexachord and Whole-Tone Quint Comparison

Below the G wtq scale is a block of hexachords and the resulting hexatonic scales.[31] The first column of hexachords comprise stacked major triads a tritone apart (cf. Petrushka chord). The second column contains hexachords that comprise stacked minor triads a tritone apart. Each hexachord in the first column is the complement

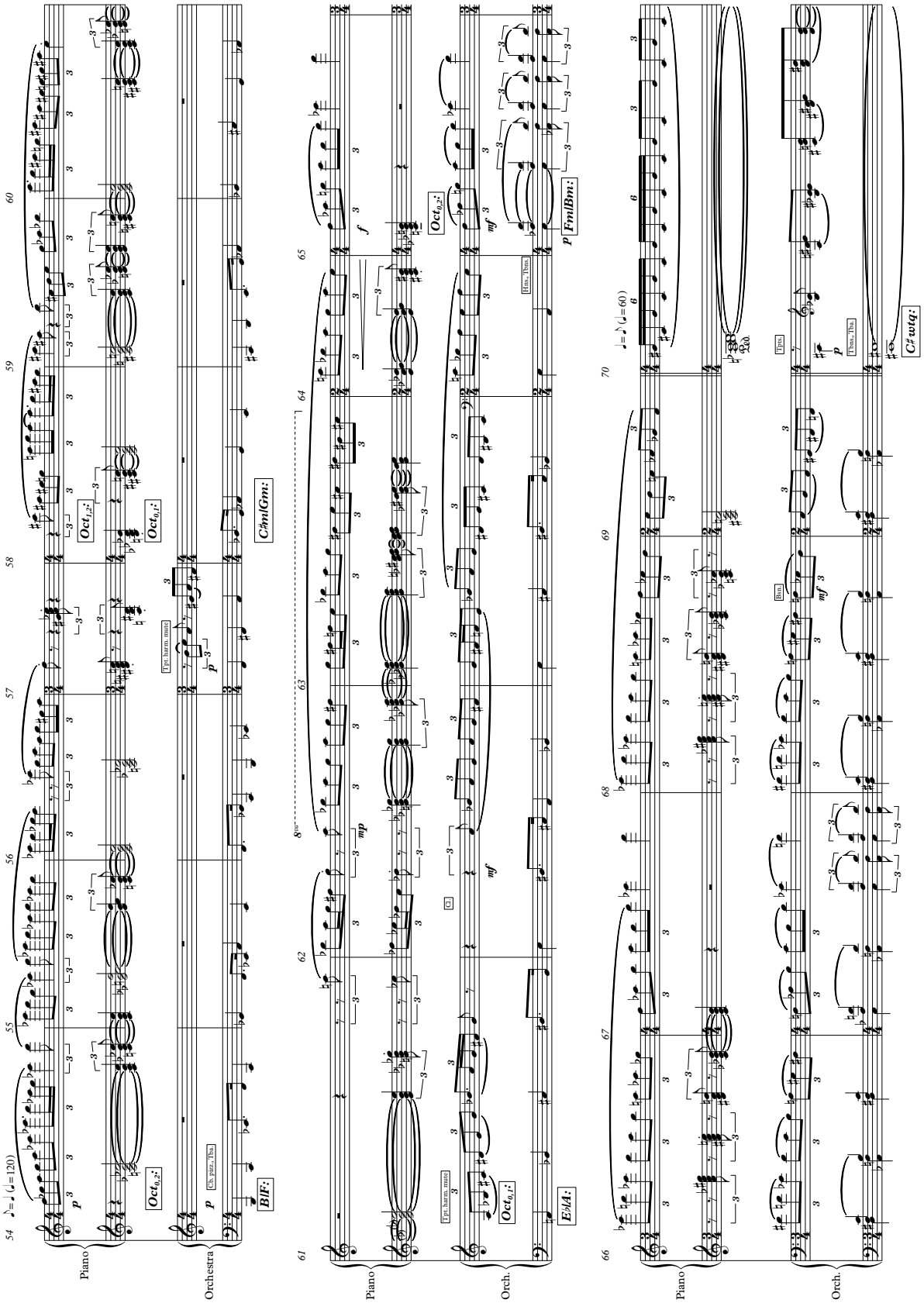
[30] See footnote 13 on page 6 regarding the suitability of calling this a true scale.
[31] I use *hexatonic* in its generic sense to mean any six-tone scale, not in the specific sense of a scale of alternating semitones and minor thirds. (Wilson)

of the hexachord in the second column. The hexatonic scales in Figure 13 above are the only six hexatonic scales used in "River".

The hexatonic scale derived from the stacked G and C♯ major triads (called G/C♯) maximally intersects both G wtq and C♯ wtq: five tones are in common. The A and E♭ minor hexachord (called Am/E♭m) is a complement to G/C♯; the two hexachords have zero intersection. Each of these hexachords is a subset of a distinct octatonic collection. The hexachords in the subsequent staves have similar relationships to WTQ scales and each other.

Example 13 below represents about half of the hexatonic bars within "River". Here I make a clear reference to the jazz heritage of New Orleans. The contrabass and tuba present a walking bass, and the piano offers an improvisatory treatment of the octatonic scale over syncopated seventh chords. In jazz nomenclature, the octatonic scale is called the *diminished scale*, and the left-hand voicings of diminished triads plus major sevenths pulled from the diminished scale is a common jazz accompaniment to this scale.[32]

[32] In jazz, these chords are sometimes considered to have dominant function, but I do not treat them as dominants. (Levine 1989, 76-81)



Example 13: "River", bars 54-70

The 10 bars prior to this example are unambiguous in their hexatonic assertions, but the octatonics in Example 13 supplement the hexatonic foundations. The walking bass stays within each of the hexatonic scales labelled in the example: B/F → C♯m/Gm → E♭/A → Fm/Bm. The piano and other instruments playing over the walking bass use the octatonic scale that is a superset of the active hexatonic. For example, in bar 54, with the walking bass in B/F, the piano makes use of all eight notes within $Oct_{0,2}$, a superset of B/F. When the walking bass shifts to C♯m/Gm, the piano right hand shifts to $Oct_{1,2}$, a superset of C♯m/Gm, however the left hand borrows notes from $Oct_{0,1}$, creating tension that is resolved in bar 61. All remaining octatonics in Example 13 are supersets to the active hexatonics.

The walking bass and improvisatory piano in bars 54-64 are stylistically convincing as jazz. Yet, to the best of my knowledge, the hexatonic nature of the bass line against the piano's octatonic has not previously been explored this way.

Table 4: Modulations in "River", bars 43-70

	Only Hexatonic Scales		All Active Scales	
Bar	**Transformation**[33]	**Scale**	**Transformation**[34]	**Scale**
43		A wtq		A wtq
45	A, D♯, (E) → G♯, D	G/C♯	A, D♯, (E) → G♯, D	G/C♯
49	*complement*	Am/E♭m	*complement*	Am/E♭m
54	B♭, E → B, F	B/F	E♮, B♭ → (2)5(8)E	$Oct_{0,2}$
58	*complement*	C♯m/Gm	0369 → 147T	$Oct_{1,2}$
61	G♯, D → A, E♭	E♭/A	258E → 0369	$Oct_{0,1}$
65	*complement*	Fm/Bm	147T → 258E	$Oct_{0,2}$
70	F♯, C, D → F𝄪, C♯, D♯, (A)	C♯ wtq	0(2)6 → C♯, F𝄪	C♯ wtq

[33] Notes in parentheses indicate extra scale degrees that are removed (left side of the arrow) or are added (right side of the arrow).

[34] Transformations into and out of the octatonic are represented by pitch class numbers. "T" represents pitch class ten, and "E" is pitch class eleven.

Unique to bars 45 to 69 are modulations that do not follow the conventions previously discussed. In Table 4, the first major column relates the modulations into, through, and out of the hexatonic scales used in "River": The second major column adds consideration of the octatonic scales.

The modulation from A wtq into G/C♯ is a relatively short two-step, maximally-smooth transformation that involves the loss of one extra tone (E). The modulation is further facilitated by the developmental nature of the music here: earlier musical gestures are reinterpreted within the G/C♯ hexatonic scale.

In contrast, the modulation to Am/E♭m is antithetical to the common tone approach of all previous modulations presented in this paper. The modulation from G/C♯ to the complement Am/E♭m is both dramatic – the ear recognizes the complete shift between hexachords with no common tones – and maximally-smooth: each tone from one hexachord shifts chromatically up or down to a tone of the next hexachord.[35] With this modulation is a sense of stepping forward.

To return to G/C# would be a musical step backwards. Instead, bar 54 makes a two-step shift to the B/F major hexachord. This is an optimal shift between scales of these two hexachord classes: there are no more than four common tones possible between any of the potential pairs. The transformation (B♭, E → B, F) is a Leading-tone exchange[36] for each of the triads involved: E♭ minor → B major and A minor

[35] In *"Still"*, some of my Russian inspired modes are closely related to these hexachord complements. *Chapter 6:* Modes Inspired by Yavorsky's Theories examines the voice leading that generates these modes and how this voice leading is closely related to the modulations between complements.

[36] A Leading-tone exchange is a transformation mapping a major triad onto a minor triad (and vice versa), where the two tones of the minor third are kept and the third

→ F major. The effect is a subtle shift in colour between the two closely related hexachords that does not disturb the forward motion of the previous modulation.

The series of hexachord modulations from bar 45 to bar 65 is sequential in nature:

G/C♯ → Am/E♭m →
B/F → C♯m/Gm →
E♭/A → Fm/Bm

This three-cycle sequence creates a sense of harmonically stepping forward three times – once for each of the complement modulations – and a triad root movement that walks the whole-tone scale from which the entire movement is derived: G A B C♯ E♭ F.

The net result is an intentional climb to a localized climax that begins at bar 70. However, the modulation from Fm/Bm hexatonic to the C♯ wtq in bar 71 would be a three-step transformation: only half of the hexatonic is comprised of tones common to C♯ wtq. This is far from optimal, and there is no potential claim of a parallel or fifth relationship that would smooth the transition.

The smoothness of this modulation is explained by the role of the octatonic scale at play. In bars 54 to 65, the octatonic scales are subservient to the hexachords emphasized melodically and harmonically by the bass and piano, and we hear the hexatonic modulations as primary. However, starting in bar 65, the piano and clarinet increasingly give equal time to all tones within the octatonic so that a full octatonic sound is prominent by the time bar 70's transition to C♯ wtq occurs. The

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tone moves by step. For example, the transformation between F major and A minor is a Leading-tone exchange. (Berry)

effect is a smooth modulation involving five common tones between $Oct_{0,2}$ and C♯ wtq, and the heightened energy of the previous 25 bars is undisturbed upon exiting this extended hexatonic area.

I have examined how Tymoczko's approach to scale networks has influenced my choice and design of the modes I used in both *The Nightingale and the Rose* and "River". I showed how the Whole-Tone Quint scale can alternate between a strong grounding in tonality and floating through the whole-tone. I created for "River" a sizeable and diverse network of closely related scales. Considerable discussion has focused on the modulation between my modes, and I have used some of Tymoczko's metrics (the size of the intersection and the smoothness of the voice leading) to discuss how the modulations support the intended affect of my music. I expanded Tymoczko's approach to modulation to include discussion of parallel modulation and modulation by tonic relationships, and I used these as justifications for the success of many multiple-step modulations.

Harmonically speaking, "River" represents some new areas of growth. Working with new synthetic modes has opened a variety of new colours. For much of the work, the harmonic motion is defined not by individual chords but by modulations between different scales. Still, my modes frequently functioned more as colourful variations of traditional harmonic relationships instead of radical breakthroughs in how I approach harmony.

To break beyond my traditional approach to harmony, I needed completely different tools. Below I discuss the first of these tools I explored – rotational arrays – and how it relates to my use of modes.

Chapter 5: Rotational Arrays as a Derivative of Mode

Introduction

"Breaking" is likely the most emotional work I have written, and understanding the context of the movement is useful in my discussion of rotational arrays. The program notes I wrote for the "Breaking" explain:

> *As Hurricane Katrina passed by New Orleans, storm surges pushed water from the river and lake into the canals that cross the city. While the rising water overtopped some levees, it was the seven catastrophic levee failures within the city that overwhelmed the city's pumping stations and prevented New Orleans from completely draining the floodwaters for nearly a month. Although the levees were designed to resist water at levels much higher than those Katrina pushed into the city, the Army Corps of Engineers eventually conceded that the levees were never built nor maintained to those design specifications. Tests that demonstrated the appropriate design strength were either misinterpreted or ignored, money was pinched, and many fingers were pointed in the flooding's aftermath. As it turns out, the 2005 New Orleans flood was not a natural disaster: it was a man-made disaster that killed a thousand or more New Orleans residents and cost over $100 billion.*
>
> *The second movement is not about the tragedy and pain of the flood, as originally intended. It is more an expression of the anger that grows with awareness of the extent that human decisions — whether by error, apathy, or intentional malfeasance — played a role in this disaster.*

The arc of the work is inspired by the timeline of events associated with Hurricane Katrina. On 28 August 2005, at 12.40 a.m. (Central Daylight Time), Katrina was far offshore and declared a category 4 hurricane. On 30 August, around noon,

martial law was declared in New Orleans. These two events were mapped onto a musical time period of five minutes – the originally intended length of "Breaking" – at a tempo of ♩ = 120.

On 29 August, between 6.30 a.m. and 9.00 a.m., there were seven catastrophic failures in the levees protecting New Orleans.[37] This maps to near the 2'30" mark in my music. Up to this point, "Breaking" has been climbing in intensity. At bar 77 (rehearsal J), which exactly correlates to the moment (6.00 a.m.) when water first topped some of the levees in New Orleans East, the music dramatically changes character. Following shortly are seven full orchestral *fortissimo* hits symbolizing the seven levee failures, the last hit falling on the 9.00 a.m. mark. The coordination of the levee failures to my music is the only place where I carefully matched the time frames. The music that follows symbolizes the rising waters and the chaos within the city. The ending is a raw expression of anger.

