An Acquisition and Demonstration of Expanded Chromatic Connectivity in Webern's *Fünf Sätze für Streichquartett*, Op. 5, movement I, through the Examination of Fixed Pitch Class Derived from Examples of Pitch Class Set 3-3 in Accompanimental Contexts.

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Abstract

The first movement of Anton Webern's *Fünf Sätze für Streichquartett Op.5, Heftig bewegt,* is an intensely fragmented, mosaic-like example of motivic construction. Despite the complexities of the composition, a seminal pitch class set arises, providing a unified source between the horizontal and vertical dimensions. Furthermore, Webern utilizes fixed pitch classes between adjacent chords that serve as the locus for other permutations within supersets of pitch class set 3-3 within those collections of pitches.

This document will begin with a macro analysis that describes how performance technique differentiates the elements of melody, accompaniment, and polyphony, allowing for conclusive accompanimental roles to be determined. Pitch class set 3-3 and its frequently recurring supersets will be introduced, demonstrating the significance of this set as a motive on horizontal and vertical dimensions. When examining the accompanimental harmonies in their most expansive eight-pitch construction, it becomes clear that two unique vertical eight-pitch sets occur at moments of the piece that would qualify as being cadential, resulting in clear sectional delineation. A micro analysis of the exposition reveals the distinct relationship of these cadential moments to the vertical sectional material preceding it, and how the conclusive harmonic material contains fixed pitch classes between subsequent chords, which when observed through voice leading reductions, demonstrate contours of chromaticism that further enforce the influence of pitch class set 3-3 as the foundational constructive figure of *Heftig bewegt*.

Dedication

To every musician who keeps trying. It will eventually take shape.

Acknowledgments

Thank you to Doctors Mahin, Zuschin, and Glarner for the copious amount of input you provided me while formulating these concepts. Without your assistance, knowledge, and encouragement, this document would not have come into fruition. Although the concept seemed far-fetched initially, you all stood by my determination to see this idea through to the end. I will be forever grateful for everything you have collectively taught me during my time at Radford University and will hold this knowledge close throughout my future endeavors in music.

Thank you to the Radford University School of Music for fostering and cultivating an environment that enables students to question, explore, and grow in the discipline of music. This program has allowed for many invaluable opportunities and ensured preparedness for many wonderful possibilities in the future.

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Chapter 1: A macro analysis of Op. 5, F*ünf Sätze für Streichquartett,* movement I. Observations of textural delineation in horizontal and vertical dimensions.

Fünf Sätze für Streichquartett, Op. 5, composed by Anton Webern in 1909, exists as a prototypal example of the composer's earliest deviations from post-tonal music into the free atonal genre that stemmed from the Second Viennese School in the first decades of the twentieth century. The opening movement, *Heftig bewegt*, subtly exploits a highly fragmented nature by constructing motives and submotives that interact on horizontal and vertical dimensions, formulating an interwoven example of intrinsically connected motives, appearing on a micro and macro scale. Using melodic motives on the horizontal dimension and recurring harmonic trends on the vertical dimension, the piece presents an array of material demonstrating multidimensional correlations that exhibit the foundational pitch class set, set 3-3. Russian theorists and Webern scholars Yuri and Valentina Kholopova succinctly describe this pitch class set and its importance in the music of Webern:

> Though the five groups are part of a unified self-contained hemitonic system, Webern does differentiate among them. One of Webern's particularly favorite groups is group 3 in its trichordal version (1 H. + 3 H.). It is possible to explain this structurally and semantically. Structurally, group 3a is the only group—containing two different intervals—that does not exist in diatonicism and is used only in chromaticism. Semantically, it connects the intonational sharpness of the minor second, inverted into a major seventh, with the singing softness of the minor third, inverted into a major sixth. Webern understood the significance of these intervals that had taken hold in tonal music over the centuries.[1]

In order to create a consistent method of discrimination between the elements of melody and accompaniment, in conjunction with moments when they act as complimentary arrangements comprised of traits unique to both melody and harmony, a concrete definition of each must be ascertained. An organic approach to ascertain the

[1] Yuri and Valentina Kholopov, *The Music of Webern* (Moscow: Kompozitor, 1999) 18

delineation of melody and accompaniment in *Heftig bewegt* is to observe the textural characteristics of the piece at a given moment on the horizontal and vertical planes.

With the directional axes in mind, the melodic figures can be interpreted as figures in which an instrument plays a singular line that forms a contour in its horizontal progression, allowing such figures to supersede the material sounded in the remaining voices. This horizontal motion with motivic function will be defined as the melodic element of the piece. As such, these melodic figures are frequently seen to experience immediate imitation, either in full form or in fragments, throughout other voices in the ensemble. This action will be interpreted as imitative polyphony, rather than simple imitation. Imitative motion throughout the ensemble in Webern's compositional methodology for *Heftig bewegt* functions as the reiteration of a fragment from a larger melodic idea that immediately precedes the moment, interpolated between the multiple voices of the ensemble in various forms and transpositions. These moments are characterized by a rapid, albeit brief, overlap amongst voices; however, the construction of the motives, regardless of size, will remain consistent with that particular motive in the melodic phrase.

Contrastingly, the elements functioning as accompanimental figures are interpreted as momentary action on the vertical dimension consisting of either dyads within a single part in addition to another pitch of equal, or similar, duration in singular or multiple other voices, or two voices that sound a dyad or greater number of pitches in equal rhythmic duration. There are moments in the piece where the ensemble will fulfill these qualifications in all voices, resulting in what will be considered both a melodic and

harmonic motivic figure. From these parameters, the following analysis of melody, accompaniment, and secondary motives may be ascertained.

Considerations for Macro Analysis

Most analytical publications regarding Op. 5, movement 1 associate the piece with traditional Sonata-Allegro form. The 1922 Universal Edition score suggests this form as well; however, the editor describes a slightly differing division than this document proposes regarding the length of the exposition. In the preface of the 1922 edition, the editor, F.S., describes the form of the piece as follows: "The first movement…could be taken for a sonata form. The tendency is unmistakable: 1 - 13 = exposition; 14 - 36 = development; 36 - 50 = recapitulation and coda."[2] This supposition, while reasonable to conceive, disregards the manifestation of cadential vertical figures, particularly those of the recurrent eight-pitch vertical motive that permeates the movement, creating a cohesive sectional division by means of recurring figures. The form proposed by the author divides the piece similarly to the divisions suggested by the editor of the Universal Edition score, with the exception of the exposition concluding in measure 17. This sectional division is displayed in Table 1.

Table 1: Sectional Divisions by Measure

Measure	1 – 6	7 – 17	18 – 36	37 – 50	51 – 55
Section	Exposition		Development	Recapitulation	Coda
Subsection	Motivic Group A	Motivic Group B			

[2] Fünf Sätze für Streichquartett [UE. preface pages unnumbered, author, F.S.]

These proposed divisions, with the exception of the development, are concluded by the eight-pitch vertical motive, either as a pre-cadential figure, or as an ultimate cadential figure. Later in the document, the importance of this cadential pitch group will be discussed in detail.

Performance Technique as Textural Delineation

The primary four performance techniques of *arco, pizzicato, col legno*, and *am Steg* establish adherent relationships to the elements of melodic motives, secondary themes, imitative polyphony, and accompanimental gestures. These distinct sonic characteristics directly correspond to thematic material and function as delineations regarding melody versus accompaniment within the texture of the piece. The compositional demarcations associated with these specific techniques are listed as follows: *arco*, which introduces primary melodies based on semitone construction; *pizzicato*, highlighting melodic fragments, extended imitative passages, and accompanimental roles; *col legno*, emphasizing cadential eight-pitch sets and ensemble-spanning vertical figures; and *am Steg*, relegated to secondary motives, brief imitative passages, and melodic reiterations.

Performance technique in *Heftig bewegt* consistently corresponds to compositional ideas and allows for a method of differentiation between melodic motives, subsidiary melodies, and accompanimental figures by means of timbre. Texture, defined traditionally, correlates to the instrumental density of the piece, typically by the number of voices sounding simultaneously. Timbre and texture are dually essential in outlining the formal construction of the piece, and one frequently compliments the other to create sectional boundaries within the composition. They are, however, not dependent upon one

another to designate these boundaries, and do function as independent entities. The remainder of this chapter offers methods and examples pertaining to the coexistence of texture and timbre to define themes and formulate sectional differentiation throughout the piece. These approaches to differentiation are timbral diversity by means of instrument technique, contrasting articulations, and vertical density variances between parts.

By utilizing the prevalent timbral elements appearing throughout the piece, particularly moments of homophonic motion regarding eight-pitch vertical figures to distinguish melodic and accompanimental motives, a recognizable form can be realized. Additionally, the use of timbral differentiation through performance technique within the ensemble allows for further distinction between melodic and accompanimental function. Textural attributes examined in context within the ensemble facilitated by the timbral differentiation attributed to individual parts allows for the constructional elements of the piece to be identified and assigned a function. The ability to assign this functional differentiation will later provide a foundation for multidimensional analysis on a micro scale.

Motivic Group A

In Motivic Group A (measures 1 - 6), the melodic material consists of the initial augmented octave gesture that permeates many of the future melodic structures, followed by a tetrachord consisting of the culmination of all pitches that comprised the semitone figure on beat 3 of the first measure. This is superseded by the horizontal eight-pitch melodic motive played by violin I in measures 2 – 4. Violin II then reiterates this motive, creating imitation beginning on the upbeat of beat 1 in measure 3 while accompanimental figures are played by viola and cello. A brief moment of imitative polyphony is employed

between the second eighth note of beats 1 and 3 of measure 5 before introducing the first vertical pre-cadential eight-pitch set on the third sixteenth note of beat 3 of the fifth measure. Motivic Group A is concluded with the pre-cadential homophonic gesture in measures 4 - 6 that leads to the *col legno FF* reiteration of the last motion of eight-pitch homophony on the third sixteenth note of beat 1 in measure 6, followed by a transposed *PPP* restatement of the tetrachord originally found on the third sixteenth note of beat 1 in measure 1, transposed t = 9.

Considering the compositional techniques used in the opening gesture shown in Figure 1, particularly that of octave doubling with each two-pitch figure with no pitch overlap, this motive would be considered an imitative juxtaposition of melody and accompaniment between voices to reinforce the fundamental semitone interval, employing pitch classes $C^{\natural}$ - $C^{\sharp}$ and accompaniment $F^{\natural}$ - $E^{\natural}$.

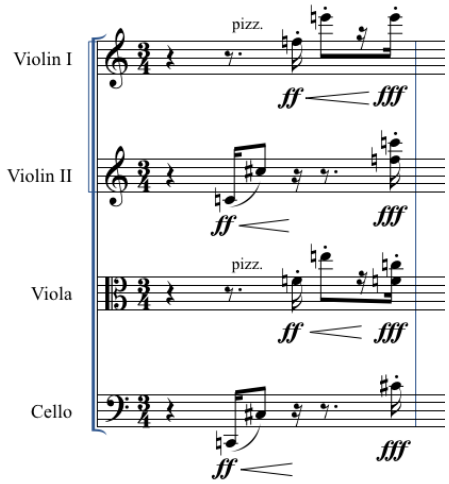

Figure 1: Occurrence of unison augmented octave and major seventh motifs in measure 1

The augmented octave leap gesture on beat 2 of measure 1 in the violin II and cello parts and its rhythmic facsimile on the third sixteenth note of beat two of the same measure played in violin I and viola proves to be an integral figure to the construction of

the piece. This figure, displayed in Figure 1, utilizes the interval of a semitone by means of the augmented octave in violin II and cello, and major seventh in violin I and viola, played in different octave registrations, introducing the hierarchical melodic attribute of the semitone found throughout the piece. This segment in measure 1 operates as a single melodic gesture interspersed across the four voices of the ensemble, creating an active melodic gesture, heard over four octaves in the initial sounding. Using the lack of pitch overlay and the different timbral abilities of the ensemble, clear representations of the augmented octave and major seventh are immediately heard through the reinforcement of the figure and timbral variance.

On beat 2 of the second measure, the preliminary example of a discernible melodic figure is juxtaposed against a distinctly accompanimental gesture (Figure 2). The chromatic *arco* sixteenth note figure in violin I starkly contrasts the sparingly placed *pizzicato* eighth and sixteenth notes found in violin II, viola, and cello. This textural differentiation explicitly demonstrates that a concrete melodic figure is being introduced with the intention of being elevated above the accompanimental material found in other voices. As the melody is repeated on beat 1 of measure 3, violin II initiates an imitative phrase, complementing the figure stated by violin I. This second instance of two-line imitation condenses the introductory imitation of the semitone leap, particularly the augmented octave, to one motive separated between two voices rather than two motives, major seventh and augmented octave, divided across four voices. The obvious timbral dissimilarity and rhythmic contrast in violin I, and later violin II, from viola and cello, introduces an initial melody and accompaniment texture, denoted by the contrasting coloration in Figure 3.

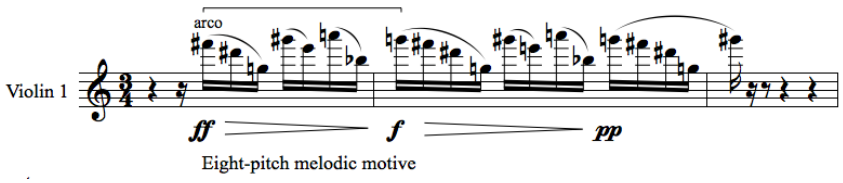

Figure 3: Violin I, measures 2 – 4

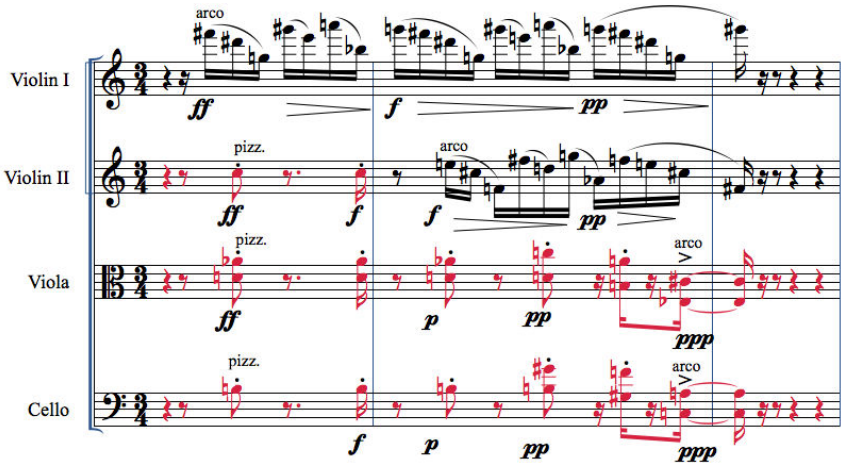

Figure 2: Textural differences in measures 2 - 4, delineated by contrasting coloration

Measure 4 introduces rapid imitative roles with timbral continuity that involves all voices of the ensemble playing *am Steg*. The cascading figure of three sixteenth notes with intervals perfect fourth - major seventh are sounded in succession through the quartet, separated only by the duration of a sixteenth note. This form of minutely offset imitative figures becomes a developmental, pre-cadential characteristic throughout the piece, foreshadowing sectional changes and motivic permutations, occurring most prominently in measures 4, 14 - 15, and 46 - 47. In Figure 4, the three-pitch motive is distributed between all voices in the ensemble with the separation of a sixteenth note, as shown in the bracketed segment.

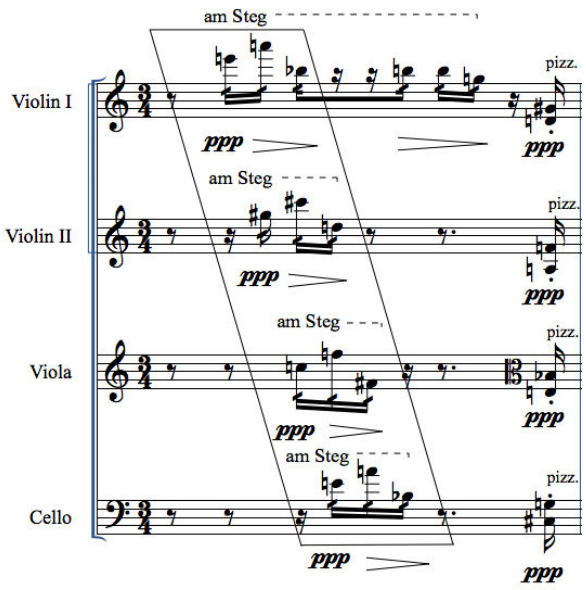

Figure 4: Demonstration of a polyphonic imitation occurring in measure 4

The conclusion of measure 4 displays the first instance of the eight-pitch vertical chord, which acts primarily as a cadential element in *Heftig bewegt.* These vertical moments require dyads in each voice, and will always contain eight individual, non-repeated pitches. This particular instance on the third sixteenth of beat 3 of measure 4, shown in Figure 4, is a pre-cadential instance of the motive, distinguished by the *PPP* dynamic, and the groups of complimentary sixteenth notes in the violin I and cello voices that surround the figure.

The next occurrence of the eight-pitch motive on beat 2 of measure 5 utilizes the figure as a melodic motive that propels the phrase to the cadential moment on the third sixteenth of beat 1 of measure 6, with the arrival of the *FF* eight-pitch figure. These instances of eight-pitch figures are inherently crucial regarding the texture of the piece, as they result in the sole moments of timbral continuity and complete homophony across the ensemble.

The prevalent textures in Motivic Group A provide a clear differentiation between melodic, subsidiary, and accompanimental material. The *arco* performance of the semitone gesture in measure 1 by violin II and cello highlights the figure as a melodic motive, while the *pizzicato* violin I and viola reiterate the importance of the semitone as an accompanimental gesture. The extended violin I and violin II motive in measures 2 - 3 is played *arco*, highlighting its prominence as a melodic motive, while the viola and cello accompany with conflicting *pizzicato* textures. The following example of imitative polyphony within the full ensemble is played *am Steg*, providing a brief timbral shift across all voices. The concluding figure of vertical eight-pitch homophony is played *arco*, again reinforcing the melodic significance of the semitone gesture performed in all voices, while the consummation of the homophonic phrase is attacked *col legno*, enforcing the end of the first section. This format of motivic association by means of timbre will remain constant through the remainder of the movement.

Motivic Group B

Motivic Group B introduces a new melodic figure in measures 7 - 9 in the cello voice accompanied by tremoloed dyads in viola. The duration of both parts are noted to be played *am Steg,* insinuating continuity between the two voices, resulting in a substantial contrast between this figure and the following contrapuntal phrase. Beginning on the first sixteenth note of beat 2 in measure 9 until beat 2 of measure 13, violin I and violin II execute the figure of a clearly defined harmonized subservient melody paired with a contrasting second melody performed by the viola, both performed *arco*. Upon the conclusion of this figure, the viola and cello sound an *am Steg* restatement of the initial figure of Motivic Group B, on the second eighth note of beat 2 until the second eighth

note of beat 4 of measure 13. Measure 14 displays another instance of four-voice imitative polyphony, performed *pizzicato,* with substantial amounts of overlap within the figures, allowing the four-pitch gesture to be repeated with a sixteenth note of separation 16 times over the course of seven beats in measures 14 - 15, eventually dispersing in fragments between all voices of the ensemble. This timbral continuity emphasizes the unity of each voice in the ensemble, which creates the allusion of a single voice executing the extended gesture of imitative polyphony. The section is concluded by an augmentation of the initial cello motive from measure 7 on the second sixteenth note of beat 2 of measure 16, followed by an explicit moment of closure, denoted by the second occurrence of a cadential vertical eight-pitch set, accentuated by two *col legno FFF* sixteenth note iterations on the fourth sixteenth note of beat 2 and the first sixteenth note of beat 3 of measure 17.

Texturally, Motivic Group B widely enforces the same timbral associations as observed in measures 1 - 6. Melodic motives are performed either *arco* or *am Steg*, however, the extended period of imitative polyphony is played *pizzicato* rather than *am Steg*. The section is similarly concluded with an *arco* reinforcement of a primary melodic motive in all voices with the final eight-pitch set played *col legno*.

Development

The development dissects the previously introduced motives into scarcely discernible fragments that are meticulously interwoven and mutated with contrasting figures. All preceding melodic motives experience metamorphosis and alteration in some format, forcing the transformations to function within substantially different roles. Although the motives are often developed to an indistinguishable extent, the roles of

timbre achieved through performance technique remain consistent in the writing of Webern, enabling contrasting sonic capabilities to be observed. While the motivic content of the exposition is extensively obscured in the developmental measures, the motives pertaining to pitch class set 3-3 still prevalently appear, allowing the melodic mutations to retain a degree of aural familiarity. The concluding moments of the development in measures 31 - 36 feature traits of Motivic Group A by establishing a melodic figure, polyphonic imitation, and homophonic gestures in accompanimental voices. This gesture ultimately concludes on the third eighth note of beat 2 in measure 35 with a five-pitch vertical moment, delivered in a contrasting method from prior sectional conclusions, with all voices participating in a timbrally stable *arco* decrescendo.

