GLOBAL COHERENCE IN THE SELECTED ATONAL WORKS OF ANTON WEBERN

by

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Presented to the School of Music
and the Graduate School of the University of Oregon
in partial fulfillment of the requirements
for the degree of
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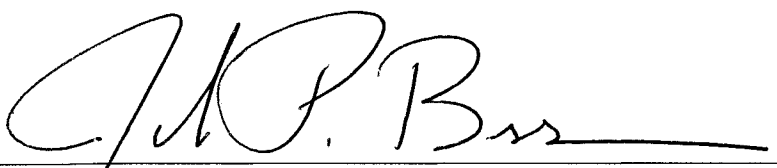

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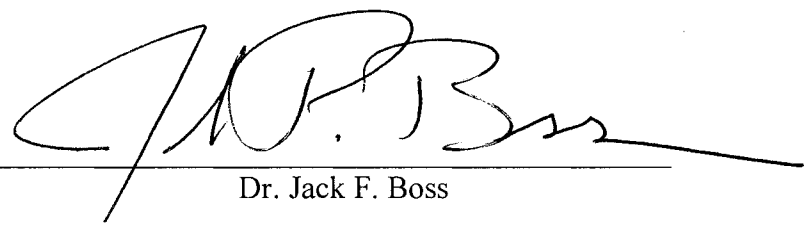
Approved: 

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This study examines entire works from Anton Webern's atonal oeuvre (1908-1914) to show how global coherence is achieved through the notion of process. Talking about 'process' is a way of talking about music as it unfolds over time, as it happens dynamically, and it also takes into consideration how the composer thought about coherence. In a 1932 lecture Webern describes unity as "how one thing leads to another." With this in mind, this study describes how coherence is expressed both within movements and through an entire work in Webern's *Six Bagatelles for String Quartet* (1911-1913), *Cello Sonata* (1914), and *Three Short Pieces for Violoncello and Piano* (1914).

The harmonic structure plays an important unifying role in each piece. However, Webern expresses coherence in several other ways as well, described analytically as contour-space segments, pitch interval successions, and rhythm (including duration

successions and duration-space successions). These prove useful in reinforcing assertions I make regarding formal structure and descriptions about overarching processes that contribute to global coherence.

A process that I call 'focusing' is one way in which Webern expresses global coherence over an entire work. In general, a process of focusing involves musical materials being unclear or only suggested at the beginning of a piece, then being clarified or realized in the middle, and finally focused into their bare essentials by the end. As a result, a coherent progression can unfold across a piece in different ways. Conversely, this process can also progress in the opposite direction. In addition, there is evidence of nascent serial technique as expressed through rhythm, contour, and harmony.

My interpretations of three of Webern's late atonal compositions offer a different analytic perspective—adding another 'piece to the puzzle' of our understanding of Webern's atonal music. By examining the processes that contribute to global coherence in *Three Short Pieces* Op. 11, *Cello Sonata*, and *Six Bagatelles* Op. 9, we can provide a thorough picture of how Webern creates unifying structures across an entire work. Indeed, the kinds of coherence displayed by Webern's pieces closely match concepts that many attribute to his teacher, Arnold Schoenberg. This helps us to understand the Second Viennese School itself as a coherent development.

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Introduction

The years 1908-1914 represent a period of instability both personally and professionally for Anton Webern. The death of his mother in 1906, the ending of composition lessons with his teacher and mentor Arnold Schoenberg in 1908, his inability to find work throughout this period, and finally the commencement of World War I in 1914 had a profound affect on Webern that was reflected in his compositions. According to Kathryn Bailey (1998):

> It was a period of transition, a short period of freedom separating two quite different disciplines, the regularity of formal lessons in composition and the regimented life of the military. This is reflected in the music that dates from these years, music that spans the gap between tonal forms of Webern's youth and the text-determined structures of the period after 1914, through a no-man's-land of aphoristic...miniatures.[1]

The focus of this study is on understanding how Webern's works from the second half of this period, viz., his late atonal works, are unified according to coherent principles. Examples include his *Six Bagatelles for String Quartet* (1911-1913), *Cello Sonata* (1914), and *Three Short Pieces for Violoncello and Piano* (1914). Webern's

[1] Kathryn Bailey, *The Life of Webern*, (Cambridge: Cambridge University Press, 1998), 81.

musical output during this period consisted of short, ascetic works with sparse textures, minimal pitch material, extreme ranges of register and dynamics, and brief motivic ideas, all hallmarks of his aphoristic style.

Theorists have long been concerned with how music 'hangs together.'[2] Atonal and serial music does not bring with it a long-standing set of expectations or principles for formal structure, or melodic and harmonic motion, as does tonal music. For this reason it is paramount, when analyzing atonal or serial music, to consider how the composer conceived of and expressed his own notions of coherence. In doing so, an analyst can establish her own framework on which she can hang her analytic observations.

That Webern was always concerned with cohesion is well established. In a 1932 lecture he said,

> *Unity* is surely the indispensable thing if meaning is to exist. Unity, to be very general, is the establishment of the utmost relatedness between all component parts. So in music, as in all other human utterance, the aim is to make as clear as possible the relationships between the parts of the unity; *in short, to show how one thing leads to another* (emphasis mine).[3]

In describing unity as "how one thing leads to another," Webern invokes the idea of process. Talking about 'process' is a way of talking about music as it unfolds over time, as it happens dynamically. If we are to have a greater understanding of unity, we must

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[2] The German word for coherence is *Zusammenhang*, which literally means 'to hang together.'

[3] Anton Webern, *The Path to the New Music*, ed. Willi Reich, trans. Leo Black. (Bryn Mawr: Theodore Presser Company, PA., 1967), 42.

necessarily examine relationships not only within but also between movements of a work, as well as the process or processes that contribute to coherence of the whole. It is necessary to go farther than identifying unifying devices within a movement.

Some studies of Webern's atonal music take fragments of the music from different parts of a piece to demonstrate a particular point, and do not take into consideration how they fit into the 'story.' Straus (2003), for example, uses Webern's Op. 11/3 as an illustration of his perspective on atonal voice-leading. Approaches that examine portions of a piece only rarely address the compositional design (e.g., why one movement or section occurs before or after another) or how the chosen portions of the music contribute to a movement's form. Further, analyses that isolate portions of the music often read like a list of features.[4] In contrast, my study focuses principally on the succession of harmonic structures, as they occur in particular orders during the course of each piece, which in turn provide global coherence. This idea of process describes how coherent progressions are projected both within a movement and across an entire work—an approach that is not represented in the analytic scholarship on Webern's atonal music.[5]

Webern expresses coherence in several ways. Although harmonic structure plays an important unifying role in each piece, other analytic descriptions such as contour-

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[4] Baker (1982) creates what may best be described as a catalogue of all pitch class sets in his analysis of Webern's *Six Pieces for Orchestra*, Op. 6. He compares pitch class sets between movements, paying attention to invariants, literal complements, and identical repetitions of sets. By this method Baker believes the impact of the pitch-class set relations to structural coherence may be studied. But his 'tally' approach isolates segments and pays no attention to how the pitch class sets relate within each movement or how they may be heard as a succession.

[5] The kinds of literature I mean include: Wittlich (1969), Wintle (1975), Cogan & Escot (1976), Chrisman (1979), Forte (1980), Escot (1982), Marra (1983), Hanson (1983), Kabbash (1984), Berry (1987), Forte (1994), Forte (1998), Lambert (2000), Clifford (2002), Straus (2003), Sallmen (2003). A detailed survey of literature pertinent to each of the compositions I discuss will be placed at the beginning of each chapter.

space segments, pitch interval successions, and rhythm, including duration successions and duration-space segments, prove useful in reinforcing assertions I make regarding formal structure and descriptions about overarching processes that contribute to global coherence.

A process that I call 'focusing' is one way in which Webern expresses global coherence over an entire work. In general, a process of focusing involves musical materials (like Kh members)[6] being unclear or only suggested at the beginning of a piece, clarified or realized in the middle (the Kh relationship becomes more salient), and finally reduced to their bare essentials by the end (larger Kh related sets fall away while only trichords remain). Conversely, this process can also progress in the opposite direction. As a result, a coherent progression can unfold across a piece in different ways. In addition, there is also evidence of early serial technique as expressed through rhythm, contour, and harmony.

My analytic interpretations of three of Webern's late atonal compositions, *Three Short Pieces for Violoncello and Piano*, Op. 11 (1914), *Cello Sonata* (1914), and *Six Bagatelles for String Quartet*, Op. 9 (1911-1913) offer an analytic perspective that adds a 'piece to the puzzle' of our understanding of Webern's atonal music. I have found traditional pitch-class set relations to be the most effective means to describe my understanding of Webern's atonal music, but I also use other types of analytic descriptions such as contour, pitch interval successions, and rhythm to demonstrate that

[6] Also called the 'reciprocal complement relation,' Kh arises when a set can contain or be contained within the first pitch-class set in the nexus set, like 6-Z19 (013478), and can also contain or be contained within the complement of the first set, in this case 6-Z44 (012569). See Allen Forte's book, "The Structure of Atonal Music" (1973) for additional information.

there is a relationship of musical parameters that reinforces my interpretations of these pieces. These different analytic methods will show that Webern's own documented assertions about coherence are evident in his music.

Chapter II first surveys the published literature on *Three Short Pieces* Op. 11 and this survey is followed by my own interpretation of the work. The process of focusing plays an important unifying role across the entire work that can be demonstrated through a network of subsets and supersets around 6-Z19 (013478) and 6-Z44 (012569) that is *suggested* in the first movement, *realized* in the second movement, and then is *condensed* to its bare essentials in the third movement. The primary harmonic materials of the work, 3-3 (014) and 3-4 (015), are involved in a variety of processes and relationships involving subsets and supersets of the Kh subcomplex 6-Z19/6-Z44 that unify each movement as well as participate in the process of focusing described above.

Chapter III offers my analysis of Webern's *Cello Sonata* without a literature survey, given that there are no published analyses of this work. There is a close link between the basic harmonic material and unifying process employed in this work and in Op. 11. The basic harmonic repertoire of the *Cello Sonata* also involves set classes 3-3 (014) and 3-4 (015) but, unlike Op. 11, these trichords combine in different ways to create tetrachord supersets that are used primarily as harmonies. These tetrachords unfold a gradual interval expansion of their prime forms by the end of the work in a similar fashion to the trichord expansion in the final movement of Op. 11. The process of focusing is also evident here, but unlike Op. 11, the process occurs in reverse order and with four-note motives. It is a two-stage process whereby the basic motive, clearly

presented and salient at the beginnings of sections, undergoes a developmental process of variation, to the point where the original motive has been distorted and unfocused. Webern also uses what may best be described as nascent serial techniques on these same four-note motives. Transformations of contour-space segments and duration successions, including inversion, retrograde, and retrograde inversion, unfold a pattern that contributes to global coherence.

Chapter IV begins by surveying the literature of *Six Bagatelles* Op. 9. This is followed by a discussion of the unfolding of successions of nested groups of set classes as expressed through Kh subcomplexes that provide coherence within and across the work. There is a close link between the basic harmonic repertoire in this work and the *Cello Sonata*, though it is formed in different ways. In Op. 9 the generalized interval pattern, 'semitone-some other interval-semitone', (identified by Chrisman (1979)), forms the basis for the harmonic materials. Tetrachords like 4-7 (0145), 4-8 (0156), and 4-9 (0167), form nexus sets for a relatively small group of Kh subcomplexes to which virtually all of Webern's harmonies belong. In the *Cello Sonata*, these *same* tetrachords form its harmonic repertoire but, in that piece, it is the way in which trichords combine to form tetrachord supersets that helps us understand the harmonic framework. In the *Six Bagatelles*, Op. 9, on the other hand, an emphasis is not placed on successive chromatic connections. In these pieces, for each Kh subcomplex, Webern takes vertical slices through the group to organize the harmonic structure. In addition to examining the

different ways in which Webern projects the semitone in the harmonic structure, I pay attention to the motivic structure, which also unfolds a developmental process that contributes to global coherence.

The process of building nested sets can also be described by a procedure that subdivides intervals resulting in larger sets. For example, the interval, 7, in the pitch interval succession of set class 4-7 (0145), < 1—3—1—7 > is divided into intervals 6 and 1 to form set class 5-6 (01256) or pitch interval succession < 1—3—1—6—1 >. Similar pitch interval successions recur throughout the work providing synchronic coherence.

The ways in which Webern builds larger sets provides evidence of nascent serial technique. Pitch classes may be added to a set as the music unfolds chronologically or a set may be built up from later to earlier pitches representing a retrograde formation of a set. Further, the progressions of Kh subcomplexes create a pattern to project the large-scale structure of the entire work. The patterns suggest that Webern may have used transformations of a prime progression to create unity both within and across the movements.

Chapter V summarizes the interpretations of these works and offers my conclusions about process and structure in Webern's atonal music.

CHAPTER II

Three Short Pieces for Violoncello and Piano, Op. 11

Literature Survey

Webern's *Three Short Pieces*, Op. 11 have received relatively little critical attention as a whole. Analyses of Op. 11 are more often limited to a single movement, with the middle movement receiving the least attention. Several scholars have published analyses on the first movement alone, including Escot (1982), Marra (1983), Kabbash (1984), and Clifford (2002). The third and final movement has received analytic attention from scholars such as Wintle (1975), Cogan & Escot (1976), Berry (1987), and Straus (2003). These analyses often take fragments of the music from different parts of the piece to demonstrate a particular point. Approaches like these only rarely address the compositional design (*e.g.*, why one movement or section occurs before or after another) or how the chosen portions of the music contribute to a movement's form. For these reasons I will limit my discussion of these types of analyses to a summary of their contributions.

There are only three scholars who have undertaken an examination of Op. 11 in its entirety over the past thirty years—Gary E. Wittlich (1969), Allen Forte (1998), and Philip Lambert (2000). Each of these analysts takes a different approach to investigating

Op. 11. Wittlich focuses on the pitch and interval structure within and between sets, Forte asserts the octatonic scale can account for the pitch structure of all Webern's atonal music, and Lambert examines Op. 11 with respect to pitch symmetry and networks of transpositions (inspired by David Lewin). I will summarize and thoroughly examine each scholar's contribution, and include my own comments where appropriate. But first I provide a brief summary of analyses of Op. 11 that are limited to a single movement.

James Marra discusses only the first movement of Op. 11 in his 1983 article, "Interrelations Between Pitch and Rhythmic Structure in Webern's Op. 11, No. 1." Marra focuses on relationships between structural rhythmic events and structural pitches. His discussion of the pitch structure in the first section of his article is hampered by incorrect identification of set classes in his analysis. Marra gives a measure-by-measure account considering texture, dynamics, timbre, register, and placement of rests in determining what he calls 'pitch-structural relationships.' While Marra does offer his interpretation of the form of this piece, he too neglects to show a process that contributes to overall coherence.

Pozzi Escot also limits her discussion to the first movement in "Towards a Theoretical Concept: Non-linearity in Webern's Op. 11/1." She bases her analysis on the psychologist Abraham Moles's notion of musical perception as "a musical message broadcasted in a succession of packages of originality of varying size."[7] Based on the categories: ambiguity, hidden proportions, and entropy, as they relate to information theory, Escot concludes that this movement is an excellent example of non-linearity. By

[7] Pozzi Escot, "Towards a Theoretical Concept: Non-linearity in Webern's Op. 11/1," Sonus 3/1 (1982), 18.

parsing successive packages in different ways, non-linearity is observed in the brevity of partitions, constant shifts in register, interruption, and linear discontinuity, to name only a few manifestations. Her methodology for determining non-linearity is based on a scientific approach that objectively calculates proportions and divisions of pitch and rhythm. But, according to my and others' understanding of Op. 11, the first movement is not, as she calls it, a "marvel of non-linearity" but one that expresses great linearity through processes both on the large and small scale.

Robert Clifford's 2002 article "Multi-Level Symmetries in Webern's Op. 11, No. 1" is one of the more recent analyses of the opening movement. Clifford asserts that the symmetries expressed in this movement occur at several structural levels and that these levels are determined by the temporal and registral positioning of musical events. Clifford uses methods of contour theory to create three structural levels: minimal extension, medial extension, and maximal extension.

For minimal extension Clifford determines the contour of the melodies as well as the primary pitches in each melody (the pitches at the beginning or end of a melody or at any high or low points in contour). For medial extension, Clifford analyzes the contour of contiguous chords by determining their registral extremes and the midpoints of the extremes. Maximal extensions involve larger scale projections of minimal and medial extensions. Clifford finds complex interactions between these three extensions involving symmetries of melody types around an axis, symmetrical sequences of chords, and symmetry of pitches at maximal extension as well as support for these symmetries through the rhythmic positioning of these musical events. While Clifford does not

suggest a formal structure for the movement, the registral and rhythmic parameters he discusses suggest some kind of binary form with an axis delineating each section. However, the kind of coherence Clifford describes is based on synchronic relationships rather than diachronic processes.

Christopher Wintle (1975) describes the third movement as an early version of derivation, a principle associated with twelve-tone music. He demonstrates a relationship between the trichordal and rhythmic structure. Wintle finds an inverse relationship between the expanding durations of important trichords and rhythmic patterns typically associated with sentence-structure.

Robert Cogan and Pozzi Escot, in their textbook, *Sonic Design: The Nature of Sound and Music* (1976), view this movement as an early exploration of twelve-tone music and understand it through the completion of the aggregate. They observe that the melodic notes of the cello and piano taken unfold the aggregate that is completed once the last note has sounded. The aggregate unfolds six melodic successions of semitones that are isolated as small groups based on musical parameters such as register, timbre, contour, and spacing. When the piano chords are considered, more semitones enter the fold. The chromatic collection is projected melodically and harmonically across the piece.

In his book, *Structural Functions in Music* (1987), Wallace Berry discusses only the third movement of Op. 11 in his chapter on rhythm and meter. He suggests that this movement is a good example of what is sometimes characterized as "nonmeter,"

"antimeter," "suspended meter," or "ameter."[8] The lack of a sense of meter results, in part, from the quiet dynamic level, articulation, slow tempo and minimal number of musical events. Despite the meter not being easily apprehended, Berry believes that this movement has a functional metrical structure. By analyzing the attack points of the cello and piano parts, Berry finds that each part has an independent structure resulting in metrical incongruence between parts. Nevertheless, it is the synchronic relationships between attack points that create overall structure at the same time as asymmetry between individual parts and a sense of incongruent meter or being "off center" metrically.

In his 2003 article, "Uniformity, Balance, and Smoothness in Atonal Voice Leading," Joseph Straus includes the third movement of Op. 11 as an illustration of his new model of pitch-class counterpoint. His model describes the connection between any two harmonies in atonal music. He too, is concerned with linear aspects of the piece, but he does not discuss an overarching process that contributes to coherence. I will now discuss the three analyses of the whole of Op. 11 that I referred to earlier.

Gary Wittlich's Ph.D. dissertation, "An Examination of Some Set Theoretic Applications in the Analysis of Non-Serial Music" provides one of the few analyses of Op. 11 as an entire work. The significance of his analysis lies primarily in its historical context. Written in 1969, Wittlich's dissertation deserves mention as an early attempt to employ pitch-class set theory, at a time when this analytic method was in its infancy; so it is not surprising that his examination of Op. 11 does not go deeper than identifying the interval and pitch structure. He does not use Forte set class names, but labels the prime

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[8] Wallace Berry, *Structural Functions in Music*, (New York: Dover Publications, Inc., 1987), 397.

forms, identifies the formal structure of each piece, and summarizes the pitch interval content. For his discussions of pitch structure, Wittlich likes to partition the music into what he calls "sound events." These events, as he defines them, are "pitch collections created by discrete units reflecting the dialogue nature of Webern's writing."[9] His findings regarding pitch structure are sometimes at odds with what he designates as the formal structure of the given movement. In general, Wittlich's analytic approach is to catalogue recurring sets and then compare sets for maximal similarity within a given movement and between movements. He does make connections between harmony and form—certain sets are characteristic of certain sections. The following briefly discusses Wittlich's findings for each movement of Op. 11 with additional commentary on their strengths and weaknesses. I will include Forte set names together with prime forms to aid in the discussion.

According to Wittlich, it is the dyad structure that determines the 4-part form of the first movement of Op. 11. In his analysis, only adjacent vertical and linear dyads are identified. The first section extends from measure 1 to the middle of measure 3, the next section begins in the second half of measure 3 to the middle of measure 5, the third section continues through the end of measure 5 through measure 6, and the final section from measure 7 to 9. The end of Wittlich's second section corresponds to what I believe is the end of the first section of a binary form. According to Wittlich, the first and last

[9] Gary Wittlich, "An Examination of Some Set-Theoretic Applications in the Analysis of Non-Serial Music," (Ph.D. diss., University of Iowa, 1969), 95.

sections emphasize (0,4) dyads, with (0,3) and (0,1) dyad types having secondary emphasis.[10] Section two emphasizes (0,6), (0,4), and (0,3) dyad types. Section three has many (0,1) dyads that are generally represented by major sevenths and minor ninths.

Wittlich identifies many of the same trichords in his analysis that I do, but he places more emphasis on tetrachords, which he describes as the most frequent structure in the piece. Wittlich places primary importance on tetrachords 4-7 (0145) and 4-Z29 (0137). These tetrachords are important because they are the first to occur in the piece and they are the only ones to appear more than once.

Wittlich makes a critical error when he misidentifies a tetrachord as 4-Z29 and consequently weakens his main point about the primary tetrachords. At the beginning of his third section in measure 5, he identifies pitch classes {11, 4, 5, 8} in the cello line as (0137) or set class 4-Z29. These pitch classes in fact create set class 4-18 (0147). He claims that each section contains two tetrachords, with the exception of the third section, which contains three, that are maximally similar to 4-Z29 and one tetrachord that is not maximally similar and that this feature is a good example of Webern's compositional consistency. When we substitute the correct set class, 4-18, his argument does not hold true across the piece.

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[10] I am unsure why Wittlich describes dyads (0,3) and (0,1) as having secondary emphasis. First, in his first section there are three occurrences of dyad (0,4) in m. 1 and only one appearance of four different dyads—(0,6), (0,3), (0,5), and (0,1) from measures 2-3 to end the section. Wittlich does not explain why (0,5) and (0,6) are excluded from being of secondary emphasis when the occurrence of these dyads is equal to that of (0,3) and (0,1). Further, in his final section, measures 7-9, the dyad (0,1) occurs just as many times as the (0,4) dyad that Wittlich singles out for primary emphasis. Also, the dyads (0,1) and (0,4) are emphasized contextually in different ways. The (0,4) dyad is presented vertically three times and melodically one time. The opposite is true of the (0,1) dyad. This dyad is presented vertically one time and melodically three times. These inconsistencies reveal a weakness in his arguments about dyad interval classes.

Table 1 summarizes the set classes contained within each section as well as their interval vectors for comparison. The greyed out portion in section III includes Wittlich's incorrect identification of the tetrachord in question.

TABLE 1: Summary of set classes and interval vectors in Wittlich's Fig. 29,[11] Op. 11/1

I		II		III		IV	
				4-Z29 (0137) ✗	[111111]		
4-7 (0145)	[201210]	4-7		4-18 (0147) ✓ (my correction)	[102111]	4-11 (0135)	[121110]
4-Z29 (0137)	[111111]	4-Z15 (0146)	[111111]	4-14 (0237)	[111120]	4-19 (0148)	[101310]
		4-18 (0147)	[102111]	4-8 (0156)	[200121]	4-12 (0236)	[112101]
				4-4 (0125)	[211110]		

Because set classes 4-Z29 and 4-18 are related by R_p and R_2, i.e. have a strong similarity, Wittlich's contention ends up being valid for sections I, II, and IV despite the error. When we replace 4-Z29 with 4-18 we find that these three sections do, in fact, have a tetrachord that is maximally similar to (0147) and one that is not. However, it turns out that *all* the tetrachords in section III are actually *dissimilar* to 4-18.

Wittlich also discusses the most common hexachords of the piece. He identifies hexachords in the first three sections and describes the similarity between and within these sections. For example, in section I Wittlich identifies 3 hexachords: 6-Z10 (013457), 6-Z39 (023458), and 6-15 (012458). He points out that 6-Z10 and 6-Z39 are

[11] Wittlich's Figure 29 diagrams the trichords and tetrachords on the score. See Wittlich (1969), 89.

Z-related pairs and that 6-15 is maximally similar to this pair. He does not describe how these hexachords relate to the form or how they contribute to coherence. Wittlich also states that there are no featured hexachords in section IV (mm. 7-9) apart from another instance of 6-Z3 we first saw in section III. In fact, there is a Z-related pair of hexachords, 6-Z13 (013467) and 6-Z42 (012369), and another appearance of 6-Z17 (012478) that I identify in the final two measures of the piece. Wittlich identified 6-Z17 earlier in the piece. If he had included the Z-related pair 6-Z13 and 6-Z42 and 6-Z17 in the final section he would have had an analogous presentation of related hexachords as in section I. Previously, 6-15 is maximally similar to a Z-related pair in section I and 6-Z17 is maximally similar to a different Z-related pair in the final section. As it turns out the hexachords in sections I and IV are maximally *dissimilar* to each other but more could have been said regarding similar constructions in different sections of the piece.

Finally, Wittlich partitions the music into "sound events". Table 2 reproduces Wittlich's Table 8 that summarizes the pitch class content of Op. 11/1.[12]

TABLE 2: Wittlich's Table 8 of sound events and pitch class content of Op. 11/1

SECTION	EVENT	PIANO (P)	CELLO (C)	P ∩ C	P ∪ C
I	A	{2,4,5,8,9}	{6}	∅	{2,4,5,6,8,9}
	B	{0,1,3,4,5,7,8,9}	{10,11}	∅	{0,1,3,4,5,7,8,9,10,11}
II	C	{0,2,5,6}	{4,7,8}	∅	{0,2,4,5,6,7,8}
	D	{1,2,4,5,8,9,10,11}	{0,3}	∅	{0,1,2,3,4,5,8,9,10,11}
III	E	{1,2,7,8,9,10}	{11}	∅	{1,2,7,8,9,10,11}
	F	{1,2,3,6,7,8}	{4,5}	∅	{1,2,3,4,5,6,7,8}
IV	G	{0,2,3,4,7,9,10,11}	{6}	∅	{0,2,3,4,6,7,9,10,11}
	H	{2,6,9,10}	{1,3,4,7}	∅	{1,2,3,4,6,7,9,10}

[12] Wittlich (1969), 96.

Each section has two events and in each event the pitch classes between instruments are non-intersecting. The complete aggregate is formed when the pitch classes of A and B and C and D are combined but the latter two sections do not combine to create the aggregate. Section III omits pitch class 0 and section IV omits pitch classes 5 and 8. Wittlich believes the presence of the total chromatic collection plays a role in determining the form of this piece. This catalogue approach does not take into account how the pitch materials unfold across the piece nor does he elaborate upon how the absence of the complete chromatic in sections III and IV helps define the form even though he notes how excluded pitch classes are different in each section.

According to Wittlich, the middle movement can be divided into three sections. The first section consists of measures 1-3, the second measures 4-9, and the third measures 10-13. As with the previous movement, Wittlich places importance on what sets recur and how maximally similar they are to each other. In section one he identifies trichords 3-3 and 3-4 and tetrachords 4-2 (0124), 4-Z15 (0146), and 4-7 (0145) as prominent sets. He believes that 4-Z15 and 4-7 serve to relate the second movement to the first movement. He asks us to recall that these tetrachords were the only collections to appear more than once in the opening movement, and that another version of 4-7 appeared twice in section I of the first movement. In fact, in the first section of the opening movement he described 4-7 and 4-Z29 (0137), *not* 4-Z15 (0146) as important tetrachords. 4-Z29 and 4-Z15 are Z-related and not interchangeable sets but he may have been thinking in terms of interval vectors.

Wittlich describes section II as being unified primarily by 4-5 (0126) which appears four times. No other description is provided. Further Wittlich identifies a series of hexachords (6-Z10, 6-Z36, 6-Z11, 6-1) and describes how some are maximally related to hexachords in the previous movement. At no time does he explain how the hexachords fit into the second movement itself or explain what function they serve. I believe that the hexachords that are important in this middle movement are 6-Z19 and 6-Z44, hexachordal complements that Wittlich does not even identify. Wittlich's description of the third section highlights trichords 3-4 and 3-5 and some of their supersets and then compares the larger sets for similarity.

Wittlich describes the pitch structure of the middle movement as similar to the opening movement. Rests separate the "sound events" in this movement. Table 3 reproduces Wittlich's Table 10 that summarizes the pitch class content of Op. 11/2.[13] Wittlich points out that just as in the first movement the pitch classes of each instrument for each event are non-intersecting, except for event D where the piano and cello duplicate pitch class 0. He does not ascribe any importance of non-intersection to the overall structure of the second movement or the piece as a whole.

[13] Wittlich (1969), 105.

TABLE 3: Wittlich's Table 10 of sound events and pitch class content in Op. 11/2

SECTION	EVENT	PIANO (P)	CELLO (C)	P ∩ C	P ∪ C
I	A	{2,4,8,10,11}	{3,5,6,7}	∅	{2,3,4,5,6,7,8,10,11}
	B	{0,1,4,5,8,9}	∅	∅	{0,1,4,5,8,9}
II	C	{1,2,3,5,6,7}	{9,10,11}	∅	{1,2,3,5,6,7,9,10,11}
	D	{0,1,2,3,4,5,9,10,11}	{0,6,7,8}	{0}	{0,1,2,3,4,5,6,7,8,9, 10,11}
III	E	{5,6,9,10,11}	{0,1,2,8}	∅	{0,1,2,5,6,8,9,10,11}
	F	{0,1,2,5,6,7,8,9,11}	{10}	∅	{0,1,2,5,6,7,8,9,10, 11}

Each section contains two sound events as was the case in movement one and the union of the events of the first two sections creates the aggregate. Events B and C and D and E also create the aggregate, although the union of D and E is trivial since event D already contains all twelve pitch classes. Wittlich links these sections through the total chromatic collection. His comparison of the first two sections of the opening and middle movements with respect to total chromatic content is weakened by the fact that event D in the middle movement contains all twelve pitch classes itself.

For the final movement, Wittlich delineates three distinct sections that correspond to my own understanding of the form. He labels them A, B, and C. The rests determine the sections and 'sound events.' A summary of the pitch class content of each sound event reveals that piano and cello pitch classes do not intersect. Table 4 reproduces Wittlich's Table 11 that shows the pitch class content of the final movement.[14] He points out that no section completes the aggregate but a union of sections B and C does contain the aggregate without repeating pitches.

[14] Wittlich (1969), 111.

TABLE 4: Wittlich's Table 11 of sound events and pitch class content in Op. 11/3

EVENT	PIANO (P)	CELLO (C)	P ∩ C	P ∪ C
A	{1,2,5}	{0,3,4,10,11}	∅	{0,1,2,3,4,5,10,11}
B	{3,4,6,7,8}	{5}	∅	{3,4,5,6,7,8}
C	{0,6,10,11}	{1,2,9}	∅	{0,1,2,6,9,10,11}

In his discussion of the intervallic structure of the sets of this movement, Wittlich identifies trichord and tetrachord sets that are also present in the previous two movements. In particular he identifies trichords 3-3 and 3-4, and tetrachords 4-2 (0124) and 4-7 (0145), that occur twice, and 4-4 (0125) and 4-5 (0126) that appear only once. He identifies the prominent segmentation of 4-4 in the cello in the middle section from measures 3-5 as the only occurrence of this set class.

Wittlich misses two important segmentations of 4-4 in the first section of the piece. The first appears as the first four pitches, not including the trill, of the cello, {3, 0, 11, 10} listed in order of occurrence from m. 1-4. This opening gesture in the cello is similar to the gesture in the right hand of the piano that starts the middle section. These 4-4s are related to each other by inversion, T_6I. The second 4-4 occurs in measure 2 with the chord in the piano and the pitch C in the cello. This vertical sonority is created by two successive events and should have been identified.

According to Wittlich, the pitch materials actually divide the piece into two parts with pitch class 7 serving as a kind of pivot in measure 5. With the exception of pitch classes 7, 8, and 9, each pitch class appears once in each half. Pitch class 9 is excluded from the first half, while pitch class 8 is excluded from the second half. It seems that

Wittlich seeks to describe how the chromatic collection unfolds in this piece, but his discussion of the pitch materials goes against the formal structure that he described as three distinct sections—A B C.

Wittlich's analysis of Op. 11 focuses on using appearances of the total chromatic collection to reinforce the "sound events" that delineate the form, and cataloguing of set classes for interval class comparison. Recall that in the opening movement the "sound events" A, B and C, D of sections I and II combine to create the aggregate. Sections III and IV do not create the aggregate. In the middle movement the "sound events" A, B and C, D of the first two sections also create the aggregate but event D already contains all twelve pitch classes itself. No aggregate is formed in the final section of the piece. In the third movement no aggregates are formed within sections and in fact it would take all three sections combined to form the total chromatic collection. Wittlich does not explain the significance of having formed the aggregate of unordered pitch classes or having *not* formed the aggregate in a given section. Even though I think his description of creating an aggregate with events C, D in section II of the second movement is forced to create an analogy with the first movement, his notion of pitch class content within sections can be applied to my understanding of the large-scale form of the entire work.

Wittlich describes the first two section pairs of the opening and middle movements of Op. 11 as analogous because each pair of sections (A+B and C+D) forms the aggregate, while the remaining sections do not. In the final movement no individual section forms the aggregate. Although Wittlich does not go so far as to say so, he seems to imply that the final movement is being set off as something different while movements

one and two are more similar because their respective sections I and II form the aggregate, albeit in different ways. If we label the large-scale form with letters, Op. 11 may best be described as an A A′ B. This designation corresponds to my understanding of the work.

I believe movements one and two are best described as the binary form A A′ resulting from different unifying processes and the final movement is best described as the three-part form A A′ B. The third movement presents in miniature the large-scale form of the entire work— A A′ B.

Wittlich's comparison of the interval classes of various sets within and between sections, does little more than provide a catalogue and tally of frequently used sets. Apart from identifying how similar the sets are in terms of interval class and how certain sets are more characteristic of certain sections, Wittlich does not explain how the sets create coherence across the work. Despite some of the weaknesses in Wittlich's analysis of Op. 11, his analysis provides historical perspective: an early attempt to employ pitch-class set theory to the atonal music of Webern.

Allen Forte is another scholar who discusses Op. 11 in its entirety, in his 1998 book *The Atonal Music of Anton Webern*. Forte's approach to Webern's atonal music is primarily pitch oriented but he also discusses other facets of the music like rhythm, timbre, form, register, as well as biographical information. His analytic readings provide a valuable resource that gives one perspective on how various works cohere. Forte believes that Webern's music before Op. 17 is principally organized by one harmonic language: that is derived from the octatonic scale. The octatonic collection serves as a

master superset to which all of Webern's harmonies and motives belong, causing synchronic coherence. But Forte does not suggest that the octatonic design is involved in a diachronic process across the work. Forte adopts Pieter van den Toorn's classification of the different versions of the octatonic scale built on pitch classes 1 (C♯), 2 (D), and 3 (D♯), called Collections I, II and III.[15] I, too, will use this classification, hereafter called CI, CII and CIII, when discussing Forte's analyses. Focusing on form and the octatonic design, I will examine Forte's analysis of Op. 11 and offer comments on the effectiveness of this approach as well as highlighting any discrepancies between my and his analysis of Op. 11.

Forte leaves his discussion of the opening movement of Op. 11 for the end of the analysis.[16] Forte divides this movement into 3 sections. The first section, A, extends from measures 1-3, ending with the B♭ in the cello; the second, B, from measures 3-7, starting with the F♯ in the piano, and the third and final section, C, from measures 8-9. For him, these sections are set off by rests and the initiations of the last two sections recall elements from measure 1. I would argue that the form can be described as a binary form—A and A′, based on a process involving pairs of Z-related hexachords intersecting

[15] The three octatonic collections can also be referred to by the numerically lowest pitch-class semitone. CI corresponds then to $OCT_{1,2}$, CII to $OCT_{2,3}$, and CIII to $OCT_{0,1}$. (See Straus (2004) for additional information.)

[16] In my experience, the first movement is the most elusive of the three movements. Examining the other two movements first helped inform the analysis of the opening movement. According to Forte, he leaves the analysis of the first movement to the end because this movement seems to receive the most attention of the work.

with set class 4-18 (0147) that creates a shape to provide coherence to the movement, and also on motivic variation that helps project the form. (Please refer to Example 17 on page 74 of my analysis.)

The beginning of an octatonic collection or the end of a subset of a particular collection corresponds to Forte's understanding of the formal division, for the most part. For example, the hexachord 6-Z13 (013467) of CI is completed at the end of the A section and the pentad 5-28 (02368) of CII is initiated at the beginning of the B section.[17] However, between sections B and C there is an overlap of 6-30 of CII and 7-31 of CI on pitch class 2 in measure 8. This pitch, D, initiates the start of the final section. In general, for this movement and for the remaining two movements, I contend that the octatonic progression has little to do with highlighting the form: in fact, the octatonic collections seem to blur the formal sections. When the proposed formal structure of a piece is not or cannot be supported by the primary unifying parameter, the octatonic collection in this case, the analysis is weakened. It seems that Forte is primarily concerned with fitting the pitch material into the octatonic scale, with form, rhythm, timbre, and register being secondary interests.

Forte encounters a problem accounting for pitch class 9, in measure 5 in the right hand of the piano. (Refer forward to Example 2 on page 31 for the score.) The chord sounding with the cello's pitch B in measure 5 creates the highly chromatic hexachord 6-Z3 (012356) that cannot be explained in terms of an octatonic collection. But because the linear pentad, 5-10 (01346) of CI minus the problematic pitch class 9, initiates a

[17] Forte does not explicitly indicate that octatonic subsets help to highlight the form.

complete instance of the octatonic CI, 8-28, Forte chooses to file the errant pitch class 9 under "unexplained pitch constituents."[18] Forte does not offer a reason pitch class 9 may have been included as part of the sonority or a suggestion about its purpose in the overall scheme of the piece. We will discover that this is not the only time Forte has trouble fitting the pitch material into the octatonic design. Forte is able to connect all other pitch material to some version of the octatonic collection. He does pick and choose however, to overlap pitches from different versions of the collection or leave out successive pitches if they do not fit.

Now, to Forte's analysis of Op. 11, movement two. In this movement, rhythm and ensemble play important roles in determining its formal structure, according to him. Section A extends from measure 1 to 5, section B from measure 6 to 9 and contains longer durations, and section C from measure 10 to 13 with a return to shorter durations. Sections A and C are similar because each section begins with both instruments playing simultaneously followed by the piano and cello exchanging short phrases. The middle section however, has a slow melodic phrase in the cello that extends the entire section. Forte's description of the form stands in contrast to my understanding of the formal structure. I believe that the middle movement is best described as A A′, a binary form based on the unfolding of the harmonic materials and motivic development. (See Example 15 on page 67 of my analysis).

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[18] Allen Forte, *The Atonal Music of Anton Webern*, (New Haven: Yale University Press, 1998), 249.

In this movement, despite his efforts to connect all pitch material to the octatonic scale, Forte cannot reconcile all the pitch classes. In measures 2 and 3, two sets, 6-Z44 (012569) and 6-20 (014589) (atonal sets common to both Schoenberg and Webern) cannot be explained in terms of the octatonic scale. (Refer forward to Example 3 on page 38 for the score.) Forte simply describes this as an interference in the octatonic continuity, but offers no explanation of what role these two sets play in the movement. I identify one other 6-Z44 comprised of the total pitch class content of measure 10. Forte does not identify this collection this way. He instead explains the pitch classes in measure 10 as belonging to either CII or CIII: pitch classes {11, 2, 5, 9} belong to CII and pitch classes 10 and 6 belong to CIII. While it is possible to fit much of the pitch material into an octatonic structure, many times pitch classes, in linear succession, are skipped over or serve as an overlap to another version of the scale. The unfolding of the octatonic collections does not highlight the formal structure of the piece. Forte's approach of picking out pitch classes to fit the model without respect to how they fit in to melodic or rhythmic motives or even the discussion of the form reveals a weakness in his analysis.

Forte divides the final movement into three sections; with the first section extending from measure 1 to the middle of measure 3, and the middle section beginning in measure 3 with the F♯ in the piano. (Refer forward to Example 4 on page 39 for the score). However, the end of this middle section is where Forte is unclear about the formal divisions of both the middle and final sections. He first suggests that the middle section ends in measure 6 but then in the next paragraph suggests that "bars 5-6 would be a convincing and conclusive cadence were it not for the entrance of the Cello on f^{1} in the

second half of bar 5, which follows directly upon e♭ in [the] Piano."[19] This position is not clarified by indicating an alternative ending or by explicitly saying where the final section starts. If we are to take his first assertion that the middle section ends in measure 6, then Forte's formal divisions of the piece correspond to my reading of the sections designated A A′ B.

In this movement, Forte is able to link all pitch classes to the three forms of the octatonic scale, CI, CII, and CIII. The ordering of the pitch classes is not a concern when looking for a complete version of 8-28 (013467910), although segments of the octatonic scale are located together. For example, in measures 2 and 3, pitch classes {1, 2, 5, 10, 11} in the piano and cello create a subset of CI, 5-16 (01347). However, the completion of the complete CI collection does not occur until measure 5 with pitch class 4 in the left hand of the piano. In order to complete CI, Forte must skip over the pitch class 6 that occurs immediately following the 5-16 pentad identified above. Pitch class 3, which occurs simultaneously with the E to complete CI in measure 5, does not belong to the CI collection and must also be ignored. In some cases Forte must use the same pitch class for two versions of the octatonic collection. While Forte is able to connect the octatonic threads, the completion of the versions of the octatonic collection do not correspond to his formal sections and he does not take into account how the collections unfold across the piece.

[19] Forte (1998), 244.

Forte's assertion that Webern's atonal music is based on 'octatonicism', offers a different interpretation that I do. I have found very little evidence to suggest octatonicism was part of Webern's (or even his teacher, Schoenberg's) compositional repertoire and my understanding of his music suggests Webern's harmonic language is more closely connected to set classes 3-3 (014) and 3-4 (015) and their supersets.

I believe that the octatonic threads that Forte identifies actually arise from combining versions of the trichord 3-3 (014) in different ways. For example, if we focus on octatonicism alone, then set class 4-3 (0134), a subset of the octatonic collection, has the characteristic alternating half- and whole-step pattern as shown in its prime form. However, set class 4-3 (0134) can also be characterized as two overlapping but non-adjacent 3-3 (014) trichords—{0, 1, 4} and its inversion {0, 3, 4}. I show in my analysis of Op. 11 that it is not octatonicism that is the unifying structure for the work, but rather the interaction of set classes 3-3 (014) and 3-4 (015) and their supersets that creates coherence within each movement and across the work. I will now move on to the most recent scholar to discuss of Op. 11 as an entire work.

Philip Lambert's analysis of *Three Short Pieces*, Op. 11, published in the 2000 article "On Contextual Transformations," is inspired by David Lewin's concept of contextual transformations. Lambert focuses primarily on pitch symmetry and transformations of set class 4-7 (0145) to describe his understanding of the work. He believes there is a musical progression involving structural 4-7 tetrachords that unfolds across the work to connect all three movements together. This idea of progression across a work parallels my belief that some diachronic process creates coherence of the whole.

Despite sharing a similar view to mine of how coherence may be expressed in Webern's atonal music, Lambert's analysis of Op. 11 is not totally persuasive because he leaves out pitch material that does not fit his methodology. Also, some of his segmentations that give rise to 'important' 4-7 tetrachords are dubious. The following examines Lambert's analysis of Op. 11 with additional comments about the effectiveness of his approach.

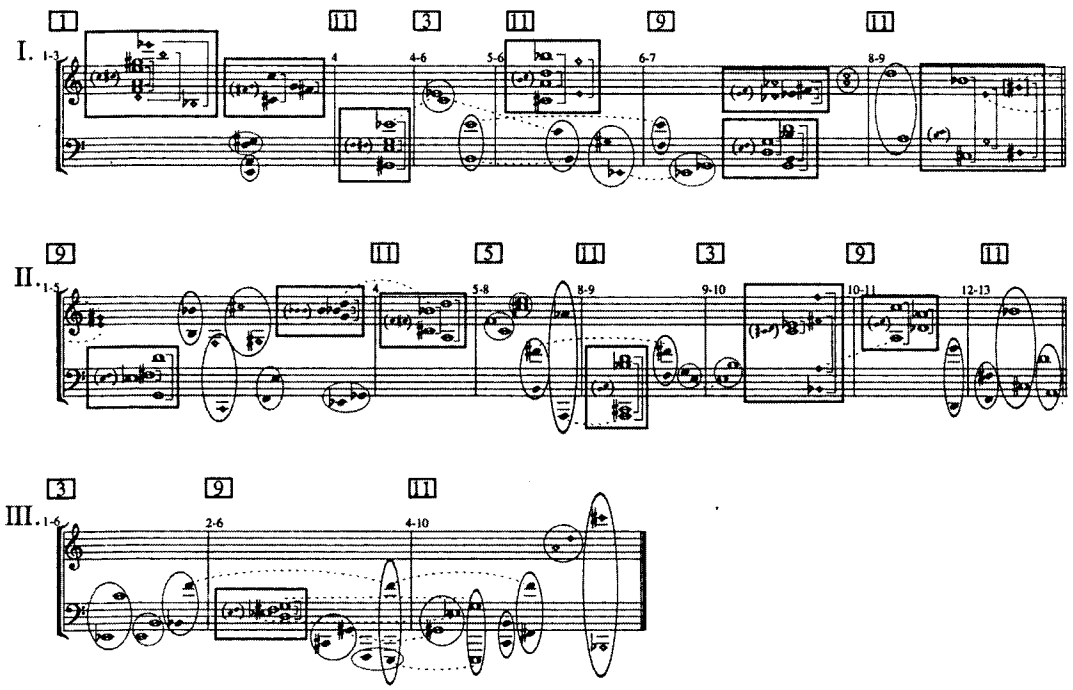
Lambert believes that the primary compositional strategies throughout Op. 11 involve the tetrachord 4-7 (0145) represented by the dyads F4—A4 and E5—G♯5 (which are pitch symmetrical around C5/C♯5). This form of 4-7 interacts with other pitches that have the same or similar p-space symmetries. In the first movement Lambert highlights a prominent 4-7 (0145) in measure 1 in the piano with pitch classes {4, 5, 8, 9}. (Refer forward to Example 2).

Lambert describes the structural continuity and coherence of Op. 11 as "the occurrence, recurrence, and association of primary tetrachords and their attendant constellations [that] create an overall transformational narrative."[20] The structural progression involves a p-space-inversionally-symmetrical occurrence of set class 4-7 (0145) that establishes the index number for a particular section. Other dyads then project the same index number by forming groups with the same pitch axis as 4-7 or by forming other four-note groups to surround the interval class 6 pitch axis. These four-note groups may also occur as separate entities that do not play a role in pitch symmetry. A prevailing

[20] Philip Lambert, "On Contextual Transformations," *PNM* 38/1 (2000), 66. By 'constellation' Lambert means the relationship of inversional pairings that all sum to the same index number. The index number in a pitch or pitch class symmetrical collection is the number that results when the pitch class integers of each of the symmetrical dyads in the collection are added.

index number for a given section is called an *index zone*. Lambert wants to show that there is a progression from one index zone to another and transformational relationships within and between index zones.