Rotational Array for "Breaking"

To generate material for "Breaking", I used rotational array techniques modelled after those applied by Oliver Knussen for *Flourish with Fireworks*.[38] In *Flourish with Fireworks*, Knussen's treatment of the material generated by his five-note row and the resulting rotational arrays is deeply engaging, yet it has enough transparency that the listener can immediately connect to the motivic elements involved and hear the harmonic language at work. My goal was to match that same level of transparency and engagement.

[37] These times are estimates deduced from a combination of first-person accounts and stopped clocks of flooded houses. (Nelson 2015, 37)
[38] (Anderson 2002)

I connect the material for movement 2's rotational arrays with the material from movement 1. The row I chose and its generated array are shown in Figure 14 below.[39]

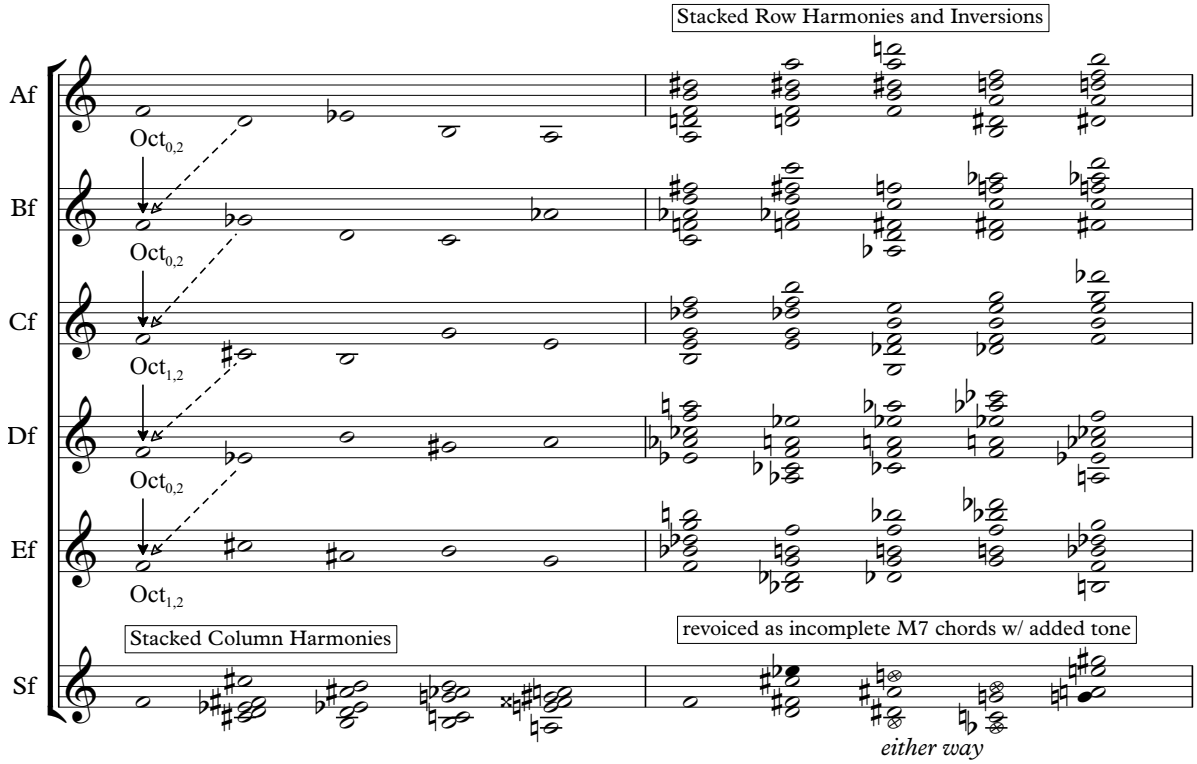


Figure 14: Rotational Array for "Breaking"

The prime row has five notes: F D E♭ B A. A few key characteristics of this row's derivation stand out:

a) The entire row is of the G wtq scale.

b) There are no duplicate notes.

c) When arranged in order of pitch, the resulting ordered collection is NCS compliant. (Including a C♯ would have created two consecutive semitones.)

[39] The staff labeled *Sf* is explained in "Stacked Columns in the Arrays" on page 55.

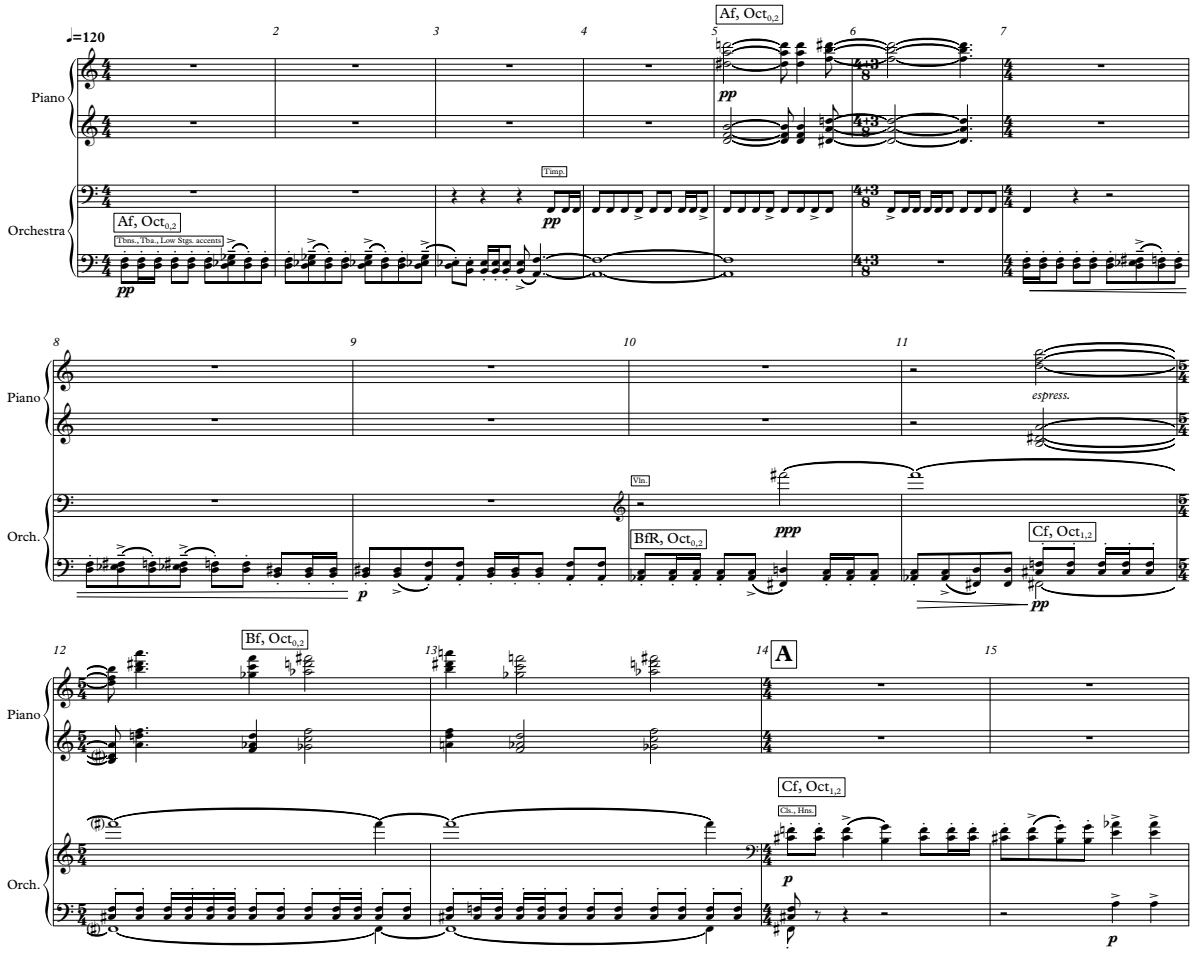
d) Sequentially, it is the first five notes of the opening melodic structure within "River" (Figure 12) that collectively meet the above criteria.

e) The entire row is of the $Oct_{0,2}$ scale.

Constraining this row to the G wtq scale and deriving its sequence from the opening theme of "River" connect "Breaking" to the previous movement. Other rows I tried also had connections to "River", although not always in the same way. That this row has no duplicate notes and is NCS compliant is largely a byproduct of my experimentation: of the nineteen rows that I explored, this one best offered an interesting melodic shape and an appropriate balance of consonance and dissonance in the resulting harmonies. Limiting the row to the octatonic scale was not a requirement I predefined, but it is a characteristic that is heavily utilized in "Breaking" and discussed further below.

As illustrated in Figure 14, the row is rotated in the traditional manner. I label each of the rows generated by the rotation *Af* through *Ef*. The letters A to E indicate a specific rotation of the row, and the *f* indicates that each of the rows is transposed to start on pitch class F. The second bar of each row shows the *stacked row* harmonies for that row. The initial chord, comprised of the row's five notes, is an open voicing spanning roughly a twelfth. Each successive chord is a different inversion of the first chord. The voicing and inversions shown here are the same voicings used by almost all of the piano's vertical harmonies.

Application of the Rows



Example 14: "Breaking", bars 1-15

Like Knussen, I use the generative cell as a loose map of pitch centres for the entire movement. At the local level I employ a more flexible application of the rows: row statements may begin anywhere within the cell, cycle in sequence, end anywhere, and temporarily be interrupted by restatements of prior material. This enables more control of melodic lines and, perhaps of greater importance, the ability to develop the work's energy with rhythmic repetitions of musical fragments. In the opening of "Breaking" (Example 14), partial row repetition is key to the character of the rhythmic brass. The piano's melodic gesture in bar 13 restates notes from both *Af* and *Bf* and is used to close the phrase.

To create cohesion and facilitate the soloist's performance, most piano voicing comes directly from the voicing of the stacked harmonies already discussed. The piano chords in Example 14 can be found within the generated arrays shown in Figure 14. Bar 5, beat 1, is voiced the same as *Af*, stacked row 3. Bar 6 is voiced as *Af*, stacked row 1. The row gives the melody, and the stacked row gives the harmony that fits underneath a particular note.

Tension is created when the octatonics of two rows clash. In bar 11, the trombones begin a rhythmic pattern using the first two notes of *Cf*, which belongs to the $Oct_{1,2.}$ At the same time, the tuba and violin hold the F♯ from *BfR*, and the piano continues unfolding its statement of *Af* and *Bf*. *Af* and *Bf* belong to the $Oct_{0,2}$, and the tension between the clashing octatonics foreshadows the nature of this movement. At bar 14, the piano pauses, ending the $Oct_{0,2}$ clash, and the *Cf* statement in the horns and clarinet continues without tension.

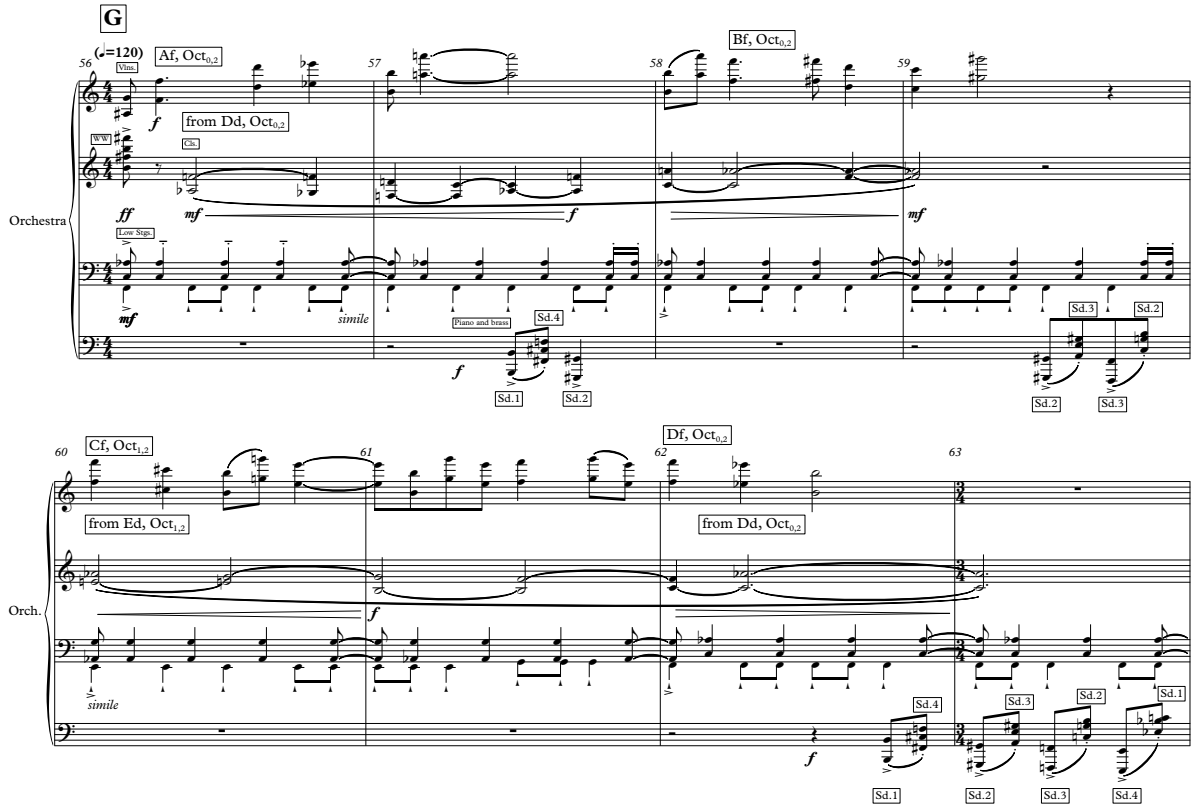
Stacked Columns in the Arrays

In Figure 14's rotational array, the first bar of the last staff (labelled *Sf*) shows the *stacked column* harmonies from the array. These harmonies are generated the standard way: all of the first notes of each row are collected into the first chord, all of the second notes of each row into the second chord, and so forth. Duplicate notes are removed.

In the second bar of *Sf*, I have revoiced each chord as an incomplete major 7^{th} chord with an added-tone placed above or below the chord. The closed noteheads indicate the added tone, and the open noteheads indicate the tones that are from the major 7^{th} chord. Noteheads with a cross indicate that the note can be considered the added tone or part of the major 7^{th} chord.