Recapitulation

The recapitulation subsequently employs heightened traits of motivic fragmentation in similar methods as observed in the development to reintroduce certain melodic figures in a familiar, significantly compressed format. The *am Steg* figure in measure 37, displayed in Figure 5, reinforces the harmonic foundation found in the first measure of the piece on both horizontal and vertical dimensions through a recurring melodic fragment. The subordinate melody from the polyphonic gesture in Motivic Group B is reintroduced in measure 38, offset with accompanying semitone gestures that experience metamorphosis, eventually leading to a retrogradation of the pre-cadential homophonic figure found in Motivic Group A by measure 43. Measure 45 dismembers the violin motive found in measures 2 - 4 with interspersed fragments of the initial accompanimental gestures from measure 18 of the development, and develops these ideas through an expansive phrase of imitative polyphony. The culmination of the

recapitulation arrives at measure 49, with a transposition of the eight-pitch homophonic gesture, originally seen in measures 5 - 6, imparting the anticipation of sectional closure.

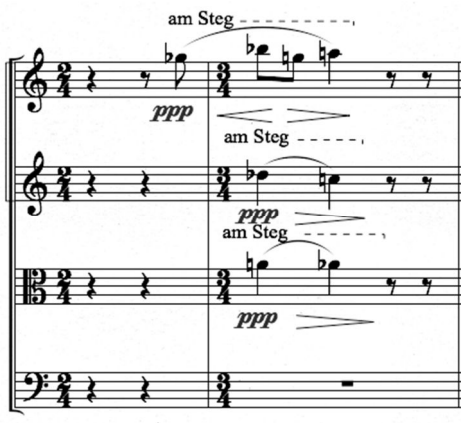

Figure 5: Measures 36 – 37

The timbral choices employed in the recapitulation impart a density that was previously avoided in the piece. Utilization of timbral alterations to delineate texture in the recapitulation becomes more frenzied, introducing rapid changes between *arco, pizzicato,* and *am Steg* techniques in single lines, particularly in moments of imitation. Although prominent melodic figures are still performed *arco*, textural differentiation becomes more prevalent in measures 37 - 50, with the first instances of staccato bowing being utilized rather than *pizzicato*. Juxtaposed timbral ideas consequently appear more frequently, with moments of the three textures being performed simultaneously.

To close the movement, a brief coda is employed in measures 51 - 55 to establish the paramount motive of the semitone once more. The melodic motives found within the coda consist solely of a semitone figure, which reinforces the augmented octave as seen in measure 1, occurring first in the lower octaves of the viola and cello in measure 51, then sounded by violin I decrescendoing in a stratospheric registration through measures 52 - 54. Similarly to the beginning of Motivic Group A, this instance of the prominent

augmented octave gesture is performed *arco*, while offset against timbrally divergent accompanimental roles, first utilizing *pizzicato* in measure 51, then a combination of *pizzicato* and *am Steg* in measures 52 - 54. Violin II and viola reinforce the harmonic foundation established in Motivic Group A through a succession of *am Steg* dyad figures that reside beneath the semitone motive in violin I. The coda ends with the augmented octave $C^{\natural}$ to $C^{\sharp}$ figure passing between cello, viola, and violin I, spanning the range of five octaves, before the cadential eight-pitch set is sounded a final time at a barely perceptible *PPP* dynamic.

By introducing sectional divisions in *Heftig bewegt* by means of textural density and timbral variance, a quasi-traditional example of the Sonata-Allegro form becomes apparent. As the piece is further analyzed, the attributes observed supersede the timbral association to melodic gestures in addition to the density, and space occupied by accompanimental motives on the vertical axis will provide strategic divisional methods to approach the piece by methods of set theory analysis. In the following chapter, the seminal pitch class set 3-3 will be introduced and its influence pertaining to the constructional methods on the horizontal and vertical dimensions will be studied, with particular attention to its recurrence within the accompanimental realm as a foundational figure.

Chapter 2: Pitch class set 3-3, its construction, foundational importance in *Heftig bewegt,* and pertinence to the semitone plus minor or major third figure.

The foundational constructive element of *Heftig bewegt*, pitch class set 3-3, is a frequently recurring salient motive of the piece on a multidimensional level. This pitch class set is comprised of three pitch classes separated by the intervals of a minor second and a minor third, which when combined create an overall intervallic scope of a major third. Furthermore, the Kholopovs designate pitch class set 3-3, by way of its interval content, as the "Webern Group"[3] in their analytical work, *The Music of Webern (Музыка Веберна).* They offer further information regarding Webern's gravitation to this particular pitch class set, stating, "At the beginning of the quartet (op. 5) the motive C♯ - C ♮- E♮ is given as a significant idea-formula related to Beethoven's famous "muss es sein?" from the Introduction to the Finale of his Op. 135 quartet (notably, Beethoven's aphoristic theme is built on the same group, 3a[4])."[5]

This specific three-pitch motive will be examined as an infrastructural element to determine characteristics of the harmonic language employed by Webern throughout the movement. The occurrences of pitch class set 3-3 will be analyzed primarily as a vertical accompanimental chord, but also as prominent melodic motives and axis points, which connect the horizontal and vertical dimensions and establish cohesion between harmony and melody.

As motives are examined on the vertical and horizontal planes, the figures will often expand beyond the scope of the simple 3-3 trichord. These tetrachords, hexachords,

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[3] Kholopova, 22

[4] The Kholopova group 3a is synonymous to the Forte pitch class set 3-3. It is referenced as group 3a in the Kholopov classification of differing Hemitonic groups. [KO]

[5] Kholopova, 24

and other larger pitch collections that contain pitch class set 3-3 as a subset frequently display multiple iterations that may be extracted from the expanded chord through techniques of set theory described by Allen Forte in *The Structure of Atonal Music*[6].

When observing pitches that compose pitch class set 3-3, the pitches notated in their best normal order will result in the integer set [0,1,4]. As a simple trichord, pitch class set 3-3 will yield the integers mentioned above without fail. However, when instances of the trichord are held within larger, more complex sets, factors of inversion based on the interval pattern unique to pitch class set 3-3 is necessary to extract the trichord from its superset. Concurrently, particular melodic and harmonic sets that expand to as many as eight individual pitches will certainly contain multiple iterations of pitch class set 3-3, hence yielding examples of subset 3-3 masked within the content of the pitch collection.

In the following example from measure 1 (see Figure 6), the tetrachord comprised of pitches C♮, C♯, E♮, and F♮ constructs pitch class set 4-7, integers [0,1,4,5], on the vertical plane. With the consideration of this group of integers, a single example of pitch class set 3-3 in best normal order exists using integers [0,1,4], or pitches C♮, C♯, and E♮, as written. Another instance of set 3-3 can be derived through inversionally arranged integers [1,4,5], which concurrently creates a second instance of pitch class set 3-3, using pitches C♯, E♮ and F♮.

[6] Forte, Allen. *The Structure of Atonal Music* (New Haven, CT: Yale University Press, 1973)

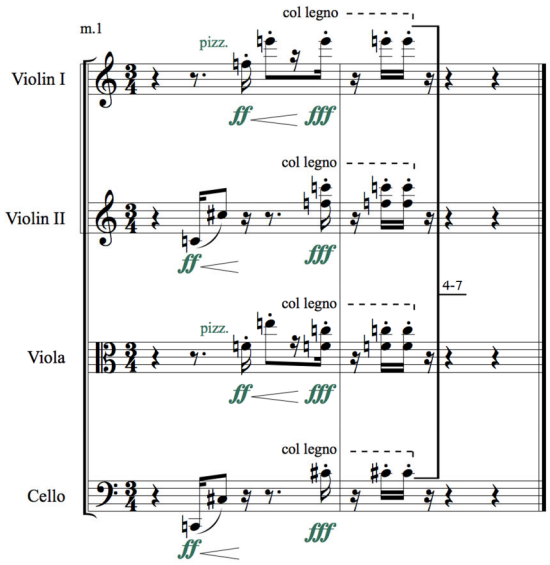

Figure 6: Vertical construction of pitch class set 4-7 in measure 1 across all voices of the ensemble

Furthermore, when considering an instance of pitch class set 8-10 found in measure 17, the construction of this larger set is dependent upon the utilization of two separate instances of pitch class set 4-17. Pitch class set 4-17, comprised of integers [0,3,4,7], is similarly constructed with two instances of pitch class set 3-3, by using integers [3,4,7] in prime form, and integers [0,3,4] by inversion, which accordingly demonstrates that pitch class set 8-10 possesses four individual instances of pitch class set 3-3. This process of set construction by combinations of smaller pitch class sets is displayed in Figure 7.

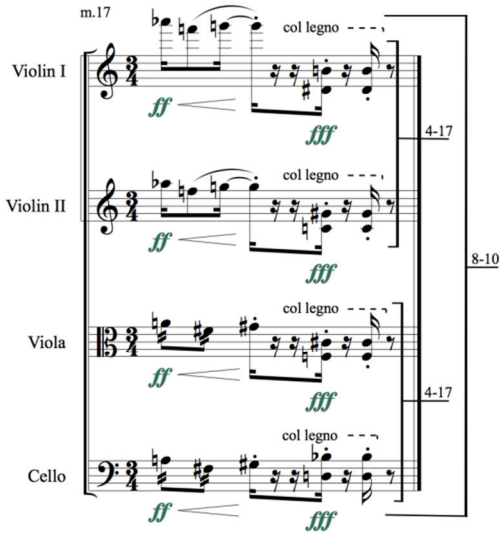

Figure 7: Composition of pitch class set 8-10 in measure 17 by utilizing two instances of pitch class set 4-17, t = 2

The Semitone:

Pitch class set 3-3 displays many of the fundamental horizontal and vertical characteristics found within the movement in three comprising intervals. The emphasis on the prevalence of chromaticism related to the semitone in pitch class set 3-3 pervades the piece on a multidimensional level, yielding prominent semitonic figures within the horizontal lines, vertical harmony, and extended voice leading, as will be shown in chapter IV. The composer made clear the importance of the semitone interval, when in a 1933 lecture he states:

> it was soon clear that hidden laws were there, bound up with the twelve notes; the ear found it very satisfying when the course of the melody went from semitone to semitone, or by intervals connected with chromatic progression. That's to say, on the basis of chromaticism, not of the seven-note scale. The chromatic scale came to dominate more and more: twelve notes instead of seven.[7]

[7] Edward Lippman, *Musical Aesthetics* (Stuyvesant, NY: Pendragon Press, 1990) 115.

While the presence of chromaticism is frequently enforced on the horizontal plane, particularly in the prominence on the semitone leap of an augmented octave or major seventh in melodic figures, the semitone rarely manifests in purely harmonic functions within a single part (refer to cello on beat one of measure 48 for the sole exception). Although the horizontal motion often progresses with an emphasis on semitone contours, it is uncommon for the motion of concurrent semitones to be a chromatic minor second or augmented unison; rather, these consequent semitone intervals are found in major seventh and augmented octave figures. Subsequently, when observed in vertical applications, the single voice dyad will employ wider intervallic separation. It is only when one voice sounding a dyad is paired with a corresponding accompanimental voice that chromatic dissonances relating to pitch class set 3-3 are formed, hence creating a tetrachord with sufficient chromaticism from which to extract the foundational pitch class set.

Instances of chromatic movement on the horizontal plane begins in the first measure of the piece where all voices introduce the ascending augmented octave and major seventh leaps. As the initial melodic figure of eight pitches is played by violin I in measure 2, the utilization of all possible iterations of chromatic motion appear, i.e. the augmented unison, major seventh, and minor second. Furthermore, the contour of the entire motive rises a semitone from the initial $F^{\sharp}_{5}$[8] on beat 2 of measure 2 to the concluding $G^{\natural}_{5}$ on beat 1 of measure 3, and expanding further to $G^{\sharp}_{5}$ with the reiteration of the figure in measure 3. This gesture, displayed in Figure 8, further solidifies the

[8] $F^{\sharp}_{5}$ registration is based on the premise that middle $C^{\natural}$ corresponds to $C^{\natural}_{3}$

importance of the semitone emphasis found in the opening measures, by augmenting the duration in which the chromatic motion unfolds.

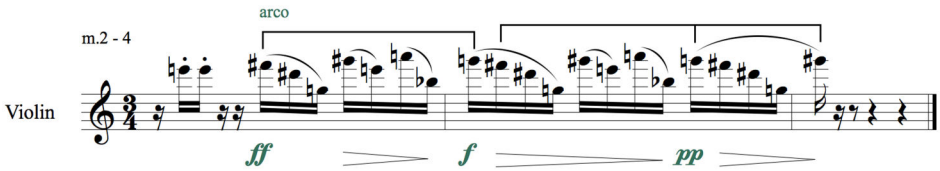

Figure 8: Ascending semitone contours over the duration of melodic figures found in violin I in measures 2 - 4

In measures 9 - 13, violin I exhibits substantial use of the semitone between adjacent pitches, while violin II demonstrates adjacent semitone movement in only three instances during the phrase. Although the semitone intervals do not correspond directly between the voices, the intervallic separation between the two voices remains consistent, highlighting the intervals of minor or major third.

The semitone on the vertical plane acting as an element of accompanimental chord construction behaves on a less obvious level. The semitone as a vertical figure functions in two fundamental ways when constructing vertical figures. The first of these is the semitone functioning as an axis point between different voices in the chord, as displayed in Figure 9. Another common method of semitone inclusion in vertical chords is placement within the outermost voices in the chord, which is demonstrated in Figure 10.

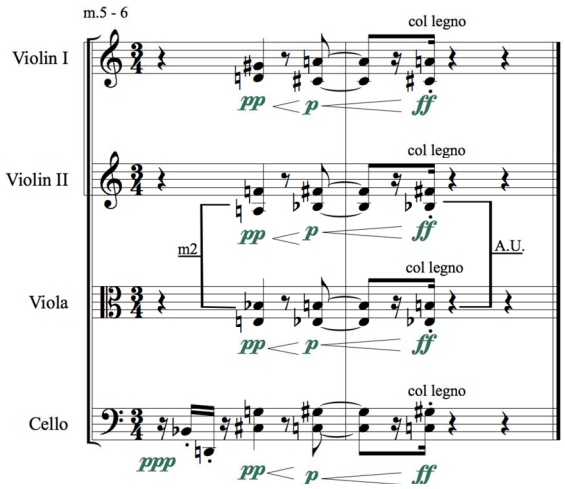

Figure 9: Measures 5 – 6. The semitone functioning as an axis point between two tetrachords, designated by the bracket between violin II and viola.[9]

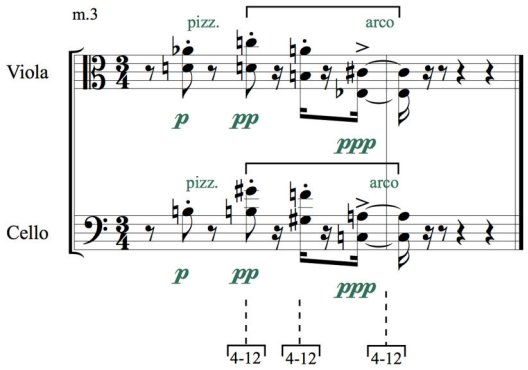

Figure 10: Measures 3 – 4. The Semitone placement in outermost voices of the chords displayed within the bracket

Despite the semitone acting in a less noticeable fashion on the vertical axis, the prevalence of this interval in the construction of harmonic material is integral to the foundation of the piece.

[9] A.U. will be used as an abbreviation for the augmented unison interval throughout the duration of this document.

The Minor and Major Third

The minor third and major third, like the semitone, are prominent in consequent intervals on the horizontal plane that construct melodic phrases. These intervals and their enharmonic equivalents are used frequently on both planes as demonstrated in Figure 11; however, they do appear more prominently in the vertical realm used in harmonic aspects within accompanimental figures.

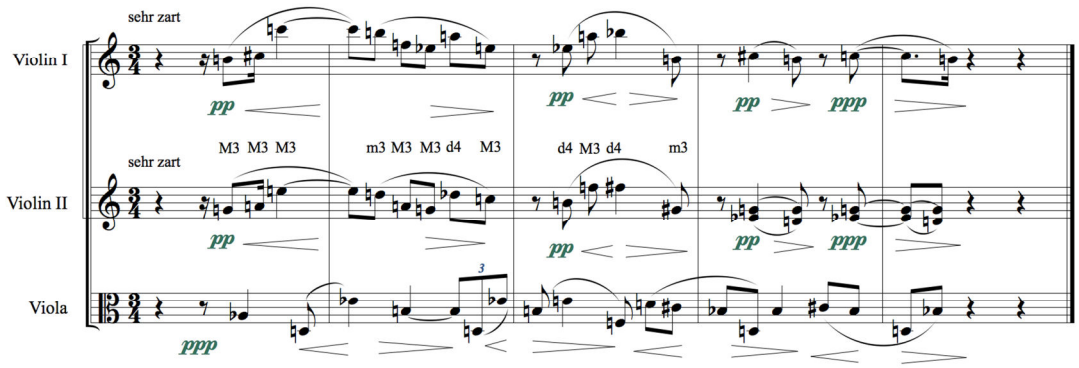

Figure 11: Measures 9 – 13 display the intervallic separation comprised of thirds within the homophonic texture of violin I and violin II

The non-semitone intervals in pitch class set 3-3 display contrasting functions to the role of the semitone, which is predominantly melodic. The imperfect consonance of the minor and major third intervals is frequently utilized as an intervallic separation between primary and subsidiary polyphonic voices and as prominent intervallic separators in consequent descending vertical pitches. When considering the construction of a horizontally progressing motive with a melodic function, such intervals are commonplace; nevertheless, Webern's utilization of these intervals in higher occurrence within his work demonstrates no irrefutable evidence to suggest construction with these two intervals serves a foundational role as independent intervals. Rather, the minor and major third must be paired with another interval to impart significance to these intervals

as a grouping. Alternately, an examination of the vertical construction of accompaniment within the piece contributes a significantly purposeful operation for the minor third and major third intervals as independent entities when juxtaposed against other groupings of minor or major thirds.

Analogous to the construction of chordal passages involving the semitone, vertical figures primarily display instances of the minor third or major third interval within a single voice as a dyad. Consequently, these intervals share certain traits with the semitone in the construction of vertical chords, occasionally functioning as the outermost pitch boundary of a chord. The opening tetrachord of the movement on the third sixteenth of beat 3 in measure 1, exhibits this quality by utilizing the minor third as an outer boundary within the tetrachord. More frequently, the minor third or major third interval functions as the intervallic separator between any two pitch classes that construct the semitone interval within an accompanimental chord, and in so doing, prevent any single voice from sounding the semitone in a single vertical function.

The Basic Interval Pattern (BIP) in Horizontal Instances of Pitch Class Set 3-3

The function of the semitone as a vital element in the progression of horizontal motives, when considered regarding the construction of pitch class set 3-3, appears in more selective instances than other intervals utilized in construction of the set. To observe the occurrence of consecutively arranged intervals of minor second, minor third, and major third, integers 101100 respectively, in any order, as a linear melodic function results in fewer than expected semitone intervals, with a heightened emphasis on the major and minor third. This examination using Forte's Basic Interval Pattern (BIP) highlights the intervals that create pitch class set 3-3, and allows for instances of the set

to become apparent on the horizontal dimension by means of numerical succession. To construct pitch class set 3-3 horizontally using the BIP, there are six possible integer-based combinations to properly configure the set: [1,3], [3,1], [1,4], [4,1], [3,4], and [4,3].

Table 2 displays all instances of horizontally occurring instances of pitch class set 3-3, segregated by intervallic content in correspondence to each delineated section of the piece. By considering the BIP horizontally, patterns of interval usage, particularly regarding the prevalence of the horizontally occurring minor or major third interval throughout the piece, become apparent. As the movement progresses through each section, the minor or major third interval begins to impose hierarchy over the semitone, forcing the semitone to accept an increasingly subservient role within horizontal progression.

Table 2: Number of occurrences of each interval combination of pitch class set 3-3 within the individual sections of the piece

	Exposition		Development	Recapitulation
Interval	Motivic Group A	Motivic Group B		
[1,3]	3	2	0	7
[3,1]	3	0	1	4
[1,4]	3	4	2	4
[4,1]	2	1	0	0
[3,4]	7	1	12	16
[4,3]	1	6	12	4

The examination of this relationship of BIPs in Motivic Group A shown in Table 2 displays the more frequently occurring semitone plus third combination, [1,3] and [3,1], and will correspond to the BIP beginning with a minor third, [3,4], rather than that

beginning with a major third [4,3]. To further this premise, the BIP content in Motivic Group B shows that the semitone and major third is represented most often; hence, it will correspond to the non-semitone BIP beginning with a major third, [4,3]. This trait of corresponding BIPs represented through the remainder of the piece suggests a possible harmonic language characterized horizontally by means of the third interval existing as either minor or major. The demonstrated [1,3] and [3,1] to [3,4] and [1,4] and [4,1] to [4,3] relationships imply that an emphasis on the minor third is represented in Motivic Group A, with a combined six instances of the interval combinations [1,3] and [3,1], and a total of seven occurrences of pitch class set created with corresponding intervals [3,4]. The major third takes precedence in Motivic Group B, with a combined total of five instances of interval combinations [1,4] and [4,1], concurrently establishing a relationship with interval pattern [4,3], beginning with the major third. This satisfies traditional requirements of contrasting qualities of harmonic language in Sonata Allegro Form; however, rather than utilizing standard tonal combinations, intervallic content is employed as the delineator of form division. A further examination of the BIP chart in Table 2 demonstrates an adherence to the harmonic standards of Sonata-Allegro form through the duration of the piece, featuring equal weight given to both the minor and major third in the development, and a distinct gravitation back to the minor third in the recapitulation.