EXAMPLE 1: Reproduction of Lambert's Example 12



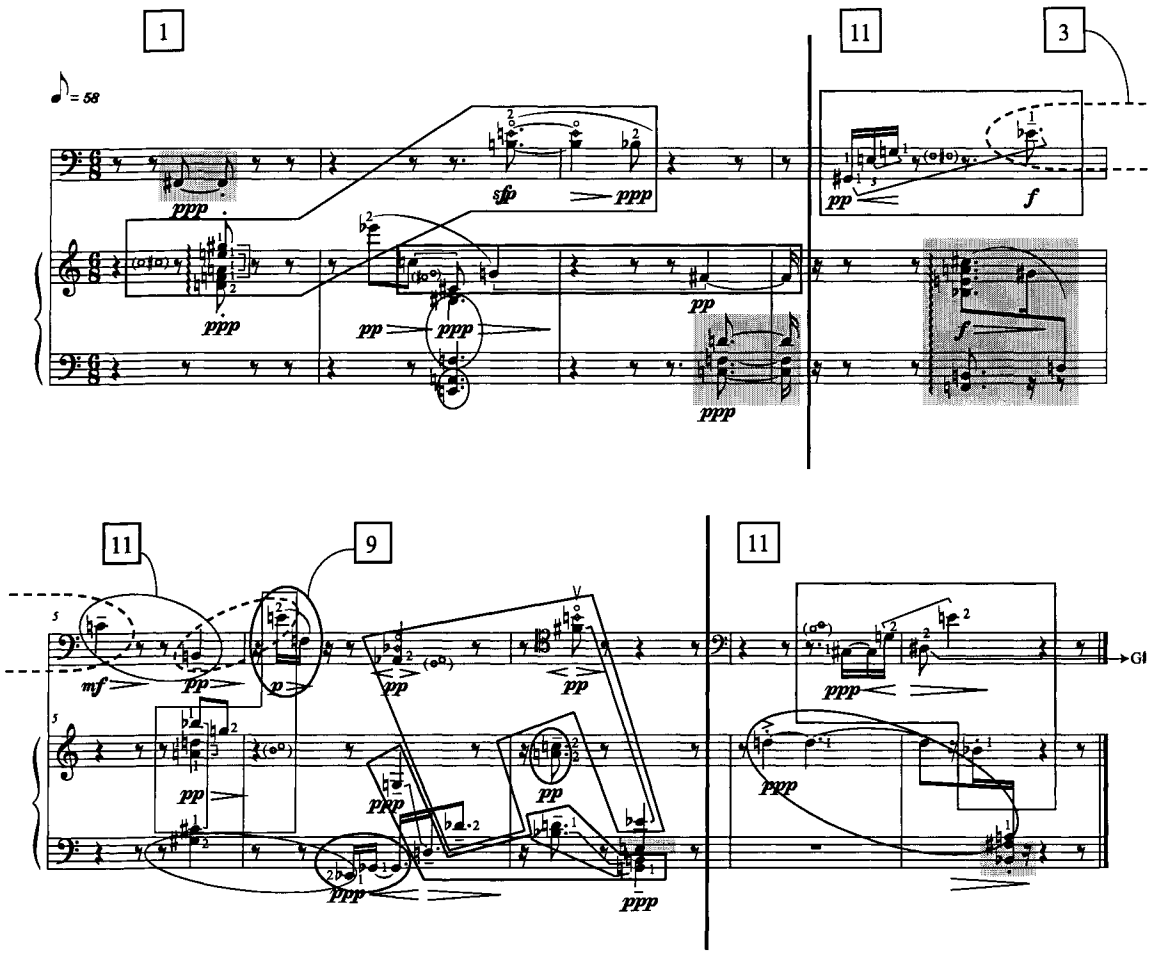
EXAMPLE 12: SUMMARY OF THE STRUCTURE OF OP. 11

Used by permission of *Perspectives of New Music* and Philip Lambert

Lambert provides a chart that summarizes the appearances of set class 4-7 (0145), p-space symmetries, inversional pairings, and index zones of Op. 11 as his Example 12. It is reproduced here as Example 1. At first glance, a pattern of index zones emerges across the work. Index zones 3, 9, and 11 recur in different combinations with all three

movements ending with index zones 9 and 11. In fact, the last three index zones of movement two—3, 9, and 11 (measures 9-13) are repeated as the total index zone content of the final movement.

EXAMPLE 2: Superimposed version of Lambert's Example 12 on Op. 11/1



Lambert's reduction of the pitch material of Op. 11 shown in his Example 12 is shown to be misleading when we consider how his example relates to the actual music. First, simultaneous or overlapping musical events are presented sequentially in the chart.

Second, Lambert does not include the total pitch content of Op. 11. Parts of the music are left unaccounted for because they are not involved in p-space symmetry or they do not belong to set class 4-7 (0145).

Example 2 superimposes Lambert's Example 12 chart on the score of Op. 11/1 to examine some inconsistencies and problems with segmentations of 4-7 (0145). The numbers in boxes represent the prevailing index number for that section. Circled dyads have the same index number as the rest of the zone but do not participate in symmetry. With respect to designating the start or end of a zone I will use a thick vertical line. (As we will see, in some areas it is impossible to create a separate index zone.) Large boxes surround tetrachords that project p-space symmetry surrounding a given axis. The axis is represented as small open noteheads in parentheses. Instances of set class 4-7 are highlighted with the numbers 1 or 2. The first occurrence of a 4-7 tetrachord is labelled with number 1 and the second occurrence with number 2. Pitches that Lambert does not include are enclosed in shaded grey boxes.

In measure one, Lambert segments set class 4-7 (0145) as the top four notes of the chord in the piano as well as highlighting the dyads F—A and E—G♯ (that constitute the 4-7). These dyads are symmetrical about the C/C♯ axis. The second instance of 4-7 occurs with pitch class 2 (the bottom note of the piano chord), pitch class 3 (the highest note in the piano in measure 2), and pitch classes 11 and 10 in the cello in measures 2 and 3. The resulting dyads D—B and E♭—B♭ also share the same p-space axis around C/C♯. While this may be true, the segmentation of the second instance of 4-7 (0145) is suspect. This second segmentation of 4-7 shown in Example 6 extends three measures and skips over

pitch classes {0, 1, 4, 5, 7, 8, 9} in the piano in measure two to choose the harmonic B and B♭ in the cello. His segmentation of 4-7 is convoluted and not confirmed by register, rhythm, or position to warrant such a grouping. It seems that Lambert is picking out pitch classes to match the first, more salient, 4-7. Lambert could have just as easily chosen pitch classes {0, 1, 4, 5} from measure two in the piano, or even better, the bottom four notes of the chord in the piano {4, 5, 8, 9} which would be more like his opening 4-7 in measure 1. However, neither of these groupings have the p-space symmetry he desires. Lambert does highlight the dyads E—A and F—G♯ in measure 2 as having the same index number as the prevailing index zone, but they do not participate in pitch symmetry. However, he does not group all four notes as another instance of 4-7 (0145).

The first three measures plus the downbeat of measure 4 constitute index zone 1. Lambert does not suggest that index zones participate in determining the formal structure of the movement. In this zone, Lambert does not account for the F♯ in the cello in measure 1 or the chord in the piano at the end of measure 3 in his analysis. He acknowledges that some pitches are left out but does not offer an explanation for their existence in the music. Leaving out pitches that do not fit the analytic model reminds me of Forte's analysis of Op. 11 where he filed notes that didn't fit the octatonic design under "unexplained pitches."[21] In fact, in the first movement alone, Lambert does not account for 10 additional notes. Following the chord in measure 3, Lambert skips over the entire piano part in measure 4, does not account for the pitch E on beat 2 of measure 7

[21] The "unexplained pitches" that Forte can't account for are limited to one or two pitches while Lambert has many more pitches he does not explain.

in the piano, and finally leaves out the B♭ and F♯ in the piano in measure 9. Offering no explanation for these 14 pitches (more than 20% of the total pitch content of the movement) weakens his analysis. While not every pitch can participate in creating a 4-7 tetrachord or have similar p-space symmetry, there must be some compositional reason for their presence in this piece, and Lambert does not go far enough to suggest their importance.

The second index zone begins with the cello gesture in measure 4. In fact, this zone overlaps with *three* additional index zones. The second zone, index 11, contains the 4-note gesture in the cello in measure four. The next zone, index zone 3, contains two dyads that create set class 4-7 but do not participate in p-space symmetry. The first dyad in index zone 3 (E♭ and C) overlaps with the preceding index zone 11 in one pitch—E♭ in measure 4. The second dyad (B and E) overlaps with the following index zone 11 in measures 5-6 as well as overlapping index zone 9 (m. 6) in one pitch—E. This overlapping of index zones is not obvious from Lambert's Example 12. Lambert suggests that it is the progression from one zone to another that helps create continuity and coherence. He says, "The symmetries and zones I have described represent areas of significant transformational consistency, if not utter uniformity, through which the music can be thought to move."[22] However, the index zones from measures 4-6 are not sequential and may suggest a kind of synchronic coherence rather than the diachronic progression that Lambert proposes in his paper.

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[22] Lambert (2000), 70.

Lambert admits that some of the notes he pairs together are not always temporally proximate or as clear as they could be, but he justifies his unusual pairings of dyads into tetrachords in two ways: first, the fact that two dyads have the same index number supports his segmentations even when other musical parameters suggest something different, and second, that the emphasis should be on how his note pairings combine to form 4-7 rather than the dyads themselves. Toward that end, Lambert does something unusual at the end of movement one; he *implies* a note that he needs to create a 4-7 tetrachord. He points out that the last three cello notes, pitch classes 3, 4, and 7 form set class 3-3 (014), and suggests that this trichord connects to the top two notes of the piano chord in the first measure of movement *two* with pitch classes 4 and 8. Pitch class 4 in the piano, overlaps with pitch class 4 from the cello, and the addition of pitch class 8 to the cello trichord does create the 4-7 tetrachord. Lambert wants to show a connection across the work. This reading would be more convincing if the note required to create 4-7 appeared as a single note in the cello, or even as a single note in the piano at the beginning of the middle movement. Instead, the cello plays the *ppp* melodic gesture creating set class 3-3 (014) in measures 8-9 in movement one, followed by a chord in the piano to end the movement (which essentially interrupts the connection of the cello trichord to the start of the second movement). The second movement begins with a *forte* chord in the piano. Pitch class 8 that Lambert uses to create the 4-7 sonority is not temporally proximate to pitch classes {3, 4, 7} in the cello. Further, isolating two pitches (E and G♯) from the chord of the piano of the next movement is an aural stretch. Lambert's addition of a pitch to create a link between movements and his omission of

pitches that do not fit his model both suggests that his analysis is incomplete and raises questions about the validity of his segmentations of 4-7 (0145) as well as their salience.

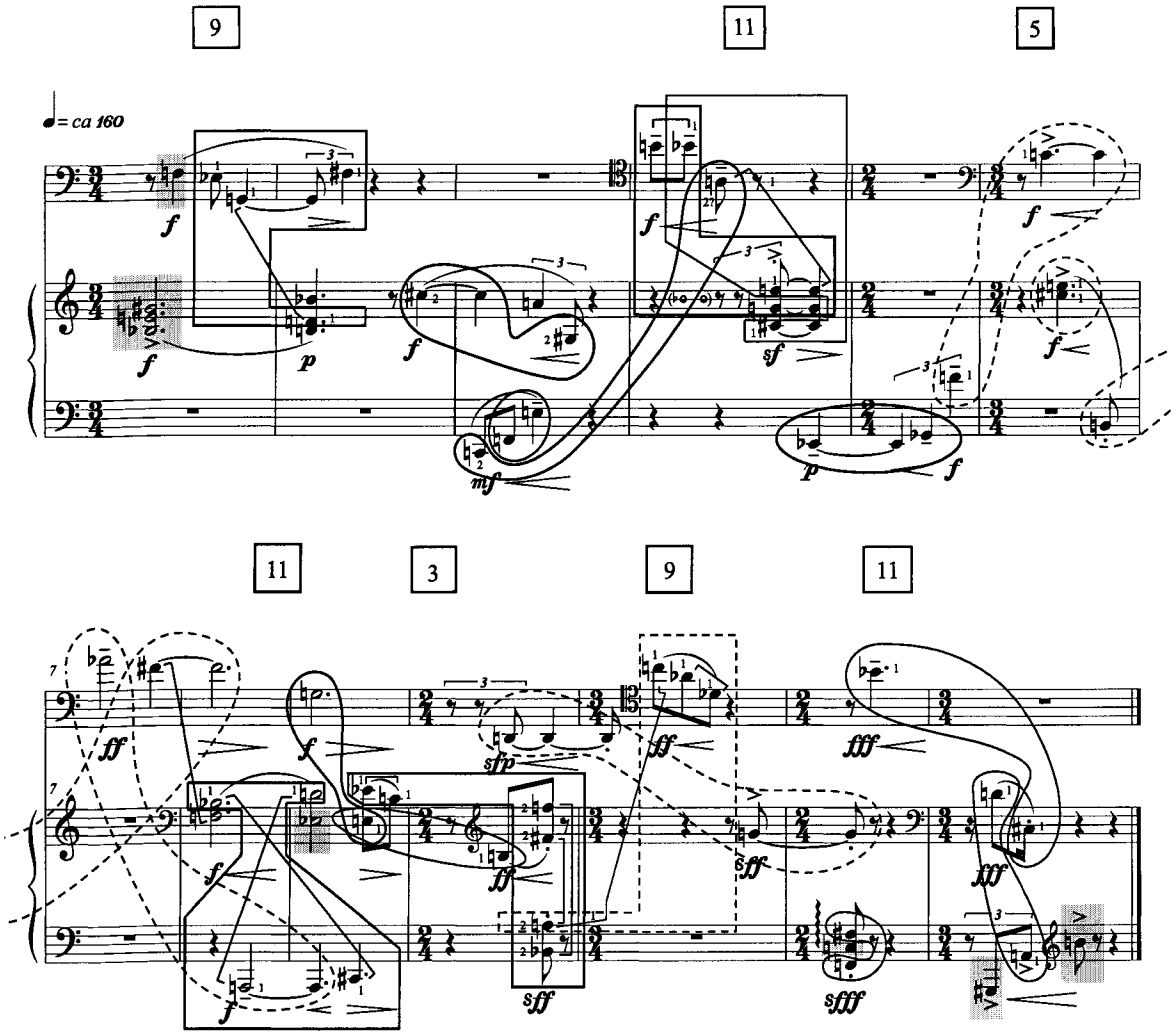
Lambert's analysis of movement two (refer forward to Example 3) contains some of the same problems as his reading of movement one, plus one new error. The segmentations of 4-7 (0145) are more salient in this movement than in the first movement; however, there are two segmentations of 4-7 that seem to be chosen to 'fit the model'. In measures 2 and 3 Lambert highlights what is supposed to be the second instance of 4-7 (0145); however, in his Example 12 he inserts a pitch G3 that participates in forming the "4-7" tetrachord along with the pitches C2, C♯5, and G♯3 in diamond-shaped noteheads. These pitch classes {0, 1, 7, 8} actually form set class 4-8 (0156), not 4-7 (0145). I believe that the pitch classes he intended are {0, 1, 8, 9}, which do create set class 4-7. However, if there is a typographical error in his Example 12, that should have A3 instead of G3, there is an additional problem; the pitch A that is required to create set class 4-7, appears an octave higher (A4) in the right hand of the piano in measure 3. But if we go by his representation of the register of pitch A, Lambert seems to choose a less temporally proximate pitch A in the cello in measure 4. This A3 matches his diagram. I'm not sure why Lambert did not choose pitch class 9 in measure 3 for the 4-7 segmentation. The dyads C♯—G♯ and C—A could be highlighted because they contain the same index number, and create pitch-class symmetry around B♭/B but do not participate in pitch symmetry. But if Lambert did intend dyads C♯—G♯ and C—G to be highlighted, it could be because each dyad has pitch symmetry but around different axes. These four pitch classes have pitch-class symmetry but form set class 4-8 (0156), not

4-7 (0145). For some reason he ignores the pitch-class symmetry with the 4-7 tetrachord that is actually there in favor of the pitch symmetry of the dyads C♯—G♯ and C—G.

There is one prominent 4-7 tetrachord that Lambert excludes altogether, even though the four notes are successive and the dyads have the same index number. In measure 7, a 4-7 (0145) tetrachord begins on the F♯ in the cello, which is followed by F and B♭ in measure 8 in the piano, and then followed by the low A in the left hand of the piano. These four pitches essentially form a 4-7 chord and can be divided into two dyads A—F♯ and B♭—F♮. These dyads have the same index number (3) but do not participate in pitch symmetry.

The index zones in movement two are less complex than in movement one. See Example 3. However, there is some overlapping of zones that obscures the progression across the piece. For example, index zone 9 extends from measures 1 to 5 and the second zone, index zone 11, is completely contained within measure 4 and overlaps pitch classes between zones. Both index zones 9 and 11 share pitch class 10 in the cello and pitch class 2 in the piano. Further, the first zone actually finishes *after* the second zone. Lambert's Example 12 suggests there is a sequential progression, but the musical context shows that the movement from zone to zone is less straightforward.

EXAMPLE 3: Superimposed version of Lambert's Example 12 on Op.11/2

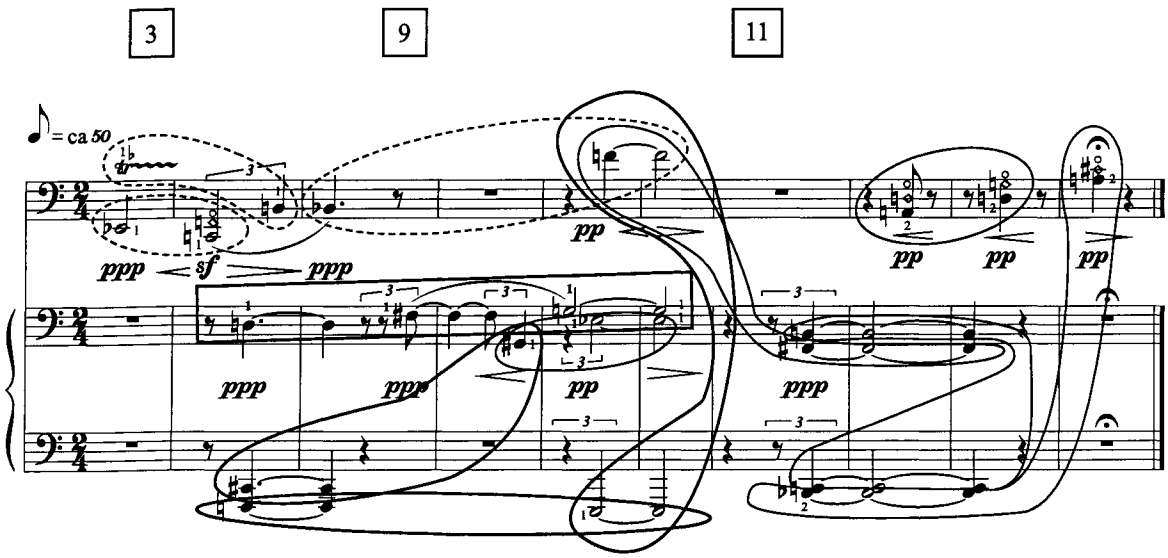


There are several pitches that are left unaccounted for in the music. These pitches are highlighted in shaded grey boxes in Example 3. In measure one Lambert excludes the chord in the piano and the first pitch in the cello from his analysis of movement two. (You may recall that the pitches E and G♯ were taken from this movement to complete a 4-7 tetrachord at the end of the first movement so I believe this in part explains why he

does not include them here.) Lambert also excludes the E♭ in the piano in measure 9, the C in the piano in measure 12, and pitches G♯ (the lowest note of the piece) and B (the last note of the piece) in measure 13. Just as in movement one, Lambert does not offer an explanation for the pitches that do not participate in p-space symmetry or belong as part of a 4-7 tetrachord. The omission of pitches without explanation, the misidentification of a 4-7 (0145) tetrachord, overlapping index zones that obscure the progression, and the missed prominent 4-7 that contains dyads with the same index numbers all lessen the strength of Lambert's analysis.

In his analysis of the final movement, Lambert accounts for all pitches (unlike the first two movements) and identifies four segmentations of 4-7 (0145). See Example 4.

EXAMPLE 4: Superimposed version of Lambert's Example 12 on Op. 11/3



The first four notes in the cello, including the trill, create the initial 4-7. The second occurrence is a registrally significant segmentation of 4-7 in the right hand of the piano

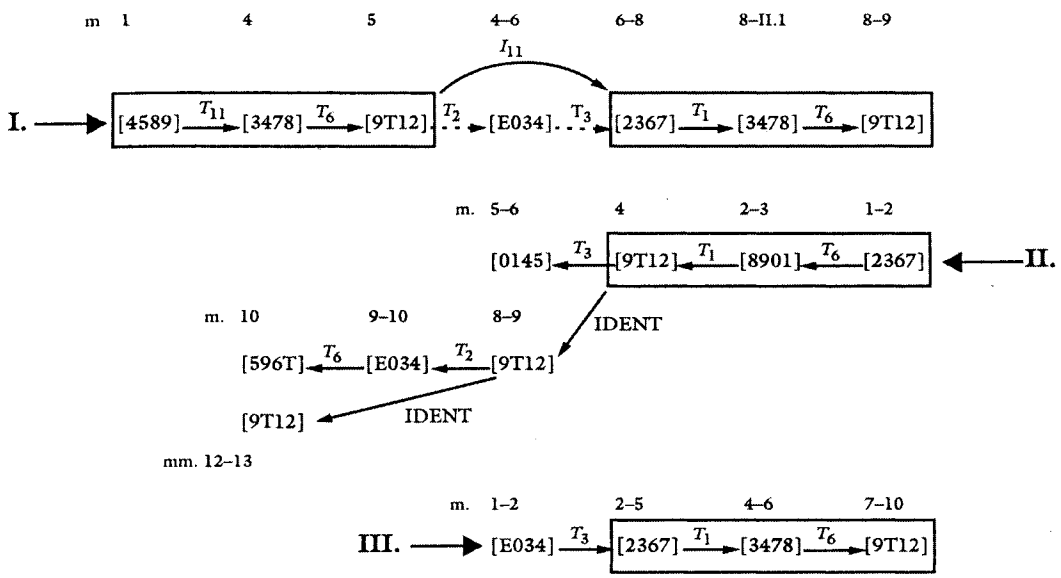
from measures 2-6 with pitch classes {2, 3, 6, 7}. The next 4-7 occurs in measures 4-6 with pitch classes {3, 4, 7, 8} and overlaps the previous 4-7 tetrachord in two pitch classes—3 and 7. To this point, Lambert's segmentations are salient ones, but the final occurrence of 4-7 extends from measures 7-10 and is the least clear of all the 4-7 tetrachords. Lambert isolates the B♭ from the chord in the piano in measures 7-9 and combines the final gesture in the cello to create set class 4-7 (0145) with pitch classes 9, 2, and 1. The attacks of each of these pitch classes are successive but registrally the B♭ in the piano is three or four octaves lower than the harmonics in the cello. This combination of pitch classes {1, 2, 9, 10} certainly forms set class 4-7, but Lambert's segmentation seems driven by his analytic construct (although it could also be justified by asserting that these pitches are registral extremes).

Lambert presents the index zones 3, 9, and 11 successively in his Example 12. If we examine the musical context of the index zones we discover that index zone 3 lies on top of, rather than next to, index zone 9 and they overlap in one pitch, F, in measure 5. The start of index zone 11 also overlaps not only index zones 3 and 9 in the same pitch but index zone 9 in pitch classes 8 and 3 in measures 4-5 in the piano. Index zones 3 and 9 happen simultaneously, not successively, and consequently this raises questions about how a progression can move from one zone to the next when two distinct index zones occur at the same time.

Lambert's Example 12 (shown as Example 1) summarizes the tetrachord appearances, p-space symmetries, inversional pairings, and index zones of Op. 11 as we have discussed, but does not include a transformational progression of tetrachords.

Lambert's Example 13, reproduced here as Example 5, unfolds the transformational progression of 4-7 (0145) tetrachords in an effort to show how the entire work is tied together. Lambert's discussion of the transformational networks of 4-7 (0145) is brief and does show a pattern that can be traced through all three movements. His chart of 4-7 transformations does not prioritize tetrachords with p-space symmetry. I will briefly summarize Lambert's findings in Example 13, then I will comment on the transformational network itself.

EXAMPLE 5: Reproduction of Lambert's Example 13



EXAMPLE 13: TRANSFORMATIONAL NETWORKS OF (0145)S IN OP. 11

Used by permission of *Perspectives of New Music* and Philip Lambert

In movement one, three p-space symmetrical 4-7 tetrachords {4, 5, 8, 9} in measure 1, {3, 4, 7, 8} in measure 4, and {9, 10, 1, 2} in measure 5 are connected by T_{11} and T_6 transformations. In measures 6-9, there are three other prominent set class 4-7s.

The first is formed by pitch classes {2, 3, 6, 7} in measures 6-7 that is related to the next 4-7 tetrachord {3, 4, 7, 8} by T_1 from measures 8-9 of movement one and measure 1 of movement two, that is then related to another 4-7 tetrachord {9, 10, 1, 2} by T_6 in measures 8-9. There is an intervening secondary functioning 4-7 tetrachord in measures 4-6 that connects the T_{11}/T_6 transformation in measures 1-5 to the T_1/T_6 transformation from measures 6-9 plus the first measure of movement two. Pitch classes {11, 0, 3, 4} in measures 4-6 are approached by a T_2 from the tetrachord in measure 5 and left by T_3 to connect to the tetrachord in measures 6-8. This transformational pattern creates the following progression across the movement: $T_{11} \rightarrow T_6 \rightarrow T_2 \rightarrow T_3 \rightarrow T_1 \rightarrow T_6$. Lambert then observes that if you take the transformational network from the first movement backwards, it can describe the transformational progression across movement two.[23]

In measures 1-2 of the second movement, pitch classes {2, 3, 6, 7} form the initial 4-7 (0145) that is connected to the next 4-7, pitch classes {8, 9, 0, 1} in measures 2-3 by T_6. This tetrachord is related to the next 4-7, pitch classes {9, 10, 1, 2} in measure 4 by T_1. The tetrachord {9, 10, 1, 2} in measure 4 is related by T_3 to the {0, 1, 4, 5} tetrachord in measures 5-6. It is at this point that the network branches off. Another {9, 10, 1, 2} tetrachord appears in measures 8-9 which is related by T_2 to the following {11, 0, 3, 4} tetrachord in measures 9-10. This {11, 0, 3, 4} tetrachord is related by T_6 to the next 4-7 tetrachord, pitch classes {5, 6, 9, 10}, in measure 10, almost completing the reverse order of the transformational network presented in movement one. This penultimate tetrachord

[23] In effect, he is describing a transformational palindrome that begins at the end of movement one and works backwards and starts at the beginning of movement two and works forwards. ($T_{11} \leftarrow T_6 \leftarrow T_2 \leftarrow T_3 \leftarrow T_1 \leftarrow T_6 \| T_6 \rightarrow T_1 \rightarrow T_3 \rightarrow T_2 \rightarrow T_6 \rightarrow X$)

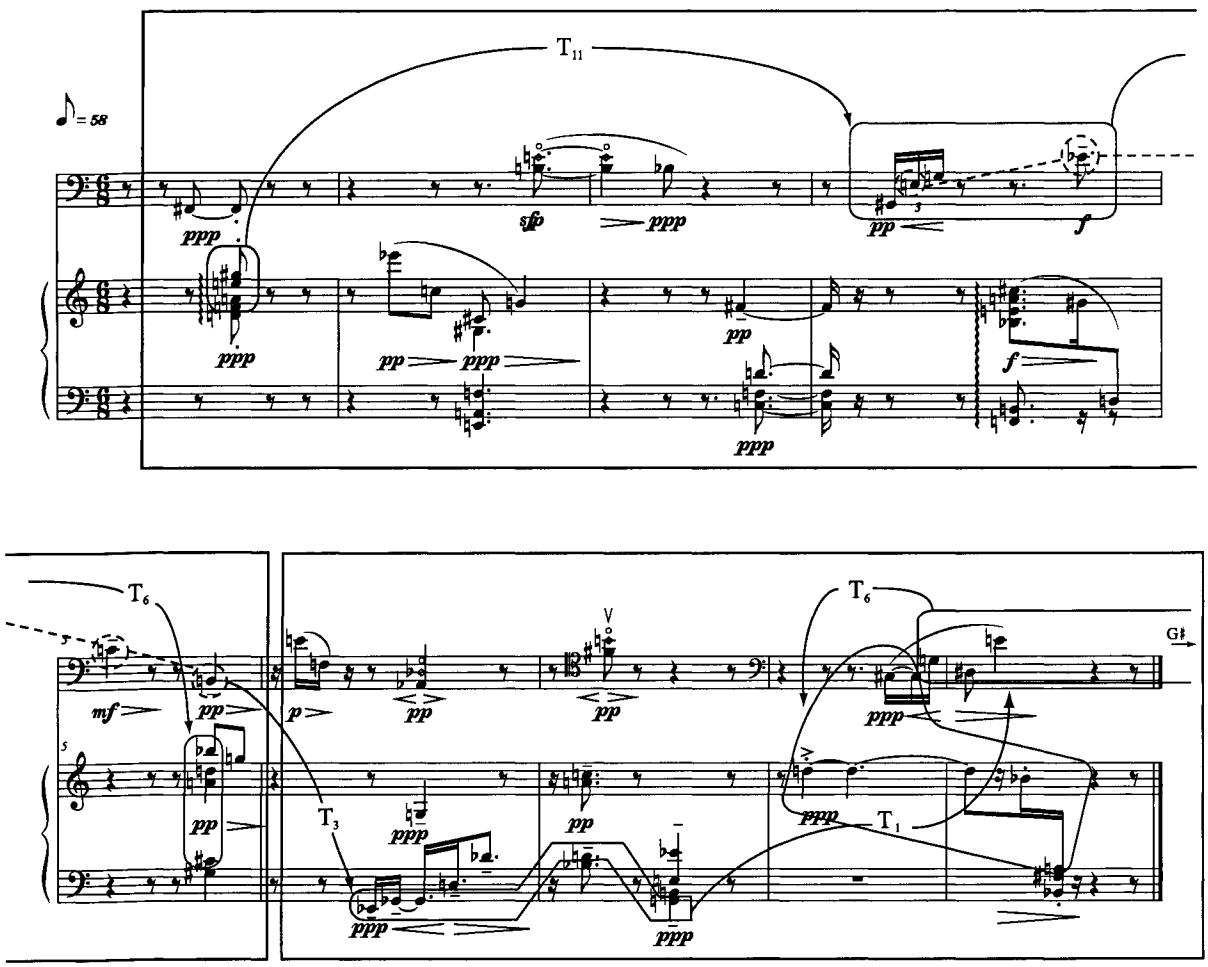
of the movement does not relate to the last tetrachord by T_{11} as expected. Instead another occurrence of pitch classes {9, 10, 1, 2} end the movement from measures 12-13. You will recall that these same pitch classes, {9, 10, 1, 2}, also end the first movement. Lambert suggests that the purpose of this tetrachord is to recall not only the end of the first movement, but also the first block of transformations that ends in measure 5 of movement one.

Lambert describes the final movement as encapsulating the basic transformational progression of the entire work. Pitch classes {11, 0, 3, 4} form the initial 4-7 in measures 1-2 that is related to the next 4-7 tetrachord, pitch classes {2, 3, 6, 7} in measures 2-5, by T_3. This tetrachord is connected to the next tetrachord, pitch classes {3, 4, 7, 8} in measures 4-6 by T_1. The 4-7 tetrachord ends this movement with pitch classes {9, 10, 1, 2} (the same pitch classes that ended the previous two movements) and is related to the penultimate tetrachord by T_6. In fact, the second half of the transformational network first presented in movement one ($T_3 \rightarrow T_1 \rightarrow T_6$) appears in sequential order to span the final movement.

This idea that the final movement summarizes the basic transformational progression parallels my own idea that the final movement condenses the harmonic material into its bare essentials. For Lambert, it is the structural 4-7 (0145) tetrachords and their transformational progression that unify the entire work. However, I focus on the trichords 3-3 (014) and 3-4 (015) (that both happen to be subsets of 4-7) and their supersets that participate in creating coherence across the work. (See my own analysis of Op. 11 later in this Chapter, pages 52-62.)

I have superimposed Lambert's Example 13 on the score as Examples 6, 7, and 8, to examine the transformations of 4-7 (0145) that he highlights across the work. Lambert admits that some tetrachords that are included in his Example 12 are not included in his Example 13 because they are of secondary importance. However, Lambert includes some new 4-7 tetrachords in Example 13 that did not appear in his Example 12. One such example occurs in movement one and involves the 4-7 tetrachord {11, 0, 3, 4} that links the two transformational blocks in movement one together. Refer to Example 6.

EXAMPLE 6: Superimposed version of Lambert's Example 13 on Op. 11/1

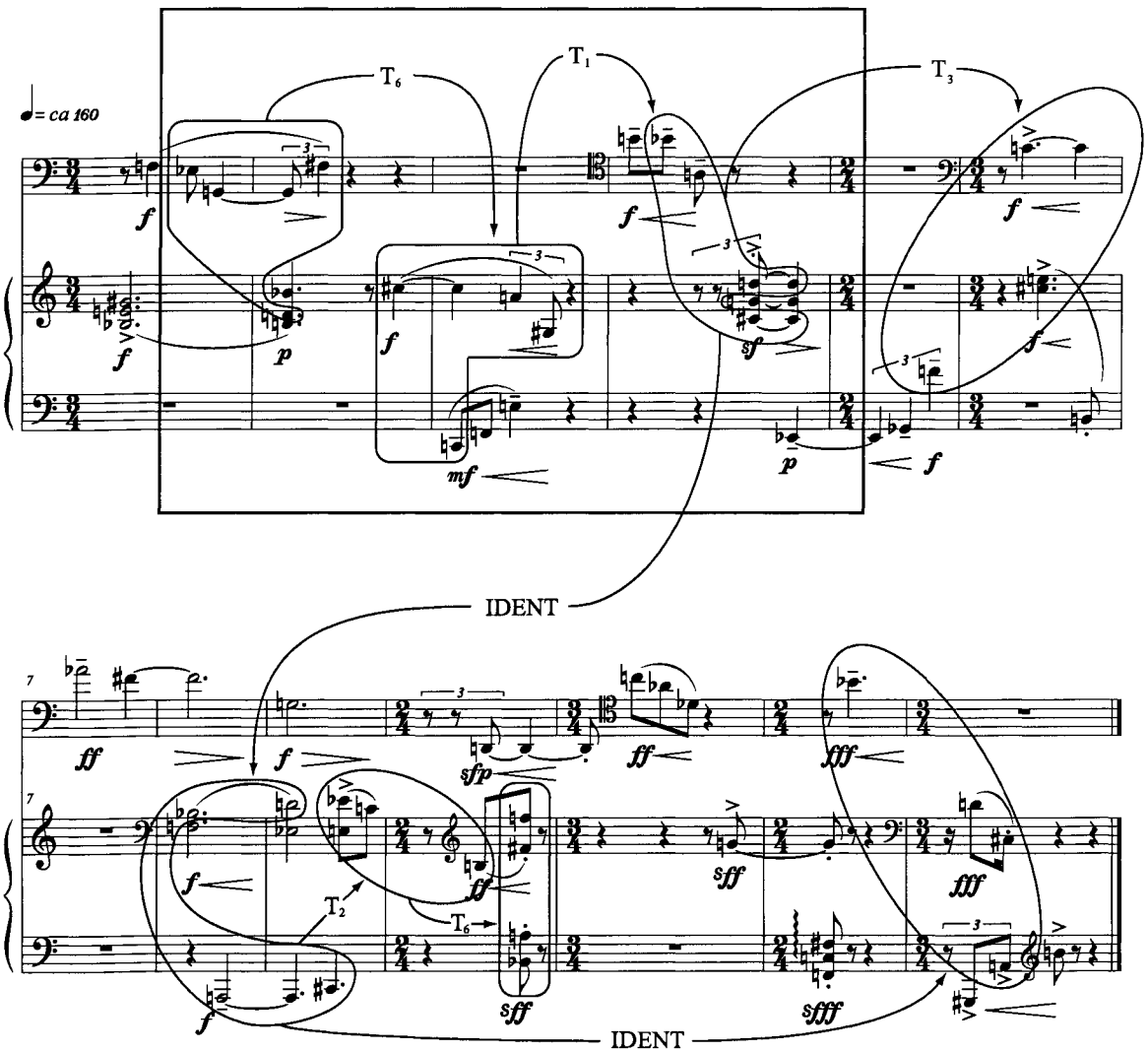


These pitch classes can be found in the cello from measure 4 to 5. Notice that Lambert chooses pitch class 4 from the middle of the sixteenth note triplet in measure 4. This pitch does not hold rhythmic or registral significance with respect to the remaining successive pitch classes to warrant a segmentation like this. In fact, pitch classes 3 and 4 overlap the second 4-7 tetrachord that Lambert identifies (the four note cello gesture in measure 4.) Lambert's analysis needs a way to get from the first block to the next block of transformations, so it makes this {11, 0, 3, 4} tetrachord sequential, which actually happens simultaneously with the T_6 transformation from tetrachord {3, 4, 7, 8} to {9, 10, 1, 2} in measures 4-5. The transformational progression does not always occur in succession, and Lambert's linear charting of transformations obscures this fact.

Lambert admits to a different circumstance in movement one where the 4-7 tetrachord {3, 4, 7, 8} in measures 8-9 plus measure 1 of the next movement moves to the 4-7 tetrachord {9, 10, 1, 2} that actually *precedes* it. To justify this reordering, Lambert focuses on how the 4-7 relationships at the end of the piece reflect a progression that inverts the T_{11}—T_6 from the beginning of the piece to conclude with a T_1—T_6 progression. He does not however, offer an explanation for the lack of chronology mentioned earlier.

Despite some concerns about the segmentation of set class 4-7 (0145) in his Example 13, Lambert's transformational networks for the remaining two movements do show a linear progression across each piece for the most part. Example 7 shows his 4-7 network across movement two. Each 4-7 tetrachord appears in succession across the movement with no overlapping segmentations.

EXAMPLE 7: Superimposed version of Lambert's Example 13 on Op. 11/2

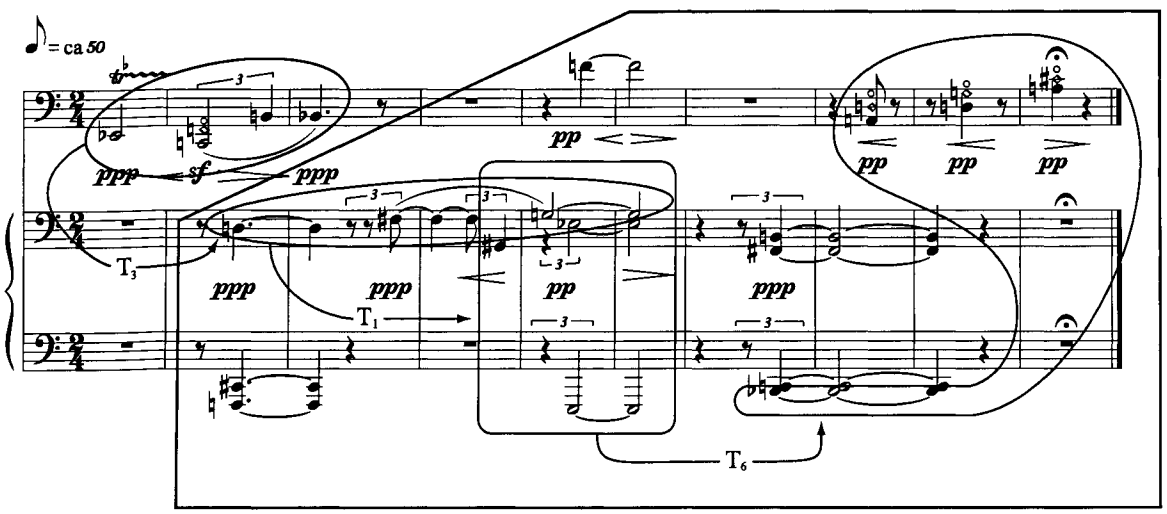


In the final movement, there are some overlapping pitch classes between the second and third 4-7 tetrachords. Refer to Example 8. The registral segmentation of set class 4-7 (0145) in measures 2-6 with pitch classes {2, 3, 6, 7} overlaps the next 4-7 tetrachord {3, 4, 7, 8} in measures 4-6 in two pitch classes—3 and 7. In fact, this 4-7 tetrachord was not included in Lambert's Example 12. Despite this tetrachord being

essential to his understanding of the transformational network, I suspect that it was excluded from Lambert's Example 12 because it does not have p-space symmetry. Consequently, it was not identified as a structural tetrachord.

The examination of Lambert's Examples 12 and 13 from his analysis of Op. 11 (reproduced previously as Examples 1 and 5) reveals some weaknesses with respect to the overall transformational progression he posits across the work. First, Lambert simply leaves out pitches that do not participate in symmetry or belong to set class 4-7 (0145). Second, some of his segmentations of 4-7 appear to be motivated by the analytic construct rather than relying on the proximity, register, etc. of the pitch classes.

EXAMPLE 8: Superimposed version of Lambert's Example 13 on Op. 11/3



Finally, Lambert's Examples 12 and 13 suggest there is a sequential progression of events when often times index zones or transformational progressions actually occur simultaneously, out of order, or overlap each other in pitch classes in the music.

Further, Lambert does not suggest that the index zones, the transformational progression of 4-7 (0145), or even the 4-7 tetrachords themselves help delineate the formal structure of the work. In fact, he does not address form at all. In my analysis of Op. 11, the processes involved in contributing to coherence also help define the form. Despite these problematic areas, my own understanding of how the work is unified parallels Lambert's. As I mentioned earlier, the idea that the final movement encapsulates or summarizes the transformational progression of set class 4-7 (0145) into its basic form is analogous to my assertion that the final movement condenses or distills the primary harmonic material into its bare essentials—trichords 3-3 (014) and 3-4 (015).

Analysis

In 1914, at the suggestion of his father, Anton Webern undertook the task of writing a piece for cello and piano—a suggestion that Webern wrote about to Schoenberg. "I shall now write a major piece for cello and piano. My father asked me to do it. He likes cello music. For me, however, his wish becomes the occasion to find at last an approach to longer movements again—your idea."[24]

As Webern's remarks suggest, Schoenberg had recommended that he attempt once again to write in a larger form. The "major piece" Webern refers to is the *Cello Sonata.* Webern had sketched out this piece only two weeks prior to writing Schoenberg.

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[24] Hans and Rosaleen Moldenhauer. *Anton von Webern: a Chronicle of his Life and Work,* (New York: Alfred A. Knopf, 1979), 205.

However, Webern stopped composing the *Cello Sonata* to write the *Three Short Pieces for Cello and Piano,* Op. 11. Concerned that Schoenberg would be upset by his failure to produce an extended work, Webern wrote him to explain the digression.

> I am sending you by the same mail a copy of what I last wrote. ...I beg you not to be indignant that it has again become something so short. I should like to tell you how this happened and thereby try to justify myself. I already had the quite distinct conception of a major two-movement composition for cello and piano and began working it out at once. However, when I was fairly far advanced with the first movement, it became more and more compellingly clear to me that I had to write something else. I felt with complete certainty that I would leave something unwritten if I suppress the urge. Thus I broke off the major work, although my progress in it had been smooth, and quickly wrote these small pieces. ...This is how these three pieces originated, and rarely have I felt so certain that something good has come into being.[25]

Published in 1924 by Universal Edition, *Three Short Pieces*, Op. 11 embody the concept of Webern's aphoristic style in its most extreme form. The total playing time of these pieces is only about two minutes; the movements extend nine, thirteen, and ten measures respectively. Despite the sparseness of the melodic line and texture, as well as the minimal pitch material and short duration, and because of the multiplicity of intervallic and rhythmic relationships, the music is not easily apprehended as what turns out to be a unified whole, and in fact, seems to go against the idea of long-range coherence altogether. In a short and ascetic work, Webern creates an intricate network of relationships that is surely not obvious at first hearing.

The most intriguing aspects of the way Webern creates long-range coherence in Op. 11 can be explained through an overarching process that I call 'focusing.' In general, a process of focusing involves musical materials being unclear or only suggested at the

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[25] Moldenhauer (1979), 205-206.

beginning of a piece, then clarified or realized in the middle, and finally focused into their bare essentials by the end. In this case, the significance of the harmonic material is unclear at the beginning, clarified in the middle by the provision of a harmonic context, and then distilled into its essential elements by the end. This process has some elements in common with the concept of 'musical idea' that is usually attributed to Webern's teacher, Arnold Schoenberg.

Throughout his career, Schoenberg's concept of musical idea took on a range of meanings. Schoenberg described musical idea as a unifying framework for tonal composition.

> In its most common meaning, the term idea is used as a synonym for theme, melody, phrase, or motive. I myself consider the totality of a piece as the *idea*: the idea which its creator wanted to present. But because of the lack of better terms I am forced to define the term idea in the following manner: Every tone which is added to a beginning tone makes the meaning of that tone doubtful. If, for instance, G follows after C, the ear may not be sure whether this expresses C major or G major, or even F major or E minor; and the addition of other tones may or may not clarify this problem. In this manner there is produced a state of unrest, of imbalance which grows throughout most of the piece, and is enforced further by similar functions of the rhythm. The method by which balance is restored seems to me the real *idea* of the composition.[26]
>
> [Each composition] raises a question, puts up a problem, which in the course of the piece has to be answered, resolved, carried through. It has to be carried through many contradictory situations; it has to be developed by drawing consequences from what it postulates...and all this might lead to a conclusion, a *pronunciamento*.[27]

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[26] Arnold Schoenberg, "New Music, Outmoded Music, Style and Idea" in *Style and Idea: Selected Writings of Arnold Schoenberg*, (London: Faber and Faber, 1975), 122-123.

[27] Arnold Schoenberg, "My Subject: Beauty and Logic in Music" in commentary to *The Musical Idea*, ed. P. Carpenter and S. Neff, 63.

Schoenberg believed that the principles associated with tonal composition should also be applicable to atonal and serial music. Musical idea, as applied to atonal and serial music, sets up an imbalance or a problem at the beginning of a piece stemming from the opposition of two musical elements that is elaborated throughout the piece and is resolved by the end, not unlike that in a tonal composition.[28] Musical idea, whether expressed in tonal, atonal, or serial music, represents a process that creates overall unity within a piece.

Musical idea, like 'focusing,' is a coherent principle that describes how the succession of musical material follows a process or progression across a piece. But, musical idea is a unifying principle generally limited to within a single piece and does not normally apply to a multi-movement work. It is also important to note that 'focusing' does not involve the resolution of opposing materials as seen in musical idea, but can and does apply to multi-movement works.

The overarching process of 'focusing' can be demonstrated in Op. 11 through a network of subsets and supersets around 6-Z19 (013478) and 6-Z44 (012569) that is suggested in the first movement, realized in the second movement, and then condensed to its bare essentials in the third movement.

As I mentioned, my approach to Op. 11 concentrates more intently than any of the previous literature, on processes that unify the entire work. To demonstrate these processes, I will first discuss the unifying features of each movement, in reverse order,

[28] Jack Boss has also considered how Schoenberg's notion of 'musical idea' applies to his atonal and serial music, in his 2000/2001 article, "The "Musical Idea" and Global Coherence in Schoenberg's Atonal and Serial Music."

and then I will show how one master process across the entire work contributes to coherence. In order to better understand how the piece is put together, I have found it useful to start with the basic harmonic materials, evident in the final movement, which in turn informs the interpretation of the first two movements.

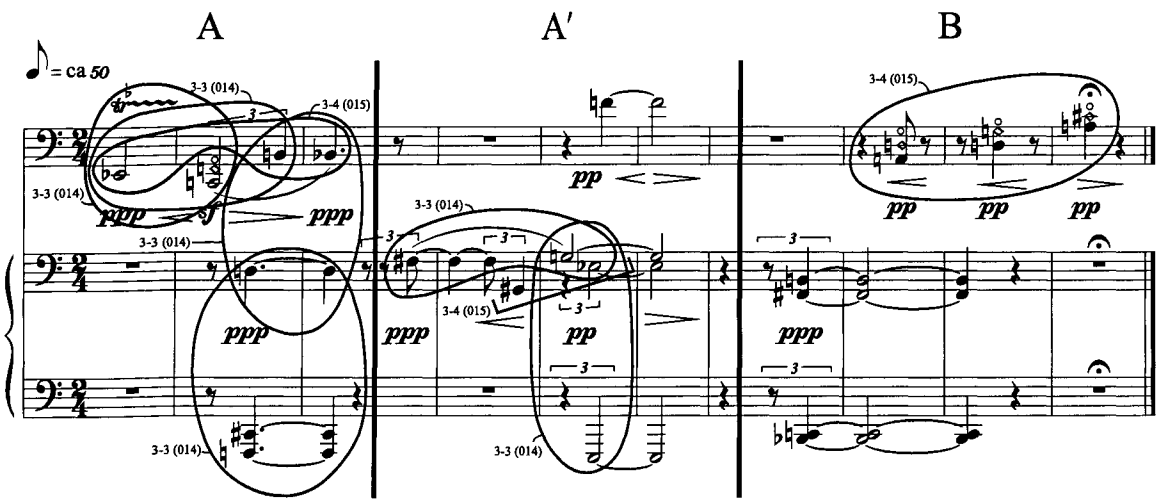
Op. 11, FINAL MOVEMENT

The third miniature demonstrates a compact and complex network of processes employing only 20 notes (21 including the trill's upper neighbor) in 10 measures. The sections are clear enough, being set apart from each other by brief silences, but the form of the piece is not evident at first. It seems that Webern is highlighting the final section as something separate from the previous material while at the same time maintaining similarities, even though they are less easily apprehended. Thus, the form is probably best described as a variant of bar form A A′ B. What unifies the form of this piece and contributes to its coherence are its diachronic processes and synchronic relationships. By "diachronic" I mean processes that operate from beginning to end: by "synchronic" I mean relationships that unify the piece without respect to its sequential ordering.