This entire rotational array is used in five different transpositions: one for each note of the original row (F D E♭ B A). The suffix note name for each label (*Af – Ef, Sf*) is changed to match the transposition (e.g., *Af*, *Aᘔ*, *Aeᘔ*, *Ab*, and *Aa*). The complete set of rotational arrays is contained within the appendix on page 86.

The stacked rows, which are not subsets of octatonics or WTQs, are used only occasionally within "Breaking". In the following example, the piano and brass unfold the *Sᘔ* harmonies as articulation for the neoromantic treatment of the rows *Af - Df* in the violins and accompaniment.



Example 15: "Breaking", bars 56-63

The bottom staff in Example 15 uses the harmonies of *Sᘔ*. I label the source of each harmony with *Sᘔ.1* to *Sᘔ.4* to indicate which of the four *Sᘔ* harmonies is being used. Each of the *Sᘔ* harmonies has four voices, and I separate them into two separate lines of music. The bass line is played sequentially by the octaves in the piano and

brass. The top three voices are played in reverse order, from the fourth chord to the first chord. These two separate threads of music are alternated to create the figures seen in the piano and brass. Rehearsal G is the beginning of a lengthy crescendo in energy that culminates just before the point marking the levee breaks. The long arcs of the violin lines bring imagery of strengthening winds. The stacked columns of *Sθ* do not share a scale with any other material, and the accents offer a harsh independence evocative of the violence of the storm.

Transposed Stacked Rows in "Breaking"

One final transformation is used to generate potential harmonies. For each set of stacked rows within a given row rotation and transposition, the inversions are all transposed to the first note of that iteration of the row. Figure 15 demonstrates the transposition for the row *Af*.

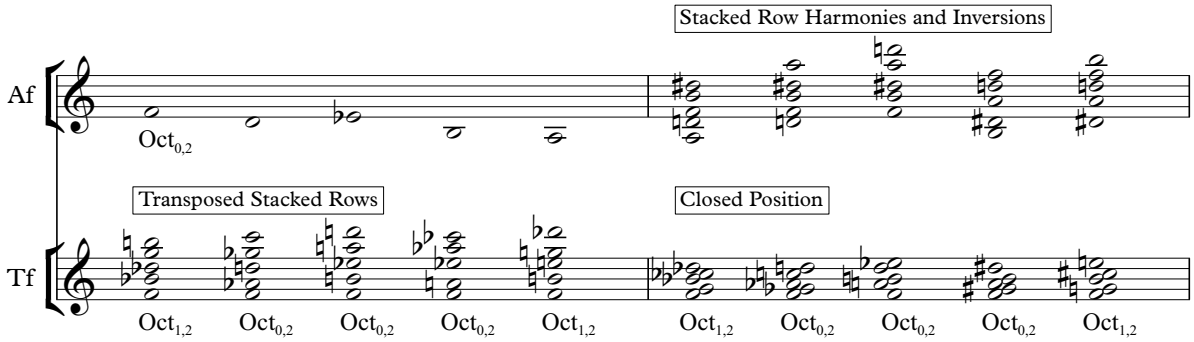


Figure 15: Transposing Stacked Rows

In Figure 15, *Tf* shows each inversion of the stacked rows transposed to bass note F. For convenience in reading the collection, the second bar in *Tf* shows the same harmonies of the first bar revoiced into closed position.[40] There are five distinct sets of stacked-row transpositions (*Tf – Ta*), one for each note of the original row. All five are included at the end of the appendix on page 86.

[40] The specific voicing of the closed position has no relevance to how *"Breaking"* was composed.

Within "Breaking", the process of generating rotational arrays and harmonies parallels my understanding of Knussen's process for *Flourish with Fireworks* with one exception. When Knussen generated his stacked-row harmonies, he maintained the same relative registers for each note of the row. Thus, his five-note row generated stacked-row harmonies that look like this:

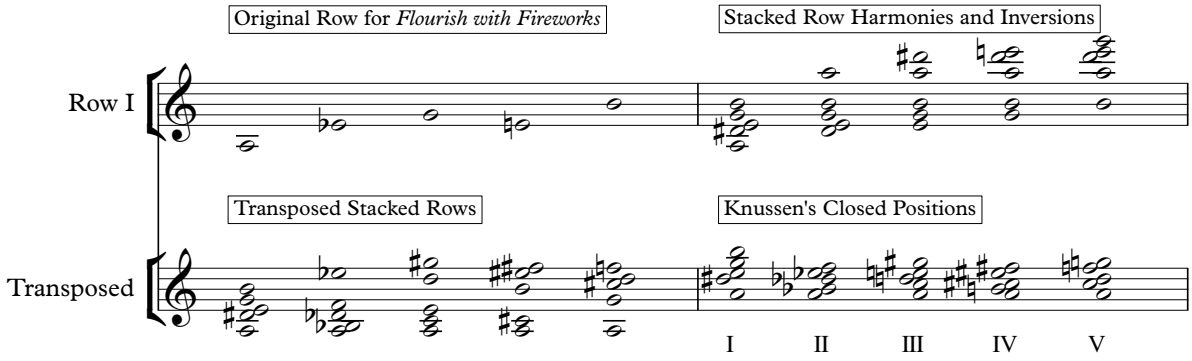


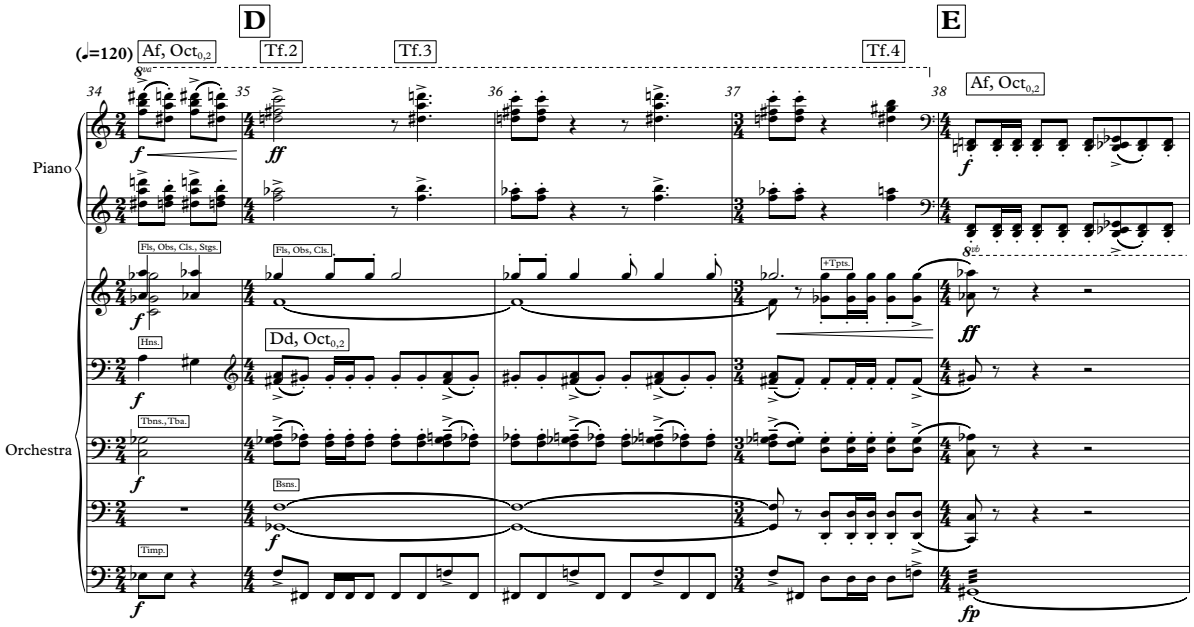
Figure 16: Stacked Rows of *Flourish with Fireworks*

Compare this with Figure 15, where my stacked rows are voiced differently from the original registers of the row's notes. Consider the implications of the differences:

- **Voicing:** In my analysis of *Flourish with Fireworks*, I did not note any harmonic moments where Knussen intentionally maintains the same voicings as shown above. In contrast, my choice of voicing plays a large role in the piano part of "Breaking" (see the discussion about Example 14 starting on page 54).

- **Order of Transpositions:** The choice of voicing for the stacked rows affects the order of the bass notes in the sequence of inversions, and the order of the bass notes directly defines the order of transpositions of each harmony. Thus the order of the transposed stacked harmonies in *Flourish with Fireworks* is determined by the register of each note in the original row, and the order in "Breaking" is determined by the voicing I chose for the stacked rows.

If the order of the transposed stacked-rows were not significant in either work, than this difference of process would be of no consequence. However, both works do utilize the harmonic progression generated by this order. In *Flourish with Fireworks*, shortly after rehearsal E, Knussen treats the sequence of chords above (labelled I – V) as a chorale to accompany the melody.[41] Likewise, there are a couple of areas in "Breaking" where the transposed stacked-rows are iterated in their original sequence. Example 16 below offers one such spot.



Example 16: "Breaking", bars 34-38

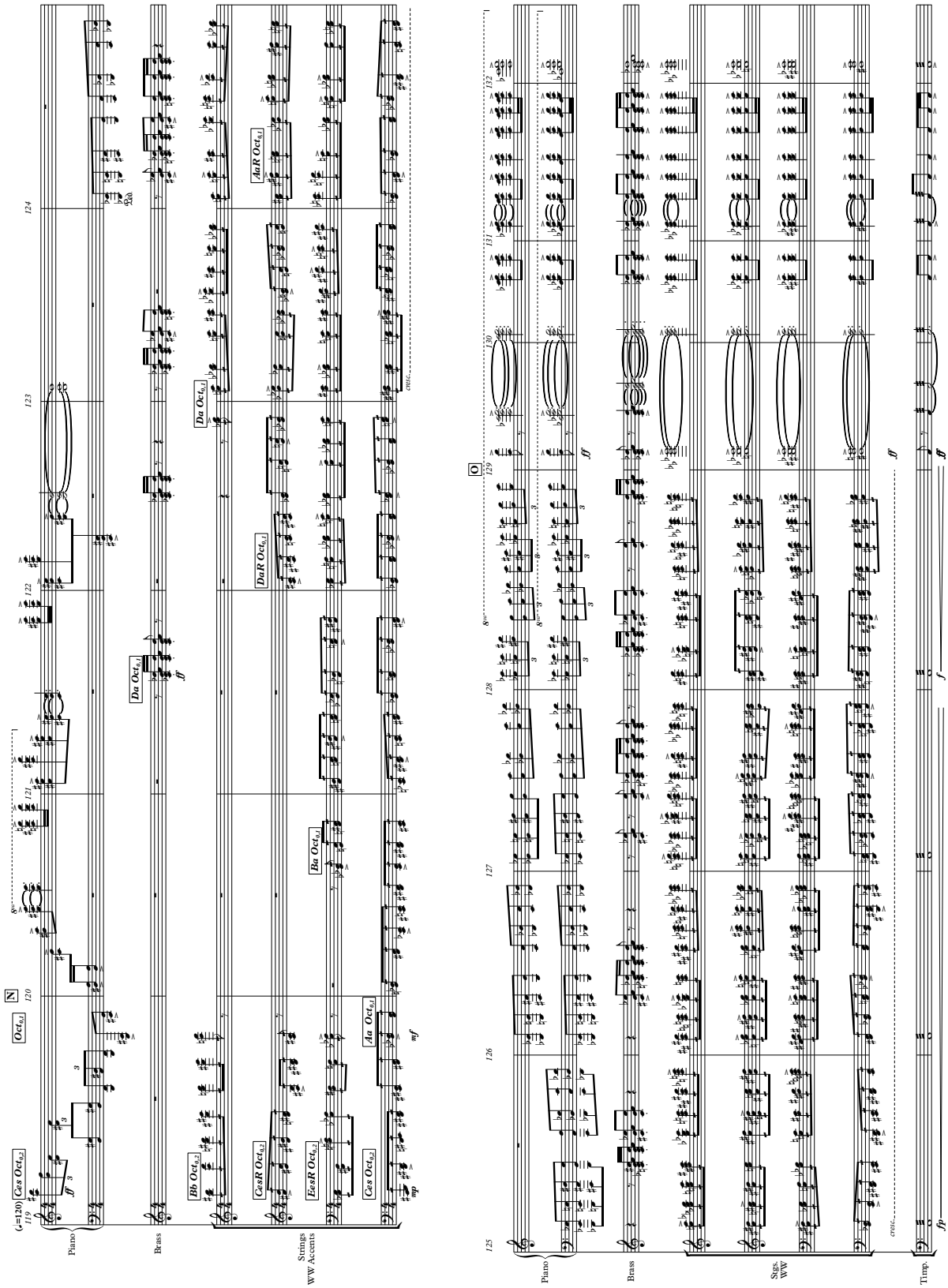
This is a local climax of a musical line of thought initiated in bar 1. For some time, the piano has dominated the scene, and this is the last climactic exclamation before the piano moves to an accompaniment role. In bar 35, the piano articulates with chords from the *Tf* sequence: *Tf.2*, *Tf.3*, and, after a few reiterations of those two, *Tf.4*.

[41] (Anderson 2002, 4)

Octatonic Implications of the Rows

As mentioned before, row *Af* is contained within $Oct_{0,2}$. By extension, each transposition, rotation, and stacked-row is also contained within an octatonic. Because the octatonic is a mode of (very) limited transposition, there is significant overlap of the containing octatonics. Of the 25 iterations of the row, thirteen iterations are of $Oct_{0,2,}$ six are of $Oct_{1,2,}$ and six are of $Oct_{0,1.}$ The 25 chords of the stacked-row transpositions share an identical distribution of octatonics. Within each transposition of an array (e.g., *Af – Aa*, or *Cf – Ca*), there are three rows of one octatonic and two of the octatonic two semitones higher. Each set of transposed stacked-row harmonies shares a similar distribution. Using a generative cell that is a subset of a mode of limited transposition enables the application of a cohesive harmonic idiom based upon that mode.