Vertical Construction Methods Using the Intervals of Set 3-3

The formation of many chords within the accompanimental realm utilize intervallic traits of pitch class set 3-3 in their construction, particularly regarding the pitch separation between the innermost and outermost voices. The vertically constructed

figures displayed in Figures 12, 13, and 14 are taken from Motivic Group A and exemplify commonly occurring pitch class sets 4-7, 4-12, and 8-10 found in the Universal Edition score.

In Figure 12, the instance of pitch class set 4-7, found on the fourth sixteenth note of beat 3 in measure 1, displays major third as the interval that separates the highest and lowest voices of the tetrachord from the interior voices. Although the interval between $C^{\sharp}_{3}$ in cello and $F^{\natural}_{3}$ in viola is notated in the manuscript as a diminished fourth, the separation of these notes by four semitones renders it enharmonically a major third. The semitone function in this chord provides an axis between the interior and exterior voices, with $E^{\natural}_{5}$ played in violin I forming a major seventh with the $F^{\natural}_{4}$ played in violin II and viola. The $C^{\sharp}_{3}$ played by the cello functions in the same method, forming an augmented unison with $C^{\natural}_{4}$ and $C^{\natural}_{5}$ played in violin II and viola. Finally, the outermost voices, $C^{\sharp}_{3}$

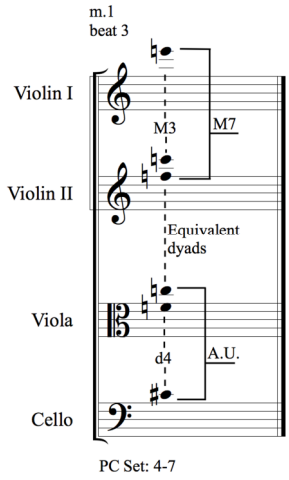

Figure 12: This tetrachord displays the semitone difference in the outermost voices and intervallically equivalent separation between inner voices, notated enharmonically and $E^{\natural}_{5}$, sounded in cello and violin I, respectively, the pitches separated furthest in frequency, form a minor third, the final interval necessary to construct pitch class set 3-3.

The second example of semitone function within vertical intervallic constraints, pitch class set 4-12, is found in violin II, viola, and cello in the second beat of measure 2, and condenses to only the viola and cello voices by beat one of measure 3. The semitone in this figure connects the outermost voices of the chord, $B\natural_2$ in cello and $C\natural_4$ in violin II, followed by viola, and continues in a similar compositional pattern with each instance of pitch class set 4-12 throughout the remainder of the movement, illustrated in Figure 13.

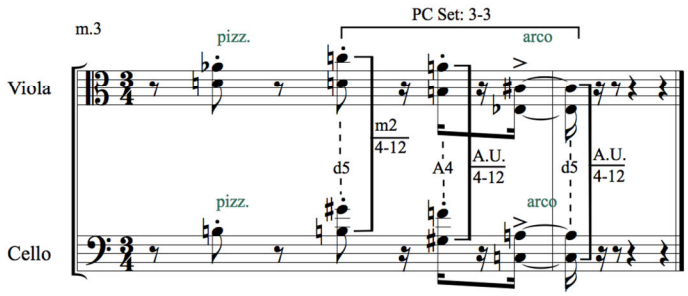

Figure 13: Three consecutive tetrachords creating pitch class set 4-12 with a semitone difference in the outermost voices, and enharmonic equivalence between the inner voices

Pitch class set 8-10 acts as a unique example of vertical construction due to the inclusion of two iterations of pitch class set 4-17 that are connected by a semitone as a point of axis between $B\flat_2$ played in violin II and $B\natural_2$ played in viola. The two instances of pitch class set 4-17 that comprise set 8-10 are also noteworthy for the semitone that corresponds to the outermost voices of each example of the set, $B\flat_2$ to $A\natural_3$ in set one of example B of Figure 14 (violin I and violin II), and $C\natural_2$ to $B\natural_2$ in set two (viola and cello).

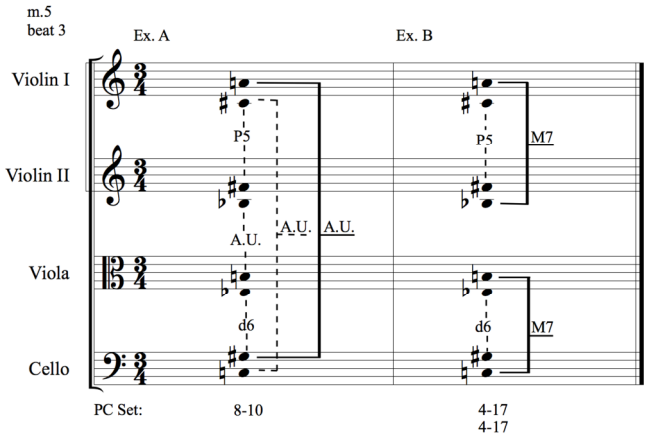

Figure 14 (A, B): Pitch class set 8-10 demonstrates the semitone as an axis point between the two tetrachords that comprise the set as well as a connection between the outermost voices. When pitch class set 8-10 is considered as two examples of pitch class set 4-17

Horizontal and Vertical Axis Sharing Pitch Class Set 3-3

Pitch class set 3-3 consequently acts as a unifying element between the horizontal and vertical dimensions of the piece. In these moments, pitch class set 3-3 appears in its prime form within a horizontal melodic gesture, acting as a subset within a larger set that establishes a prominent thematic motive. These thematic horizontal motives with pitch class set 3-3 in prime form will recurrently be seen to construct the same pitch class set on the vertical axis in conjunction to the melodic figure. Instances of these intersecting pitch class sets can be observed in the following collection of examples.

A simple construction of pitch class set 3-3 with the inclusion of motives built on both the horizontal and vertical planes appears in measure 7 as the cello and viola begin Motivic Group B. The prime form of pitch class set 3-3 occurs as a subset of pitch class set 4-3 in the horizontal cello melodic figure, comprised of pitches C♯, D♮, and F♮. When observed on the vertical dimension, the viola dyad accompanimental figure in

conjunction with the cello pitches on beat 2 and 3 of measure 7 creates two separate instances of pitch class set 3-3 in its prime form, containing pitches E♮, F♮, G♯, and E♭, E♮, G♮ (see Figure 15).

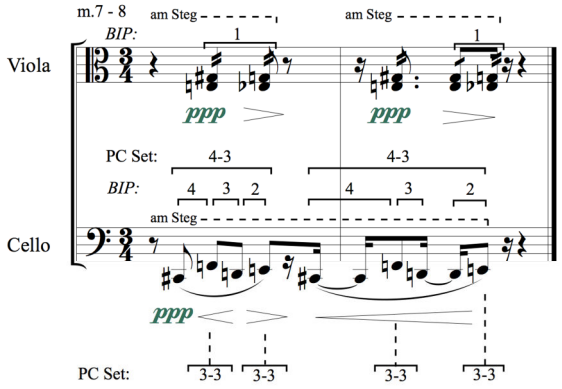

Figure 15: Measures 7 – 8. This example displays the shared pitch axis between horizontal pitch class set 4-3 that allows vertical pitch class set 3-3 to be created

A similar example of pitch class set construction over both planes appears at the beginning of the recapitulation in measures 36 - 37. This occurrence introduces the horizontal pitch class set 4-3 performed by violin I, originally found in Motivic Group B in measures 7 - 9 in cello, with pitches G♭, G♮, A♮, and B♭ in best normal order. When the vertical motion of the accompaniment in violin II and viola is considered with the progression of the melodic motive on beats 1 and 2 of measure 37, two additional prime form examples of pitch class set 3-3 are formed, composed of pitches A♮, B♭, D♭, and A♭, A♮, and C♮. This example is constructed in a similar method to the aforementioned example of this figure in measure 7, with the sole modification being the division of accompanimental pitches into two voices rather than one dyad (see Figure 16).

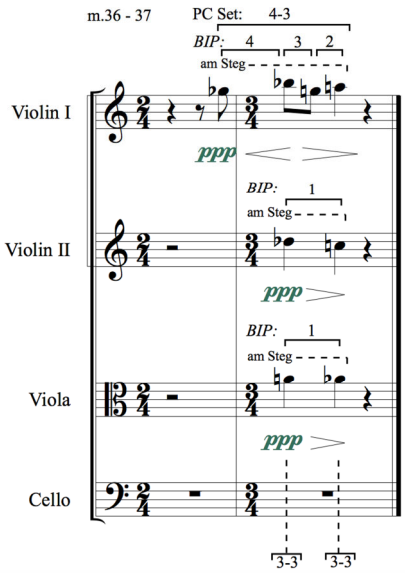

Figure 16: Measures 36 – 37 shows another instance of horizontal pitch class set 4-3 enabling the construction of vertical pitch class set 3-3

The construction of pitch class set 3-3 on a multidimensional level occurs in a less noticeable method in the opening measure of the piece, requiring the consideration of all voices and pitches in the ensemble. When regarded by part, the voices display no evidence of pitch class set 3-3 in its entirety on the horizontal plane, however, if the two horizontally progressing unison lines are viewed as a unified figure employing pitches C♮, C♯, E♮, and F♮, pitch class set 3-3 is created as a subset of pitch class set 4-7. The conclusion of this introductory gesture results in a tetrachord comprised of all pitch classes found in the horizontal figure, consequently yielding a second example of pitch class set 4-7 that uses the same pitch collection as the horizontal instance of pitch class set 4-7 (see Figure 17).

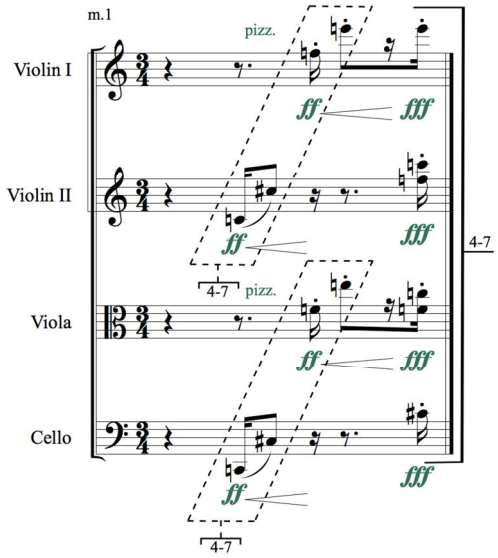

Figure 17: Measure 1 creates a symmetrical occurrence of pitch class set 4-7 on the horizontal and vertical axes using the same pitches

A unique instance regarding the multidimensional construction of pitch class set 3-3 is seen on beat 3 of measure 4 through beat 1 of measure 5, displayed in Figure 18. Here, the horizontal and vertical pitches played by violin I create pitch class set 4-18 using pitches G♮, G♯, B♮, and D♮. The augmented fourth dyad in violin I on the last sixteenth note of beat 3 is a segment of a larger eight-pitch vertical figure, pitch class set 8-18, constructed of pitch class sets 4-18 and 4-28. The diminished fifth dyad in the cello voice within pitch class set 4-28 initiates an adjacent instance of inverted pitch class set 4-18, which is inversionally equivalent to the prior instances of the set found in violin I. After inversion is completed for pitch class set 4-18 in the cello voice, pitches B♭, B♮, D♮, and F♮ are acquired. This example presents two instances of pitch class set 4-18 in violin I and cello that utilize a larger pitch class set as a point of axis, uniting two individually occurring pitch class sets by inversional equivalence (see Figure 19).

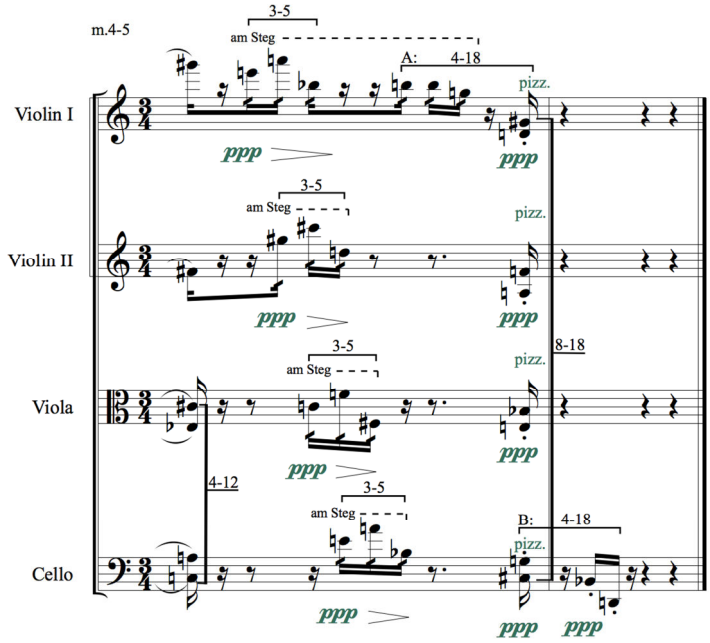

Figure 19: Measures 4 – 5 creates two examples of pitch class set 4-18, pitch class set A played by violin I in prime form and pitch class set B played by cello inverted, with the common locus of pitch class set 8-18

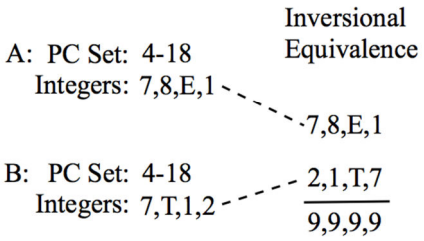

Figure 18: Measures 4 – 5. Display of pitch class set 4-18, A and B, from Figure 18, and the inversional equivalence achieved through the addition of integers constructing the individual pitch class sets

The functions of pitch class set 3-3 as a constructive element as shown in Figures 12 through 19 display the multifaceted uses of the set in the composition of *Heftig bewegt*. As the perceivable instances of this set are most prominently noticed in horizontal melodic motives, the less frequently occurring vertical moments that contain pitch class set 3-3 are of substantial interest due to the intervallic behavior within the chord, particularly amongst tetrachords and larger pitch collections. The intersection

involving examples of pitch class set 3-3 created vertically to the corresponding set on the horizontal plane also introduces further cohesion to the argument regarding the importance of pitch class set 3-3 as a fundamental element in the construction of the piece. In the following chapters, these attributes of pitch class set 3-3 will be further examined in detail to present methods that offer explicit examples to the comprehensive influence of the set across the piece as a whole.

Chapter 3: Pitch class set 3-3 as a component of the larger, vertical eight-pitch set. Illustrations of the vertical cadential figure in form, its subsets, and relation to preceding material by means of subset 3-3.

The prevalence of pitch class set 3-3 and the methods involved in its acquisition on the vertical dimension throughout the movement displays undeniable correlations to each section by means of the chordal scope, intervallic composition, and relation to larger pitch class sets demonstrated on the vertical plane. As the vertical composition of the piece is observed, certain instances of the supersets containing pitch class set 3-3 become notably prominent as accompanimental figures, principally pitch class sets 4-7, 4-12, 4-17, and 4-18. These accompanimental trichords and tetrachords are integral to the eventual occurrence of the vertical eight-pitch figures that indicate the conclusion of the sections found within the piece. The aggregation of the accompanimental figures containing pitch class set 3-3 lead to the construction of the cadential eight-pitch chord by means of interval content acquired through the addition of multiple tetrachords. The resultant figure, which contains each instance of tetrachordal accompaniment as a subset, suggests that Webern deliberately selected the pitch and interval content of these cadential figures to illustrate the significance of the previously heard harmonies as a single cumulative gesture. Correlations between the intervallic content of cadential eight-pitch sets to the trichordal and tetrachordal vertical accompanimental functions throughout the piece will be examined throughout the remainder of this chapter.

The cadential eight-pitch sets occur in two differing constructions. The first of these sets is comprised of pitch class set 4-18, integers [0,1,4,7], superimposed upon a fully diminished seventh tetrachord, pitch class set 4-28, integers [0,3,6,9], resulting in pitch class set 8-18. The second recurring eight-pitch set is constructed with two

instances of pitch class set 4-17, integers [0,3,4,7], superimposed vertically upon the other, resulting in pitch class set 8-10. Pitch class sets 8-10 and 8-18 maintain a pitch collection based upon intervallic content that demonstrates relationships to intervals comprising preceding vertical functions in conjunction with a pitch construction that utilizes two tetrachords containing at least one instance of pitch class set 3-3 as a subset. These two eight-pitch sets are the impetus to an ultimate goal in two instances within the piece: as a pre-cadential progression at the conclusion of Motivic Group A in measures 5 - 6, and later, to provide finality to the recapitulation in measures 49 - 50. In both cadential passages, these sets work in conjunction to provide a two chord harmonic conclusion, 8-18 - 8-10. Another cadential moment incorporating an eight-pitch set occurs at the conclusion of Motivic Group B in measure 17, where a reiterated instance of pitch class set 8-10 is sounded independently of set 8-18, lending the supposition that this set posseses pitch content enabling it to function independently of pitch class set 8-18. The strength of pitch class set 8-10 as a formative vertical function is further implemented as the defining vertical figure of the piece, concluding the coda in measure 55.

Intervallically, these sets are both comprised of expanded collections of primarily chromatic intervals separated by two major seconds within the scope of the set, resulting in the overall span of a major sixth. Pitch class set 8-18 contains the major second intervals within the interior of the set, displaying the integers [0,1,2,3,5,6,8,9] when placed in best normal order. Contrastingly, pitch class set 8-10 contains the major second intervals at the beginning and end of the set, resulting in integers [0,2,3,4,5,6,7,9] when set in best normal order. With the saturation of chromaticism in these large sets, there

will indisputably be a substantial degree of intervallic content shared amongst the pitches represented within the set. Pitch class sets 8-18 and 8-10, by Forte's analysis, contain the interval content 546553 and 566452 respectively.

Pitch class sets 8-18 and 8-10 possess particular characteristics that are unique to each figure. Pitch class set 8-18 is never observed to function as an independent figure within the movement; rather, all instances of its occurrence are dependent upon pitch class set 8-10 following immediately afterwards. The tetrachords that constitute the construction of pitch class set 8-18, while displaying a degree of similarity through ordered transposition, possess only one instance of pitch class set 3-3 as a subset, no inversional equivalence, and only two shared intervals, the minor third and diminished fifth. Consequently, pitch class set 8-10, is utilized as an independent figure in measures 17 and 55, demonstrating autonomy from the preceding pitch class set, 8-18. Furthermore, the pitch class set 4-17 tetrachords that construct pitch class set 8-10 illustrate inversion equivalence, four instances of pitch class set 3-3 as a subset, and complete similarity through interval content. Although both pitch class sets 8-18 and 8-10 contain numerous instances of each possible interval, both pitch class sets do share interval content similarities in the number of semitone, minor third, and perfect fifth intervals within the set, which have both been seen to be integral intervals in the construction of pitch class set 3-3 and other instances of tetrachordal accompaniment.

Table 3 illustrates the three singular intervals comprising pitch class set 3-3, the minor second, minor third, and major third, and their prevalence in pitch class set 8-18 through number of occurrences, five, six, and five, respectively. If pitch class set 8-18 is considered by its tetrachordal composition using pitch class sets 4-18 and 4-28, the

disparity of intervallic content between the four-note and eight-pitch sets becomes apparent. Table 4 displays the contrasting intervallic correspondences when pitch class set 8-18 is examined in its tetrachordal subdivision.

Table 3: Interval Content of pitch class sets 3-3 and 8-18

Set	**Interval Content**					
3-3	1	0	1	1	0	0
8-18	5	4	6	5	5	3

Table 4: Interval Content of pitch class set 8-18 and its subsets

Set	**Interval Content**					
3-3	1	0	1	1	0	0
4-18	1	0	2	1	1	1
4-28	0	0	4	0	0	2
8-18	5	4	6	5	5	3

Clearly, pitch class sets 3-3 and 4-18 demonstrate greater cohesion in intervallic equivalency, with the fundamental three intervals being present in the tetrachord, with an emphasis on the minor third, and addition of the perfect and diminished fifth intervals to the overall intervallic span of the set. The discrepancy of interval content when comparing pitch class sets 3-3 and 4-28 is the product of the tetrachord being constructed solely of minor thirds and their resultant diminished fifths, creating a fully diminished seventh chord. Although pitch class set 4-28 demonstrates little similarity to pitch class set 3-3 in constructive traits, it further reinforces the minor third as an indispensable intervallic property within the piece.