There are two significant diachronic processes in the pitch-class realm that contribute to the coherence of the third movement, and both processes occur in a similar way. First, there is an expansion of the intervals of the prime form of set class 3-3 (014) throughout the piece and second, there is a contraction followed by an expansion of the prime form intervals of tetrachord supersets of 3-3.

EXAMPLE 9: Formal Structure and Trichord Content of Op. 11/3

Op. 11/3



Example 9 shows that the A section contains four segmentations belonging to set class 3-3 (014) and that these 3-3s are salient segmentations created by contiguous pitch classes. There are no contiguous 3-4s (015) in the A section but there is a set class 3-4 in the cello created by pitch classes {3, 10, 11}. This segmentation is not obvious at first but these pitch classes are registrally connected.

The middle section contains two set class 3-3s and one set class 3-4 embedded in the right hand of the piano. And, the final section contains no set class 3-3s, but a prominent 3-4 motive in the cello completes the piece. Thus, set class 3-4 unfolds in an interesting way across this piece.

The set class 3-4 in the A section is more obscure than the 3-4 in the A′ section. In the A section the pitch-classes that create the set class 3-4 in the cello are 'interrupted' by the harmonic sounding two octaves higher, resulting in a non-contiguous segmentation of pitch-classes {3, 10, 11}. In the A′ section, the set class 3-4 is hidden in the right hand of

the piano with pitch-classes {3, 7, 8}. The pitch-classes that create this 3-4 are contiguous and a more convincing segmentation than the 3-4 in the A section. On the other hand, the segmentation of 3-4 in the A′ section is not obvious either, because it excludes the first note in the right hand, pitch-class 6. But, this 3-4 predicts what follows in the final section. In the final section, set class 3-4 is prominently featured as the final motive in the cello—this is a transposition of the set from the middle section.

Further evidence that processes involving set class 3-4 contribute to the movement's form can be demonstrated through contour.[29] In the A section the segmentation of 3-4, pitch classes {3, 10, 11} is expressed as a large ascending leap followed by a descending step (+8 -1) or c-segment (hereafter c-seg) < 0 2 1 >. Set class 3-4, pitch classes {3, 7, 8}, in the A′ section has a similar contour: a large ascending leap followed by a small descending leap (+11 -4)—c-seg < 0 2 1 >. The c-segs from the A and A′ form *identical* musical contours and are both similar in register. In the B section, however, set class 3-4 is highlighted as something different. The contour of final melodic motive is two ascending small leaps, c-seg < 0 1 2 >, unlike the contours of the previous sections. Further, the use of harmonics also suggests that the final section should be considered different from the A and A′ sections, but nevertheless "grow out of" the A section in some sense.

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[29] Robert Morris (1987) defines contour space (c-space) as "a type of musical space consisting of elements arranged from low to high disregarding the exact intervals between elements." The elements in c-space are called c-pitches (cps) that are numbered in order from low to high beginning with 0 up to (n-1), where n equals the number of elements. When cps are grouped to form an ordered set, Marvin and Laprade (1987) define this grouping a c-segment (c-seg) and define it as an ordered set of c-pitches in c-space.

By examining the comparison matrices we can compare contours in c-space, which will provide a concise profile of a c-seg's structure.[30] The COM-matrix also allows us to examine the similarity of two c-segs through the contour similarity function (CSIM). CSIM measures the similarity between two c-segs of the same cardinality. It compares specific positions in the upper right-hand triangle of the COM-matrix for c-seg A with the corresponding positions in the matrix of c-seg B in order to determine the total number of similarities between the c-segs. (We only examine the upper right-hand part of the matrix because each value in that part of the matrix is mirrored on the other side of the main diagonal of zeros by its inverse.) For each identical position, add 1. After all positions are compared then divide by the total number of positions compared. The closer the number is to 1, the greater the similarity between c-segs. Table 5 displays the COM-matrices for each section of the movement.

[30] Morris's comparison matrix (COM-matrix) is a two-dimensional array that displays the results of the comparison function, COM (a,b), for any two c-pitches in c-space. If b is higher than a, the function returns a value of +1; if b is lower than a, the function returns a value of −1; if b is the same as a, the function returns a value of 0. (Morris (1987), Definition 1.2) The integer 1 is omitted in the COM-matrix. Morris's COM-matrix also allows us to examine the similarity of two c-segs through the contour similarity function (CSIM). CSIM measures the similarity between two c-segs of the same cardinality. It compares specific positions in the upper right-hand triangle of the COM-matrix for c-seg A with the corresponding positions in the matrix of c-seg B in order to determine the total number of similarities between the c-segs. (We only examine the upper right-hand part of the matrix because each value in that part of the matrix is mirrored on the other side of the main diagonal of zeros by its inverse.) For each identical position, add 1. After all positions are compared then divide by the total number of positions compared. The closer the number is to 1, the greater the similarity between c-segs.

TABLE 5: Comparison matrices of three note c-segs (3-4 melodic motives) in Op. 11/3

A	0	2	1
0	0	+	+
2	—	0	—
1	—	+	0

A′	0	2	1
0	0	+	+
2	—	0	—
1	—	+	0

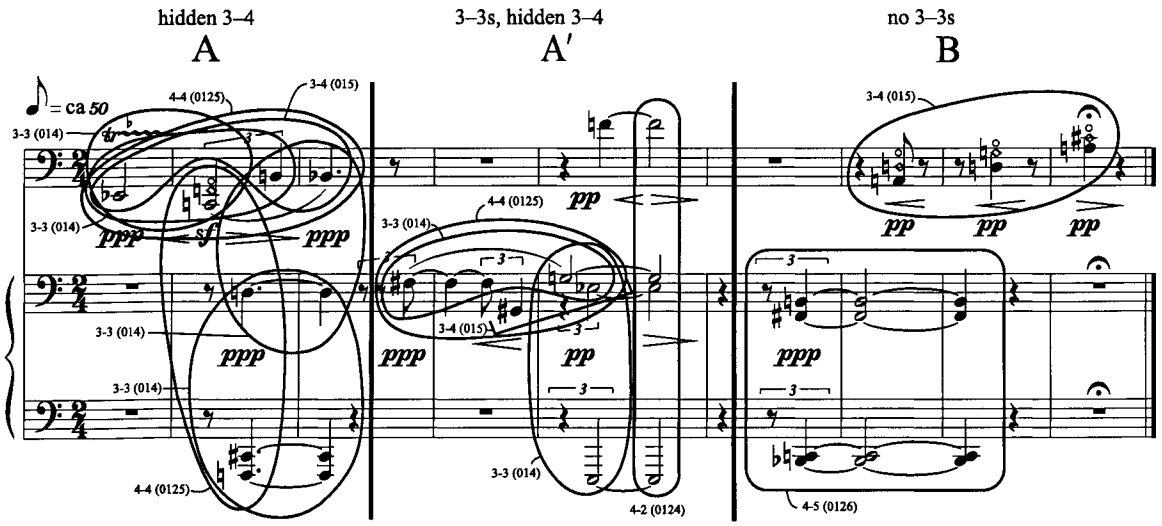
B	0	1	2
0	0	+	+
1	—	0	+
2	—	—	0

By examining the COM-matrices for set class 3-4, we already discovered that the c-segs of sections A and A′ are identical and thus yield the maximum similarity value of 1. If we compare the COM-matrices of sections A and A′ with section B, we discover that 2 of the 3 positions are identical, yielding a weaker similarity value of 0.67. Thus, distinguishing the B section as something different from sections A and A′.

As I already suggested, not only processes involving the salience or obscurity of set class 3-4, but also those dealing with the interaction of 3-3 and 3-4 contribute to the coherence of this piece. Set class 3-3 is featured most prominently in the first section, and I believe it is a primary generating feature of the entire piece. Across the movement, there is a gradual expansion of the prime form intervals of set class 3-3 across the piece to set class 3-4 by the end, as well as a gradual change in contour. It is interesting that in the first section, 3-3 is prominently featured, and this section includes no contiguous 3-4 segments. In contrast, the final section, B, contains no 3-3s but features 3-4 prominently in the melodic motive of the cello. The gradual expansion of 3-3 to 3-4, combined with the other members of 3-4 gradually revealing themselves across the piece are developmental processes that contribute to the form and overall coherence of the piece.

Example 10 shows the second diachronic process, which involves supersets of 3-3. The tetrachords 4-4 (0125), 4-2 (0124), and 4-5 (0126) unfold across the piece in a way similar to the trichord processes just described, but instead display an interval contraction followed by an expansion across the piece. It is important to note that set classes 4-4 and 4-2 are supersets of 3-3 while 4-5 is a superset of 3-4.

EXAMPLE 10: Expansion and Contraction of Tetrachords in Op. 11/3



The A section begins with a set class 4-4 in the cello, which is followed by another 4-4 in the right hand of the piano in the A′ section. Immediately following set class 4-4 in the piano, a contraction of the prime form's intervals to set class 4-2 occurs in measures 5 and 6 as a chord. The final section, B, begins with an interval expansion of the original set class 4-4 to 4-5, parallel to the expansion among the trichords portrayed in

Example 1. The expansion and contraction of these tetrachord intervals creates a process of development across the piece, as well as giving further evidence that the final section is different and separate from the first two sections.

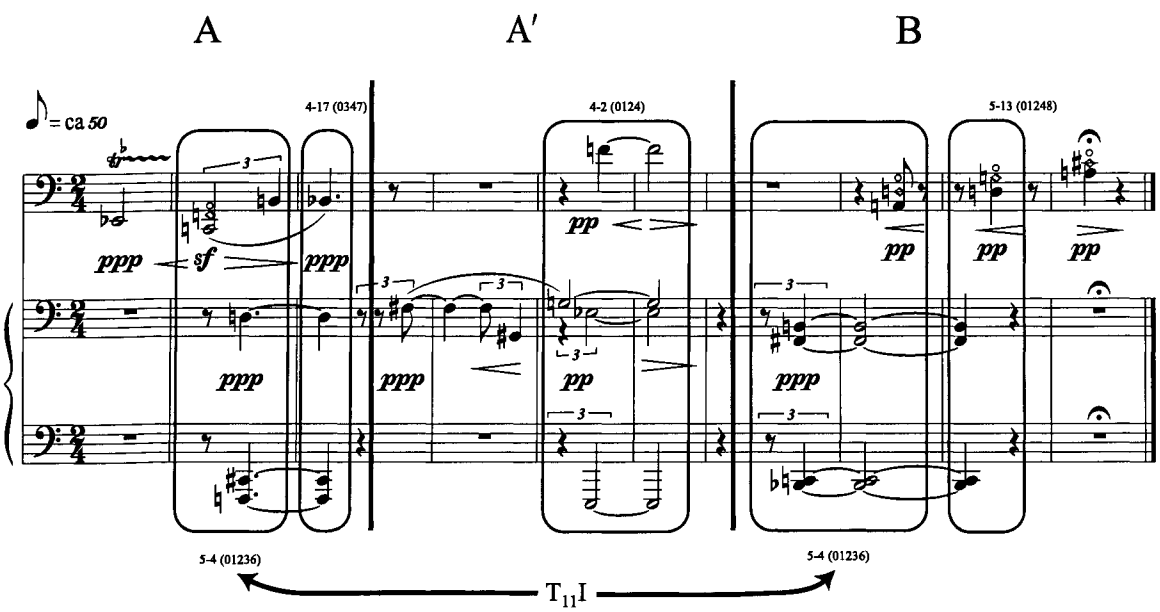
Isolating the melodic motives of each section, the set classes that are projected horizontally, will also show how the final section is highlighted as something different. Changes in the cardinality of melodic motives as well as rhythmic changes help contribute to form. The opening melodic motive in the cello, as we discovered earlier, forms set class 4-4 (0125). In the A′ section, the melodic motive in the right hand of the piano also forms set class 4-4 but it is an inversion of the 4-4 found in section A. The final motive in the cello in the B section has been abbreviated to a trichord, set class 3-4, a subset of set class 4-4. Despite 3-4 being a subset of 4-4, the motives in the first two sections are inversions of the same set class and consequently are more strongly related than the final abbreviated motive of the B section. Thus, a comparison of the contours of set class 4-4 from A and A′ reveals how Webern distinguishes these tetrachords from each other while still maintaining similarity. The first is < 0 3 2 1 > and the second forms < 2 0 3 1 >.

Like contour, rhythm also plays a role in contributing to form. There is a gradual rhythmic expansion between the first two melodic tetrachords, belonging to set class 4-4. At first glance it looks like the durations have simply reversed order, but the motive in A′ is slightly longer in duration, about a quarter note, than the motive in the opening section. In the final section the motive has a shorter duration than the previous motives. Further, section B contains rests between each of the harmonics unlike the motives in the A and

A′ sections, again highlighting the differences between sections. By comparing the melodic motives of each section, we notice that the first two sections are more closely related to each other in size and rhythm than they are to the final section.

In addition to the role of 3-3 and 3-4 as common subsets, there are several synchronic relationships that still need to be addressed, including comparisons of sets between sections, transposition and inversion relationships within and between sections, and similarity relations.

EXAMPLE 11: Tetrachord and Pentachord Similarities in Op. 11/3

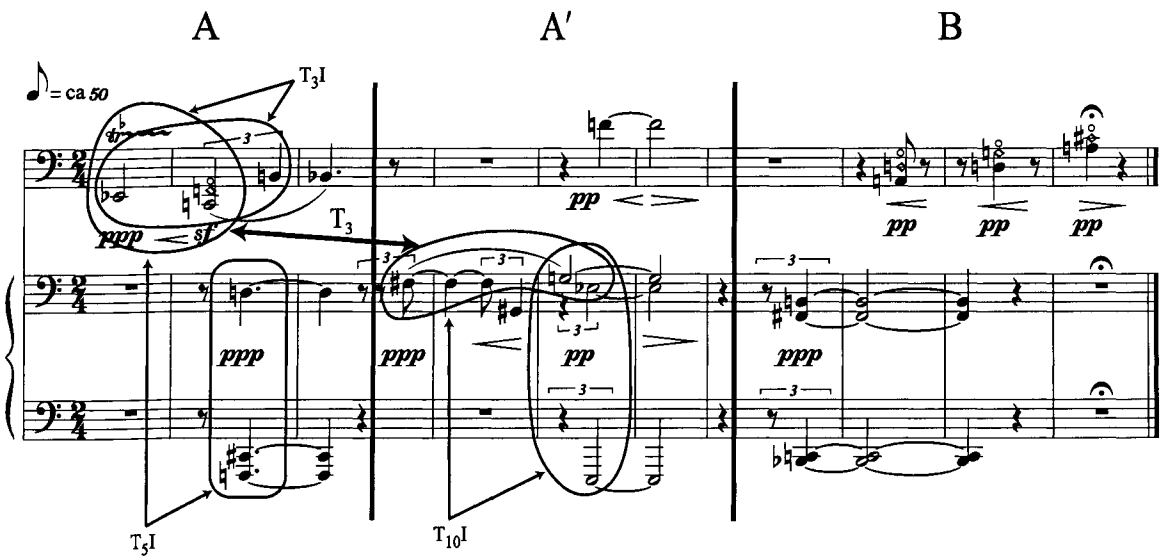


In Example 11, sections A and B have a pentachord in common, which is expressed as the first full chord that contains all the notes in the piano and cello. The common set class is 5-4 (01236), a superset of 3-3. Set class 5-4 occurs in measures 2 and 8 as a verticalization of notes, and these two 5-4s are related by inversion. The middle

section does not contain a similar pentachord vertical. The pentachord 5-4 does create symmetry of the form by bringing back similar verticals in the outer sections of the piece.

There are three set classes that only occur once within the piece, one in each section: set classes 4-17 (0347), 4-2 (0124), and 5-13 (01248). These set classes are chords that include both the cello and piano and occur at the end of their respective sections. At first glance set classes 4-17, 4-2, and 5-13 might be thought of as introductions of new material. However, 4-17, 4-2 and 5-13 are all supersets of 3-3, the generating trichord of the piece.

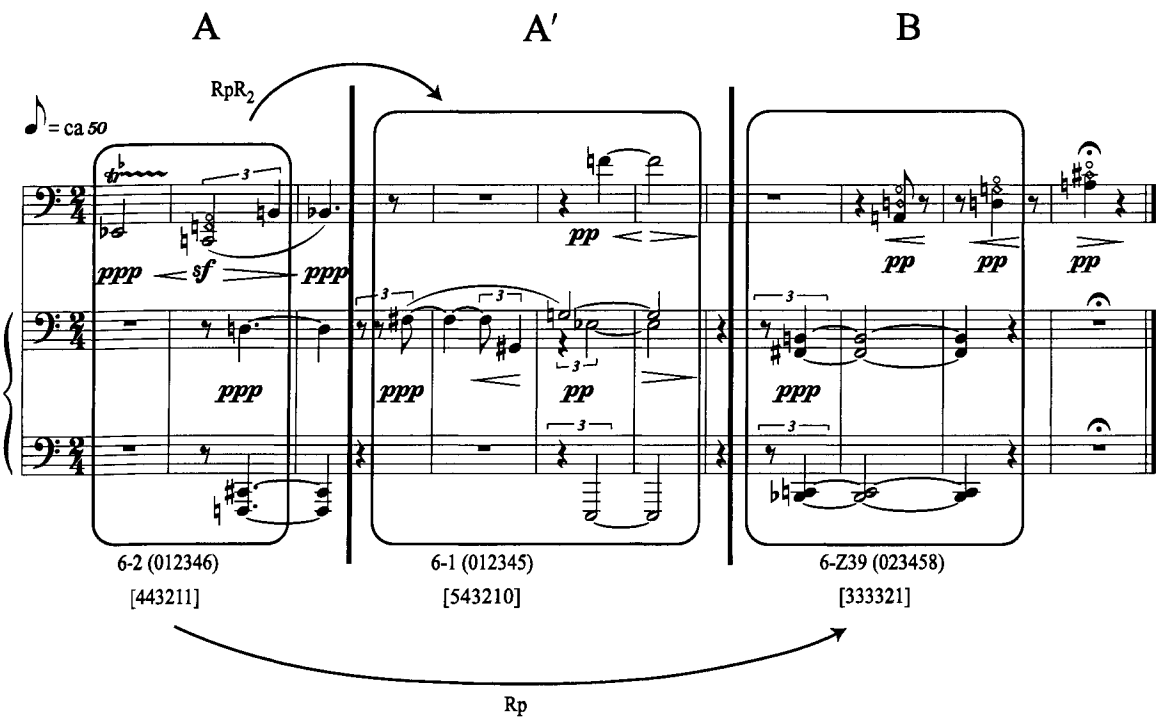
EXAMPLE 12: Transposition and Inversion Relationships of 3-3 (014) in Op. 11/3



Another synchronic relationship occurs as transposition and inversion relationships within sections and across sections. Example 12 shows that in the opening section, the first occurrence of 3-3 is outlined by the first three notes in the cello, including the F♭ trill, pitch-classes {0, 3, 4} in normal form. The other set class 3-3s

within this section are related to the original set by inversion. However, when we consider the first trichord 3-3 in section A and the first trichord in section A′, we see that they are related by *transposition.* This similarity of intervallic relationships between and within sections provides further evidence of the form: a similar process occurs in sections A and A′ that does not happen between the first two sections and the final section. Again, Webern is distinguishing the final section from the first two sections as something different.

EXAMPLE 13: Similarity Relations in Op. 11/3



Similarity relations between sections also serve to highlight the form. Example 13 illustrates the similarity relations between the hexachords of the sections. Taking the first six notes in measures 1-2 not including the trill note, pitch-classes {11, 0, 1, 2, 3, 5} in normal form create the hexachord 6-2 (012346), in section A′ the total pitch-class

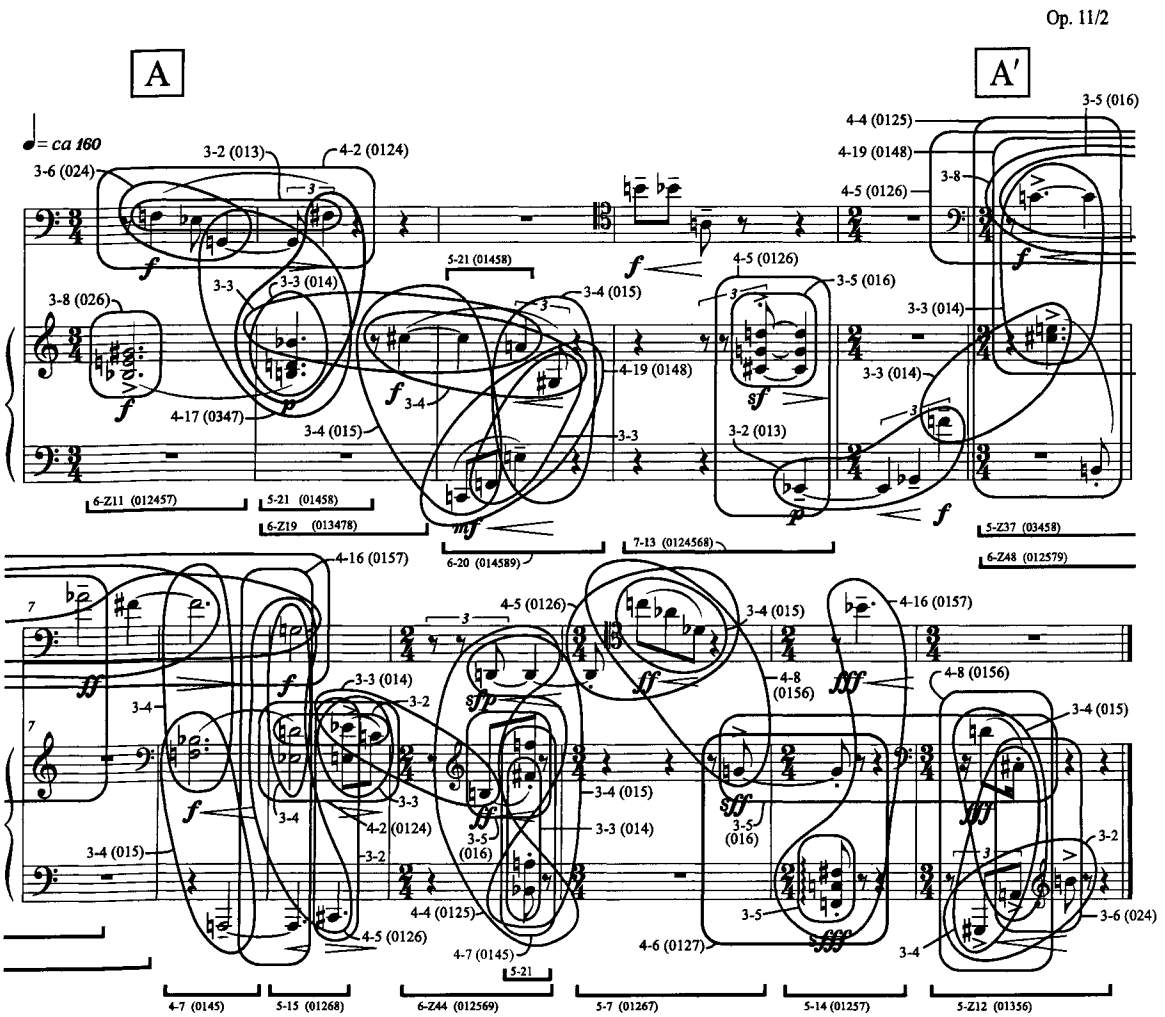
collection creates the chromatic hexachord 6-1 (012345), and in the final section the first six pitch-classes {6, 9, 10, 11, 0, 2} in normal form create the hexachord 6-Z39 (023458). When we compare the hexachords of sections A, 6-2, and A′, 6-1, we find that both hexachords have a common subset 5-1 (01234), creating an R_p relationship, as well as an R_2 relationship. These 2 chromatic pentachords are transpositions of each other and overlap in one pitch class, 3, E♭. In fact, pitch class 3 creates horizontal symmetry between these two 5-1s, as that pitch class starts the chromatic collection in section A and is one of the last pitch classes heard in the A′ section. Comparing the hexachord 6-2 from the A section with the hexachord 6-Z39 from the B section, we find there is only an R_p relationship. The hexachords in the A and A′ sections are more similar than the hexachords between the A and B sections. The strong relationship between the first two sections gives further evidence that Webern wants the final section to be different and less closely related to A and A′. In general, there is a gradual interval expansion than spans this movement, and the manner in which this gesture unfolds distinguishes each section of the movement from each other, and groups the first two sections together in opposition to the third.

MOVEMENT TWO

This middle movement consists of only 13 measures and, just as in the final movement, a number of complex processes operate to provide coherence of the whole. Forte suggests that this movement can be divided into three sections. The first section extends from measure 1 to 5; the second, from measure 6 to 9, and the third and final

section from measure 10 to 13. For him, rhythm and ensemble play important roles in determining the form. I would argue that the form should be described as a binary form—A and A′, based on the harmonic content, as shown in Example 14.

EXAMPLE 14: Harmonic Content of Op. 11/2



A clear frame for the piece is established in measures 1 and 13 with set classes 3-6 (024) and 3-2 (013). Notice that set class 3-6 appears only at the beginning and ending of the piece and overlaps set class 3-2 in two pitch-classes. However, it is developing variation among the harmonies and motives contained inside the frame that clarifies the form and provides coherence to the piece.

Schoenberg worked toward a definition of developing variation in his book *Fundamentals of Musical Composition.* According to him,

> Variation means change. But changing every feature produces something foreign, incoherent, illogical. It destroys the basic shape of the motive. Accordingly, variation requires changing some of the less-important features and preserving some of the more-important ones. Preservation of rhythmic features effectively produces coherence. For the rest, determining which features are more important depends on the compositional objective. Through substantial changes, a variety of motive-forms, adapted to every formal function, can be produced. Homophonic music can be called the style of 'developing variation'. This means that in the succession of motive-forms produced through variation of the basic motive, there is something which can be compared to development, to growth.[31]

If we take Schoenberg's idea that motivic variation requires some features to stay the same while other aspects change and that the succession of motives has a direction that results in a shape,[32] (this part is crucial to the definition), then Op. 11 Number 2 can be described as developing variation. The purpose of developing variation in this piece is to project the form.

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[31] Arnold Schoenberg, *Fundamentals of Musical Composition*, (London: Faber and Faber, 1967), 8.

[32] Boss's 1992 article, "Schoenberg's Op. 22 Radio Talk and Developing Variation in Atonal Music" defines atonal developing variation in just this way (a succession of motives that has a direction.)

As I said, I believe that the piece can be divided into two sections. Example 14 illustrates this interpretation. The first 5 measures are the A section and the A′ section begins in measure 6. Measures 2 and 3 establish the primary harmonic material for the entire piece with set classes 3-3 (014) and 3-4 (015) and their supersets. Measure 2 prominently features set class 3-3 but by measure 3 set class 3-4 is the primary trichord. It is important to notice that *all* pitch class sets in measure 2 are subsets of 6-Z19 (013478), a set class that contains two discrete 3-3s and one contiguous 3-3. Similarly, in measure 3 *all* pitch class sets are subsets of 6-20 (014589), a set class that is comprised completely of contiguous set class 3-3s. 6-Z19 in measure 2 is answered in measure 10 by its complement, 6-Z44 (012569). These two hexachords together form the nexus of a Kh subcomplex that contains every trichord, tetrachord and pentachord of measures 2 and 3. 6-Z44 contains three contiguous set class 3-3s (and this set also creates the letters of Schoenberg's last name—EsCHBEG.)

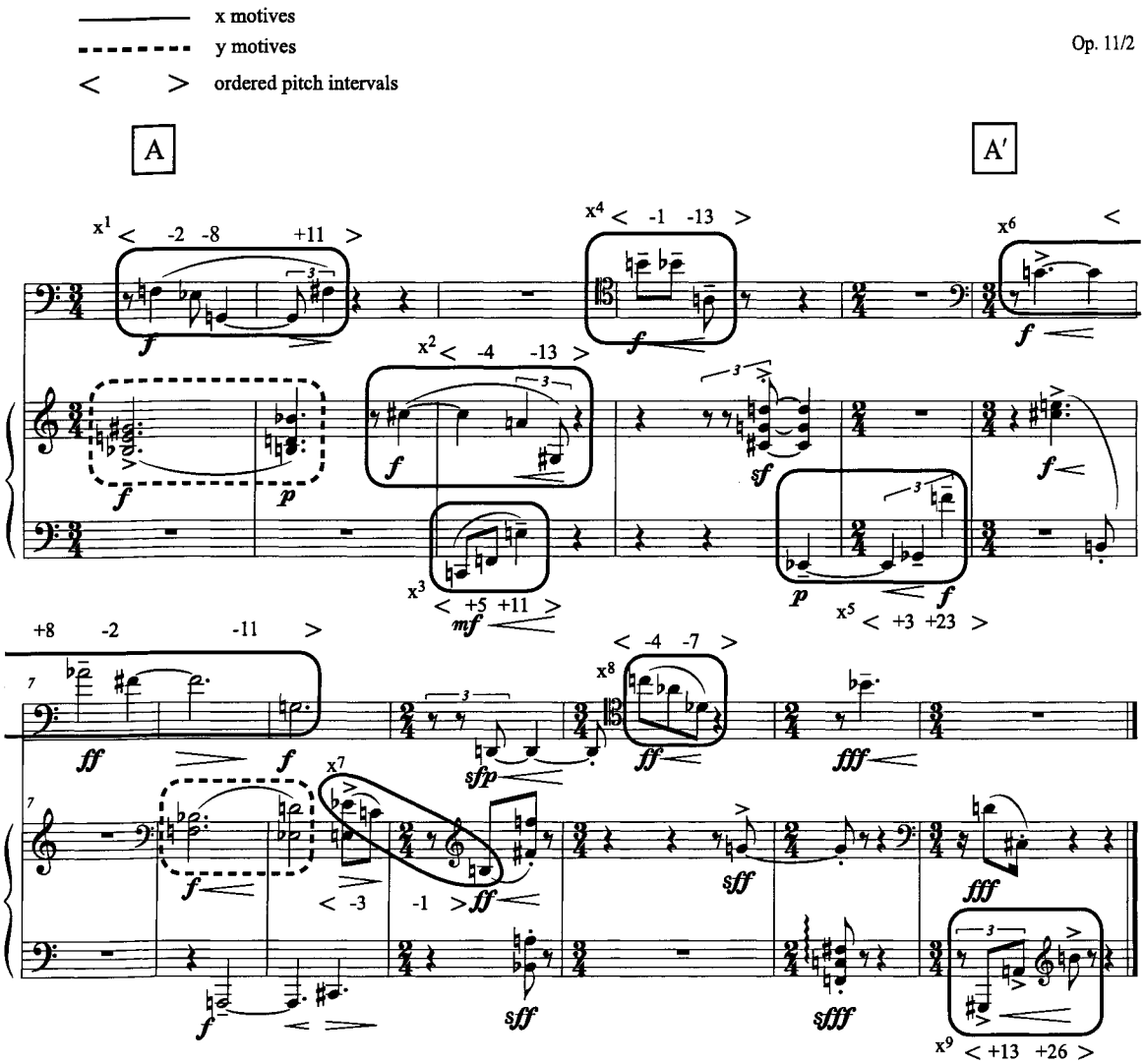
After establishing the large network of Kh-related sets in measures 2 and 3, Webern creates harmonic liquidation[33] in measures 4 and 5 by drastically reducing the number of Kh-related sets. For example, measures 4 and 5 do not contain any 3-3 sets. Set classes 3-1 (012), 3-2 (013), 4-5 (0126), and 7-13 (0124568) do not belong to the Kh subcomplex around 6-Z19/6-Z44, nor are they subsets or supersets of 6-20. The only element preserved from measures 2 and 3 is 3-5, which is prominently featured as a chord in the right hand of the piano.

[33] By harmonic 'liquidation' I mean bringing in foreign set classes.

At the beginning of section A′ in measure 6, we return to the primary harmonic material established in section A with some changes. With the exception of set class 3-8, a whole tone segment, *all* sets in measures 6 and 7 are supersets of 3-3. Set class 3-3 returns, though it is less easily apprehended. In measures 8 and 9 set class 3-4 is emphasized, though as chords this time, and set class 3-3 follows in measure 9, unlike the situation in measures 2 and 3 where 3-3 and 3-4 overlap. Along with harmonic material associated with the beginning, other set classes not belonging to the Kh subcomplex around 6-Z19/6-Z44 or to 6-20 contribute to the harmonic liquidation in the latter measures of A′. At measure 10, 6-Z44 provides the other nexus set for the subcomplex that had been represented by 6-Z19. Notice that *all* sets in this measure are subsets of 6-Z44 and that set class 3-3 is less easily apprehended due to register and instrumentation. In fact, 3-3 does not return again in the piece. In effect, measure 10 returns to the primary harmonic material associated with the beginning with some changes, and the absence of 3-3, the primary trichord, in the last three measures leads to the further harmonic liquidation. In measures 11-13 the only set class preserved from the primary harmonic material is set class 3-4. Set class 3-5 is the only other set that belongs both to the Kh subcomplex around 6-Z19/6-Z44 and is a subset of 6-20. In measure 12, just as in measure 4, set class 3-5 is the only remaining set belonging to the basic harmonic material. It seems that only the smaller sets are being preserved while the larger sets create harmonic variation because they lie outside the primary harmonic material. The harmonic liquidation of set class 6-20 and the Kh subcomplex around 6-Z19 and 6-Z44, helps define the form and is a process of developing variation that spans the piece.

Example 15 highlights one other aspect of developing variation that occurs in the motivic structure of the piece. I have outlined what I am calling "x" and "y" motives with solid and dashed lines respectively. I have also provided the ordered pitch intervals for the "x" motives. The "x" motives consist of two or three pitch intervals and the "y" motives are accompanimental chords to the "x" motives.

EXAMPLE 15: Motivic Variation in Op. 11/2



There is a general trend in the A section for the last interval of each successive motive to grow larger, but successive motives do not gradually expand in A′. What are particularly interesting to note are the "x" motives that start each section, labelled x1 and x6. Notice that the ordered pitch intervals for x1 are < –2, -8, +11 > and the ordered pitch intervals for x6 are < +8, -2, -11 >. If we consider the contours of these motives placed next to each other, they may best be described as a sine wave. The first starts at a peak then dips to a trough and then rises again to a peak. The second rises to a peak and then dips to a trough.

Despite their different contours, these two "x" motives have the same ordered pitch intervals, some reversing direction, providing further evidence of the A A′ form. Further, if we examine the rhythm of these two "x" motives, the last two durations consist of a longer note followed by a slightly shorter note. These durations reveal a gradual expansion of the rhythm. The durational expansion between x1 and x6 reminds the listener of interval expansion between prime forms in movement three and between ordered intervals in this movement.

The "y" motives accompany the x1 and x6 motives. The characteristic feature of these motives is that the first chord expands intervallically to the next chord in a wedge shape. At first, the "y" motive starts out just before the "x1" motive and the expansion occurs just before the last note of the "x1" motive. When the "y" motive returns in the A′ section, it is delayed. The "x6" motive starts with a different accompaniment but the "y"

motive arrives just before the last note of the "x6" motive. Both "y" motives are similar in duration and interval expansion but their placement within the piece causes development and helps support the A A′ form.

By looking at pitch interval successions we also notice that contour also plays a role in projecting the form. Contiguous four-note melodic motives in their respective sections demonstrate a high degree of similarity while a comparison of these same motives *between* sections reveals they are highly dissimilar. Example 16 identifies theses motives and their contours.

In section A, the melodic motive labelled x1 in the cello, set class 4-2 (0124), creates the c-seg < 2 1 0 3 >. The melodic motive labelled x2a on Example 16, set class 4-11 (0135) immediately follows in the right hand of the piano and ending with the first note of the cello in measure 4, creates the c-seg < 3 1 0 2 >. Refer forward to Table 6 on page 71, which compares the respective COM-matrices of c-segs < 2 1 0 3 > and < 3 1 0 2 >: we see that five out of the six positions are identical, yielding a strong similarity value of 0.83.[34]

[34] Recall that CSIM measures the similarity between two c-segs of the same cardinality. It compares specific positions in the upper right-hand triangle of the COM-matrix for c-seg A with the corresponding positions in the matrix of c-seg B in order to determine the total number of similarities between the c-segs. (We only examine the upper right-hand part of the matrix because each value in that part of the matrix is mirrored on the other side of the main diagonal of zeros by its inverse.) For each identical position, add 1. After all positions are compared then divide by the total number of positions compared. The closer the number is to 1, the greater the similarity between c-segs.

EXAMPLE 16: Contour and Four-note c-segs in Op. 11/2

< > 4 note c-seg

Op. 11/2

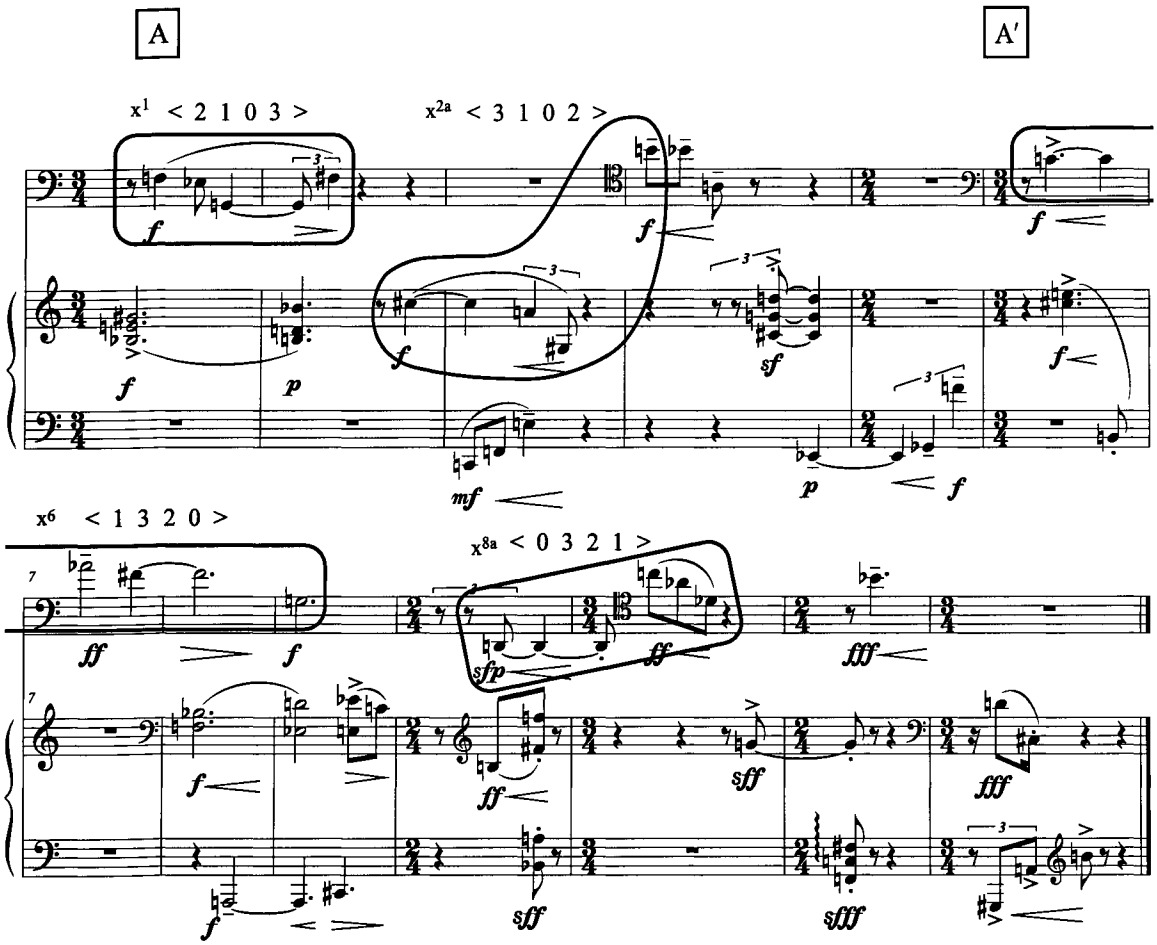


TABLE 6: Comparison matrices of four-note c-segs in Op. 11/2

4-2 (0124) x^1

	F	E♭	G	F♯
	< 2	1	0	3 >
A	2	1	0	3
2	0	—	—	+
1	+	0	—	+
0	+	+	0	+
3	—	—	—	0

4-5 (0126) x^6

	C	A♭	F♯	G
	< 1	3	2	0 >
A′	1	3	2	0
1	0	+	+	—
3	—	0	—	—
2	—	+	0	—
0	+	+	+	0

4-11 (0135) x^{2a}

	C♯	A	G♯	B
	< 3	1	0	2 >
A	3	1	0	2
3	0	—	—	—
1	+	0	—	+
0	+	+	0	+
2	+	—	—	0

4-5 (0126) x^{8a}

	D	C	A♭	D♭
	< 0	3	2	1 >
A′	0	3	2	1
0	0	+	+	+
3	—	0	—	—
2	—	+	0	—
1	—	+	+	0

In the A′ section, the melodic motive in the cello, set class 4-5 (0126), labelled x6 creates the c-seg < 1 3 2 0 >. The next 4-note motive is also in the cello labeled x8a and forms the 4 note c-seg < 0 3 2 1 >. These two motives happen to form set class 4-5 and are inversions of each other. By comparing their COM-matrices we notice that just like in the A section, c-segs < 1 3 2 0 > and < 0 3 2 1 > have five out of the six positions in common yielding another strong similarity value of 0.83.

However, when we compare the 4-note c-segs of these motives *between* sections the similarity values are quite weak. (See Table 7) A comparison of the COM-matrices of x1 of the A section with x6 and x8a of the A′ section yields weak similarity values of 0.17 and 0.33 respectively. Similarly, comparing x2a with x6 and x8a yields similarity values of 0.33 and 0.17 respectively. The 4-note c-segs of the A section have contours that are highly similar. The same is true with respect to the 4-note c-segs of the A′ section. However, dissimilar contours of the 4-note c-segs *between* sections provide further evidence of the form.

TABLE 7: Contour Similarity Function, CSIM (A,B) of 4-note c-segs in Op. 11/2

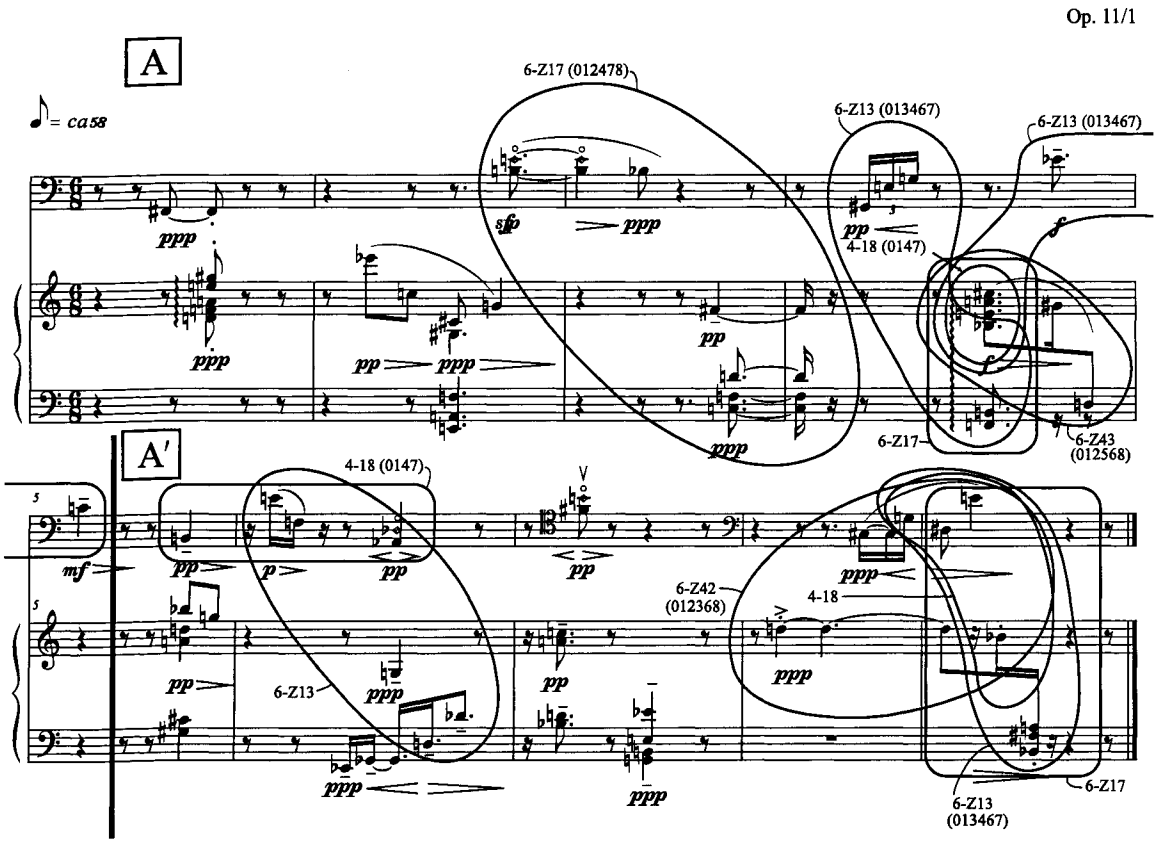
Within Sections		Between Sections	
A	CSIM (x^1, x^{2a}) = 5/6 = 0.83	A + A′	CSIM (x^1, x^6) = 1/6 = 0.17
A′	CSIM (x^6, x^{8a}) = 5/6 = 0.83	A + A′	CSIM (x^1, x^{8a}) = 2/6 = 0.33
		A + A′	CSIM (x^{2a}, x^6) = 2/6 = 0.33
		A + A′	CSIM (x^{2a}, x^{8a}) = 1/6 = 0.17

MOVEMENT ONE

The first movement has the fewest measures, nine, and greatest number of notes of all the movements. In fact, the processes that contribute to the form and ultimately the coherence of this first movement are also the least clear of the three movements. Forte (1998) suggests that the form of movement one is composed of three sections. The first section extends from measure 1 to 3, ending with the B♭ in the cello; the second, from measure 3 to 7, starting with the F♯ in the piano, and the third and final section from measure 8 to 9. For him, the octatonic progression determines the form. I would argue that the form can better be described as binary—A and A′. This is based on a process involving pairs of Z-related hexachords intersecting with set class 4-18 (0147) that creates a shape to provide coherence to the movement, as well as motivic variation that helps project the form. This process has much in common with the process of 'focusing' that spans the entire work.

Example 17 illustrates the pairs of Z-related hexachords in question: 6-Z13 (013467) and 6-Z42 (012369), and 6-Z17 (012478) and 6-Z43 (012568). The relationship of set class 4-18, which happens to be a favorite sonority of the Second Viennese School, to the pairs of Z-related hexachords is vague at the beginning. In measures 2 and 3 there is a clear segmentation of 6-Z17 but there is no prominent 4-18 subset. The first clear presentation of set class 4-18 occurs in measure 4, when it is presented as a chord. It is at this point that the relationship between 4-18 and the Z-related hexachord pairs becomes clearer.