Example 14 on page 54 demonstrated layering rows and harmonies of incompatible octatonics to create increased dissonance and tension. Example 17 below shows the climax of "Breaking", just before the piano cadenza, and demonstrates other ways the octatonic relationship is utilized. At this point in the music, the levees are long breached, and prominent is the rising water figure in the strings, first introduced in bar 102. With each reiteration of this extended strings gesture, more voices are added, the range is increased, and the dynamic level is raised. The brass accents impart the violence and danger of the tragedy, and the piano is expressing panic with its arpeggios and block chords over the entire range of the instrument.



Example 17: "Breaking", bars 119-132

In this section, each of the rows that are being used at any moment shares the same octatonic superset. Just before rehearsal N, $Oct_{0,2}$ is the active collection. Starting at N and continuing to the end of the climax, $Oct_{0,1}$ is the active collection. The coordinated shifts of the octatonic supersets offer clear harmonic direction to the rising water, even while the simultaneous melodic and accented iterations of multiple rows create complexity and excitement.

Both the brass and piano pull their harmonies from stacked rows. A more complex process, where notes from the active octatonic are added to supplement or thicken the music from the active rows, creates the string figures. Figure 17 below demonstrates the process.

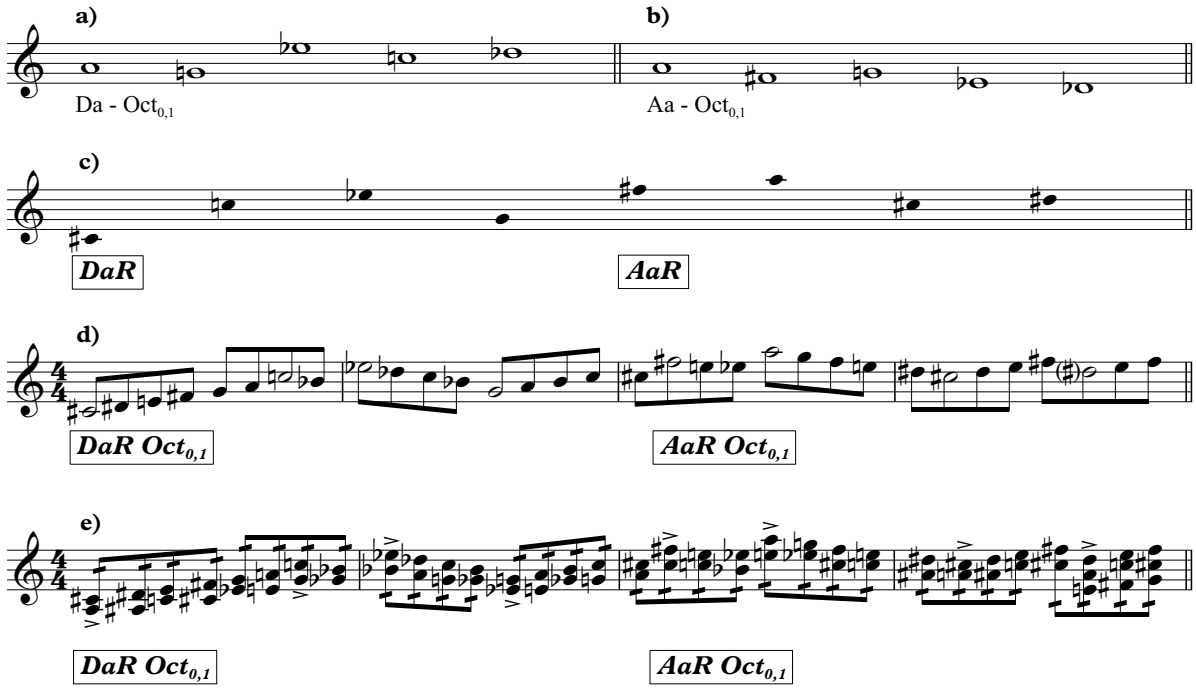


Figure 17: Building the Rising Water Figures in "Breaking"

In Example 17 (page 61), bar 122, a new rising water figure starts in the second staff shown in the "Strings" section. It is marked as using notes from *Da* retrograde (*DaR*) and *Aa* retrograde (*AaR*). Figure 17 demonstrates how these four bars were created. From the source rows (Figure 17a and Figure 17b) the notes for the rising

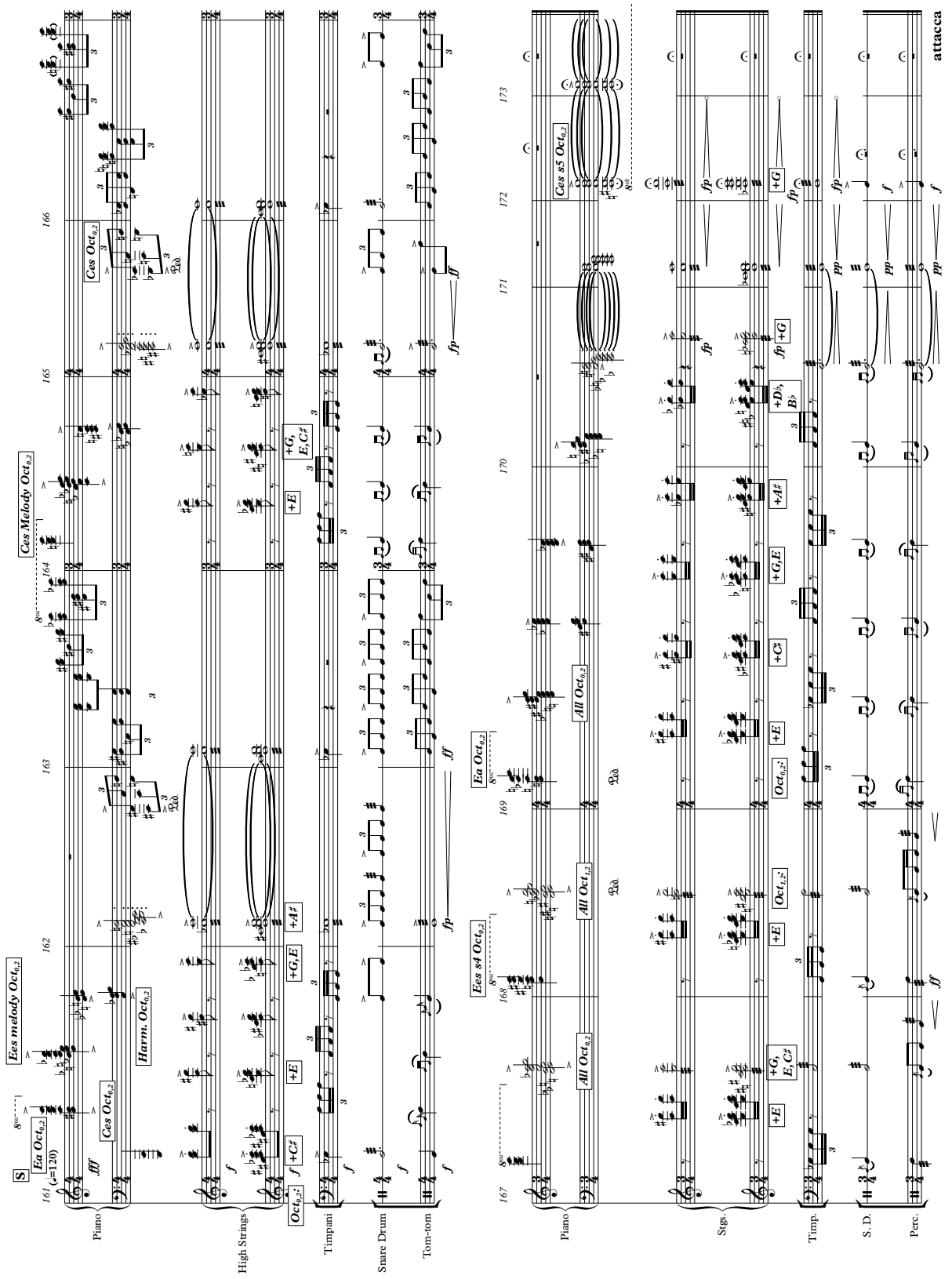
water line are chosen (Figure 17c). Figure 17d shows the melodic gaps filled in with scalar material from the prevailing octatonic, $Oct_{0,1}$. At each note originating from the rows, the melodic line reverses direction to emphasize that note.

This phrase is from the third statement of the rising water gesture, which requires a thicker texture than the previous gestures. Each melodic line is thickened with one or two parallel lines. To double the line, a scalar fourth is added underneath each note in the original rising water line. In the octatonic, a scalar fourth is either an i.c. 4 or i.c. 5, so a scalar run of the rising water line generates dyads alternating between i.c. 4 and i.c. 5. Using scalar thirds or fifths would have created a run of identical intervals, and the flowing imagery would have been diminished. The first three bars of Figure 17e show the parallel scalar fourths and their alternating sizes.

To generate the third line, a scalar eighth underneath the original melody is added. This creates an alternating i.c. 10 and i.c. 11 pattern, as shown in the last three notes of Figure 17e. In "Breaking", the original notes of the row are accented in the strings and doubled by the woodwinds. Accenting the notes of the row so that they are clearly audible helps maintain cohesiveness and adds energy to the rising water figure. Constraining the added notes to the same octatonic maintains the harmonic motion of the rising water gestures.

Intentional Clashing With the Prevailing Octatonic

"Breaking" ends with a full expression of anger that begins with a very rhythmic solo piano section climbing in energy and register. Percussion emphasizes the rhythmic anger with a three-part canon, and long tone octatonic clusters in the high strings (foreshadowing the clusters of movement three) add to the tension by straying out of the prevailing octatonic scale.



Example 18: "Breaking", bars 161-173

Example 18 shows the final outburst of anger within "Breaking", where the piano traverses the complete range of the piano five times before crashing into the lowest two octaves. The notes of the strings' high tremolos and accents that are outside the prevalent octatonic are labelled with a "+". These extra tones create a strong dissonance and grating that exceeds anything prior in the movement and prepares for the stark contrast of the *attacca* entrance to "Still".

Conclusion

Fundamentally, "Breaking" is a rhythmic work, which I believe is appropriate for the subject of the movement. This was the first time I had worked with rotational arrays, and I will use this tool again in future compositions. The freedom from functional harmony enabled me to focus on rhythmic development, large-scale motion of energy, and the expression of deeply felt emotions. Working with a row that fits within the octatonic offered many unexpected opportunities in the design of my piece, and the implications of using rows within modes of limited transposition is worthy of future exploration.

In the next section I discuss my final manipulation of modes: processes inspired by early twentieth-century Russian music theory. The modes I discuss below share many similarities with the hexachords discussed in "River", but the process used to generate the modes within "Still" suggests a different underlying structure of the modes, and hence a different treatment in the music. "Still", the third movement of *Currents*, fully embraces the practice of harmonic movement by shifts in modes or collections and represents to me the full achievement of my goal to break my reliance on principles grounded in common practice.

Chapter 6: Modes Inspired by Yavorsky's Theories

Boleslav Yavorsky's Theories on Mode

Roughly 50 years after some of Stravinsky's most influential works, Arthur Berger published his paper "Problems of Pitch Organization in Stravinsky".[42] There he attempted to define a new theory about Stravinsky's music and, in the process, coined the term "octatonic". In contrast, in as early as 1906 Russian music theorist Boleslav Yavorsky (1877–1942) was documenting theories that would influence modern Russian music theory and would be applicable to the music of Rimsky-Korsakov, Scriabin, Stravinsky, and Prokofiev.[43]

Yavorsky developed a complex theory that was further refined by his student Sergei Protopopov (1893 – 1954) and late twentieth-century Russian music theorist Yuri Kholopov (1932–2003).[44] The concept of "mode" (*lad*) in Russia was expanded beyond the traditional Western definition to incorporate ideas from these theories,[45] and *lad* now roughly translates to *tonality*.[46] In the context of Russian music theory, I only will be discussing pitch classes, and my use of the term "mode" will refer to pitch class collections and the relationships between the included pitch classes.

In his theories, Yavorsky came to the conclusion that voice leading, as in the context of note tendencies dependent upon vertical and horizontal intervals, was to be replaced with *pitch leading* and *pitch gravitation*. The "resolution" of the tritone would become the predominant force of defining pitch gravitation within a "mode", and

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[42] (Berger 1963)
[43] (Ewell 2012, sec. 2.7)
[44] I have found relatively few sources about Russian music theory written in English. A complex yet comprehensive source is Gordon McQuere's translation of Protopopov's text *The Elements of the Structure of Musical Speech*. (McQuere 1978)
[45] (Ewell 2012, sec. 2.1-2.3)
[46] Philip Ewell, e-mail message to author, 29 February 2016.

pitch leading is how pitches move, typically along these gravitation paths. Some explanation is in order.

In Yavorsky's theories, the resolution of the tritone is the primary cell used to create his modes.[47] He defines the two systems shown in Figure 18: one where a tritone resolves to an i.c. 4 or i.c. 8, and one where a perfect fifth resolves through a perfect fourth to an i.c. 3, or the inverse of the intervals resolve to an i.c. 9:[48]

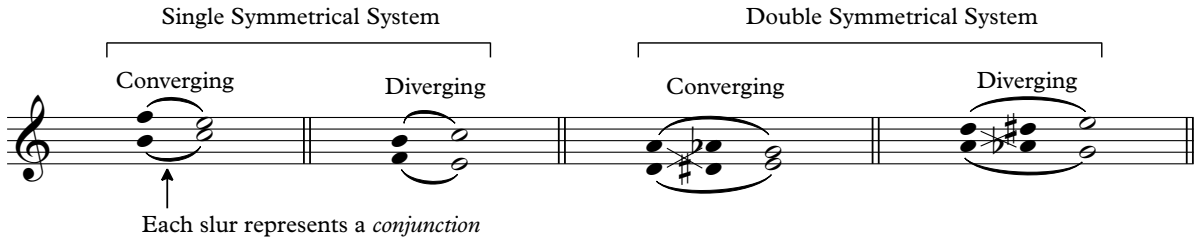


Figure 18: Tritone Resolution Systems in Yavorsky's Theories

Open noteheads represent stability; closed represent instability. The two or three-note path from an unstable tone to a stable tone is called a *conjunction* and is marked with a slur. Pitch gravitation follows conjunction paths from instability to stability.