The construction of pitch class set 8-18 by means of pitch class sets 4-18 and 4-28 contains a single instance of pitch class set 3-3 when the tetrachords are considered as independent entities. The lack of semitonic intervals in pitch class set 4-28 eliminates any possibility for the construction of the foundational pitch class set; however, pitch class set 4-28 does enforce the minor third interval with four occurrences in the tetrachord, and a second significant interval, the diminished fifth, which is prevalent particularly in pitch class sets 4-12 and 4-18. Although tetrachords 4-18 and 4-28 contain only a single instance of pitch class set 3-3 independently, once they have been combined to construct pitch class set 8-18, seven examples of pitch class set 3-3 are created. This eight-pitch figure exhibits four instances of the foundational set existing in prime form utilizing the integers as follows: [1,2,5], [2,3,6], [5,6,9], [8,9,0], and three additional inverted sets, using integers, [2,5,6], [5,8,9], and [9,0,1]. While pitch class set 8-18 functions in complete dependence upon pitch class set 8-10 in the vertical composition of the piece, the numerous instances of subset 3-3 within the expanse of the larger pitch class set proves that its pitch composition is a conscious choice by the composer.

Conversely, pitch class set 8-10 ultimately contains fewer instances of subset 3-3, despite being constructed of two prevalent accompanimental tetrachords. This construction proves poignant in the intervallic content of the set due to the location of the semitone and minor third intervals in the vertical construction of each example of pitch class set 4-17. In similar fashion to other accompanimental tetrachords, the pitch arrangement of pitch class set 4-17 features the semitone between the outermost pitches of the set, a trait of accompanimental devices described in chapter 2.

Analogous to pitch class set 8-18, pitch class set 8-10 is constructed with intervallic content containing multiple iterations of each measurable interval corresponding to the foundational pitch class set 3-3. The resulting intervallic content of 546553 again displays a substantial permeation of the intervals comprising pitch class set 3-3, the minor second, minor third, and major third, with five, six, and four occurrences each, respectively (see Table 5).

Table 5: Interval Content of pitch class set 8-18 and its subsets

Set	**Interval Content**					
3-3	1	0	1	1	0	0
8-10	5	6	6	4	5	2

The tetrachordal construction of pitch class set 8-10 involving two instances of pitch class set 4-17 results in four immediate iterations of subset 3-3; however, the internal intervallic construction centered around six adjacent semitones does not allow same prominence of subset 3-3 as seen in set 8-18. When examined as a fully realized eight-pitch set in best normal order, the following combinations of integers yield prime form subsets of pitch class set 3-3: [2,3,6], [3,4,7], and [5,6,9], and inverted form subsets, [0,3,4], [2,5,6], and [3,6,7] (see Table 6).

Table 6: Interval Content of pitch class set 8-10 and its subsets

Set	**Interval Content**					
3-3	1	0	1	1	0	0
4-17	1	0	2	2	1	0
8-10	5	6	6	4	5	2

When considering the intervallic content of pitch class set 4-17 in relation to pitch class set 8-10 as a constructional element, the similarities to pitch class set 3-3 become apparent. The set utilizes the three comprising intervals of pitch class set 3-3 in greater frequency with the addition of a perfect fifth interval to expand the overall span of the set.

Again, the correspondence of foundational intervals composing pitch class set 3-3 are present in the supersets that relate to the construction of cadential pitch class set 8-10, displaying the interval content similarities between pitch class set 3-3, supersets from which extraction is made possible, and the construction of the eight-pitch set. The following chart demonstrates the constructional cohesion that relates pitch class set 3-3 to the ultimate construction of the pre-cadential and cadential pitch class sets 8-18 and 8-10 (see Table 7).

Table 7: Interval content of the vertical eight-pitch cadential figures and their respective subsets

Set	**Interval Content**					
3-3	1	0	1	1	0	0
4-17	1	0	2	2	1	0
4-18	1	0	2	1	1	1
4-28	0	0	4	0	0	2
8-10	5	6	6	4	5	2
8-18	5	4	6	5	5	3

The introduction of the eight-pitch figures that indicate sectional division on the vertical axis allows for a further examination of intervallic content in the material preceding these larger sets and displays subset relationships these accompanimental gestures hold pertaining to the cadential pitch class sets. The progression of

accompanimental vertical gestures in the opening three measures of Motivic Group A contains two recurring pitch class sets that are unrelated to the immediate construction of the cadential eight-pitch sets: pitch class sets 4-7 and 4-12. The single instance of a vertical figure not containing subset 3-3 occurs in the third measure on beat 2, where viola and cello form a trichord that lacks the necessary semitone to construct the set. These introductory measures comprising Motivic Group A can be graphed as shown in Table 8 to observe the behavior of tetrachordal intervallic content pertaining to the construction of tetrachords that contain the subset 3-3.

Table 8: Interval Content of the first two vertical figures in Motivic Group A

Set	**Interval Content**					
3-3	1	0	1	1	0	0
4-7	2	0	1	2	1	0
4-12	1	1	2	1	0	1

In Table 8, a variety of interval content is observed; however, despite the divergent nature of these tetrachords in relation to pitch class set 3-3, the continued correlation to the compositional intervals of pitch class set 3-3 remain present in each occurrence of these tetrachords.

With the continuity of interval content in Motivic Group A demonstrated in Tables 5 through 8, the significance of the constructional intervals of pitch class set 3-3 becomes apparent in the composition of larger vertical sets. The placement of these intervals within vertical accompanimental construction and the prominence of such intervals in the context of both vertical and horizontal applications must also be considered. The factors considered in lending prominence to certain intervals on a compositional level lies in their positioning on the vertical axis with pitches sounded in

the outermost voices of the chord or those played simultaneously within a single voice, the dyad.

Exposition and Recapitulation

Upon examining the prominent intervals comprising the vertical construction of tetrachords in Motivic Group A, congruencies appear by means of minor thirds appearing in the outermost voices in pitch class sets 4-7 and 8-10, and major sevenths lying in the outermost voices of all instances of pitch class set 4-12. A notable correspondence amongst vertical functions is the diminished fifth or its enharmonic equivalent, which functions as either a dyad within a single voice or as an interval separating two adjacent dyads, occurring in pitch class sets 4-12, 4-17, 4-18, 4-28, 8-10, and 8-18, ultimately excluding only pitch class set 4-7 from possessing this trait.

These examples of intervallic content on the vertical axis indicate the magnitude of the tetrachord possessing subset 3-3, particularly regarding its interval content, in Motivic Group A. Each occurrence of pitch class set 3-3 exists within one of three tetrachords, and never as an independent vertical pitch class set in Motivic Group A. Consequently, the sole instance of a non-tetrachordal vertical pitch class set functioning as an accompanimental figure is pitch class set 3-10 on beat 1 of measure 3, albeit a subset of constructing elements of larger sets containing similar interval content (pitch class sets 4-12 and 4-28), is unrelated to the foundational tetrachords due to the lack of a semitone.

The sparingly used yet contextually similar nature of the vertical applications of accompanimental tetrachords in Motivic Group A displays gravitation toward a singular pitch collection, pitch class set 4-12, utilizing the compositional intervals of major

seventh, diminished fifth, and their enharmonic equivalents. Additionally, the opening and closing sets of the section, pitch class set 4-7, lend symmetry to the treatment of vertical gestures in the initial six measures while simultaneously enforcing the minor third interval in the outermost voices of the ensemble.

Table 9 demonstrates the constructional similarities utilized in the formation of the accompanimental tetrachords in Motivic Group A. The uniformity of intervallic content created through Webern's utilization of chromatically influenced voice leading produces recurring figures between the outermost voices and between dyads within certain tetrachords that remain stable for the duration of the piece.

Table 9: Progression of vertical accompanimental tetrachords in Motivic Group A

Measure	1	2	2	3	3	3	3	4	5	6	6	6
Set	4-7	4-7	4-7	4-12	4-12	4-12	4-12	8-18	8-18	8-10	8-10	4-7
Alt. Set	-	-	-	-	-	-	-	4-18	4-18	4-17	4-17	-
Outer Interval	m3	m3	m3	m9	m9	m9	m9	P5	P5	m3	m3	m3
Axis Interval	P5	P5	P5	d5	d5	d5	d5	m2	m2	m2	m2	P5

The thematic horizontal motives accompanied by the previously examined tetrachordal progression displays an extensive degree of cohesion to the prominent intervals found within the accompanimental figures. The saturation of the semitone, minor third, and perfect fourth, the complimentary interval to the perfect fifth shown in Table 7, permeate the horizontally progressing themes in Motivic Group A. Furthermore, the major third interval, necessary to construct pitch class set 3-3, frequently appears

within horizontal movement, particularly through its enharmonic equivalent, the diminished fourth.

The vertical figures in Motivic Group B do not maintain the same uniformity of pitch composition as the vertical gestures in Motivic Group A although the intervallic content remains somewhat more consistent. While previous iterations of vertical figures functioned as tetrachords in relation to a conclusive eight-pitch set, Motivic Group B employs both trichords and tetrachords in its catalogue of pitch composition for vertical figures, all of which directly relate to cadential pitch class set 8-10.

The accompanimental gestures in Motivic Group B, while utilized less frequently, maintain the same correspondence to cadential pitch class set 8-10 that concludes the section in measure 17. Most instances involving the vertical formation of trichords or tetrachords that contain pitch class set 3-3 as a foundational pitch collection exist by means of dyads played in a single voice complimenting a horizontally progressing line sounded in another solo voice or multiple other voices utilizing independent melodic

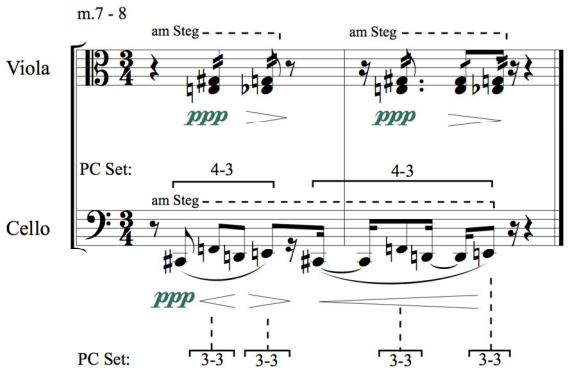

Figure 20: The addition of horizontal melodic motives with vertical accompanimental dyads to create pitch class set 3-3 as a passing harmony

ideas, an instance of which is shown in Figure 20.

The interval content of the phrase beginning in measure 7 presents five iterations of pitch class set 3-3 by the juxtaposition of a melodic line in cello and dyadic accompaniment in viola. Each instance of this set presents a minor third or its enharmonic equivalent between the outermost voices, while a major third interval exists within the dyads. This consequently produces two of the fundamental intervals necessary for the existence of pitch class set 3-3 in the prominently heard intervallic separations, the minor and major third.

In Figure 20, the horizontally progressing cello motive pairs with the accompanimental major third dyads in viola on beats 2 and 3 of measure 7, and again on the second sixteenth note of beats 1 and 2 of measure 8. The cello motive functions as a major seventh beneath the lower voice within the dyads played in viola, providing necessary chromaticism for the two voices to intertwine and creating pitch class set 3-3 when the parts change pitch simultaneously.

The interval content of the phrase beginning in measure 7 presents five iterations of pitch class set 3-3 by the juxtaposition of a melodic line in cello and dyadic accompaniment in viola. Each instance of this set presents a minor third or its enharmonic equivalent between the outermost voices, while a major third interval exists within the dyads. This consequently produces two of the fundamental intervals necessary for the existence of pitch class set 3-3 in the prominently heard intervallic separations, the minor and major third.

Other moments of vertical figures in Motivic Group B, specifically in measures 12 - 13 are created through rhythmically evolving progressions that demonstrate similar traits to suspension figures, which substantiate multiple iterations of tetrachordal motion within a single metrical beat, as seen in measures 12 - 13 in Figure 21. These rapid fluctuations of vertical pitch composition in measures 12 - 13 result in conclusive 4-17 tetrachords, as demonstrated in Figures 22 and 23.

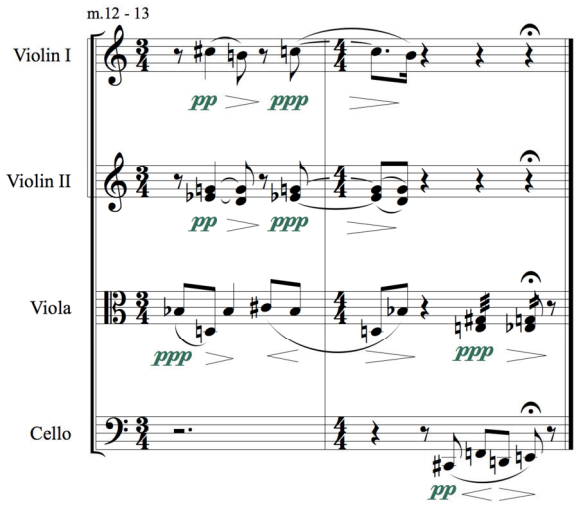

Figure 21: Fluctuations of tetrachordal harmony in measures 12 – 13
in the violin I, violin II, and viola voices

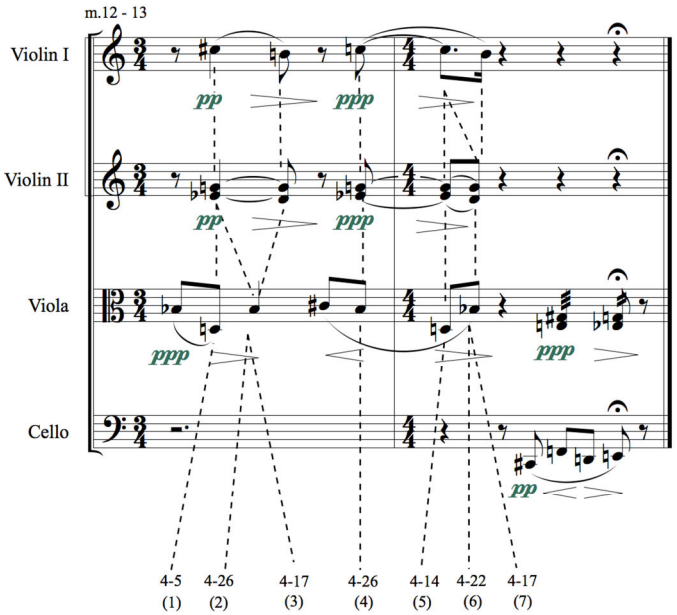

Figure 22: Pitch composition of each tetrachord created in measures 12 - 13. Numbers 1 – 7 correspond to numbered chords provided in Figure 22

Figure 22 provides a simplified representation of the resultant pitch alignments that create the seven tetrachords illustrated in Figure 23. From the pitches displayed Figure 22, information can be extracted to view the relationships created within this suspension figure in the context of larger forms of accompanimental harmony found within the section.

Intervallic behavior in measures 12 - 13 relates cohesively to the observed functions demonstrated in Motivic Group A. Although the set content diverges from the characteristics of previously examined tetrachords, the organization of the outer voices that comprise these tetrachordal sets maintain similar tendencies concerning intervallic behavior. This gesture, comprised of the accompanimental suspension figures in violin I and violin II in conjunction with the melodic motive in viola creates seven adjacent tetrachords through voice leading, which demonstrates the interval content shown in Table 10.

Table 10: Interval content found in the suspension figure in measures 12 - 13

Set	**Interval Content**					
4-5	2	1	0	1	1	1
4-26	0	1	2	1	2	0
4-17	1	0	2	2	1	0
4-20	1	0	1	2	2	0
4-14	1	1	1	1	2	0
4-22	0	2	1	1	2	0
4-17	1	0	2	2	1	0

While only two of the tetrachords formed through the suspension figures displayed in Figure 23 correspond to the interval content of pitch class set 3-3, the behavior of the outermost voices maintains consistency with prominent intervals observed in Motivic Group A. The initiation of the figure on the second eighth note of beat 1 in measure 12 is constructed with a major seventh in the outermost voices, which proceeds to another major seventh on the second eighth note of beat 2, emphasizing the movement of a semitone. Additionally, the diminished fifth interval is featured in violin I and violin II in measure 12 prior to the resolution to pitch class set 4-17 on the second eighth note of beat two in the same measure. The second iteration of the suspension figure beginning on the second eighth note of beat 3 in measure 12 begins with a less common major second interval in the outermost voices, which over the course of two passing tetrachords resolves to contain a major seventh in the outer voices, establishing a second occurrence of pitch class set 4-17 as a concluding figure. These instances of pitch class set 4-17 as a figure of resolution relate directly to the set construction of cadential pitch class set 8-10, accomplished by the combination of two vertical instances of pitch class set 4-17.

Although all instances of vertical figures displaying an accompanimental function clearly exist as a subset within the cadential pitch class set 8-10, not all of the examples of vertical intervallic content in Motivic Group B contain the seminal pitch class set 3-3. While this appears as an aberration from the structural consistency of Motivic Group A, where each accompanimental tetrachord maintained a subset of pitch class set 3-3, the tetrachords lacking pitch class set 3-3 in Motivic Group B function as suspension figures that effectively resolve to a superset of pitch class set 3-3 through chromatic voice leading.

The trichord and tetrachord organization of Motivic Group B is displayed in Tables 11 and 12, with Table 11 including all instances of vertical figures, while Table 12 utilizes only the occurrences of vertical functions that include pitch class set 3-3 as a subset. These figures are segregated into two sections, the first relating to trichordal vertical function, the second to tetrachordal vertical function.

Table 11: Progression of trichordal vertical functions in Motivic Group B

Measure	7	7	8	8	8	9	13	13
Set	3-3	3-3	3-3	3-3	3-4	3-3	3-3	3-3
Alt. Set	-	-	-	-	-	-	-	-
Outer Interval	A2	m3	A2	m3	M3	A2	A2	m3

Table 12: Progression of trichordal vertical functions in Motivic Group B

Measure	12	12	12	12	13	13	13
Set	4-5	4-26	4-17	4-20	4-14	4-22	4-17
Alt. Set	-	-	3-3	-	-	-	3-3
Outer Interval	M7	m3	M7	M2	M2	M2	M7

The examination of Table 12 lends rationalization for the exclusion of pitch class sets 4-5, 4-26, 4-20, 4-14, and 4-22 that comprise the progression of vertical tetrachords in Motivic Group B. These harmonic fluctuations initiated through chromatic voice leading imply a suspension figure, which initiates a resolution occurring at the conclusion of the gesture, thus vindicating pitch class set 4-17 as the prominent figure of resolution based on the intervallic content of the tetrachordal grouping.

Considering this progression of vertical interval content for Motivic Group B, it becomes apparent that the behavior of pitch class sets 3-3 and 4-17, based on interval content and pitch class set construction, are the prominently functioning accompanimental figures of the section. These sets are both represented as subsets within cadential pitch class set 8-10, found in measure 17 on the fourth sixteenth note of beat 2,incorporating intervallic content that is cohesive with the construction of the cadential pitch class set (see Table 13).

Table 13: Progression of vertical harmonic functions containing pitch class set 3-3

Measure	7	7	8	8	9	12	13	13	13
Set	3-3	3-3	3-3	3-3	3-3	4-17	4-17	3-3	3-3
Alt. Set	-	-	-	-	-	3-3	3-3	-	-
Outer Interval	A2	m3	A2	m3	A2	M7	M7	A2	m3

The examination of intervallic content within the exposition (see Table 14) exemplifies a series of vertical accompaniment tetrachords that share the commonality of intervallic behavior and foundational pitch class set 3-3 as a subset.

Table 14: Interval content of pitch class set 8-10 and its prominent subsets containing pitch class set 3-3

Set	**Interval Content**					
3-3	1	0	1	1	0	0
4-17	1	0	2	2	1	0
8-10	5	6	6	4	5	2

As displayed in Table 15, each accompanimental tetrachord shares intervallic traits with pitch class set 3-3, with an emphasis on the minor and major third. While all intervals from the seminal set are represented in each tetrachord used, the incorporation of additional intervals invades the construction of the accompanimental tetrachords, specifically the diminished and perfect fifth intervals and their enharmonic equivalents. These additional intervals consequently appear prevalently in the construction of the cadential pitch class sets 8-10 and 8-18. Furthermore, these intervals are an integral element in the contour of recurring melodic motives that characterize the piece, particularly noticeable in the prevalence of pitch class set 4-12.

Table 15: Interval content of frequently occurring vertical tetrachords in the exposition in relation to pitch class set 3-3

Set	**Interval Content**					
3-3	1	0	1	1	0	0
4-7	2	0	1	2	1	0
4-12	1	1	2	1	0	1
4-17	1	0	2	2	1	0
4-18	1	0	2	1	1	1

Expectedly, the recapitulation advances in similar formats to the exposition while incorporating additional contrapuntal figures to further manipulate motives introduced in

Motivic Groups A and B. Each prominent motive from the exposition ubiquitously returns, modified by augmentation, retrogradation, and juxtaposition through alternating voices within the ensemble. Although each reiterated motive experiences an aspect of transmogrification, the innate behavior of each individual figure remains steadfast to its original function, particularly with regard to intervallic content.