EXAMPLE 17: Z-related hexachordal pairs and 4-18 (0147) in Op. 11/1



6-Z13 (013467)	[324222]	6-Z42 (012369)
6-Z17 (012478)	[322332]	6-Z43 (012568)

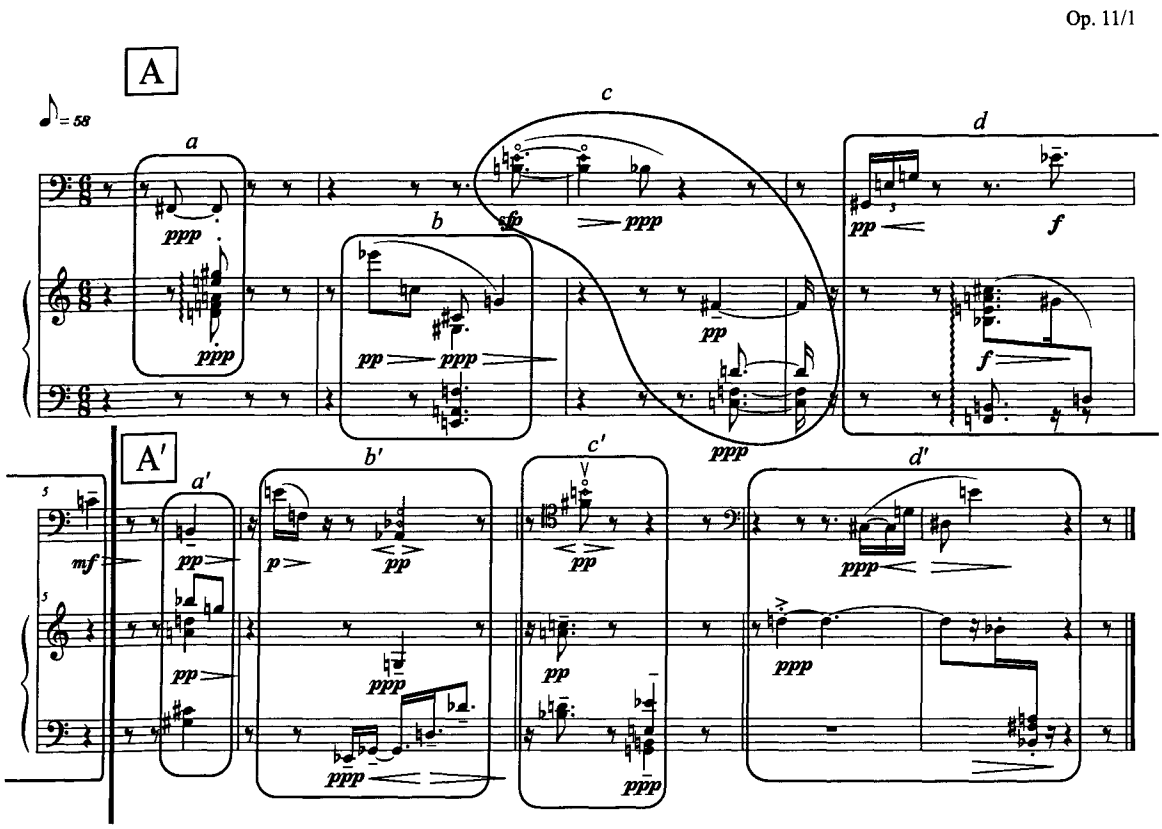
6-Z13 first appears in measure 4 starting with the gesture in the cello. In the first part of the measure we can see that 6-Z13 intersects 4-18 for the first time but only in one pitch-class—pitch-class 10 in the right hand of the piano. 6-Z13 is a superset of 4-18 but because the intersection occurs in only one pitch-class, the relationship is not fully

realized. In the latter part of measure 4 there is another 6-Z13 that now intersects 4-18 in four pitch classes—pitch-classes 1, 4, 9, and 10. 4-18 is now completely contained within 6-Z13 but we have yet to see its Z-related hexachord, 6-Z42. Also in measure 4 we find that set class 4-18 is completely contained within 6-Z17 and 6-Z43; the only time this Z-related pair is presented together. I do not believe that this pair is fully involved in the overarching process of this movement as 6-Z43 does not occur again. By the end of the A section the relationship between 4-18 and the first Z-related hexachord of the first pair, 6-Z13, is emphasized, each having intersected with the other twice, but it is not until the A′ section that the full extent of this relationship is realized.

In measures 5 and 6 of section A′, set class 4-18 is prominently displayed in the cello and intersects with another 6-Z13 in m. 6 in three pitch-classes—pitch-classes 4, 5, and 8. This is the first time 4-18 has been presented as a melodic motive. It is not until the last two measures that the full realization of this intersecting relationship occurs. 6-Z42 appears for the first time, starting in measure 8 in the piano. Its Z-related hexachord, 6-Z13 appears with the upbeat to measure 9 on pitch-class 7 in the cello. 6-Z13 intersects with its hexachordal complement in 4 pitch-classes—pitch-classes 3, 4, 7, and 10. In fact, these *same* pitch classes form set class 4-18, bringing to fruition the realization of the Z-related hexachord's relationship with set class 4-18. The relationship of hexachords 6-Z13 and 6-Z42 and 4-18 is vague at the beginning, clearer in the middle and resolved at the end of the piece. This process provides a shape across the movement, and, since it happens twice, it helps project the form—A A′.

Developing variation among the motives also plays a role in defining the two-part form. Example 18 outlines four motives in section A, labelled *a*, *b*, *c*, and *d* and their variations in the A′ section, labelled *a′*, *b′*, *c′*, and *d′*. A comparison of the motives between sections of this movement reveals that the successive motives in each section create a shape that further defines the form—A A′.

EXAMPLE 18: Motivic Development in Op. 11/1



Motive *a* in measure 1 and motive *a′* in measure 5 have several important similarities. First, both motives have the same texture—a chord and a single note. Second, both have the same metrical context—2 eighth rests followed by the harmonic

content contained within a quarter note duration. Finally, they feature the same trichords, 3-3, 3-4, and 3-11, with set class 3-3s presented discontiguously in the outer voices, and set class 3-4s presented contiguously in the inner voices. (Refer forward to Example 19 on page 82).

While both the *a* and *a'* motives share the same instrumentation, the single note is heard in the cello for motive *a* and in the piano for motive *a'*. These motives also have opposite contours and the duration of *a'* is the same as motive *a*. While the metrical context of these motives may be the same, accent plays a role in variation. In motive *a* the chord is deemphasized metrically because it follows the single note in the cello. In motive *a'*, the chord is emphasized by occurring first with the single note following in the piano. Finally, while the common trichords create harmonic similarities between these motives, set classes 3-3, 3-4, and 3-11 occur in different registers, highlighting the differences between *a* and *a'*.

The next motive in the A section, motive *b*, occurs in measure 2 with the piano only. The variation of this motive is outlined as motive *b'* in measure 6. Their similarities are fewer than the *a* and *a'* motives, but they still exhibit a commonality. Motives *b* and *b'* both share the same downward contour for the first 2 pitch classes. Also, both motives contain set class 4-7 (0145) in the left hand of the piano and it occurs in the same register. The only difference is textural in that set class 4-7 in the *b'* motive is arpeggiated.

Despite the initial contour similarities between the first 2 notes of motives *b* and *b'*, when we consider the gestures in the cello of each motive in their entirety, we discover that in fact, the contours are horizontal mirror images of each other. The contour of the *b* motive resembles a backwards 'check mark' while the contour of the *b'* looks like a 'check mark' (✓). Motive *b'* not only develops with respect to the contour but there is additional variation within the *b'* motive itself. The upward direction of the 'check mark' contour is essentially stated twice—once by the cello itself, and once by the arpeggiated chord in the piano. Further variation occurs in the instrumentation and the addition of a harmonic in the *b'* motive that is not present in *b*. Fewer features are retained between the *b* and *b'* motives but they can still be heard as being interrelated.

The third motive in the A section, *c*, extends from the end of measure 2 through the downbeat of measure 4. In the A' section, motive *c* is varied in measure 7 and labelled *c'*. Shared characteristics between *c* and *c'* are as follows: in each motive, the harmonic in the cello is preceded and followed by chords in the same register. (The chord that precedes the start of the *c* motive belongs to the *b* motive, but aurally they are similar.) In fact, the distance between the cello and the onset of the chord that follows is metrically similar. In *c*, the cello and the chord that follows both came in as the final dotted eighth of subsequent measures, while in *c'*, the cello and the following chord came in on

subsequent offbeats. In addition, the durations of both chords are almost identical—a sixteenth note longer in *c* than *c'*. Also, the contours involving the harmonic in the cello and the following chord are the same—both have downward contours.[35]

Clearly some elements between *c* and *c'* have been retained but *c'* also develops the *c* motive in several ways. Here are some differences: first, *c'* develops the harmonic vocabulary of c. Both motives have set class 3-3 in common but *c'* reintroduces trichords we associate with *a* and *a'* like set class 3-4 and 3-11 in particular. Further, *c'* introduces a compact 6-Z44 in the left hand of the piano—an important complement to this movement and to the entire work. Just as we saw in motives *a* and *a'*, accent plays a role in variation in *c* and *c'*. The chord in motive *c* that follows the cello is deemphasized because the F♯ enters a sixteenth note early. However, motive *c'* is emphasized because all notes of the chord occur together. A similar process occurs in two pairs of motives and further comparisons between motives *a* and *c* reveal that just as the chord is deemphasized by the F♯ in the cello in motive *a*, so too is the chord of motive *c* weakened by the same pitch class—F♯. Motive *c'* also develops texturally by anticipating the entrance of the cello harmonic immediately with a chord. Finally, *c'* is rhythmically more compact than *c*. The cello harmonic in *c'* is shortened and the note that followed the harmonic in *c* is eliminated, making motive *c'* an abbreviated version of *c* in the A section.

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[35] The chord in the latter part of motive *c* also has similarities to motive *a*. Both have an attack of a single note, which is immediately followed by a chord. Also notice that the pitch F♯ initiates motive *a* and the chord in motive *c*, though in different registers.

The final motive, *d*, extends from measure 4 through the downbeat of measure 5 and ends the A section. This motive is varied and appears as the last two measures to end the A′ section as *d*′. There are two distinct similarities between *d* and *d*′—instrumentation and contour. These motives have the same instrumentation and the contours of the piano parts are identical. The contours move downward and additionally span the same registers. While there are not many aspects preserved between *d* and *d*′, rhythmic and gestural variation creates development and ultimately contributes to the shape of the movement.

By comparing the final gestures of the piano in *d* and *d*′ we notice that the placement of the chord in *d* happens last in the *d*′ motive and that there is rhythmic variation in the *d*′ motive. There is a lengthening of the first note and a shortening of the last sonority in *d*′. In addition *d*′ has a more complex contour than *d*. The contour of the cello in the *d* motive (pitch classes 8, 4, 7, 3 as they appear) is essentially an upward slant. In contrast, the contour of the *d*′ motive (the first five notes, pitch classes 2, 1, 7, 3, 4) in effect, creates the shape of an uppercase 'W'. There is a large leap down to a C♯, followed by a small leap up, then a small leap down, and completed by a large leap up to E. However, in both motives we still recognize the overall upward direction of the cello lines, and the downward direction of the piano parts.

There is a two-stage process of motivic variation across movement one. First, four distinct successive motives are presented and form the A section, then each motive is developed, in order, across the remainder of the piece to form the A′ section and

complete the shape. Developing variation, as well as a process involving pairs of Z-related hexachords intersecting with set class 4-18 (0147) which we discussed previously, provides coherence to movement one and in turn, helps project the form—A A′.

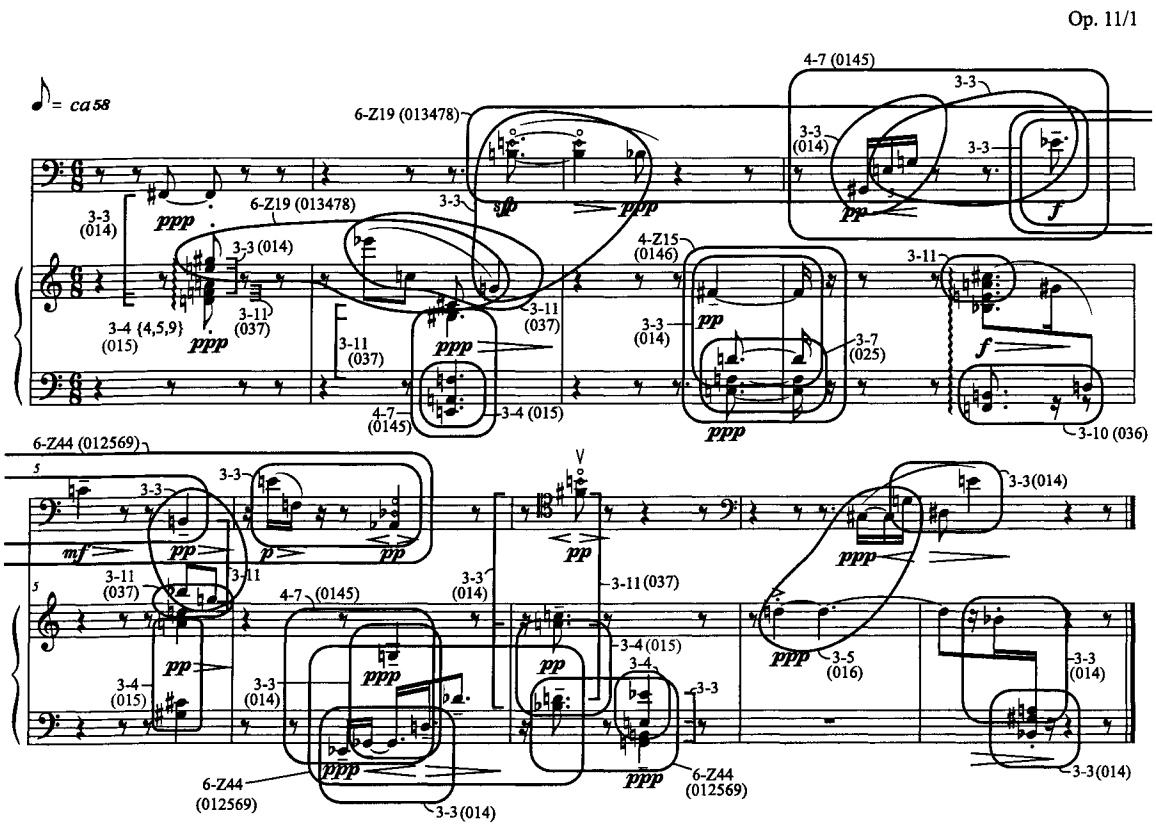
LONG-RANGE COHERENCE

How, then, is this entire work unified? As I suggested at the beginning, long-range coherence across the whole work is achieved through a three-stage process whereby the significance of the harmonic materials at the beginning of the piece, Kh-related sets to 6-Z19/6-Z44, is unclear or unfocused. By the middle of the piece the significance of the harmonic material is clarified or more focused. By the end of the piece the musical materials are condensed into their bare essentials; the harmonic material of Op. 11 has been distilled into its basic elements.

In the first movement a network of subsets and supersets around 6-Z19 and 6-Z44 is only suggested. Example 19 shows that 6-Z19 first appears melodically in the piano in measures 1 and 2. It is immediately followed by another melodic instance of 6-Z19 in the cello from measure 2 to 4. The last note of this hexachord, pitch-class 3, overlaps with the start of the first instance of 6-Z19's complement, 6-Z44, which extends from measure 4 through 6 in the cello. There are no further instances of 6-Z19 but there are two more 6-Z44s intersecting in the piano from measure 6 to 7. In this movement, all the 6-Z19s and 6-Z44s are presented linearly, for the most part, and while their subsets, particularly 3-3, 3-4, and 3-11, are evident elsewhere in the music, not many are emphasized as contiguous subsets within the segmented hexachords of 6-Z19 and 6-Z44.

Unlike movement two, the interplay between 3-3 and 3-4 and their supersets is not the main unifying factor. The importance of 6-Z19 and 6-Z44 is not fully realized until the second movement.

EXAMPLE 19: Kh-subcomplex 6-Z19/6-Z44 and some smaller subsets in Op. 11/1



In the middle movement, as shown in Example 14, the primary harmonic materials, established by set classes 3-3 and 3-4 and their supersets, form the Kh subcomplex around 6-Z19 and 6-Z44. The segmented subsets of the Kh subcomplex are emphasized as nested sets within each of these hexachords, more than in movement one. The subsets that do not belong to that Kh subcomplex, like 3-2, and 4-5 for example, are

involved in the process of harmonic liquidation at section endings, through reducing the number of Kh-related set classes that contribute to defining the form and unifying the piece.

The common thread between all three movements can be summarized in the final movement, which features the trichords 3-3 and 3-4. In movement one there are abundant 3-3s and 3-4s as well as 3-11s but these are not involved in a process that contributes to the overall coherence of the piece. In movement two, set classes 3-3 and 3-4 are established as the primary harmonic material and their supersets form the Kh subcomplex around 6-Z19/6-Z44 that plays an important unifying role. In the final movement, the larger sets that we saw playing an important role in contributing to coherence in the first two movements, are now gone. It is primarily set classes 3-3 and 3-4 that are involved in the unifying processes of the piece. This movement can be heard as a condensation of the set-class elements and processes that were suggested in movement one and realized in movement two.

The final movement not only distills the harmonic material into two essential kernels, it also summarizes the formal structure of the entire work in this movement. You will recall that I described the third movement as a modified bar form—A A′ B. As the letter designations suggest, the first two sections of the movement are similar and the final section is contrasting. This three-part form also describes how *all three movements* of Op. 11 are related to each other.

Movement one can best be described as a binary form—A A′, based on a process involving pairs of Z-related hexachords intersecting with set class 4-18 (0147) and motivic variation. Movement two is also best described as a binary form—A A′ based on the harmonic context (a more complete version of the Kh subcomplex around 6-Z19/ 6-Z44). The first two movements are both binary forms but use different processes to arrive at their respective A A′ designations. Considering the formal structures of each movement, I believe the overall formal progression of the entire work can be described as A A′ B—the *same* description used to express the formal sections of the final movement. Webern has unified each movement through different processes and at the same time created a coherent progression from movement to movement. Through the intricate networks discussed here, Webern has not only expressed his own notions of unity but the essence of this work epitomizes the sentiment "*non multa sed multum*"—"not much in quantity, but much in content."[36]

[36] In a dedication to Webern's *Bagatelles* Op. 9, Alban Berg wrote '*non multa sed multum*'. Op. 9 was written around 1911, several years earlier than Op. 11 but I believe Berg's description is equally apt here.

CHAPTER III

Cello Sonata

Analysis

At the urging of his teacher, Arnold Schoenberg, Webern made the attempt in his *Cello Sonata* (1914) to compose in larger forms. As discussed previously, Webern interrupted his work on this composition to write *Three Short Pieces*, Op. 11 (1914). Shortly after completing Op. 11, World War I broke out and Webern never returned to the *Cello Sonata* to compose the second movement he intended. Consequently, this piece does not have an opus number and was not published until Carl Fischer brought it out in 1970. To my knowledge there are no published analyses of Webern's *Cello Sonata*, and a discussion of this piece is long overdue.[37]

Consisting of 41 measures, the first movement of his *Cello Sonata* is a mammoth composition for Webern. (Recall that the three movements of Op. 11, counted together, total 32 measures.) Not surprisingly, there is a significant diachronic process in the *Cello Sonata* that is analogous to the process that unifies the final movement of Op. 11. Recall that in the third movement of Op. 11 that there is an expansion of the intervals of the prime form of 3-3 (014) across the piece that contributes to coherence and that the final

[37] There is only a brief mention of the chords in measures 1-2 of the *Cello Sonata* in Demske (1986), 66 as an illustration of fractional rcbs (registral center of balance). According to Demske the registral center of balance arises when the magnitude of the registral point of a set is calculated.

movement distills the harmonic repertoire into its basic elements—trichords 3-3 (014) and 3-4 (015). In the *Cello Sonata* I believe that there is a similar interval expansion of the prime form of set class 3-3 to 3-4 across the movement, but it is achieved in a different way. In the first section of the movement the harmonic material is generated by the various ways set class 3-3 (014) combines with itself to form tetrachords. In the second section, tetrachords are generated by combining trichords, but it is set class 3-4 (015) that combines with itself. This diachronic process helps delineate the form and provide overall coherence to the piece. But, before discussing in detail how the tetrachords are generated to create the harmonic repertoire, it is important first to discuss the form.

I believe the form is best described as binary—A A′. The A section extends from measure 1 to 25 and the A′ section from measure 26 to 41. The similarities of set class, contour, pitch interval succession, and rhythm of the opening four note gestures between sections provide evidence of the two-part form. Also, there are rhythmic and dynamic clues that contribute to hearing the piece as binary. I will now consider, in detail, the various features that help delineate the sections of the form. Refer forward to the score reproduced as Example 20 on pages 92-94.

In measure 1, the four-note gesture in the cello creates set class 4-3 (0134) with the ordered pitch classes {5, 2, 6, 3}. These pitch classes present the first occurrence of the four-note motive we see throughout the piece; generally characterized as the rhythm short-short-short-long (s-s-s-l). The pitch interval succession of this motive is

< -4 +16 +9 > and it can be represented also as a c-seg with the contour < 1 0 2 3 >. There are some distinct similarities between this opening motive and the motive that initiates the A' section.

TABLE 8: Formal Structure and Opening Motive Comparison in *Cello Sonata*

OPENING 4-NOTE MOTIVE	MEASURE NUMBER	INSTRUMENT	SET CLASS	PITCH INTERVAL SUCCESSIONS	CONTOUR	RHYTHM
A section {5, 2, 6, 3}	1	cello	4-3 (0134)	< -4 +16 +9 >	1 0 2 3	s-s-s-l
A′ section {7, 5, 4, 8}	26	piano	4-3 (0134)	< -2 +11 +4 >	1 0 2 3	s-s-s-l

In measure 26, the four-note gesture in the left hand of the piano creates set class 4-3 (0134) with the ordered pitch classes {7, 5, 4, 8}; the same set class that opens the piece. This gesture not only forms 4-3 but also maintains the same rhythmic pattern—s-s-s-l, (though the short durations have been lengthened slightly, from eight-note triplets to quarter-note triplets), the same contour, < 1 0 2 3 >, and a similar pitch interval pattern. The pitch interval succession of the opening motive in A′ maintains the same order of downward and upward leaps, but the actual pitch intervals are slightly smaller than the opening motive in the A section. Table 8 compares each motive side-by-side to highlight the similarities of the different parameters. Further, the A section is also set off from the

TABLE 9: Harmonic Repertoire of *Cello Sonata*

3-3 (014)	3-4 (015)	3-5 (016)
MAXIMIZES CONTIGUOUS 3-3s	MAXIMIZES CONTIGUOUS 3-4s	MAXIMIZES CONTIGUOUS 3-5s
4-7 (0145)	4-8 (0156)	4-9 (0167)
4-17 (0347)	4-20 (0158)	
MAXIMIZES NON-ADJACENT 3-3s	MAXIMIZES NON-ADJACENT 3-4s	MAXIMIZES NON-ADJACENT 3-5s
4-3 (0134)	4-7 (0145)	4-6 (0127)
		4-8 (0156)
OTHER TETRACHORDS CONTAINING A 3-3	OTHER TETRACHORDS CONTAINING A 3-4	OTHER TETRACHORDS CONTAINING A 3-5
4-2 (0124)	4-4 (0125)	4-5 (0126)
4-4 (0125)	4-5 (0126)	4-13 (0136)
4-Z15 (0146)	4-11 (0135)	4-Z15 (0146)
4-18 (0147)	4-19 (0148)	4-16 (0157)
4-19 (0148)	4-16 (0157)	
4-12 (0236)	4-14 (0237)	

A′ section because of the brief silence in measure 25 and the quiet dynamic level in both the cello and piano. In the A section, there are few occasions when both the cello and piano have simultaneous rests. Also, the last seven measures of the section (m. 19-25) grow increasingly more quiet, culminating in *ppp* by measure 24 and a decrescendo in the cello in measure 25.

Besides helping to define the form as A A′, the opening motive of the piece provides evidence of the primary harmonic materials (three-note set classes and four-note supersets.) It is the first example of a set class that is generated by overlapping 3-3s and establishes the primary motive that is developed across the movement.

In the A section, tetrachords that maximize 3-3 (014) trichords in their prime form are featured prominently. Table 9 categorizes the different ways 3-3 (014), 3-4 (015), and 3-5 (016) combine with themselves and with each other to form tetrachords that either maximize or minimize these trichords in their prime forms.

Each column is divided into three sections: tetrachords that maximize contiguous trichords in their prime forms, tetrachords that maximize non-adjacent trichords in their prime forms, and tetrachords that contain one trichord as a subset in their prime forms. Notice that the shaded areas and dashed lines outlining some boxes in the third category, show that some set classes are shared among columns.

For example, tetrachord 4-7 (0145) contains two contiguous 3-3s in its prime form—{014} and {145}. Although 4-7 also contains two 3-4 (015) trichords—{015} and {045}, in this case the 3-4s are non-adjacent. Tetrachords 4-4 (0125) and 4-19 (0148) can be characterized as sharing one 3-3 and one 3-4 in their prime forms. Set class 4-4

contains one 3-3 with {125} and one 3-4 with {015} and set class 4-19 contains one 3-3 with {014} and one 3-4 with {018}. (We will see that these three tetrachords are related more to the 3-3 category than the 3-4 category because they happen mostly in the piece's A section together with other 3-3 generated tetrachords.)

The middle column shows the different ways set class 3-4 (015) combines with itself to form tetrachords. Set classes 4-8 (0156) and 4-20 (0158) can be characterized as maximizing two contiguous 3-4s in their prime forms with {015} and {156} and {015} and {801} respectively. But, just as with 4-7 (0145) containing maximum 3-3s and 3-4s in its prime form, set class 4-8 (0156) can also be characterized as maximizing two non-adjacent 3-5s with {016} and {056} and so 4-8 also shows up in column three. Set class 4-7 (0145) maximizes two non-adjacent 3-4s in its prime form, and there are six tetrachords that can be characterized as having only one 3-4 trichord in their prime forms—set classes 4-4 (0125), 4-5 (0126), 4-11 (0135), 4-19 (0148), 4-16 (0157), and 4-14 (0237). As mentioned previously, some tetrachords can be described as having more than one type of trichord in their prime forms. Recall that set classes 4-4 (0125) and 4-19 (0148) each contains one 3-3 and one 3-4 trichord in their prime forms. In the middle column, set classes 4-5 (0126) and 4-16 (015) each contain one 3-4 and one 3-5 trichord in their prime forms. 4-Z15 (0146) is the only other tetrachord that can be described as containing different trichords in its prime form; in this case it contains one 3-3 and one 3-5 trichord.

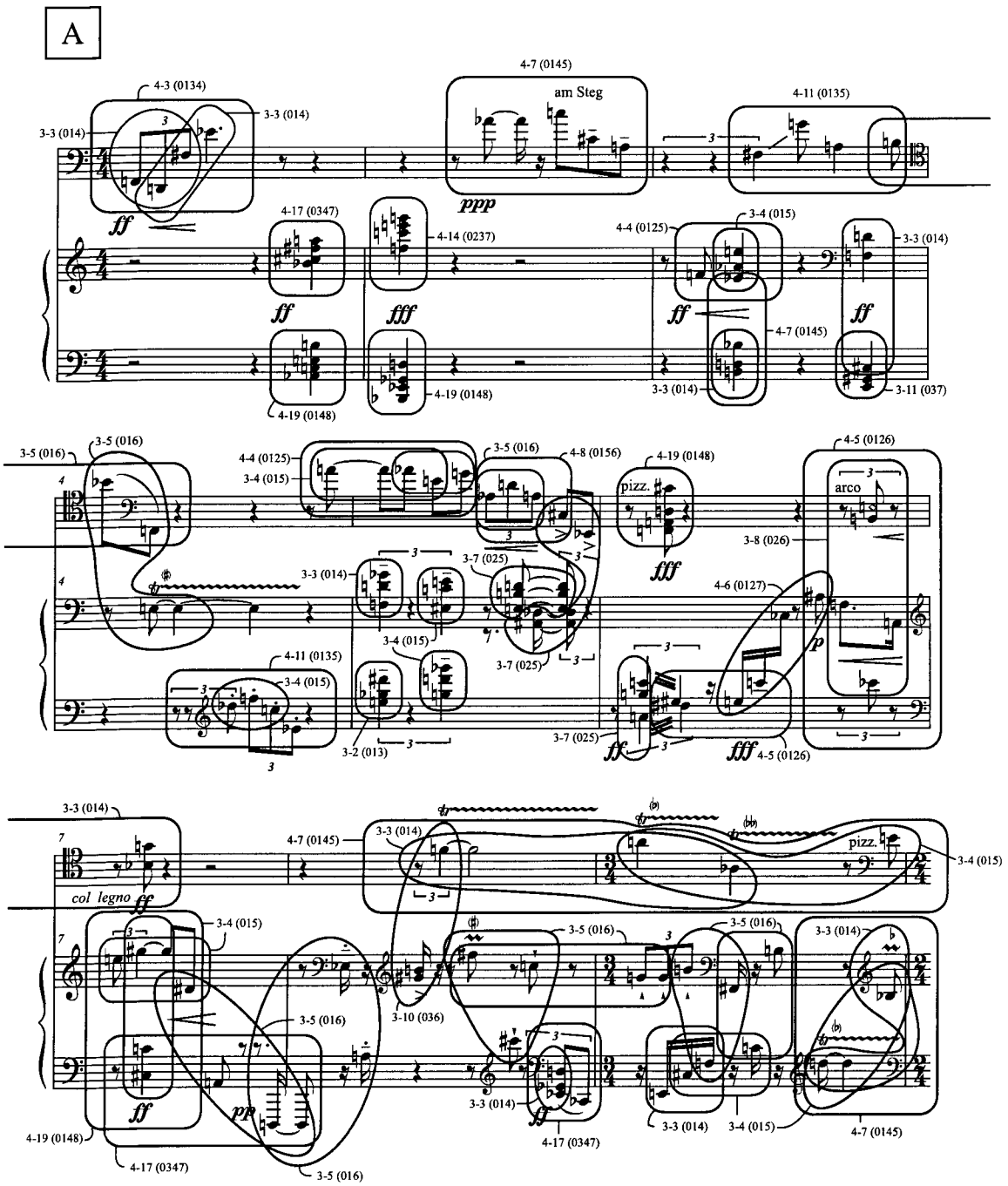
Finally, the right column shows the different ways in which set class 3-5 (016) combines with itself to form tetrachords. Set class 4-9 (0167) is the only tetrachord that

maximizes contiguous 3-5s in its prime form with {016} and {167}. However, there are two tetrachords that maximize set class 3-5 in another way—with two non-adjacent appearances of 3-5 in their prime forms. The first tetrachord is set class 4-8 (0156) that we initially saw in the 3-4 column. In the third column 4-8 (0156) maximizes two non-adjacent 3-5s with {016} and {056} in its prime form. The other tetrachord is set class 4-6 (0127) that maximizes non-adjacent 3-5s with {017} and {127} in its prime form. There are four tetrachords that can be described as containing one 3-5 trichord—set classes 4-5 (0126), 4-13 (0136), 4-Z15 (0146), 4-16 (0157). Set class 4-13 (0136) is the only tetrachord that does not contain either 3-3 or 3-4 in its prime form other than 3-5.

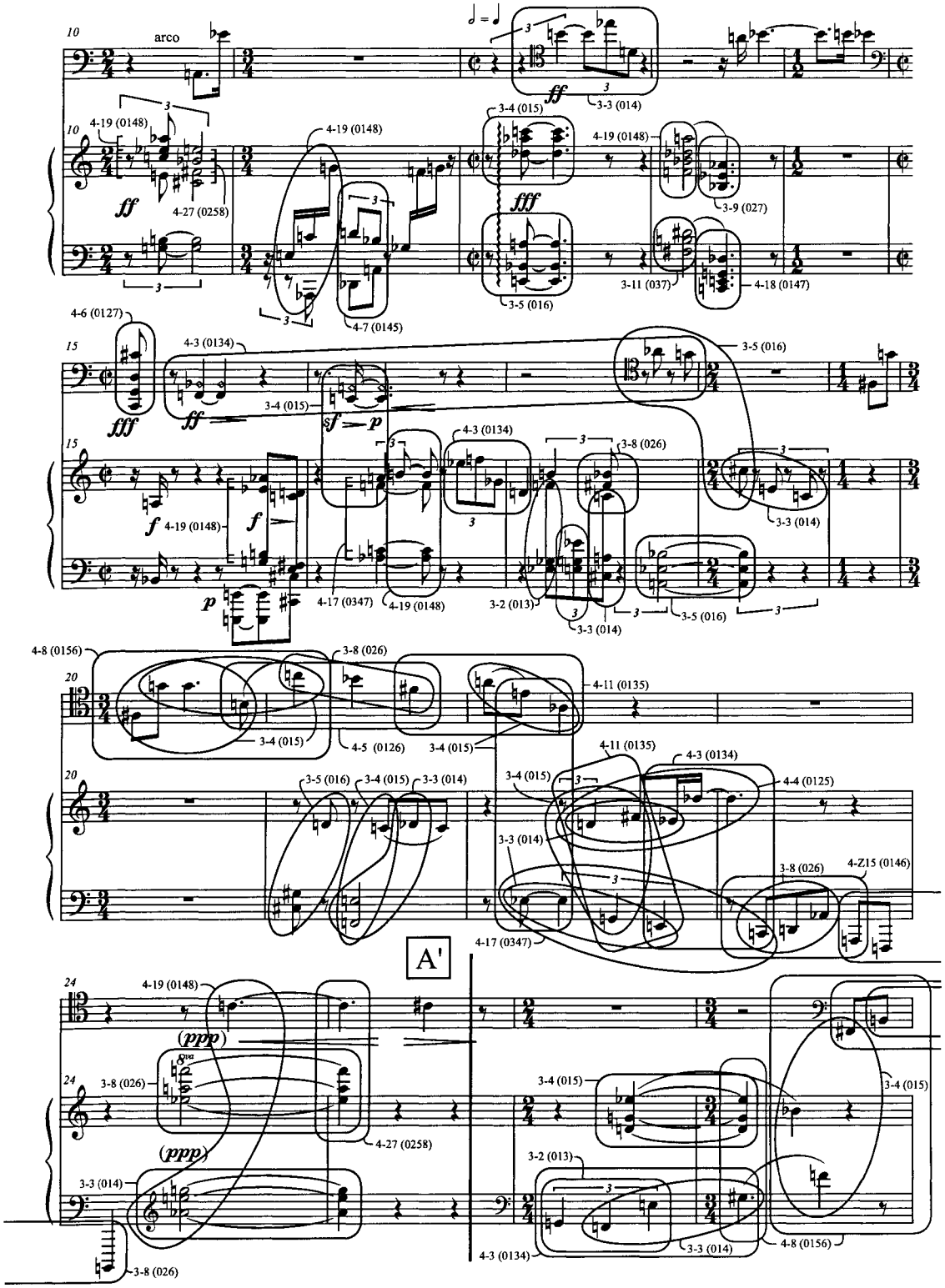
Table 9 reveals that there are a total of eighteen distinct tetrachords that create the harmonic repertoire of Webern's *Cello Sonata*. The tetrachords described here represent a relatively small harmonic repertoire that is involved in an interval expansion of prime forms across the piece.

The expansion of intervals of the prime form happens at two different levels. At what I will call the background level, it occurs with the different tetrachords that maximize a given trichord in their prime forms. In addition, at the surface level, there are ordered expansions and contractions of the three trichords (3-3, 3-4, and 3-5) that create the tetrachords. These trichords reflect, in miniature, what is happening with prime form intervals of tetrachords across the piece. First I will discuss the underlying process involved with the tetrachords. Example 20 illustrates the harmonic material on the next three pages.

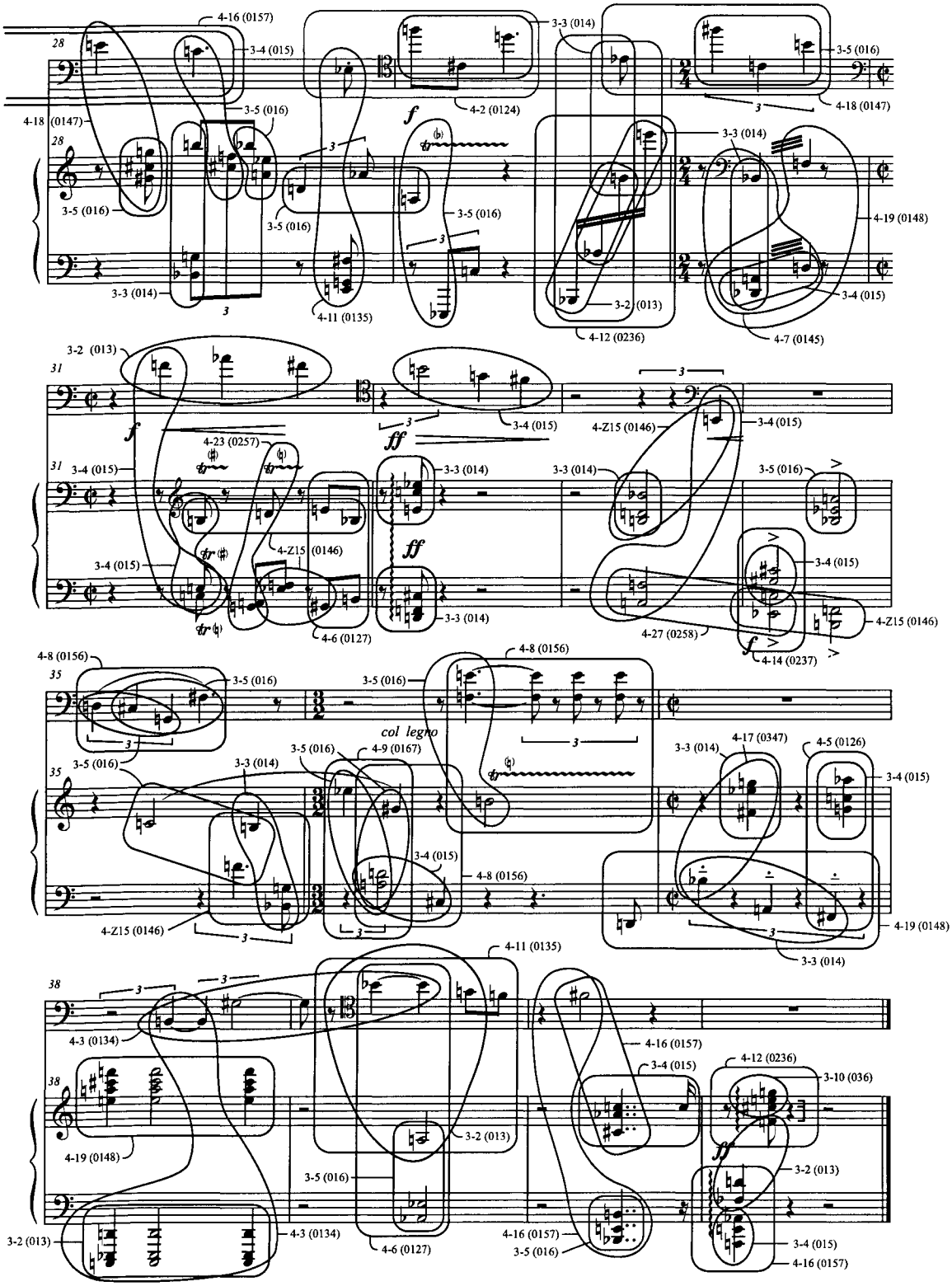
EXAMPLE 20: Harmonic Analysis of *Cello Sonata* (m. 1-9)



EXAMPLE 20: *continued* (m. 10-27)



EXAMPLE 20: *continued* (m. 28-41)



When we examine which tetrachords are maximized in each section we discover that the A section makes the most use of tetrachords that maximize 3-3 trichords in their prime forms with little crossover to the other categories. The A′ section however, contains a drastically reduced number of 3-3-containing tetrachords and instead utilizes tetrachords that maximize 3-4 in the prime form. Table 10 summarizes the tetrachords contained within each section for comparison. Tetrachords that do not appear in either section are excluded.

TABLE 10: Tetrachord content of A and A′ sections *in Cello Sonata*

	A section	A′ section
MAXIMIZES CONTIGUOUS 3-3		
4-7 (0145)	6	2
4-17 (0347)	5	1
MAXIMIZES NON-ADJACENT 3-3		
4-3 (0134)	3	3
OTHER TETRACHORDS CONTAINING 3-3		
4-4 (0125), 4-19 (0148)	11	2
4-Z15 (0146)	0	4
4-18 (0148), 4-12 (0236)	1	4
MAXIMIZES CONTIGUOUS 3-4		
4-8 (0156), 4-20 (0158)	1	5
OTHER TETRACHORDS CONTAINING 3-4		
4-11 (0135), 4-14 (0237)	5	5
4-5 (0126), 4-16 (0157)	1	5
MAXIMIZES CONTIGUOUS 3-5		
4-9 (0167)	0	1
MAXIMIZES NON-ADJACENT 3-5		
4-6 (0127)	1	1
OTHER TETRACHORDS CONTAINING 3-5		
4-13 (0136)	0	1

As an illustration of the background interval expansion process, I would like to compare the opening four-note cello gestures of the A and A′ sections. In measure 1 the first four pitch classes in the cello {5, 2, 6, 3} create set class 4-3 (0134), a tetrachord that maximizes only 3-3s in its prime form. In measures 27-28 of the A′ section, the pitch classes {6, 11, 4, 0} create set class 4-16 (0157), a tetrachord that contains no 3-3s in its prime form but can be characterized as having both a 3-4 and a 3-5 trichord in its prime form. The last two intervals of the prime form of the first tetrachord have increased by a whole- and half-step respectively. This relationship between prime forms does not translate directly to the ordered pitch intervals and contours of the two sets. But, perhaps there is a hint of the more abstract expansion in the way Webern expands the middle ordered pitch interval of the first set < +16 > to < +17 > as the middle interval of the second set, or in the fact that the first set reaches only as high as E♭4, while the second set attains E♮4. While this is a surface level comparison of two tetrachords between sections, it is meant as an illustration of what is happening at an underlying level. The interval expansion of prime forms across the work does not occur in a linear fashion, from tetrachord to tetrachord, rather there is a gradual shift that occurs between sections whereby tetrachords belonging to the 3-3 category evident in the A section are essentially replaced by tetrachords belonging to the 3-4 category in the A′ section.

As mentioned previously, there is a surface level process with trichords 3-3 (014), 3-4 (015), and 3-5 (016) that reflects on a smaller scale the interval expansion among tetrachords across the work. The trichords highlighted are not isolated subsets, but appear as three-note melodic figures or chords initiated by simultaneous attacks. These trichords

consistently participate in an ordered expansion or contraction of intervals of their prime forms. In some cases, trichords not belonging to the three set classes 3-3, 3-4, and 3-5 provide further expansion or contraction of the prime forms.

Measure 5 provides an example of a gradual expansion of the intervals of prime forms expressed as chords. Pitch classes {4, 6, 3} in the left hand of the piano form set class 3-2 (013) and are heard simultaneously with pitch classes {5, 2, 6} in the right hand of the piano that form set class 3-3 (014). The next two chords in the piano both form set class 3-4 (015) with pitch classes {7, 2, 6} and {5, 0, 4}; they are related by transposition. The next trichord is formed by pitch classes {4, 11, 2} and creates set class 3-7 (025). The intervals of the prime forms of these trichords form an ordered expansion—3-2 (013) to 3-3 (014) to 3-4 (015) to 3-7 (025).[38]

One other notable chain of expansion in the intervals of trichord prime forms occurs in the last three measures of the piece. Concentrating on the harmonic materials in the piano reveals that in measure 39, pitch classes {8, 3, 9} form set class 3-5 (016). In the left hand of measure 40 the pitch classes {10, 4, 11} form another 3-5 trichord—an inversion of the previous 3-5. In the right hand of measure 40, pitch classes {1, 8, 0} form set class 3-4 (015). Examining the last two chords reveals that Webern duplicates pitch class 4 in the first chord in measure 41. Webern rarely repeats pitch classes in a single sonority. Further, these chords are 'rolled' so each pitch class can be heard

[38] Set class 3-7 (025) both expands and contracts. Previously, the interval expansion in the prime form occurred between the second interval and the outer interval (i.e. from 3-3 (014) to 3-4 (015), the half step is retained between sets, the second interval expands from 3 half steps to 4 and the outer interval expands from a major third to a perfect fourth.) In the case of the expansion of 3-4 (015) to 3-7 (025), the first interval has expanded to a whole step, the outer intervals, the perfect fourth, have been retained, and the second interval has been contracted by a half step. So, in this case while the outer intervals have not expanded, the expansion from half- to whole-step is an interval expansion of prime forms.

individually and the chords are not perceived as chord successions but as one sonority. Because of the repeated pitch class and texture, I believe that these chords can be divided into three registrally salient trichords. The lowest sounding trichord with pitch classes {9, 4, 8} forms set class 3-4 (015), a transposition of the previous 3-4 trichord, the median sounding trichord with pitch classes {4, 2, 5} forms set class 3-2 (013), and finally pitch classes {1, 4, 7} in the highest register form set class 3-10 (036), the diminished triad. Initially there is a contraction of intervals from set class 3-5 (016) to 3-4 (015) from measure 39 to 40 but in the final measure there is both a contraction to set class 3-2 (013) and an expansion to set class 3-10 (036) to complete the piece. I believe this dual expansion and contraction of prime form intervals at the end reinforces the idea that musical elements become more unclear as the piece progresses. (It would have been more clear, in this context, if the prime form intervals had continued to contract.) As we will see this progression toward a lack of clarity also occurs in the motivic successions in both A and A′. In the examples I have just considered, the trichord expansion occurs between chords but there are also occasions where the interval expansion occurs between melodic three-note gestures.

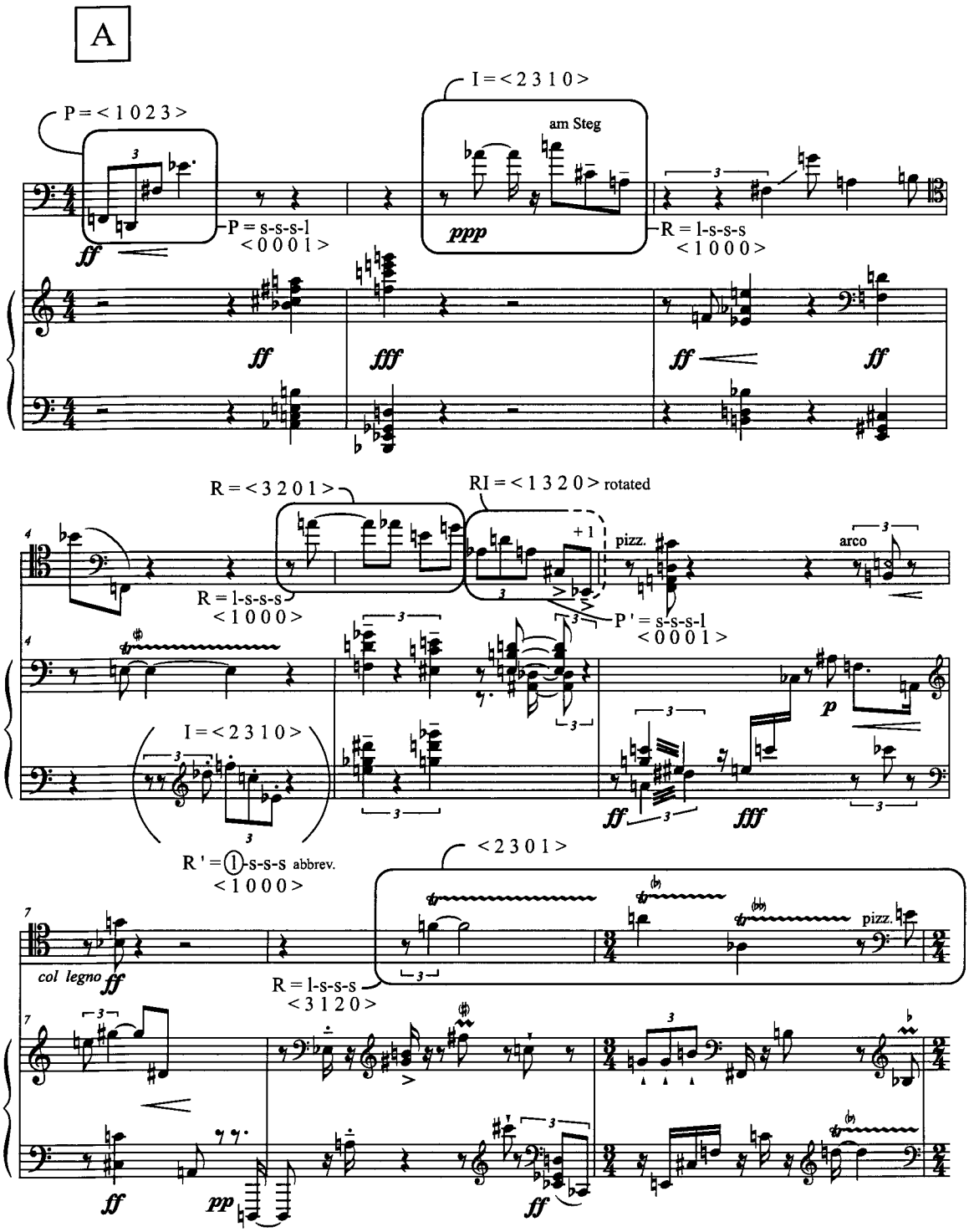
From measure 6 to 8 there is a gradual expansion of intervals of melodic trichords. In the cello, pitch classes {11, 10, 7} form set class 3-3 (014). In measure 7 in the piano, pitch classes {4, 8, 3} form set class 3-4 (015)[39] which is immediately followed by pitch classes {9, 2, 3} in a lower register to form set class 3-5 (016). Another

[39] The chord that is formed in the piano also forms set class 3-4 (015), an inversion of the melodic figure in the piano.