These systems are the building blocks for Yavorsky's modes. They can be combined in as many ways the octave will allow to create collections where a pitch class is either stable or unstable. The stable pitch classes within a mode are collectively known as the *tonic*, and the unstable pitch classes are collectively known as the

[47] I do not detail Yavorsky's derivations and classifications related to this process. Philip Ewell offers a succinct yet more comprehensive introduction. (Ewell 2012)
[48] Yavorsky argues that the tritone cross-relationship in the movement between the two perfect intervals supports his theory of the tritone being the predominant force. The cross-relationship is marked with lines in the diagram. Ewell does not see musical justification in this argument. (Ewell 2012, sec. 2.8, 2.15)

connecting moment. Consider the mode that Yavorsky calls the *Duplex-Major Mode*, the manifestation of the Petrushka chord:

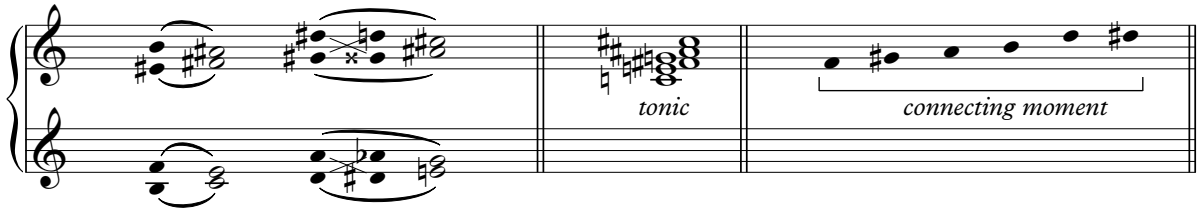


Figure 19: Yavorsky's Duplex-Major Mode

When the mode is laid out as a scale, the conjunctions can be graphed to show the pitch gravitations moving from the closed noteheads to the open noteheads:

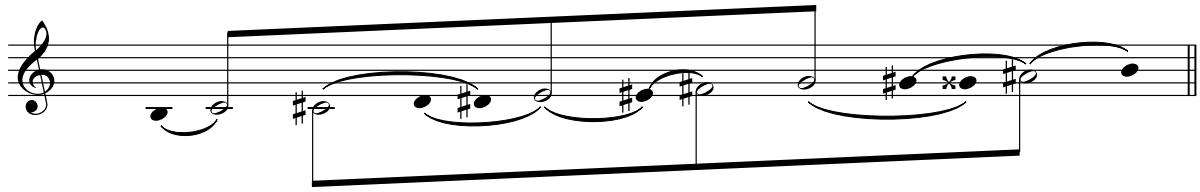


Figure 20: Yavorsky Pitch Gravitations

Pitch gravitations are an expanded concept of the $\hat{7}$ and $\hat{4}$ pitch tendencies within diatonic scales, and their function underlies the perception of stability in the *laɗ*'s tonic. When design of the mode and pitch gravitations are considered, an analysis of music such as Stravinsky's can be more nuanced than an octatonic-based analysis.[49] Inversely, Yavorsky's theories offer an alternate approach to harmonic and melodic thinking in composition.

The Mode for "Still"

This introduction to Yavorsky's theories is necessarily brief and extremely incomplete, yet it is sufficient to demonstrate the influence within "Still". The

[49] (Ewell 2012, sec. 5.6-5.9)

predominant source of harmonies within "Still" comes from a Yavorsky inspired mode derived from the C wtq scale:

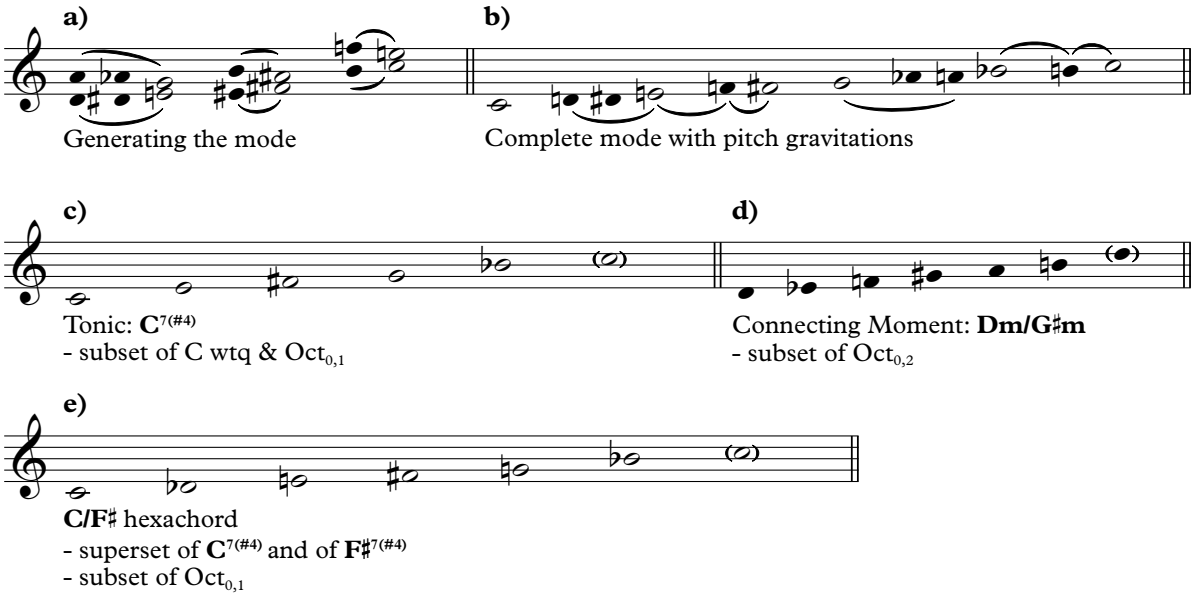


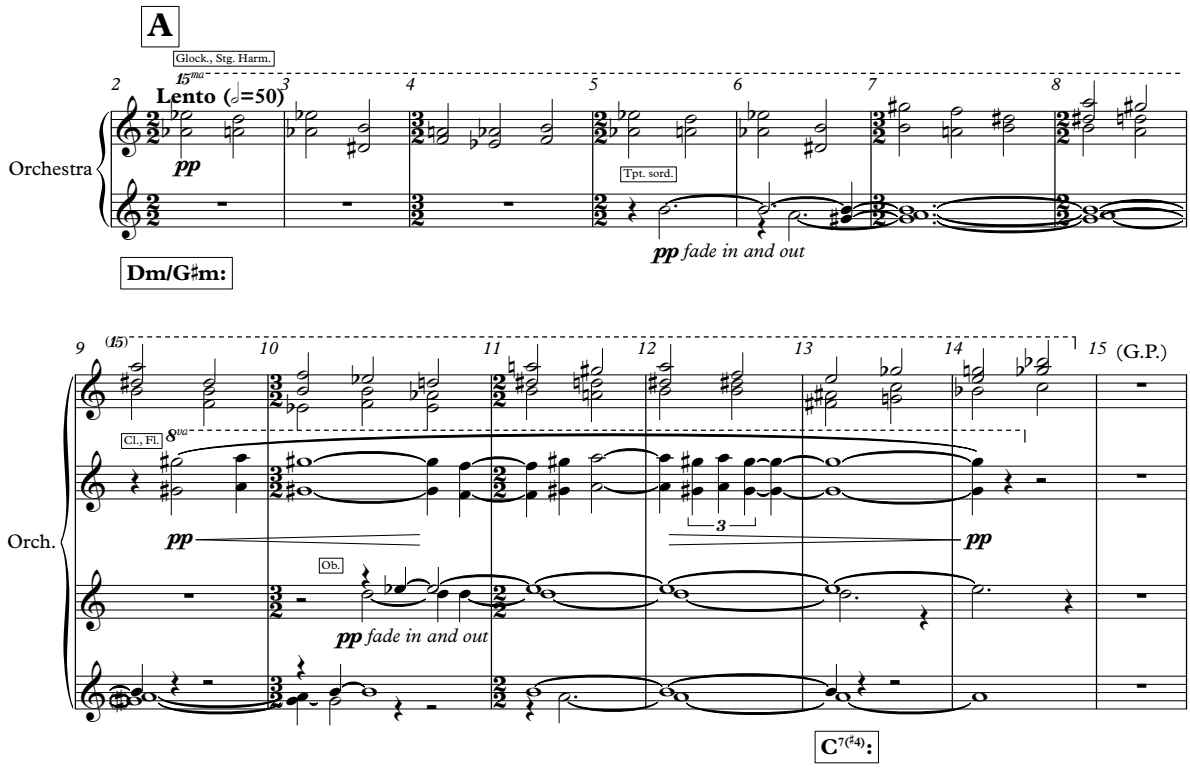
Figure 21: Harmonic Source for "Still"

Figure 21a shows three generating systems which resolve to five notes from the C wtq scale. The results are organized sequentially in Figure 21b, with pitch gravitations marked with slurs. Figure 21c and Figure 21d separate the tonic and connecting moment, and they are respectively given descriptive labels $\mathbf{C}^{7(\sharp 4)}$ (the pentachord resembles a C^7 with an added $\sharp 4$) and **Dm/G♯m** (the hexachord can be constructed from a D minor and a G♯ minor triad). A few observations relevant to "Still" follow:

- Dm/G♯m is also the connecting moment to $F\sharp^{7(\sharp 4)}$.
- The pentachords $C^{7(\sharp 4)}$ and $F\sharp^{7(\sharp 4)}$ are maximally intersecting.
- The hexachord C/F♯ (constructed from the major triads C and F♯ and shown in Figure 21e) is a superset of $C^{7(\sharp 4)}$ and $F\sharp^{7(\sharp 4)}$.

- C/F♯ and Dm/G♯m are complements and are subsets of distinct octatonics.

The *7*(♯*4*) pentachord and its connecting moment are the primary classes of harmony used within "Still". The *7*(♯*4*) pentachord is treated as a stable arrival point when following its connecting moment. Consider the notes used in the opening to "Still".



Example 19: "Still", bars 2-15

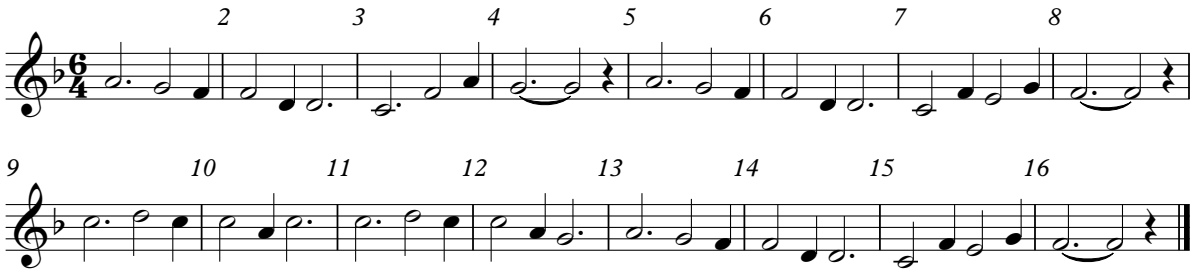
After an introductory lament by the waterphone,[50] the glockenspiel and string harmonics enter and evoke incessant time with a glassy progression of dyads (and eventually triads) from the Dm/G♯m hexachord. The muted trumpets and oboes

[50] The waterphone is a percussion instrument with a tined, metal resonating chamber attached to a tube. A small amount of water is placed inside the resonating chamber to allow modulation of the tone through movement of the instrument. The instrument may be tapped on the resonator and scraped or bowed on the tines. The tines have pitch but are not tuned.

fade in and out of clusters of the same hexachord, underneath a slow clarinet and flute line. The thin tone colours, the quiet and sustained dissonances, and the slow walk of the dyads – all within the dark harmonic implications of the Dm/G♯m hexachord – impart a sense of stillness, loneliness, and hopelessness. In bar 13, the glassy triads shift to the slightly more hopeful tonic ($C^{7(\sharp 4)}$) and reach into the emptiness of the grand pause before the piano solo entrance. The fading tones from the connecting moment linger into this shift, intentionally softening the sense of resolution.

Nearer, My God, to Thee *and "Still"*

"Still" is constructed from distorted fragments of the hymn *Nearer, My God, to Thee*, as sung to the tune "Bethany".[51] *Nearer, My God, to Thee* is a traditional feature of the New Orleans jazz funeral and is played as a slow $\frac{4}{4}$ dirge prior to the burial. It is fitting to base "Still" upon this hymn: the standing water that remained after the levee failures was filled with literal death, and the discourse that followed was predicting the metaphorical death of the city itself. I chose *Nearer, My God, to Thee* over other jazz funeral tunes because it is nearly pure pentatonic and thus highly receptive to alternate harmonizations. When I do present *Nearer, My God, to Thee* in its entirety, I base it upon the less common setting in $\frac{6}{4}$ so that the affect is more of hope than of tragedy.