The homorhythmic phrase sounded by violin I and II originally in measures 9 - 12 is restated in augmented form in measures 38 - 42 with transposition t = 7 by viola and cello, counterbalanced by an ostinato figure in violin I emphasizing pitch class set 3-3. The intervallic pattern coincides to that displayed in Figure 11 in chapter 2, with emphasis on the minor and major third interval separation between the homorhythmic melodic lines. Immediately following in measures 42 – 43, the suspension figure from measures 12 - 13 is recalled, with transposition t = 5, again experiencing a contrapuntal compliment in the cello voice, instilling forward momentum to the phrase. This motive, while not directly adhering to the previous iteration of the figure by means of pitch class set content, maintains a similar intervallic function, despite being offset by additional horizontal activity by the cello. A noticeable inclusion of the homophonic cadential gesture occurs in measures 49 - 50, where the progression of eight-pitch sets, originally introduced in measures 5 – 6, is used to conclude the recapitulation, with transposition t = 4. This conclusive moment again enforces the prevalence of the eight-pitch vertical gesture as a cadential landmark, incorporating a familiar recurring figure as a sectional delineator.

Development

The development, occurring in measures 18 - 37, contains substantially fewer examples of vertical accompanimental chords interspersed throughout the section. Rather, these accompanimental figures occur solely at points of cadential preparation and sectional conclusion. As the horizontal progression undergoes variation, the intervallic similarities amongst the developed motivic fragments become more prominent, enabling an axial shift from the vertical to horizontal plane. The few occurrences of vertically functioning accompanimental figures continue to highlight a similar behavior to previously utilized examples, still exhibiting a foundation related to pitch class set 3-3.

The first instances of trichordal harmony in the development, illustrated in Figure 24, occur on the fourth sixteenth note of beat 1 in measure 24, which highlights a passing cadential moment prior to a shift in motivic material. This moment of initial vertical accompaniment is attained through a subtle restatement of the opening augmented octave figure in cello, on the last eighth note C♮ of measure 23 into the first eighth note C♯ of measure 24. The resultant vertical pitch class set is found to be pitch class set 4-2, which then expands within the viola part from D♮ to F♯, creating pitch class set 4-7. This gesture reflects both the initial and conclusive pitch class set of Motivic Group A, and functions as a subset of the eight-pitch cadential motive.

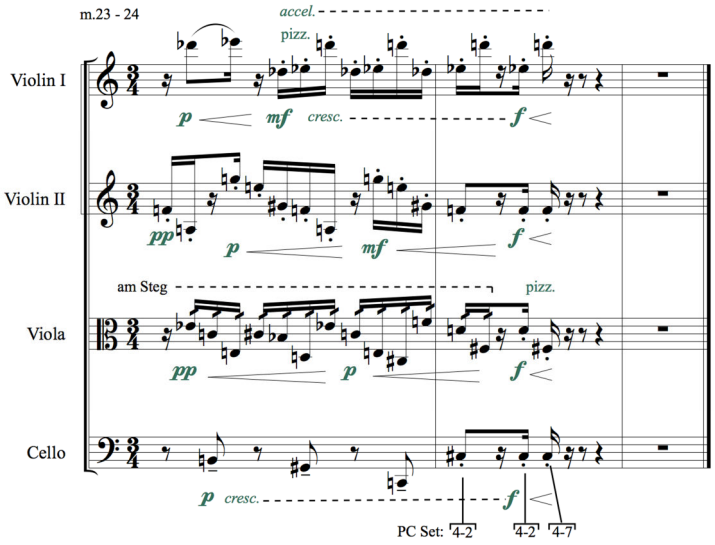

Figure 24: Passing cadential moment in measures 23 - 24 utilizing pitch class sets 4-2 and 4-7

Measure 29 reintroduces vertical accompanimental chords in the development by means of the multidimensional addition of pitches, in which both the melody and resultant accompaniment result in pitch class set 3-3 both horizontally and vertically as shown in Figure 25. The accompanimental figures fluctuate between pitch class sets 3-3, 3-4, and 4-18 over the ensuing eight measures, with a gravitation toward pitch class set 4-18, which contains the subset 3-3. The prevalent use of pitch class set 4-18 as an accompanying figure in measures 31 - 36 exhibits instances of this tetrachord chromatically undulating by a semitone, which displays planing motion before reaching the concluding chord of the development in measures 35 - 36.

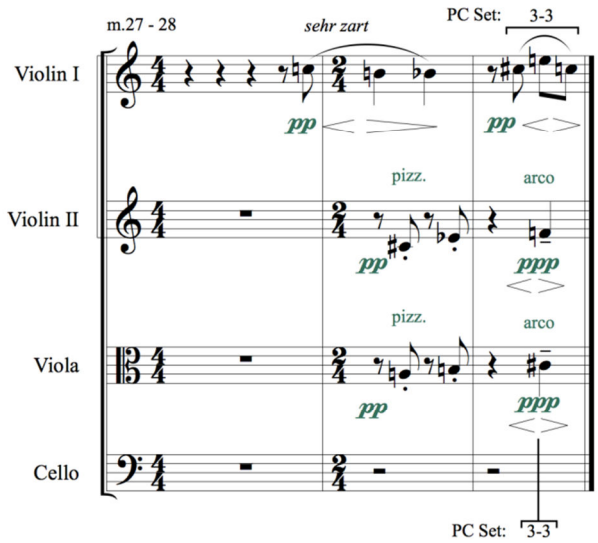

Figure 25: Intersecting horizontal and vertical examples of pitch class set 3-3, with the vertical example of the pitch class set created by intersecting the horizontally occurring instance

The vertical accompanimental chords in the development allow the placement of the fewer instances of accompanimental figures to strengthen the role of the tetrachord with subset 3-3 as an indicator of pre-cadential and cadential material. With no utilization of this figure in the development outside of phrases leading to cadential moments, the premise of the vertical pitch collection as a cadential indicator is further solidified, particularly in the context of pitch class set 3-3. These traits of accompanimental harmony lead to the conception that a method of continuity exists between these cadential indicators, instilling a relationship amongst all trichordal and tetrachordal moments possessing pitch class set 3-3 independently or as a subset throughout the duration of the piece. This premise will be demonstrated and confirmed in the following chapter.

Chapter 4: The connections established through the examination of fixed pitch class, and resultant conclusions pertaining to the hierarchical contour of chromaticism throughout the piece as a whole.

Material introduced previously in this document has established that pitch class set 3-3 permeates the entire movement and serves as a foundational structure for the construction of the piece. This chapter will demonstrate that large scale harmonic cohesion exists between adjacent examples of this pitch class set. An examination of the horizontal progression of accompanimental chords on the vertical plane yields a consistency of pitch class set content throughout the duration of each section, and furthermore, expands to display a level of connectivity that reaches beyond outwardly visible similarities by means of the fixed pitch class. From the acquired fixed pitch classes, voice leading reductions are constructed that will demonstrate an allegiance to connectivity between adjacent vertical figures and chromatic voice leading on microcosmic and macrocosmic levels within the piece.

Fixed pitch class, a trait describing at least one retained pitch class shared between adjacent examples of pitch class sets, allows the establishment of a connective thread within the vertically functioning elements, which yields a sense of horizontal movement that expands beyond motion provided by standard voice leading alone. The presence of fixed pitch class exists as a connective element amongst adjacent sets, which provides a locus of centrality to extend harmonic cohesion, suggesting a sense of function not unlike horizontal progression within tonal harmony. Subsequently, the source of unification provided by fixed pitch class is granted further strength when observed in context of pitch collections that contain one or more subsets of pitch class set 3-3 by means of the isolation of the previously established fundamental set. This expectation of fixed pitch class connectivity requires an examination of all vertical instances of pitch

class set 3-3 and the supersets which possess the set, resulting in a condensed score of vertically functioning accompaniment displaying only instances of pitch class set 3-3.

The behavior of acquired fixed pitch classes pertaining to pitch class set 3-3 enables a collection of pitch classes, and consequently pitch class sets, that creates a hierarchical order capable of establishing long-term connectivity throughout the piece. With the consideration of fixed pitch classes pertaining to sectional and longer duration periods of the movement, the postulation will be made that, similar to theories of Schenkerian Analysis, connectivity could be established in association with vertical figures found in prominent locations in the piece. With pitch class set 3-3 and supersets thereof acting as these foundational figures, it is not unreasonable to suppose that the composer did indeed design this movement with the consideration of extended pitch class connectivity by employing the concept of fixed pitch class to establish a cohesive thread within the piece.

Schenker's theory of harmonic analysis is constructed around the reduction of a piece of tonal music to demonstrate the unfolding of the tonic triad over time and, in due process, highlight further contextual tonal relationships. This method of analysis, while not intended by Schenker himself to extend beyond music centered in tonality, proves to be adaptable and applicable to certain aspects of atonality as well by including tactics introduced by Allen Forte in set theory.

The absence of a defined tonic chord in atonal music creates a substantial hindrance in performing such an analysis; however, the characteristics pertaining to the function of a tonic chord must be considered in relation to the function of vertical moments of accompaniment in context of atonal music. The tonic is expected to exist at

the initiation and conclusion of sectional material, and maintain a presence, either horizontally or vertically, throughout a section, despite the occurrence of deviations leading to chromatic harmonies existing outside of the tonic key. Similarly, the examination of vertical chord figures constructed of the same pitch class set in atonal music with points of occurrence corresponding to prominent musical moments may be interpreted as tonic-centric figures. Although there is no tonic "root" pitch class per se, the intervallic behavior of the recurrent pitch class set establishes attributes of congruency to the function of the vertical figure and the tonal tonic, lending instances of vertical accompaniment the identity of a unique chord. Thusly, upon the examination of the recurrence of a chord, certain qualities imputed to functions within tonal music may become visible within these vertical collections of pitch classes.

Consistencies between the tonal tonic and the atonal recurrent pitch class set extend beyond moments of temporary vertical action, hence expanding their similarities. As frequently denoted by Schenker in his graphic analyses, the outline of the tonic triad is observed to unfold throughout the duration of a piece of tonal music. This trait is homogenous to the recurrent pitch class set, which consequently creates an outline of unique pitch classes that directly correspond to the foundational pitch class set by means of intervallic content throughout the duration of the piece, a concept acting analogously to Schenker's outline of scale degrees 1, 3, and 5 demonstrating the major chord on the tonic pitch.

Characteristics existing in the harmonic content of tonal music relates unyieldingly to the unfolding of the tonic chord as a means of harmonic progression by utilizing the strength of the scale degrees as a natural system, a philosophy championed

by Schenker. What, then, inhibits the composer from formulating substitutions for the tonic chord in the guise of musical gestures that maintain cohesive traits relatable to the tonic chord that is being emulated? Although this concept alienates the philosophy of harmony as a direct byproduct of "nature" and its influence in the construction of tonal harmony, the abstracted function of verticality in providing an accompanimental role remains the same: a collection of pitch classes that support the horizontal progression of motivic material. While atonal music aspires to banish the authority of natural hierarchy in the construction and establishment of pitch within harmony, the function of the role is sustained, either by fulfilling the requirements of the natural system suggested by Schenker, or by the semi-formulaic intervallic constraints imposed by man.

With the establishment of the fundamental element in *Heftig bewegt*, pitch class set 3-3, as a substitute for the functional tonal tonic by traditional standards, an analysis can be completed utilizing this particular pitch class set, harvesting fixed pitch classes from adjacent examples of pitch class set 3-3, and setting these collected pitch classes in order and number of occurrence. From this analysis, a harmonic contour demonstrating long-range cohesion and relationships can be constructed and undergo reductions in a method similar to Schenkerian Analysis, allowing insight to the overarching shape of the piece by juxtaposing tonal harmonic analysis techniques with set theory.

Presented in Figure 26 is an example of the principle of fixed pitch class, demonstrating the characteristics by which connectivity is established, and exhibiting the ultimate result relating to the structural importance of establishing individual pitch classes that form a locus between collections of unique pitch class sets occurring adjacently.

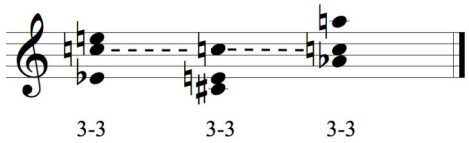

Figure 26: Three differing adjacent instances of pitch class set 3-3 with C♮ providing a locus between them, by functioning as a fixed pitch class

An examination of measure 1 on the horizontal plane yields pitch class set 4-7, integers [0,1,4,5], containing pitches $C^{♮}$ - $C^{♯}$ - $E^{♮}$ - $F^{♮}$. An analysis of the vertical plane will display the same result, creating a tetrachord across the four voices of the ensemble that creates pitch class set 4-7, containing the same pitches. In the first beat of measure 2, this same tetrachord is played twice more, further instilling the sonic prominence of this particular tetrachord containing two semitones separated by a minor third. On the second sixteenth note of beat 2 in measure 2, another tetrachord containing pitch class set 3-3 is seen as an accompanimental figure, sounded in violin II, viola, and cello. Viola and cello proceed to sound three consequent tetrachords on the second quarter note of beat 2 in measure 3 until beat 1 of measure 4. Beginning on the fourth sixteenth note of beat 3 in measure 4 and continuing until the conclusion of measure 6, four consecutive eight-pitch vertical figures are played, containing four individual tetrachords, three of which contain pitch class set 3-3 by means of one or two subsets. Table 16 demonstrates all instances of tetrachords that contain pitch class set 3-3 as a subset within Motivic Group A.

Table 16: All vertical tetrachord figures containing subset 3-3 in measures 1 - 6

Measure	1	2				3			4	5		6	
PC Set 1	4-7	4-7	4-7	4-12	4-12	4-12	4-12	4-12	4-18	4-18	4-17	4-17	4-7
PC Set 2									4-28	4-28	4-17	4-17	

From Table 16, thirteen instances of five individual tetrachords have been identified as accompanimental figures, each of which contains one or more subsets of pitch class set 3-3, with the exception of the fully diminished tetrachord constructing pitch class set 4-28, which acts as part of the integral eight-pitch vertical function in measures 4 and 5. The isolation of vertical instances of pitch class set 3-3 and the supersets that contain this particular pitch class set allow a representation of the harmonic contour of Motivic Group A to be constructed and further examined by means of subset behavior, and eventually, fixed pitch class.

Table 17: Unique pitch class sets, number of occurrence, and subsets of pitch class set 3-3 within each tetrachord

Pitch Class Set	Recurrence #	Subsets (3-3)
4-7	4	2
4-12	5	1
4-17	4	2
4-18	2	1
4-28	2	0

The extracted instances of subset 3-3 from within the given tetrachords displayed in Table 17 result in 23 possible instances of pitch class set 3-3, found by multiplying the recurrence number by the subsets within the tetrachord. These instances of pitch class set 3-3 may be arranged consecutively in order of occurrence, notwithstanding that tetrachords containing two or more subsets of pitch class set 3-3 are to be grouped as a single entity, as it would be presented in the score.

As displayed in Figure 27, measure 5 contains a vertical eight-pitch figure containing two instances of tetrachord 4-17, which, consequently, possess two instances of subset 3-3. This results in four instances of pitch class set 3-3 comprised of eight unique pitch classes, which is notated, for the sake of analysis, by four trichords arranged in order of occurring pitch from top to bottom, as written in the score. This method of arrangement pertaining to the extracted 3-3 subsets, with the two found in violin I and II displayed above and the two in viola and cello below, lends clarity for the examination of the presented charts in relation to the manuscript of the piece.

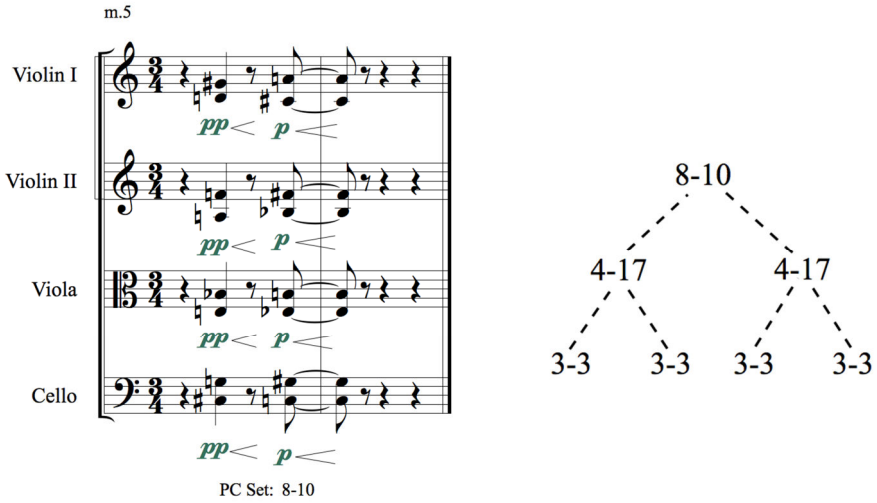

Figure 27: Pitch class set 8-10, reduced to two 4-17 tetrachords, further reduced into four subsets of pitch class set 3-3

Once figures containing 3-3 subsets have been ascertained from the accompanimental figures, individual pitch classes comprising each occurrence of subset 3-3 are determined by a vertical analysis of Motivic Group A, allowing for a graphic representation displaying the nature of fixed pitch classes to be generated. Figure 28 enables the contour and recurrence number associated with each fixed pitch class to be observed in conjunction with the function of the vertical figure in the context of the score.

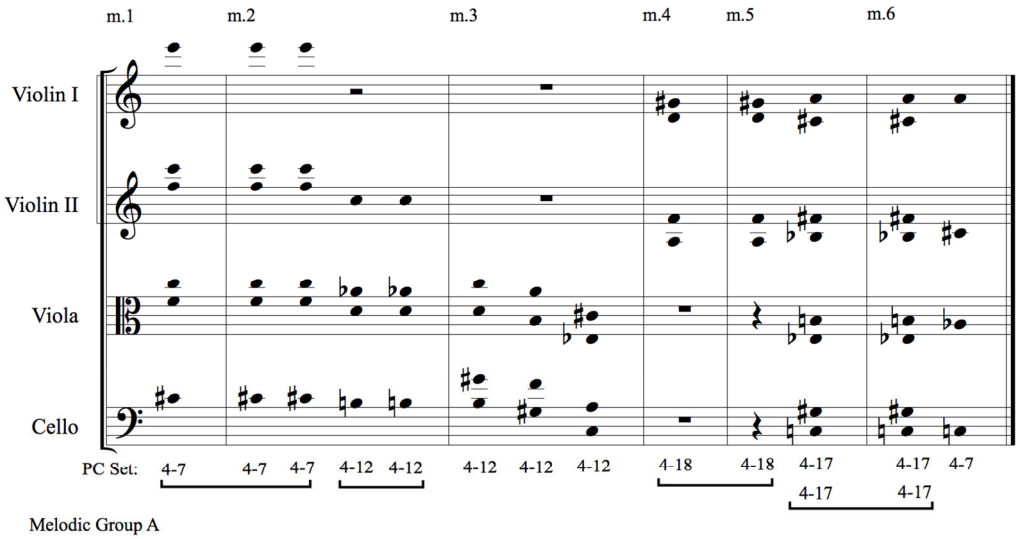

Figure 28: All instances of supersets of pitch class set 3-3 in measures 1 - 6, notated as in the score. Brackets beneath pitch class set names denote exact duplications of pitch class set

Figure 28 illustrates the instances of vertically functioning accompaniment containing pitch class set 3-3 in Motivic Group A, with pitches arranged exactly as they appear in the score and rhythmic constraints removed for observational clarity. These vertical moments of accompaniment have been separated from horizontally progressing melodic motives and positioned in order of appearance in the score, and are identified by the measure in which they appear and their unique pitch class set name bestowed by Forte. The two pitch class sets devoid of pitch class set 3-3 in any fashion occur on the second eighth note of measure 3 (pitch class set 3-10), and in measure 5 on the second

beat as well as the second eighth note of the third beat (pitch class set 4-28). These sets, which do not subscribe to the stipulations above, will remain separate from this analysis.

In the case that multiple examples of pitch class set 3-3 occurring consecutively are exact duplicates of each other by means of pitch class content (refer to the repeated tetrachord on the third sixteenth note of beat 3 in measure 1 through the third sixteenth note of beat 1 in measure 2), also shown in Figure 28, then the adjacently appearing repetitions will be condensed into a single iteration of the subsets containing pitch class set 3-3, denoted by brackets underneath pitch class set names in examples, at no detriment to the analysis of the fixed pitch class extending through the harmonic content.

When exact duplications of adjacent pitch class sets have been reduced into a single occurring pitch class set, four tetrachords composed of differing pitch and intervallic content are available for fixed pitch class analysis. These tetrachords, in order of occurrence, exist as pitch class sets 4-7, 4-12, 4-12, 4-12, 4-18, 4-17, and 4-7. The thrice occurring duplication of adjacent pitch class sets 4-12 within the previously mentioned pitch class sets are not reduced due to the pitch collection within each set, which if Figure 28 is referenced, is seen to be different in each instance of the set.

In the event that multiple instances of pitch class set 3-3 occur within a superset, the subsets of pitch class set 3-3 are removed from the tetrachord in which they appear and are arranged on the staff in the most condensed form possible while notating the semitone, inherent to pitch class set 3-3, as a major seventh interval. This arrangement of pitches on the staff is simply for clarity in viewing the fixed pitch class relationship between adjacent examples of pitch class set 3-3. In the case that the tetrachord from which pitch class set 3-3 is extracted contains more than one instance of pitch class set 3-

3 as a subset, the second subset is notated on the lower staff as illustrated in Figure 29 however, it retains equal importance and functionality in relation to the adjacent sets notated on the upper staff.