3-5 occurs in measure 8 with pitch classes {6, 1, 0} in the right hand of the piano. This trichord is a transposition of the previous 3-5 and has the same contour but it is heard in a higher register. The melodic trichords unfold an interval expansion of their prime forms from set class 3-3 (014) to 3-4 (015) to 3-5 (016). In at least some cases, the interval successions reflect the same expansions. For example, the 3-4 trichord in measure 7 has a pitch interval succession of < +4 -17 > that is immediately followed by the 3-5 trichord in measures 7-8 with the pitch interval succession < -19 +25 >. We can see that between these two trichords each interval has expanded (though they have opposite contours.)

There is also a developmental process involving motivic variation of tetrachords, which plays an important role in contributing to coherence. I believe the process of variation that unfolds across the work has much in common with the process of 'focusing' described in *Three Short Pieces*, Op. 11 but it moves in the reverse direction. Recall that in Op. 11 the harmonic repertoire was unclear or only suggested in the first movement, clarified or realized in the second movement, and then distilled into its bare essentials in the final movement. In the *Cello Sonata* motives at the beginning of the piece are clear and salient segmentations. As the piece progresses the motives become less easily identified due to the different types of distortions applied to the motives. By the end of the piece Webern combines many different variations in the final cello gesture, culminating in the most extreme deformation or the most unfocused segmentation due to remote variations of the motive.

EXAMPLE 21a: Four-note motives in *Cello Sonata* measures 1-9



The motives are identified by the generalized durational pattern of short-short-short-long (s-s-s-l), which will be referred to as the prime form (P) of the motive.[40] Motives are often highlighted by rests before and after the four-note successions, or some other parameter suggests the grouping like register or rhythmic changes. In the A section, almost all the motives occur in the cello. Examples 21a and 21b illustrate these motives. The duration successions appear below the motive and an indication if it is a transformation. The letters R, I, and RI refer to retrograde, inversion, and retrograde inversion respectively.

The first motive occurs in measure 1 and represents the source rhythmic pattern to which the following motives will be compared; its prime form. The second motive occurs in measure two and reverses the durational ordering to a slightly longer note followed by three shorter notes. In fact, it is a retrograde of the original pattern. The third motive occurs in measure four in the piano. It contains the same eighth note triplet figure as the opening motive but is perceptibly more closely linked to the second instance of the motive as a variant based on rhythm and contour. The third instance of the motive has been abbreviated to four notes of equal duration. I believe that this motive is an abbreviated retrograde of the durational pattern because the triplet eighth notes have been previously grouped as the three short durations. In addition, the second and third motives have the same contours and similar durational patterns. The shortening of the long duration represents a variation of the pattern but nonetheless can be linked to both the original pattern as a retrograde and to the second motive in measure 2.

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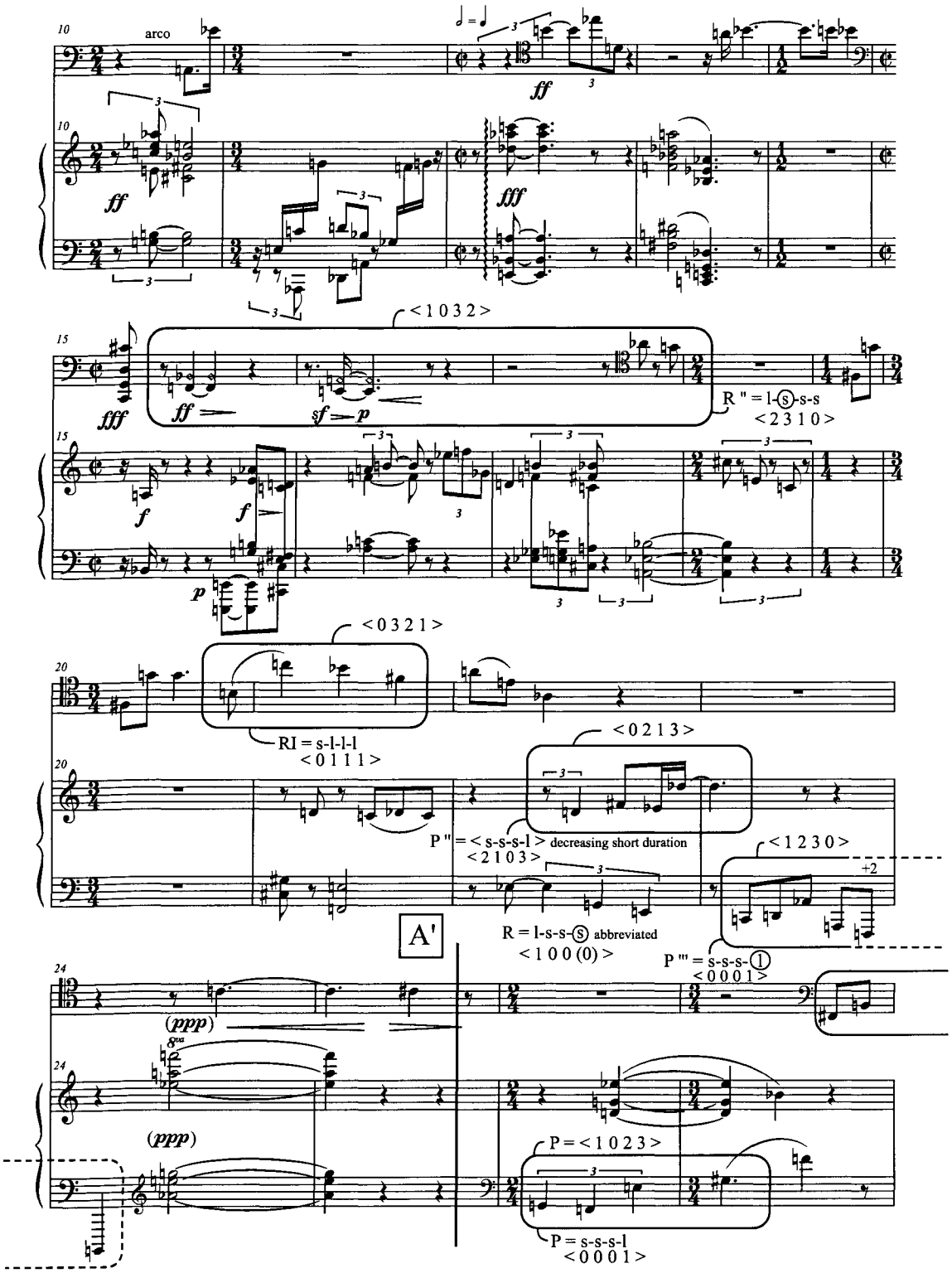
[40] Other versions include the retrograde (l-s-s-s), the inversion (l-l-l-s), and the retrograde inversion (s-l-l-l) of the prime form (s-s-s-l).

The next two motives occur in measures 4-5 and are less easily identified because they occur in succession without a rest to separate them, and a note has been added to the second motive, making it a five-note motive. The first of these motives occurs with the upbeat to measure 5 as outlined in Example 21a. It is a retrograde of the original durational pattern and it spans the same number of beats as the motive in measure 2. Immediately following the retrograde just described is a prime form of the durational pattern but with some development. It begins with the characteristic three-triplet eighth notes but instead of a single longer note Webern expands the motive to include five notes. The one long note to complete the pattern has been divided into two notes that together form the 'long' duration of the pattern.

The next motive extends from measure 8 to 9 in the cello. It is yet another retrograde of the durational pattern but the motive is augmented rhythmically taking about six beats to complete. Webern is lengthening the motive while still maintaining the durational proportions of the pattern. The following motive takes even further this idea of drawing out the motive over time. This motive occurs in measures 15-17 and takes eleven beats to complete. See Example 21b. The first two notes, pitch classes 5 and 4, have longer silences following them that make the four-note motive less easily apprehended. The motive is another retrograde of the durational prime form although the first 'short' duration is only slightly shorter than the 'long' duration. In these ways Webern is developing the original motive and obscuring it at the same time.

Example 21b: Four-note motives in *Cello Sonata* measures 10-27



In the last few measures of the A section, Webern obscures the durational motive even more. In measures 19-22 in the cello, there is a succession of nine pitch classes that do not clearly group into motives. The eighth-note upbeat to measure 21 and the three quarter notes in measure 21, metrically reminds me of the third motive of the piece in measures 4-5. If we consider measure 20-21 a motive obscured by successions of pitch classes, then this motive is, in fact, a *retrograde inversion* of the original motive. Here the durational successions are short-long-long-long (s-l-l-l). This is the first occurrence of a motive other than a prime or retrograde form. By not having a clear four-note segmentation the motive is obscured and results in a new version of the original motive not seen before.

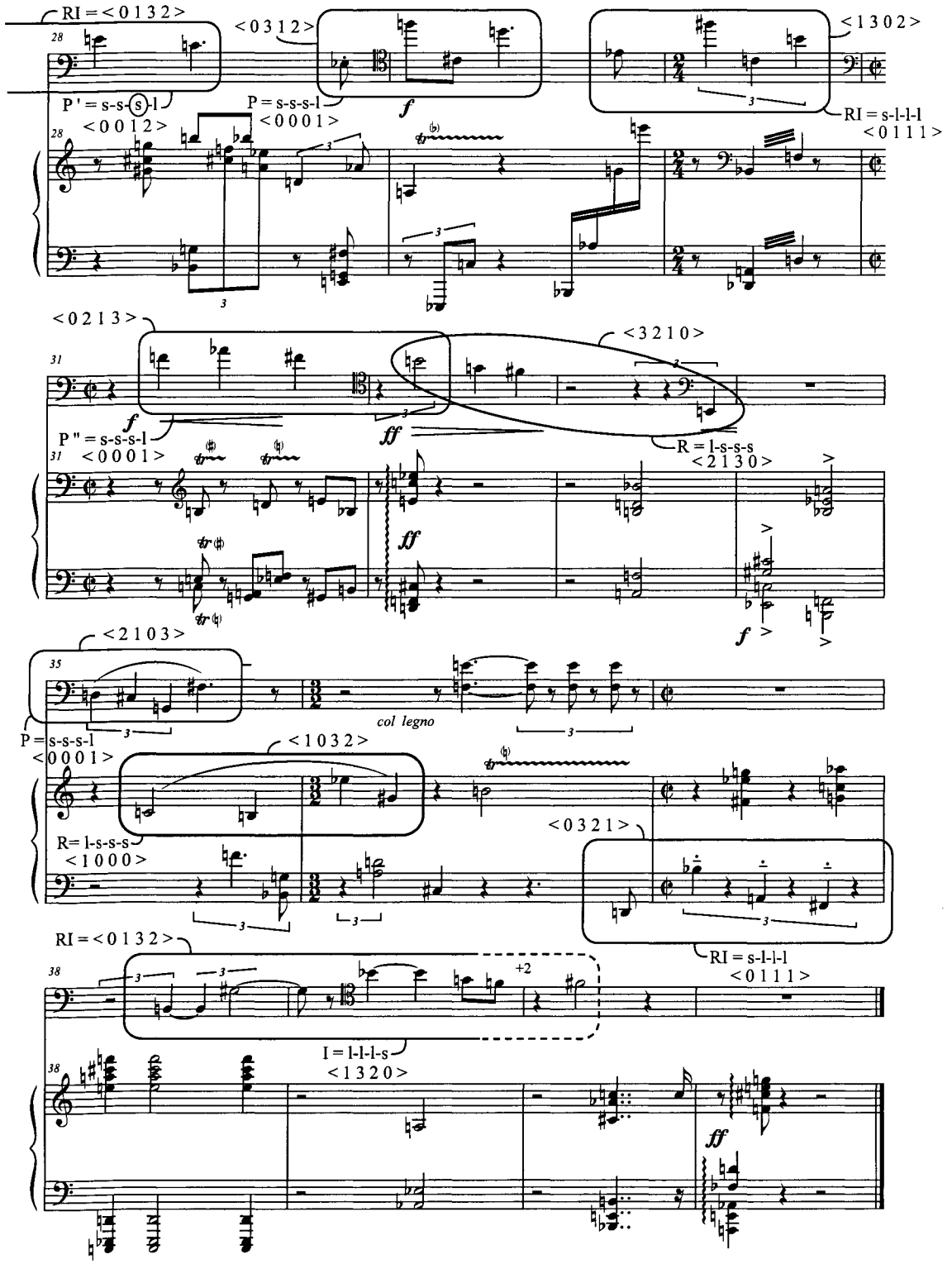
While most of the motives have appeared in the cello part the final three motives of the A section appear in the piano from measure 22 to 23. In the left hand of the piano in measure 22 we notice a uni-directional triplet figure that may remind us of the opening motive. However, this motive has been abbreviated to only three notes. This would have been yet another retrograde of the durational pattern but instead the final 'short' note is missing. The next motive in the left hand of the piano occurs in measure 23 and is reminiscent of the elongated motive in measure 5. In measure 23 the motive begins with three short notes and just as in measure 5, the 'long' note that would have completed the pattern has been augmented with an additional eighth note plus a quarter note in measure 24. The abbreviation and augmentation of motives contributes to variation and obscures our ability to recognize the original motive.

The final motive of the A section occurs along with the motive described in measure 22. In measure 22, in the right hand of the piano, the four-note motive is representative of the s-s-s-l pattern but the 'short' succession of pitches, while shorter than the 'long' duration, decrease in duration from a triplet quarter note to an eighth note to a sixteenth note. Previously the 'short' durations of the motives have been equivalent in duration for the most part. The varying short durations in this motive contribute to a deformation of the original motive that causes it to be less easily apprehended.

In the A section, many of the motives clearly project a version of the prime durational pattern (s-s-s-l) expressed by the first motive of the piece. Webern seems to be utilizing the prime and retrograde versions of the pattern for the most part (there is one inversion). Variation occurs by abbreviating or lengthening the duration of a note or notes, by drawing out the time it takes to complete the motive, by adding rests in between notes, or by obscuring the segmentation. This results in a kind of 'deformation' or unfocusing of the opening motive by the end of the A section.

The A′ section starts with the prime form of the durational pattern in the piano, outlined previously in Example 21b. The characteristic triplet figure followed by a long note is not highlighted as well as the opening motive of the piece (because of the addition of another note), but as mentioned previously, the opening motives of each section have the same contour, set class, and similar ordered pitch interval successions. Choosing the next motive is not entirely obvious at first glance. From measure 27 to 30 (See Examples 21b and 21c) in the cello there is a string of pitches that are not partitioned into smaller groups by rests. Towards the end of the A section the four-note segments were unclear

EXAMPLE 21c: Four-note motives in *Cello Sonata* measures 28-41



and consequently the motive is obscured. Webern is doing the same thing near the beginning of the A′ section. I believe the next motive in the A′ section occurs in the cello from measure 27 to 28 because of rhythm and contour. This is another prime form of the durational pattern with a slight variation. Only two of the three 'short' durations are of equal value and the third is twice as long in duration but not as long as the 'long' duration. We saw in the previous section that lengthening the duration of a note develops the motive. What is different, however, is that the leaps between notes of the four-note motives begin to become larger than they had been in the A section. The large leaps tend to break up the motive into portions, (for instance, the +17 leap between the pitches B of measure 27 and E of measure 28) resulting in the motive not being easily apprehended as a whole. Webern is further obscuring the motive by liquidating the motive into smaller parts (like F♯—B, E—C in measures 27-28).

Immediately following there are two motives that occur in the cello from measure 28 to 30. See Example 21c. The first occurs with the upbeat to measure 29 and the second occurs with the upbeat to measure 30. These motives have the same metric presentation as the motive in measure 21 of the A section. The motive in measure 29 is another prime form and the motive in measure 30 is a retrograde inversion, the same as the motive in measure 21. Notice that there are large leaps between successive pitches that result in motives fragmenting into dyads. In fact, the first three cello motives of the A′ section are fragmented in this manner. In measures 27-28, the first and last two pitches of the motive group together because of the +17 leap from B—E. In measures 28-30, these two motives

have successive large leaps between adjacent pitches creating a kind of compound melody. The interval pitch successions of these motives are < +26 -16 +13 > and < +15 -18 +11 > respectively. Consequently, pitches E♭—C♯ and F—D in measures 28-29 and pitches E♭—C and F♯—B in measures 29-30 can be heard as isolated dyads. The large leaps are contributing to motivic liquidation and the 'deforming' of the original pattern. The succession of pitches from measure 27 to 30 actually divide into three motives that are representative of the durational pattern set forth at the beginning of the piece even though motivic liquidation helps to obscure the segmentations.

The motives in the cello from measure 31 to 33 overlap each other and pose a challenge in terms of segmentation. The first motive extends from measure 31 to 32 as a prime form of the durational pattern. What is different from other appearances of the motive is that the 'long' duration is separated from the three-note grouping by a rest. The difficulty in segmentation arises with this 'long' duration on pitch class 11 in measure 32 because it also seems to initiate the next motive from measure 32 to 33. There is a similar problem of segmentation with this motive as well. While the 'long' duration is immediately followed by two 'short' durations, the final 'short' duration is separated by rests, and sounds alone. However, this l-s-s-s pattern is a retrograde of the original motive. Webern here is maintaining the expected durational patterns but because the completion of each durational pattern is interrupted by rests and because the 'long' duration in measure 32 is serving double duty, the result is similar to the effect of having large leaps between notes of the motives; the motives are broken into smaller segments. For example, the four-note motive in measures 32-33 is fragmented into two parts—a

trichord and a single note. Because these musical events are separated by almost a measure of rests, the motive is heard as a three-note grouping in measure 32 followed by a single sounding pitch in measure 33. As a result, motivic liquidation causes the four-note grouping to be less easily recognized.

In measure 35, Webern returns to a clear and salient segmentation of the prime form of the durational motive. In terms of rhythm, it recalls the motive that initiates the A′ section in measures 26-27 in the piano with triplet quarter notes followed by a dotted quarter note. Another motive also begins in measure 35 in the right hand of the piano. This one is a retrograde, which is then followed by a retrograde inversion in measures 36-37 in the left hand of the piano. In both cases large leaps between notes contribute to liquidation of the motive into smaller chunks just as in measures 27-30. The retrograde inversion of the motive in measures 36-37 is almost identical to the retrograde inversion seen in measures 29-30. The durations extracted rhythmically in both are an eighth note followed by three triplet quarter notes. However, in measure 37 Webern has lengthened the time span it takes to complete the motive by adding rests to separate the 'long' durations. This is also the last clear four-note segmentation of the motive.

In measures 38-40, Webern deforms the motive to its furthest point by combining all the different variation techniques discussed up until this point. First, this is the only time that the inversion of the durational motive has been used—l-l-l-s. Second, the 'long' durations are of varying lengths though they slightly increase in duration as the 'long' durations progress. Third, there are large leaps between notes, particularly for the notes of 'long' duration. Fourth, the four-note motive has been expanded to include one or two

additional notes. The 'short' duration is stretched out with the addition of another eighth note. Finally, the durational motive is further deformed with the final note in the cello in measure 40. It has been separated from the previous five notes with a rest but I believe it should be included as part of the final motive of the piece because it is similar to the development of the motive seen in measures 23-24. It seems that Webern takes the durational motive to an extreme, unfocused form in measures 38-40.

In summary, in the A′ section, Webern includes many more prime form motives than were present in the previous section and the only occurrence of the inversion of the original motive to end the movement. The different variations of the motive across each section do reinforce the formal structure of the work. As we have discovered, both sections begin with the same motive. In fact, these are the only two motives that share many of the same musical parameters including set class, contour, and similar pitch interval successions. Each instance of the motive initiates a process of development across its respective section. In this way, the form, A A′ is highlighted by a two-stage process: each section begins with the prime form of the durational motive and Webern obscures the motive by using different variation techniques including a variety of transformations of the durational pattern, adding successive notes to make larger collections and consequently unclear segmentations, adding rests between successive notes, fragmenting the motive by making large leaps or shortening the motive itself to three notes. By the end of the A section, the original motive has been transformed and

obscured to some degree, but by the end of the A′ section the original motive has been transformed to its extreme because Webern combines all the variation techniques in the final appearance of the motive.

Examining the relative 'short' and 'long' duration successions of motives is one way to describe motivic development through what is essentially rhythm. In the 1991 article, "The Perception of Rhythm in Non-Tonal Music: Rhythmic Contours in the Music of Edgard Varèse," Elizabeth West Marvin describes a type of rhythmic contour that may be understood as analogous to melodic contour.[41] Marvin proposes a type of temporal space called duration space, which is comparable to contour space, with one caveat. In contour space, melodic contours can be aurally recognized with accuracy regardless of context. However, rhythmic contours, in duration space, are influenced by a listener's perception of the meter. Marvin asserts that when the beat level is difficult to perceive, rhythmic contours best describe the listener's perception of relative short and long durations. For this reason, Marvin considers only non-metrical works.[42] I will include a brief discussion of "d-segs" in the *Cello Sonata* after reviewing some terminology.

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[41] Melodic contours represent relative pitch height and rhythmic contours represent relative duration. In both cases a precise measurement of interval span or durational span is not calculated.

[42] I would not describe Webern's *Cello Sonata* as 'non-metrical,' though there are parts of the music that the beat may not be easily discernable, but after a conversation with Marvin in March 2005 and upon her suggestion, I considered the rhythmic contours in duration space based on the motives I already identified in Examples 21a-c.

According to Marvin, duration space (d-space) consists of elements arranged in order from short to long. Elements in d-space are termed durations (durs) and are numbered beginning with 0 up to (n-1), where n equals the number of elements. A d-segment (d-seg) is defined as an ordered set of durations in d-space. When determining the numbering of durs from short to long, one must take into account the temporal span that extends from the onset of one dur to the onset of the next dur. This temporal span is called the 'inter-onset interval' and it is this consideration that separates duration space from contour space because d-space compares pairs of points (onset to onset) while c-space compares points in space.[43]

Returning to Examples 21a-c, (See pages 100, 103, and 106 respectively) d-segs are noted immediately below the duration successions (labelled s-s-s-l or some transformation). Of the twenty motives outlined in the score, we notice that only six of the d-segs do not have equivalent durations for the repeated duration of the succession. For example, for a prime or retrograde form of the duration succession, the notes of the repeated 'short' duration are of equal value. In the case of a retrograde inversion of the duration succession (s-l-l-l), (like measures 20, 30, or 37), the notes of the repeated 'long' duration are of equal value. For the most part, Webern maintains similarities between motives by keeping the same duration for the repeated notes in the duration succession. The relative 'short' and 'long' duration successions do not provide this kind of information because a 'short' duration is determined by the relative length of the 'long' duration. For example, in measure 22, in the right hand of the piano, (Example 21b) I

[43] Elizabeth West Marvin, "The Perception of Rhythm in Non-Tonal Music: Rhythmic Contours in the Music of Edgard Varèse," *MTS* 13/1 (1991), 66-67.

have labelled the motive P " because of the development of the 'short' duration. The 'short' durations are not equal, in fact, they are decreasing in length, but they are all shorter than the 'long' duration. The relative 'short' and 'long' duration succession approach I employ takes into consideration motivic development by relating changes to a normalized version. Doing this can sometimes be more helpful than just examining a d-seg.

For example, the motive in measure 8-9, illustrated in Example 21a, is labelled as a retrograde of the prime form duration succession. However, when you take into account the inter-onset interval, its d-seg is < 3 1 2 0 >. The d-seg does not reflect a strong connection with the d-seg < 0 0 0 1 > associated with the prime form of the motive in measure 1. I am not convinced that we hear four different durations, which would make the original motive more difficult to hear. There is clearly a long duration to start the motive in measure 8, followed by two quarter notes, and finally a brief rest and a shorter eighth note. We may have expected another trill on the last note of the motive instead of the pizzicato but I do not think the listener misses the l-s-s-s durational pattern. By examining the d-segs in the *Cello Sonata* we discover that the repeated durations of a succession are preserved.

Other aspects of the motive undergo development besides the durational pattern. A similar process of development occurs with contour across the work. I will use the same motives outlined in Examples 21a through c. These motives are compared using a type of contour equivalence relation that involves c-space segment class (csegclass); an equivalence class whereby c-segs are related by identity (prime), retrograde, inversion,

and retrograde inversion.[44] In measure 1 the contour of the opening motive is < 1 0 2 3 > which will serve as the prime version of the motive. In measure 2 the motive is presented in contour inversion, < 2 3 1 0 >. The next motive from measure 4 to 5 is a contour retrograde < 3 2 0 1 > of the motive. The following motive, also in measure 5 represented as < 1 3 2 0 > is a contour retrograde inversion of the motive but it is rotated. The retrograde inversion, if presented as the other transformations had been, would actually be < 0 1 3 2 > but the version presented in the music has the lowest note happening last instead of first. However, the correct order of the retrograde inversion is retained when starting from 0 in < 1 3 2 0 >. To this point the successive motives are all transformations of the prime contour < 1 0 2 3 >. The rotated retrograde inversion varies the contour in an unexpected way so that its transformation is obscured. In fact, none of the contours of the motives in the remainder of the A section are transformations of the prime contour. It seems that Webern maintains similarity of contour at the beginning of the piece and then discontinues use of the contour transformations in order to create development across the section.

In measure 26 of the A′ section, the motive returns to the familiar contour < 1 0 2 3 > first heard at the opening of the piece. The next motive in measures 27-28 is a clear instance of retrograde inversion < 0 1 3 2 > of the prime contour. Until we get to the final motive of the piece, there are no further contour connections to the prime version. Webern, even more quickly than in the A section, is moving away from the

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[44] There are two equivalence classes proposed by Morris. In Op. 11 c-segs were compared with respect to their comparison matrices. In the *Cello Sonata*, c-segs are compared with respect to csegclass although specific transformations of a prime csegclass can be described in terms of changes in the '+'s and '-'s of the COM-matrices. See Marvin and Laprade (1987), 231-235.

transformations of the prime contour. However, for the final motive, Webern returns to a retrograde inversion transformation of the contour, rounding off the motivic process in a subtle way. It is interesting that, as we learned in the previous discussion, the final motive can be described as an extreme form or the most unfocused durational motive to end the movement but, unlike the A section, Webern's final motive does retain similarities to the prime contour even though it is the least easily apprehended of the four transformations.

The processes at work in Webern's *Cello Sonata* closely match the unifying processes in his *Three Short Pieces*, Op. 11. (This is not surprising, given that Webern interrupted composing the *Cello Sonata* to write Op. 11.) In the *Cello Sonata* there is an interval expansion of prime forms of tetrachord supersets of 3-3 (014) to tetrachord supersets of 3-4 (015). This process is more abstract than the interval expansion of the 3-3 and 3-4 trichords in Op. 11/3 but they both constitute an overarching process of prime form interval expansion. While the gradual expansion of the harmonic repertoire happens at the background level in the *Cello Sonata*, surface level expansions involving pitch interval succession and prime forms of individual trichords reinforce the underlying harmonic expansion of the intervals of tetrachords across the work. Further, there is a process of 'unfocusing' involving the variations of the motivic structure. That is, unlike Op. 11, the process of 'focusing' moves in the opposite direction. At the beginning of the piece the four-note motive appears in its clearest or most focused form. As the piece progresses, transformations of the durational pattern and other variations of the motives themselves are developed resulting in the motives being less and less easily apprehended. By the end of the piece the motives have become unfocused. In the *Cello Sonata*, just as

in Op. 11, Webern expresses his own notions of unity through similar coherent and overarching progressions.

CHAPTER IV

Six Bagatelles for String Quartet, Op. 9

Literature Survey

Webern's *Six Bagatelles*, Op. 9, like *Three Short Pieces*, Op. 11, has received little critical attention as a whole. There are only three scholars who have undertaken an examination of Op. 9 in its entirety—Richard Chrisman (1979), Jeffrey Perry (1990), and Allen Forte (1998). Each of these analysts takes a different approach to investigating Op. 9. Chrisman focuses on unordered pitch collections and their recurring interval successions; Perry suggests a multi-dimensional counterpoint that is unique to each movement; Forte asserts, as he did for Op. 11, that the octatonic scale accounts for the pitch structure in all of Op. 9. I will summarize and examine each scholar's contribution, and include my own annotations where appropriate.

Analyses of Op. 9 are often limited to a single movement or only small portions of a movement. Several scholars have published analyses that discuss at least one movement in detail, including Pousseur (1959), and Forte (1994)[45] who discuss the opening movement. Kabbash (1984) examines the fourth movement, while Sallmen (2003), discusses the fourth movement and excerpts from movements one and three.

[45] Because Forte's 1994 analysis of the first movement is incorporated into his 1998 book, I will limit my discussion of Forte's interpretation to the more recent publication where he discusses the entire work.

Some analyses take only fragments of the music to illustrate a particular point, including Forte (1973) who uses part of the fourth movement to illustrate the basic interval pattern (bip) associated with set class 4-9 (0167): 556, and Berry (1987), who makes tonal references in the first three measures of movement one.

Jeffrey Perry's Ph.D. dissertation, "A Study of Anton Webern's Six Bagatelles for String Quartet, Op. 9" (1990) does not employ pitch class set theory, and he takes more of a compositional stance than a theoretical one. Perry makes linear connections between musical parameters like timbre, register, articulation, duration, tempo, and meter to create what he calls a 'multi-dimensional counterpoint.' He suggests each movement has a unique counterpoint but that there are linear threads that can be traced across movements, which give rise to a new contrapuntal system. Despite my best efforts, I was unable to obtain a copy of his dissertation for a more thorough review.[46]

Allen Forte is another scholar who discusses Op. 9 in its entirety in his book, "The Atonal Music of Anton Webern." (This is the same book in which his analysis of Op. 11, discussed in Chapter 2, appears.) Recall that Forte believes that the octatonic scale serves as a master superset to which all of Webern's motives and harmonies belong. Focusing on form and the octatonic design, I will examine Forte's analysis of Op. 9 and offer comments on the effectiveness of his approach as well as highlighting any discrepancies between our analyses of Op. 9.

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[46] I have derived the information provided here from Perry's dissertation abstract and through my personal correspondence with him.

Forte only discusses part of the formal structure of Op. 9/1. He suggests the A section extends from measure 1 to 5 and is divided into two parts (measures 1-3, ending on the pitch E2 in the cello, and measures 3-5) based on contour and octatonic threads. Refer forward to Example 22 on page 134 for the score. Tracing the octatonic threads across the A section, Forte accounts for all the pitch classes. While no octatonic collections overlap between the two parts of the A section, some pitch classes are shared among CI and CIII. (Recall that the different versions of the octatonic scale built on pitch classes 1 (C♯), 2 (D), and 3 (D♯), are called Collections I, II and III).

In measures 1 and 2, Forte highlights set class 4-13 (0136) with ordered pitch classes {3, 1, 0, 6}, (the same one I identify as a Kh subcomplex in my analysis), as belonging to CIII. In measures 2-3, Forte outlines another set class 4-13 with pitch classes {10, 4, 5, 7} in violin I as belonging to CI. What is of particular interest to him is that the pitch classes of the first set are transposed at T_4 and then presented in retrograde as the second set. Set class 4-13 in measures 1 and 2 he labels as a tetrachord fragment of CIII as well as a subset of 8-28 belonging to CII. In order to highlight 4-13 as a tetrachord of CIII, Forte must ignore the first pitch of the piece, but by using it as part of CII he can create the complete octatonic scale. As for measures 6-10, Forte does not offer any explanation.

Forte divides movement two into three sections: the first section extends from measure 1 to 2, the middle section from measure 4 to 6, skipping over measure 3 entirely, and the final section from measure 7 to 8, (though he does not explicitly identify this section). Refer forward to Example 24 on page 150 for the score. Forte identifies motivic

connections involving pitch and pitch-class motives comprised of chromatic dyads or three-note clusters in measures 1-2 and 4-6 and compares them. It is through these motivic connections that a sense of unity is achieved. However, many of the motives are not temporal. In terms of octatonic threads, in measures 4-6, Forte identifies 7-31 from CII and CIII as well as 6-Z13 from CI. These are larger subsets of the octatonic collection: the longer successions suggest that this brief passage is, in his words, "a model of lucidity." Forte, however, omits the final two measures, without explanation, from his analysis.

Forte's understanding of the formal structure of movement three is the same as mine. (For the score, refer forward to Example 26 on page 157). Forte divides the piece into two sections: the first section extends from measure 1 to 4, and the second from measure 5 to 9. He bases this determination primarily on the octatonic structure. Forte only discusses the first section and describes it as a complete octatonic cycle—CIII, CI, CII, CIII. His analysis of the octatonic design is incomplete leaving the reader to wonder if there are any octatonic connections in the second section.

Forte divides movement four into two sections: the first section extends from measure 1 to 4, and the second from measure 5 to 8 based on pitch and rhythmic strata. (I too, have the same interpretation of the form.) Refer to Example 28 for the score on page 164. Forte connects all pitch material to an octatonic collection, though pitches are shared among collections. According to Forte, Webern systematically assigned a different rhythm to each instrument (measures 1-6) and the increasing number of attacks (1, 2, 3, 3 respectively) creates proportions that result in a pattern of interactions among

instruments. By measures 7 and 8 the rhythmic strata disappear reflecting the notation *verlöschend* or dying out in the score. In terms of pitch strata, Forte details the connections between sections. For example, in measure 5 in violin II, pitches C♯4 and D5 recall measures 1-2 with the pitches E♭5 and A6 in violin I based on the triplet rhythm. But at the same time, pitch classes 1 and 2, and also 6 and 7, all of which appear in measure 2 in the cello, are recalled in measure 5. The rhythmic and pitch structures serve to highlight the form and unify this movement.

Forte's description of the form for movement five is rather complex and is the most detailed of all the movements of Op. 9. Forte's description of the formal structure is based primarily on octatonic segments as well as surface similarities. The overall form is A B A' B', with each B section containing smaller sections. Refer to Example 30 on page 169 for the score. The A section is measure 1 and is considered an introduction. Section B extends from measure 2 to 7, with two subdivisions—a_1 (measures 2-5) and a development section called a_2 (measures 6-7). Section A' is measure 8 alone, while the B' section extends from measure 9 to 12, with three subdivisions—*a* (measures 9-10), which recalls measures 2-5, *b* (measures 11-12), which is comparable to measures 6-7, and a final *a* (measure 13), which recalls the A section.

Set class 4-3 (0134) in measure 1, the introduction, establishes the dynamics, rhythm, and the octatonic direction for the rest of the piece. The 4-3 tetrachord is a subset from CIII, but the rest of the piece involves the interaction of CI and CII. The pitch material in measures 2-7 overlaps to form complete octatonic collections of CI and CII, and the same octatonic collections are also created in measures 7-13. The development

section explains the isolated 4-3 tetrachord in measure 1. According to Forte, pitch classes {6, 9, 7, 10} in measures 6-7 are the missing link to the introduction because they form set class 4-3 (0134) and complete the octatonic collection CIII first introduced with pitch class {0, 1, 4, 3} in measure 1. He accounts for the presence of the CIII tetrachord subset at the outset, but Forte ignores pitch classes 8 and 7 in the viola and cello, in measure 6. These pitch classes are sounding before pitch class 6 in the second violin that Forte identifies as the start of the 4-3 tetrachord. In fact, pitch class 8 in the viola is sustained, and is still sounding when pitch class 9 occurs in violin I, the second pitch class of the 4-3 tetrachord. I do not think we can aurally ignore pitch class 8, particularly when it is louder than the entrance of pitch class 9. If we include pitch classes 8 and 7, they create a chromatic pentachord. Forte seems to pick out the pitch classes needed to explain the lone set class 4-3 (0134) from CIII at the beginning of the movement. Consequently, pitches that sound at the same time as the 4-3 tetrachord Forte highlights are ignored.

According to Forte, the underlying harmonic structure is octatonic and the surface chromaticism, so prevalent in this movement, "results from the interaction of octatonic threads."[47] (Recall that this assertion applies not only to this piece, but to all of Webern's atonal music.) Forte's claim is particularly interesting because, as I explain in my analysis of Webern's *Cello Sonata*, I believe it is the way Webern combines trichords like 3-3 (014) and 3-4 (015) to create tetrachords like 4-3 (0134), or 4-2 (0124) that generates the harmonic repertoire, which can also account for the octatonic threads Forte

[47] Forte (1998), 193.

describes. In contrast, Forte believes the underlying octatonic structure results from the way chromatic elements are combined. Here are two different ways of understanding the underlying harmonic structure of Webern's atonal music.

Forte discusses only the beginning and end of movement six and does not offer an interpretation of the form. Refer to Example 32 on page 177 for the score. In measures 1-2 and the chord of measure 3, he illustrates a successive presentation of set class 7-31 from CIII, while the pitch C in the cello initiates set class 8-28 of CII that overlaps 7-31 in three pitch classes—0, 3, and 5. Hexachord 6-30 from CI completes this excerpt starting with pitch G4 in violin I in measure 2. For the last two and a half measures of the piece, Forte notes set class 7-31 from CI with pitch classes {7, 8, 10, 11, 1, 2, 4}. The middle measures of this movement are not discussed.

While Forte is able to connect octatonic threads, they do not always correspond to the formal sections of the movement. Further, Forte leaves out significant portions of the music without explanation and/or no discussion of the form; unlike his analysis of Op. 11, which leaves only a few pitches unaccounted for. Some of the analyses of the movements of Op. 9 are incomplete, weakening his assertion that all of Webern's atonal music can be connected to the octatonic collection.

Published more than twenty-five years ago, Richard Chrisman (1979) is one of the first scholars to discuss *Six Bagatelles*, Op. 9 as an entire work. Chrisman believes the harmonic structure is based on the successive intervallic pattern: semitone-some other interval-semitone. His approach is an additive process where each pitch added to a set subdivides a larger interval. Chrisman uses an interval array to demonstrate the intervallic

content of a set as well as the subdivisions of the intervals as the set becomes larger. The harmonies he identifies are relatively few in number: four to five tetrachords and pentachords each, out of a possible twenty-nine and thirty-eight respectively and only six to seven hexachords out of a possible fifty. I think Chrisman is correct when he talks about sets that have the intervallic pattern noted above but, while he is looking at successive intervals as a process, he is actually interested in synchronic coherence. He identifies recurring intervallic patterns in all six movements but he does not suggest that they are involved in a diachronic process. Further, Chrisman leaves out some pitch content when it does not seem to fit his analysis of Op. 9 and does not discuss form for any of the movements. Using Chrisman's idea of intervallic successions as a starting point, I offer a more complete analysis of Op. 9. I not only offer my interpretation of the formal structure but I also discuss the harmonic and motivic organization within and between movements, examining tetrachord Kh subcomplexes, additional intervallic successions that Chrisman misses, and the motivic structure to show a diachronic process that unifies the work.

Henri Pousseur, in his 1959 article, "Webern's Organic Chromaticism," presents a short study of the first movement of Op. 9, focusing only on semitonal relationships. These relationships form what he calls 'chromatic chains' that create 'harmonic fields.' (A harmonic field consists of a group of notes that express interval class 1.) Because not all chromatic notes occur in succession, Pousseur categorizes semitonal relationships as being either direct or indirect connections. Direct connections refer to simultaneous notes or temporally adjacent notes. Indirect connections refer to non-adjacent half steps

(chromatic notes). In general, the larger compound intervals of the semitone appear directly or as adjacent notes in the music, while literal semitones tend to occur indirectly in the music. Pousseur claims that indirect connections of pitch relationships "emerge with perfect clearness [sic]"[48] but he does not suggest what musical parameters contribute to this clarity. He also suggests that repeated pitch classes, which cannot be linked by semitone, are perceived as "absolutely different notes"[49] relating not to a chromatic chain but to distinct harmonic fields. Some of Pousseur's justifications seem designed purely to make pitch material fit into a semitonal network, which is not always convincing.

Pousseur divides the first movement into six sections based on chromatic chains and harmonic fields. The first extends from measure 1 to 3, ending with pitch class 4 in the cello, the second section from measure 3 to 4. According to Pousseur, it is impossible to define the borders of the middle sections precisely. For example, the third section begins in measure 5 and ends somewhere at the beginning of measure 7. The fourth section begins in measure 7 and ends somewhere at the beginning of measure 8.

The fifth section extends from measures 8 to the first half of 9. The final section begins in the middle of measure 9 after the brief simultaneous rest in all four instruments. Because Pousseur concentrates on semitonal connections, there are limitations to discussing chromatic harmonic fields in the opening movement. I believe his approach requires a more in depth look into how semitonal fields unfold across a piece to create coherence.

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[48] Henri Pousseur, "Webern's Organic Chromaticism," in *Die Reihe* (1959), 52.

[49] Ibid., 54.

Paul Kabbash in his article, "Aggregate-Derived Symmetry in Webern's Early Works," (1984) focuses on completion of the initial aggregate and the symmetrical division of it into pulses called the *w-structure*. Kabbash partitions the aggregate into different musical events that are then unfolded in different ways in subsequent sections of the piece.

Kabbash discusses only the fourth movement of Op. 9. He divides this movement into two sections based on timbre, rhythm and texture.[50] The first section extends from measure 1 to 4, including pitch 4 on the downbeat of measure 5, and the second section extends from measure 5 to 8. However, according to Kabbash, a ternary form is superimposed on the binary form based on different criteria like aggregate formations, hexachordal complementation, and repetition of set sequences. These formal designs create a symmetrical structure that divides the time span of the piece into three exact proportions. At the same time, the completion of the first aggregate creates a focal point by which transformations can account for the pitch content before and after the first aggregate completion, a property that derives from the proto-serial characteristics of the piece. Kabbash takes a different approach than I do, focusing on the aggregate, proportions and the *w-structure* model. His procedure shows there are relationships between sections of the music but he does not discuss relationships within the partitions.

[50] Kabbash's interpretation of the form also corresponds to Forte's (1998) and my formal divisions of the fourth movement.

Mark Sallmen (2003) believes that understanding the ordered relationships of pitch classes in Webern's pre-serial works addresses "the presentation of ideas" as ordered phenomena.[51] He traces motives, *i.e.* ordered sets of pitch classes, and includes motives that are related by retrograde, transposition, and/or inversion in the same motive class. Sallmen identifies a variety of motivic paths, including paths that involve the ensemble while others trace individual parts, and some paths account for every pitch class while others skip over pitch classes. In this case, Sallmen suggests that the pitch classes that are skipped over are embellishments, or two paths may leave out pitch classes but when considered together account for all pitch classes. In general, motives unfold one succession at a time but occasionally pitch classes are presented as simultaneities or sometimes are sustained through the start of the next pitch class creating an overlap. By considering the different unfoldings of motives, Sallmen demonstrates how the piece coheres as well as showing a process across the piece. However, he discusses only movement four thoroughly. Excerpts from movements one and three support his findings in the fourth movement, but his analysis is incomplete.

Some of Sallmen's motives match up with mine, but this is coincidental. My approach differs from his because I discuss motives as derived from an ideal melodic form involving pitch intervals rather than pitch class intervals that create the pattern, semitone-some other interval-semitone. I do not trace individual lines or discuss motives

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[51] In *The Path to the New Music* (1932), Webern describes how twelve-tone composition is a logical continuation of musical tradition. He traces two paths through the history of music. One path is "the development of the tonal field" and the second path involves "the presentation of ideas" or "repetition." (pp. 22, 32) According to Sallmen, because the presentation of ideas involves ordered phenomena and the development of the tonal field involves unordered collections, Webern's pre-serial music could be described in both ways. Further, Sallmen notes that recent analyses of Op. 9 focus on unordered relationships among pitch materials as another rationale for discussing motives.

in terms of transposition, retrograde, or inversion transformations. Instead I focus on how the appearance of the semitone is developed in chromatic motives across the work. Further, Sallmen's broad inclusion of items in his motive classes might argue against a perceptual basis for his argument for ordered pitch classes.

Analysis

During the years 1909-1913 Webern composed three groups of pieces for string quartet, two of which would be combined to create *Six Bagatelles*, Op. 9. He composed a set of pieces in 1911 that he titled *Four Pieces for String Quartet*, later renamed *Second String Quartet*. (This group of compositions later became movements two through five of the *Bagatelles*, Op. 9.) In 1913 Webern completed his *Three Pieces for String Quartet*: the first and last movements of this work would later become the outer movements of Op. 9. (The middle movement was never published.) Despite this group of pieces not being conceived of as a single work, the succession of movements is ordered in such a way to create coherence across the entire work. Internal evidence of the harmonic and motivic variety indicates strongly that Webern was projecting the focus of individual pieces from both stages of the composition in similar ways. Internal evidence also indicates that the movements of both stages were somehow (subconsciously or intuitively) fit together to create a coherent whole. Because there are overarching processes that can describe Op. 9 as a work, I will consider them together in my analysis.

His teacher, Arnold Schoenberg, contributed a foreword for the *Bagatelles*, which was intended to help the listener better understand Webern's music. He wrote:

> Though the brevity of these pieces is a persuasive advocate for them, on the other hand that very brevity itself requires an advocate. Consider what moderation is required to express oneself so briefly. Every glance can be expanded into a poem, every sigh into a novel. But to express a novel in a single gesture, joy in a single breath—such concentration can only be present in proportion to the absence of self-indulgence. These pieces will be understood only by someone who has faith in music as the expression of something that can be said only musically.[52]

Published in 1924 by Universal Edition, on the occasion of their premiere during the *Donaueschingen* Festival, *Six Bagatelles*, Op. 9, like Op. 11, embody Webern's aphoristic style. Op. 9 has a total playing time of about two minutes and the movements extend ten, eight, nine, eight, thirteen, and nine measures respectively, amounting to just thirty-nine measures for the entire work. Despite (or in some cases, because of) the minimal pitch material, the juxtaposition of extremes in register and dynamics, the multiplicity of timbral effects, and the short duration, the music is not easily apprehended as a unified whole, and additionally seems to go against the idea of long-range coherence altogether. In such a short and Spartan work, Webern creates networks of relationships that are not obvious at first hearing.

Other scholars, including Chrisman (1979), Lambert (2000), and Sallmen (2003) have previously identified set class 4-7 (0145), a set that contains 3-3 and 3-4 as subsets, as a prominent harmony in Webern's atonal music. Chrisman goes a step further and notes that many recurring tetrachords have the intervallic pattern—semitone-some other interval-semitone and that this pattern becomes the basis for the creation of larger

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[52] Moldenhauer (1979), 193.

structures over the entire work. In fact, as a new pitch is added to a set, a nested structure is formed where smaller sets are contained within larger sets to create what may be best described as concentric circles. The tetrachords are nexus sets of a small group of Kh subcomplexes to which virtually all of Webern's harmonies belong. For each group, Webern takes vertical slices through the Kh subcomplex to organize the harmonic structure, and these vertical slices create a pattern to project the large-scale structure of the entire work. As I have already suggested, the building of nested sets can be described through a process of subdividing intervals that results in larger sets. For example, given the tetrachord 4-7 (0145), the successive intervals are 1—3—1—7. If we subdivide the last interval, 7, into 6 and 1 it creates the interval pattern 1—3—1—6—1 forming the pentachord 5-6 (01256).[53] The piece uses this process to unify the work synchronically, with the same interval successions coming back across movements. Before discussing what interval patterns are formed, I will describe the characteristic harmonies of Op. 9.

The primary harmonic materials are tetrachords around which Kh subcomplexes are built: 4-7 (0145), 4-8 (0156), 4-9 (0167), and 4-19 (0148). It is important to notice that, with the exception of 4-19, the primary harmonic materials all create the generalized interval pattern first noted by Chrisman—semitone-some other interval-semitone. There are some other less prominent tetrachord Kh subcomplexes like 4-4 (0125), 4-5 (0126), 4-6 (0127), and 4-13 (0136) evident in the music. With this less prominent group of Kh subcomplexes it is important to notice that, with the exception of 4-13, these tetrachords

[53] Chrisman takes this approach to describing synchronic coherence in Op. 9 but he leaves out portions of the music. When the harmonies do not form set classes Chrisman expects, he tends to skip over those portions even though they could be described in terms of the process of subdividing intervals.

also contain the characteristic intervallic content of the first group, but it is reordered to semitone-semitone-some other interval. The basic intervallic pattern has been reinterpreted so that the larger interval occurs at the end of the succession rather than between the two semitones.