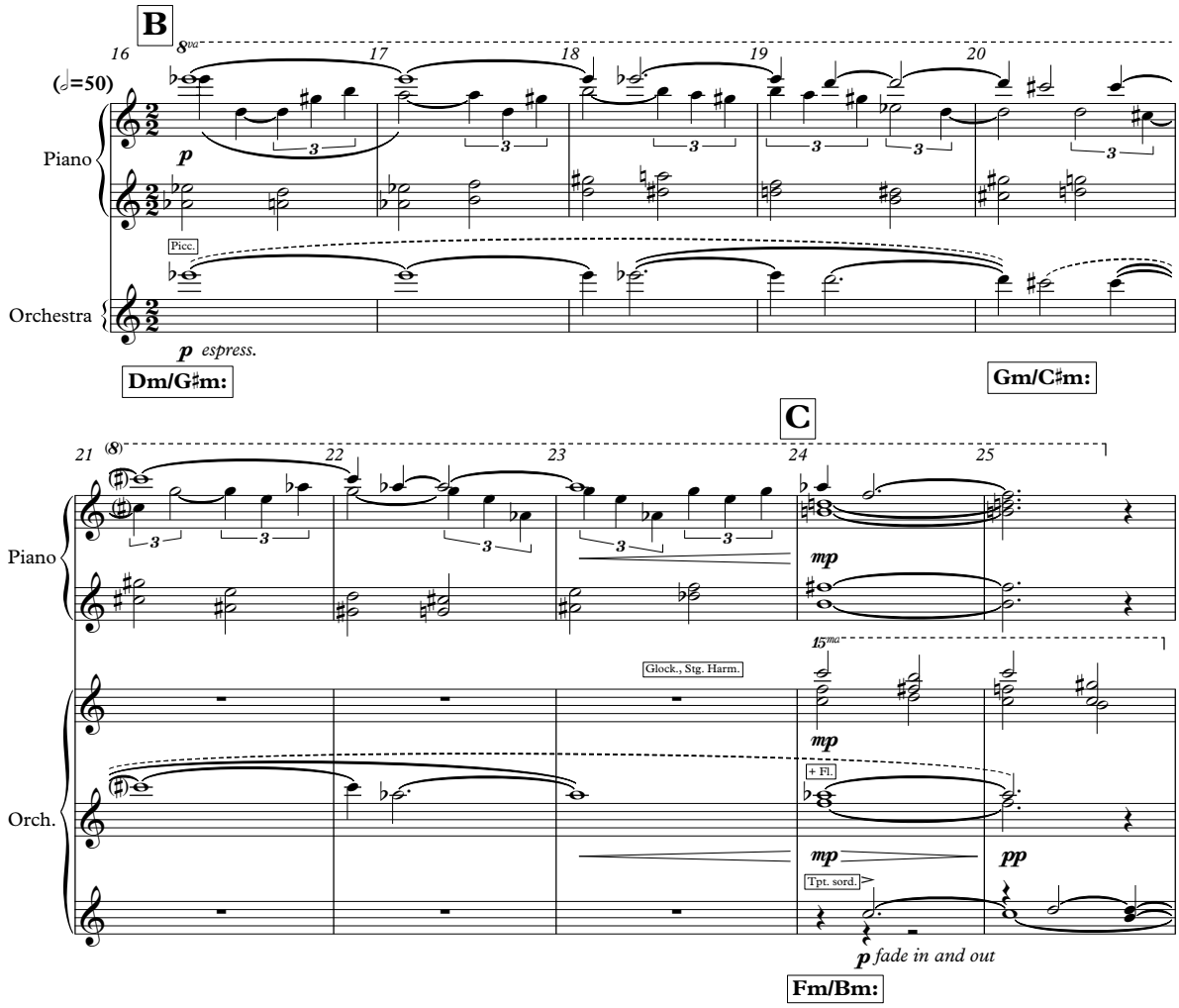


Example 20: *Bethany*, the setting for *Nearer, My God, to Thee*

[51] "Bethany", by Lowell Mason (1792-1872), is the customary setting of *Nearer, My God, to Thee* in the United States.

The recurring motif of clusters that fade in and out has been foreshadowed by both of the previous movements, and it is significant that the first clusters of "Still" (Example 19) offer the first distorted fragments from the hymn *Nearer, My God, to Thee*. The attack points of the muted trumpets in bars 5-6 outline the descending third in the first bar of the hymn. The attack points starting with the oboes in bar 10 and continuing to the trumpets in bar 11 outline the hymn's contour of Example 20, bars 11-12.

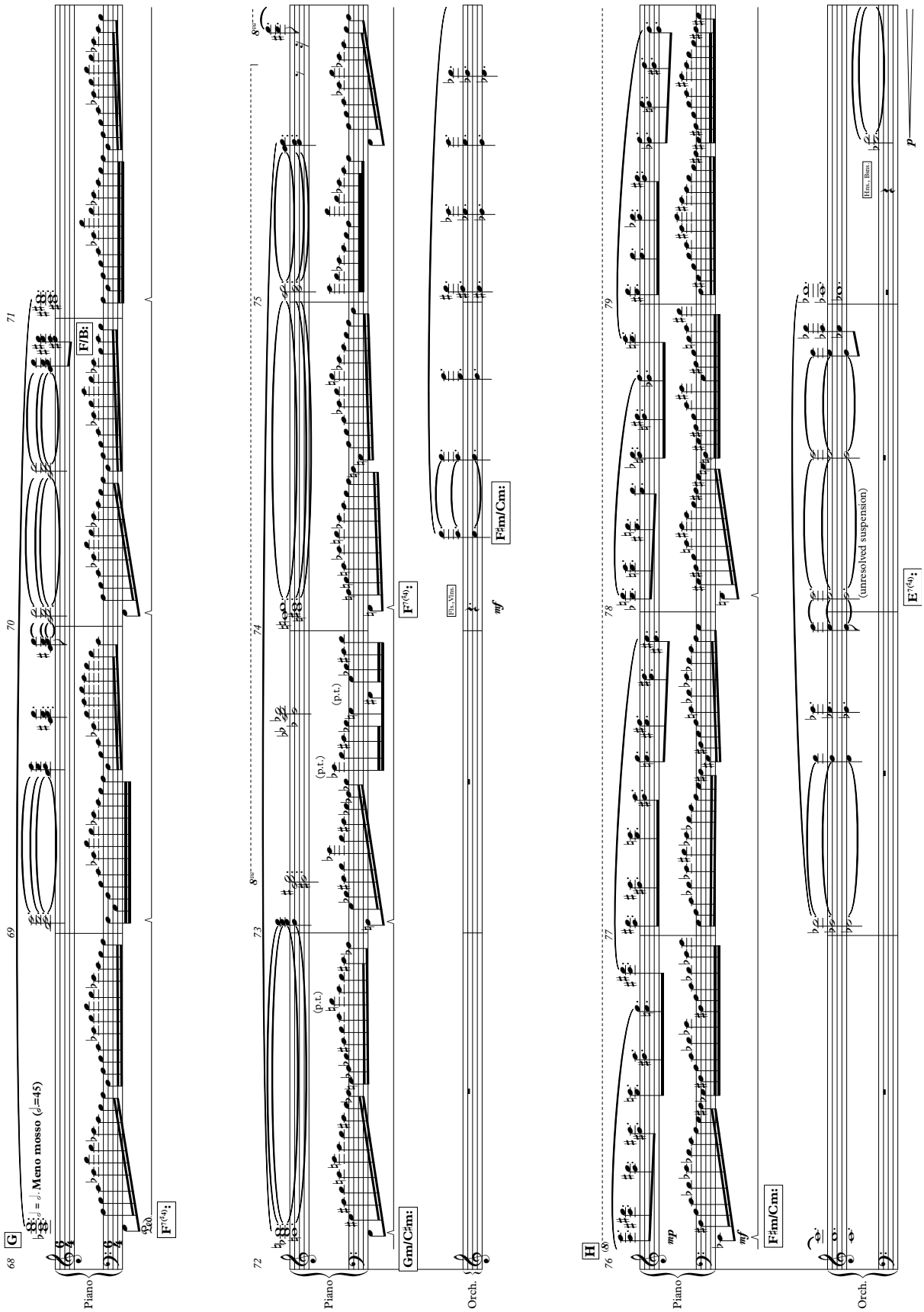
Frequently the fragments of the hymn unfold slowly or are hidden in inner voices:



Example 21: "Still", bars 16-25

Starting at bar 18, the piccolo and top line of the piano take nine bars to outline just over two bars of the beginning of *Bethany*'s contour, complete with repeated notes. In the piano, the right hand's lower voice (D G♯ B A) outlines the contour of the hymn's bars 3-4 and continues through the G in bar 22 to unfold (with some ornamentation) the contour of bars 5-8 in the hymn.

The hexachord shifts in Example 21 do not follow the connecting moment and tonic model discussed earlier. Moving the collection from Dm/G♯m to Gm/C♯m can be interpreted two ways: either as a transposition of a semitone, or as a transposition of a perfect fifth – both transformations give the same hexachord. This type of "modulation" is used multiple times within "Still". At bar 20 this shift seems to step downwards without releasing any tension, as if one is carefully navigating the physical aftermath of the tragedy. The shift to Fm/Bm in bar 24 is a play on the tonic and connecting moment relationship: the tonic of Gm/C♯m, $F^{7(\sharp 4)}$, shares three common tones (those that make the F's fifth and tritone) and the same octatonic superset with Fm/Bm, so the shift from Gm/C♯m to Fm/Bm bears some resemblance to an arrival on the tonic. However, the end result is different. There is an additional edge to the shift at bar 24 that helps propel the music into an increased level of tension on the return of the clusters and walking triads.



Example 22: "Still", bars 68-79

Example 22 above demonstrates a few harmonic and motivic variations on the patterns already seen. From bar 68 to bar 75, a left hand piano figure evocative of water is introduced while the right hand slowly paraphrases bars 1-4 of the hymn. While the core harmonic movement is between connecting moments and their tonics, superset and conflicting collections are used to augment the harmonies. Within this phrase, the collections shift from $F^{7(\sharp 4)}$ to the connecting moment Gm/C♯m and back to the tonic $F^{7(\sharp 4)}$. However, at the end of bar 70, the right hand introduces an F♯, expanding the collection by one tone to the F/B hexachord, a superset to $F^{7(\sharp 4)}$ and complement to Gm/C#m. At bar 74, with the piano again firmly grounded within $F^{7(\sharp 4)}$, the flutes and violins prepare for their melodic role by descending through much of the F♯m/Cm hexachord, the connecting moment to a later arrival of the $E^{7(\sharp 4)}$ tonic. The three common tones between F♯m/Cm and $F^{7(\sharp 4)}$ strike a balance between tension and fluidity.

At rehearsal H (bar 76) the piano shifts to F♯m/Cm with a reference to the opening dyads, and the tension is released. The flutes and violins pick up bars 5-6 of the hymn, but the contour is inverted for the only time within "Still". This middle section of "Still", which continues through bar 104, slowly paraphrases nearly the entire hymn. This particular hymn fragment is inverted to initiate a slow energy rise that peaks at bar 102 and gently releases through bar 106. The imagery in my mind is of a slow draining of standing water, not unlike what New Orleans experienced as the levee breaches were closed and one by one the pumping stations were restored to operation.

A Second Derivative Mode

In using Yavorsky's methods to create tonics and the corresponding connecting moments, I wanted to limit my tonics to subsets of the WTQ scale. Figure 21 (page

69) demonstrates the creation of the primary mode for "Still", one whose tonic is comprised of five-notes from the WTQ. While Yavorsky's methods can generate a mode with a six-note whole-tone tonic, another subset of the WTQ scale, this tonic would not contain $\hat{5}$ of the WTQ, and the reference to WTQ would not be evident. There is one other Yavorsky mode that has a tonic comprised of five notes, including $\hat{5}$, from WTQ. Figure 22 shows this mode using notes from E wtq.

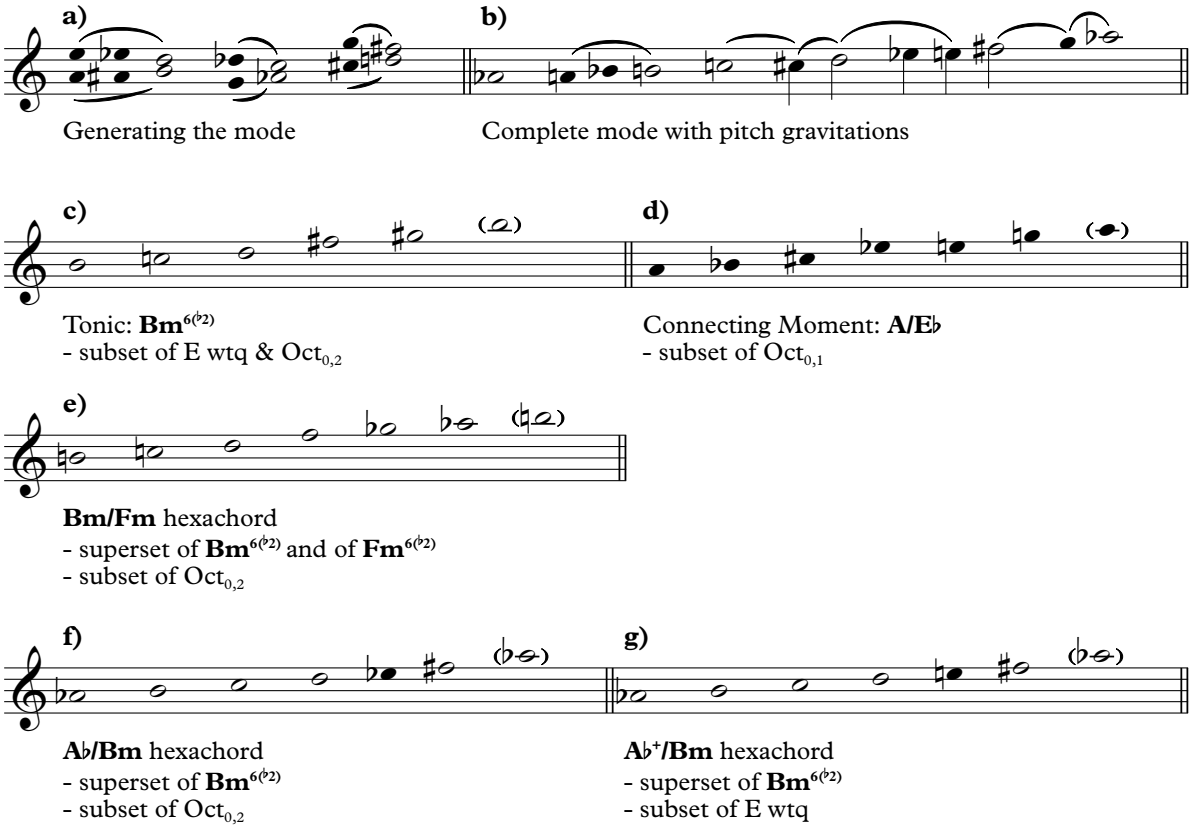


Figure 22: Second Harmonic Source for "Still"

This mode shares some symmetry with the mode of Figure 21: the roles of the major and minor triads are reversed so that the tonic is an added-tone minor triad and the connecting moment comprises two stacked major triads. In this mode, the tonic I call **Bm**$^{6(\flat 2)}$ is equivalent to a Bm^{6} (in jazz terms) with an added ♭2. The Bm/Fm hexachord (Figure 22e) is a superset to both tonics of A/E♭. Two more derivative hexachords are shown in Figure 22. Figure 22f borrows an E♭ from the connecting

moment to create what I call the A♭/Bm hexachord; Figure 22g borrows an E♮ from the connecting moment to create the A♭$^{+}$/Bm hexachord.[52] The Bm/Fm, A♭/Bm, and A♭$^{+}$/Bm hexachords are all supersets of Bm$^{6(\flat 2)}$, and all maximally intersect each other. A♭$^{+}$/Bm also maximally intersects with any of the WTQ scales that share the same whole-tone scale as E wtq.

