PORTFOLIO OF FOUR COMPOSITIONS

Part I

A Dissertation
Presented to the Faculty of the Graduate School
of Cornell University
In Partial Fulfillment of the Requirements for the Degree of
Doctor of Musical Arts

by
Takuma Itoh
August 2012
PORTFOLIO OF FOUR COMPOSITIONS

Takuma Itoh, D.M.A.
Cornell University 2012

The four works included in this portfolio reflect some of my recent approaches to composition. *Undercurrent, Parallel Divergence, and Afterimage* demonstrate my initial attempts at using the technique of fixed-register pitch field that I will discuss in Part II of this dissertation. *Undercurrent*, in addition to using pitch fields, is formally organized through the juxtaposition of five blocks of musical ideas. One particular musical idea that lies dormant for much of the piece gradually emerges to take over by the end. *Parallel Divergence* closely models Berio’s *Points on a Curve to Find…*, featuring a virtuosic piano part in a chamber group, with the other instruments closely following the piano (“parallel”), only to go in different directions (“divergence”) to create a complex and varying texture. *Afterimage* takes advantage of the idiosyncrasies offered by the cello, using only natural harmonics and left hand pizzicatos of open strings. The strings are de-tuned to offer a less conventional set of notes, but the result is a 23-note pitch field throughout the entire work.

*Daydreams* utilizes a triadic progression as the underlying harmonic basis of the work, and explores spatialization. Indeterminate notation is used alongside a more conventional, metered notation to create a sense of timeless suspension. A group of musicians move from the stage to the balconies during the piece to create a reverberant, “surround-sound” effect at the climax of the piece.
BIOGRAPHICAL SKETCH

Takuma Itoh (b. 1984) spent his early childhood in Japan before moving to Northern California where he grew up. He received his bachelor’s degree from Rice University in 2006, his master’s degree from the University of Michigan in 2008, and entered the D.M.A. program at Cornell University in the fall of 2008. His teachers include Roberto Sierra, Steven Stucky, Kevin Ernste, William Bolcom, Bright Sheng, Shih-Hui Chen, Anthony Brandt, Pierre Jalbert, and Karim Al-Zand.

His works have received performances in the United States, Europe, Asia, and Australia by such performers as the Albany Symphony, the Silesian Philharmonic Orchestra (Poland), the New York Youth Symphony, the Haddonfield Symphony, the Shanghai Quartet, the St. Lawrence Quartet, the Momenta Quartet, the Syzygy Ensemble (Australia), the Argento Chamber Ensemble, the H2 Saxophone Quartet, the Aspen Contemporary Ensemble, and the Cornell Wind Ensemble. He is the recipient of a 2012 Charles Ives Scholarship from the American Academy of Arts and Letters, four Morton Gould Young Composer Awards (including the 2010 Leo Kaplan Award), the American Composers Orchestra 2008 Underwood New Music Readings, Haddonfield Young Composer Competition, and the New York Youth Symphony First Music Commission. He has also been a fellow at the Pacific Music Festival and the Aspen Music Festival and an associate artist at the Atlantic Center for the Arts.

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Lastly, to my family and Carol, I am so grateful for your love and support.
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UNDERCURRENT
for large chamber ensemble

Takuma Itoh
(2010)

INSTRUMENTATION

1 Flute (+Piccolo)
1 Oboe
1 Clarinet (B-flat)
1 Bassoon

1 Horn (F)
1 Trumpet (C)
1 Trombone

1 Percussion (one player):
   Snare Drum
   Marimba (4.3 octave)
   Crotales (2 octaves)
   2 Bongos
   Suspended Cymbal
   Chime (F-sharp, only)
   5 temple blocks

1 Piano

2 Violin
1 Viola
1 Cello
1 Contrabass

SCORE NOTES

Score is in C

Duration: 8 minutes

Premiered on April 17, 2010 by the Festival Chamber Orchestra; Cynthia Johnston-Turner, conductor
Undercurrent
Takuma Itoh
(2010)

Menacing $\downarrow = 76$

Piccolo

Oboe

Clarinet in B

Bassoon

Horn in F

Trumpet in C

Trombone

Percussion

Piano

Violin 1

Violin 2

Viola

Cello

Bass

© 2010 Takuma Itoh
Picc. 42

Ob. 42

Bb Cl. 42

Bn. 42

Hn. 42

C Tpt. 42

Tbn. 42

Perc. 42

Vln. 1 42

Vln. 2 42

Vla. 42

Vc. 42

Cb. 42

Pno. 42

(CROTALES)
Picc.
Bb Cl.
Bsn.
Hn.
C Tpt.
Tbn.
Perc.
Vln. 1
Vln. 2
Vla.
Vlc.
Cb.
Pno.
(MARIMBA)
Fl.

Ob.

Bb Cl.

Bsn.

Hn.

C Tpt.

Tbn.

Perc.

Pno.

Vln. 1

Vln. 2

Vla.

Vlc.

Cb.

119

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a tempo
continue to beat time until the end

continue to beat time until the end
PARALLEL DIVERGENCE
for flute, bass clarinet, violin, cello, piano

Takuma Itoh
(2011)

INSTRUMENTATION

1 Flute
1 Bass Clarinet (B-flat)

1 Violin
1 Cello

1 Piano

SCORE NOTES

Score is transposed

Duration: 6 minutes

Premiered on March 6, 2011 by the Argento Chamber Ensemble

PERFORMANCE NOTES

♩♩ throughout (no metric modulation)

All trills are played a half-step above the written note
Parallel Divergence

Acrobatic

\[ \text{\( \frac{d}{d} \) = 72 (or faster)} \]

Takuma Itoh

(2011)

\[ \text{Flute} \]

\[ \text{Bass Clarinet in B}^\flat \]

\[ \text{Violin} \]

\[ \text{Cello} \]

\[ \text{Piano} \]

\[ \text{fp} \]

*All trills are played a half-step above the written note*

© 2011 Takuma Itoh
AFTERIMAGE
for solo cello

Takuma Itoh
(2011)

INSTRUMENTATION
1 Cello

SCORE NOTES
Duration: 8 minutes
Premiered on Dec. 10, 2011 by Kathryn Bates Williams

PERFORMANCE NOTES
Scordatura tuning:

There are two versions of the score:

1. Performance score for the cellist, written as played

2. The same performance score on one line combined with another marked ‘sounding,’ in which the actual pitches are notated.

The piece is approximately 8 minutes long
if necessary, insert small rests to play
L.H. pizz (see m. 55). Steady pulse

Ethereal, Rubato  $\frac{\text{b}}{\text{c}} = 126$

\textit{bring out upper line}

\textit{p} light, fast tremolo, transparent
Steady ($\text{q} = 126$)

(\text{q} = 63)

(pizz.)

(arco)

97
DAYDREAMS
for wind ensemble

Takuma Itoh
(2010)

INSTRUMENTATION

3 Flutes (third doubling on Piccolo)
2 Oboes (second doubling on English Horn)
4 Clarinets (B-flat)
Bass Clarinet (B-flat)
2 Bassoons
2 Alto Saxophones (E-flat)
1 Tenor Saxophone (B-flat)
1 Baritone Saxophone (E-flat)

3 Trumpets (B-flat)
4 Horns (F)
2 Tenor Trombones
1 Bass Trombone
1 Euphonium
1 Tuba

Percussion (four players)
Piano
Harp (optional)
Double Bass

Percussion requirements:

1. Crotale (upper octave C [to be carried offstage]), Triangle (hi), Suspended Cymbal (shared with IV).
   a. Antiphonal Right: Crotales (full upper octave, except C and D), Large Triangle
2. Crotale (upper octave D), Triangle (mid), Glockenspiel (shared with IV)
   a. Antiphonal Left: Crotales (full lower octave, except A)
3. Crotale (lower octave A), Triangle (lo), Vibraphone (shared with IV), Suspended Cymbal
4. Glockenspiel (shared with II), Vibraphone (shared with III), Bass Drum, Suspended Cymbal (shared with I), Tam-Tam

SCORE NOTES

Score is in C

Duration: 16 minutes

Premiered on March 3, 2011 by the Cornell Wind Ensemble; Cynthia Johnston-Turner, conductor

Revised in June, 2011
PERFORMANCE NOTES

Flutes 1-3, Clarinets 2-4, and Percussion 1-2 start onstage and move to the back of the hall when indicated.

These instruments should form two groups on opposite sides of the hall as follows:
   Antiphonal Left: Flute 1, Clarinet 2 and 3, Percussion 2
   Antiphonal Right: Flute 2 and 3, Clarinet 4, Percussion 1
   Use a balcony if available at the concert hall.

There are occasional repeat signs followed by a wavy line within a single part (e.g. m. 1: percussion 1-3; m. 5: clarinet 1-3). The figures within should be repeated until indicated by the end of the wavy line.

Sections marked “Senza Tempo” should not be conducted. A cue should be given by the conductor at the beginning of the bar, and held for the duration indicated (the durations are approximate and should be adjusted depending on the performance situation (hall size, acoustics, etc.).

The music from mm. 149-176 quotes Chopin’s Ballade No. 2 in F major, Op. 38.
Daydreams

Spacious, Calm
Senza Tempo

1
2
3
4

≈20-30 sec.
≈15 sec.
≈5 sec.
≈5 sec.

Flute 1-3
Oboes 1, 2
Clarinet in B♭ 1-4
Bass Clarinet
Bassoon 1, 2
2 Altos
Saxophones
Tenor Baritone
Trumpet in B♭ 1-3
Horn in F 1-4
Trombone 1-3
Euphonium
Tuba
Percussion 1
Percussion 2
Percussion 3
Percussion 4
Piano
Harp
Double Bass

CROTALES
play note 2-4 times
attacks should not line up
rate of crotale hits as before
TRIANGLE (HI)
avoid any semblance of pitch
TRIANGLE (MED)
avoid any semblance of pitch
TRIANGLE (LO)
avoid any semblance of pitch
in any order, imitate the crotales
in any order; imitate the crotales
in any order; imitate the crotales

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In Tempo

1
2
3

Ob. 1-2

steady but with your own tempo \( (q = \text{c} 60-66) \)

Clarinet 2

steady but with your own tempo \( (q = \text{c} 60-66) \)

Ben. 1, 2

steady but with your own tempo \( (q = \text{c} 60-66) \)

Sax. A 2

steady but with your own tempo \( (q = \text{c} 60-66) \)

Tpt. 1-3

steady but with your own tempo \( (q = \text{c} 60-66) \)

Hn. 1-4

steady but with your own tempo \( (q = \text{c} 60-66) \)

Tbn. 1-3

steady but with your own tempo \( (q = \text{c} 60-66) \)

Euph.

steady but with your own tempo \( (q = \text{c} 60-66) \)

Perc.

steady but with your own tempo \( (q = \text{c} 60-66) \)

Pno.

steady but with your own tempo \( (q = \text{c} 60-66) \)

 Hp.

steady but with your own tempo \( (q = \text{c} 60-66) \)

Db.

steady but with your own tempo \( (q = \text{c} 60-66) \)

\( \text{longer and longer tones.....} \)
Senza Tempo

1

≈5 sec.

steady but with your own tempo \( q = \frac{60}{66} \)

2

≈5 sec.

3

≈5 sec.

In Tempo

\( q = 60 \)

Flute

\( p \)

steady but with your own tempo \( q = \frac{60}{66} \)

Clarinet

\( p \)

steady but with your own tempo \( q = \frac{60}{66} \)

Bar. 1-2

\( p \)

steady but with your own tempo \( q = \frac{60}{66} \)

Clarinet

\( p \)

steady but with your own tempo \( q = \frac{60}{66} \)

Sax.

\( p \)

steady but with your own tempo \( q = \frac{60}{66} \)

Tuba

\( p \)

steady but with your own tempo \( q = \frac{60}{66} \)

Perc.

\( p \)

steady but with your own tempo \( q = \frac{60}{66} \)

Pno.

\( p \)

steady but with your own tempo \( q = \frac{60}{66} \)

Hp.

\( p \)

steady but with your own tempo \( q = \frac{60}{66} \)

D.B.
exit stage left

exit stage right

exit stage right

ob. 1-2

cl. 1-4

bass cl.

bass

a 2

t

b

tuba

h. 1-4

trumpet

trumpet

tamb.

euph.

tuba

bassoon

clarinet

flute

pno.

perc.

hp.

sax.

d.b.

gradually walk off stage right

gradually walk off stage left

same as m. 2

same as m. 2

same as m. 2

p
longer and longer tones....
Senza Tempo

1) =5 sec.
2) =7 sec.
3) =10 sec.

Play into m. 220

Ft. 1

Bb Cl. 1

Left

Bb Cl. 1

Perc. 2

Ft. 2

Right

Bb Cl. 4

Perc. 1

Ob. 1-2

Clarinet 1

Bass. 1, 2

A 2

Sax. T

B

Tpt. 1-3

Hn. 1-4

Tbn. 1-3

Euphonium

Tuba

Perc. 1-3

Pno.

Hp.

D.B.
Senza Tempo

=5 sec.
SURVEY AND METHODOLOGY OF FIXED-REGISTER PITCH FIELDS

Part II

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August 2012
SURVEY AND METHODOLOGY OF FIXED-REGISTER PITCH FIELDS

Takuma Itoh, D.M.A.

Cornell University 2012

Survey and Methodology of Fixed-Register Pitch Fields examines an oft-used compositional technique of the 20th and 21st century that allows composers to organize harmony through strict placement of pitches to specific registers. Despite its widespread use, there currently exists no comprehensive survey or a methodology for analyzing such works. This dissertation is an initial attempt to contribute to an area of musical analysis that I believe is in need of further exploration.

The first portion of this dissertation is a broad survey of the many composers and works that have used fixed-register pitch fields. This investigation reveals a rich variety of works, from as far back as Webern to today, and encompassing styles as varied as serialism, spectralism, and minimalism.

Following the survey, I outline a method of analyzing such works by deconstructing the structure of pitch fields into more analyzable components. This methodology is then applied to examine three works: Luciano Berio’s Sequenza VII for oboe, Elliott Carter’s “Anaphora” from his song cycle A Mirror on Which To Dwell, and John Adams’ China Gates. The analyses of these three works reveal structures that may be overlooked using traditional methods, and offer valuable perspective and insights into the understanding of these works.
Takuma Itoh (b. 1984) spent his early childhood in Japan before moving to Northern California where he grew up. He received his bachelor’s degree from Rice University in 2006, his master’s degree from the University of Michigan in 2008, and entered the D.M.A. program at Cornell University in the fall of 2008. His teachers include Roberto Sierra, Steven Stucky, Kevin Ernste, William Bolcom, Bright Sheng, Shih-Hui Chen, Anthony Brandt, Pierre Jalbert, and Karim Al-Zand.

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Chapter 1
Introduction

1. Overview

The technique of fixed-register pitch fields has routinely been used by a number of notable composers in the 20th and 21st century. Various publications focusing on a single composer tend to discuss pitch fields – sometimes using different terminology – as a phase in a composer’s output, but there is little comprehensive study on the subject to track the history, evolution, and application of this oft-used technique across several generations of composers. This dissertation will attempt to look at different ways composers have used fixed-register pitch fields, and establish new tools to allow a way of comparing one pitch-field-based composition to another.