The subsets and supersets that form the Kh subcomplexes of the primary tetrachords represent a relatively small number of sets. Table 11 illustrates the subcomplexes of the more prominent tetrachord harmonies and Table 12 illustrates the less prominent tetrachord subcomplexes. (The small numbers in parentheses in these Tables refer to the number of sets in the subcomplex.)

TABLE 11: Primary Tetrachord Kh Subcomplexes in Op. 9

4-7 (0145) (14)	4-8 (0156) (13)	4-9 (0167) (8)	4-19 (0148) (20)
3-3, 3-4	3-4, 3-5	3-5	3-3, 3-4, 3-11, 3-12
5-3, 5-6, 5-Z18, 5-21	5-6, 5-7, 5-20, 5-22	5-7, 5-19	5-13, 5-Z17, 5-21, 5-22, 5-26, 5-30, 5-Z37
6-1, 6-5, 6-14, 6-15, 6-16, 6-Z19/6-Z44, 6-20, 6-31	6-5, 6-Z6/6-Z38, 6-7, 6-16, 6-Z17/6-Z43, 6-18, 6-Z19/6-Z44	6-5, 6-Z6/6-Z38, 6-7, 6-18, 6-30	6-14, 6-15, 6-16, 6-Z19/6-Z44, 6-20, 6-21, 6-22, 6-31, 6-34

TABLE 12: Secondary Tetrachord Kh subcomplexes in Op. 9

4-4 (0125) (24)	4-5 (0126) (26)	4-6 (0127) (14)	4-13 (0136) (25)
3-1, 3-3, 3-4, 3-7	3-1, 3-4, 3-5, 3-8	3-1, 3-5, 3-9	3-2, 3-5, 3-7, 3-10
5-2, 5-3, 5-4, 5-6, 5-11, 5-14, 5-Z37, 5-Z38	5-4, 5-5, 5-6, 5-7, 5-9, 5-13, 5-15, 5-Z38	5-5, 5-7, 5-14, 5-Z36	5-4, 5-10, 5-Z12, 5-19, 5-25, 5-29, 5-31, 5-Z36
6-1, 6-2, 6-Z3/6-Z36, 6-5, 6-8, 6-9, 6-Z10/6-Z39, 6-Z11/6-Z40, 6-14, 6-15, 6-16, 6-18	6-2, 6-Z3/6-Z36, 6-Z4/6-Z37, 6-5, 6-Z6/6-Z38, 6-7, 6-9, 6-Z12/6-Z41, 6-15, 6-16, 6-Z17/6-Z43, 6-18, 6-21, 6-22	6-5, 6-Z6/6-Z38, 6-7, 6-9, 6-Z11/6-Z40, 6-Z12/6-Z41, 6-18	6-2, 6-Z3/6-Z36, 6-5, 6-Z11/6-Z40, 6-Z12/6-Z41, 6-Z13/6-Z45, 6-Z25/6-Z47, 6-27, 6-Z29/6-Z50, 6-30, 6-33

Between Kh subcomplexes there can be an overlap of shared subsets and supersets. For example, the subcomplexes around set classes 4-7 and 4-19, in the outer columns of Table 11, share the most set classes—nine. Also notice that the hexachord 6-5 is shared among the first three Kh subcomplexes. I point this out because we will see that sometimes a nested set class will lie outside of the prevailing Kh subcomplex. When this is the case, the set acts as an 'auxiliary' set and always belongs to one of the other prominent Kh subcomplexes. I will discuss this further as it occurs in specific examples through the analysis of Op. 9.

In contrast, the Kh subcomplexes of the secondary tetrachords contain a relatively large number of sets, with the exception of the subcomplex around 4-6, which has only fourteen subsets and supersets. Because of this, the Kh subcomplex around 4-6 is more in

keeping with the primary subcomplexes noted in Table 11. While the 4-6 subcomplex is not highlighted over the entire work, we will see that 4-6 increases in frequency, particularly in the final movement of Op. 9.

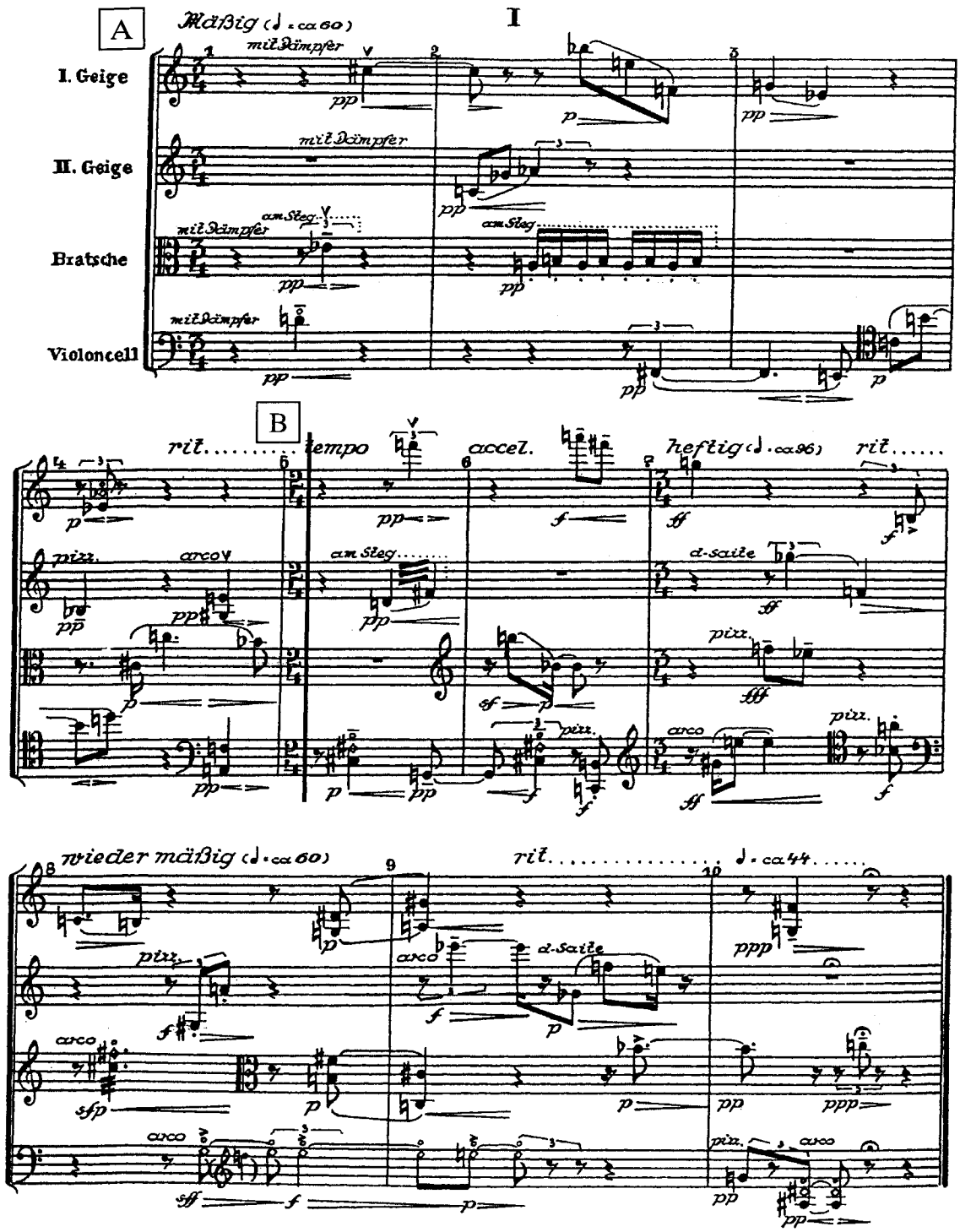
The following analysis of Op. 9 will be divided into two main parts. The first part focuses on the harmonic and formal structure of individual movements. I will proceed with a detailed description of the formal structure of the opening movement followed by a discussion of how the Kh subcomplexes, noted above, and the interval successions of the nested subsets unfold across the movement. Finally, I will show that the succession of subcomplexes creates a shape that unifies the first movement. A discussion of subsequent movements will be limited to formal structure and summaries of the successions of Kh subcomplexes and intervallic patterns.

The second part of my analysis of Op. 9 considers how each movement contributes to unifying the entire work. I will proceed with a discussion of the large-scale structure based on the succession of Kh subcomplexes outlined in all six movements, followed by a discussion of the different ways Webern expresses semitones throughout the work. (He begins by presenting them horizontally in pairs on either side of a larger interval, then breaks this pattern up step-by-step.)

Op. 9, MOVEMENT ONE

I believe that the opening movement may be best described as a binary form. Please see Example 22 for the score. The first section extends from measure 1 to 4 and the second from measure 5 to 10 based primarily on the change of dynamics, tempo, and motivic structure.

EXAMPLE 22: Opening Movement, Op. 9



The opening section is set off from the second section in several ways: first, a brief rest in all four instruments on the downbeat of measure 5. In fact, this is the only time there is a simultaneous rest. Second, there is a *ritardando* in the latter half of measure 4 that has the effect of ending a phrase, and measure 5 returns to the opening tempo. Additionally, the emphasis on two-note groups (rather than three-note) helps us to hear a two-part form. The contrast of the dynamic level between measure 4 and the *crescendo* into measure 6 also helps to determine the form, but in a less obvious way.

Regarding the change from three-note to two-note groups: in the first section, there are several three-note motives. For example, in measure 1 pitch classes {2, 3, 1} (in order of occurrence) create an ascending three-note motive, which is immediately followed by another ascending three-note motive in violin II in measure 2 with pitch classes {0, 6, 8}. There are three additional salient three-note motives in the opening section: one descending motive in measure 2 in violin I with pitch classes {10, 4, 5}, another ascending motive in measures 3-4 in the cello with pitch classes {0, 11, 2}, and the third motive in measure 4 in the viola with pitch classes {1, 0, 10}.

In contrast, the second section fragments the motives into two-note groups. Individual instruments tend to have more motives with either two successive or two simultaneous notes than were featured in the opening section, and far fewer three-note motives. For example, in measure 5 we encounter the first two-note motive in violin II with pitch classes 2 and 6. Immediately following, in measure 6, there is another two-note motive in the viola on pitch classes 11 and 10. In the same measure, violin I has a registrally significant two-note motive on pitch classes 9 and 6. There are six additional

salient two-note motives in individual instruments: in measure 7 there are three successive entrances of two-note motives with the cello, viola, and violin II, the fourth in measure 8 in violin II, the fifth in measures 9-10 in the viola, and finally in measure 10 in the cello. Unlike the first section, there is an abundance of two-note harmonies created by individual instruments. In the first section there are only 2 double stop harmonies in, measure 4 on pitch classes 9 and 7 and 8 and 4 respectively, to close the section. In the second section there are seven. Two occurrences appear in the cello in measures 6 and 7, two in the viola from measures 8-9, and three in violin I from measures 8-10.

It seems that the motivic structure, texture, and tempo are the primary musical parameters that help delineate the form of movement one. The harmonic materials do not play a prominent role in determining the formal structure of this movement (or any of the six movements, as it turns out), unlike the previous examples of *Three Short Pieces,* Op. 11 and the *Cello Sonata,* in which the harmonic materials played an integral role.

Let us turn our attention now to how harmonic materials *do* contribute to unifying the work. The following describes the succession of tetrachord Kh subcomplexes across movement one—how these structures are created by subdividing intervals, and how the succession of tetrachords creates a shape.

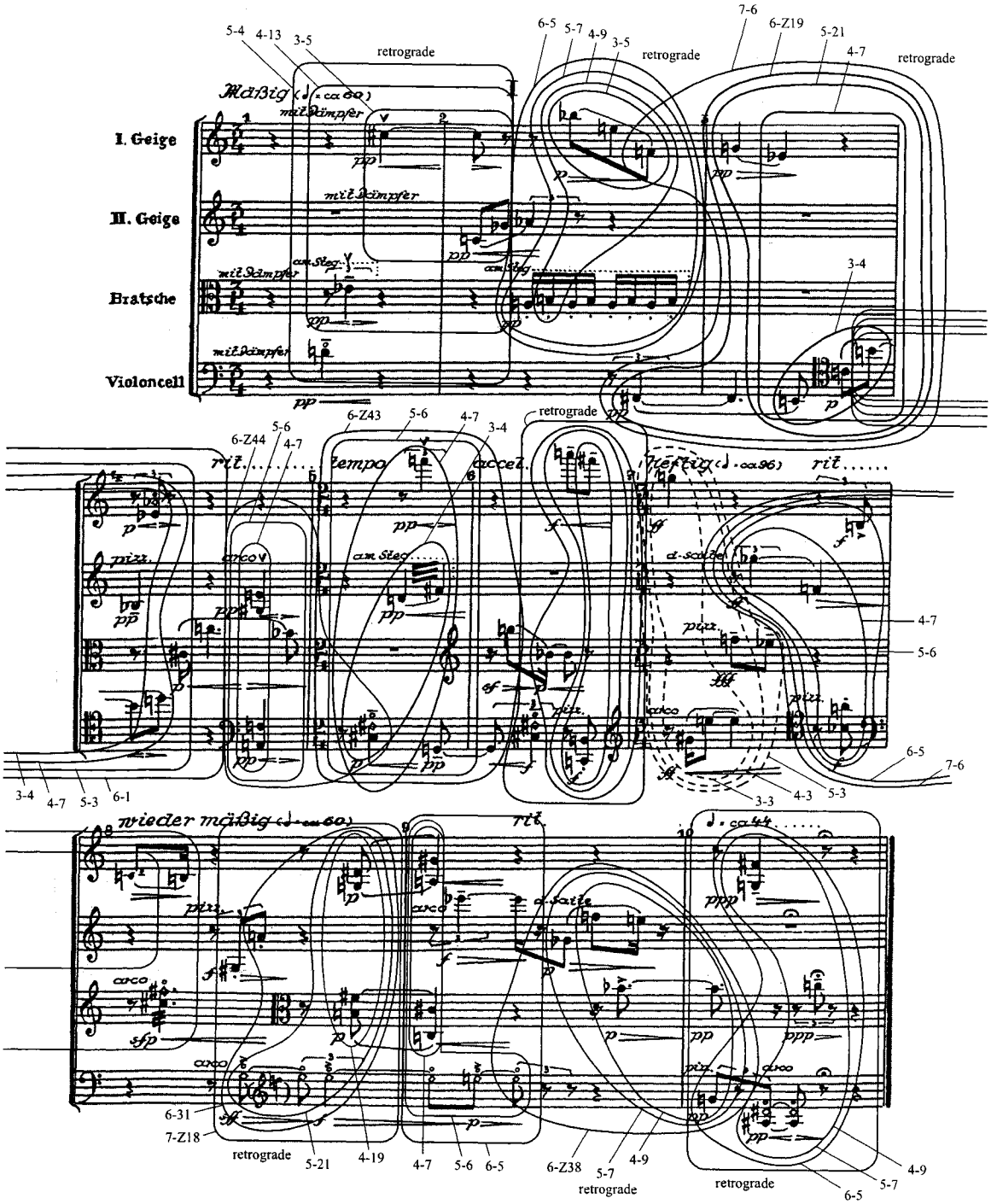
The additive process of augmenting a new pitch to a characteristic tetrachord (or its subset) that forms a Kh subcomplex can happen in two ways: the nested sets are built up moving from left to right in the music, or they may be built up in a retrograde fashion, from right to left. This latter procedure could be viewed (if one wanted to retain chronological consistency) as a "subtractive" process whereby larger sets lose members

consecutively to form smaller units. But to retain procedural consistency, I will describe such nestings as additive processes working backwards. Each of the first three measures is constructed in the latter way. Example 23, on the next page, illustrates the nested subsets and supersets representing various Kh subcomplexes.

The Kh subcomplex that provides the sets for measure 1 is built around 4-13 (0136). Moving from the downbeat of measure 2 to measure one, the nested structure progresses from set class 3-5 (016) on pitch classes {0, 1, 6} to 4-13 (0136), with the addition of pitch class 3, to 5-4 (01236), with the addition of pitch class 2, the first note of the piece. In effect we are moving from the periphery of the harmonic structure closer to its centre or kernel. One might suggest that Webern is anticipating what will eventually develop into serial techniques by presenting the nested harmonic structure in retrograde.

In measure 2 the same retrograde process creates a different Kh subcomplex, this time around 4-9 (0167). The centre or the smallest subset of the Kh subcomplex is set class 3-5 (016) formed by pitch classes {4, 5, 10} in violin I. By adding pitch class 11 to the trichord, the 4-9 superset is formed. Next, pitch class 9 is added to create the pentachord 5-7 (01267). Finally the hexachord 6-5 (012367) is formed with the addition of pitch class 8 of violin II.

EXAMPLE 23: Kh Subcomplexes in Op. 9/1



In measure 3 another retrograde structure occurs with the Kh subcomplex around 4-7 (0145). Pitch classes {0, 4, 11} in the cello form set class 3-4 (015). By adding each of the pitch classes 3, 7, 6, and 11 (from the previous measure) in succession, they form the supersets 4-7 (0145), 5-21 (01458), 6-Z19, (013478), and 7-6 (0123478) respectively. This first occurrence of the Kh subcomplex around 4-7 initiates a succession of three separate 4-7 subcomplexes in a row.

In measure 4, the nested harmonic structure is presented from left to right, unlike the previous three measures. A 3-4 (015) trichord is created on pitch classes {3, 10, 11}. When we add pitch class 2 in the cello to this set we form set class 4-7 (0145) and when pitch class 1 is added from the viola part to this tetrachord we form set class 5-3 (01245). Notice that the pentachord superset is different from the pentachord presented in measure 3. Set classes 5-3 (01245) and 5-21 (01458) both belong to the Kh subcomplex around 4-7 and are two of only four pentachords belonging to this subcomplex, but we will discover that set class 5-3 is only rarely used. Finally, when we add pitch class 1 from the viola the chromatic hexachord 6-1 (012345) is formed. In fact, the chromatic hexachord belongs to the primary subcomplex around 4-7. It is not shared among any of the other primary Kh subcomplexes though it does belong to the secondary subcomplex around 4-4 (0125).

The second entrance of the Kh subcomplex around 4-7 also occurs in measure 4. Set class 4-7 appears as the chord in the latter part of the measure on pitch classes {4, 5, 8, 9}. Pitch class 10 in the viola forms the superset 5-6 (01256) and adding pitch class 1 from the cello part in measure 5 forms the hexachord 6-Z44 (012569). Recall that its hexachordal complement, 6-Z19, appeared in measure 3.

The third successive appearance of the subcomplex around 4-7 occurs in measures 5-6. In this case, some of the larger sets are indeed supersets of 4-7 but they do not belong to the Kh subcomplex. I have called these 'auxiliary' sets because even though they do not belong to the prevailing subcomplex, they do belong to one of the other prominent Kh subcomplexes. I will identify the specific instances of the auxiliary sets as the analysis progresses.

A 3-4 (015) trichord is formed with pitch classes {1, 2, 6} in measure 5. Supersets belonging to the Kh subcomplex around 4-7 are constructed in the following manner: adding pitch class 5 to this trichord creates a 4-7 tetrachord, adding the next new pitch class in measure 5, pitch class 7, forms set class 5-6 (01256), adding pitch class 11 in measure 6 produces the hexachord 6-Z43 (012568). However, this hexachord lies outside the subcomplex around 4-7 (0145), but it does belong to the Kh subcomplex around 4-8 (0156), a subcomplex that does not appear in movement one but gains more prominence as the work progresses. Set class 6-Z43 is not shared among the other primary Kh subcomplexes around 4-7, 4-9, or 4-19. In this way there is an overlapping of the subcomplexes around 4-7 and 4-8. However, I consider the Kh subcomplex around

4-7 to be the prevailing harmonic collection for two reasons: first, set class 4-7 (0145) is a prominent harmony in Webern's atonal music in general and second, the tetrachord is evident in the music.

In measure 6 we not only return to the Kh subcomplex around 4-13 (0136) we first encountered at the outset of the piece, but the harmonic structure returns to a retrograde presentation. Pitch classes {0, 6, 11} form the trichord 3-5 (016), followed by the addition of pitch class 9 in violin I to form set class 4-13. The next note (thinking backwards) appears in the viola on pitch class 10 creating a 5-4 pentachord. (If we go one step further and add pitch class 1 in the cello, which overlaps the previous Kh subcomplex, the hexachord 6-Z36 is formed.) Notice that the progression from 3-5 (016) to 4-13 (0136) to 5-4 (01236) involves the very same set classes used at the beginning of the piece, and they are presented in a retrograde fashion, as before. It seems Webern is returning to the same harmonic material, but the second time the set classes are inversions of each other.

Measure 7 is somewhat problematic because of the chromatic successions of adjacent pitch classes. However, I believe the first half of the measure can be explained by the Kh subcomplex around 4-3 (0134). This is the only time there is a nesting of sets belonging to this Kh subcomplex. However, notice that it is one of the set classes that projects the interval pattern semitone-other interval-semitone, so it has a generalized relationship to many of the primary and secondary Kh subcomplexes. Because the Kh subcomplex around 4-3 (0134) does not occur again in this movement, or in any of the following movements, I believe its function is to link the return of 4-13 (0136) to the

following 4-7 (0145), which I will discuss momentarily. Further, because set class 4-3 (0134) can be characterized as having the same interval pattern as 4-7 (0145) and at the same time shares the successive intervals; semitone, whole-tone with 4-13 (0136), I think the Kh subcomplex around 4-3 can be viewed as transitional and not part of the prevailing sequence of Kh subcomplexes.

The familiar Kh subcomplex around 4-7 (0145) returns in the latter half of measure 7-8 and initiates the first of three successions of this Kh subcomplex. Pitch classes {5, 6, 9, 10} form the 4-7 tetrachord and each successive entrance of pitch classes 11, 0, and 1 builds the larger sets: 5-6 (01256), 6-5 (012367), and 7-6 (0123478), the complement of 5-6.

In the latter part of measure 8, the next entrance of the Kh subcomplex around 4-7 is disguised in two ways: by a set class that lies outside the prevailing Kh subcomplex and by the additive process of building sets in retrograde. Recall that in measure 5, the hexachord 6-Z43 had appeared as a superset of 4-7 but it did not belong to its Kh subcomplex; however it did belong to another Kh subcomplex around 4-8. In this case, (m. 8), the nested sets suggest either the Kh subcomplex around 4-19 or 4-7. (The outlying set 7-Z18 suggests the 4-7 subcomplex.) The choice is further complicated because both Kh subcomplexes have nine set classes in common.

The first set is formed with the chord on pitch classes {3, 6, 7, 11}, which creates set class 4-19 (0148). Pitch class 2 is added to this tetrachord to form set class 5-21 (01458). Pitch classes 9 and 8 are added in (reverse) sequence to form set classes 6-31 (014579) and 7-Z18 (0145679). If we consider the nesting of these sets to form a Kh

subcomplex around 4-19 then 7-Z18 lies outside the collection. However, of all the representative Kh subcomplexes, 7-Z18 and its complement, 5-Z18 only belong to the Kh subcomplex around 4-7. While a 4-7 tetrachord is not represented in the music, the larger sets all belong to the Kh subcomplex. Further, what immediately follows suggests that the prevailing Kh subcomplex is that around 4-7.

The final succession of Kh subcomplexes around 4-7 occurs in measure 9. The first set is formed with the chord on pitch classes {0, 1, 8, 9}, which creates set class 4-7 (0145). Just like the previous measure, pitch class 2 is then added to the 4-7 tetrachord, but instead it creates set class 5-6 (01256). Finally, the addition of pitch class 3 to the pentachord forms set class 6-5 (012367). I believe the nesting of sets in measure 9 helps clarify the Kh subcomplex in measure 8.

I will add a few more comments about the nesting in measure 9 I have just described, in support of my assertion that measure 8's nesting belongs to the Kh subcomplex around 4-7. A 4-7 tetrachord is evident in the music and its supersets belong to the Kh subcomplex around 4-7. Neither set class 5-6 nor set class 6-5 is held in common with the Kh subcomplex around 4-19. You may recall that set class 6-5 is a hexachord that is shared by all the representative Kh subcomplexes, except 4-19. Further, when we compare the shape of the nested structures in measures 8 and 9 we notice that they are palindromes of each other. In both cases a chord is formed by violin I and viola, followed by the addition of pitch class 2, which happens to be the same pitch, then

followed by another pitch. In measure 8, however, a septachord is created while only a hexachord is formed in measure 9. For all these reasons, it is plausible to consider the Kh subcomplex presented in retrograde in measure 8 to belong to 4-7 rather than 4-19.

The first movement ends with two overlapping instances of Kh subcomplexes around 4-9 in retrograde. The first proceeds from measure 10 to 9 with pitch classes {4, 5, 10, 11} forming set class 4-9 (0167). The successive entrances (moving backwards) of pitch classes 6 and 2 form set classes 5-7 (01267) and 6-Z38 (012378) respectively. The final Kh subcomplex around 4-9 occurs in measure 10. Pitch classes {0, 1, 6, 7} form set class 4-9. The addition of pitch class 11 creates another 5-7 pentachord but adding the next note, pitch class 10, creates set class 6-5 (012367), a different hexachord from that of the previous measure, but one that belongs to the Kh subcomplex around 4-9.

The total pitch content of the opening movement can be described in terms of nested subsets and supersets belonging to Kh subcomplexes around tetrachords that form concentric circles. On six occasions, almost half of the time, Webern builds up the nested sets in retrograde. In effect, we are moving from the periphery towards the centre that contains the generating harmony of the Kh subcomplex. These same nested structures can also be described in terms of a subdivision of intervals, as I suggested previously.

Here is a more complete description of the subdivision process: the pitch classes of a given set are placed in ascending order and the adjacent intervals of the pitch classes are calculated including the 'around-the-corner' interval. For example, given the pitch classes {0, 1, 6} the adjacent intervals are 1—5—6. To create a larger set one of the two

larger intervals, 5 or 6, is divided in some way to form a tetrachord. If we divide the interval 6 into intervals 5 and 1 we create the interval succession 1—5—1—5 or pitch classes {0, 1, 6, 7}, a superset of the original trichord. This process of subdividing intervals to create larger sets describes, in a different way, how all sets are formed in Op. 9.

Table 13 summarizes the total pitch content for the first movement; the subsets and supersets and the subdivision of intervals giving rise to the prime forms of the larger sets. When we compare the successive intervals of recurring set classes to each other, sometimes a pattern emerges. For example, set class 4-7 (0145) occurs a total of five times, the most of any set class. (See measures 2-3, 4, 5-6, 7-8, and 9 in Table 13.) The expressions of 4-7 in the music reveal an incomplete palindrome that coincides with the two-part form described at the outset. Recall that I described measures 1-4 as the first section and measures 5-10 as the second section, based on texture and tempo.

TABLE 13: Summary of the pitch class content and subdivision of intervals in Op. 9/1

MEASURE NUMBERS	PITCH CLASSES	SET CLASSES & PRIME FORMS	SUBDIVISION OF INTERVALS
1-2	{0, 1, 6}	3-5 (016)	1—5—6
	{0, 1, 3, 6}	4-13 (0136)	1—2—3—6
	{0, 1, 2, 3, 6}	5-4 (01236)	1—1—1—3—6
2	{4, 5, 10}	3-5 (016)	1—5—6
	{4, 5, 10, 11}	**4-9 (0167)**	*1—5—1—5*
	{4, 5, 9, 10, 11}	5-7 (01267)	1—4—1—1—5
	{4, 5, 8, 9, 10, 11}	6-5 (012367)	1—3—1—1—1—5
2-3	{0, 4, 11}	3-4 (015)	4—7—1
	{0, 3, 4, 11}	**4-7 (0145)**	**3—1—7—1**
	{0, 3, 4, 7, 11}	5-21 (01458)	3—1—3—4—1
	{0, 3, 4, 6, 7, 11}	6-Z19 (013478)	3—1—2—1—4—1
	{0, 3, 4, 5, 6, 7, 11}	7-6 (0123478)	3—1—1—1—1—4—1
4	{3, 10, 11}	3-4 (015)	7—1—4
	{2, 3, 10, 11}	**4-7 (0145)**	**1—7—1—3**
	{1, 2, 3, 10, 11}	5-3 (01245)	1—1—7—1—2
	{0, 1, 2, 3, 10, 11}	6-1 (012345)	1—1—1—7—1—1
4-5	{4, 5, 8, 9}	**4-7 (0145)**	**1—3—1—7**
	{4, 5, 8, 9, 10}	5-6 (01256)	1—3—1—1—6
	{1, 4, 5, 8, 9, 10}	6-Z44 (012569)	3—1—3—1—1—3
5-6	{1, 2, 6}	3-4 (015)	1—4—7
	{1, 2, 5, 6}	**4-7 (0145)**	**1—3—1—7**
	{1, 2, 5, 6, 7}	5-6 (01256)	1—3—1—1—6
	{1, 2, 5, 6, 7, 11}	6-Z43 (012568)	1—3—1—1—4—2
6	{0, 6, 11}	3-5 (016)	6—5—1
	{0, 6, 9, 11}	4-13 (0136)	6—3—2—1
	{0, 6, 9, 10, 11}	5-4 (01236)	6—3—1—1—1
	{0, 1, 6, 9, 10, 11}	6-Z36 (012347)	1—5—3—1—1—1
7	{4, 5, 8}	3-3 (014)	1—3—8
	{3, 4, 5, 8}	4-3 (0134)	1—1—3—7
	{3, 4, 5, 7, 8}	5-3 (01245)	1—1—2—1—7
7-8	{5, 6, 9, 10}	**4-7 (0145)**	**1—3—1—7**
	{5, 6, 9, 10, 11}	5-6 (01256)	1—3—1—1—6
	{0, 5, 6, 9, 10, 11}	6-5 (012367)	1—3—1—1—1—5
	{0, 1, 5, 6, 9, 10, 11}	7-6 (0123478)	1—3—1—1—1—1—4
8	{3, 6, 7, 11}	4-19 (0148)	3—1—4—4
	{2, 3, 6, 7, 11}	5-21 (01458)	1—3—1—4—3
	{2, 3, 6, 7, 9, 11}	6-31 (014579)	1—3—1—2—2—3
	{2, 3, 6, 7, 8, 9, 11}	7-Z18 (0145679)	1—3—1—1—1—2—3
9	{0, 1, 8, 9}	**4-7 (0145)**	**1—7—1—3**
	{0, 1, 2, 8, 9}	5-6 (01256)	1—1—6—1—3
	{0, 1, 2, 3, 8, 9}	6-5 (012367)	1—1—1—5—1—3
9-10	{4, 5, 10, 11}	**4-9 (0167)**	*1—5—1—5*
	{4, 5, 6, 10, 11}	5-7 (01267)	1—1—4—1—5
	{2, 4, 5, 6, 10, 11}	6-Z38 (012378)	2—1—1—4—1—3
10	{0, 1, 6, 7}	**4-9 (0167)**	*1—5—1—5*
	{0, 1, 6, 7, 11}	5-7 (01267)	1—5—1—4—1
	{0, 1, 6, 7, 10, 11}	6-5 (012367)	1—5—1—3—1—1

The interval pattern 1—3—1—7 ends the first section and begins the second section, creating the mirror for the next interval succession in each section. If the opening intervallic pattern had also occurred at the end of the movement the palindrome would have been complete.

3—1—7—1
1—7—1—3 ↑
1—3—1—7

1—3—1—7 ↓
1—7—1—3
(3—1—7—1)

However, when we compare the interval successions of 4-9 in measures 2, 9-10, and 10 in Table 13, the three occurrences produce the interval pattern 1—5—1—5. In this case, this consistent interval pattern is a result of a replication of pitch classes {4, 5, 10, 11} in measures 2 and 9-10, and the pitch classes {0, 1, 6, 7} in measure 10 are a T_4 transformation of the previous measures. The subdivision of intervals to create larger sets is another way to describe the harmonic structure of Op. 9, and the interval patterns noted in Table 13 are evident in the subsequent movements, helping to create synchronic coherence across the work. I would now like to turn my attention to the final part of the analysis of the opening movement that examines how the progression of Kh subcomplexes creates a shape to provide global coherence.

The progression of Kh subcomplexes across movement one can be summarized, in terms of their nexus sets, in two parts (measures 1-5 and 6-10 respectively) as follows:

4-13, 4-9, 4-7, 4-7, 4-7 | 4-13, 4-7, 4-7, 4-7, 4-9.

Notice that the Kh subcomplexes around 4-13 (0136) begin each section and that what remains are palindromes of each other. For purposes of this analysis I will consider the progression 4-7, 4-7, 4-7, 4-9 to be the prime form and the progression 4-9, 4-7, 4-7, 4-7 to be the retrograde transformation. I would suggest that Webern is employing what could be described as early serial technique to project a pattern and consequently a shape across the movement. Each section begins with the Kh subcomplex around 4-13 and in both instances the identical sets 3-5, 4-13, and 5-4 are constructed by adding notes from right to left in the music or in retrograde. In the first section, Webern projects the sequence of Kh subcomplexes as a retrograde transformation of the sequence found in the second section.

As noted above, the progressions of Kh subcomplexes extend from measure 1 to 5 and 6 to 10 respectively. If we compare this division of the opening movement into two equal sections based on successions of Kh subcomplexes with the formal structure I discussed earlier based on texture, tempo, and rhythm, we notice that they do not align.[54] There is a displacement of about a measure between the two interpretations. It could be that Webern is obscuring the progression of Kh subcomplexes by shifting the start of the second part of the sequence away from the onset of the second formal section.

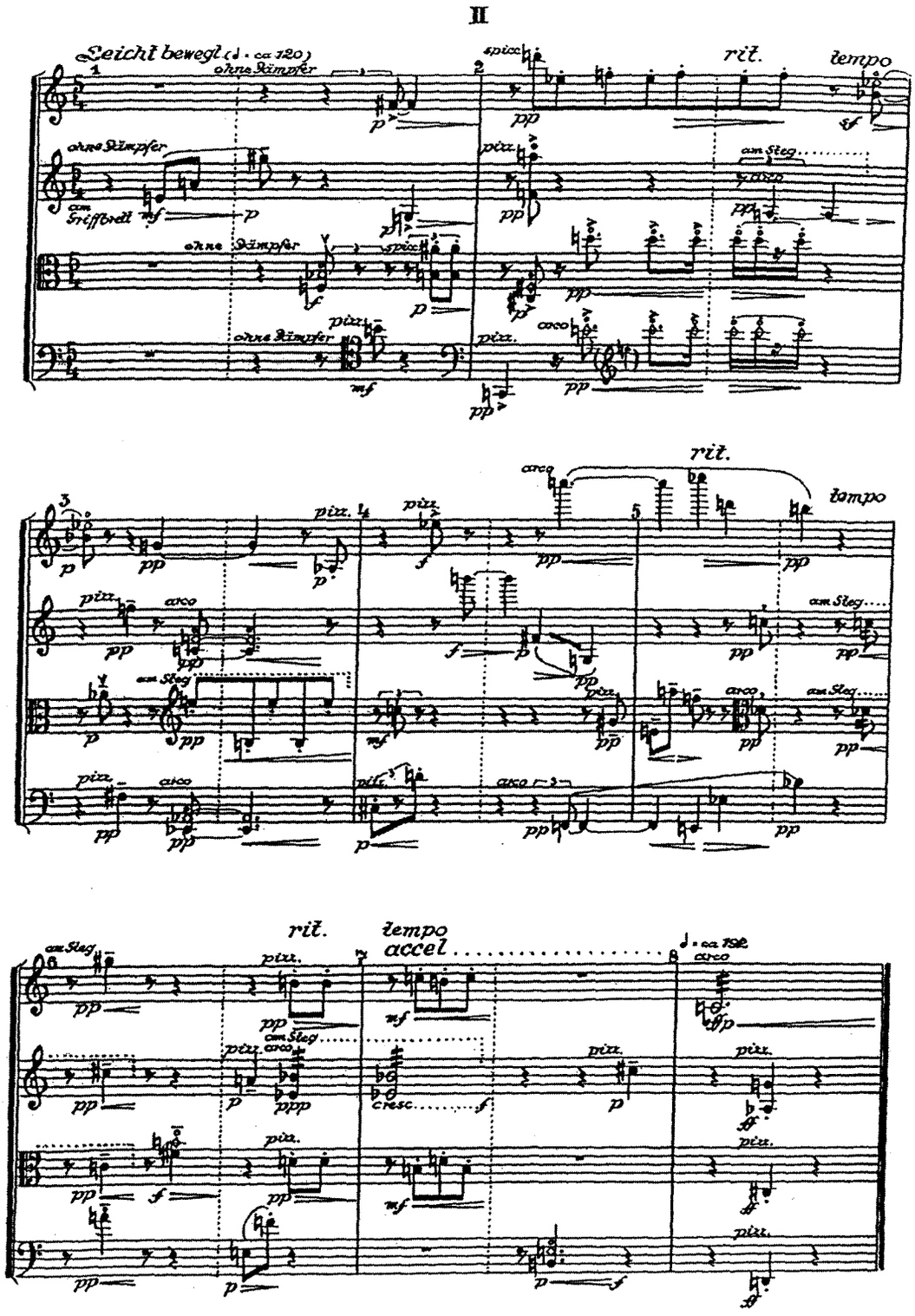
[54] Recall that in Forte's (1998) interpretation of the form, the A section ends in measure 5.

MOVEMENT TWO

The formal structure of movement two is problematic in part because of Webern's unusual choice of meter, 5/4. Each measure is divided into either 2+3 or 3+2. He alternates between these two divisions until the final measure, which switches to the triple meter, 3/4. However, the triple and duple units are not emphasized consistently harmonically or by another musical parameter like timbre, register, dynamics or articulation. As a result the metric pulse is not easily apprehended. Further, the surface level musical parameters do not seem to unfold a pattern that would help to distinguish different sections in the music. Please see Example 24 for the score.

It seems that measures 4 and 5 contain contrasting material in that the pitches in violins I and II are in an extreme register, and these measures lack significant successions of alternating pitches and simultaneous sonorities evident in measures 2-3 and 6-8. This movement does not fit well with a small form, and the few observations I have made with this movement do not have enough merit to warrant dividing this piece into sections. Therefore, I suggest that movement two is a one-part form.

EXAMPLE 24: Second Movement, Op. 9

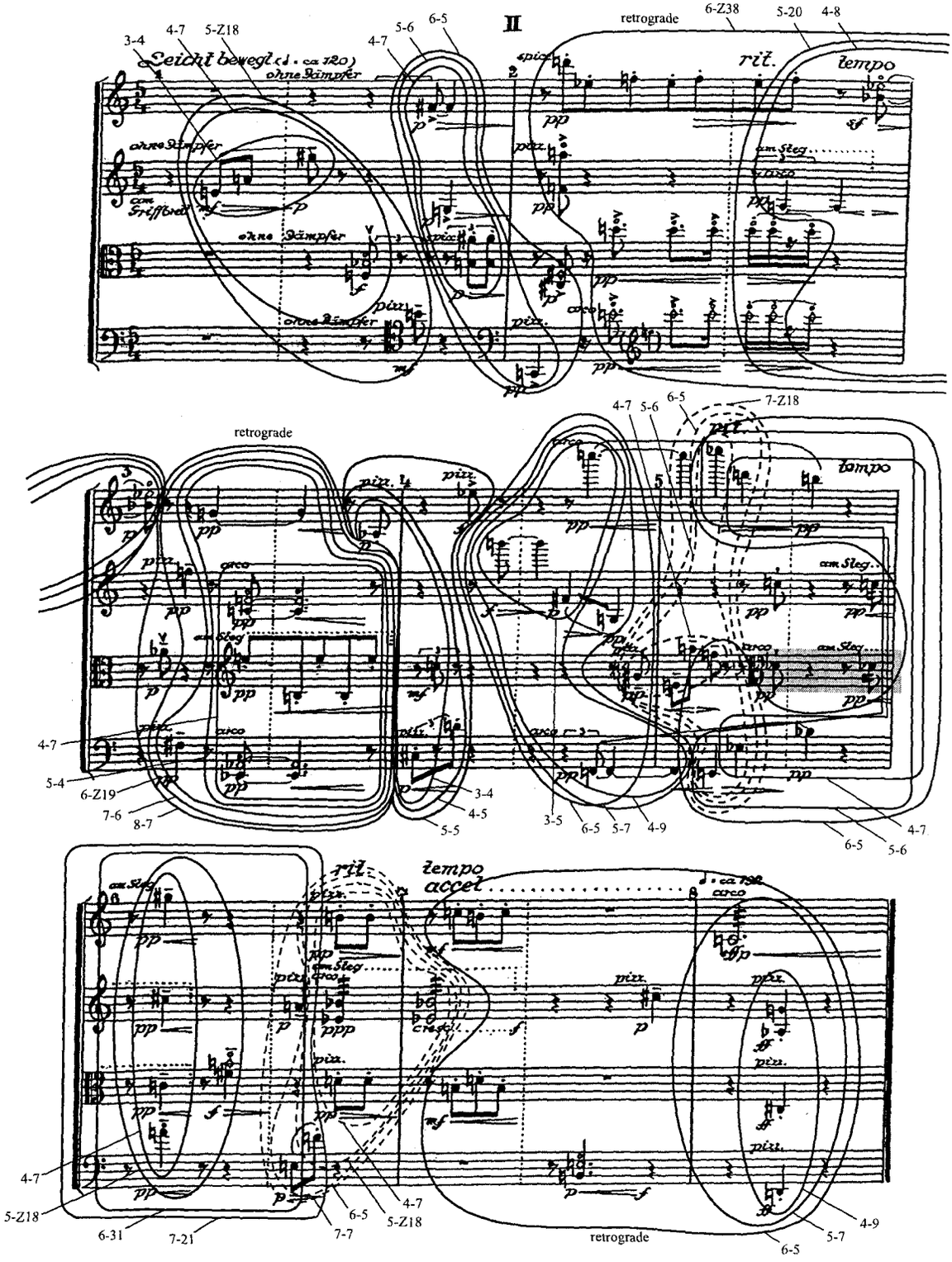


In movement two, the progression of Kh subcomplexes projects a two-stage process in a similar way to movement one. The two parts extend from measures 1-4 and measures 5-8 and the succession of subcomplexes can be described as follows:

4-7, 4-7, 4-8, 4-7, 4-5, 4-9 | 4-7, 4-7, 4-7, 4-9.
4-7

Example 25 illustrates the Kh subcomplexes on the score. Even at first glance, there are some striking similarities between the subcomplex progressions in movements one and two. The now familiar progression 4-7, 4-7, 4-7, 4-9, described earlier as the prime form, also occurs as the progression in the second half of the movement. This two-part progression also divides the piece into two equal sections harmonically, just as in movement one. However, in movement one the Kh subcomplexes progressed only one per measure whereas in movement two, more than one subcomplex can occur within a measure, and in one case, subcomplexes overlap. For example, in measure one there are two successive instances of the Kh subcomplex around 4-7 (0145), and in measure 4, the subcomplexes around 4-5 (0126) and 4-9 (0167) occur in succession. And, in measure 5, there are two overlapping occurrences of the Kh subcomplex around 4-7. These are illustrated in the progression at the top of the page, one on top of the other. Notice that all nexus sets in the progressions project the interval succession, semitone-other interval-semitone, in their prime forms. Also, with the exception of 4-5 (0126), all subcomplexes represent the primary tetrachord group noted previously in Table 11.

EXAMPLE 25: Kh Subcomplexes in Op. 9/2



I would describe the first part of the progression as an elaboration of the prime form—4-7, 4-7, (4-8), 4-7, (4-5), 4-9. The Kh subcomplex around 4-8 (0156) in effect, *ornaments* what had been three successive subcomplexes around 4-7 by delaying the arrival of the third instance. The Kh subcomplex around 4-5 (0126) has an embellishing function also, but to a lesser degree, by immediately preceding the expected subcomplex around 4-9 (0167). The largest set belonging to the Kh subcomplex around 4-5 is the pentachord 5-5 (01237), so it is a relatively small representation of the group and it also happens quickly, lasting only a dotted quarter in duration. Consequently this subcomplex is not emphasized in the music to the same extent as the subcomplex around 4-8, which is sustained over a full measure by the repetition of pitch classes. This lends credence to the categorization of Kh subcomplexes as either primary or secondary groups. Webern emphasizes the primary subcomplex around 4-8 (whose function is to elaborate the progression), while the secondary subcomplex around 4-5 serves more like a 'passing' subcomplex, filling in the motion between 4-7 and 4-9 in the progression.

The second part of the Kh subcomplex progression from measures 5-8, is essentially the prime form progression 4-7, 4-7, 4-7, 4-9. However, with respect to movement one, the harmonic rhythm of the subcomplex succession is accelerated, on one hand by having two instances of 4-7 in measure 6 but, on the other hand slowed down by the subcomplex around 4-9 spanning the last two measures. The two-part progression of Kh subcomplexes in movement two maintains strong similarities, though with some changes, to movement one, and may best be described as ornamented P (prime) and P′.

Webern also uses the same technique to build nested sets in movement two as he had in the first movement. In fact, the Kh subcomplex around 4-9 that appears in the final measure of both movements one and two is constructed in retrograde. Refer back to Examples 23 and 25 for illustrations of the Kh subcomplexes. Other subcomplexes appearing in retrograde in the second movement are at measures 2 and 3. Webern has reduced the number of sets built up in a retrograde fashion in the second movement, but it is interesting that he chose to end each movement with sets being nested in retrograde. With the exception of one note, the building of nested sets in a prime or retrograde fashion accounts for the pitch content of movement two. Pitch class 1in the viola in measure 5, does not fit into the nested structures of the Kh subcomplex around 4-7, which appears twice. If we do add pitch class 1 to either of the largest sets (6-5 or 7-Z18), it would result in a chromatic set, which does not belong to the subcomplex around 4-7. Despite this rogue pitch class all of the other pitch classes are accounted for in the nested structures of nexus sets.

We discovered in the first movement that the nesting of subsets and supersets can be described in terms of the subdivision of intervals. Table 14 summarizes these structures as they occur in movement two. When we compare the successive intervals of recurring set classes, like 4-7, to each other we notice that the interval pattern 1—3—1—7 is used to start the progression and that the last three occurrences of 4-7 have the same interval succession: 1—7—1—3. We do not see a pattern created by the interval successions of 4-7 across the movement as we did in movement one.