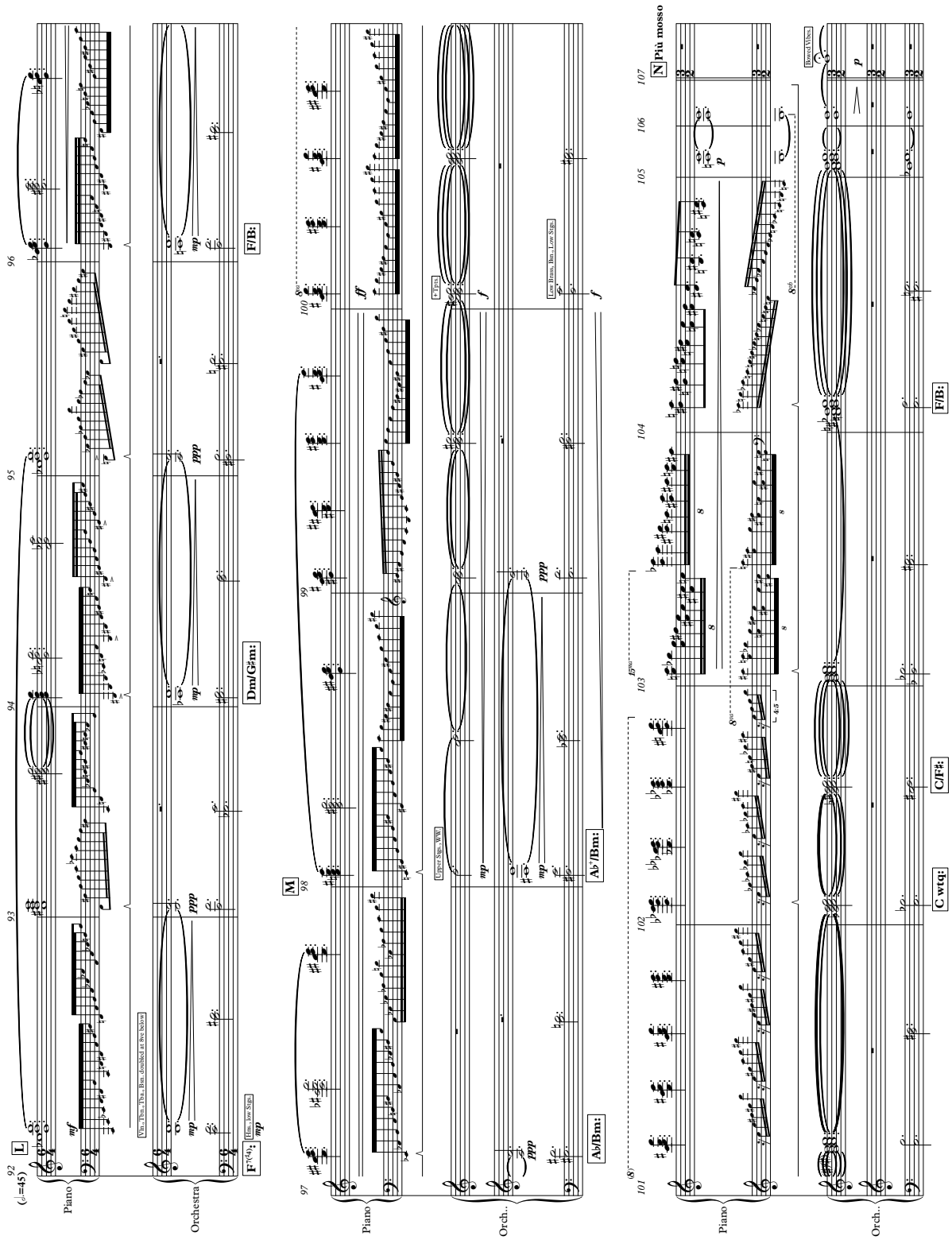
These hexachord tonic variations are used in the lead up to the climax of Example 23 (page 78). At this climactic point, the active collections tend to be built upon major triads, the shifts happen more quickly than usual, and there are more maximally intersecting modulations here than anywhere else. These quick, relatively consonant, and smooth modulations (detailed in Table 5), combined with the flowing piano patterns and growing clusters, evoke for the last time the sense of water flowing. The semitone / fifth relationship in the last shift creates a sense of arrival to the closing of the climax.

Table 5: Collection Shifts in "Still", bars 92-104

Bar	Collection	How Modulated Here
92	F$^{7(\sharp 4)}$	
94	Dm/G♯m	Maximally intersecting; four common tones
96	F/B	Four common tones; double Relative transformation[53]
97	A♭/Bm	Four common tones
98	A♭$^{+}$/Bm	Maximally intersecting
102	C wtq	Maximally intersecting
102	C/F♯	Maximally intersecting
104	F/B	Semitone or fifth relationship (cf. bar 72, Example 22)

[52] Compare the A♭$^{+}$/Bm hexachord to Scriabin's mystic chord.

[53] A Relative transformation is a mapping of a major triad onto a minor triad (and vice versa) where the notes of the major third are kept and the third note moves by step. For example, the transformation between F major and D minor is a Relative transformation. (Berry) Compare to page 47's discussion of the double Leading-tone exchange in bar 54 of *"River"*.

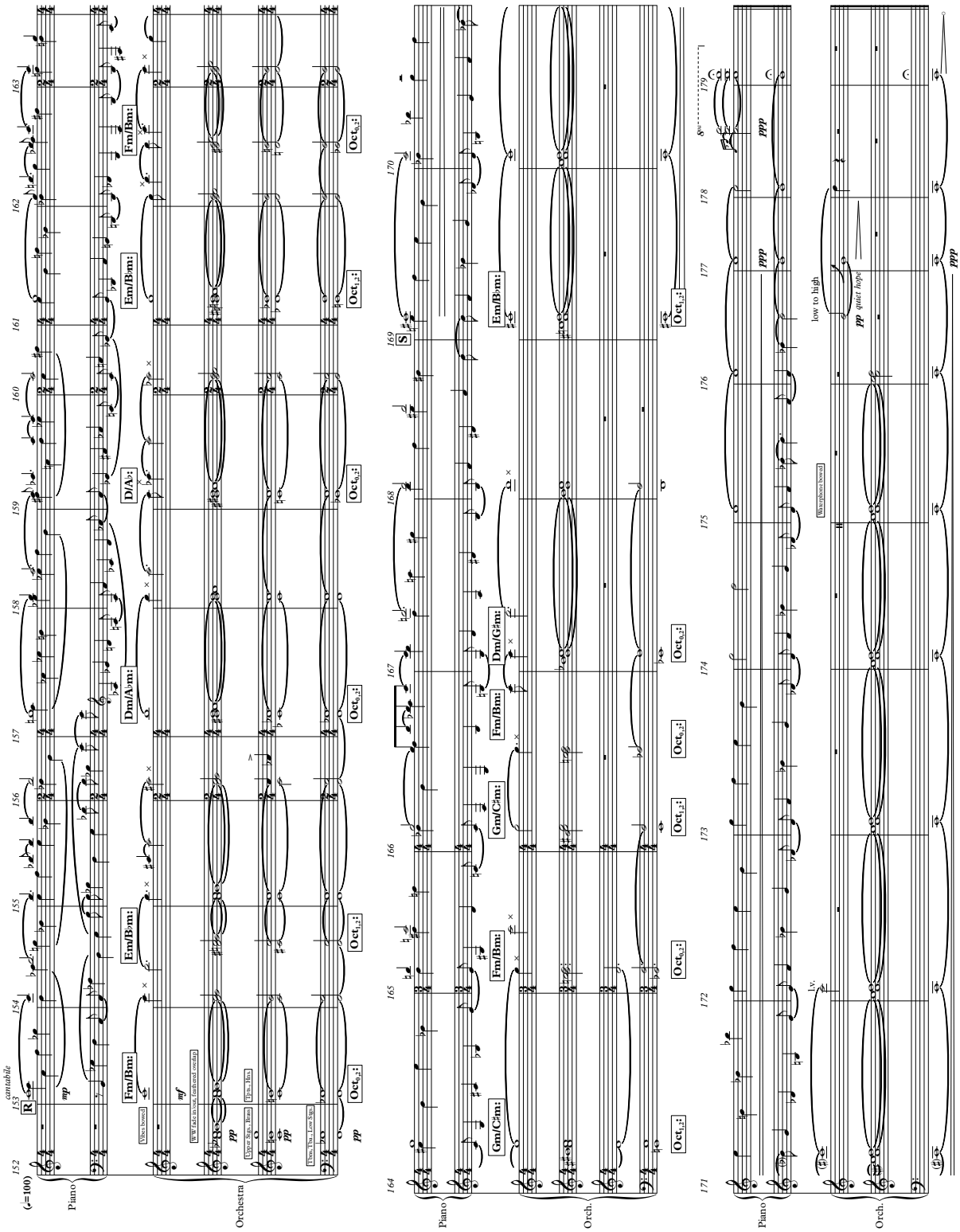


Example 23: "Still", bars 92-107

Delaying Stability With Modulations

Example 24 below shows rehearsal R to the end. Prior to this section, "Still" offers a strong statement of hope and community that begins with rehearsal N's entrance of the pure-tone bowed vibraphone, a contrast to the microtonal bowed waterphone that evokes hopelessness at the beginning of "Still". This leads to an unabashedly American harmonic and orchestral chorale treatment of the full hymn in its original form. However, in the last 35 bars of "Still" I remind the listener that, once the larger community dissipates, only those closest to the tragedy are left to continue the healing and rebuilding. While hope may remain, the sense of being alone in continuing the effort may return, the wounds may seem fresh again, and the search for healing and closure continues. The chorale ends ambiguously, the octatonic reasserts its colour, and soon the music enters a final section (Example 24, below) of distorted hymn fragments, broken dyads, and feathered clusters within a series of rapidly changing hexachords.

The piano at rehearsal R is a variation of its first entrance in "Still" (see rehearsal B, Example 21). The distorted opening fragment of the hymn is heard twice in the bowed vibraphone and piano top voice: once starting at bar 153, and again at bar 157. Bar 161 begins the last clearly stated fragment of the hymn (bars 3-4), and that is motivically varied and deconstructed in the final phrases to the end. While the piano's inner voice at R is similar to that of rehearsal B, the left hand at rehearsal R paraphrases the opening's walking dyads as broken intervals at the crotchet, a quaver out of phase from the right hand.



Example 24: "Still", bars 152-179

The hexachords shift quickly, there are few common tones between adjacent collections, and the connecting moment and tonic relationship is largely abandoned.

The piano's out of phase figures and lack of local points of stability evoke the search for grounding. Initially, residuals from the chorale (G♮ and A♮) conflict with the implied octatonic scales, emphasizing the contrast between this unstable section and the earlier chorale. To me, this reflects a desire to avoid the realities of the healing process.

The final hexachord transitions of bars 167 and 169 break the pattern of instability and almost create a stable arrival point. Bar 167's transition to Dm/G♯m is a noticeably subtle shift with four common tones. The transformation is sweetened by the resolution of the prominent E♮ suspension in the bass, through the octatonic-compatible E♭, to the D♮ doubling of the soprano line. The final arrival at the Em/B♭m hexachord in bar 169 hints at stability in several ways:

- The soprano and bass move in parallel to the C♯. Parallel voice leading of this nature is unusual in this movement, and here it strongly signifies an arrival point.

- The Em/B♭m hexachord shares three common tones and a parent octatonic to what would be the tonic of the Dm/G♯m connecting moment ($C^{7(\sharp 4)}$). (Compare this to bar 24, Example 21.)

- Only tones from the Em/B♭m hexachord are used in the harmonies, so there is no pull away from the hexachord's stability.

- Repeating patterns in the piano accompaniment emphasize the stability desired at this point.

This almost stable moment represents a tentative arrival at some grounding, and hope for healing is offered. However, "Still" clearly ends more as a question than a statement. The movement opened with a Dm/G♯m connecting moment and $C^{7(\sharp 4)}$ tonic relationship constructed from the C wtq scale, yet closes with a Dm/G♯m to Em/B♭m shift. Much of the work was constructed around the connecting moment and tonic relationship, yet the ending only hints at a connecting moment to tonic resolution. The C♮ and F♯ that would reinforce a sense of the Russian tonic are never stated, and the movement ends with an emphasis on a first-inversion B♭ minor harmony. Even the final upward gestures by the waterphone and the piano are feminine in nature: expressing hope, but not making a definitive statement. Ten years after the levee failures in New Orleans there is hope, but much uncertainty about New Orleans still remains.

Chapter 7: Conclusion

The goal of my Master's program was to learn how to compose in a harmonic language not tethered to common practice. I did this through the study of theoretical papers, analysis of scores, and composing with the tools I gathered.

In this commentary, I have presented three significant works for my composition portfolio. While *The Nightingale and the Rose* and *I Wish I Could Remember That First Day* are formative pieces, I feel that it is the twenty-five minute, three-movement piano concerto *Currents* that most fully demonstrates my growth as a composer and the fulfilment of my goals.

I have used my exploration of mode as a common theme in discussing my works. In four separate areas of exploration, I have presented my findings from research and analysis, and I have demonstrated how I have applied these findings to my music.

I discussed the expansion of the diatonic harmonic language through added-tone sonorities. I used the music of Eric Whitacre as my model and the writings of Angela Hall as the basis for my theoretical understanding. In *I Wish I Could Remember That First Day*, I explored how context affects the interpretation of a complex chord, gave examples of where the sonorities in my music can not be analysed as an added-tone sonority, and showed how the use of clusters is a natural outgrowth of added-tone sonorities.