Definition

A fixed-register pitch field is a compositional technique in which a composer freezes the register of all the notes being used. A note within the pitch field cannot be moved up or down the octave, nor can extraneous notes be inserted. A composer would presumably construct a pitch field in the pre-compositional stage to suit the needs of the intended composition, with the freedom to choose the quantity of notes and their registral placement. Once the pitch field has been created, the composer is free to circulate through the notes in any order for as long as necessary, as long as all notes outside of the field are excluded. The limitation placed on the availability of notes hinders the maneuverability of melodic construction, but results in a harmonic clarity that remains consistent throughout a single pitch field.
**Terminology**

There have been many terms used to describe pitch fields, often specific to a single composer. These alternative names include: harmonic fields; vertical row (*Grove Music Dictionary*) spaces (Jonathan Harvey);¹ tableaux (Mel Powell);² sieves (Iannis Xenakis);³ twelve-note chord aggregates (Witold Lutosławski);⁴ hypostatization (Taruskin);⁵ and several to refer to Carter’s pitch fields including spatial set,⁶ vertically ordered twelve-tone set,⁷ fixed twelve-note structure,⁸ and registrally-ordered all-interval row.⁹

**A chord or a scale?**

When a composer creates a pitch field, the collection of notes functions in many ways like a chord or a scale.

In a traditional chord, the register of the notes can move to different octaves and still be considered as the same; a major triad still retains its identity no matter how it is voiced. Using a pitch-class set (pc set), any major triad (or a minor triad, for that matter) can be described as [0 3 7]. In a pitch field, the identity changes if certain notes are displaced up or down the octave. Any aggregate chord (a chord containing all twelve notes of the chromatic scale) is considered to have a pc set of [0 1 2 3 4 5 6 7 8 9 10 e]. However, this does not differentiate between a pitch field of twelve notes packed within a span of an  

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octave or spread out over six octaves, as example 1.01 shows. A pitch field renders pc-sets to be of little value as a form of analysis because pitch-class by its definition does not take register into account, while the retention of a note’s registral identity is at the very heart of any pitch field.

Example 1.01: A) Twelve-note chromatic cluster; B) twelve notes stacked in P5 over 6.5 octaves. These two are considered equivalent in pc set theory.

Traditional scales have a pattern that is repeated every octave. A section of a scale spanning an octave is the same at any register, and as a result, notes of a scale do not have a registral identity.

There are some pitch fields that are built similarly to a scale with repeating pattern. Unlike traditional scales, however, the notes of such a pitch field retain their registral identity by not repeating at the octave. An example can be found in Xenakis’ *Jonchaies* (example 1.02), in which the composer creates a scale that has a periodicity of a perfect 11th (arrows indicate the start of a new segment). Even though the same pitch-classes are found in multiple octaves, the non-octave periodicity gives the same pitch-class a different identity each time it repeats (e.g. pitch-class A repeats three times in example 1.02, as the first, seventh, and fifth notes of the repeating pattern).
Pitch fields constructed without a periodic pattern will usually contain fewer notes. When the notes are packed tightly with small intervals separating the adjacent notes, then the pitch field will resemble a scale but with a narrow ambitus; when spaced out widely to encompass a wider range, the spacing of the adjacent notes will generally be wider. For instruments with a small range, many of the notes of a widely spaced pitch field would be inaccessible, further limiting the number of pitches they would have available to play from an already restricted set.

2. Literature on pitch fields

The two notable examples of an overall survey are the *Grove Music Dictionary's* entry on “Harmony,” section V, written by Julian Anderson and Charles Wilson;10 and Paul Nauert’s article from *Perspectives of New Music*, “Field Notes: A Study of Fixed-Pitch Formations.”11

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Anderson and Wilson’s entry in *Grove* is an examination of late twentieth-century harmonic devices, with an extensive portion dedicated to registrally fixed harmonic practices. However, due to the limited context of the dictionary, there is no detailed examination of any single work. Instead the article provides a brief but thorough overview from Pierre Boulez, Karlheinz Stockhausen, Henri Pousseur, Luciano Berio, Witold Lutosławski, and Elliott Carter. The pandiatonic music of Steve Reich, Philip Glass, John Adams, and Arvo Pärt are discussed as well with some reference to fixed-register formations. Spectral music is mentioned without any direct connection with fixed-register harmony.

Nauert’s article begins with a survey of works by Anton Webern, Mel Powell, Carter, and Lutosławski, briefly highlighting the features of each composer’s use of pitch fields. However, the main thrust of Nauert’s article focuses on development of a method that utilizes pitch fields as “abstract resources for composition.”12 The initial survey of the works by the aforementioned composers provides more detail than the *Grove* article, and many of the features highlighted are points that Nauert finds important when discussing his own theories later on.

3. Composers’ use of pitch fields

The following is a survey of how different composers have utilized fixed-register pitched fields in their compositions. My aim is not to provide a comprehensive list, but rather to show how different composers approach this particular technique.

12 Ibid., 214.
The first instance of a work that placed pitch-classes in distinct registers was Anton Webern’s Symphony, op. 21, first movement, composed in 1928. Despite the rigorous twelve-tone double canon that takes place from the opening measure, the quick-shifting klangfarbenmelodies, or the high degree of disjunction, the work maintains a static harmonic consistency that comes as a result of fixing the register. Webern scholar Kathryn Bailey considers the work to be in sonata form,\textsuperscript{13} with one pitch field throughout the exposition, another for the recap, and two simultaneously in the development, with every field being symmetrically constructed around one or two central pitches (example 1.03).\textsuperscript{14}

Example 1.03: Webern, Symphony, op. 21/I, pitch fields for A) exposition, mm. 1-26; B) and C) development, mm. 27-41; D) recapitulation, mm. 42-66


Webern uses identical row forms in the exposition and recapitulation (figure 1.4). The sonority between the two, however, is considerably different, due to the change in pitch fields as well as a destabilization of the rhythm, meter, and timbre in the recap.

Example 1.04: Webern, Symphony, op. 21/i, tone row

Particularly in the exposition and the recapitulation, the pitch fields create harmonic stasis amidst all of the intricacies and flux within. Such harmonic consistency is unprecedented in twelve tone works that have often focused primarily on the horizontal dimensions such as melodies and motives, often at the expense of harmonic control. The concern was later shared by Pierre Boulez:

What worried me increasingly in my own early works and, for instance, in the works of Schoenberg was the absence of control over vertical structure. Harmonic encounters took place more or less by accident. Melodic lines had reached an extreme degree of refinement, but side by side with them were harmonic relationships that not only lacked refinement but were the result of pure chance.15

With the use of a fixed-register pitch field starting with op. 21, followed by the second movement of Piano Variations, op. 27 (1936),16 Webern discovered possibilities for

16 Quartet for violin, clarinet, tenor saxophone, and piano, op. 22/i also uses pitch fields for sections but not for the entire piece unlike op. 21/i and op. 27/ii.
the twelve-tone language that could “compensate for this perceived arbitrariness,”¹⁷ and thereby showing a new path for a whole generation of composers who followed.

**Messiaen**

A work often cited as ushering in the brief era of total serialism is Oliver Messiaen’s *Mode de valeurs et d’intensités* (1949). Messiaen arranged a pre-compositional array of 36 distinct pitches, with each note assigned a particular duration, attack and dynamic level – in essence, Messiaen treated each note as a separate sound-object, each with a unique timbre. Richard Taruskin argues that this work, due to what he terms “hypostatization” – the total determination (‘fixing’) of a limited assemblage of sonic elements or events – reflects a direct influence from Webern’s Symphony Op. 21, String Quartet op. 28, and Piano Variations op. 27,¹⁸ a reasonable assessment considering the significance of Webern’s music during this period. Of course, Messiaen took Webern’s idea several steps further by fixing not just the register, but attack, duration, and dynamics.

Another possible source of influence is the music of John Cage. In the summer of 1949, Messiaen invited Cage to Paris to perform his *Sonatas and Interludes* (1946-8), a set of works for prepared piano in which the instrument is modified to create an array of sounds that do not correspond with the pitch of the key being hit. Instead, each key is treated as a fixed sound object. According to Messiaen scholar Robert McNulty, “The proximity of Cage’s performance to Messiaen’s working on *Cantéyodjayâ* and *Mode de

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*valeurs et d’intensités* is too compelling for Cage not to have been a vital influence in the creation of these important pieces."\(^{19}\)

Regardless of the influence, the overall harmonic sonority of *Mode de valeurs et d’intensités* is one of stasis. The fixing of register, in particular, simplifies the overall harmonic language, undermining the complex exterior of the work. That each note is assigned a specific timbre only heightens the overall sense of immobility. While Messiaen’s pre-compositional scheme for this piece is usually presented together with all the parameters, example 1.05 has been reduced to only the pitch and the register.

![Example 1.05: Olivier Messiaen, *Mode de valeurs et d’intensités*, pitch scheme](image)

Cage

Around the same time *Sonatas and Interludes* and other works for prepared piano were being written, Cage began to explore a practice now known as the “gamut technique,” in which a collection of musical materials are defined during the pre-compositional phase. Cage considered these musical materials as “not simply a collection of pitches, themes,

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motives, or scales, but a collection of sounds of varying character and complexity."\textsuperscript{20} By treating pitches as sound-objects, Cage was able to free himself from following any traditional harmonic progressions and voice-leading. The gamut technique can also be seen as an application of the ideas previously developed in his works for the prepared piano and percussion into works for pitched instruments.

Cage first incorporated the gamut technique in \textit{Two Pieces for Piano} (1946) and \textit{The Seasons} (1947) for orchestra, often mixing the gamut amongst freely composed materials. The first work that adhered to a strict use of the gamut technique throughout the entire composition, however, was the \textit{String Quartet in Four Parts} (1949-50). A gamut of thirty-three elements is all that is used to sustain this twenty-minute work. The work is largely melodic, with the entire harmonic content predetermined based on the gamut. Cage went so far as to describe the work as “a melodic line without accompaniment,”\textsuperscript{21} since harmony is completely subservient to the melody and the gamut.

\textsuperscript{21} Ibid., 40.
Example 1.06: Cage, *String Quartet in Four Parts*, gamut of sonorities. Reprinted with the permission of Cambridge University Press

The stasis that Cage is able to achieve is not simply from the lack of harmonic progression, but is also the result of the limited pitch resources that he places upon on the composition with the gamut. Cage is using a pitch field, but much in the same way as in Messiaen's *Mode de valeurs et d'intensités*, each note can be thought of as having a unique timbre.

Other composers have adopted the gamut technique, including Morton Feldman (*Piano* [1977]), Christian Wolff (*For Piano I* [1952]), and John Luther Adams (*The White Silence* [1998]). However, they have all adopted a “looser” definition of the gamut technique, which mixes free composition with pre-composed sonorities, and where the pre-composed materials gradually mutate over time.

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Boulez

Pierre Boulez's impetus for using pitch fields may have come from a combination of the three aforementioned composers: Webern, through the study of the works; Messiaen, as a student of his class when *Mode de valeurs et d'intensités* was being composed; and through intense correspondence with Cage during the time when the gamut technique was being formulated (Boulez was the one who in fact invited Cage to perform *Sonatas and Interludes* in the summer of 1949). Unlike *Mode de valeurs et d'intensités* and the gamut technique, Boulez’s use of pitch field is strictly pitch-based therefore more appropriate to associate with Webern.

Boulez considers fixed registration as “[o]ne of the refinements of classic 12-tone technique,” which he uses “to obtain a sort of value corresponding to tonal values, such as modulation, to appeal to completely different procedures, which are founded on the mobility or fixity of notes.” Fixing registers has become an important part of Boulez’s compositional arsenal, often used to create and delineate sections in the piece. An early work such as Piano Sonata No. 2 (1947-8) shows an ephemeral use of pitch fields, often limited to a few fixed notes, with other pitch-classes roaming freely. Example 1.7 shows a brief moment in which the C-sharp, D, and G-sharp/A-flat are fixed:

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*Derive 1* is constructed in a bipartite form, with the harmony alternating among six pitch fields (example 1.08). The harmonic rhythm of each pitch field is methodically controlled: in the first section, the harmonic rhythm systematically expands, with each succeeding pitch field lasting a beat longer than before (with a few exceptions); the second section gradually accelerates in harmonic rhythm, this time with each pitch field lasting one beat less than the previous. There is also a coda consisting of a single pitch field

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(example 1.09). Despite the complex exterior of the piece, the harmonic language and the formal idea are remarkably simple.

Example 1.08: Boulez, *Derive I*, pitch fields

<table>
<thead>
<tr>
<th>Section 1</th>
<th>Section II</th>
<th>Coda</th>
</tr>
</thead>
<tbody>
<tr>
<td>PF No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3 4 5 6 7 8</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>4 5 6 7 8 9</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>6 7 8 9 10 11</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>7 8 9 10 11 13</td>
<td></td>
</tr>
</tbody>
</table>

Example 1.09: Boulez, *Derive I*, harmonic rhythm. Reprinted with the permission of Cambridge University Press.

**Pousseur**

Henri Pousseur’s essay “Outline of a Method,” published in *Die Reihe* in 1957, begins by asserting that some music is designed to be unpredictable but ends up paradoxically being perceived as repetitive. His article proposes methods of sustaining the unpredictability without sounding repetitive by carefully controlling six “parameter-dimensions”: harmonic fields, registers, dynamics, types of morphological behavior, chronometric density, polyphonic density. Using his own compositions as examples

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(Quintet in memory of Webern [1955], and three movements from his Exercises pour piano [1959]), Pousseur details his compositional method of methodically varying each parameter. Of particular interest is his formulation of “harmonic fields” that temporarily fix a group of pitches with one or two characteristic intervals that define each harmony. This idea would be influential to the harmonic thinking of his friend Luciano Berio.

**Berio**

The influence of Pousseur’s article, however, only went so far; according to Berio scholar David Osmond-Smith, “Berio was perhaps more interested in the spirit than in the letter of Pousseur’s formulations.”

Osmond-Smith’s diagram of pitch fields used in the first 16 measures of Epifanie A (1961) (Ex. 1.10) indicates the extent of the chromatic saturation of the notes of the pitch fields (indicated by white note-heads), made denser by notes outside the field that are used in “brief tutti chords...and pitches introduced in the aftermath of a field or a chord, usually to fill out gaps within the previous structure” (indicated by black note-heads). Some of Pousseur’s influence can be seen through Berio’s preference for limiting the intervallic content of the notes of the field. Pitch fields gave Berio a method to control the massive orchestral textures from one measure to the next. However, the profusion of notes within each pitch field and the lack of time each pitch field has to establish its sonority does not lead to much harmonic clarity. Lines between note-heads indicate a chromatic saturation,

30 Ibid., 25.
curved brackets indicate common nucleus, and the square brackets shows the intervallic connection between mm. 7-9 and mm. 15-16.