TABLE 14: Summary of the pitch class content and subdivision of intervals in Op. 9/2

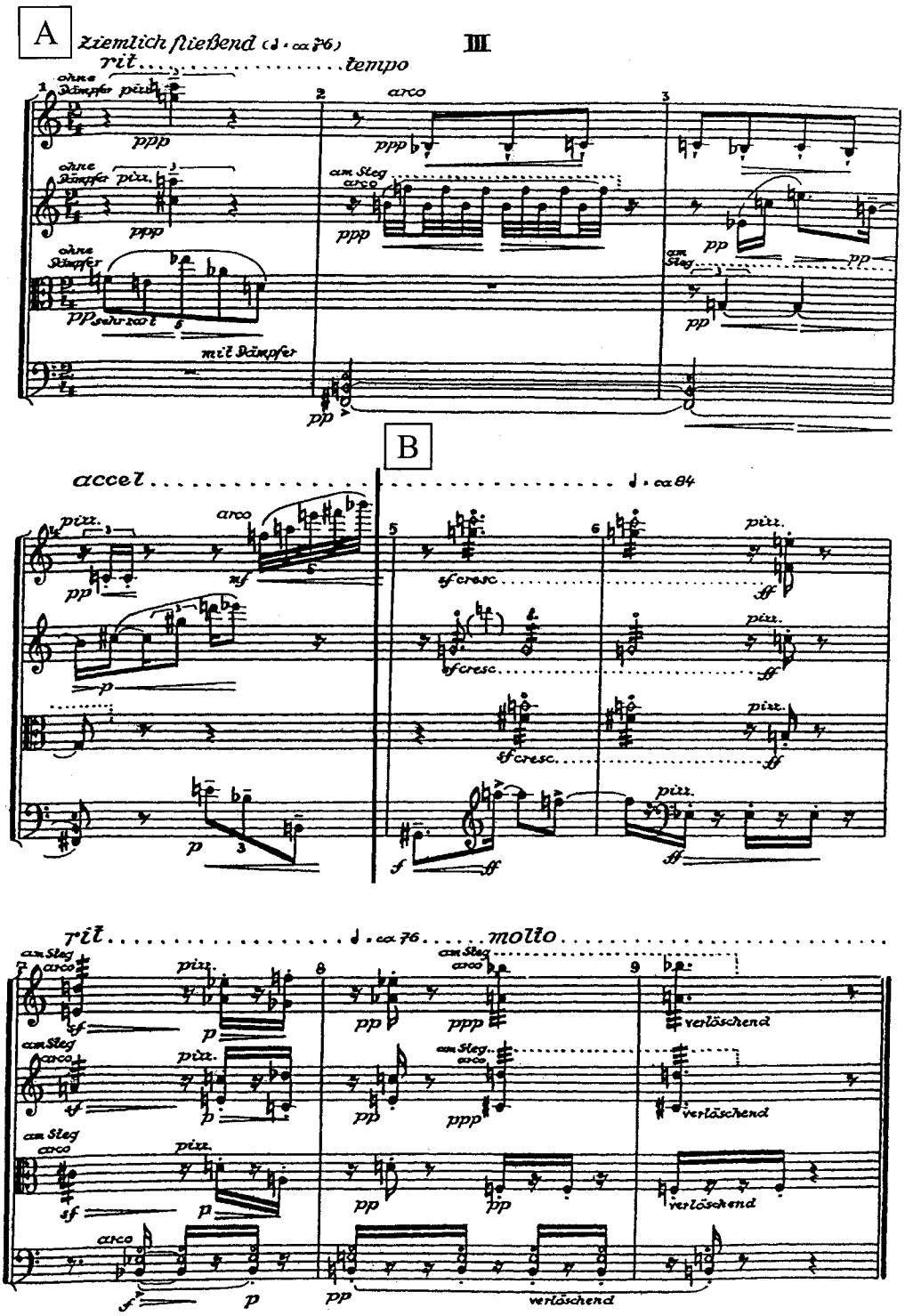
MEASURE NUMBERS	PITCH CLASSES	SET CLASSES & PRIME FORMS	SUBDIVISION OF INTERVALS
1	{4, 8, 9}	3-4 (015)	4—1—7
	{4, 5, 8, 9}	**4-7 (0145)**	**1—3—1—7**
	{4, 5, 8, 9, 11}	5-Z18 (01457)	1—3—1—2—5
1-2	{6, 7, 10, 11}	**4-7 (0145)**	**1—3—1—7**
	{0, 6, 7, 10, 11}	5-6 (01256)	6—1—3—1—1
	{0, 1, 6, 7, 10, 11}	6-5 (012367)	1—5—1—3—1—1
2	{4, 5, 9, 10}	4-8 (0156)	1—4—1—6
	{2, 4, 5, 9, 10}	5-20 (01568)	2—1—4—1—4
	{2, 3, 4, 5, 9, 10}	6-Z38 (012378)	1—1—1—4—1—4
3	{0, 3, 4, 11}	**4-7 (0145)**	**3—1—7—1**
	{0, 3, 4, 7, 11}	5-21 (01458)	3—1—3—4—1
	{0, 3, 4, 6, 7, 11}	6-Z19 (013478)	3—1—2—1—4—1
	{0, 3, 4, 5, 6, 7, 11}	7-6 (0123478)	3—1—1—1—1—4—1
3-4	{0, 1, 8}	3-4 (015)	1—7—4
	{0, 1, 2, 8}	4-5 (0126)	1—1—6—4
	{0, 1, 2, 3, 8}	5-5 (01237)	1—1—1—5—4
4	{0, 6, 11}	3-5 (016)	6—5—1
	{0, 5, 6, 11}	4-9 (0167)	5—1—5—1
	{0, 5, 6, 7, 11}	5-7 (01267)	5—1—1—4—1
	{0, 5, 6, 7, 8, 11}	6-5 (012367)	5—1—1—1—3—1
5	{4, 5, 8, 9}	**4-7 (0145)**	**1—3—1—7**
	{3, 4, 5, 8, 9}	5-6 (01256)	1—1—3—1—6
	{2, 3, 4, 5, 8, 9}	6-5 (012367)	1—1—1—3—1—5
	{0, 2, 3, 4, 5, 8, 9}	7-Z18 (0145679)	2—1—1—1—3—1—3
5	{2, 3, 10, 11}	**4-7 (0145)**	**1—7—1—3**
	{2, 3, 4, 10, 11}	5-6 (01256)	1—1—6—1—3
	{2, 3, 4, 5, 10, 11}	6-5 (012367)	1—1—1—5—1—3
6	{0, 1, 8, 9}	**4-7 (0145)**	**1—7—1—3**
	{0, 1, 6, 8, 9}	5-Z18 (01457)	1—5—2—1—3
	{0, 1, 4, 6, 8, 9}	6-31 (014579)	1—3—2—2—1—3
	{0, 1, 4, 5, 6, 8, 9}	7-21 (0124589)	1—3—1—2—2—1—3
6	{2, 3, 10, 11}	**4-7 (0145)**	**1—7—1—3**
	{2, 3, 5, 10, 11}	5-Z18 (01457)	1—2—5—1—3
	{2, 3, 4, 5, 10, 11}	6-5 (012367)	1—1—1—5—1—3
	{2, 3, 4, 5, 9, 10, 11}	7-7 (0123678)	1—1—1—4—1—1—3
7-8	{1, 2, 7, 8}	4-9 (0167)	1—5—1—5
	{0, 1, 2, 7, 8}	5-7 (01267)	1—1—5—1—4
	{0, 1, 2, 7, 8, 11}	6-5 (012367)	1—1—5—1—3—1

MOVEMENT THREE

The formal structure of movement three can be best described as a binary form, AB, based on dynamics, texture, and timbre. Please see Example 26 for the score. The A section extends from measure 1 to 4 and the B section from measure 5 to 9. The first section is soft, with the dynamic level ranging from triple *piano* to *piano* with *mezzo forte* in the violin gesture that ends the section leading to the B section. The B section begins loudly with a *forte* dynamic level and rises to *fortissimo* by measure 6. Measure 7 returns to *piano* and the piece ends by growing ever more quiet. You may recognize this same dynamic level pattern from movement one. Recall that the first section of movement one was primarily at a dynamic level of *pianissimo* and that the second section went from *forte* to triple *forte* then became more and more soft to end the piece. Of course, the onset of the second section in the opening movement had not been punctuated by the loud dynamic as it is in the third movement.

The changes in texture and timbre go hand-in-hand to help the listener perceive two sections. In the A section, all four instruments take turns playing melodic figures. In contrast Webern switches from melodic motives to harmonies in the B section. Violins I and II and the viola play simultaneously, for the most part in this latter section, and the cello plays short notes that are offset slightly from the chords. The rests between the attacks of the sonorities and individual cello notes sets off this section from the first. Besides the change from melodic to harmonic figures, there is a change in timbre that also helps us to hear this movement as a two-part form. The B section contains many more harmonics, double stops, and bowed tremolos than the A section.

EXAMPLE 26: Third Movement, Op. 9



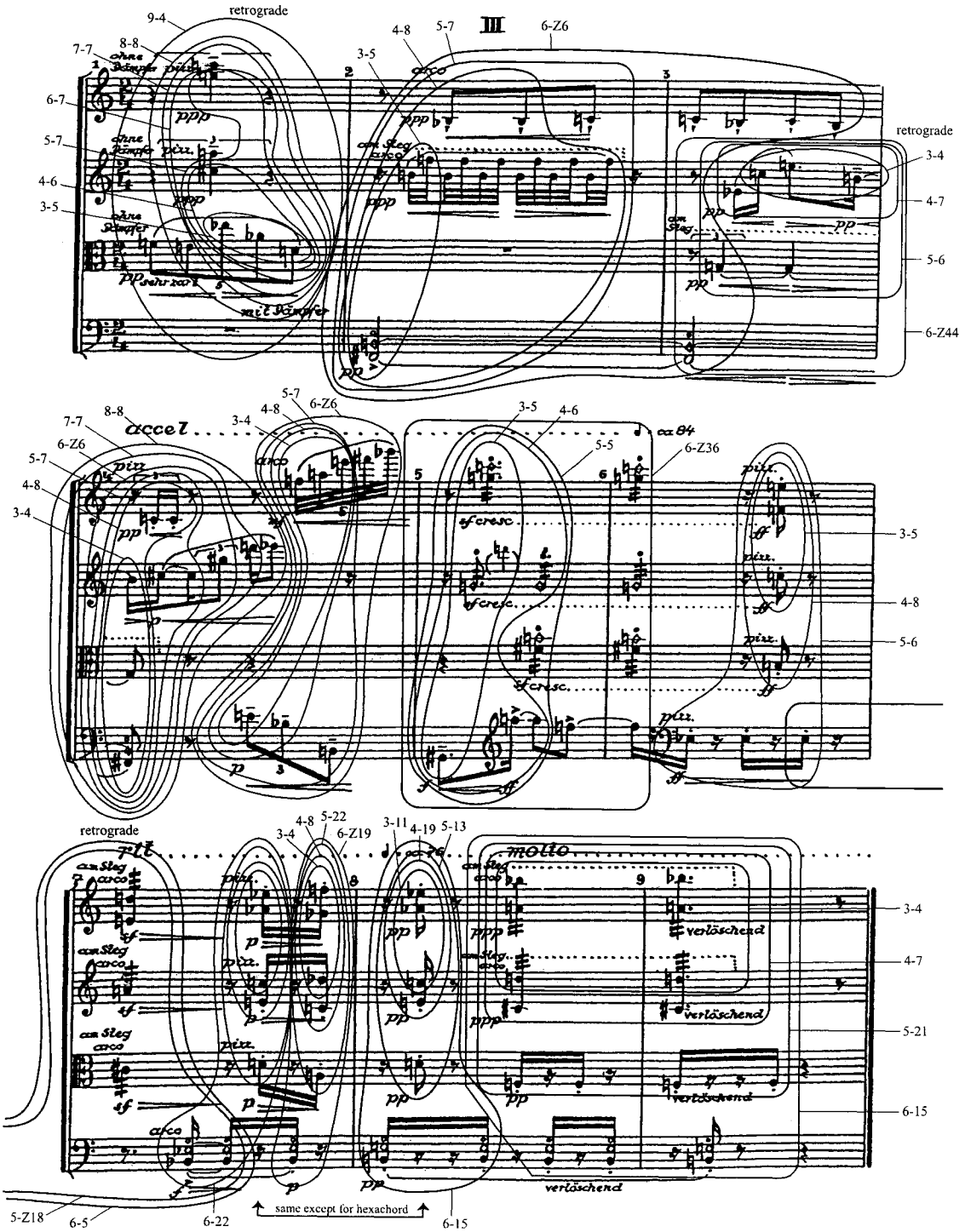
For all these reasons, the second section is heard as something different from the opening section and consequently this helps us to hear the third movement as binary.

In movement three, the progression of Kh subcomplexes projects a two-stage process that corresponds to the formal structure described above. Example 27 illustrates these nested structures as they appear in the music. The two parts of the progression extend from measure 1 to 4 and measure 5 to 9 respectively, and the succession of subcomplexes can be described as follows:

4-6, 4-8, 4-7, 4-8, 4-8, | 4-6, 4-8, 4-7, 4-19, 4-8, 4-19, 4-7.

Webern sets off each section by beginning it with the Kh subcomplex around 4-6 (0127). This is a different secondary subcomplex from the one that Webern had used to begin the sections in the first movement (4-13 (0136)). Notice in measure 5 that set class 6-Z36 (012347), is a superset of 4-6 (0127) but does not belong to the subcomplex around 4-6. I consider this hexachord an auxiliary set because 6-Z36 does belong to the subcomplexes around 4-13, 4-4, and 4-5, all the other secondary Kh subcomplexes. Moreover, none of the primary subcomplexes contain this hexachord.

EXAMPLE 27: Kh Subcomplexes in Op. 9/3



Each 4-6 Kh subcomplex is followed by the succession of subcomplexes around 4-8 (0156) and 4-7 (0145). There is a shift away from successions of the Kh subcomplex around 4-7 and the 4-9 subcomplex is notably absent. Instead, Webern emphasizes the subcomplex around 4-8 but at the same time maintains the presence of 4-7 in the progression. Please note that the 4-7 subcomplex in measure 7 is represented by the pentachord 5-Z18 (01457) and the hexachord 6-5 (012367). A 4-7 tetrachord is not present in the music but because 5-Z18 does not belong to any of the Kh subcomplexes except the one around 4-7, it is appropriate to consider it as a substitute for 4-7.

What is not evident from looking at the progression noted above, is the shape that the Kh subcomplexes take on the surface of the music. Recall that in movement one, the harmonic rhythm was one subcomplex per measure. In movement two, on several occasions two successive subcomplexes occurred in a measure, plus in one instance Kh subcomplexes overlapped within a measure. In movement three, the harmonic rhythm accelerates at the end of the first part of the progression in measure 4 with two successive Kh subcomplexes around 4-8. In the second part of the progression (measures 5-9) three subcomplexes occur in rapid succession. In measures 7-8, there are brief occurrences of the subcomplexes around 4-19 and 4-8. The subcomplex around 4-19 in measure 7 spans only three sixteenth notes in duration; the following 4-8 also in measure 7 spans just two sixteenth notes in duration; 4-19 in measure 8, is the longest in duration of the three—four sixteenth notes. Consequently, they are not emphasized in the music. Because of this, I think of their brief appearances as analogous to the embellishing subcomplex around 4-5 (0126) that occurred in movement two. Recall that the secondary subcomplex

around 4-5 had served a 'passing' function in the music. Similarly, even though the subcomplex around 4-8 in measure 7 is featured prominently throughout the movement and it is framed by almost identical constructions of the subcomplex around 4-19, I believe this progression of Kh subcomplexes (4-19, 4-8, 4-19) embellishes the succession of subcomplexes around 4-7 from measures 7 and 8-9. In this case, the second part of the progression is essentially: 4-6, 4-8, 4-7, 4-7, which effectively modifies the overall progression of Kh subcomplexes as follows:

4-6, 4-8, 4-7, 4-8, 4-8, | 4-6, 4-8, 4-7, 4-7.

Additional comments will be made about this progression in the discussion about how the progressions of Kh subcomplexes fit into a larger context.

Table 15 summarizes the building of these Kh subcomplexes by describing them in terms of the subdivision of intervals. As before, Webern uses the technique of building sets from either left to right in the music or in retrograde. The opening Kh subcomplex around 4-6 is one of three occasions where the nesting of sets is constructed in retrograde, the second time occurs in measure 3 around 4-7, and the final time from measure 7 to 6, also around set class 4-7. Webern uses retrograde for only three of the nine concentric circles of sets. In addition, unlike the previous two movements, a retrograde does not occur in the final measure of the piece. However, in all three movements, the third subcomplex in each of their respective progressions occurs in retrograde. When we compare the interval successions of the recurring set classes, like 4-8, we do not observe any significant pattern across the work.

TABLE 15: Summary of the pitch class content and subdivision of intervals in Op. 9/3

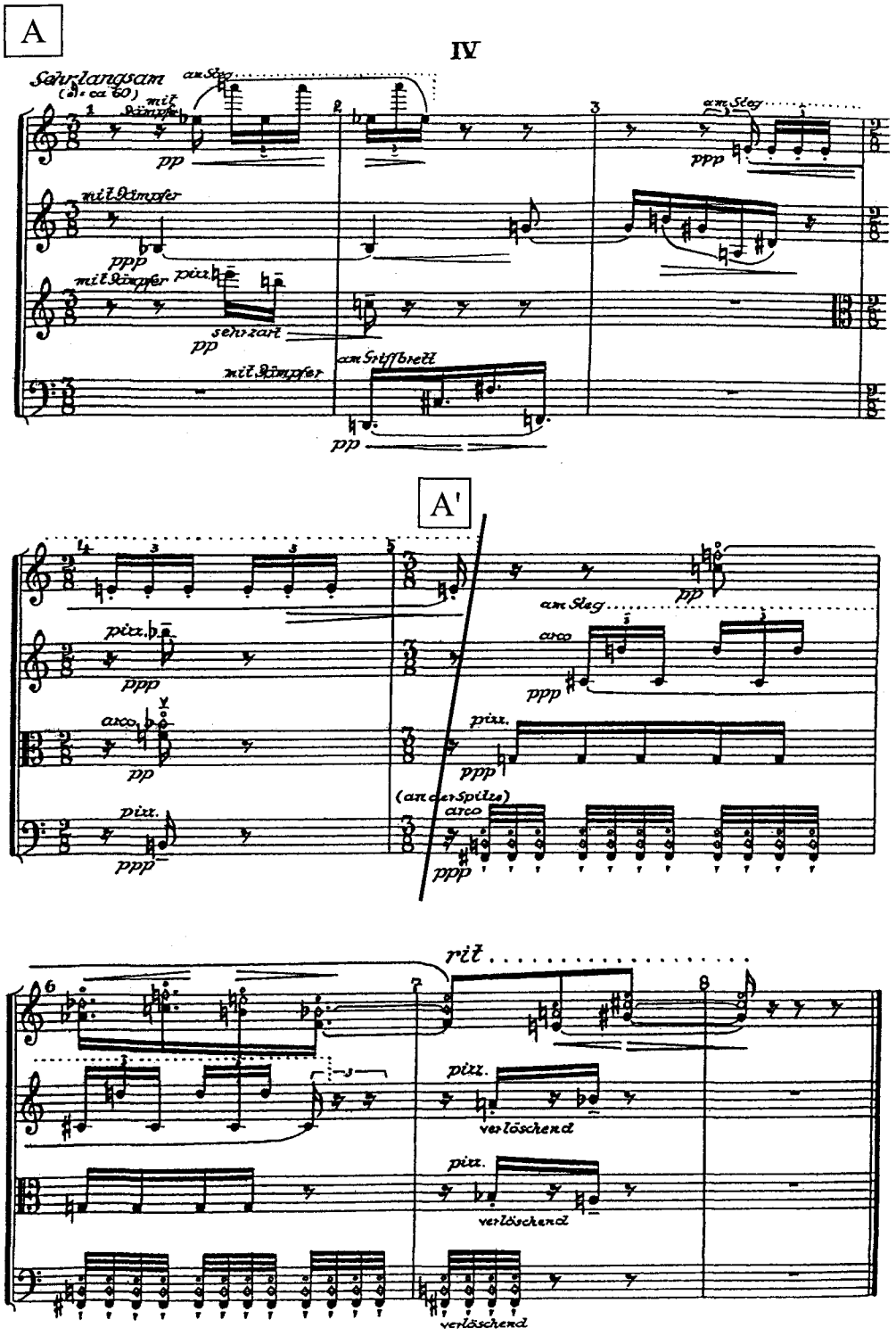
MEASURE NUMBERS	PITCH CLASSES	SET CLASSES & PRIME FORMS	SUBDIVISION OF INTERVALS
1	{2, 3, 8}	3-5 (016)	1—5—6
	{1, 2, 3, 8}	4-6 (0136)	1—1—5—5
	{1, 2, 3, 7, 8}	5-7 (01267)	1—1—4—1—5
	{1, 2, 3, 7, 8, 9}	6-7 (012678)	1—1—4—1—1—4
	{0, 1, 2, 3, 7, 8, 9}	7-7 (0123678)	1—1—1—4—1—1—4
	{0, 1, 2, 3, 4, 7, 8, 9}	8-8 (01234789)	1—1—1—1—3—1—1—3
	{0, 1, 2, 3, 4, 5, 7, 8, 9}	9-4 (012345789)	1—1—1—1—1—2—1—1—3
2-3	{5, 6, 11}	3-5 (016)	1—5—6
	{5, 6, 10, 11}	**4-8 (0156)**	**1—4—1—6**
	{0, 5, 6, 10, 11}	5-7 (01267)	5—1—4—1—1
	{0, 5, 6, 7, 10, 11}	6-Z6 (012567)	5—1—1—3—1—1
3	{0, 4, 11}	3-4 (015)	4—7—1
	{0, 3, 4, 11}	4-7 (0145)	3—1—7—1
	{0, 3, 4, 10, 11}	5-6 (01256)	3—1—6—1—1
	{0, 3, 4, 5, 10, 11}	6-Z44 (012569)	3—1—1—5—1—1
4	{6, 7, 11}	3-4 (015)	1—4—7
	{0, 6, 7, 11}	**4-8 (0156)**	**6—1—4—1**
	{0, 1, 6, 7, 11}	5-7 (01267)	1—5—1—4—1
	{0, 1, 6, 7, 8, 11}	6-Z6 (012567)	1—5—1—1—3—1
	{0, 1, 2, 6, 7, 8, 11}	7-7 (0123678)	1—1—4—1—1—3—1
	{0, 1, 2, 3, 6, 7, 8, 11}	8-8 (01234789)	1—1—1—3—1—1—3—1
4	{4, 5, 9}	3-4 (015)	1—4—7
	{4, 5, 9, 10}	**4-8 (0156)**	**1—4—1—6**
	{4, 5, 9, 10, 11}	5-7 (01267)	1—4—1—1—5
	{4, 5, 6, 9, 10, 11}	6-Z6 (012567)	1—1—3—1—1—5
5-6	{2, 7, 8}	3-5 (016)	5—1—6
	{2, 7, 8, 9}	4-6 (0136)	5—1—1—5
	{2, 6, 7, 8, 9}	5-5 (01237)	4—1—1—1—5
	{2, 5, 6, 7, 8, 9}	6-Z36 (012347)	3—1—1—1—1—5
6	{0, 4, 5}	3-5 (016)	4—1—7
	{0, 4, 5, 11}	**4-8 (0156)**	**4—1—6—1**
	{0, 3, 4, 5, 11}	5-6 (01256)	3—1—1—6—1
6-7	{1, 2, 4, 9, 10}	5-Z18 (01457)	1—2—5—1—3
	{1, 2, 3, 4, 9, 10}	6-5 (012367)	1—1—1—5—1—3
7	{0, 3, 8}	3-11 (037)	3—5—4
	{0, 3, 4, 8}	4-19 (0148)	3—1—4—4
	{0, 2, 3, 4, 8}	5-13 (01248)	2—1—1—4—4
	{0, 2, 3, 4, 8, 10}	6-22 (012468)	2—1—1—4—2—2
7	{1, 5, 6}	3-4 (015)	4—1—7
	{0, 1, 5, 6}	**4-8 (0156)**	**1—4—1—6**
	{0, 1, 5, 6, 9}	5-22 (01478)	1—4—1—3—3
	{0, 1, 5, 6, 9, 10}	6-Z19 (013478)	1—4—1—3—1—2
8	{0, 3, 8}	3-11 (037)	3—5—4
	{0, 3, 4, 8}	4-19 (0148)	3—1—4—4
	{0, 2, 3, 4, 8}	5-13 (01248)	2—1—1—4—4
	{0, 2, 3, 4, 8, 11}	6-15 (012458)	2—1—1—4—3—1
8-9	{2, 9, 10}	3-4 (015)	7—1—4
	{1, 2, 9, 10}	4-7 (0145)	1—7—1—3
	{1, 2, 5, 9, 10}	5-21 (01458)	1—3—4—1—3
	{1, 2, 5, 9, 10, 11}	6-15 (012458)	1—3—4—1—1—2

MOVEMENT FOUR

The fourth movement is rife with repeated notes, particularly long successions of them. In fact, there are only thirty different pitches in this entire movement. There is very little dynamic contrast across the piece. Like Forte, I believe the form of this movement is binary, A A'. The A section extends from measures 1-4, including the pitch E4 on the downbeat of measure 5, and the A' extends from measures 5-8. The second section is set off from the first because of the contrast in texture, the long successions of repeated notes in three instruments, and the addition of harmonics, in the first violin and cello from measure 5 to 8. However, because of motivic connections between sections, I am calling the second section A' rather than B.

As Forte points out, there are pitch class connections between sections. For example, recall in the discussion about Forte's analysis that in measure 5, pitch classes 1 and 2 in violin II and pitch classes 6 and 7 are derived from the cello in measure 2. The triplet figure in violin II in measures 5-6 recalls measures 1-2. The violin motive in measure 6 reminds us of the cello motive in measure 2, though their contours are mirror images of each other. Webern maintains some pitch class and rhythmic similarities between sections while changing other musical parameters, helping us hear this movement as binary.

EXAMPLE 28: Fourth Movement, Op. 9



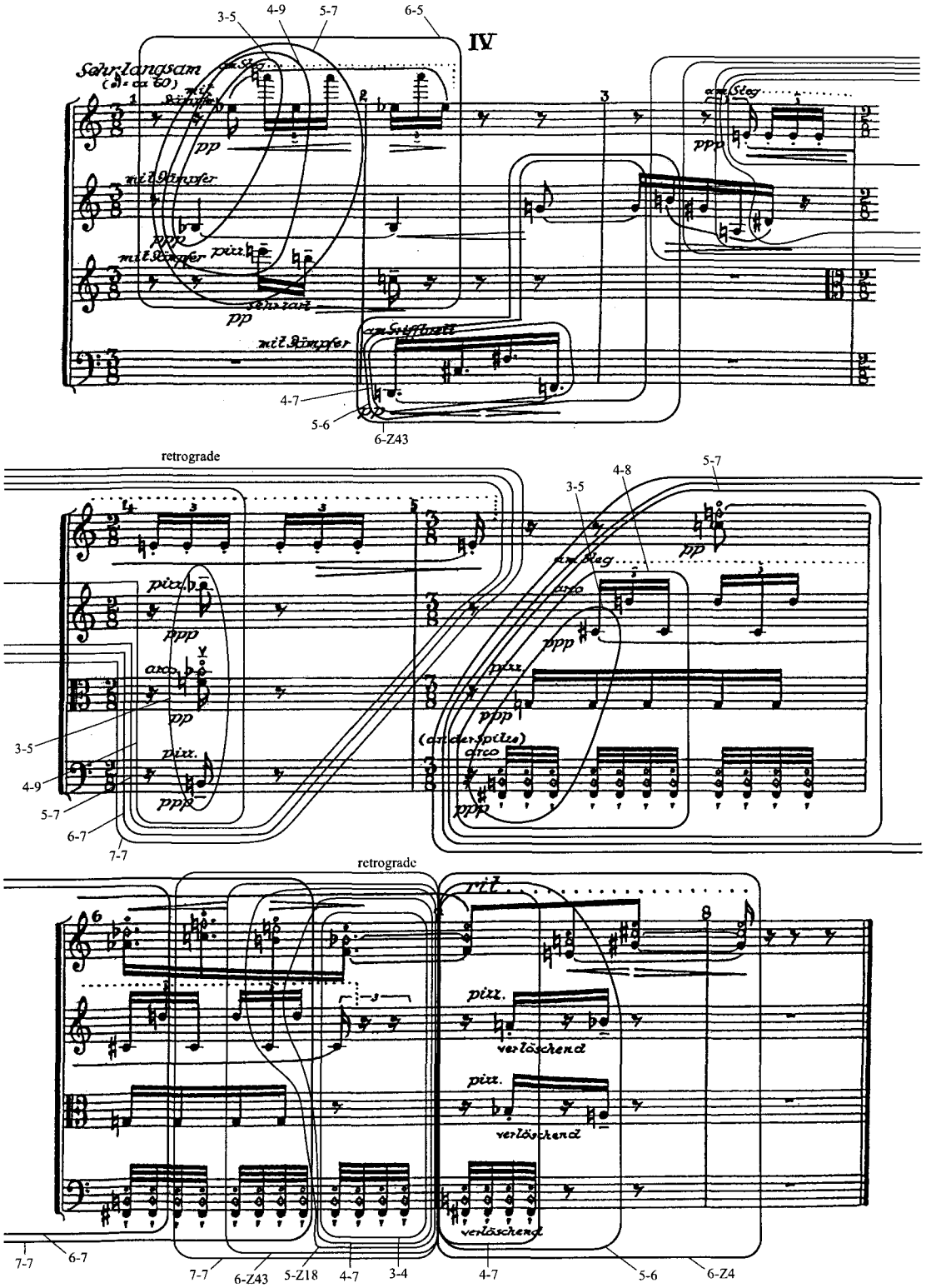
Because of the minimal pitch material, the Kh subcomplex progression consists of only six subcomplexes, the fewest of all the movements. Example 29 illustrates the nesting of these sets on the score. Just as in the previous three movements, the progression of Kh subcomplexes unfolds in two parts as follows:

4-9, 4-7, 4-9 | 4-8, 4-7, 4-7.

The subcomplex around 4-9, absent in movement three, returns, and it occurs, for the first time, on either side of the 4-7 subcomplex. We can recognize the second half of the progression as the unembellished version of the progression from movement three. Notice that the Kh subcomplex that ends each section extends two measures (though just barely for 4-7), and that the harmonic rhythm for the others is about one per measure.

With all three occurrences of the Kh subcomplex around 4-7, a set that lies outside of the subcomplex appears as a superset. Notice in measures 2 and 6, set class 6-Z43 (012568) forms a superset of 4-7 (0145) but does not belong to its subcomplex. Similarly in measures 7-8, 6-Z4 (012456) is a superset of 4-7 but does not belong to the subcomplex. However, these auxiliary hexachords do belong to other familiar Kh subcomplexes—6-Z43 to both 4-8 and 4-5, and 6-Z4 to 4-5 only. The auxiliary hexachord 6-Z43 was similarly used in movement one in measures 5-6.

EXAMPLE 29: Kh Subcomplexes in Op. 9/4



When we examine how nested sets in this movement are created, we see that Webern constructs two of the Kh subcomplexes in retrograde. The first progresses from measure 4 to 3 around 4-9 and the second occurs in measure 6 around 4-7. This time only two of the seven Kh subcomplexes are created in retrograde, but just as in movements one to three, the third subcomplex that appears is a retrograde. I do not know the significance of this common thread, but it is curious.

Table 16: Summary of the pitch class content and subdivision of intervals in Op. 9/4

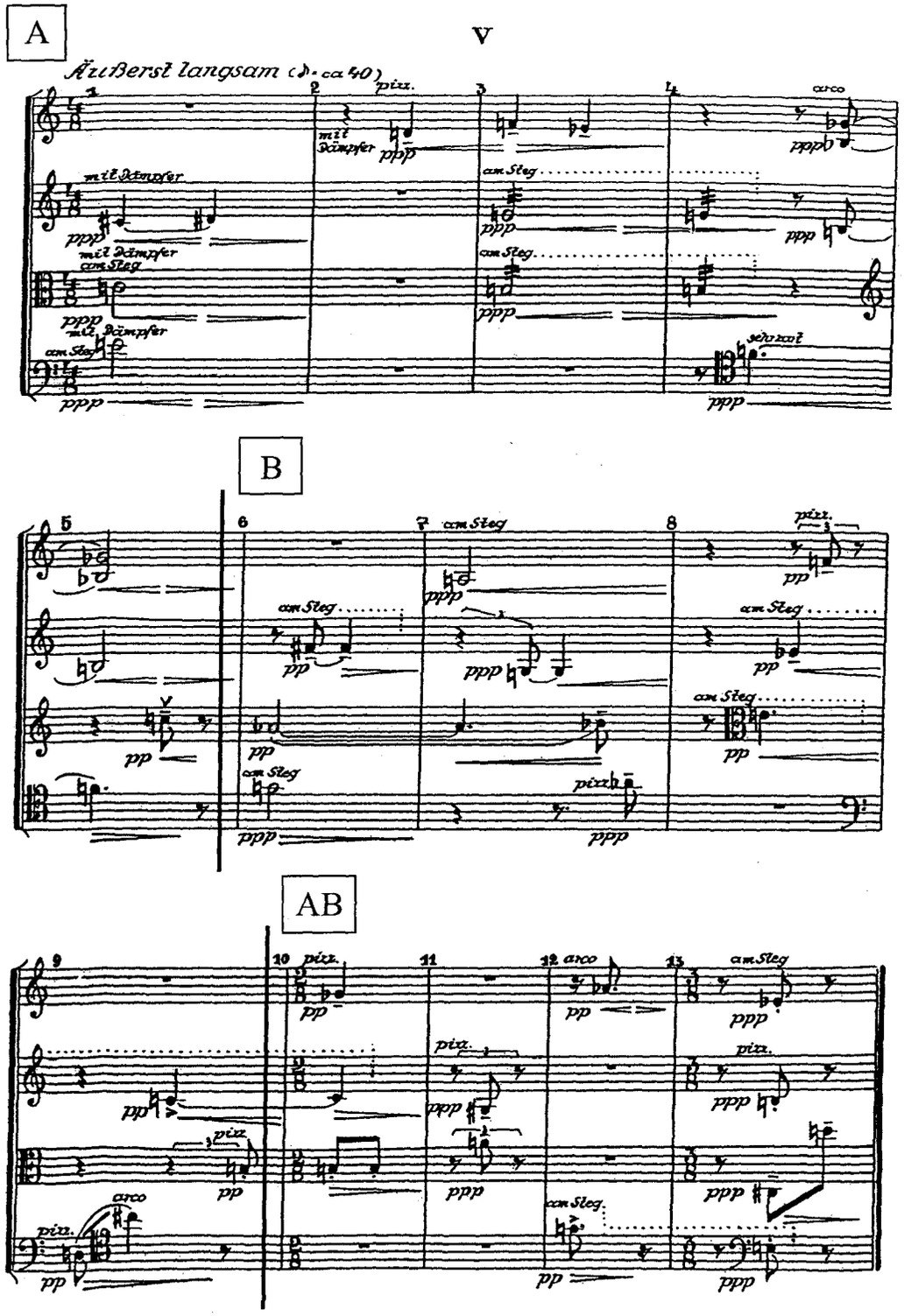
MEASURE NUMBERS	PITCH CLASSES	SET CLASSES & PRIME FORMS	SUBDIVISION OF INTERVALS
1-2	{3, 9, 10}	3-5 (016)	6—1—5
	{3, 4, 9, 10}	4-9 (0167)	1—5—1—5
	{3, 4, 9, 10, 11}	5-7 (01267)	1—5—1—1—4
	{0, 3, 4, 9, 10, 11}	6-5 (012367)	3—1—5—1—1—1
2-3	{1, 2, 5, 6}	**4-7 (0145)**	**1—3—1—7**
	{1, 2, 5, 6, 7}	5-6 (01256)	1—3—1—1—6
	{1, 2, 5, 6, 7, 11}	6-Z43 (012568)	1—3—1—1—4—2
3-4	{5, 10, 11}	3-5 (016)	5—1—6
	{4, 5, 10, 11}	4-9 (0167)	1—5—1—5
	{3, 4, 5, 10, 11}	5-7 (01267)	1—1—5—1—4
	{3, 4, 5, 9, 10, 11}	6-5 (012367)	1—1—4—1—1—4
	{3, 4, 5, 8, 9, 10, 11}	7-7 (0123678)	1—1—3—1—1—1—4
4-5	{5, 10, 11}	3-5 (016)	5—1—6
	{4, 5, 10, 11}	4-9 (0167)	1—5—1—5
	{4, 5, 6, 10, 11}	5-7 (01267)	1—1—4—1—5
	{4, 5, 6, 7, 10, 11}	6-7 (012678)	1—1—1—3—1—5
5-6	{1, 6, 7}	3-5 (016)	5—1—6
	{1, 2, 6, 7}	4-8 (0156)	1—4—1—6
	{0, 1, 2, 6, 7}	5-7 (01267)	1—1—4—1—5
	{0, 1, 2, 6, 7, 8}	6-7 (012678)	1—1—4—1—1—4
	{0, 1, 2, 6, 7, 8, 11}	7-7 (0123678)	1—1—4—1—1—3—1
6	{1, 5, 6}	3-4 (015)	4—1—7
	{1, 2, 5, 6}	**4-7 (0145)**	**1—3—1—7**
	{1, 2, 5, 6, 11}	5-Z18 (01457)	1—3—1—5—2
	{1, 2, 5, 6, 7, 11}	6-Z43 (012568)	1—3—1—1—4—2
	{0, 1, 2, 5, 6, 7, 11}	7-7 (0123678)	1—1—3—1—1—4—1
7-8	{5, 6, 9, 10}	**4-7 (0145)**	**1—3—1—7**
	{4, 5, 6, 9, 10}	5-6 (01256)	1—1—3—1—6
	{4, 5, 6, 8, 9, 10}	6-Z4 (012456)	1—1—2—1—1—6

When we examine the interval successions of recurring 4-7 tetrachords in movement four, the same interval pattern, 1—3—1—7 emerges (which gives rise to the set's prime form), but Webern subdivides the intervals differently in order to produce different pentachords. Please see Table 16, which summarizes all the nested sets and their interval patterns found in this movement. In measures 2-3 and 6 Webern uses the same pitch classes {1, 2, 5, 6} and subdivides the interval 7 into 1 and 6, and 5 and 2 respectively to produce set classes 5-6 (01256) and 5-Z18 (01457). In measures 7-8 Webern uses different pitch classes {5, 6, 9, 10}, but subdivides the interval 7 into 1 and 6 to form another 5-6 pentachord. In the case of 4-9, the same procedure takes place but results in only one pentachord. Because set class 4-9 is a symmetrical set, the interval succession must be 1—5—1—5 (when pitch classes are arranged in ascending order). In measures 3-4 and 4-5 there are duplicate pitch classes—{4, 5, 10, 11}. However, Webern subdivides the outer interval 5 into 1 and 4 in measures 3 and 4, and the inner interval 5 of the tetrachord in measures 4 and 5 into 1 and 4 resulting in set class 5-7. In this movement, when pitch classes are duplicated and then divided to form different supersets, Webern subdivides the same larger interval differently (interval 7 into 1—6, 6—1, 5—2 in the case of 4-7). Alternatively, he creates the same superset by subdividing different positions of larger intervals within the set like the case of 4-9.

MOVEMENT FIVE

The longest of the six movements, sixteen measures, this piece can be described as a three-part form based on surface level pitch class interval expansions and contractions. See Example 30 for the score.

EXAMPLE 30: Fifth Movement, Op. 9



The A section extends from measure 1 to 5, the B section from measure 6 to 9, and the final section, a combination of both A and B, extends from measure 10 to 13. What is often noted about this movement is the chromaticism. The surface level chromaticism helps define the form. In the A section there is a gradual expansion of unordered pitch class intervals; in the B section, all of the harmonies reflect the most compact succession of intervals, chromatic sonorities; the final section combines both larger unordered pitch class intervals from A and chromatic successions from B in the harmonies.

In measure 1, the two set class 3-3 (014) sonorities ({0, 1, 4} and {0, 3, 4}) create the unordered pitch class intervals 1 and 3. In measure 3, the first sonority (set class 3-5 (016)), creates the unordered pitch class intervals 4 and 1 on pitch classes {11, 4, 5}, while the next sonority (3-4 (015)), creates the unordered pitch class intervals 5 and 1 on pitch classes {11, 4, 5}. The unordered pitch class interval 3, from measure 1 expands to 4 at the beginning of measure 3, then to 5 in the latter part of measure 3. Pitch classes {11, 4, 5} are duplicated in measure 4 but the interval expansion continues at the end of the measure into measure 5 with pitch classes {10, 11, 5, 6} in the violins and cello. The unordered pitch class interval 5 expands to 6. There is an expansion of one of the unordered pitch class intervals across the A section.

The surface level chromaticism highlights the B section (measures 6-9) as something different. When we examine the pitch class content of each of these measures, all the harmonies create chromatic trichords or tetrachords. Further, these chromatic

harmonies represent a contraction of the unordered pitch class intervals to their most compact form, the semitone. This section also contains the complete aggregate, with only one repetition of pitch classes 7 and 8 in measure 7.

In the final section, Webern combines elements of the previous sections. In measure 10, the unordered pitch class intervals, familiar from the end of the A section, 1 and 6, return on pitch classes {11, 0, 6}. In measures 11 and 12, Webern brings back the chromatic successions from the B section, but this time they are represented as dyads. However, if we take the pitch classes from measures 11 and 12 together, they create a chromatic trichord. In fact, these measures parallel what happens in measure 7. In both cases, pitch classes 9 and 8 are first heard together, then pitch class 7 follows as a single note. Webern however, changes the register in measures 11-12. In measure 13, pitch classes {4, 11, 1, 3} create the unordered pitch class intervals 5 and 2. If we include the final note to this sonority, pitch class 2, then we have the unordered pitch classes 5, 2, and 1. It seems that in the final section Webern returns to some of the larger unordered pitch class intervals evident in the A section but at the same time maintains similarities of chromatic harmonies with the B section.

As we turn our attention to the harmonic structure of this movement, we discover that although this piece is the longest of the six, it has a total of seven Kh subcomplexes, one more than movement four, which has the fewest. In this movement, the Kh subcomplexes we saw previously as embellishments are given greater prominence and appearances of primary subcomplexes are reduced in number or absent altogether in the progression.

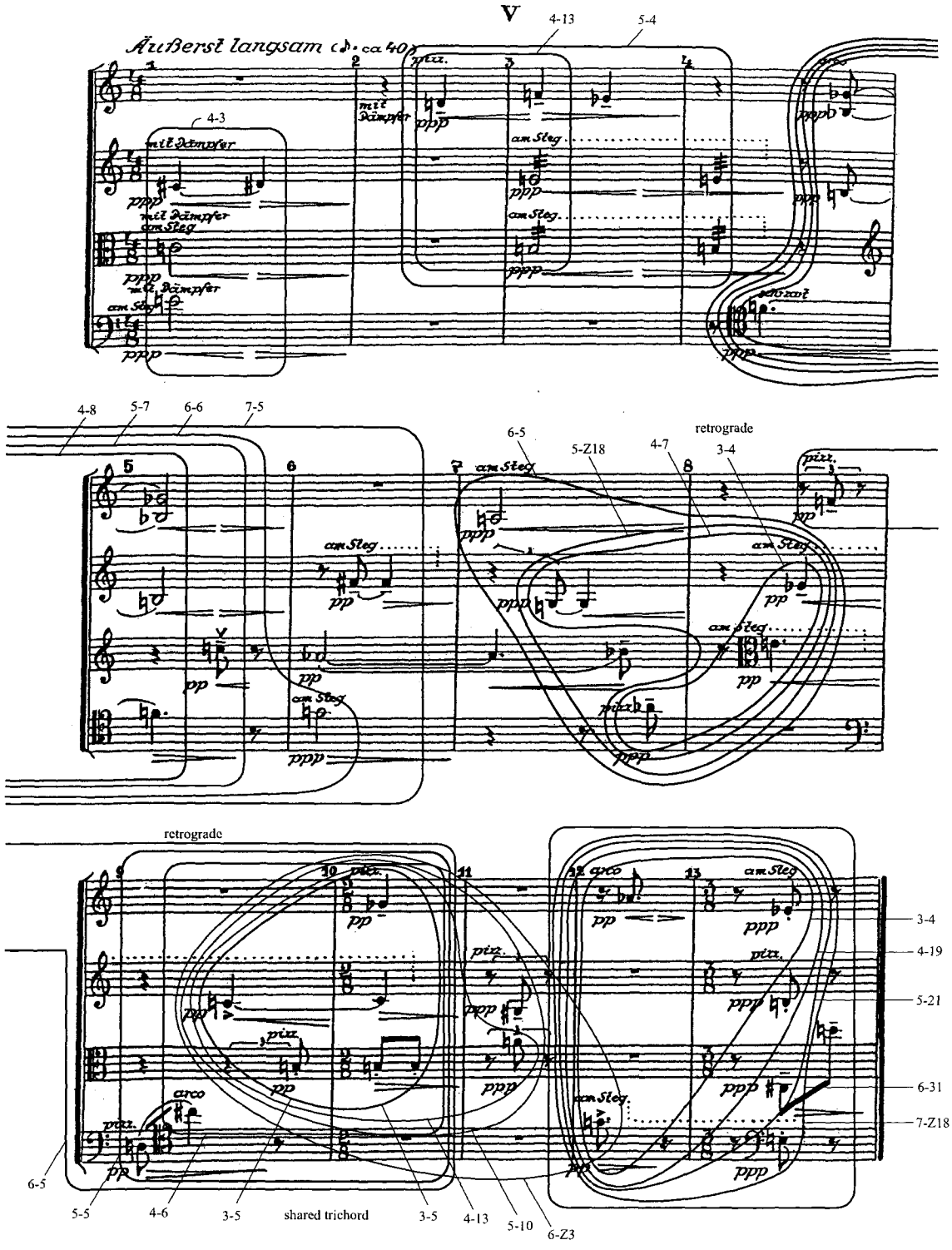
The movement's succession of Kh subcomplexes can be described as follows:

4-3, 4-13, 4-8, 4-7, 4-6, 4-13, 4-19.

Notice that the subcomplex around 4-9 is notably absent here. (This subcomplex was also absent in movement three, but other primary subcomplexes were prominently featured through repetition there. In movement five, however, the secondary subcomplexes outnumber the primary ones.) Example 31 outlines the Kh subcomplexes on the score.

There is only one appearance each of the Kh subcomplexes around 4-7 and 4-8, and the subcomplex around 4-8 is one of only two occurrences of sets constructed in retrograde. (The subcomplex around 4-6 is the other.) A complication arises when the subcomplexes around 4-6 and 4-13 in measures 9-11 overlap, by sharing a common trichord which generates the nested sets in opposite directions. The subcomplex around 4-6 starts with set class 3-5 (016) on pitch classes {0, 6, 11} and builds larger sets in retrograde while 4-13 uses this same trichord and builds the subcomplex from left to right. An overlap of two different Kh subcomplexes has not occurred in previous movements and consequently disguises the harmonic progression by making unclear where the subcomplexes start and end.

EXAMPLE 31: Kh Subcomplexes in Op. 9/5



In addition, the Kh subcomplex around 4-19, that had made only a brief appearance in movement three, extends for two measures and is the last subcomplex heard in movement five. Another subcomplex that had made only a fleeting appearance was 4-3, in movement one. Recall that its purpose there had been to link the Kh subcomplexes 4-13 and 4-7 together. In this movement, set class 4-3 (0134) is featured prominently as the opening sonority but it is the sole representative of the subcomplex.

TABLE 17: Summary of the pitch class content and subdivision of intervals in Op. 9/5

MEASURE NUMBERS	PITCH CLASSES	SET CLASSES & PRIME FORMS	SUBDIVISION OF INTERVALS
1	{0, 1, 3, 4}	4-3 (0134)	1—2—1—8
2-3	{2, 4, 5, 11}	4-13 (0136)	2—1—6—3
	{2, 3, 4, 5, 11}	5-4 (01236)	1—1—1—6—3
4-6	{5, 6, 10, 11}	4-8 (0156)	1—4—1—6
	{0, 5, 6, 10, 11}	5-7 (01267)	5—1—4—1—1
	{0, 5, 6, 7, 10, 11}	6-Z6 (012567)	5—1—1—3—1—1
	{0, 5, 6, 7, 8, 10, 11}	7-5 (0123567)	5—1—1—1—2—1—1
7-8	{3, 4, 8}	3-4 (015)	1—4—7
	{3, 4, 7, 8}	4-7 (0145)	1—3—1—7
	{3, 4, 7, 8, 10}	5-Z18 (01457)	1—3—1—2—5
	{3, 4, 7, 8, 9, 10}	6-5 (012367)	1—3—1—1—1—5
8-10	{0, 6, 11}	3-5 (016)	6—5—1
	{0, 1, 6, 11}	4-6 (0127)	1—5—5—1
	{0, 1, 2, 6, 11}	5-5 (01237)	1—1—4—5—1
	{0, 1, 2, 5, 6, 11}	6-5 (012367)	1—1—3—1—5—1
9-12	{0, 6, 11}	3-5 (016)	6—5—1
	{0, 6, 9, 11}	4-13 (0136)	6—3—2—1
	{0, 6, 8, 9, 11}	5-10 (01346)	6—2—1—2—1
	{0, 6, 7, 8, 9, 11}	6-Z3 (012356)	6—1—1—1—2—1
12-13	{3, 7, 8}	3-4 (015)	4—1—7
	{3, 7, 8, 11}	4-19 (0148)	4—1—3—4
	{3, 4, 7, 8, 11}	5-21 (01458)	1—3—1—3—4
	{1, 3, 4, 7, 8, 11}	6-31 (014579)	2—1—3—1—3—2
	{1, 2, 3, 4, 7, 8, 11}	7-Z18 (0145679)	1—1—1—3—1—3—2

The subcomplexes presented in this movement seem to summarize, to some extent, all the different Kh subcomplexes of the previous movements. With the exception of the subcomplex around 4-13 (0136), there is only one appearance of each subcomplex.