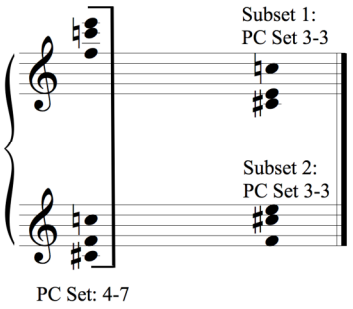

Figure 30: Method of placing multiple 3-3 subsets from pitch class set 4-7 as seen in measure 1

Figure 30 displays the behavior of the fixed pitch class throughout Motivic Group A by means of a reduction of vertically functioning accompaniment. The dashed lines visually represent fixed pitch classes moving from one instance of pitch class set 3-3 to the adjacent example. In certain cases, as demonstrated in the fixed pitch class motion from measure 4 to measure 5, more than one pitch class will remain fixed, thus resulting

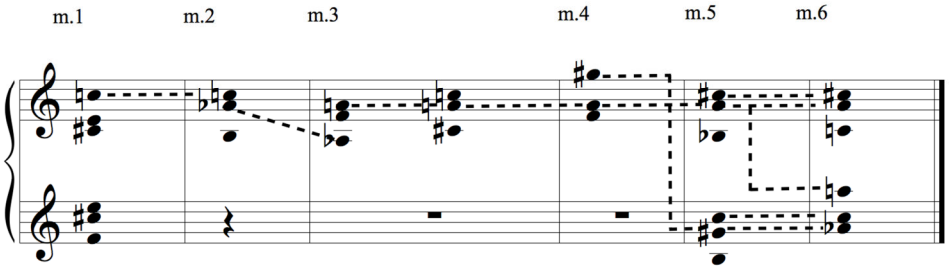

Figure 29: Extracted instances of pitch class set 3-3 from larger vertical figures. Fixed pitch classes are highlighted by dashed lines

in a dyad of fixed pitch classes between these instances of the pitch class set within the music.

Through an examination of the motion of fixed pitch classes in the vertical reduction of Figure 30, four unique pitch classes can be obtained: C♮, A♭, A♮, and the

dyad of C♯ and A♮ in the upper staff, and a G♯ and C♮ dyad in the lower staff. These obtained pitch classes correspond to integers [8,9,0,1] in modulo twelve, where C = 0. To obtain these pitches from the vertical reduction, the C♮ obtained from the lowest pitch in the notation of the first 3-3 subset in measure 1 is seen to correspond by fixed pitch class to the top-positioned C♮, found in the next 3-3 subset in measure 2. The interior A♭ of pitch class set 3-3 in measure 2 then subsequently corresponds to the lower notated A♭ in pitch class set 3-3 in measure 3. The A♮ in the first instance of pitch class set 3-3 in measure 3 demonstrates fixed pitch class connectivity to the interior A♮ of the second instance of pitch class set 3-3 in the same measure. The A♮, as a fixed pitch class, then remains as a connective thread through the duration of Motivic Group A, existing as a source of unification between adjacent examples of pitch class set 3-3. The fixed pitch classes that appear in addition to the extended duration A♮ begin to construct fixed pitch class dyads, noticed with the addition of the G♯ found between measure 4 and the lower subset of measure 5, and C♮ and A♮, and C♯ and G♯ established between measures 5 and 6.

The behavior of fixed pitch class within pitch class set 3-3 as a unifying element between adjacent accompanimental tetrachords is obvious within the first six measures of the piece. Each instance of pitch class set 3-3 and its inversion demonstrates a degree of connectivity leading to the next accompanimental function, and through these cohesive characteristics, begins to establish a harmonic language unique to this behavior. This technique leading to the generation of a particular harmonic function suggests the behavior of the accompaniment acts with the laws of tonal construction in mind while

simultaneously dispelling the constructive principles of harmonic construction enforced by natural means.

Once the fixed pitch classes have been identified, the individual pitches are extracted from the context of the pitch class set in which they are found and set apart as independent pitches, and dyads when applicable, to create a figure that demonstrates the harmonic contour of Motivic Group A (see Figure 31).

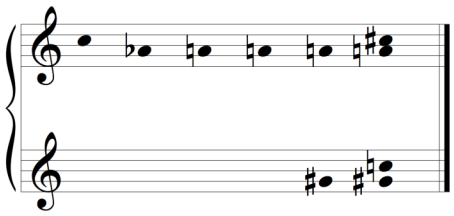

Figure 31: Fixed pitch classes obtained from adjacent examples of vertical pitch class set 3-3 in measure 1 - 6

Once the reduction containing fixed pitch classes is constructed, an arrangement of ten pitches comprised of four unique pitch classes is achieved. From this reduction, a contour of chromatic movement over the duration of the section may be ascertained. The first pitch, C♮, displays an ascent of a semitone, reaching its ultimate goal upon the final C♯. Consequently, the initial pitch of C♮ extends through Motivic Group A, demonstrating retention by way of C♮, the top pitch of the dyad obtained in measure 6. The chromatic motion is continued within the phrase by the semitone ascent of A♭ to A♮, with the continuation of A♮ as a fixed pitch class throughout the remainder of pitch classes displayed on the upper staff. The motion of A♭ to A♮ is further decorated by the entrance of the G♯ from measure 5 in the lower staff, which renders this chromatic shape to A♭, A♮

, $G^{\sharp}$, which designates the $A^{\flat}$ as an upper neighbor note in context of the overall chromatic movement.

From the decisive chromatic movement discovered within the extracted fixed pitch classes within Motivic Group A, the example shown in Figure 32 can be constructed, which, by beaming, demonstrates the extended motion of these pitch classes over the duration of the set. The clear correspondence found in this analysis of the initial six measures of *Heftig bewegt* and analyses conducted in Schenkerian style is not accidental. The beaming method introduced by Schenker to describe extended relationships within a piece of tonal music is equally applicable to atonal music when a tonic substitute has been identified, as was completed previously in this chapter. From this method, the harmonic connectivity found through fixed pitch classes is readily demonstrated, as displayed in Figure 32, resulting in a concise description of contoured movement that existed within the harmony employed by Webern, despite obscuration by vertical density.

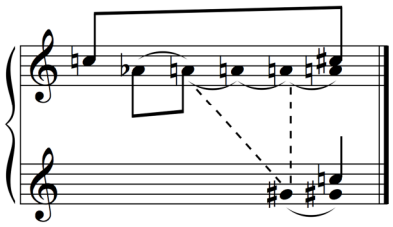

Figure 32: Initial beaming of fixed pitch classes to show connectivity within measures 1 - 6

Figure 33 experiences further reduction by consolidating the repeated A♮ to a single iteration of the note, and beaming this figure to the G♯ on the lower staff, completing the connection of the neighbor note figure.

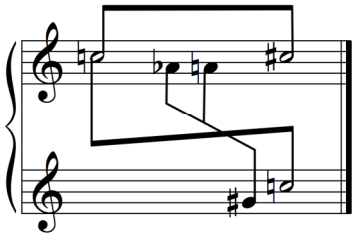

Figure 33: Secondary reduction of fixed pitch classes in measures 1 - 6, by consolidating repeated pitch classes when applicable, and expanding beamed pitches

The contour of Motivic Group A will accept one further transformation by relocating the G♯ from the lower staff to the upper staff, imparting visual continuity to the chromatic neighbor note figure. The final reduction achieved through the continuity of fixed pitch class in Motivic Group A is displayed in Figure 34.

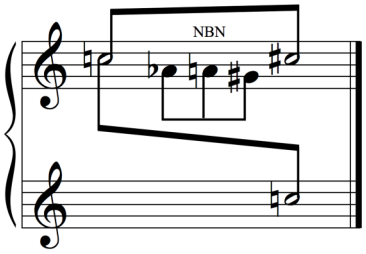

Figure 34: final reduction of harmonic connectivity by fixed pitch class in measures 1 - 6

The resultant figure in Figure 34, comprised of pitch classes [8,9,0,1] creates an outline of pitch class set 4-7 over an extended harmonic range of the piece. This particular pitch class set is realized to be a transposition of the introductory tetrachord with a transposition t = 8, and consequently, a direct reproduction of the concluding pitch

class set of Motivic Group A, t = 0. Pitch class set 4-7, as seen in examples of vertical analysis, inherently contains two subsets of the foundational pitch class set 3-3, displaying an overarching unification to the opening measures of the piece.

Motivic Group B, occurring in measures 7 - 17, contains the second collection of thematic motives that recur throughout the piece. The first of these themes occurs in the cello voice in measures 7 - 9 with the viola providing dyadic accompaniment. Immediately following, a polyphonic theme is introduced featuring a duet between violin I and II, with the viola juxtaposing a contrasting independent theme from measures 9 - 13. To finalize the introduction of new themes, a reiteration of the initial motive of Motivic Group B appears in measure 13 with a restatement of the cello motif with viola accompaniment, which is followed by a transmutation of the final four pitches of the cello motive featuring imitative polyphony amongst the ensemble as a whole. Measures 16 - 17 insert an augmentation of the first eight notes found in the cello theme played by violin I and II, and a direct restatement of the same theme in viola and cello transposed t = 5. The final chord of Motivic Group B in measure 17 is again a vertical eight-pitch set, which is comprised of two separate 4-17 tetrachords, reminiscent of the conclusion of Motivic Group A, found in measures 5 - 6 with transposition t = 2. Table 18 displays all instances of pitch class set 3-3 and supersets containing the foundational set found in Motivic Group B.

Table 18: All vertical figures containing pitch class set 3-3 in measures 7 - 17

Measure	7		8		9	12	13			17	
PC Set 1	3-3	3-3	3-3	3-3	3-3	4-17	4-17	3-3	3-3	4-17	4-17
PC Set 2										4-17	4-17

While only thirteen instances of pitch class set 3-3 in prime form or through subset extraction appear in Motivic Group B, even fewer instances of the set demonstrate variance in pitch, thus establishing a minimalism in fulfilling fixed pitch class analysis. From the thirteen occurring examples of pitch class set 3-3 displayed in Table 18, nineteen individual instances of pitch class set 3-3 are found within Motivic Group B (see Table 19).

Table 19: Unique pitch class sets, number of occurrence, and subsets of pitch class set 3-3 within each tetrachord

Pitch Class Set	Recurrence #	Subset (3-3)
3-3	7	1
4-17	6	2

The vertical material in Motivic Group B, while more sparse, demonstrates similar behavior to the analyzed vertical material from Motivic Group A. A reduction of vertical accompaniment comprised of pitch collections containing pitch class set 3-3 as either an independent entity or as a subset, found in measures 7 - 17 will then be created. As discussed previously in the document, Motivic Group B employs additive construction of pitch class set 3-3, which incorporates horizontally progressing moments with accompanimental dyadic activity to produce noticeable instances of pitch class set 3-3 within the music. From these specifications, Figure 35 is created, demonstrating all instances of accompanimental moments wherein pitch class set 3-3 is present as a subset.

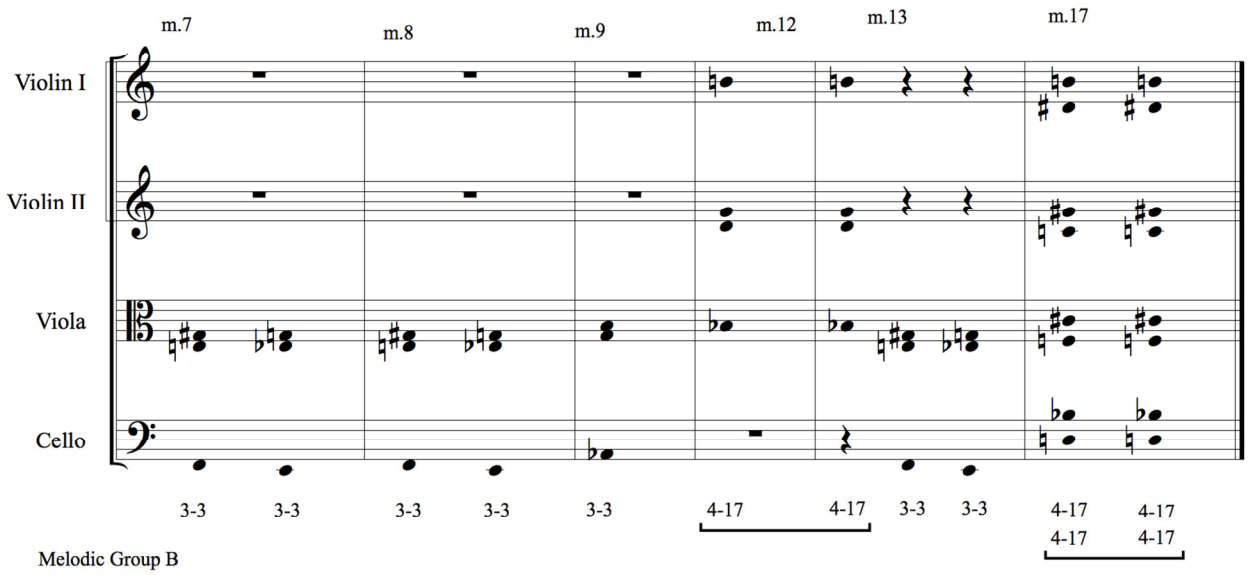

Figure 35: All instances of pitch class set 3-3 and its supersets in measures 7 - 17

Upon condensing the exact adjacent vertical duplications appearing in Motivic Group B to single instances of the particular tetrachord, which occur as the 4-17 tetrachords in measures 12 - 13 and 17, and following the elimination of exact duplications, the trichords containing pitch class set 3-3 shall be arranged by the constraints regarding Figure 29, to create a representation of vertical accompanimental harmony for measures 7 - 17. From this reduction, the behavior of fixed pitch classes acting in Motivic Group B may be ascertained.

In measures 7 - 8, the continuity of fixed pitch class is seen to exist through the lower note of the displayed instance of pitch class set 3-3, E♮. As this repeated figure expands motivically in the score, the fixed pitch class concurrently shifts in measures 8 - 13 to contain first the G♮ then the addition of B♮, introducing a dyad of a major third in the top and bottom staves (see Figure 36).

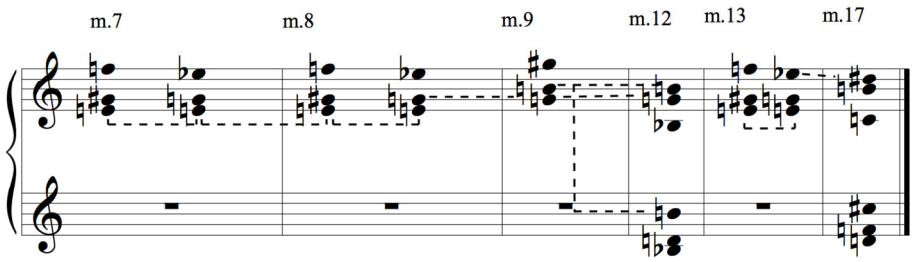

Figure 36: Extracted instances of pitch class set 3-3 from larger vertical figures. Fixed pitch classes are highlighted by dashed lines

The third beat of measure 13 presents the first interruption of fixed pitch class continuity when the developed melodic motif is finalized on the first beat and reset to the motif that introduced Motivic Group B on the second eighth note of beat 2. This break in absolute connectivity must not be considered detrimental to the progression of the fixed pitch class; rather, it should be noted that this moment of reset in the music allows for a slight shift in overall continuity, which is reinstated immediately. The $G^{\natural}$ in the instance of pitch class set 3-3 found on the second eighth note of beat 1 in measure 13 forms a semitone ascent to the $G^{\sharp}$ in the instance of pitch class set 3-3 on beat three in the same measure, a figure that appears prominently in extended harmonic examinations of the piece. Thus, even in the absence of absolute fixed pitch class connectivity, the semitone relationship between the disjointed moments of harmonic content bears the continuity necessary to lend cohesion to these figures. Fixed pitch class connectivity resumes from the third beat of measure 13 until the conclusion of the section in measure 17, again enforcing $E^{\natural}$ between the two instances of pitch class set 3-3 in measure 13 and continuing chromatic motion to include $D^{\sharp}$ as the final fixed pitch class of the section.

An examination of the fixed pitch classes displays an indisputable significance to pitch class 4, $E^{\natural}$, in the construction of the 3-3 trichords highlighting the initial melody of

the section in measures 7 - 8, and additionally in the reprise of the figure in measure 13. The extension of this introductory melodic figure into measure 9 allows for G♮ to gain harmonic prominence as a fixed pitch class between the adjacent examples of pitch class set 3-3. The G♮ is further enforced as part of the major third dyad between the instances of pitch class set 3-3 found adjacently in measures 9 and 12, with B♮ functioning as the complimentary dyadic half, forming the major third. Following the break in fixed pitch class connectivity between the 4-17 tetrachord on the second eighth note of beat one and the 3-3 trichord on beat three of measure 13, E♮ returns as the fixed pitch class within the reiterated melodic figure, lending symmetry to the section.

In the case that the fermata on beat 4 of measure 13 signified the conclusion of this section, a substantial discrepancy presents itself, offering a collection of fixed pitch classes that offer no formal correspondence to the foundational vertical content of the piece. However, as mentioned in chapter 2, structural clues imply that the exposition of the piece is not final until the fourth sixteenth note of measure 17, when the recurrent cadential figure of pitch class set 8-10 is emphasized. With this extension of this section, one further fixed pitch class may be obtained from Motivic Group B, found between pitch class set 3-3 on beat four of measure 13 and the 4-17 tetrachord appearing on the fourth sixteenth note of measure 17, D♯. This final fixed pitch class extracted from the section fulfills the hypothesis that all sectional collections of fixed pitch class will yield a pitch class set containing the foundational pitch class set 3-3; and, by enabling the construction of this set, divulges substantial evidence to counteract previous speculations regarding the form of the piece, extending the exposition four measures further (see Figure 37).

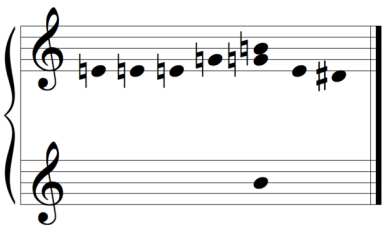

Figure 37: Fixed pitch classes obtained from adjacent examples
of vertical pitch class set 3-3 in measures 7 - 17

Once the fixed pitch classes obtained from Motivic Group B are displayed in order of occurrence, the frequently retained E♮ clearly behaves as a cohesive thread throughout the section. Consequently, the chromatic contour of fixed pitch class over the sectional duration, as similarly displayed in the fourth reduction of Motivic Group A (see Figure 34), remains consistent by the retained E♮ descending a minor second to D♯ over the course of Motivic Group B. Furthermore, the contour of this reduction highlights key intervallic relationships pertaining to the construction of pitch class set 3-3, by including the minor third and major third, with pitch classes E♮ to G♮ and G♮ to B♮, respectively. To conclude this reductive analysis, a perfect fifth relation is established between recurrent E♮ pitch classes separated by a B♮ occurring on the upper and lower staves. With this information regarding the fixed pitch classes obtained, the reduction of Motivic Group B shown in Figure 38 may be constructed.

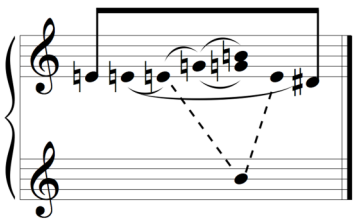

Figure 38: Initial beaming of fixed pitch classes to
show connectivity within measures 7 - 17

This reduction offers means for further simplification by allowing the combination of equivalent or complimentary tones that do not detract from the relationships established in the previous paragraph. Within these constraints, the second instance of retained E♮ and the first G♮ may be eliminated as unnecessary duplicate pitch classes that add no further functionality to the reduction. The final reduction of Motivic Group B is shown in Figure 39, utilizing the fewest number of pitch classes necessary to achieve the contour of the phrase with no instance of extraneous pitch class.

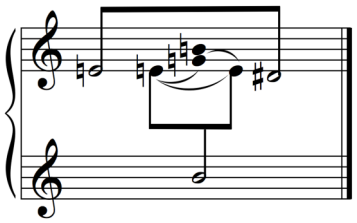

Figure 39: Final reduction of harmonic connectivity
by fixed pitch class in measures 7 - 17

From the fixed pitch class analysis from measures 7 - 17, pitch class set 4-19, integers [3,4,7,E] in best normal order, is constructed, using pitch classes E♮, G♮, B♮, and D♯. This collection of pitch classes does satisfy the expectation of containing at least one instance of the foundational pitch class set 3-3, while simultaneously presenting new perspectives concerning the overall form of the piece.