Example 1.10: Berio, Epifanie A, pitch fields m. 1-16 (from Osmond-Smith 25)

Berio’s focus on smaller forces, often for a solo instrumentalist or vocalist starting with his Sequenza I for flute (1958), necessitated a more melodic approach compared to the works for the enormous orchestral forces that he had been using before. With regard to his approach to melody:

I wanted to establish a way of listening so strongly conditioned as to constantly suggest a latent, implicit counterpoint. The ideal was the “polyphonic” melodies of Bach. An inaccessible ideal, naturally, because what implicitly guided polyphonic listening in a Bach melody was nothing less than the history of baroque musical language, whereas
in a “non-linguistic” melody like my *Sequenza* for flute, history provided no protection, and everything had to be planned out explicitly.\textsuperscript{31}

The polyphonic melodies and implicit counterpoint that Berio sought necessitated a less densely saturated, longer-lasting pitch field than in *Epifanie A*. The simplification and the clarity of his harmonies allowed Berio to create a harmonic syntax that suggested directionality, a task not easily achieved in a non-tonal (“non-linguistic”) context. There is perhaps no better example of directionality than *Sequenza VII* for oboe (1969), which starts with a single note (B\textsubscript{4}), progressively adding additional notes until nearly the entire 2.5-octave range of the oboe is chromatically saturated. The progression can be seen in example 1.11. While most *Sequenzas* are not as systematically constructed as this, according to Berio, “The title [*Sequenza*] was meant to underline that the piece was built from a sequence of harmonic fields from which the other, strongly characterized musical functions were derived.”\textsuperscript{32}

\begin{center}
\scalebox{0.6}{
\begin{tikzpicture}
\begin{scope}[shift={(-1.5,0)}]
\draw (0,0) -- (7.5,0);
\foreach \x in {1,...,7}\filldraw[black] (\x cm,0) circle (2pt);
\foreach \x in {1,...,7}\filldraw[black] (\x cm,2cm) circle (2pt);
\filldraw[black] (1.5cm,0) circle (2pt);
\filldraw[black] (2.5cm,2cm) circle (2pt);
\filldraw[black] (3cm,0) circle (2pt);
\filldraw[black] (3.5cm,2cm) circle (2pt);
\filldraw[black] (4.5cm,0) circle (2pt);
\filldraw[black] (5cm,0) circle (2pt);
\filldraw[black] (5cm,2cm) circle (2pt);
\filldraw[black] (6cm,0) circle (2pt);
\filldraw[black] (6cm,2cm) circle (2pt);
\filldraw[black] (7cm,0) circle (2pt);
\filldraw[black] (7cm,2cm) circle (2pt);
\end{scope}
\end{tikzpicture}}
\end{center}

Example 1.11: Berio, *Sequenza VII*, outline of pitch structure (from Osmond-Smith 34)


\textsuperscript{32} Ibid.
This gradual and methodical expansion of a pitch field is typical of Berio, and can be seen in works such as *O King* (1968), *Points on a Curve to Find...* (1974), and *Brin* (1990), each with its own scheme. In *Points on a Curve to Find...*, a ten-pitch-class pitch field is put into constant circulation by a virtuosic piano line. While the external texture is fast and intricate, the notes swirl around the same ten notes to create harmonic stasis. The harmony is varied slowly in two ways: by the displacement of a note within the pitch field to a different register; and by the substitution of an unused pitch-class in place of one already in circulation. This technique creates an almost imperceptible change in content of the pitch field, giving listeners an opportunity to familiarize themselves with the harmonic content of the melody without staying on any single pitch field for too long. Example 1.12 traces the evolution of the pitch field in snapshots around each of the first six rehearsal numbers, although the octaves are displaced in between each rehearsal mark more actively.

Example 1.12: Berio, *Points on a Curve to Find...*, pitch fields around first six rehearsal numbers
Donatoni

Franco Donatoni’s work *Spiri* (1977) represents an artistic breakthrough and a beginning of what the composer himself labeled as his “joyous” period. His struggles prior to this period stemmed from his dissatisfaction with the mechanical procedures that “once set off, fixed into a rigid mechanism which lost all contact with the subjective act which initiated it.” With *Spiri*, Donatoni begins a newfound focus on the flow of horizontal lines to give his compositions a level of freedom and a sense of “play” that was not present before.

The intricate melodies in the beginning of *Spiri* create a highly contrapuntal texture. Through the use of pitch fields, Donatoni is able to keep a consistent harmony throughout, while giving his melodic ideas a distinct character based on the intervallic content. Much like his compatriot Berio, Donatoni quickly exhausts all the notes of the pitch field to a point of stasis, necessitating frequent harmonic changes. However, unlike *Sequenza VII* and *Points on a Curve to Find*... that feature a gradual, nearly imperceptible evolution of harmony, the succession of pitch fields in *Spiri* is abrupt, switching between two recognizably different pitch fields that share few common tones in between, as shown in example 1.13.

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In the opening measures of *Spiri*, the two instruments play melodies that clearly outline the pitch field. By m. 11, however, Donatoni obscures the harmony by introducing two different pitch fields simultaneously: the flute and the ensemble violin play within one field, while the oboe and solo violin play within another. While not harmonically as clear as the first seven measures, Donatoni maintains coherence by layering one familiar pitch field on top of a new, with many common tones shared between the two. The familiarity of the harmonic and musical content of one of the layers keeps the addition of another layer from sounding too overwhelming. Example 1.14 shows the two fields, with the top staves utilizing the same pitch fields from the first measures of the piece.
Example 1.14: Donatoni, *Spiri*, mm. 11-20, combining pitch fields

**Band-pass filter “field”**

Before moving on, it should be mentioned that I have not included pieces that attempt to translate a band-pass filter technique from electronic music studios onto instrumental works. A band-pass filter passes only a specified bandwidth of sound frequencies, thereby extracting a small slice from a complex sonority (such as a white noise). A full chromatic cluster spanning many octaves would often function as an instrumental analog to a white noise, which would then be “filtered” into a smaller bandwidth by eliminating all but a select range of the chromatic cluster.

Stockhausen’s *Gruppen* (1955-57) and Ligeti’s *Atmosphères* (1961) use the concept of a band-pass filter to control and maneuver large orchestral clusters. However, unlike the pitch fields that have been discussed thus far, the band-pass filter principle only puts an upper and lower limit, with a full chromatic saturation in between. The main concern for this dissertation is the intervallic possibilities within a field, and a controlled cluster, consisting of all minor seconds within the top note and the bottom, will not make for a extensive discussion in this context, so band-pass pitch-fields will not be explored further.

**Lutosławski**

Although Witold Lutosławski never fully embraced the serial thinking that swept the Darmstadt International Summer Courses for New Music in the 1950s to the 1960s, his compositions starting with the *Five Iłłakowicz Songs* (1956-7) to his last work, *Subito* (1992), utilized some form of a “twelve-note aggregate chord.” The syntax in which such twelve-note aggregate chords were used changed over the course of his lifetime, from its
constant presence in the “middle” period (from *Five Iłłakowicz Songs* to *Novelette* [1979]), to simpler textures of the “late” period (*Epitaph* [1979] to *Subito*), in which his sparing use of twelve-note chords are saved for climaxes and ‘cadential’ functions.35

These aggregate chords are vertically fixed in register as a result of Lutosławski’s preference for harmonies with limited intervalllic content and his wariness of “harmonies containing many interval-classes, finding them lacking a distinctive character.”36 The two categories of twelve-note chords that Lutosławski constructs are, according to Charles Bodman Rae: those constructed using two, three, or four principal intervals; and those made from “chord-aggregates” – the superimposition of three four-note chords. Of the latter, Rae identifies ten different types of four-note chords that Lutosławski uses, and nearly all the intervals contained are major or minor 3rds (the exceptions being perfect 4ths on three occasions). Both types of twelve-note chords are constructed using a few basic intervals.

As a result of living in isolation in Soviet-controlled Poland, Lutosławski remained unaware of the musical trends occurring in the West. His formulation of fixed-register pitch fields therefore comes not from the influences of Webern and Boulez, but derived independently through the study of Béla Bartók, whose works such as *Fourteen Bagatelles* Op. 6, nos. VIII and X, and *Mikrokosmos* no. 143 “Divided Arpeggios” are largely built around just two intervals (also called “interval pairing”).

34 Period scheme as proposed in Steven Stucky’s 2001 article “Change and Constancy.”
The compositions of Lutosławski’s “middle” period contain long progressions of successive twelve-note chords. *Mi-Parti* (1975-6) for orchestra begins with eight such chords, each with a preponderance of major 7ths and a lack of any minor 9ths (example 1.15). The reason is, according to Steven Stucky, “[Lutosławski] believes that sevenths...exert an attraction inward toward each other, while ninths...’explode’ outward, repelling each other.”

![Example 1.15: Lutosławski, Mi-Parti, chord succession from the beginning. Reprinted with the permission of Cambridge University Press](image)

The transformation of one chord to another through registral displacement creates a subtle shift in the intervallic content, from a total lack of perfect fifths in the outer four chords, to an abundance in the middle four. Similar discrepancies can be found with the major 3rd interval as well. Chapter 2 will go into depth about methods that can be used to understand how much the octave transfers affect the intervallic contents.

Although the example above and much of the music in this study focuses on the harmonic stasis that results from a pitch field, instances of more dynamic textures exist when the harmonic rhythm is kept in constant flux. Lutosławski’s fourth movement of *Jeux vénitiens* (1960-1) and the beginning of the Cello Concerto (1969-70) following the opening

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38 Ibid., 119.
monologue are both works in which the pitch fields change in quick succession. The contrast between the static and the dynamic sections in Lutosławski’s music reflects the differences in formal function: a section of stasis is often designed to intensify the anticipation by hinting but not achieving the listener’s desire for development; a fast-moving section likely represents the fulfillment and realization of such a development.

Carter

Elliott Carter’s use of what Andrew Mead calls “twelve-tone sets, vertically ordered and at a fixed transposition, freezing the twelve pitch-classes in certain registers” maximizes the intervallic content – a stark contrast to Lutosławski. Carter takes advantage of chords with diverse intervallic properties, such as the all-interval twelve-note chords (a chord-type containing twelve pitch-classes and eleven unique intervals from 1 to 11), or the all-trichord hexachords (set class [012478] containing all twelve possible trichords).

An all-interval twelve-note chord can be found in works such as String Quartet No. 3 (1971), Concerto for Orchestra (1969), and Night Fantasies (1978-80) for solo piano. Night Fantasies is considered a harmonic “breakthrough” for Carter, using eighty-eight all-interval twelve-note chords in which each interval of the chord is paired symmetrically with its inversion equivalent with a tritone at the center, as shown in example 1.16 (this formation is also known as “retrograde-inversion-invariant all-interval twelve-note chords”). In order to maintain the diverse intervallic content, the all-interval twelve-note chords must be fixed in register.

Example 1.16: Carter, *Night Fantasies*, RI-invariant all-interval chords, mm. 3-11

All-trichord hexachords, unlike the all-interval twelve-note chords, are not fixed in register. However, in “Anaphora” from the song cycle *Mirror on Which to Dwell* (1976) based on a set of poems written by Elizabeth Bishop, Carter creates a twelve-note pitch field in which twenty-four such hexachords in prime and inverted forms are embedded within (four are shown in example 1.17).

Example 1.17: Carter, “Anaphora,” pitch field, example of an all-trichord hexachord and all 12 trichords within

Carter has a penchant for highlighting intervals or set classes for portions of a piece. In “Anaphora,” the vocal line emphasizes “one interval after another – perfect fifths, major and minor thirds, minor sevenths, and, climactically major ninths.”

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tranquillo opening of Night Fantasies emphasizes fourths and fifths, mm. 15-26 with minor thirds and major sixths, mm. 70-9 with a [0,2,5] trichord, mm. 123-8 with a [0,1,4,6] tetrachord, mm. 195 with [0,1,5], the ending with ninths and sevenths, and so on.\textsuperscript{43} In the String Quartet No. 3, Carter splits the quartet into two duos, each playing seemingly independent music from the other – so independent, in fact, that they do not play the same number of movements: Duo I, consisting of violin I and cello play four movements, while Duo II with violin II and viola plays six movements in total. Despite such dense counterpoint in the quartet, Carter’s use of all-interval twelve-note chords gives him control over the harmony. Moreover, each movement is associated with a specific interval, which he is able to bring out because the pitch field that he is working with gives him access to all eleven intervals:\textsuperscript{44}

<table>
<thead>
<tr>
<th>Duo I</th>
<th>Duo II</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Furioso – major seventh</td>
<td>1. Maestoso – perfect fifth</td>
</tr>
<tr>
<td>2. Leggerissimo – perfect fourth</td>
<td>2. Grazioso – minor seventh</td>
</tr>
<tr>
<td></td>
<td>5. Largo tranquillo – major third</td>
</tr>
<tr>
<td></td>
<td>6. Appassionato – major sixth</td>
</tr>
</tbody>
</table>

\textbf{Xenakis}

In the 1960s, Iannis Xenakis looked for new ways to conceive of time and space in his music through the examination of the Greek theoretical writings of Pythagoras and

\textsuperscript{43} Ibid., 215.
\textsuperscript{44} Ibid., 82-83.
Aristoxenos, as well as the structure of Byzantine music. According to James Harley,

Xenakis was able to come away with two important conclusions following his studies:\(^45\)

1. An approach to formal construction based on the transformational and combinatorial techniques of group theory;
2. An extension of symbolic logic he called “sieve theory,” enabling ordered collections of intervals to be constructed and permutated.

It is the latter that inspired Xenakis to create mathematically generated pitch structures that spanned multiple octaves without repetition at the octave. According to Xenakis, his theory of sieves is as follows: “[A] theory permitting the construction of symmetries which are as complex as one might want, and inversely, to retrieve from given series of events or objects in space or time the symmetries that constitute the series.”\(^46\) In other words, any repetitive structure (which he calls “symmetry”) can always be broken down into smaller, simpler “symmetrical” components. In example 1.18, James Harley outlines Xenakis’ explanation of deriving a major scale from two smaller components that repeat every 3 and 4 semitones.\(^47\) “Modulus” or “mod” refers to the number the smallest unit – in this case, a semitone – separating each cycle (“mod 3” means a note every minor 3rd); “tr” refers to the starting point (“tr2” means that the pattern starts on 2, not 0).

\(^47\) Harley, 43.
Example 1.18: The sieve method for deriving a major scale (Harley 43)

This idea, outlined in *Formalized Music* (1971), was of course not meant to construct major scales and other known collection of notes, but to devise new sets of scales. Sieves were first applied in constructing microtonal pitch collections in such works as *Nomos alpha* (1966) and *Nomos gamma* (1968). Microtonality could be managed similarly to the construction of the major scale above by treating the smallest interval as a quarter-tone or even an eighth-tone. Later, in works starting with *Jonchaies* (1977), a “tempered” scale pitch sieve is used, often for entire sections of a piece, creating a strong intervallic structure that gives the piece a complex modal sonority. The particular “mode” used in *Jonchaies* (example 1.2) reflects Xenakis’s long fascination with gamelan music (Xenakis took a trip to Indonesia with Toru Takemitsu and Betsy Jolas in 1972). Within each

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segment of the pitch sieve, interlocking fourths are separated by a semitone (e.g. G#-A-C#-D) to produce a sound often associated with the pelog scale. Such use of a pelog-like scale continued in many subsequent works, including Pléiades (1979), Palimpsest (1979), Anemoessa (1979), Aïs (1980), and Shaar (1983). As Harley states, “The periodic nature of the sieve creates uniformity throughout the full range of the material, though its non-octaviating structure...has the effect of weakening the tonal implications of the leading tones to create a more mysterious, compelling expression.”

Takemitsu

Toru Takemitsu’s trip to Indonesia with Xenakis (and Jolas) proved to be an influence for at least one piece – For Away (1973) for solo piano – with passages in which he evokes gamelan music. The interlocking patterns on the piano are further accentuated by temporarily freezing the register of the pitches being used, thereby limiting the collection of notes available, much like with a gamelan instrument (example 1.19 and 1.20).

The passage from example 1.19 clearly shows a non-European influence, while still managing to use all twelve pitch-classes in the pitch field, suggesting that he made a connection between the gamelan music and the fixed-register pitch fields that were being used by composers in Europe, and forged a synthesis. However, many of the passages in this piece, such as in example 1.21, do not make such explicit allusions to gamelan music.
Example 1.21: Takemitsu, *For Away*, pp. 2-3, m. 8 (Editions Salabert)
Example 1.22: Pitch field of Example 1.21

Takemitsu’s use of fixed-register pitch fields is fleeting and unsystematic. Certain sections of the piece use it, while others do not; when he does, a pitch field is contained within a single measure, which in this piece can be drawn out over several systems. Nevertheless, *For Away* is a unique synthesis between pitch field ideas that come from two vastly different locales.