I explained Dmitri Tymoczko's theories of scale construction and scale networks and showed how I used them to map potential scales and modulations for two works: *The Nightingale and the Rose* and "River". For *The Nightingale and the Rose* I designed a relatively straightforward scale network based upon my Whole-Tone

Quint scale. I showed how my choice of scales affected my harmonic options and led me towards a use of harmony less connected to common practice but in many ways still functional.

For "River" I designed synthetic scales new to me using the constraints of maximal intersection. I created a scale network much more ambitious in scope than that I used for *The Nightingale and the Rose*, and I demonstrated the three main types of modulation I used within "River": maximally intersecting modulations (the modulation primarily discussed by Tymoczko); modulations between parallel modes; and modulations involving tonics related by fifths. I also discussed how and why I used hexachord complements in "River", how these related to the WTQ scale, and my approach to modulation between these hexatonics.

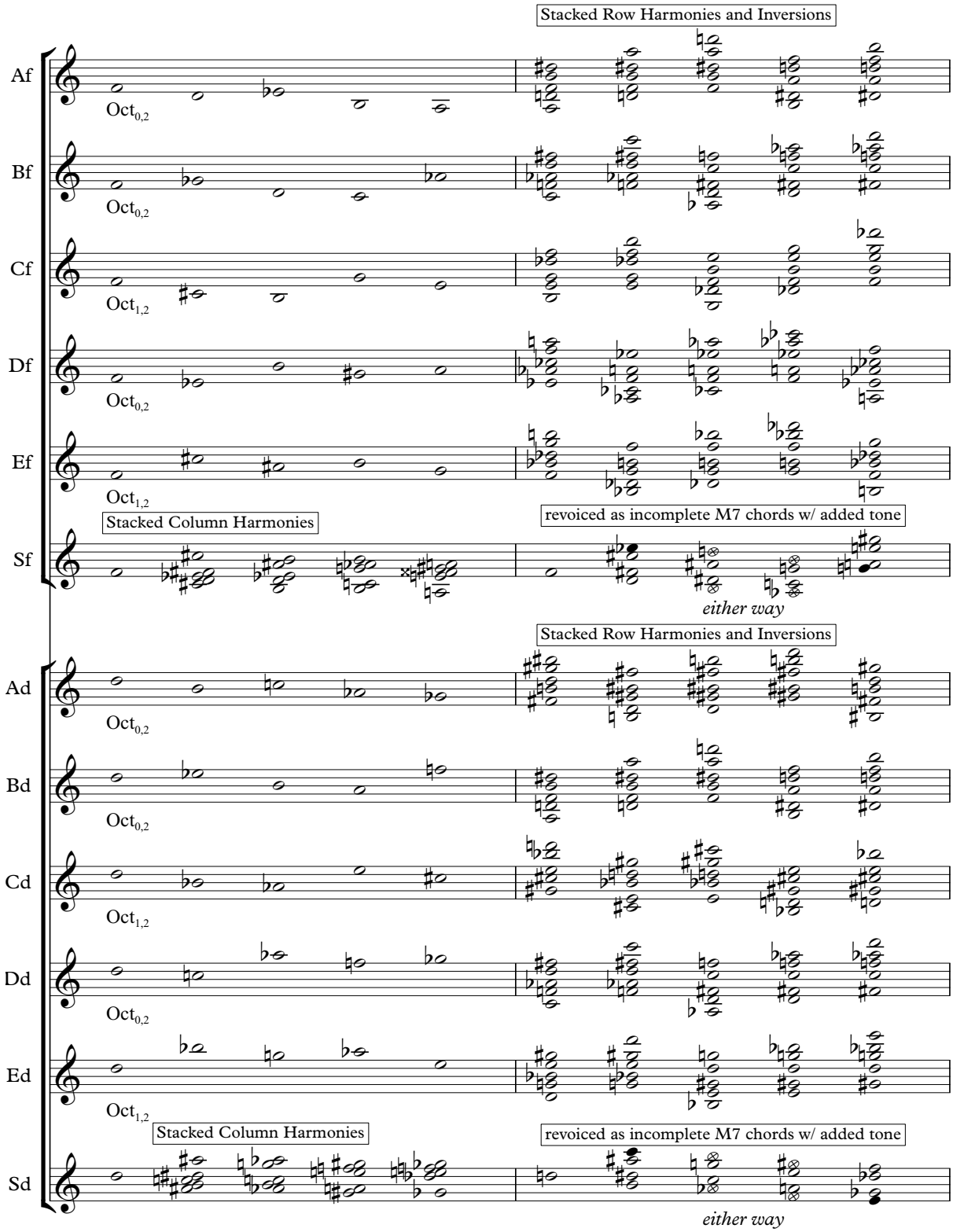
With a row derived from the G wtq and melodic material from movement one, I modelled the rotational array process for "Breaking" after Oliver Knussen with one deviation from his method. I offered examples of using every aspect of the array that was generated. I demonstrated how using a row that is a subset of a mode of limited transposition opened up opportunities to consider the containing collections (octatonics, in my case) integral to the harmonic language.

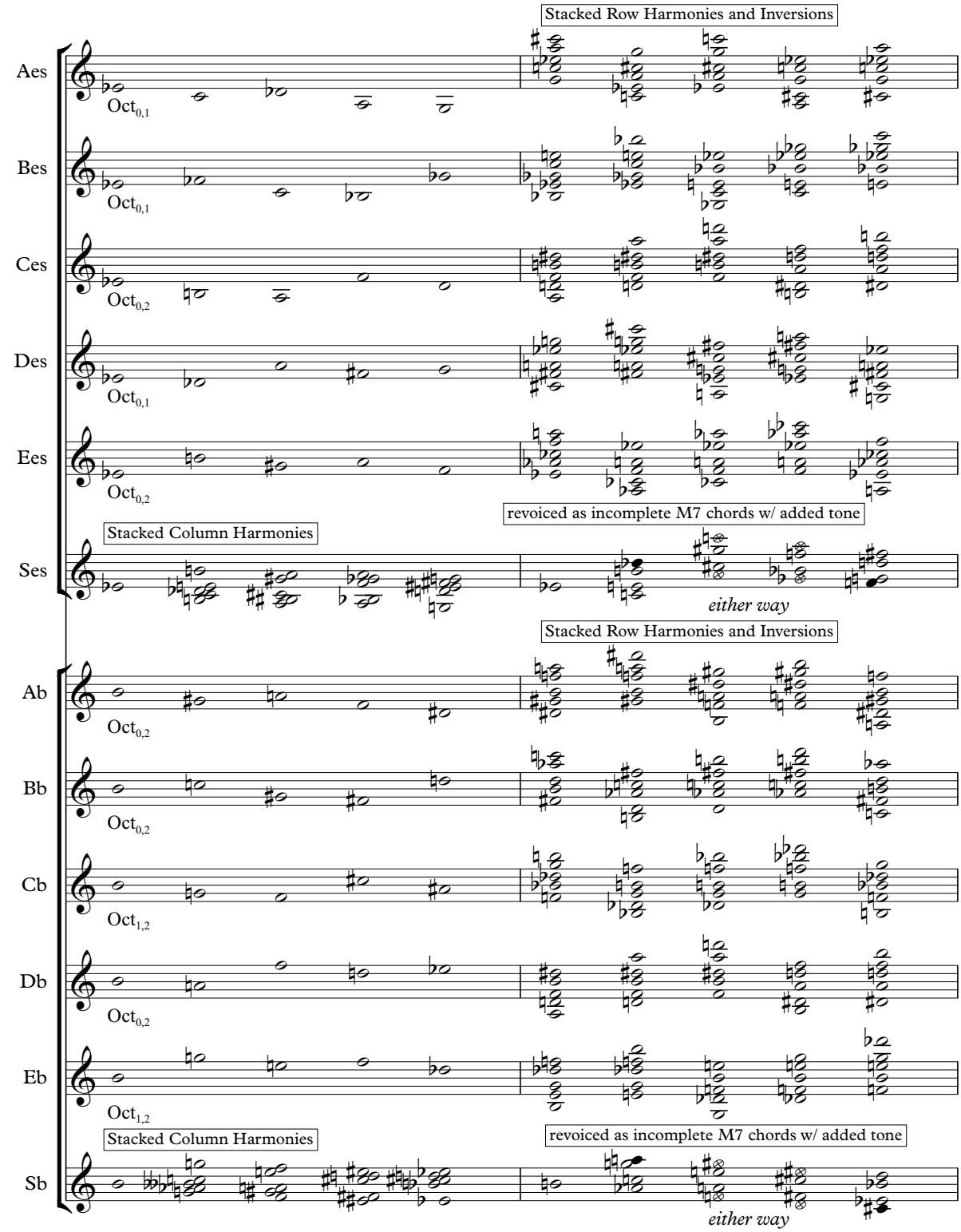
For "Still", the third movement to *Currents*, I briefly presented how the Russian music theorists view and construct modes, and I demonstrated how I constructed my "Russian mode" as a derivative of the WTQ. I used the connecting moment to tonic relationship as a means of generating stable arrival points. I explored hexachords that are supersets to my tonics and the implications of shifting between complements and shifting by transposition. I discussed how I distorted fragments of

the hymn *Nearer, My God, to Thee* to fit notes from my collections, and I pointed out where this creates both cohesion and symbolism within the work.

"Still" is a fitting close to my Master's study. I feel that it represents the culmination of a year of research, analysis, and composing. Like "Still", my Master's ends with hope and a sense of more work to be done. What I am able to demonstrate today as my growth as a composer is significant, but undoubtedly the most important skill I have acquired through this Master's by Research is the confidence and experience of exploring new ideas, synthesizing them, and applying them to my own art.

APPENDIX: Rotational Arrays for “Breaking”




Stacked Row Harmonies and Inversions
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revoiced as incomplete M7 chords w/ added tone
Stacked Column Harmonies
Ses
either way
Stacked Row Harmonies and Inversions
Ab
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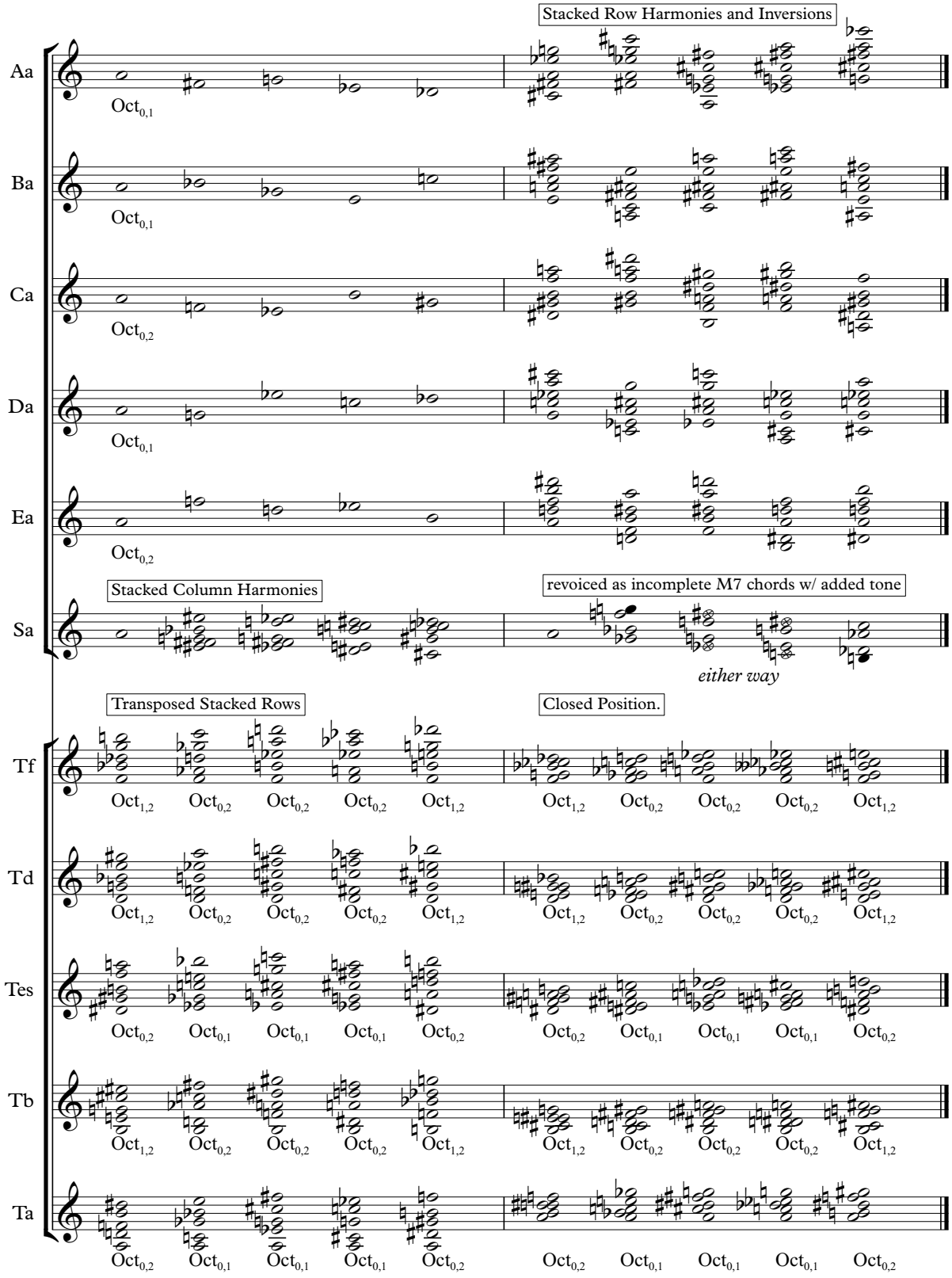
Stacked Row Harmonies and Inversions
Aa
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Ca
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Stacked Column Harmonies
revoiced as incomplete M7 chords w/ added tone
either way
Transposed Stacked Rows
Closed Position.
Tf
Td
Tes
Tb
Ta
Oct1,2
Oct0,2
Oct0,1

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