The nature of the development, found in measures 18 - 36, shows sparse vertical movement on a harmonic level; however, the connectivity of fixed pitch class remains stable, despite being separated by greater durations of independently functioning horizontal progressions. Measures 18 - 19 initiate an arpeggiation of the 4-17 tetrachord, found prominently in the construction of the eight-pitch vertical figure, creating an imitative ascending figure that creates three unique 4-17 tetrachords interspersed between cello, viola, and violin II. Measures 19 - 22 contain an augmentation of the cello theme from measures 7 - 9, which is juxtaposed with the arpeggiated 4-17 tetrachord figure previously observed in measures 18 - 19, additionally integrating a similar tactic of fragmentation found in measures 15 - 16 by distributing the 4-17 figure between different voices in the ensemble. The introductory violin theme from measure 2 is subsequently reinstated on the second sixteenth note of beat 2 in measure 22 in violin I, then in viola on the second sixteenth note of beat 1 in measure 23, and experiences transformation by means of augmentation through measure 24. At the conclusion of this gesture on beats 1 and 2 of measure 24, the first concrete examples of vertical harmonies arise, constructed amongst each voice the ensemble.

On beat 3 of measure 24 until the conclusion of measure 26, an imitative representation of the chromatic motive found in measure 2 is presented in the viola and cello, while violin II plays fragment of the homorhythmic theme from measures 10 - 11 (transposition t = 1) beginning on the second eighth note of beat 3 in measure 25. The initial cello theme from Motivic Group B is referenced again in measure 28, where violin I sounds fragments of this theme in retrograde while accompanied by violin II and viola, hence creating horizontal and vertical examples of pitch class set 3-3 within the harmony.

The next iteration of vertically based harmony consequently appears in measure 28 with the inclusion of a 3-3 trichord on beat two sounded in violin I, violin II, and viola, then the accompaniment immediately shifts to violin II, viola and cello on beat two of measure 29 until beat two of measure 30. A 4-18 tetrachord is introduced as an accompanimental interior voice in measures 31 - 34, which then expands to a five-pitch vertical variant in measure 35 until beat 1 of measure 36, expanding to include each voice in the ensemble, creating a pentad to conclude the developmental section with pitch class set 5-Z36**,** integers [0,1,2,4,7] in best normal order, with transposition t = 5, once inverted.

The collection of trichords and tetrachords in measures 18 - 36 can be observed in order of occurrence in Table 20.

Table 20: All vertical figures containing set 3-3 in measures 18 - 36

Measure	24			28	30	31	32	33	34	35		36
PC Set 1	4-2	4-2	4-7	3-3	3-3	4-18	4-18	4-18	4-18	5-22	5-Z36	5-Z36
PC Set 2												

As expected in a traditional developmental section, the range and function of the harmony is expanded to compliment the transformation of thematic material. Likewise, in this section, previously unseen vertical figures begin to occur, incorporating moments of increased vertical density to accompany the motivic variance. Despite the expansion of vertical density, fewer instances of pitch class set 3-3 appear, granting the ability to extract only fourteen instances from the twelve naturally occurring vertical pitch class sets that function as a superset of pitch class set 3-3. The numeration of these subsets is displayed in Table 21.

Table 21: Unique pitch class sets, number of occurrence, and subsets of pitch class set 3-3 within each tetrachord

Pitch Class Set	Recurrence #	Subset (3-3)
3-3	2	1
4-2	2	1
4-7	1	2
4-18	4	1
5-22	1	2
5-Z36	2	1

Upon the recognition of the vertical occurrences of pitch class set 3-3 and supersets containing it within the development, a reduction of harmony throughout the section is established, yielding the chart of accompanimental vertical figures seen in Figure 40.

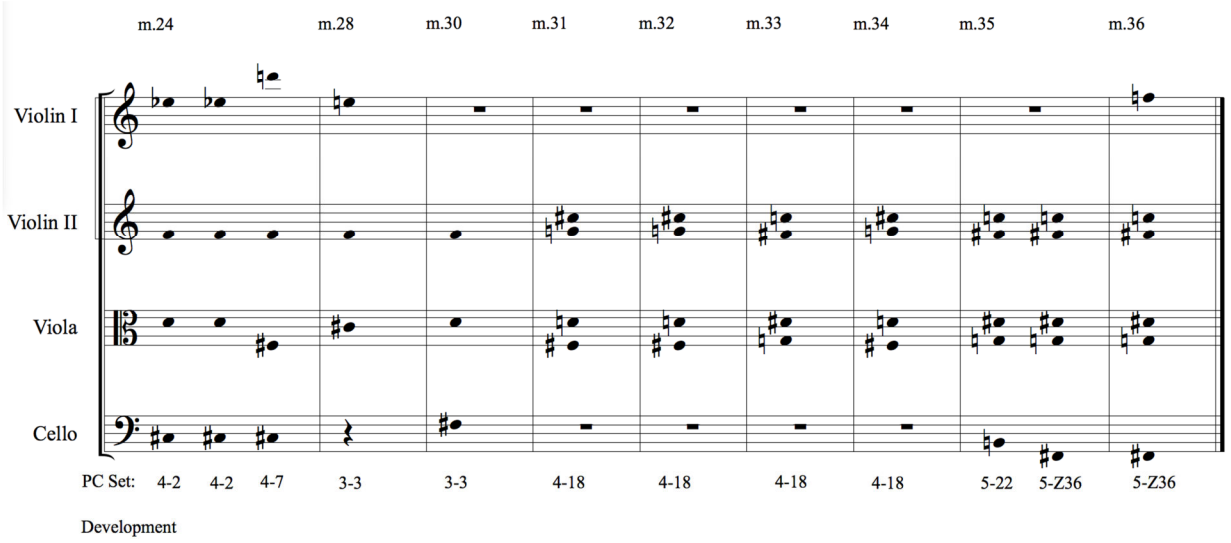

Figure 40: All instances of pitch class set 3-3 and its supersets in measures 18 - 36

From the reduction in Figure 40, an increased amount of exact adjacent repetition is noticed, suggesting fewer variances of fixed pitch classes, particularly involving the 4-18 tetrachord found as a fixture in violin II and viola in measures 31 - 34. As the section

concludes in measures 35 - 36, the additional textural density comprising the vertical motion while adding further harmonic color does not influence the number of 3-3 subsets within the chordal figure. This further enforces the importance of the single instance of pitch class set 3-3 existing unchanged within the pentad sets 5-22 and 5-Z36, both of which retain pitch class set 4-18 as a subset.

Upon eliminating exact adjacent replications of pitch class sets and arranging the sets as performed previously, a greater reduction is constructed, demonstrating the forward progressing motion of fixed pitch class through the duration of the section.

From Figure 41, it is clear that there are two preeminent pitch classes present through the duration of the development: F♮ and G♮. These two pitch classes establish a connective thread between four adjacent examples of vertical harmony each, which is then separated by a break in overall connectivity between measures 30 and 31, suggesting a shift in the developmental progression as a whole.

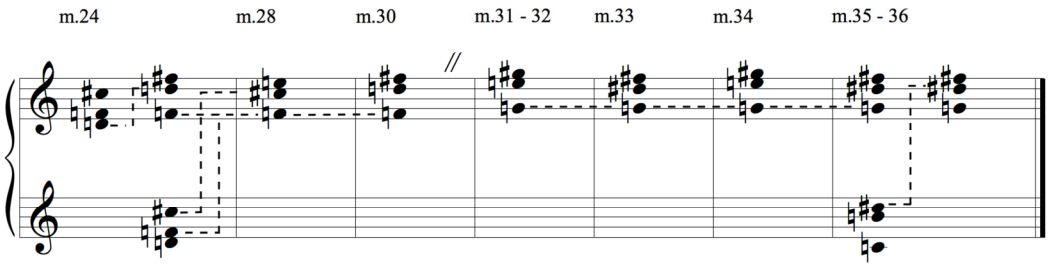

Figure 41: Extracted instances of pitch class set 3-3 from larger vertical figures. Fixed pitch classes are highlighted by dashed lines

In addition to the prominence of F♮ and G♮, dyadic relationships are formed between adjacent examples of harmony, which result in the extraction of fixed pitch classes D♭ and C♯, acquired in harmonic motion within measures 24 and 28. These associated dyads provide necessary chromaticism to the acquired fixed pitch classes to

ultimately yield the chromaticism necessary to obtain a pitch class set containing subset 3-3 from the extracted fixed pitch classes.

One final fixed pitch class is achieved in measures 35 - 36, by means of the fixed $D^{\sharp}$ found as the upper pitch of pitch class set 3-3 on the lower staff and the interior pitch of the final instance of pitch class set 3-3 set on the upper staff. This collection of fixed pitch classes grants the final collection of acquired pitch classes from the development to be demonstrated in order of appearance as in Figure 42.

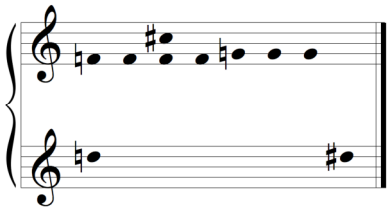

Figure 42: Fixed pitch classes obtained from adjacent examples of vertical pitch class set 3-3 in measure 18 - 36

Figure 42 demonstrates the extracted fixed pitch classes to follow a simplistic contour through measures 18 - 36, beginning with two dyad figures separated by one recurrent $F^{\natural}$ acting as a point of axis. Following this figure, $G^{\natural}$ takes prominence as the fixed pitch class from measure 31 until measure 36, when the section is concluded by a single instance of $D^{\sharp}$. The overall motion of the section is again an ascending semitone motion, found by the consideration of $D^{\flat}$ found as a fixed pitch class in measure 24 to the final $D^{\sharp}$ acquired in measure 36. Further, a complimentary major second ascent is present over the same period of duration, utilizing the hierarchical pitch classes of the section, $F^{\natural}$ and $G^{\natural}$. Finally, a single instance of $C^{\sharp}$ exists, somewhat outside of the contextualization of the sectional contour, yet still providing a key pitch class for later analysis. With these

established relationships, a final reduction of the fixed pitch class contour can be constructed (see Figure 43).

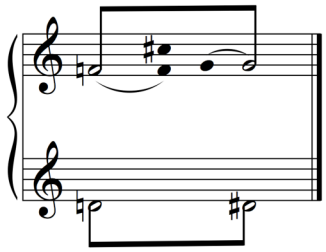

Figure 43: Beaming of fixed pitch classes to show connectivity within measures 18 - 36

With this collection of fixed pitch classes, a pitch class set for the conclusive reduction of the development may be established, using pitches $C^{\sharp}$, $D^{\flat}$, $D^{\sharp}$, $F^{\flat}$, and $G^{\flat}$, with corresponding integers [0,1,2,4,6], t = 11, resulting in pitch class set 5-9.

The recapitulatory material beginning in measure 37 recalls motives from Motivic Group B, initiated by multidimensional iterations of pitch class set 3-3, sounded horizontally by violin I and vertically with the addition of the violin II and viola parts to the melodic figure in violin I. The motive found in measure 37 dispels the textural density of the development and utilizes a brief moment of homophony to reinstate pitch class set 3-3 as both a melodic and harmonic figure. Allusions of accompanimental vertical function are immediately withdrawn following the previously mentioned motive, upon the reintroduction of the polyphonic duet figure originally found in measures 9 - 12 with an ostinato gesture in violin I outlining pitch class set 3-3 through arpeggiation.

The next examples of vertically-based harmony are found on the last eighth note of beat 3 in measure 42 through the conclusion of measure 43 where a 4-17 tetrachord is formed through a transposition (t = 5) of the theme found originally in measures 12 – 13.

The suspension figures and resultant vertical progression behaves in a similar manner to the formerly heard instance of this phrase, yielding rapid movement through seven sets over the course of four beats.

Beginning in measure 44, the introductory figure of measure 1 returns, consisting of two ascending minor ninth leaps in the cello transposed to t = 0 and t = 5, which are juxtaposed against a vertical instance of pitch class set 4-18 composed of two dyads in violin II and viola, which provides a familiar harmonic center. Immediately following is a gesture that directly restates the sixteenth note theme of measures 2 - 3 with transposition t = 3, in this instance navigating by imitative polyphony through each voice of the ensemble in measure 45. Two instances of pitch class set 4-7 separated by a major second then appear on the second beat of measure 46; they accompany an echo of the chromatically descending figure that was observed in measures 40 - 41. An arpeggiated 4-7 tetrachord is presented in measure 47 in the familiar method of imitative polyphony, arriving at a climatic installation of pitch class set 5-22 on the first beat of measure 48, which consequently fragments into a descending 3-3 trichord across all voices presented on pitch classes 6 and 8. The cadential vertical eight-pitch figure occurs once more in measures 49 - 50, transposed t = 4, again reinforcing this prominent gesture to lend finality to sectional delineations within the piece. An enharmonic retrograde fragment of the cello motive found in measures 7 - 9 concludes the recapitulation in measure 50, introducing pitch class set 5-Z38, integers [0,1,2,5,8], t = 7, as the ultimate harmonic destination achieved to accompany a final horizontal utterance of pitch class set 3-3 in violin I and violin II.

The vertical movement in measures 37 - 55, while still demonstrating relationships to pitch class set 3-3, proves to behave in less predictable fashion**,** primarily due to the frenzied pace of developed thematic fragments being interpolated against contrasting themes in a recapitulatory manner. Consequently, these fragmentary gestures cause the amount of absolute connectivity between fixed pitch classes during the eighteen measures of recapitulation to be fractured to a greater degree than the previously observed sections of the piece; however, the connectivity relates directly to the reintroduced themes, furthering the premise that fixed pitch classes behave in a manner corresponding to thematic delineations within a section.

The recapitulation ultimately yields fourteen instances of vertical harmony with pitch class set 3-3 as a subset. These pitch class sets are displayed in order of occurrence in Table 22.

Table 22: All vertical figures containing pitch class set 3-3 in measures 37 - 50

Measure	37		43		44	45	46		48	49			50	
PC Set 1	3-3	3-3	4-18	4-17	4-18	4-18	4-7	4-7	5-22	4-18	4-17	4-18	4-17	5-Z38
PC Set 2											4-17		4-17	

As illustrated in Table 22, the harmonic functions within the recapitulation exhibit a cohesive bond to the harmonies found in the exposition divisions, Motivic Group A and Motivic Group B. The foreign pitch class set to the exposition is the lone representation of pitch class set 5-22, which was initially found in measure 35 as the penultimate harmonic feature of the development. The conclusive vertical harmony in the recapitulation, pitch class set 5-Z38, while unfamiliar to the harmonic context of the piece, is a close neighbor to the final harmony in the development, pitch class set 5-Z36.

These two pitch class sets share similar intervallic content, thus allowing further cadential correspondence to be established (see Table 23).

Table 23: Interval Content similarities found between pitch class sets 5-Z36 and 5-Z38, which function as concluding sectional harmonies in the development and recapitulation

PC Set	Interval Content					
5-Z36	2	2	2	1	2	1
5-Z38	2	1	2	2	2	1

From these fourteen vertical gestures, twenty individual instances of the seminal pitch class set are obtained, with only one instance of exact adjacent repetition, occurring in measures 49 – 50 (see Table 24).

Table 24: Unique pitch class sets, number of occurrence, and subsets of pitch class set 3-3 within each tetrachord

Pitch Class Set	Recurrence #	Subsets (3-3)
3-3	2	1
4-7	2	2
4-17	3	2
4-18	5	1
5-22	1	2
5-Z38	1	1

The extracted moments of vertical figures containing pitch class set 3-3 as a subset are displayed in a harmonic reduction as they appear written in the score (see Figure 44).

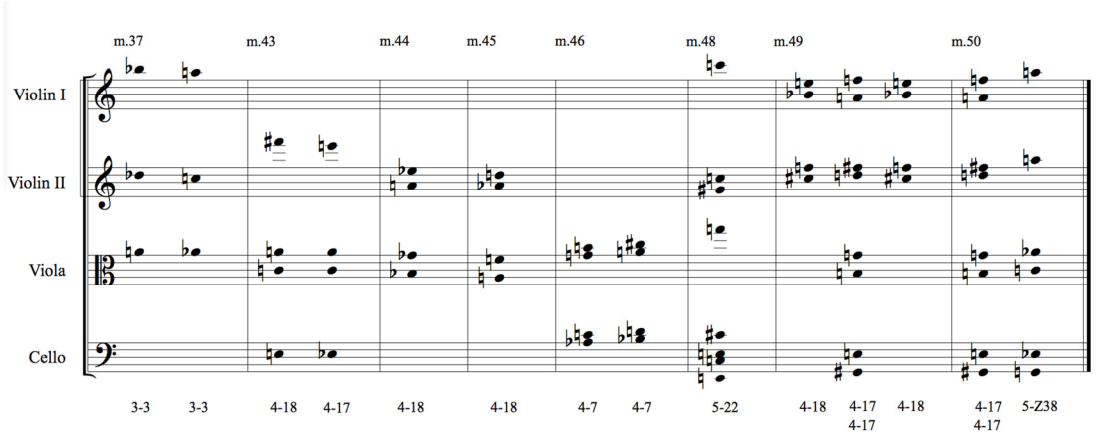

Figure 44: All instances of pitch class set 3-3 and its supersets in measures 37 - 50

From this reduction, pitch class set 3-3 is acquired from the presented vertical figures and arranged in order of occurrence, utilizing the vertical pitch arrangement found in the previous three examples demonstrating fixed pitch classes within the sectional divisions of the movement (see Figure 45).

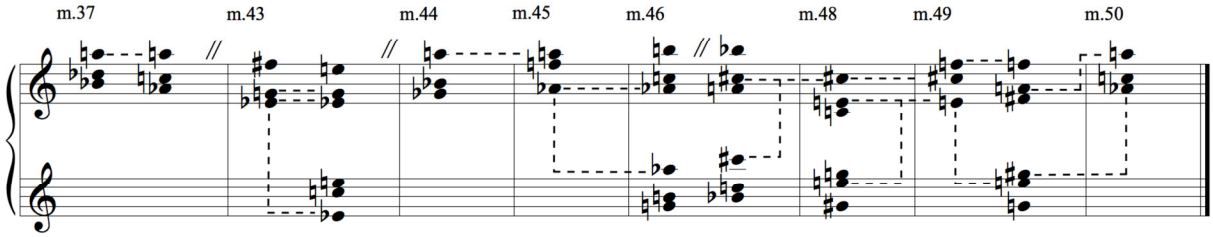

Figure 45: Extracted instances of pitch class set 3-3 from larger vertical figures. Fixed pitch classes are highlighted by dashed lines

The fixed pitch classes exhumed from Figure 46 display the greatest amount of disparity in adjacent connectivity in the piece up to this point, experiencing three instances of adjacent sets with no exact or enharmonic cohesion. Despite the disjointed nature between fixed pitch classes from measure 37 - 46, each adjacent example of connective disparity maintains a relationship of chromaticism, which, while straying from absolute cohesion, constructs a chromatic descent through voice leading between non-

fixed pitch classes. Although these three abrasions in absolute connectivity permeate the recapitulation, the resultant number of fixed pitch classes proves to be greater than in any prior section, exhibiting seven unique pitch classes.

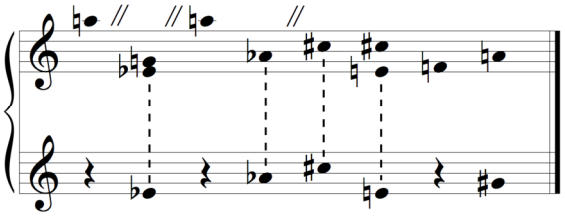

Figure 46: Fixed pitch classes obtained from adjacent examples of vertical pitch class set 3-3 in measure 37 - 50. Octave or unison correspondences are denoted by dashed lines

As displayed in Figure 46, between the first two adjacent instances of pitch class set 3-3 appearing in measure 37, a single A♮ is acquired as a fixed pitch class. Immediately following is the initial break of fixed pitch class connectivity between measure 37 and 43, in which the A♭ to G♮ acts as the voice leading connection to establish expected chromaticism. A fixed pitch class dyad is established in the two instances of pitch class set 3-3 in measure 43, highlighting pitches G♮ and E♭, thus introducing the major third interval, outlining the overall intervallic scope of pitch class set 3-3 as a vertical function. Following the second abrasion in connectivity between measure 43 and 44, the A♮ returns as the initial fixed pitch class, which then descends by a semitone to A♭ in both the upper and lower staves, providing an expanding chromatic contour to the interrupted first fixed pitch class of the recapitulation. The final instance of disconnection amongst fixed pitch classes occurs in measure 46 between two occurrences of pitch class set 4-7 that are separated by a major second. Similarly to the previous instances of disconnect, the adjacent pitch class sets are bound through chromatically progressing motion through voice leading, which, in this instance, utilizes an upward

motion of A♭ to A♮ to provide a transition by means of chromatic voice leading between vertical functions devoid of fixed pitch class.

On the second eighth note of beat 2 in measure 46 until the conclusion of the recapitulation in measure 50, absolute fixed pitch class connectivity is established, outlining an increasingly complex motion derived from the vertical harmonic function. The initial fixed pitch class acquired in measure 46, C♯, is established as a critical pitch class in the concluding measures of the recapitulation, due to the amount of repetition in which the pitch is utilized. An E♮ is consequently introduced as a dyad with the C♯, initiating a familiar figure of the minor third by means of its complimentary interval, the major sixth. Following this dyad in measure 48, the fixed pitch class of E♮ rises chromatically to an F♮ in the upper staff, while the E♮ is retained in the lower staff, constructing a dyad of a minor second. Concluding the recapitulation is a final dyadic figure comprised of a minor second, constructed of A♮ and G♯ as the fixed pitch classes, found in the upper and lower staves, respectively.