**Minimalism**

The pitch fields surveyed so far have been from composers inclined to write with a harmonic language that is highly chromatic. The blurring of the distinction between the horizontal and the vertical components gave composers the flexibility to compose in ways that the trends of total serialism were not allowing them to compose. The byproduct of this technique is a static interior in spite of any exterior complexity. While composers writing highly chromatic music found this technique appealing, they were not the only ones; the minimalists were creating global stasis with a more limited collection of notes. According to Julian Anderson and Charles Wilson:

What Slonimsky termed ‘pandiatonicism,’ the free, non-functional employment of diatonic modes as neutral pitch ‘collections’ rather than as scales with a hierarchy of degrees, had been a prominent feature of mid-century neo-classicism, but it equally came to characterize the
minimalist works of Reich, Glass and later Adams. The harmonic consequence of Reich’s phasing processes, in which unison statements of diatonic (but generally non-triadic) melodic fragments move gradually out of synchronization, is often this kind of static modal field.\footnote{Julian Anderson and Charles Wilson, \textit{Grove Music Online}, ed. S.J. Sadie, 2012 11-May <http://www.oxfordmusiconline.com/subscriber/article/grove/music/50818>.}

Of all the pieces that we have looked so far, only Cage’s \textit{String Quartet in Four Parts} creates a largely pandiatonic harmonic field. It is not a surprise, therefore, to find some close parallels in the development of minimalism and Cage’s treatment of notes as sound-objects (gamut technique). Steve Reich, whose music has been influenced by African drumming and Balinese gamelan, has likened his writing for keyboard instruments to “a set of tuned drums.”\footnote{Steve Reich, \textit{Writings on Music, 1965-2000} (New York: Oxford University Press, 2002): 73.} This thinking is most readily seen in \textit{Phase Patterns} (1980), in which a steady pulse of a paradiddle drum pattern is mapped onto a total of six notes (example 1.23) for the entirety of the work. The fragmentary melodic materials in the work also work within the same pitch material as the harmony of the pulse.

Example 1.23: Reich, \textit{Phase Patterns}, pitch field

In works that followed, the underlying pulse continues to be sustained by harmony of limited pitch content that is vertically fixed. However, the melodic layers added on top of the pulsing harmonic layer create a diatonic pitch collection without such registral identity. In \textit{Eight Lines} (1979), the harmony of the pulse is laid out by the pianos, creating a distinctive quintal and diatonic voicing. On top of this harmony, other instruments come in
to add to the texture, including the addition of notes not present in the original piano figure. In the end, the composite pitch field is largely a diatonic cluster, rendering an analysis using pitch fields to be largely ineffective.

Example 1.24: Reich, *Eight Lines*, pitch field, beginning through rehearsal 14

Another minimalist work, *China Gates* (1977) by John Adams, is perhaps better served through a pitch field analysis. According to Adams, “Gates,” a term borrowed from electronics, are the moments when the modes abruptly and without warning shift. There is
‘mode’ in this music, but there is no ‘modulation.’” An analysis of modes reveals constant and abrupt shifts between an A-flat mixolydian mode and a G-sharp Aeolian mode. The notes contained within each “gate” are also registrally fixed, and a pitch field analysis of consecutive “gates” can reveal voice-leading that underlies the sudden, yet smooth harmonic shifts.

Example 1.25: Adams, *China Gates*, pitch fields, mm. 1-95

**Gamelan-inspired works**

Since gamelan music has been a source of inspiration for the pitch field music of Xenakis, Takemitsu, and Reich, it is worth mentioning several works that explicitly attempt to imitate gamelan music, and seeing whether their music attempts to imitate the physical

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limitations of the instruments. Some of the most notable composers who composed works mimicking gamelan music were Colin McPhee, Benjamin Britten, and Lou Harrison.

McPhee uses the scale of Balinese music to convey his impressions of the gamelan music. In his transcription of a Balinese ceremonial music, *Pemoengkah* (1940), McPhee uses a total of five pitch-classes: C-sharp, E, F-sharp, G-sharp, and B, which he claims to be the closest approximation of tuning of the *gender*. The melodic materials are limited in range, but highly active rhythmically, resulting in an active texture but a static harmony. The melody notes are always doubled in octaves to perhaps better recreate the rich overtones of the instruments he was trying to imitate. Although the constant octave-doubling seems to deny the registral identity of each note, McPhee is clearly more interested in recreating the timbre of the *gender* than in imitating the physical act of playing the instrument in the way Reich approached in *Phase Patterns*.

Britten's use of gamelan-like textures in *Death in Venice* (e.g. at rehearsal 93, example 1.26) is not to evoke the music of Bali as it is to introduce “foreign” sonorities into the dramatic narrative of the opera. While Britten uses slightly more pitch classes than McPhee, in order to evoke the “exotic” sonorities he emphasizes distinctive intervallic qualities (a *pelog*-like collection, G, A-flat, D-flat and E-flat), which he fixes in register. Although Britten doubles the melodic lines in octaves (e.g. glockenspiel an octave above the xylophone), the purpose is to enrich the timbre, much as McPhee did with his transcription. The result is a harmonic stasis within a highly active rhythmic texture. Eventually he begins to introduce counterpoint and harmony (from rehearsal 95) that quickly subverts the gamelan-like textures.
Spectralism

The ideas of spectral music are usually attributed to two French composers, Gerard Grisey and Tristan Murail, who in the 1970s used the acoustic properties of sound as the basis of their compositional materials. The properties of sound – or “spectra” – could be analyzed in ways that the human ear could not discern through the development of computer software that could break down sound waves into smaller components. Particularly important was the deconstruction of timbre through a mathematical process known as a Fourier Fast Transform (FFT), in which a complex sound wave could be understood as a combination of hundreds of sine tones (the simplest form of sound). Conversely, complex sounds could be recreated through the amalgamation of many sine tones in a process known as “additive synthesis.”

Grisey adopted this technique into instrumental music by treating each instrument as a sine tone, and combining the forces to create a new, complex timbre – a term he coined
“instrumental additive synthesis.” A well-known example is the opening chord of *Partiels* (1975), which can be thought of as an orchestration of the partials of a trombone pedal $E_1$ for eighteen musicians. An actual re-synthesis of a complex tone would require many times more than the number of tones used here, but Grisey is simply using the concept of additive synthesis to create an imprecise approximation of this trombone note, assigning particular partials to instruments. An attempt at recreating timbre from its most basic components, however, consists of more than playing all of the partials as a single chord. Other elements, such as dynamic levels of each partial and envelope (attack, decay, sustain, release), are equally important. Therefore, Grisey not only assigns notes of the trombone partial to instruments, each partial is given a dynamic level and an envelope that best approximates the analysis. For example, the analysis found the fourth partial to be much weaker than the surrounding notes, and therefore, Grisey orchestrated the opening accordingly with a *pianississimo* contrabass (example 1.27).

Example 1.27: Grisey, *Partiels*, first harmonic structure and instrumentation

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55 Ibid. 6-39.
The opening of Partiels is a series of chords that outline a slow transformation from one that diligently attempts to re-synthesize the trombone sonority to one that bears little resemblance to the original timbre. This is accomplished by introducing tones that are not part of the trombone partials – “inharmonic” tones – achieved through downward octave shifting of certain partials. The partials of the original trombone timbre are fixed in register, but by methodically displacing the registers, Grisey moves away from re-synthesis of a timbre and towards simply a chord. This careful harmonic planning of intermediary steps between two points is called “interpolation.”

The opening progression of chords in Partiels underscores the importance of register in maintaining a distinct sonority. The displacement by an octave can remove a note from the “correct” placement within the spectrum of the chord, and in a sense become a non-chord tone. This gradual shift from one entity to another is known as a “process,” a term also found in minimalist music, most famously in Reich’s essay, “Music as a Gradual Process” (1968). While the two come from different origins and may find little in common aesthetically, they share similarities in the stasis that results from approaching musical form as a gradual change that can be perceived (although concerns about the predictability of form have led spectral composers to explore less predictable forms of process by superimposing several layers of processes). Murail’s Gondwana (1980), not unlike Partiels, begins with a series of sounds that emulate another instrument, in this case the sound of a large bell. However, Murail bases

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the pitch material not on a computer analysis of a bell, but on the sonority resulting from using frequency modulation (FM). FM involves a pair of tones (marked “modulator” and “carrier” in example 1.28), which are converted into frequencies in hertz (in this case, 207.65 Hz and 392 Hz, respectively). This results in a number of summation and difference tones by using the equation below, where $i$ refers to the index of modulation (the higher the number, the more complex the sound) that emerges to produce a complex sound.

$$\text{frequency} = |\text{carrier} \pm (\text{modulator} \times i)|$$

Example 1.28: Murail, *Gondwana*, opening harmony derived from FM  (from Gainey 100)\(^{58}\)

Although the pitches are determined by a mathematical concept and not on the natural overtone series, Murail is simultaneously attempting to convey a gradual transformation from a bell-like sonority to a brass instrument. This is accomplished through a change in the envelope of the overall sonority. A bell can be emulated through a sharp attack and decay, followed by a long release. It is therefore necessary for the pitches to be fixed in register, and orchestrated in a specific way to convey the dynamic levels and the envelope. In spectral music, the notes of the harmony are as essential as the orchestration. As Murail describes, “Sonorities are...created through the harmony, the

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\(^{58}\) Christopher Joseph Gainey, "Turning Sound into Music: Attitudes of Spectralism," (Thesis (Ph.D) - University of Iowa, 2009): 100.
notes, the *pitches*...Pitch structures and orchestration have become one and the same thing.”

With Murail and Grisey, fixed-register pitch fields are a byproduct of their exploration of timbre, blurring the border between timbre and harmony in various ways. The fixing of register is only a component of the overall synthetic timbre that these spectral composers are attempting to create.

**Saariaho**

Kaija Saariaho is often labeled as a “post-spectral” composer, along with composers such as Magnus Lindberg, Marc-Andre Dalbavie, and Philippe Hurel – a label roughly defined as the generation of composers who followed Grisey and Murail in a search for “original solutions for the formal organization of these new sound-based materials (timbre and process).”

Although the music of Grisey and Murail were considered reactions against the pervading serial music of the time, the generation of composers who followed, Saariaho among them, did not have such prejudices against one style over another, and found no qualms with incorporating elements of serialism with spectralism. After her studies at the Sibelius Academy studying serial techniques with Paavo Heininen followed by a close association with IRCAM in Paris, where she encountered the music of Grisey and Murail, Saariaho was fully immersed in both “schools.”

Composer Julian Anderson describes Saariaho’s music prior to her arrival in Paris:

“[T]he harmony is rather less focused and somewhat vague – there’s a clear feeling of a

composer not yet fully sure of her harmonic language." It was her experience and discoveries at IRCAM with the aid of computer analyses that led to a greater coherence in her musical language, expanding on the ideas that had been explored by Grisey and Murail. Among the techniques that she uses is the fixing of registers, although her method effectively straddles the serial and the spectral worlds.

A piece Saariaho composed upon her arrival in Paris is *Laconisme de l’aile* (1982) for solo flute and optional electronics. The piece uses a single twelve-note aggregate pitch field for the entirety of the work, strongly implying her serial training with Heininen (example 1.29). In the meantime, her new spectral influence is revealed not so much harmonically, but through a gradual transformation in timbre, a spectrum that Saariaho describes in her program notes: “[O]ne end of which is very brilliant and pure, whilst the other has a coarse harsh sound.” Although Saariaho is using the spectral music concept of process and interpolation to guide her form, the harmony that she uses is not derived from any computer-aided analysis of an acoustic or synthetic sonority.

![Example 1.29: Saariaho, *Laconisme de l’aile*, pitch field](image)

Over two decades later, her use of pitch fields and static harmony continues. In her opera *L’Amour de loin* (2000), her harmonic language is, according to Spencer Lambright,

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“[S]urprisingly limited for a two-hour opera...While Saariaho uses long pedals and repetition in most of her compositions, the static language in this opera is extreme.”63

Right from the beginning, Saariaho uses a single pitch field for the first seventy measures (example 1.30). She gives herself a considerable amount of latitude in adding tones beyond the eleven pitches, but these notes are always present and help form the harmonic identity of the opening passage.

Example 1.30: Saariaho, L’Amour de loin, pitch field, mm. 1-72

Such extreme static harmony in Saariaho is due to her emphasis on what she has called a “timbral axis.”64 As Pousset describes, “This allowed the dialectic poles in the very materiality of the sonic phenomenon: between ‘sine waves’ and ‘white noise,’ between ‘clear sounds’ and ‘noisy’ ones.”65 In other words, noise and clear sounds on the “timbral axis” is analogous to the role that consonance and dissonance assumes in tonality. By keeping the harmony static, Saariaho is able to avoid any harmonic directionality that may supersede the more subtle timbral directionality that she wants to create.

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Harvey

Jonathan Harvey’s early works reflect his education in serial music that can be traced to his studies with Milton Babbitt at Princeton and a deep interest in the music of Stockhausen. However, with the invitation to the newly opened IRCAM by Boulez, Harvey found an environment that would open up his harmonic language. Perhaps his best-known piece, *Mortuos plango, vivos voco* (1980), is considered a masterpiece in merging techniques of serialism and spectralism. The entire work is structurally unified and based on the sonic properties of the Great Tenor Bell at Winchester Cathedral. Julian Anderson summarizes the formal structure:

The eight sections of the work are each based around one selected low partial in the bell spectrum; the duration of each section was determined by the frequency-proportions of these eight pitches...In short, every event, down to the smallest detail, can be deduced directly back to the bell spectrum and the eight pitches extracted from it.\(^{66}\)

This attempt at combining serialism with spectralism has resulted in a unique approach to pitch fields. Harvey uses pitch space (his preferred term for a pitch field) as “a means of relating pitch to other musical parameters.”\(^{67}\) For example, in *Song Offerings* (1985), a set of songs using texts of Rabindranath Tagore, Harvey uses pitch fields as a metaphor for the spiritual journey of a woman’s relationship with a god expressed in the text, from an initial “attainment” of the focal note C\(_5\) in the first movement, to an outward expansion from this focal note, and an eventual dissolution at the extreme registers to symbolize the fulfillment of death and the union with god.

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\(^{67}\) Michael Downes, *Jonathan Harvey: Song Offerings and White as Jasmine* (Farnham: Ashgate, 2009): 56.
Harvey’s proclamation that the “bass line moves into the middle”\textsuperscript{68} is fundamental in understanding the harmonic language of Harvey. Of the five pitch fields that Harvey uses in \textit{Song Offerings}, four are centered around C\textsubscript{5}, with the fifth between C\#\textsubscript{5}/A\#\textsubscript{4} (figure 1.31). C\textsubscript{5} is therefore treated as a central axis throughout the entire piece without ever having to overemphasize the pitch as a pedal. Using this method, the outward expansion in the final movement can also easily be achieved through a gradual movement away from the central pitch.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{example1.png}
\caption{Example 1.31: Harvey, \textit{Song Offerings}, five pitch fields used (SP refers to Harvey’s preferred term, ‘Spaces’)}
\end{figure}

Although it is Harvey’s spiritual pursuits that inform his method of constructing pitch fields, the structure of his pitch fields is not so different from many of the aforementioned composers. Harvey specifically mentions four properties specific to many of the fields that he constructs; the fields: 1) are constructed symmetrically around an axis; 2) spans one to two octaves on each side of the axis; 3) are made from two or three intervals; and 4) are atonal. In addition, “[the pitch fields] can remain in place for anything between a second and ten minutes and thus have the ability to achieve large-scale stasis.”

With each of these properties, there is precedence among the aforementioned composers: symmetrical pitch fields are found in Webern and Lutoslawski; spans of less than two octaves are in Boulez, Donatoni, Carter, and Lutosławski; limited intervals are found in Lutosławski, Boulez, Pousseur, and Xenakis; and almost all the non-pandiatonic pitch fields can be considered atonal.

A synthesis of spectralism and Harvey’s pitch fields occurs when he uses a technique called “equal addition compression” in White as Jasmine (1999), in which each note of the pitch field is converted to a frequency as expressed in Hz. The intervals are then compressed mathematically by dividing the distances between the notes (measured by Hz) in the field by a certain fraction (Murail uses a similar technique in pieces such as L’esprit des dunes [1994] and Désintégrations [1982-3]). Harvey regards such compressions as “coloring of [the original], an ornament on it – a deviation from it, but connect[ed] to it.”

71 Michael Downes, Jonathan Harvey: Song Offerings and White as Jasmine (Farnham: Ashgate, 2009): 95.
Yet, for Harvey, his goal is not "[forsaking] harmony and regard everything as timbre, as some French composers do, but rather [as] harmony being subsumed into timbre."\textsuperscript{72}

**Timeline**

Example 1.32 is a list of many of the works discussed in this chapter. What is most noticeable is the gap in years between Webern and the next composer. Furthermore, Boulez’s Piano Sonata No. 2 only fixes a few notes for a short duration, and both Messiaen and Cage fixes register not as a harmonic tool, but to create sound objects. Therefore, it could be argued that the compositions that truly inherit the registral fixing technique that Webern pioneered in 1928 did not begin until the middle of the 1950s.

<table>
<thead>
<tr>
<th>Composer</th>
<th>Title of Composition</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Webern</td>
<td>Symphony, Op. 21</td>
<td>1928</td>
</tr>
<tr>
<td>Boulez</td>
<td>Piano Sonata No. 2</td>
<td>1947-8</td>
</tr>
<tr>
<td>Messiaen</td>
<td>Mode de valeurs et d’intensités</td>
<td>1949</td>
</tr>
<tr>
<td>Cage</td>
<td>String Quartet in Four Parts</td>
<td>1949-50</td>
</tr>
<tr>
<td>Lutosławski</td>
<td>Five Hlakovicz Songs</td>
<td>1956-7</td>
</tr>
<tr>
<td>Boulez</td>
<td>Pli selon pli</td>
<td>1957</td>
</tr>
<tr>
<td>Pousseur</td>
<td>Outline of a Method</td>
<td>1957</td>
</tr>
<tr>
<td>Berio</td>
<td>Epifanie A</td>
<td>1961</td>
</tr>
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<td>Xenakis</td>
<td>Nomos alpha</td>
<td>1966</td>
</tr>
<tr>
<td>Berio</td>
<td>Sequenza VII</td>
<td>1969</td>
</tr>
<tr>
<td>Carter</td>
<td>String Quartet No. 3</td>
<td>1971</td>
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<td>Death in Venice</td>
<td>1973</td>
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<td>Takemitsu</td>
<td>For Away</td>
<td>1973</td>
</tr>
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<td>Berio</td>
<td>Points on a Curve to Find...</td>
<td>1974</td>
</tr>
<tr>
<td>Lutosławski</td>
<td>Mi-Parti</td>
<td>1975-6</td>
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<td>Grisey</td>
<td>Partiels</td>
<td>1975</td>
</tr>
<tr>
<td>Carter</td>
<td>Mirror on Which to Dwell</td>
<td>1976</td>
</tr>
<tr>
<td>Donatoni</td>
<td>Spiri</td>
<td>1977</td>
</tr>
<tr>
<td>Xenakis</td>
<td>Jonchaies</td>
<td>1977</td>
</tr>
<tr>
<td>Adams</td>
<td>China Gates</td>
<td>1977</td>
</tr>
<tr>
<td>Carter</td>
<td>Night Fantasies</td>
<td>1978-80</td>
</tr>
<tr>
<td>Reich</td>
<td>Phase Patterns</td>
<td>1980</td>
</tr>
<tr>
<td>Murail</td>
<td>Gondwana</td>
<td>1980</td>
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<table>
<thead>
<tr>
<th>Composer</th>
<th>Work Title</th>
<th>Year</th>
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<td>Laconisme de l'aile</td>
<td>1982</td>
</tr>
<tr>
<td>Boulez</td>
<td>Derive 1</td>
<td>1984</td>
</tr>
<tr>
<td>Harvey</td>
<td>Song Offerings</td>
<td>1985</td>
</tr>
<tr>
<td>Saariaho</td>
<td>L'Amour de loin</td>
<td>2000</td>
</tr>
</tbody>
</table>

Example 1.32: Timeline of the works discussed in chapter 1

Of course, what makes pitch fields remarkable is the sheer diversity of works that resulted from this single technique. In order to analyze such remarkable variety of works that use fixed-register pitch fields, a new analytical method will be required. The following chapter will go into depth to discuss the methodology of such an approach.
Chapter 2
Categorization of Pitch Fields

A fixed-register pitch field provides an extraordinary amount of flexibility and versatility, as evidenced by the diversity of works presented in Chapter 1. Unfortunately, there currently exists no method for analyzing pitch fields in order to compare this wide array of compositions under the same light. This chapter is an attempt at bridging this deficiency, coming up with a solution for by breaking down pitch fields into smaller, analyzable components in order to compare various pieces from a single perspective. The insights gained from this method will be rewarding to the 21st-century music connoisseur who seeks to find connections between seemingly disparate schools of musical thoughts, from serialists and spectralists to minimalists and many others.

Ultimately, the study of pitch fields is a study in harmony. Many of the concepts and terms analogous to the study of tonal harmony, such as chord quality, chord progression, and voice-leading, can be applied to help understand the basic components. I would like to propose the following four categories in the analysis of pitch-field music:73

- Category 1: The construction of a single pitch field (chord quality)
- Category 2: The succession of pitch fields (voice-leading, harmonic rhythm)
- Category 3: The horizontal content within a pitch field (melody)
- Category 4: The notes that lie outside of the pitch field (non-chord tones).

73 These categories (1-3 in particular) owe greatly to Anthony Kroyt Brandt’s essay, “The Absence of Nouns: Mel Powell’s Harmonic Language,” Aperiodical, (1988). His ideas have been expanded to allow more flexibility in order to deal with a wider variety of music.
Category 1: The construction of a single pitch field

When looking at a single pitch field, there are many questions to consider: how many notes are there? Is there an upper and lower limit, and if so, how wide is it (ambitus)? If not, is there a pattern being repeated at a regular interval? Are all twelve pitch-classes present or are there pitch classes missing? Are some pitch classes used in more than one octave? Are there any prevalent or absent intervals?

The single most important information about a single pitch field is the intervallic content. With the possibility to choose any number of notes across the entire playable range to form a pitch field, it would be impractical to label distinct intervallic combinations in the same way tonality labels triads. Instead, the sonority of a pitch field can best be described by counting up all of the intervals within.

Counting “all of the intervals” does not simply mean counting the intervals between adjacent notes. It is necessary to measure the interval between every other note, every three notes, and so on. Without a systematic method, this can get unwieldy and difficult to keep track of. At first, the use of an interval-class vector\(^{74}\) seems like an obvious choice; unfortunately, it quickly becomes clear to us that an interval-class vector would not be useful: any pitch field containing twelve pitch-classes would be considered equivalent. As example 1.1 from the previous chapter showed, the sonority between two twelve-note pitch fields can be considerably different.

When the register is fixed, it becomes necessary to consider the differences between a minor 2\(^{\text{nd}}\), a major 7\(^{\text{th}}\), a minor 9\(^{\text{th}}\), a major 14\(^{\text{th}}\), and so on, all of which would be classified

\(^{74}\) Interval-class vector: a list of six integers indicating the complete interval-class content of a pitch class set.
as interval-class 1. We must, therefore, come up with a system that can distinguish differences in register. Unlike an interval-class vector, which measures interval-class 1 through 6, a system that measures the intervals within a pitch field must range from interval 1 to the largest interval possible between the highest and the lowest interval in order to eliminate octave equivalency. An interval-1 is now a minor 2\textsuperscript{nd}, but no longer a major 7\textsuperscript{th} (it will be an interval 11), a minor 9\textsuperscript{th} (interval 13), a major 14\textsuperscript{th} (interval 23) and so on. The chart below (example 2.01) shows the numerical values of intervals between 1 and 36 semitones (three octaves).

<table>
<thead>
<tr>
<th># of ½ steps between</th>
<th>traditional interval name</th>
<th># of ½ steps between</th>
<th>traditional interval name</th>
<th># of ½ steps between</th>
<th>traditional interval name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>m2</td>
<td>13</td>
<td>m2+8ve</td>
<td>25</td>
<td>m2+15ve</td>
</tr>
<tr>
<td>2</td>
<td>M2</td>
<td>14</td>
<td>M2+8ve</td>
<td>26</td>
<td>M2+15ve</td>
</tr>
<tr>
<td>3</td>
<td>m3</td>
<td>15</td>
<td>m3+8ve</td>
<td>27</td>
<td>m3+15ve</td>
</tr>
<tr>
<td>4</td>
<td>M3</td>
<td>16</td>
<td>M3+8ve</td>
<td>28</td>
<td>M3+15ve</td>
</tr>
<tr>
<td>5</td>
<td>P4</td>
<td>17</td>
<td>P4+8ve</td>
<td>29</td>
<td>P4+15ve</td>
</tr>
<tr>
<td>6</td>
<td>TT</td>
<td>18</td>
<td>TT+8ve</td>
<td>30</td>
<td>TT+15ve</td>
</tr>
<tr>
<td>7</td>
<td>P5</td>
<td>19</td>
<td>P5+8ve</td>
<td>31</td>
<td>P5+15ve</td>
</tr>
<tr>
<td>8</td>
<td>m6</td>
<td>20</td>
<td>m6+8ve</td>
<td>32</td>
<td>m6+15ve</td>
</tr>
<tr>
<td>9</td>
<td>M6</td>
<td>21</td>
<td>M6+8ve</td>
<td>33</td>
<td>M6+15ve</td>
</tr>
<tr>
<td>10</td>
<td>m7</td>
<td>22</td>
<td>m7+8ve</td>
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<td>11</td>
<td>M7</td>
<td>23</td>
<td>M7+8ve</td>
<td>35</td>
<td>M7+15ve</td>
</tr>
<tr>
<td>12</td>
<td>P8</td>
<td>24</td>
<td>P15</td>
<td>36</td>
<td>P22</td>
</tr>
</tbody>
</table>

Example 2.01: Interval numbering system that distinguishes registers

Depending on the ambitus of the pitch field from the highest note to the lowest, these numbers can sometimes exceed a three-octave range. Counting intervals beyond two octaves may prove to be less than useful – the distinctness of the intervals that are so apparent in the first octave seem to dissipate the farther apart the notes are – but we will count all of the intervals for now in order to be thorough.

Counting the intervals with this numbering system is a matter of going through each possible interval systematically. Take, for example, the first pitch field from Lutosławski's
*Mi-Parti* (example 2.02). First, convert these notes into numbers to help us with the arithmetic. If we set the lowest note E₂ as 0, we can quickly tabulate the number of semitones apart for every note above.⁷⁵

<table>
<thead>
<tr>
<th>Note</th>
<th>Numeric Conversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>B♭₅</td>
<td>42</td>
</tr>
<tr>
<td>A♭₅</td>
<td>40</td>
</tr>
<tr>
<td>F₅</td>
<td>37</td>
</tr>
<tr>
<td>D₅</td>
<td>34</td>
</tr>
<tr>
<td>B₄</td>
<td>31</td>
</tr>
<tr>
<td>F♯₄</td>
<td>26</td>
</tr>
<tr>
<td>Eb₄</td>
<td>23</td>
</tr>
<tr>
<td>C₄</td>
<td>20</td>
</tr>
<tr>
<td>G₃</td>
<td>15</td>
</tr>
<tr>
<td>C♯₃</td>
<td>9</td>
</tr>
<tr>
<td>A₂</td>
<td>5</td>
</tr>
<tr>
<td>E₂</td>
<td>0</td>
</tr>
</tbody>
</table>

Example 2.02: The first pitch field in Lutosławski’s *Mi-Parti*, and the numeric conversion

From here, it is a simple matter of subtracting the numbers in a systematic order so as to count all the intervals contained within this twelve-note pitch field. Start by subtracting adjacent intervals, starting with the bottom two, A₂ (5) and E₂ (0) (5-0=5), and working all the way up to B♭₅ (42) and A♭₅ (40) (42-40=2). Then proceed by counting the intervals between every other note, from C♯₃ (9) and E₂ (9-0=9) up to B♭₅ and F₅ (37) (42-37=5). Proceed until the end, when the distance between the highest and the lowest notes are three notes, and so on. Example 2.03 shows every single interval present in this pitch field (the numbers on the top row represent the distance between the two notes being subtracted).

---

⁷⁵ I will use scientific pitch notation in which middle C is C₄.
Example 2.03: List of all the intervals present within the note 12-note pitch field

The data collected above can be made more useful by counting how frequently each interval occurs. Example 2.04 is the result of the data compiled. We are now able to determine whether one or more intervals are being emphasized or deemphasized. In this instance, the most frequently occurring intervals in the first two octaves are 11 and 3, followed by 5, 6, 8, and 14; the intervals neglected are 1, 7, and 13 (and no 12 because pitch classes do not repeat). From this information, we can surmise that this chord contains a strong “diminished” sonority from the prevalence of 3 and 6. Also, as we shall soon see, the great disparity of the frequency of intervals 11 and 13 is significant.
Example 2.04: Frequency of the appearance of each interval

**Category 2: The succession of pitch fields**

Unlike in tonal harmony, in which there is a forward push towards an inevitable final tonic, non-tonal harmony has no such predetermined fate. As a result, composers have often struggled to create a self-contained harmonic logic within each piece. Pitch fields present one solution, giving them the ability to create a logical non-tonal progression.

By carefully surveying the harmonic shifts in successive pitch fields, we will be able to determine the voice-leading (the logic of successive pitch fields) and the harmonic rhythm (the rate of change of pitch fields).

**Voice-Leading**

In a tonal harmonic progression, not all chord changes are considered equal. There is a hierarchy in the importance of different chords within a chord progression, with some functioning more importantly than others. In the Beethoven excerpt below (example 2.05), a new chord occurs every beat. However, the I\(^6\) chord can be considered as an expansion of the first chord, and the entire second measure an expansion of a V, thus reducing the progression in the two measures to three chords instead of six.
In a non-tonal context, however, there is no harmonic functionality or hierarchy that can help identify the importance of a particular harmony over another. Instead, with a pitch field, it is possible to measure the degree of change which may reveal the level of importance in each harmonic shift: an abrupt change in the interval content of a pitch field is more discernable and likely to signal a more significant harmonic event than a gradual change.

To measure the degree of change that a pitch field undergoes, many variables must be considered, including the quantity of notes, the register, the range, the density, and the intervallic content. Fortunately, all of these can be addressed by applying the procedures of Category 1 with each pitch field. Once the data for each pitch field are compiled, it will be possible to answer questions about the degree of change that a series of a pitch fields undergoes, including information that would be difficult to measure otherwise, such as: Do certain intervals become progressively more (or less) prevalent? Does one prominent interval replace another? Are some intervals consistently present throughout a series of pitch fields? Furthermore, how do the changing intervallic contents contribute to the
overall effect of the work? This laborious procedure may reveal hidden structures within a progression of pitch fields that may help shed light on the composer’s intentions.