From this information, the following reduction of fixed pitch classes in Figure 47 is constructed, displaying the harmonic contour of measures 37 - 50.

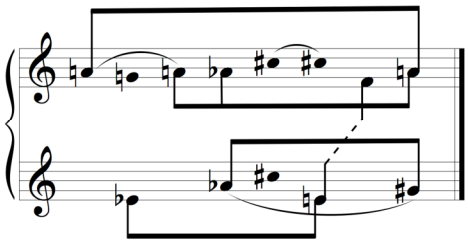

Figure 47: Initial beaming of fixed pitch classes to show connectivity within measures 37 - 50

With the information exhibited in Figure 47, a further compressed reduction of the recapitulatory material is constructed, resulting in a figure that again satisfies the constraints observed in previous reductions devised throughout the piece. Most significantly, the overall motion of a single semitone descent is present, constructed through the occurrence of the initial A♮ in the figure, to the final G♯ found as the concluding pitch of the reduction in the lower staff. The A♮ consequently is seen to be retained over the course of the reduction in the upper staff, demonstrating continuity within the harmonic motion of the section. Further, a smaller chromatic contour is observed in the upper staff of the reduction, found beginning with the second pitch of the collection, G♮, rising to an A♭, reiterated in both staves simultaneously, which ultimately resolves upward to the concluding pitch of the recapitulation, A♮. From the realization of this gesture, the A♭ in the lower staff may be moved to the upper staff due to its reinforcing nature, thus alleviating its duplicated presence in the lower staff.

The E♭, until now ignored in the lower staff, now is able to demonstrate its function in the establishment of the harmonic contour of the recapitulation. This pitch rises by semitone to E♮ at the penultimate pitch of the lower staff; however, an earlier instance of this chromatic motion is found in the upper staff, allowing a prolonged emphasis on the E♮. To extend this chromatic function, the penultimate pitch on the upper staff, F♮ is employed, extending this chromatic figure to an overall ascent of a major second, which is noticed to be complimentary to the chromatically rising gesture of G♮, A♭, A♮ previously established in the upper staff. These complimentary chromatic gestures, similar to previously observed corresponding figures, function a major third apart, further

reiterating the overall intervallic scope of the foundational pitch class set 3-3. This set of information allows the final reduction of the recapitulation to be constructed, displayed in Figure 48.

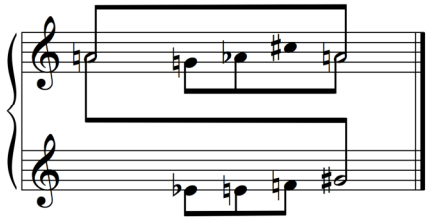

Figure 48: Final reduction of harmonic connectivity by fixed pitch class in measures 37 - 50

This reduction allows for the acquisition of seven pitch classes, which once in best normal order and inverted, construct pitch class set 7-13, utilizing integers [0,1,2,4,5,6,8] after transposition, t = 9.

The Coda, occurring in measures 51 - 55, interposes certain harmonic anomalies, diverging from the conclusions established in previous sections. Beginning on the second eighth note of beat one in measure 51, the figure of the minor ninth leap returns, sounded in octaves by the cello and viola, which is consequently passed to violin I in measure 52 while accompanied by chromatically alternating 4-18 tetrachords constructed by dyads in violin II and viola until the first sixteenth note of the fourth beat in measure 54, a figure displaying similarity to the pitch class set 4-18 accompaniment found in measures 31 - 35. A final utilization of the eight-pitch vertical figure comprised of two 4-17 tetrachords occurs on the final eighth note of measure 55, reiterating a final recognizable moment to conclude the piece. Although the coda features a substantial amount of vertical accompanimental material, the realized fixed pitch classes present an expanded harmonic idea that deviates from the expected result containing pitch class set 3-3.

The vertical functions containing pitch class set 3-3 as a subset are represented in Table 25, clearly displaying the amount of repetition and resultant harmonic symmetry found within the use of alternating instances of pitch class sets 4-18 and 5-22.

Table 25: Vertical pitch class sets with subset 3-3 found in measures 52 - 55

Measure	52		53			54			55
PC Set 1	5-22	4-18	4-18	4-18	4-18	4-18	4-18	5-22	4-17
PC Set 2									4-17

These ten instances of vertically functioning pitch class sets containing a subset of 3-3 result in fourteen individual instances of the subset, as represented in Table 26.

Table 26: Unique pitch class sets, number of occurrence, and subsets of pitch class set 3-3 within each vertical figure

Pitch Class Set	Recurrence #	Subsets (3-3)
4-17	2	2
4-18	6	1
5-22	2	2

Each vertical accompanimental chord constructed from a superset containing pitch class set 3-3 found within the coda is displayed as notated in the manuscript in Figure 49.

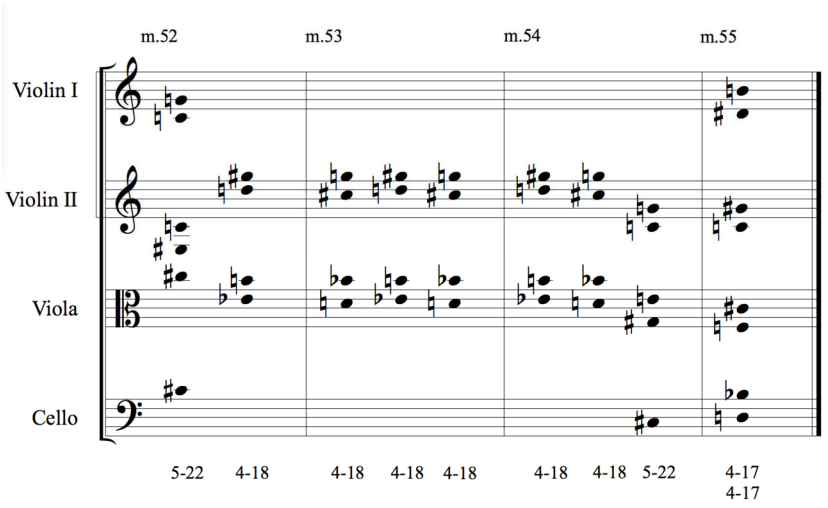

Figure 49: All instances of pitch class set 3-3 and its supersets in measures 52 - 55

Upon the extraction of pitch class set 3-3 from its encompassing supersets, the harmonic reduction shown in Figure 50 is created to attain the fixed pitch classes for the section.

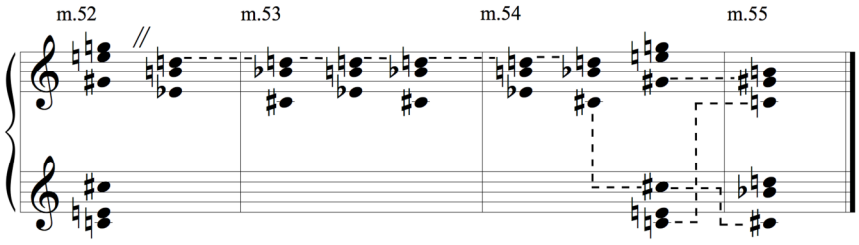

Figure 50: Extracted instances of pitch class set 3-3 from larger vertical figures. Fixed pitch classes are highlighted by dashed lines

Figure 50 displays a disconnection between fixed pitch classes occurring immediately at the onset of the section in measure 52. This abrasion in connectivity continues to fulfill the justification for disconnected fixed pitch classes by displaying chromatic movement between the interior voice E♮ and lower voice E♭. Following this instance of disconnection, fixed pitch class connectivity is reestablished, placing emphasis on D♮, which occurs through five consecutive instances of pitch class set 4-18

between measures 52 - 54. Pitch class $C^{\sharp}$ is then utilized to induce connectivity between the final sequential instance of pitch class set 4-18 and pitch class set 5-22, which, by containing two subsets of pitch class set 3-3, allows for pitch classes $C^{\natural}$, $C^{\sharp}$, and $G^{\sharp}$ to be incorporated as the final fixed pitch classes in the movement.

The fixed pitch classes attained throughout the Coda are displayed in order of occurrence in Figure 51.

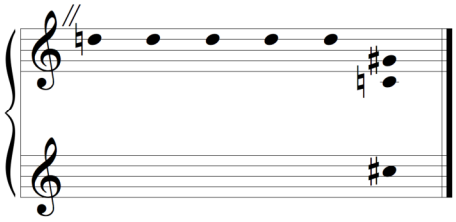

Figure 51: Fixed pitch classes obtained from adjacent examples of vertical pitch class set 3-3 in measure 52 - 55

The simplistic contour derived from fixed pitch classes within the Coda allows for a reduction to be generated that fulfills expectations previously established, despite a variance in pitch class content. The section as a whole creates an overall semitone descent, from the initial pitch, $D^{\natural}$, to the concluding pitch, $C^{\sharp}$, inserting a final instance of chromatic movement featuring the semitone within sectional bounds. Pitch classes $G^{\sharp}$ and $C^{\natural}$, although seemingly obtuse in this section, are crucial elements of the larger reduction of the piece. The reduction constructed from the information acquired in the coda is displayed in Figure 52.

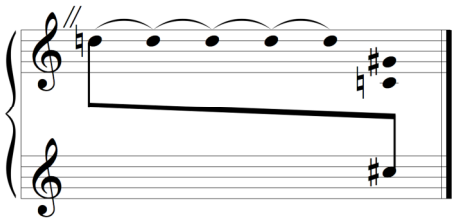

Figure 52: Initial beaming of fixed pitch classes to show connectivity within measures 52 - 55

The repetition of pitch class D♮ does not influence the overall contour of this reduction, therefore, it can be reduced to a singular instance of the pitch, as demonstrated in the final reduction for the coda (see Figure 53).

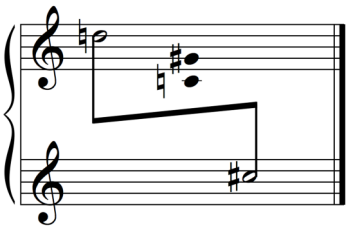

Figure 53: Final reduction of harmonic connectivity by fixed pitch class in measures 52 - 55

Notably, the fixed pitch classes acquired in the coda do not satisfy the expectations that have been set in place through earlier sectional analyses, by forming a pitch class set that does not include pitch class set 3-3 as a subset. This result, while seemingly detrimental to the predictability of this analysis, functions normally for the purpose of coda within a tonal piece; introducing new harmonic material as a conclusive feature. The acquired pitch class set 4-5, integers [0,1,2,6] after being set in best normal order and inverted, display little similarity to the traits of pitch class set 3-3 beyond possessing the intervals of semitone and major third, while still maintaining a function within the expected overall contour of the section as a whole. The preceding set of four reductions devised through the acquisition of fixed pitch classes and the resultant pitch

class sets thereof, yields a set of information that allows for further conclusions regarding the overall movement of *Heftig bewegt* to be established. The acquired pitch class sets for each sectional reduction are displayed in Table 27.

Table 27: Pitch class sets and associated integers produced from fixed pitch classes extracted from each section of the piece, additionally demonstrating the achieved subset commonality for each unique pitch class set

Section	PC Set	Integers
M.G. A	4-7	0 1 4 5
M.G. B	4-19	0 1 4 8
Dev.	5-9	0 1 2 4 6
Recap	7-13	0 1 2 4 5 6 8
Coda	4-5	0 1 2 6

The immediate appearance of subset 3-3 existing within each pitch class set acquired through fixed pitch class analysis and reductions, with the exception of the coda, results in further conclusive evidence of the permeation of pitch class set 3-3 as a foundational element of the piece, providing an intra-sectional harmonic locus throughout the movement. Furthermore, it becomes apparent from Table 27 that the recapitulation holds each previously acquired pitch class set as a direct subset, with no transformation of integers required, therefore suggesting the the recapitulation acts as an accumulation of all harmonic traits demonstrated previously; a property that is common in tonal practice regarding Sonata-Allegro form.

The fundamentals of Schenkerian Analysis allow for the previously acquired harmonic reductions corresponding to each section of the piece to be placed adjacently, formulating an overall reduction for the piece. This extended figure pertaining to harmonic motion enables further reductions of form to be generated, enabling a

conclusive harmonic contour to be ascertained for the entirety of the piece. These figures are displayed in Figure 54, with explanations of methodology applicable to each reduction.

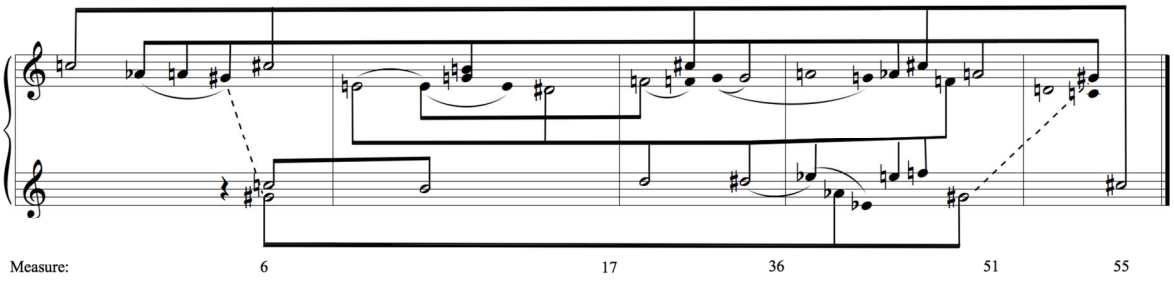

Figure 54: Fixed pitch class reduction demonstrating connectivity throughout the entirety of the movement

The Figure 54 is constructed through the adjacent placement of the final figure of each sectional reduction as displayed in earlier material of this chapter, with minimal changes to the placement of individual pitch classes when applicable for visual clarity. The original reductions by section may be referred to in Figures 34, 39, 43, 48, and 53.

This initial reduction immediately highlights a core collection of pitch classes that permeate the entirety of the piece, particularly $C^{\sharp}$, $G^{\sharp}$, and its enharmonic equivalent, $A^{\flat}$. These pitch classes exhibit a level of intra-sectional connectivity that suggests their prominence as integral pitches to the extended harmonic structure of the piece. Additionally, the expected chromatic contour of a semitone motion exists over the course of the harmonic content of the piece, beginning with the initial pitch class, $C^{\natural}$, and ascending to a retained $C^{\sharp}$, which exudes a hierarchical nature over the entirety of the harmonic content.

Interior motion is subsequently active intra-sectionally, with multiple instances of stepwise chromatic motion operating within the inner layers of the harmonic reduction.

The extended gesture, beginning at the initiation of Motivic Group B, is a chromatic descent starting with pitch class E♮, which then descends a major second by semitone to D♮ in the lower staff at the beginning of the development and is continued by a chromatic ascent of a minor third up to F♮ at the conclusion of the recapitulation.

A second reduction is then constructed by utilizing this highlighted information regarding the initial reduction of *Heftig bewegt,* resulting in Figure 55.

Figure 55 eliminates unnecessary pitch class duplications and additionally simplifies the chromatic motion by allowing the staff placement of certain pitch classes to be reorganized to lend clarity. In this reduction, the instances of retained G♯/A♭ have been relocated to the lower staff, subtracting all instances of this pitch from the upper staff. Furthermore, the pitch classes comprising the extended chromatic gesture from E♮ to F♮ have been placed together on the lower staff to form the entirety of the figure on a single line. With this reorganization of pitch classes, the chromatic ascent of C♮ to C♯ emerges from the constellation of other pitches, complimented by the chromatic neighbor tone gesture of A♭/G♯, A♮, A♭/G♯.

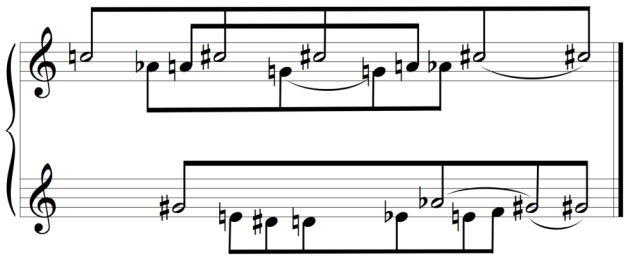

Figure 55: First reduction of Figure 54, further condensing the chromaticism induced by fixed pitch classes

An observation of the extended chromatic gesture in the lower staff reveals that it may be reduced to the simple figure of E♮ to F♮, hence creating another extended chromatic ascent existing over the duration of the reduction. Additionally, the neighbor tone figure in the upper staff may be reduced to A♮ alone, when the presence of G♯ is considered in the lower staff, which enables both pitch classes to remain present in the reduction. These considerations enable a further reduction to be created, displaying the prominence of intra-sectional chromatic semitone motion.

The third reduction in Figure 56 begins to display unique characteristics that present undeniable correlations with characteristics found throughout the piece by means of the seminal pitch class set 3-3. An observation of the pitch content of each individual staff yields the pitch classes necessary to construct pitch class set 3-3, by means of pitch classes C♮, A♮ and C♯ in the upper staff, and G♯, E♮, and F♮ in the lower staff. This product of harmonic reduction further instills the intention of the composer to saturate the piece with combinations of these intervals, and in so doing, has created a foundation, perhaps intentionally, of extended iterations of pitch class set 3-3.

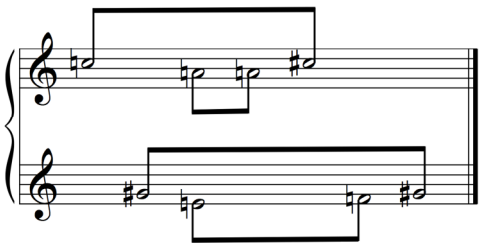

Figure 56: Further reduction of Figure 54, displaying chromatic movement over the course of the movement alongside the retention of the pitch classes G♯ and A♮

A further reduction is constructed by consolidating pitch classes G♯ and A♮ to a single line as a neighbor tone gesture, while completely eliminating the second staff by

setting the chromatic motion of E♮ to F♮ below the existing chromatic gesture in the upper staff. From such, Figure 57 is generated.

Figure 57 presents further correlation to the sectional analysis of the piece. With this reduction, the extended chromatic ascent figures are emphasized, reminiscent of the semitone contour found in each reduction of individual sections, and furthermore, highlights the chromaticism embraced by the composer. Additionally, these chromatic gestures, when considered as a single pitch class set, create the initial vertical accompanimental chord of the piece, pitch class set 4-7, exhibiting similarity to the extent of including verbatim pitch classes to the figure found on the fourth sixteenth note of beat 3 in measure 1. This conclusion solidifies the implied pitch center, pitch class set 3-3, for which the tonal tonic was substituted by exactly replicating the hypothesized pitch center through analyzing fixed pitch classes acquired from vertical accompanimental gestures over the duration of the piece.

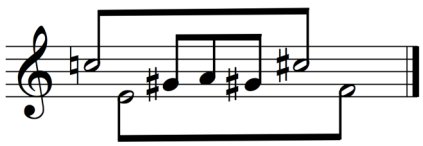

Figure 57: Final reduction derived from Figure 54, displaying the most condensed iteration of movement achieved from fixed pitch classes over the duration of the movement

With the information acquired from the combination of Set Theory principles and methods taken from Schenker's process of extended harmonic reduction, substantial evidence has been accrued to demonstrate the possibility of replacing tonal pitch centers with pitch centers derived from accompanimental pitch class sets, and through the utilization of fixed pitch classes, display harmonic connectivity while constructing extended reductions that correspond directly to the implied pitch center. This conclusion

offers evidence to believe that the early atonal works produced by the Second Viennese School, although intentionally departing from the principles of tonality, incorporate a method of composition that can still be explained through an adaptation of tonal analysis. The result of this analysis demonstrates that the techniques employed by Webern maintain a degree of correspondence to Schenker's philosophy of harmony; although the composer employs this concept in a more abstracted sense, the ultimate result presents itself in a similar state.

> We are faced here with two alternative possibilities. In one case the harmonies, conceived in the vertical direction, appear, so to speak, unfolded in the horizontal flow of the melody; in the other case they are established merely vertically, in triads or seventh chords without being confirmed, at the same time, in the melody. In the former case the color of the harmony penetrates the living flesh of the motif; in the latter case such penetration does not take place.[10]

It is evident that Webern weaves a cohesive thread within the vertical and horizontal dimensions of the piece, as referenced in Schenker's philosophy, and in so doing, allows a multidimensional syndication to permeate the piece, thus inciting an unfolding of the atonal pitch center in the absence of a tonal tonic. The juxtaposition of analytical techniques from Schenker and Forte extends the potential of atonal analysis through the reinterpretation of a principle intrinsic to music as a natural force: the pitch center. The preceding analysis demonstrates how, despite the artist's attempt to forsake the pitch center through atonality, this premise may still be proven within the atonal genre and ultimately yield a result expected in the realm of tonality. The presented information illustrates that although the artist possesses the intent to supersede Schenker's "nature" and devise a more perfect compositional method, said "nature" prevails again, enforcing a functioning pitch center whilst forsaking the tonal pitch center

[10] Heinrich Schenker, *Harmony* (Chicago, IL: Univ. of Chicago Press, 1980) 108.

presented naturally by the overtone series and thus fulfilling the propensity of nature to achieve resolution.

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