Going back to the opening of Lutosławski’s *Mi-Parti*, the eight consecutive twelve-note aggregate pitch fields that open the piece hardly change in register or spacing (example 2.06). Each pitch field is altered gradually from the previous chord through octave displacement of the notes marked with an x, but despite the changes, the progression looks and sounds largely static on a macro level.

Example 2.06: Pitch field succession from the beginning of *Mi-Parti*\(^{76}\)

<table>
<thead>
<tr>
<th>Interval</th>
<th>PF 1</th>
<th>PF 2</th>
<th>PF 3</th>
<th>PF 4</th>
<th>PF 5</th>
<th>PF 6</th>
<th>PF 7</th>
<th>PF 8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td>5</td>
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<td>37</td>
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<td>0</td>
<td>4</td>
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<td>7</td>
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<td>1</td>
<td>0</td>
<td>20</td>
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<td>4</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>23</td>
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<td>0</td>
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<td>6</td>
<td>6</td>
<td>3</td>
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<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<td>6</td>
<td>5</td>
<td>49</td>
<td></td>
</tr>
<tr>
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<td>3</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>2</td>
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<td>3</td>
<td>0</td>
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<td>14</td>
</tr>
<tr>
<td>17</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>14</td>
</tr>
</tbody>
</table>

In order to precisely measure the intervallic content of these eight pitch fields, the procedure outlined in Category 1 will be applied for each. Example 2.07 shows the results of tallying up the intervallic content of each of the first eight pitch fields and the total intervallic content of all eight on the right-most column. We quickly discover some unusual features that would not immediately be apparent by simply glancing at the chords by themselves. Particularly apparent are the complete absence of interval 13 (minor 9ᵗʰ) and abundance of interval 11 (major 7ᵗʰ) – in fact, the most frequently occurring interval within these eight pitch fields. The distinction between interval 13 and interval 11 – two
equivalent interval-classes – is important in Lutosławski’s music: the composer felt that major 7ths created a “stable” sonority through its inherent inward pull, whereas a minor 9th created a “tense” outward pull. In the case of this progression of eight pitch fields, Lutosławski was able to control the intervallic content so carefully as to create a consistent “stable” sonority throughout the eight pitch fields.

The scarcity of interval 1 and 2 (minor and major 2nds, respectively) is also notable, limiting the possibility of traditional linear melodic writing since the smallest adjacent interval would almost always be a minor 3rd or wider. The notes of the eight pitch fields are spaced out evenly across a four-and-half octave range with no clusters of densely packed notes.

Other intervals are not as consistently present or absent throughout. Intervals 4 (major 3rd) and 7 (perfect 5th) are anemic in the outer four pitch fields, while bountiful in the inner four. Likewise (although not as drastic), intervals 3 (minor 3rd), 6 (tritone) and 9 (major 6th) are more abundant in the outer four than the inner four fields. Thus, a small transformation from a diminished sonority (minor 3rd, tritone, major 6th) to a triadic sonority (perfect 5ths and major 3rds), then back to a diminished sonority can be felt (the minor 3rds are present at all times, although slightly more ample in the outer four fields). Because Lutosławski proceeds to repeat the same progression a half step higher in the following passage (at rehearsal number 10), it makes sense to create an arch-form with the harmonic progression so that he can move back to the original chord smoothly.

Harmonic Rhythm

The harmonic rhythm of these first eight chords speeds up deliberately: after a nine-measure introductory unfolding of PF-1, the entirety of the pitch field is revealed at rehearsal number 1 and lasts for seven measures. Each of the next six pitch fields gets progressively shorter: PF-2 lasts for six measures; PF-3 for five, and so on, until PF-7 which arrives on a *poco forte* for a single measure. PF-8 prepares us back for another cycle of the eight chords, with ten measures reminiscent of the opening measures of the piece.

The harmonic rhythm of the eight pitch fields reveals an acceleration that heightens the sense of forward motion; the intervallic analysis, however, shows a harmonic movement that is cyclical and largely static. The misalignment between the harmonic rhythm and the voice-leading explains the contradiction that can be heard in the passage, which seemingly accelerates and remains motionless simultaneously.

Category 3: The horizontal content within a pitch field

Analyzing the intervallic contents of pitch fields individually as well as in succession can reveal precise details on how pitch fields are constructed. However, the harmonic structure of a composition can only reveal so much; it is still necessary to investigate the contents of the surface (the notes on the page) in order to understand its relationship with the harmony. The expectation is for the surface to closely resemble the structure; however, a composer may choose to mask the most pronounced features of a pitch field by highlighting a less prominent feature of the structure. Is the entire field being activated at once, or are there only portions that are emphasized at any given moment? Which
Intervallic characteristics of the pitch field are emphasized or deemphasized? How does the composer deal with the inherent pedal points of the outer notes?

Consider the opening of Mi-Parti again. The sinuous strings emerge first by holding or sliding towards notes from the twelve-note pitch field to provide a clear harmonic backdrop. On top of this, woodwinds and horns enter gradually, weaving one melodic line over another. The register is carefully controlled, with each new entrance of an instrument group activating higher notes of the field: the first solo instrument to enter is the bass clarinet, playing the lowest notes of the pitch field. Horns, B-flat clarinets, oboes, and flutes soon follow, slowly revealing the pitch field from the bottom up. Each entrance coincides with a pitch field change, and while the harmonic changes are subtle and feel largely static, the accelerating harmonic rhythm, the gradual ascent of the pitch fields being activated, and the increasing rhythmic and melodic density combine to propel this opening passage forward. Despite the eventual textural density, all of the notes stay within the pitch field and thus the resultant harmony is still under the control.

Now, do the melodic lines emphasize or deemphasize certain intervals highlighted in the pitch field? In order to find out, we can compile an inventory of every interval that Lutosławski uses in the opening section and compare the result to the structure of the pitch field.

The melodic reduction of example 2.08 shows the melodic contours and the intervals between adjacent notes of the various melodic lines (unisons are not considered, thus repeated notes have been taken out). Each double barline represents a change in the pitch field. In cases where two simultaneous lines of the same instrument family occur (e.g. 
flute 1 and 2 at rehearsal mark 6; clarinet 1 and 2 at the same place), only the principal instrument is chosen because the lines are usually very similar in pitch content.

The tally of the total horizontal intervals used in each pitch field shows an overall sense of which intervals are being heavily utilized, and which intervals are not. If we compare this data to the actual interval content of the pitch field, we will be able to see whether the two match in proportion (the pitch field intervals have been limited to the first 15 intervals here to match the largest interval used in the melody; any larger intervals are, as a result, considered “too wide” to be used horizontally in this particular context). The eighth pitch field is not used for melodic activity, and thus not included in example 2.08 and 2.09.
Example 2.08: Lutosławski, Mi Parti, opening melodic contours
The pitch allows him to use smaller intervals than what he has to work with using just the notes of neighbor "non-interval". Example 2.09:

<table>
<thead>
<tr>
<th>HI</th>
<th>HI</th>
<th>PF-</th>
<th>HI</th>
<th>HI</th>
<th>PF-</th>
<th>HI</th>
<th>HI</th>
<th>PF-</th>
<th>HI</th>
<th>HI</th>
<th>PF-</th>
</tr>
</thead>
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<td>7</td>
<td>36.8%</td>
<td>0.0%</td>
<td>4</td>
<td>13.8%</td>
<td>3.1%</td>
<td>6</td>
<td>22.2%</td>
</tr>
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<td>0%</td>
<td>2.9%</td>
<td>0</td>
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<td>20.7%</td>
<td>18.8%</td>
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<td>0%</td>
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<td>0%</td>
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Example 2.09: Comparison of the horizontal (HI) and vertical (PF) intervallic content

One important difference in the horizontal intervallic content is the active use of interval-1, a scarce interval in all eight pitch fields. Lutosławski uses an occasional upper-neighbor “non-chord tone” – notes outside of the pitch field – in his melodic writing, which allows him to use smaller intervals than what he has to work with using just the notes of the pitch field alone. In nearly all cases, the neighbor notes are half-step upper-neighbors.
(with occasional exceptions, such as the oboe using an lower neighbor in PF-4 and -5, and the clarinets using whole-step upper neighbors in the PF-6). The half-steps are used primarily by instruments that sustain notes for a longer duration. The bass clarinet and the horns are fed a steady diet of half-steps to ornament their lines while the more active flutes and clarinets hardly use any non-chord tones. This seems to indicate that Lutosławski believed that a non-chord tone would compromise the harmonic clarity of a pitch field if activated too frequently, and thus could only be used sparingly.

Another important observation that can be made from example 2.9 is the lack of use of interval-11 horizontally, even though it is the most frequently found interval in the pitch fields. Some interval-11s can be heard as a combination of smaller intervals, but because the range of each instrumental line is severely limited, a single instrument cannot access many of the interval-11s embedded within the pitch field. Thus, this structurally important interval is always present in the background, but rarely heard explicitly in a melodic context.

With any pitch field, there is a danger of overexposing the notes, in particular the outer voices. If the composer is not careful, the outer notes can sound like an unintended pedal point on both ends. This danger is all the more apparent when looking at the first eight pitch fields – the outer voices hardly budge throughout. However, Lutosławski’s approach to the slow unfolding of the pitch fields, along with the shortening of the harmonic rhythm once all the voices enter, helps keep the outer voices from sounding stale.
Category 4: The notes that lie outside of the pitch field (non-chord tones)

This category is perhaps the least definable of the four since music using pitch fields tends not to employ notes outside the given notes. The risk, of course, is that the harmonic clarity of a pitch field can be greatly obscured by the introduction of outside notes. However, the limitation to the number of notes available greatly reduces musical possibilities, particularly with horizontal lines, and some composers feel the need to introduce non-chord tones for one reason or another.

The use of non-chord tones for additional flexibility and maneuverability in their horizontal writing can best be described using analogous concepts in tonal music, such as chromatic upper neighbors in Mi-Parti, Boulez’s use of anticipation in Derive (1984), Harvey’s use of passing tones in Song Offerings (1985). Glissandos in Mi-Parti as well as Xenakis’ Jonchaies can also be interpreted similarly as filling a gap between two notes of a pitch field. These tones are usually fleeting and within such clear harmonic structure of the pitch field that the composer can safely steer away from any harmonically ambiguous moments.

Others employ non-chord tones as a means to establish tension and contrast from the harmony of the pitch field. In the case of Berio’s Points on a Curve to Find… (1974), the solo piano part maintains a strict adherence to the notes of the pitch field, but the rest of the instruments (winds and strings) do not. Part of the reason is for practical purposes: the jagged piano lines are often not idiomatic for any other instrument, swiftly moving in and out of the range of the various instruments of the ensemble. However, the piano plays such a dominant role and so strongly delineates the pitch field that the non-chord tones of the
ensemble are made to sound peripheral. Instead, they “thicken” the piano through heterophony and offer the occasional commentary, but never usurp the leading role.

Augusta Read Thomas employs an opposite strategy in her miniature violin concerto, *Carillon Sky* (2005). The ensemble outlines a clear harmonic foundation, on top of which she constructs a solo violin line that uses mostly non-chord tones – to borrow a jazz term, the soloist is playing “outside.” The ensemble harmony is homogeneous due to the consistent harmonic content, while the solo violin dances around with different pitch materials. The harmony is obscured when the main voice of the piece plays outside of the pitch field so frequently, but the tradeoff is clear: Thomas has much more melodic flexibility than the melodies in *Mi-Parti* – a reasonable priority when composing a concerto.

**Where a pitch field ends**

The profusion of non-chord tones in *Points on a Curve to Find...* and *Carillon Sky* brings up an important question regarding the very definition of a pitch field: when does a pitch field stop being a pitch field? At what point do non-chord tones render the clarity of the harmony of a pitch field to be irrelevant? Is there a limit on the number of total notes that can be inside a pitch field before it is simply a chromatic cluster? Is there a minimum number of notes that needs to be inside a pitch field? Obviously, there are no hard and fast rules governing these issues, but some composers have taken advantage of this ambiguity to great effect.

If we recall Berio’s *Sequenza VII* for oboe from chapter 1, the trajectory of the piece starts with a single note, adds additional notes gradually until nearly every single note of the oboe’s playable range is being activated by the end (exceptions being B₃, C₄, F₄, B₅, D₆).
If the beginning and the ending were taken out of context, neither would be considered a pitch field: the former does not use enough notes, while the latter uses too many. Yet, to any attentive listener, the progression from a single note to a gradually broadening palette of notes is readily audible, and thus it makes sense to regard the entire piece as a progression of expanding pitch fields.

The opening of Steven Stucky’s *Radical Light* (2006-7) undergoes several slow harmonic shifts (example 2.10). Some are constructed using Xenakis-like non-octave scale that encompasses all twelve pitch-classes across multiple octaves; others repeat every octave, creating four- or five-note chords spanning multiple octaves. This opening passage therefore weaves back and forth between pitch fields and chords. To the listener, however, such a distinction is not as clear; instead, the opening can be heard as a gradual progression that moves towards the goal of the dramatic A minor chord at rehearsal letter E. Factors such as the bass pedal A, the thick divisi-string orchestration, the unstable chord qualities, and the layering of melodic figures keep the texture largely homogeneous and not as an alternation between two types of harmonic construction.
Example 2.10: Stucky, *Radical Light*, pitch fields / chords, mm. 1-58

Now, it is time to demonstrate these techniques to more thoroughly by studying three complete works in the following chapter.
Chapter 3
Three Analyses

This chapter will use the procedures outlined in chapter 2 to analyze three pieces: Berio’s *Sequenza VII* for oboe, Elliott Carter’s “Anaphora” from *A Mirror on Which To Dwell*, and John Adams’ *China Gates*. Recall that the four categories proposed above are 1) the structure of a single pitch field; 2) the succession of pitch fields; 3) melodic or horizontal content of the music; 4) the use of tones outside of the pitch field. These will help understand how the pitch fields contribute to the overall composition.

**Luciano Berio: Sequenza VII for oboe**

As mentioned in chapter 1, Berio’s *Sequenza VII* for oboe is constructed with a pitch field that gradually expands in each printed system, from a single note in the first system to a nearly fully chromatic collection across the entire range of the instrument in the last. Example 3.01 lists all thirteen of the pitch fields used in the work, with the arrows indicating new pitches being introduced. Each pitch field (and each printed system) spans roughly the same duration, with occasional fermatas offsetting the duration.
Example 3.01: Berio, *Sequenza VII*, pitch fields 1 through 13

Each pitch field in example 3.01 can be numerically converted, with the lowest note set to 0 and counting the distance in between the notes above by half-steps (example 3.02):

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Example 3.02: Numeric conversion of pitch fields 1-13

The numeric conversion of each pitch field in example 3.02 allows us to calculate the intervallic content, with the columns representing the distance between the notes (example 3.03):

Example 3.03: Intervallic content of PF 2-4 (PF 5-13 not included)
The frequency of each interval’s occurrence in a pitch field can then be compiled (example 3.04). Because the quantity of intervals increases as the pitch field expands, using percentages allows for a better comparison between the intervallic contents of different pitch fields.

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are the emphasis on intervals 13 (minor 9th) and 4 (major 3rd), and the paucity of the piece, certain intervals are brought out far more than others. Particularly noticeable are the emphasis on intervals 13 (minor 9th) and 4 (major 3rd), and the paucity of

Example 3.04: Intervalic content of each pitch field compiled

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The compilation of the intervalic content for all thirteen pitch fields shows the structure behind the succession of pitch fields used in this work. During the early portions of the piece, certain intervals are brought out far more than others. Particularly noticeable are the emphasis on intervals 13 (minor 9th) and 4 (major 3rd), and the paucity of
intervals 8 (minor 6th) and 12 (octave). As the pitch field becomes saturated to the point of approaching a chromatic scale, these discrepancies are largely evened out.

The structure of such a succession of pitch fields leads to an important question: will the intervals of the melody follow a similar distribution of intervals throughout the piece as the pitch fields? Will there be a homogenization of the few distinguishing intervals as the piece progresses, or will the surface retain some characteristic intervals throughout?

Example 3.05 is a reduction of the melody, outlining only the pitches and the intervals used in each pitch field.
Example 3.05: Berio, Sequenza VII, intervallic reduction of the melody in each pitch field.
The intervallic content from example 3.05 is then compiled in example 3.06 to allow us to compare precisely how the surface of the music interacts with the pitch field structure.

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77
Example 3.06: Intervallic content from example 3.05 compiled

The most striking information one notices when comparing the interval content of the melody (example 3.06) to the structure of the pitch field (example 3.04) is that the intervallic content of the melody does not become homogenized as the piece progresses. Even when the pitch field is nearly chromatically saturated at the end, the distribution of intervals are: 39% interval 13, 14% interval 7 and 10, and a complete absence of intervals 5, 9, and 12. Even as the structure of the pitch field suggests a trend away from well-defined intervals, the melodic intervals retain many of the characteristic intervals from the early portions of the piece. The final tally of the total intervals used in the piece is revealing: by far the most frequent interval is interval 13, followed by 7, 6, 10, 11, and 14; meanwhile octaves are avoided throughout, and interval 5 is kept to a minimum, only occurring in pitch fields 11 and 12.

A closer look would reveal that interval 13 is the most frequent interval from PF 2 through 4, and then again from PF 10 through 13. During the middle of the work, from PF 5 through 9, intervals 6, 1, 7, 10, and 6, respectively, enjoy brief moments as the most frequent interval, suggesting an increase in the availability of intervals as well as a heightening of disorder. However, the resurgence of interval 13 in the last four pitch fields
suggests the notion of a recapitulation and a restoring of order. It is important to keep in mind, however, that this is not a true recapitulation. While a return of interval 13 is important to notice, the expanding pitch field can be perceived as well, creating increasingly complex harmonic possibilities. Berio is counteracting the potentially inevitable harmonic entropy by bringing back more interval 13 towards the end.

Berio understands that the harmonic clarity of a pitch field is effective only when the field is not over-saturated with notes. As the harmonic structure in Sequenza VII approaches this point of over-saturation, Berio is able to find coherence within the piece by maintaining a distinct intervallic language throughout that goes against the underlying structure.

Elliott Carter – “Anaphora” from A Mirror on Which To Dwell (1976)

As previously mentioned, Elliott Carter’s song “Anaphora” from A Mirror on Which To Dwell (1976) uses a single pitch field for the entirety of the song – a globally static harmony throughout. The single twelve-note pitch field (example 3.07) contains twenty-four different formations of an all-trichord hexachord. It is this rich intervallic property that Carter exploits to bring out all dimensions of the pitch field. Using the category 1 method, the exact number of intervals within the pitch field can be counted. Example 3.08 contains the numeric conversion of the pitch field as well as the distance between all the notes. Example 3.09 is the final tally of how frequently each interval occurs.

Example 3.07: Carter, “Anaphora” A Mirror on Which To Dwell, pitch field
Example 3.08: Intervallic content of example 3.07

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Example 3.09: A tally of the intervallic content

Despite the presence of all intervals below 14 except for the octave, this pitch field favors certain intervals over others. Most common intervals are, in order; 3, 7, followed by 4, 6, 10; least common intervals (under interval 14) are 12 and 5, followed by 2 and 8. Also
notable are the relatively frequent occurrences of 13 and 14. This is statistically consistent with Schiff’s earlier statement about how the vocal line emphasizes “one interval after another – perfect fifths, major and minor thirds, minor sevenths, and, climactically major ninths.”

Carter’s emphasis on different intervals changes the sonority discreetly within a globally static harmony. How his use of intervals in the vocal line changes can be statistically measured from one phrase to another, with the length of each phrase determined by the structure of the poetry. By measuring how frequently each interval occurs in a phrase, the degree of emphasis can be measured. Elizabeth Bishop’s full poem, and the corresponding vocal contours are shown below.

Each day with so much ceremony begins, with birds, with bells, with whistles from a factory; such white-gold skies our eyes first open on, such brilliant walls that for a moment we wonder “Where is the music coming from, the energy? The day was meant for what ineffable creature we must have missed?” Oh promptly he appears and takes his earthly nature instantly, instantly falls victim of long intrigue, assuming memory and mortal mortal fatigue.

More slowly falling into sight and showering into stippled faces, darkening, condensing all his light; in spite of all the dreaming squandered upon him with that look, suffers our uses and abuses, sinks through the drift of bodies, sinks through the drift of classes to evening to the beggar in the park

---

Example 3.10: Melodic intervals of "Anaphora" in each phrase

who, weary, without lamp or book
prepares stupendous studies:

the fiery event of every day in endless endess assent.

Example 3.10: Melodic intervals of "Anaphora" in each phrase

mm. 1-10:

7-1-4-7-3-2-7-3-7-7-10-1-7-10-3-2-7-3-7-7-10

Each day with so much ceremony / begins, with birds, with bells / with whistles from a factory;

10-4-7-4-4-3-4-6-4-1-3-9-2-1-7-3-7-3-7-13-4-1-4-7-10-7-

such white-gold skies our eyes / first open on, such brilliant walls / that for a moment we wonder /
"Where is the music coming from, the energy? / The day was meant for what ineffable creature / we must have missed?"

mm. 10-22:

3-2-7-7-4-10-7-10-2-3-7-1-7-10-4-1-3-1-7-1-7-1-4

Oh promptly he / appears and takes his earthly nature / instantly, instantly falls / victim of long intrigue, / assuming memory and mortal / mortal fatigue.

mm. 24-31:

3-4-1-3-1-4-3-1-3-1-4-3-4-1-4-1-3-4-2-2-3-1-3-7-1-4-7-7-6-4-1-7-6-3

More slowly falling into sight / and showering into stippled faces, / darkening, condensing all his light;

mm. 32-36:

5-3-7-7-7-1-5-2-2-5-1-4-1-1-7-7-7-1-4-2-3-3-6-7

in spite of all the dreaming / squandered upon him with that look, / suffers our uses and abuses, / sinks through the drift of bodies, / sinks through the drift of classes / to evening to the beggar in the park / who, weary, without lamp or book / prepares stupendous studies:

mm. 37-59:

2-1-4-1-3-1-3-1-4-2-9-6-4-10-3-3-10-7-1-10-7-4-10-23-14-8

3-7-7-11-7-4-7-1-1-7-9-7-13-10-7-14

the fiery event / of every day in endless / endless assent.

mm. 59-65:
The interval content of each phrase is then tallied up below, in example 3.11

<table>
<thead>
<tr>
<th>Int</th>
<th>1st phrase mm. 4-10</th>
<th>2nd phrase mm. 10-22</th>
<th>3rd phrase mm. 24-31</th>
<th>4th phrase mm. 32-36</th>
<th>5th phrase mm. 37-59</th>
<th>6th phrase mm. 59-65</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 9.1%</td>
<td>9 16.1%</td>
<td>9 21.4%</td>
<td>5 18.5%</td>
<td>18 28.6%</td>
<td>2 12.5%</td>
</tr>
<tr>
<td>2</td>
<td>2 9.1%</td>
<td>4 7.1%</td>
<td>2 4.8%</td>
<td>3 11.1%</td>
<td>2 3.2%</td>
<td>0 0.0%</td>
</tr>
<tr>
<td>3</td>
<td>4 18.2%</td>
<td>7 12.5%</td>
<td>14 33.3%</td>
<td>4 14.8%</td>
<td>7 11.1%</td>
<td>1 6.3%</td>
</tr>
<tr>
<td>4</td>
<td>1 4.5%</td>
<td>11 19.6%</td>
<td>8 19.0%</td>
<td>3 11.1%</td>
<td>11 17.5%</td>
<td>1 6.3%</td>
</tr>
<tr>
<td>5</td>
<td>0 0.0%</td>
<td>1 1.8%</td>
<td>1 2.4%</td>
<td>3 11.1%</td>
<td>2 3.2%</td>
<td>0 0.0%</td>
</tr>
<tr>
<td>6</td>
<td>0 0.0%</td>
<td>1 1.8%</td>
<td>2 4.8%</td>
<td>1 3.7%</td>
<td>5 7.9%</td>
<td>0 0.0%</td>
</tr>
<tr>
<td>7</td>
<td>10 45.5%</td>
<td>14 25.0%</td>
<td>6 14.3%</td>
<td>8 29.6%</td>
<td>5 7.9%</td>
<td>7 43.8%</td>
</tr>
<tr>
<td>8</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>2 3.2%</td>
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</tr>
<tr>
<td>9</td>
<td>0 0.0%</td>
<td>2 3.6%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>2 3.2%</td>
<td>1 6.3%</td>
</tr>
<tr>
<td>10</td>
<td>3 13.6%</td>
<td>6 10.7%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>7 11.1%</td>
<td>1 6.3%</td>
</tr>
<tr>
<td>11</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>1 6.3%</td>
</tr>
<tr>
<td>12</td>
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<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
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</tr>
<tr>
<td>13</td>
<td>0 0.0%</td>
<td>1 1.8%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>1 6.3%</td>
</tr>
<tr>
<td>14</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>1 1.6%</td>
<td>1 6.3%</td>
</tr>
<tr>
<td>15</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
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<tr>
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<td>0 0.0%</td>
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<td>0 0.0%</td>
<td>0 0.0%</td>
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<tr>
<td>17</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
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</tr>
<tr>
<td>18</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
</tr>
<tr>
<td>19</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
</tr>
<tr>
<td>20</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
</tr>
<tr>
<td>21</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
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<td>0 0.0%</td>
<td>0 0.0%</td>
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<td>22</td>
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</tr>
<tr>
<td>23</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>1 1.6%</td>
<td>0 0.0%</td>
</tr>
</tbody>
</table>

Example 3.11: A tally of melodic intervals in each phrase

Many of the intervals highlighted in the structure of the pitch field – intervals 3 (13.6%), 7 (12.1%), 4, 6, and 10 (9.1% each) – are brought to the fore during certain phrases. Example 3.12 shows the three most frequently occurring intervals in each phrase.

Of the five most frequently occurring intervals of the pitch field, only interval 6 fails to make a major impact on the melody:

<table>
<thead>
<tr>
<th>Phrase</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>45.5%</td>
<td>7 (25%)</td>
<td>3 (33.3%)</td>
<td>7 (29.6%)</td>
<td>1 (28.6%)</td>
<td>7 (43.8%)</td>
</tr>
<tr>
<td>3</td>
<td>18.2%</td>
<td>4 (19.6%)</td>
<td>1 (21.4%)</td>
<td>1 (18.5%)</td>
<td>4 (17.5%)</td>
<td>1 (12.5%)</td>
</tr>
<tr>
<td>10</td>
<td>13.6%</td>
<td>1 (16.1%)</td>
<td>4 (19%)</td>
<td>3 (14.8%)</td>
<td>3,10 (11.1%)</td>
<td></td>
</tr>
</tbody>
</table>

Example 3.12: Most frequent intervals in each phrase
That the melody emphasizes interval 7 the most is not surprising since it is the second most frequently occurring interval in the pitch field. What is somewhat unexpected, however, is the prevalence of interval 1. Even though it occurs only four times (6.1%) within the structure of the pitch field, interval 1 takes up the vocal line disproportionately, particularly in the fifth phrase (28.6%). While it may be out of consideration for the singer to create a more linear melody, Carter does not emphasize interval 2 nearly as much (never above 11.1%). Instead, the prevalence of interval 1 occurs largely because the overlapping diminished seventh chords of the pitch field contain many opportunities to emphasize intervals 3, 4, or 7 simply by shifting a semitone.

Example 3.12 can shed light on Schiff’s earlier statement about certain intervals being brought out in the vocal line. In the first phrase, nearly half of the intervals sung are perfect fifths, perhaps word painting the bells and whistles from the opening morning imagery, “Each day with so much ceremony / begins, with birds, with bells, / with whistles from a factory.” Similarly, in the third phrase, both minor and major thirds (intervals 3 and 4) are brought to the forefront (combined total of 54.7%), with interval 1 also emerging prominently (21.4%) as a byproduct of the alternation between the two intervals 3 and 4. The narrowing of the intervals utilized could symbolize a “fall” – a reading of the poem that according to Cheryl Walker chronicles “the fall from faith into empiricism” that is reminiscent of:

the crucifixion, in which Christ, victim of long intrigue, passes from present into past, assuming his own burden of memory and at the same time becoming a memory for others by passing through that
agonizing experience of mortal / mortal fatigue...which is itself a kind of fall into distrust.\textsuperscript{79}

The second phrase, therefore, functions as a transition between these two points: while the “ceremonious” interval 7 from the beginning is still favored at 25\%, intervals 3 and 4 make up a combined total of 32.1\%, signaling the beginning of the “fall.” The fourth phrase again goes back to emphasizing interval 7 (29.6\%), although intervals 1 through 5 all have a strong presence (all over 11\%), creating a section that is largely homogeneous intervallically. The fifth phrase is likely what Schiff is referring to, as where minor 7ths are emphasized. Appearing as 11.1\% of all intervals, interval 10 does not seem to have a particularly strong imprint on this phrase – that is, until the end of the phrase, “[the beggar] who, weary, without lamp or book / prepares stupendous studies,” when five minor 7ths occur within a span of fifteen intervals. The beggar in the poem, according to Walker, is a recurring character in Bishop’s poems (a “resilient poor”), and “his ability to offer ‘endless / endless assent’ qualifies him, from a certain point of view, for association with ’the Most High.’”\textsuperscript{80} If the first half of the poem was a fall from faith, then the latter half is a symmetrical reversal in which the beggar prepares himself for enlightenment. The widening of intervals at this moment with a concentration of interval 10 reflects the beggar’s spiritual pursuits.

The last phrase, according to Schiff, is the climactic moment where major 9ths are emphasized. Much like the previous phrase, the interval is not highlighted through the volume of its usage, but through its usage on certain significant words of the poem. In this

\begin{flushleft}
\textsuperscript{80} Ibid., 122.
\end{flushleft}
case, interval 14 occurs only once, but it takes place on the final and most significant word, “assent,” during which the busy instrumental texture is suspended for a moment in order for the final word and interval to be heard clearly.

The changing intervallic contents strongly correlate with the drama unfolding within the poem. Yet, by using the same pitch field throughout the song, the work undergoes no global harmonic movement. That Carter is able to bring out so many intervallic structures using the same pitch field throughout the song is perhaps reflective of the poet’s view that “beauty and spirituality do not exist apart from everyday experience, but are woven into its very fabric.”

The intervals that Carter seems so insistent on bringing out are a musical reflection of the poem’s spiritual discoveries that are “woven into” the static pitch field.

**John Adams: China Gates**

John Adams composed *China Gates* in 1977 as a shorter and simpler companion piece to the virtuosic *Phrygian Gates*; together they form his “opus one.” Both works are composed with the same underlying principles of using rippling waves as a musical structure, which he describes as:

Rather than base the musical surface on small compact motifs, melodic fragments, or cells, I set out to build long architectonic structures of rippling wave motion. Being waves, the music by definition had to be repetitive and generate a perceptible pulse.\(^{82}\)

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The two pieces that resulted clearly show the influence of Riley, Reich, and Glass. The ’70s comprised a critical time in Adams’ s career during which his great dissatisfaction with the musical trends from post-Schoenbergian methods to the chance principles of Cage caused him to rethink his approach. Upon his familiarization with minimalist music, Adams “found the combination of tonality, pulsation and large architectonic structures to be extremely promising.”

*China Gates*, along with *Phrygian Gates*, represents his first venture into a minimalist language. The structure of the work juxtaposes different harmonic areas (“gates”) abruptly moving from flat, sharp and natural (white-note) modes without modulating. Adams includes a visual representation of the gates in the score (example 3.13), with the horizontal axis representing time and the vertical axis representing the various modes.

Example 3.13: Adams, visual representation of *China Gates* (G. Schirmer)

Example 3.13 corresponds with Adams’ claim that the piece is “an almost perfect palindrome.” The length and proportion of the first eight gates is symmetrical with the final eight, with the middle section slightly diverging from the process, resulting in an ABA’

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form. This interpretation of the form is further affirmed in the score by the presence of a low bass note in the first eight and last eight gates of the piece but not in the middle.

Within each gate, the registral disposition of all the notes remains fixed throughout and, as a result, each gate can be understood as a pitch field. Unlike the pitch fields of Berio and Carter, however, Adams uses only diatonic tones, and an attempt to analyze such music would entail some form of tonal analysis in addition to the analysis of the pitch fields. To demonstrate the difference in the two methods of analysis, example 3.14 shows a possible traditional analysis of the opening by identifying modes and figured bass, neither of which account for register.

Example 3.14: Adams, *China Gates*, modal and figured bass analysis, mm. 1-78
The traditional method can reveal many features of these opening eight gates. The figured bass shows that a similar chord quality is used throughout, with a 5th contained within each gate, and a 3rd and a 4th within all but one (missing in the eighth and second gates, respectively). The oscillation between Mixolydian and Aeolian modes gives each gate a major or minor chord quality, but always with additional tones such as 2nds, 4ths, 6ths, and 7ths that color each chord. A lone bass note links all eight chords by the use of a common-tone of A-flat / G-sharp, serving as a pedal tone. In addition, there are many other enharmonic common tones linking the two modes despite the seemingly disparate key signatures, because A-flat Mixolydian is the equivalent of G-sharp Mixolydian, which contains seven sharps in the key signature – only two more than G-sharp Aeolian. Five out of the seven notes of the two modes are therefore shared.

A well-established method of analysis will take precedence over any new approach. However, viewing the piece as a series of pitch fields can add additional insights into the work, and therefore, it would be fruitful to find ways to accommodate the methods from chapter 2 into the analysis of China Gates. Example 3.15 shows all the pitch fields of the piece.
Example 3.15: Adams, China Gates, pitch fields

Example 3.15: Adams, China Gates, pitch fields
Of the four categories discussed in chapter 2, only the first two are relevant in this discussion. There are no non-chord tones in this work, eliminating the need for category 4. In addition, the melodic dimension is obscured due to Adams’s request in the performance notes asking the pianist, “Special attention should be given to equalizing the volume of both hands so that no line is ever louder than another.”

A successful performance will therefore make the two individual lines of the hands indistinguishable, creating an ambiguity with the melody: the individual hands outline a horizontal melody each, but the composite melody, combined with the pedal, creates a distinctly different line. The difficulty in identifying exactly what consists the horizontal line creates problems when implementing category 3. Instead, only categories 1 and 2 will be considered in this analysis.

The diatonic content of China Gates brings up a new set of issues when tabulating the intervallic content of each pitch field for category 1. The notes of a diatonic set in themselves have a distinct intervallic content, therefore any musical content composed within a diatonic collection would likely contain the intervals that occur frequently in a diatonic set. Example 3.16 shows how frequently all possible intervals in a diatonic set occur.

<table>
<thead>
<tr>
<th>Int.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freq.</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>%</td>
<td>4.8%</td>
<td>11.9%</td>
<td>9.5%</td>
<td>7.1%</td>
<td>14.3%</td>
<td>4.8%</td>
<td>14.3%</td>
<td>7.1%</td>
<td>9.5%</td>
<td>11.9%</td>
<td>4.8%</td>
</tr>
</tbody>
</table>

Example 3.16: Frequency of intervals of a diatonic collection

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As stated earlier, the piece can be divided into three sections. The frequency of intervals in each section is shown in example 3.17 (the percentages do not add up to 100 because there are larger intervals within the passage that are not included):

<table>
<thead>
<tr>
<th>Intervals:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm. 1-78</td>
<td>5.3%</td>
<td>15.0%</td>
<td>8.8%</td>
<td>6.2%</td>
<td>16.8%</td>
<td>1.8%</td>
<td>14.2%</td>
<td>3.5%</td>
<td>6.2%</td>
<td>6.2%</td>
<td>0.9%</td>
</tr>
<tr>
<td>mm. 79-112</td>
<td>5.9%</td>
<td>14.6%</td>
<td>10.1%</td>
<td>8.0%</td>
<td>13.5%</td>
<td>3.1%</td>
<td>12.5%</td>
<td>5.9%</td>
<td>5.6%</td>
<td>4.5%</td>
<td>2.8%</td>
</tr>
<tr>
<td>mm. 113-end</td>
<td>6.7%</td>
<td>12.1%</td>
<td>11.5%</td>
<td>7.9%</td>
<td>11.5%</td>
<td>4.8%</td>
<td>11.5%</td>
<td>4.2%</td>
<td>6.1%</td>
<td>6.1%</td>
<td>2.4%</td>
</tr>
</tbody>
</table>

Example 3.17: Frequency of intervals of three sections of *China Gates*

The comparison of the percentages between example 3.17 and example 3.16 reveals similarities for all intervals 7 or smaller. However, starting with interval 8, there is a stark difference between the two, with significantly fewer occurrences of intervals in the music compared to a diatonic collection. This perhaps is to be anticipated due to the closeness of the voicing in many of the chords, but the expectation would be a gradual decline and not such a significant drop-off; interval 7 should have a smaller presence in example 3.17. Instead, such high presence of interval 7 suggests that Adams is placing great emphasis on the interval.

Through the course of the music, there is a steady decline of intervals 5 and 7 from the first section of the piece through the third, and a steady rise of interval 6 during the same span. This change can be heard in the music, with a slight de-emphasis of the quartal and quintal sonorities, and a presence of the tritone (after being nearly absent in the beginning). The differences are perceivable aurally, but difficult to quantify because interval 5 and 7 are still more prominent than 6. However, this method provides definitive data that confirms the perceived trend of each interval.
Despite this gradual trend, the overall work still largely reflects the minimalist aesthetic of stasis. By examining the succession of pitch fields, the subtle combination of change and stasis can be revealed.

Example 3.18 is a graphic representation of the first eight pitch fields that can help avoid any possible confusion that may arise from the enharmonic spellings between the modes.

Example 3.18: Graphic representation of pitch fields 1-8, mm. 1-78

This graphic representation quickly reveals pitches that remain static throughout: both A-flat₁ / G-sharp₁ pedal note in the bass and the E-flat₅ / D-sharp₅ are present for
every pitch field, while the D-flat₅ / C-sharp₅ occurs in all except the second pitch field. These three notes form the core of this opening, around which the top note gradually ascends. The pedal point in the bass is the most perceivable note that ties the opening section together. The two additional fixed notes create a level of harmonic stasis that is more felt than perceived, but becomes integral once the pedal note dissipates following the eighth pitch field.

The disappearance of the bass pedal tone from m. 79 destabilizes the music and marks the beginning of the B section. The duration of each pitch field is shorter, often resulting in a rapid switching of the “gates,” and without a clear bass note the exact mode is left ambiguous. Furthermore, a new white-note mode (no accidentals) is introduced at m. 79, entering intermittently to break up the smoothness of the flat and sharp mode oscillation until eventually replacing the sharp mode altogether. One significant consequence of the new mode is that it does not contain any of the three aforementioned fixed notes within its collection. Even though the initial “natural” mode appears at m. 79 for only four eighth notes, it is the first time in the piece that A-flat₁, E-flat₅, and D-flat₅ are not heard.

From pitch fields 9 through 26 (mm. 79-116, example 3.19), there are four instances of the “natural” modes being used, in pitch fields 9, 13, 17, and 22. Outside of these four instances, E-flat₅ and D-flat₅ remain sounding throughout, except in two instances at pitch fields 10 (m. 80) and 16 (mm. 93-95) where the D-flat₅ is left out. Even after the A-flat₁ pedal disappears, the two other core notes from the opening remain as an important cohesive fixture in this section.
The natural mode’s intermittent interruptions, however, foreshadow the overtaking of the sharp mode and, more importantly, the beginning of the dissolution of the E-flat\(_5\) and D-flat\(_5\) pitch field. By pitch fields 26 through 31 (mm. 113-149, example 3.20), the sharp mode is no longer in play, alternating between only the flat and natural modes. The key signatures are six flats apart – as far away as possible, with only two common tones: F and B. As a result, sustaining the common tones E-flat\(_5\) and D-flat\(_5\) is not possible any more and is completely abandoned by m. 117 (pitch field 27), extinguishing the one consistent presence that had been in the piece thus far.

Example 3.19: Graphic representation of pitch fields 9-26, mm. 79-116
With the fixed notes gone, the pitch field inches upward into the stratosphere. A new common tone, F₁, is introduced as the new pedal tone in an attempt to stabilize the relatively chaotic moment in the piece, but the Locrian mode that results during the flat modes prevents the music from feeling settled.

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Example 3.20: Graphic representation of pitch fields 26-31, mm. 113-149
The final two gates of the piece, 32 and 33, contain 5 subsections within. Each subsection is marked by a bass note, but this time, it is not a single pedal point, instead oscillating between two notes: F₁ and A-flat₁ from mm. 161-175; and F₁ and E₁ from mm. 176-end. A common tone between the two modes – the enharmonic B₄ – remains fixed throughout the entire final passage, serving as the anchor instead of the bass.

Example 3.21: Graphic representation of pitch fields 32-41, mm. 161-188

This piece can therefore be divided into four sections based on the common tones fixed in register that link the successive pitch fields. The first section involves three pitches, A-flat₁, D-flats₃, and E-flat₅ that link the first 78 measures. The next section abandons A-flat₁, but retains the other two notes. The third section begins from 113 when
F₁ enters, while D-flat₅ and E-flat₅ are both taken out at mm. 117. The final section is from m. 161 until the end, linked by a common B₄. This formal structure differs from Adams’s visual representation of the piece (example 3.13). The three-part ABA’ palindrome is admittedly a more audible and convincing way to hear this work than the form derived from common tones linking the pitch fields. However, this analysis shows disagreements between the formal and the harmonic structure: the fixed-register common tones can tie two sections together (D-flat₅ and E-flat₅ linking the first A section and the B section), and separate a single section apart (A’ section consists of two different fixed common tone).

Indeed, the work is not as palindromic as Adams claims, depending on the focus of the analysis. Overlaying a perfectly symmetrical ABA’ form is a harmonic structure that is more registrally disjunct and active in the second half of the work than the first. While a palindrome implies that the piece ends in the same way as it starts, that is not necessarily the case with this piece: intervallically, there are fewer perfect 5ths and 4ths present and more tritones compared to the beginning; there are no registrally fixed common tones linking B section to A’; low bass notes in A’ oscillate instead of staying fixed as a pedal; and there is no steady descent in the top notes of the gate from mm. 113 to the end to mirror the ascent in the opening eight gates. Tracing the relationship between the different interpretations of the forms can lead to a more sensitive understanding of the work.
Chapter 4
Conclusion

The works examined in chapter 1 show the extent to which fixed-register pitch fields have influenced the works of many composers in the past century. It would be difficult to find many other contemporary techniques that have been embraced by such wide variety of composers, from as far back as Webern all the way to today, and encompassing styles as varied as serialism, spectralism, and minimalism. It is my hope that this dissertation will contribute to an area of musical analysis that I believe is in need of further exploration.

Chapter 2 explored a new method for analysis of works that use pitch fields, which involved independent analyses of the structure of each pitch field and the evolution of the structure throughout the work, and observing how the surface interacts with the structure. The method intends to add a perspective that may have been overlooked through more traditional analyses. The three examples in chapter 3 show how the method may be used to reveal hidden structures in the music. The analysis of Berio’s Sequenza VII shows an unexpected arch form with the surface intervallic content despite an expanding pitch field and an ever-increasing harmonic complexity. Carter’s “Anaphora” from A Mirror on Which To Dwell illustrates how a comparison of the intervallic data from one section to another can demonstrate precisely the points in which certain intervals are emphasized or deemphasized. The common tones linking the pitch fields in Adams’s China Gates suggest a form that goes against the palindromic structure of the harmonic rhythm, and thus revealing different layers of interpretations with regard to the form.
In many ways, this dissertation is set up to introduce fixed-register pitch fields and prompt further interest for the topic. While numerous sections could be expanded and elaborated, several topics stand out as possibilities for further investigation.

The analytical techniques introduced in chapter 2 face some limitations. With the current method, it would be possible to deal with quarter-tones using fractions or decimal points. However, in the case of spectral music, the pitch is often determined by the frequency in hertz; therefore, intervals calculated in semitones or quarter-tones may not be as relevant to the understanding of the music.

In addition, the current method of analysis of the horizontal content (category 3) faces deficiencies in contexts where a clear individual line is difficult to define. Consider the following passage from the piano part of Boulez’s Derive I:

Example 4.01: Boulez, Derive I, mm. 3-5 (Universal Edition)

The grace notes, tremolos, and trills make up the surface activity of this passage. However, these notes are all an elaboration on the harmony: the grace notes function as an arpeggiated appoggiatura to the chord, and the trills and tremolos as a prolongation. The horizontal activity that makes up the surface is so closely tied to each chord that it becomes difficult to distinguish the vertical from the horizontal.

Even if all of the surface activity were considered as part of the horizontal dimensions, there will still be numerous decisions that must be made: when faced with a
dyad or a triad, which note(s) should be included as part of a line? How long are the phrases, and do the rests indicate an end of a phrase? How are trills and tremolos tabulated intervallically? Unless specific rules or new methods can be devised, the data compiled using category 3 will be unreliable in situations such as example 4.01 because the analysis would fluctuate too much from one analysis to another.

This dissertation has focused almost exclusively on pitch fields in which all the notes are fixed. However, the fixing of only a few notes occurs in certain compositions of serial composers, such as early Boulez (see example 1.7, Piano Sonata No. 2), Stockhausen, and Pousseur. These works were not included because such pitch fields would not be suitable for the methodology outlined in chapter 2. However, the impact that the few fixed notes have on the compositional process is likely significant, and should be worthy of a closer investigation.

Music incorporating the influence of non-Western instruments with limited pitch content was mentioned with the gamelan inspired-music of Britten and McPhee, and to a lesser extent with the music of Xenakis and Takemitsu. As the modern repertoire written for or imitating instruments with limited pitch content such as the gamelan, koto (Japan), guzhen (China), and gayageum (Korea) increases, the need to apply pitch field-related analytical techniques will surely come up.

Although a number of the composers included in this dissertation are still active, most of the works discussed were written before 1980, with only a handful composed within the past fifteen years. As stylistic barriers have broken down, composers have increasingly been willing to cross-pollinate from different aesthetic styles, as we have already seen with Saariaho and Harvey. An investigation on contemporary works will
surely reflect this trend, and it will be fascinating to see pitch field techniques applied in new contexts.

This dissertation is only a preliminary study, and it is my hope that others will find the diversity and richness of works that encompass this single technique to be worthwhile of further investigation.