The subcomplex around 4-9 is the only one not evident in this movement. Because Kh subcomplexes are not emphasized through repetition, examining the subdivisions of intervals that create these nested sets is not fruitful. However, Table 17 summarizes the pitch class content and interval subdivisions so we can see how Webern builds the sets in movement four. However, because the nexus sets do not repeat, except for 4-13, and few supersets are held in common across the piece, no significant pattern arises from examining the subdivision of intervals.

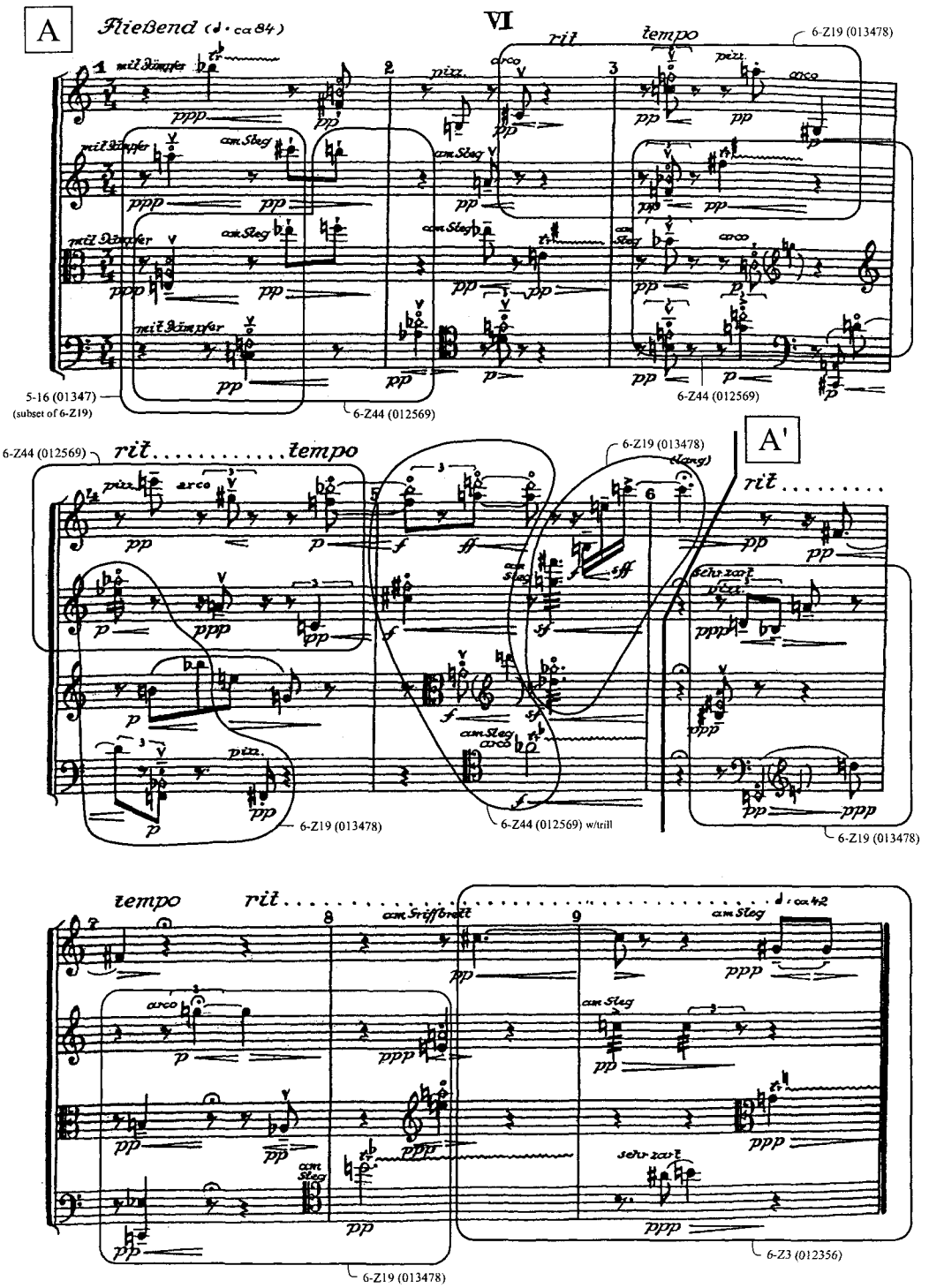
There are two septachords that do not belong to the same Kh subcomplex as the sets they contain. In measures 4-6, set class 7-5 (0123567) is an auxiliary set to the subcomplex around 4-8 because it is a superset of 4-8 and belongs to the subcomplexes around 4-5 and 4-6, two of the secondary subcomplexes, not 4-8. The other instance occurs in measures 12-13 with set class 7-Z18. This septachord is a superset of 4-19 but belongs to the Kh subcomplex around 4-7. When Webern does use a set that lies outside the prevailing subcomplex, the set class always belongs to one of the primary or secondary Kh subcomplexes identified at the beginning of this analysis—4-7, 4-8, 4-9, 4-19 and 4-4, 4-5, 4-6, 4-13, (4-3).

MOVEMENT SIX

The final movement of Op. 9 is the most difficult to understand in terms of formal structure. You may recall that Forte (1998) only interprets only a portion of this piece and does not discuss the form at all. This movement has a different character than all the other movements with all instruments muted and a pointillistic texture. Harmonically, it is easier to create larger sets that are related to each other than in previous movements, where smaller sets like trichords or tetrachords seem to better represent the harmonic structure. Please see Example 32 for the score. I believe this movement can be described as binary form (A A') based in part on the fermata in all instruments in measure 6. The first section extends from measure 1 to 5, including the pitch class 0 in the first violin sustained through the downbeat of measure 6. The second section extends from measure 6 to 9.

In movement six, familiar hexachords from Op. 11, complementary set classes 6-Z19/6-Z44 first occur as overlapping sets in the opening section, then 6-Z19 takes over as successive harmonies in the second section. In measure 1, 6-Z44 (012569) intersects with 5-16 (01347), a subset of 6-Z19 (013478), on three pitch classes—0, 3, and 4. The complete 6-Z19 hexachord occurs in measures 2-3 in the violins and overlaps with 6-Z44 in two pitch classes—5 and 6. In measure 4, the violins form another 6-Z44 and this hexachord intersects with its complement, 6-Z19 in only one pitch class. As the piece progresses, fewer pitch classes are shared between 6-Z19/6-Z44. In measure 5, 6-Z44 and 6-Z19 appear in succession with no overlapping pitch classes to end the first section. This is the last time that this hexachordal pair will appear together.

EXAMPLE 32: Movement Six, Op. 9



In measures 6-8, there are two successive occurrences of the 6-Z19 hexachord. It seems that 6-Z19 becomes more salient as the piece progresses while 6-Z44 recedes from prominence by the end of the piece. However, Webern ends the piece with a new hexachord, 6-Z3 (012356). This hexachord is a close relative of 6-Z44 (012569), because they both contain similar subsets, especially set class 3-3. It seems that Webern diverges from the harmonic material at the end of the piece by introducing the 6-Z3 hexachord, but at the same time, he may be hinting at the 6-Z44 hexachord, prominent in the first section, by using the 6-Z3 hexachord that is closely related intervallically.

It is also interesting to note that in the A section Webern alternates hexachords involving the same instruments. For example in measures 2-3, 6-Z19 appears in the first and second violin, in measure 4, its complement, 6-Z44 also occurs in the violins. Similarly, in measure 3, 6-Z44 occurs in the cello, viola, and violin II, which is followed by its complement, 6-Z19, in measure 4 with the same instruments. The same kind of alternation occurs in measures 1-2, though the 6-Z19 hexachord is not fully present. After overlapping the complementary hexachords, they appear for the first time in succession in measure 5 with the loudest dynamic level of the piece—*forte* to *fortissimo*. It seems that 6-Z19 has gained independence from 6-Z44 and is subsequently emphasized as a harmony from measure 6 to 9. These complementary hexachords, 6-Z19/6-Z44, unfold a two-stage process that contributes to defining the form. While these two hexachords do not account for all the pitch material of the movement, I believe that the linear

successions of these hexachords from measures 5-9 are highlighted in the music as harmonies. However, my understanding of the form does not quite match up with the underlying harmonic progression we are about to discuss.

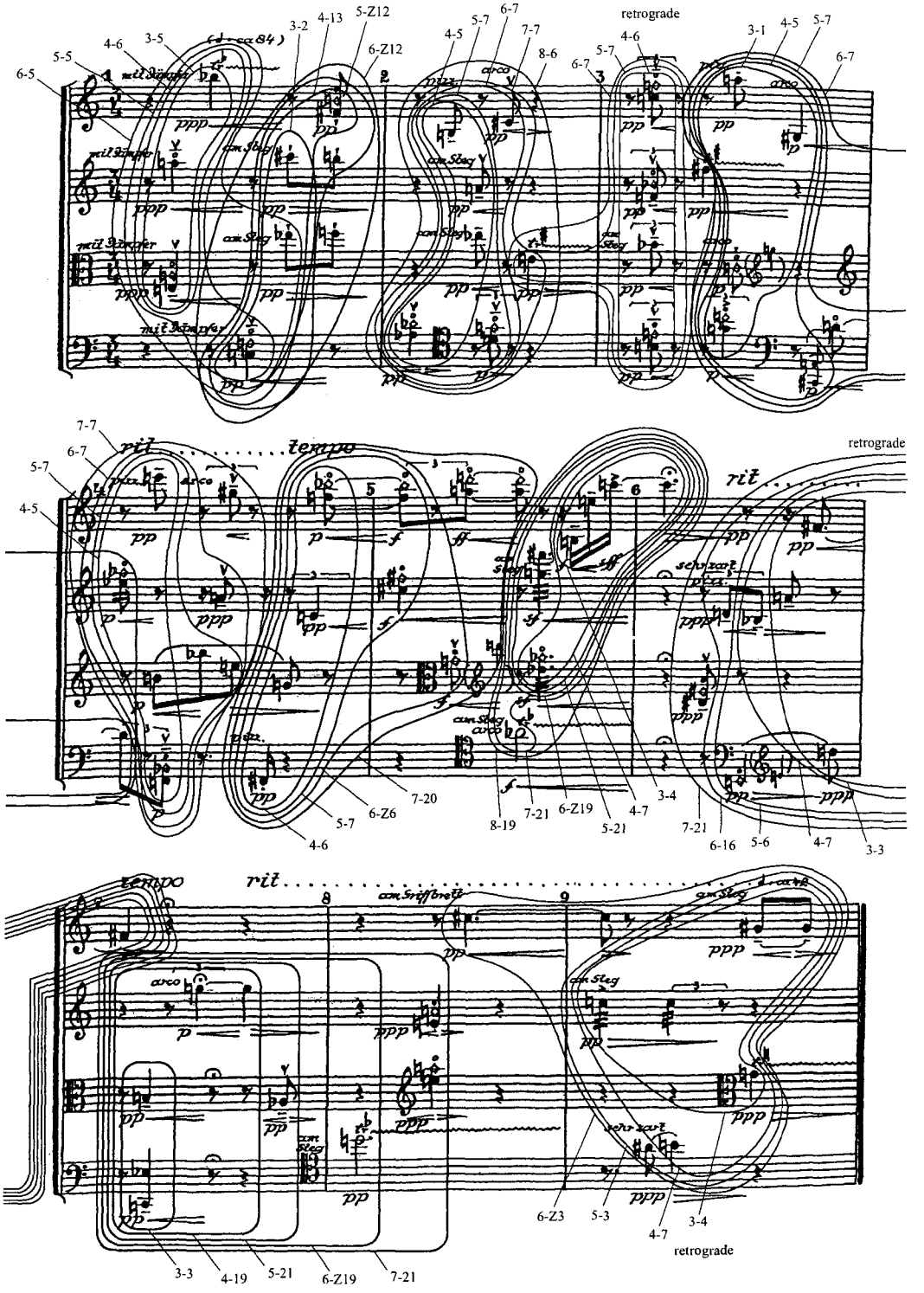
In movement six, the progression of Kh subcomplexes projects a two-stage process. The first part extends from measures 1-5, and the second extends from measures 5-9, and it can be summarized as follows:

4-6, 4-13, 4-5, 4-6, 4-5, 4-5, 4-6 | 4-7, 4-7, 4-19, 4-7.

We can see that the opening progression contains only secondary Kh subcomplexes and that there is a return to primary subcomplexes in the second half which emphasizes 4-7. Previously the Kh subcomplex around 4-5 had appeared once briefly in movement two and had an embellishing function. In movement six, this subcomplex is prominently featured, as it essentially alternates with 4-6 three times. In the latter part of the progression a succession of 4-7 subcomplexes reminds us of the progression in the opening movement. In movement one, however, 4-9 is associated with three occurrences of the subcomplex around 4-7, while in movement six 4-9 is replaced with 4-19.

What the progression charted above does not show is how these subcomplexes appear in the music. The two-part progression actually occurs in two equal parts. Example 33 illustrates the Kh subcomplexes on the score.

EXAMPLE 33: Kh Subcomplexes in Op. 9/6



There are more successive subcomplexes from measures 1-5 because the succession of pitch classes creates chords, are in close rhythmic proximity, or a combination of the two. In measures 5-9, by contrast, the pitch classes are longer in duration and presented melodically, particularly in the last three measures.

The way Webern creates these nested structures is primarily from left to right but there are three occasions where he builds sets in retrograde. The first occurs in measure 3 with the subcomplex around 4-6. The chord forms set class 4-6 (0127) and by adding pitch classes 4 and 6, the trill, in the viola (in measure 2) to this tetrachord, two larger sets contained within the subcomplex are created—5-7 and 6-7. The second retrograde occurs from measures 7 to 6 forming the first of three Kh subcomplexes around 4-7. The final Kh structure is also formed in retrograde to create the subcomplex around 4-7. In fact, this is not the first time Webern has used retrograde to form the last subcomplex of the piece. The subcomplex around 4-9, which had ended movements one and two, was also built in retrograde.

Movement six is the only movement that regularly creates septachords and octachords in successive nested structures. There are four instances where a seven-note set is the largest and two instances where an eight-note set is the largest structure. Of these, five out of the six times, the septachord belongs to the prevailing Kh subcomplex: like set classes 7-7 in measures 2 and 4; 7-21 in measures 5, 6, and 7-8. Only one time, the septachord forms an auxiliary set. In measures 4-5 set class 7-20 is a superset of 4-6 but does not belong to the subcomplex. However, as in every other case an auxiliary set is used, this set belongs to one of the primary or secondary subcomplexes. In this case, it

belongs to the Kh subcomplex around 4-8, a primary subcomplex of the work. Also notice that set class 7-7's complement, 5-7, is part of the nested structure in measures 4-5 and set class 5-21 appears twice with its complement, 7-21, in measures 5 and 7.

On the two occasions Webern includes an octachord as part of the nested structure, it is only a superset. In measure two, set class 8-6 does not belong to the subcomplex around 4-5, and in measures 5-6, set class 8-19 does not belong to the subcomplex around 4-7. In fact, these octachords are complements of two tetrachords that form some familiar subcomplexes—set classes 4-6 and 4-19 respectively. More so here than in any other movement, Webern includes complementary sets in nested structures, and as a result larger sets appear in the music.

Table 18 summarizes the pitch class content of this movement as well as the subdivisions of interval patterns. In measures 2, 3, and 4, notice that Webern uses the identical supersets of 4-5 to express the three instances of its Kh subcomplex: 4-5, 5-7, 6-7, 7-7, 8-6. There are seven other pentachords (and their complements) that belong to the subcomplex and eighteen other hexachords around 4-5. He even chooses the same octachord that lies outside the Kh subcomplex, 8-6. As we discovered earlier, 8-6 is the complement of the tetrachord 4-6 that forms the other prominent secondary subcomplex in the first part of this movement. In measure 3, the largest set is the hexachord 6-7 but Webern uses 7-7 and 8-6 in measures 2 and 4. The subdivision of intervals results in the identical interval pattern for set class 6-7: 1—1—4—1—1—4, and for set class 8-6, 1—1—1—2—1—1—1—4. The four-, five-, and seven-note sets are subdivided differently.

TABLE 18: Summary of the pitch class content and subdivision of intervals in Op. 9/6

MEASURE NUMBERS	PITCH CLASSES	SET CLASSES & PRIME FORMS	SUBDIVISION OF INTERVALS
1	{4, 10, 11}	3-5 (016)	6—1—5
	{4, 9, 10, 11}	4-6 (0136)	5—1—1—5
	{0, 4, 9, 10, 11}	5-5 (01237)	4—5—1—1—1
	{0, 3, 4, 9, 10, 11}	6-5 (012367)	3—1—5—1—1—1
1	{0, 1, 3}	3-2 (013)	1—2—9
	{0, 1, 3, 6}	4-13 (0136)	1—2—3—6
	{0, 1, 3, 5, 6}	5-Z12 (01356)	1—2—2—4—6
	{0, 1, 3, 5, 6, 11}	6-Z12 (012467)	1—2—2—1—5—1
2	{3, 7, 8, 9}	4-5 (0126)	4—1—1—6
	{2, 3, 7, 8, 9}	5-7 (01267)	1—4—1—1—5
	{1, 2, 3, 7, 8, 9}	6-7 (012678)	1—1—4—1—1—4
	{1, 2, 3, 4, 7, 8, 9}	7-7 (0123678)	1—1—1—3—1—1—4
	{1, 2, 3, 4, 6, 7, 8, 9}	8-6 (01235678)	1—1—1—2—1—1—1—4
3	{0, 5, 10, 11}	4-6 (0136)	5—5—1—1
	{0, 4, 5, 10, 11}	5-7 (01267)	4—1—5—1—1
	{0, 4, 5, 6, 10, 11}	6-7 (012678)	4—1—1—4—1—1
3	{7, 8, 9}	3-1 (013)	1—1—10
	{1, 7, 8, 9}	4-5 (0126)	6—1—1—4
	{1, 2, 7, 8, 9}	5-7 (01267)	1—5—1—1—4
	{1, 2, 3, 7, 8, 9}	6-7 (012678)	1—1—4—1—1—4
4	{3, 4, 5, 11}	4-5 (0126)	1—1—6—4
	{3, 4, 5, 10, 11}	5-7 (01267)	1—1—5—1—4
	{3, 4, 5, 9, 10, 11}	6-7 (012678)	1—1—4—1—1—4
	{3, 4, 5, 8, 9, 10, 11}	7-7 (0123678)	1—1—3—1—1—1—4
	{3, 4, 5, 6, 8, 9, 10, 11}	8-6 (01235678)	1—1—1—2—1—1—1—4
4-5	{0, 5, 6, 7}	4-6 (0136)	5—1—1—5
	{0, 1, 5, 6, 7}	5-7 (01267)	1—4—1—1—5
	{0, 1, 2, 5, 6, 7}	6-Z6 (012567)	1—1—3—1—1—5
	{0, 1, 2, 5, 6, 7, 9}	7-20 (0125679)	1—1—3—1—1—2—3
5	{0, 4, 11}	3-4 (015)	4—7—1
	{0, 3, 4, 11}	4-7 (0145)	3—1—7—1
	{0, 3, 4, 7, 11}	5-21 (01458)	3—1—3—4—1
	{0, 3, 4, 6, 7, 11}	6-Z19 (013478)	3—1—2—1—4—1
	{0, 3, 4, 6, 7, 8, 11}	7-21 (0124589)	3—1—2—1—1—3—1
	{0, 3, 4, 6, 7, 8, 10, 11}	8-19 (01245689)	3—1—2—1—1—2—1—1
6	{5, 6, 9}	3-3 (014)	1—3—8
	{5, 6, 9, 10}	4-7 (0145)	1—3—1—7
	{4, 5, 6, 9, 10}	5-6 (01256)	1—1—3—1—6
	{2, 4, 5, 6, 9, 10}	6-16 (014568)	2—1—1—3—1—4
	{1, 2, 4, 5, 6, 9, 10}	7-21 (0124589)	1—2—1—1—3—1—3
7-8	{0, 3, 11}	3-3 (014)	3—8—1
	{0, 3, 7, 11}	4-19 (0148)	3—4—4—1
	{0, 3, 7, 8, 11}	5-21 (01458)	3—4—1—3—1
	{0, 2, 3, 7, 8, 11}	6-Z19 (013478)	2—1—4—1—3—1
	{0, 2, 3, 4, 7, 8, 11}	7-21 (0124589)	2—1—1—3—1—3—1
8	{0, 7, 8}	3-4 (015)	7—1—4
	{0, 7, 8, 11}	4-7 (0145)	7—1—3—1
	{0, 7, 8, 10, 11}	5-3 (01245)	7—1—2—1—1
	{0, 1, 7, 8, 10, 11}	6-Z3 (012356)	1—6—1—2—1—1

It seems that Webern is maintaining maximal similarity among set classes and some intervallic successions but at the same time varying how they unfold. However, when we examine the other secondary subcomplex in the first part of the piece, 4-6, Webern uses a different hexachord each time and two pentachords: 5-5 and 5-7.

In contrast to the first part, in the second part of the progression (measures 5-9), Webern uses different members to express the Kh subcomplex around 4-7. He uses three different pentachords and three hexachords: 5-21, 5-6, 5-3 and 6-Z19, 6-16, and 6-Z3. While all three pentachords belong to the subcomplex, set class 6-Z3 is an auxiliary set. (This hexachord belongs to all three secondary subcomplexes around 4-13, 4-4, and 4-5.)

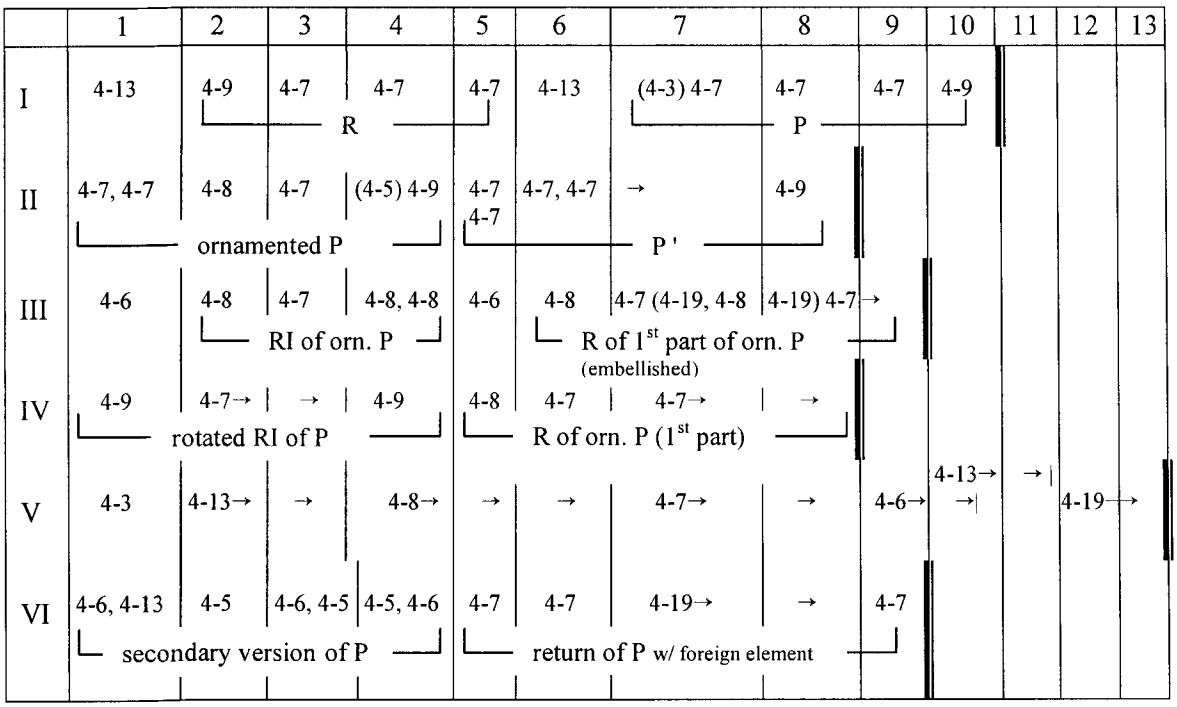
Across movements one through six we have observed that Webern uses two groups of Kh subcomplexes to create harmonic progressions. The primary group consists of subcomplexes around 4-7, 4-8, 4-9, and 4-19 and the secondary group consists of subcomplexes around 4-4, 4-5, 4-6, and 4-13. Webern most often uses the subcomplexes whose nexus sets contain the generalized interval pattern—semitone-some other interval-semitone. In creating the subcomplexes noted above, Webern uses what may be best described as nascent serial technique to build some of the nested sets in retrograde. Similarly, progressions themselves undergo different transformations of the prime form progression 4-7, 4-7, 4-7, 4-9. Sometimes Webern uses one or more supersets that do not belong to the prevailing subcomplex: when this does occur, the set belongs to one of the other subcomplexes. The procedure for subdividing intervals to create larger sets shows how Webern varies or maintains how a set is presented in the music and sometimes the unfolding of interval successions creates a pattern. All of these features create unity and

consistency in harmonic progression and harmonic repertoire in each of these movements. To show how what we have learned so far fits into the larger picture of the entire work, what follows offers a discussion of the progression of Kh subcomplexes across the entire work, as well as a discussion of how Webern's uses of the semitone in the motivic structure creates a pattern that ultimately contributes to global coherence.

LONG-RANGE COHERENCE

How then is Op. 9 unified as an entire work? As I suggested earlier, the progression of Kh subcomplexes and the way Webern expresses the semitone in each of the six movements creates patterns that contribute to global coherence in different ways. We have already discussed the harmonic progression of Kh subcomplexes within each movement, and these progressions form a large-scale progression that I would now like to explore. The progression of subcomplexes across the work can be described as departure and return. Example 34 summarizes the progression of Kh subcomplexes in all six movements. Measure numbers are listed on the top row and movements in the left column.

EXAMPLE 34: Large-scale Progression of Kh Subcomplexes in Op. 9



In our earlier discussion of movement one, the prime form of the progression of subcomplexes was identified as 4-7, 4-7, 4-7, 4-9 as the second part of the progression in measures 7-10. The first part of the progression, in measures 2-5, reflects a retrograde transformation of the prime form as 4-9, 4-7, 4-7, 4-7. The subcomplexes around 4-7 and 4-9 represent the primary group of subcomplexes identified in Op. 9. Recall that the subcomplex around 4-13 (0136) occurred immediately before each part of the progression and that 4-3 served more of a linking function. The subcomplex around 4-13 is a secondary subcomplex in the work and 4-3 is also a kind of secondary nexus set, but to an even lesser degree because it appears only rarely.

In movement two, the first part of the progression (measures 1-4) can be described as an ornamented version of the prime form 4-7, 4-7, 4-7, 4-9 from movement one. Notice that the subcomplex around 4-8 comes in between the succession of three 4-7s and that 4-5 occurs just before the completion of the progression with the subcomplex around 4-9. As discussed earlier, these two additions to the original progression serve as embellishing harmonies, 4-5 does so to a lesser extent because it occurs briefly. If we take out the embellishing subcomplexes we are left with the prime form of the progression. As a result, I have labelled this part as 'ornamented P' in Example 34. The second part of the progression in movement two is also a prime form of the progression with some changes. This time there are overlapping subcomplexes around 4-7 in measure 5 and in measures 7-8 the subcomplex around 4-9 is sustained for two measures unlike movement one. These variations to the progression do not change the succession of Kh subcomplexes that we identify with the prime form, so I have labelled measures 5-8 as P ' to reflect the slight changes.

The progressions of Kh subcomplexes in movements one and two have strong similarities due to the preservation of the primary nexus sets. Because the progressions in movement two are not duplications of movement one's progressions, we are moving away from the harmonic material established in movement one.

The progression of Kh subcomplexes in movement three, add a level of complexity and abstraction to the large-scale progression. Recall that the secondary subcomplex around 4-6 frames the start of the progressions in movement three in the same way 4-13 did in movement one. In the first part of the progression (measures 2-4),

the subcomplex around 4-8 is prominently featured and 4-9 is notably absent. The prime form pattern is absent, but the characteristic three occurrences of one primary subcomplex and one occurrence of a different primary subcomplex is retained. Because of this similarity I believe that the progression 4-8, 4-7, 4-8, 4-8 in movement three can be described as a retrograde inversion (RI) of the first part of ornamented P from movement two (4-7, 4-7, 4-8, 4-7). This is a serial transformation and adds a level of abstraction to the progression, because retrograde inversion is the least easily apprehended of the transformations. Webern retains a version of the prime form pattern (ornamented P) but focuses on different elements to express the pattern.

In the second part of the progression (measures 6-9) in movement three, the subcomplex around 4-19, the last of the primary subcomplexes, makes its first appearance. Recall that in the middle of this progression (measures 7-8), the subcomplexes around 4-19 and 4-8 had an embellishing function as they occurred briefly in the music and that the subcomplex around 4-7 in measure 7 was indicated by the pentachord 5-Z18. When we take out the embellishing subcomplexes from the progression we are left with 4-8, 4-7, 4-7. This succession of subcomplexes reminds us also of the first part of ornamented P from movement two. However, the subcomplex progression in movement four will help clarify the relationship.

The progression of Kh subcomplexes in movement three brings us further away from the prime form first expressed in movement one, but at the same time maintains some connection. In movement three the retrograde inversion transformation of ornamented P makes the first part of the progression more abstract, but the generalized

pattern of three identical primary subcomplexes and one different primary subcomplex is preserved. The succession of several embellishing subcomplexes further obscures the basic progression but at the same time we understand it as related to early material.

The first part of movement four returns to the Kh subcomplexes of the prime form in a different way while the second part clarifies what happens with the progression in movement three. In measures 1-4 the subcomplex around 4-9 frames the progression with 4-7 in the middle. The subcomplex around 4-9 has not been emphasized in the music in this way before. The alternation of 4-9, 4-7, 4-9 is essentially a rotated retrograde inversion of the prime form. There are only three subcomplexes in this part of the progression, but the retrograde inversion would be 4-7, 4-9, 4-9, 4-9. Instead of starting with the 4-7 Webern even further obscures the transformation by moving it to the centre, which results in the rotation. We have returned to the primary harmonic material with subcomplexes around 4-7 and 4-9, which in one way is a simplification of the harmonic progression but at the same time the rotated retrograde inversion of the prime form with only three subcomplexes may be considered a complexity.

The second part of the progression in movement four (measures 5-8) helps clarify the progression in movement three. The subcomplex progression 4-8, 4-7, 4-7 in movement four is the unembellished version of the progression we saw at the end of movement three. It represents another simplification of the harmonic progression in movement four as well as explaining the relationship of the embellished progression in movement three to ornamented P in movement two. The basic progression 4-8, 4-7, 4-7 at the ends of movements three and four are retrogrades of the first part of ornamented P

(measures 1-2) in movement two. Movement four simplifies, in some ways, the harmonic progression across the work by returning to the primary harmonic materials and presenting a salient progression that clarifies the relationship between progressions in movements two and three.

Movement five essentially summarizes all the previous Kh subcomplexes, with the exception of the one around 4-9. The elements of the patterns of progressions are there but the actual pattern is gone. Notice that the subcomplex around 4-19, which previously served an embellishing function, is featured as the final sonority of the progression; a position that was more often held by 4-9. The significance of this will become clearer shortly.

In movement six, two things happen: the pattern associated with the prime form returns in measures 1-5 but with entirely different elements and the elements of the prime form return, with some changes, in measures 5-9. In the first part of the progression Webern uses only secondary subcomplexes but 4-5 (0126) and 4-6 (0127) are prominently featured. At first glance we might think that the harmonic material is the furthest away from the prime form of the progression in movement one but the repetition of the two subcomplexes suggests a connection to the prime form. Recall the generalized pattern we discussed in movement three with respect to the progression 4-8, 4-7, 4-8, 4-8. This progression expresses the three identical primary subcomplexes with one different primary subcomplex that also describes the prime form progression 4-7, 4-7, 4-7, 4-9. In movement six, the repetition of subcomplexes around 4-5 and 4-6 can also be described in this manner, except that these are secondary subcomplexes. Because there are an equal

number of occurrences of 4-5 and 4-6 it is difficult to determine the first subcomplex of the progression. However, because we have seen progressions like the first part of ornamented P (4-7, 4-7, 4-8, 4-7) in movement two and the RI of ornamented P (4-8, 4-7, 4-8, 4-8) in movement three, I suggest that an analogous progression in movement six is 4-5, 4-6, 4-5, 4-5 in measures 2-4. I believe that this is essentially a secondary version of P using secondary subcomplexes instead of primary ones to express the pattern in a generalized way.

The second part of the progression in movement six (measures 5-9), returns to the primary harmonic material with three occurrences of the subcomplex around 4-7 but instead of using the expected subcomplex around 4-9, Webern introduces a foreign element into the prime form progression. Recall that the subcomplex around 4-19 had an embellishing function in movement three. In movement five, 4-19 was emphasized as the final sonority of the piece. In movement six, the subcomplex around 4-19 is pulled into the prime form pattern at the expense of 4-9 to create the progression 4-7, 4-7, 4-19, 4-7. The subcomplex around 4-19 becomes more salient as the work progresses, but it lies outside the basic progression at first. Eventually it replaces the 4-9 element to become part of the prime form progression. Essentially 4-19 supplants 4-9.

The progression of Kh subcomplexes throughout Op. 9 suggests a departure from the prime form progression, expressed in movement one, across movements two and three while maintaining similarities in patterns and transformations. In movement four, there is a return to the primary harmonic materials, though expressed in a different way, and a simplification of subcomplex progression because they are unembellished. In

movement five, there is a shift away from the patterns of Kh subcomplex elements but movement six returns first to the generalized pattern without the elements, and then to the specific prime form of the pattern involving 4-7, but with the addition of 4-19 to the pattern (replacing 4-9). Across the six movements Webern establishes the primary harmonic progression and material and moves away from it by movement three. Movement four returns to the primary harmonic material without embellishment and Webern departs from the expected pattern in movement five. The final movement essentially returns first to the pattern then to both the harmonic material and progression expressed as the prime form in the opening movement. The progression of Kh subcomplexes suggests a process of departure and return of the harmonic materials across the work and the patterns expressed in the progressions serve to unify the entire work to create global coherence.

A similar process of departure and return is also conveyed through Webern's use of the semitone in the motivic structure. As I suggested at the beginning of this analysis, the way Webern expresses the half-step creates a pattern that helps contribute to the coherence of Op. 9.

In a 1983 article titled "Webern's Chromatic Organisation," Robert Hanson examines some of Webern's atonal pieces (Op. 3/5, Op. 7/1, and Op. 10/4) to explore how he employed the semitone as "an organizing force." Semitones are presented as intervals between two notes and may be extended to form semitone clusters. It is this technique that serves to link the thematic and harmonic material and gives rise to a shape

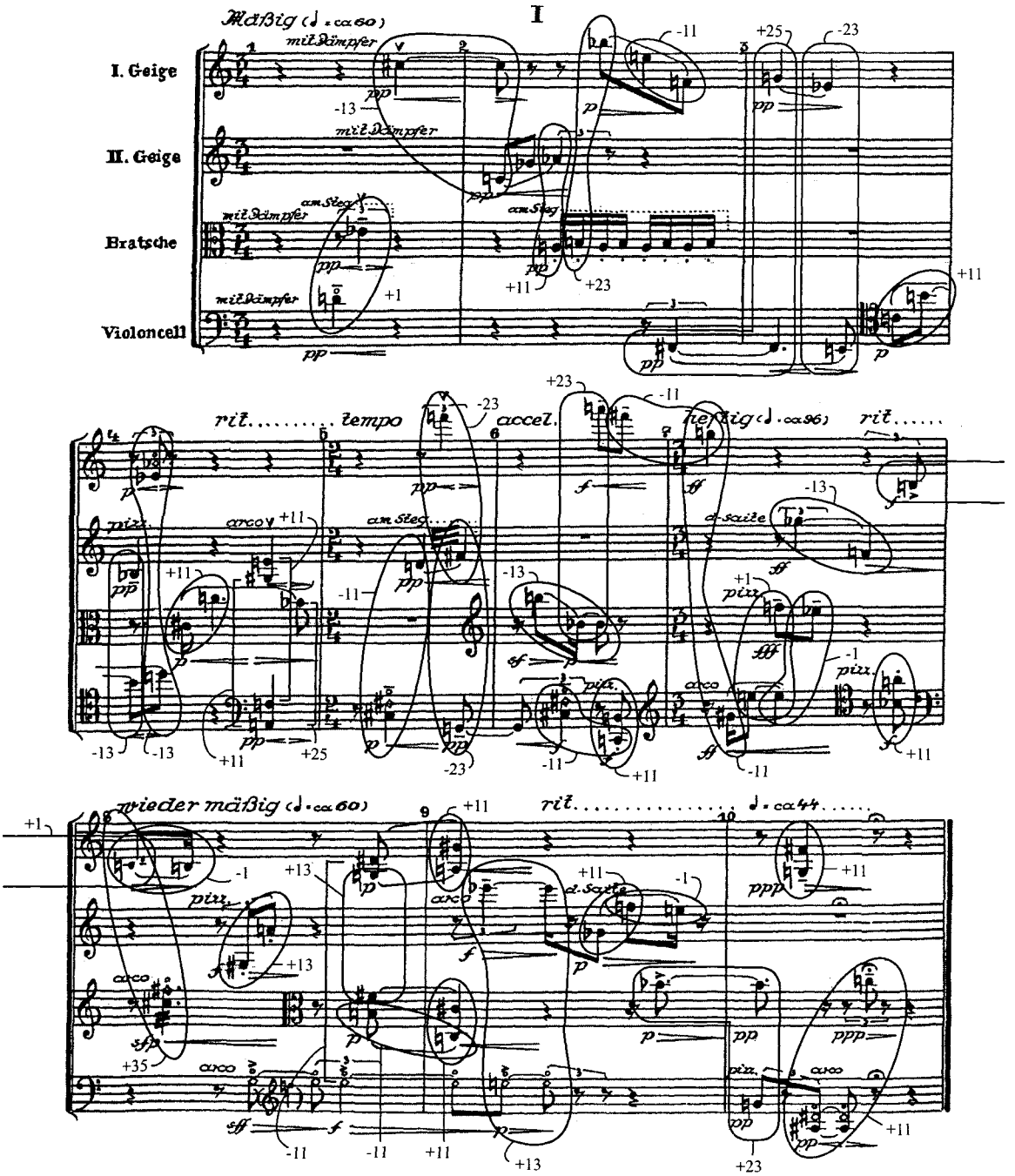
across a piece. According to Hanson, the connections made between semitones themselves and the formation of clusters can be presented in a variety of ways. Hanson identifies four primary overlapping stages in Webern's atonal music as follows:

> *i.* semitone motion commonly occurs within individual parts;
> *ii.* an individual part may form a complete, registrally conjunct cluster when its pitch content is viewed as a whole;
> *iii.* chromatically adjacent pitch classes may be distributed across different registers while remaining linked by voice, timbre or some other means and continuing to function as a pitch class group;
> *iv.* chromatically adjacent pitch classes may be distributed not only across different registers, but also across different voices, layers, and sonorities, and may similarly continue to function as a pitch-class group.

These stages provide some important general characteristics about how the semitone is used compositionally; however, I will focus more intently on how Webern uses the semitone to create variation that results in unfolding a process across the work. The following analysis will first describe the use of interval class 1, the semitone, in each of the six movements, followed by a discussion of how the different ways Webern expresses the semitone creates a shape across the entire work.

In the opening movement of Op. 9, finding adjacent chromatic pitch classes is accomplished with relative ease simply by looking at the score. In fact, the piece progresses in a systematic way to unfold successions of chromatic pitch classes. Example 35 isolates interval class 1, semitones, major sevenths and their compound intervals, as ordered pitch intervals.

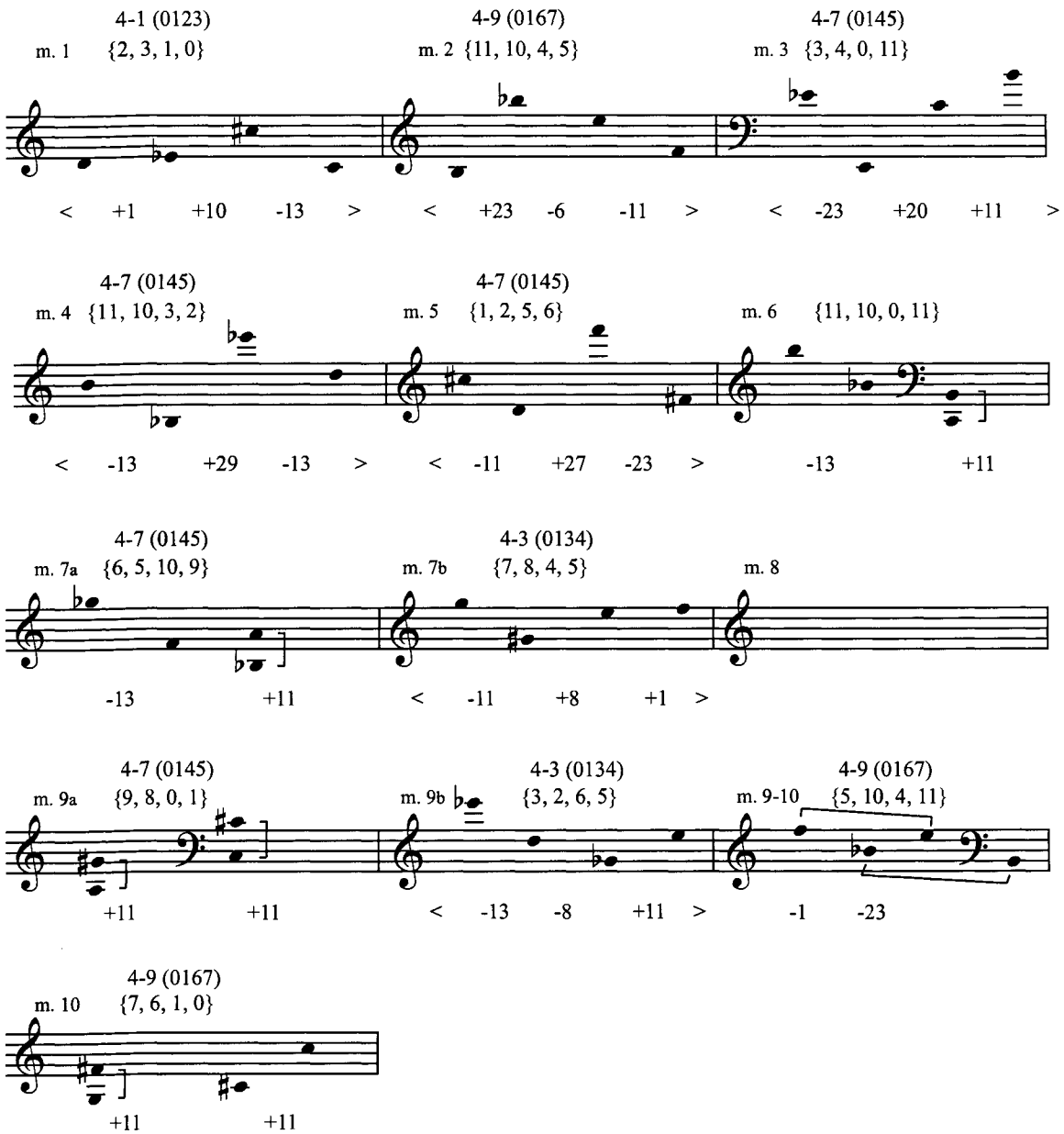
EXAMPLE 35: Ordered Pitch Intervals of Chromatic Successions in Op. 9/1



Notice that each successive note can be linked to the next, whether it is in an individual part or between parts. There are few occasions when the chromatic succession is not an adjacent pitch. In fact, there is only one pitch class in this movement that resists being connected to an adjacent chromatic pitch class. In measure 2, pitch class 6 in violin II cannot be immediately connected to a pitch class 5 or 7. In every other instance, however, a neighboring chromatic pitch class is available. Further, with the exception of the chords in measures 4 and 8, the segmentation of chromatic dyad successions is uncomplicated because adjacent pitch classes are abundant.

In addition, there is a greater number of pitch interval 11s than 1s. In fact, there are about two thirds more occurrences of major sevenths (17) than semitones (6). If we include their compound intervals, then the gap narrows with twenty-six pitch interval 11s and sixteen pitch interval 1s. By looking at isolated dyads we discover that there is an abundance of adjacent semitones presented in succession and that semitones are more often expressed as major sevenths or their compounds than their half-step counterparts. However, it is important also to consider how the semitone is expressed with respect to the harmonic context. As we have discovered, the ordering of intervals within sets as semitone-some other interval-semitone, helps contribute to coherence. Further, the ways in which Webern develops the motivic structure helps project the large-scale form. It turns out that the different types of motives established in movement one form the basis for motivic development both within and across the work.

EXAMPLE 36: Four-note motives in Op. 9/1



Using the primary tetrachords that form the nexus sets of Kh subcomplexes as a starting point (4-7 and 4-9), we will see that the unordered pitch interval successions clearly reflects the generalized interval pattern—semitone-some other interval-semitone—as motives and harmonies in the music. Example 36, on the previous page, isolates these four-note motives and presents them on a single staff to show actual register.

In measure 2, pitch classes {11, 10, 4, 5} (in order of occurrence) create 4-9, the nexus set of a Kh subcomplex. When we figure the pitch intervals of this four-note motive it creates the succession < +23 -6 -11 >. Notice that interval class 1 occurs at the beginning and end of the motive with a different interval sandwiched in between them, in this case interval class 6. Also, interval class 1 is expressed as two major sevenths, with the initial one as the compound interval 23.

In measure 3 pitch classes {3, 4, 0, 11} create set class 4-7 (0145). When we figure the intervals of this melodic motive, there are some striking similarities. The successive intervals not only reflect the generalized interval pattern, but the same unordered pitch intervals, 23 and 11, appear as the outer intervals. It is also interesting to note that Webern has chosen the opposite contour for this tetrachord. In measure 2 the ordered pitch interval succession is < +23 -6 +11>. In measure 3, however, the pitch interval succession is < -23 +20 -11>, a reflection of the first motive, and Webern chooses a compound interval for the middle of the succession as well as a different interval class, 4.

In measure 4, another set class 4-7 is formed with pitch classes {11, 10, 3, 2} and creates the pitch interval succession < -13 +29 -13>. Webern projects interval class 1 as minor ninths this time. The generalized pattern is retained, and the compound interval of the semitone, 13, occurs in the outer positions of the succession.

The next occurrence of a melodic 4-7 tetrachord occurs in measure 5 with pitch classes {1, 2, 5, 6}. The pitch interval succession for this motive is < -11 +27 -23 >. The unordered pitch intervals in the outer positions are the same as the ones expressed in the first two motives, 11 and 23. However, recall that in measures 2 and 3 the compound interval 23 occurred first. Webern retains the pitch intervals for the outer positions but reverses the order in which they unfold across the motive. Besides maintaining unordered pitch intervals, Webern also preserves contour but not the same contour as the first two motives.

Returning to the 4-7 motive in measure 4 we notice that the outer intervals move in a downward direction, < -13 > and that the middle interval is a large ascending leap < +29 >. In measure 5, the 4-7 motive also has descending leaps in the outer voices of comparable size < -11 >, with a similar large ascending leap in the middle, < +27 >, which is similar to the middle interval in measure 4.

Recall that this series of motives (4-9, 4-7, 4-7, 4-7), are the nexus sets of the progression we encountered previously as a retrograde transformation of the Kh subcomplexes that end the first section of movement one. (We will discover that in the second section of this movement, there is a shift away from four-note melodic motives and consequently away from the expression of interval class 1 in the music.) For three of

the melodic tetrachords in the first section, Webern retains the same ordered pitch-class interval, 11, as a frame for the succession and the same ordered pitch interval, -13, for the other melodic motive. In all cases, interval class 1 represents the outer intervals of these motives. What is not obvious is what Webern does with the intervening or middle interval between the interval class 1s.

As the four melodic motives unfold, the 'some other interval' of the generalized pattern also has a progression. Recall that the intervening interval of the pitch interval succession in measure 2 is a tritone or interval class 6. In measure 3, the intervening interval is the compound interval 20 or interval class 4. The middle interval of the succession in measure 4 is 29 or interval class 5. And finally, the compound interval 27 or interval class 3 occurs in between the interval class 1s. In effect, Webern is gradually contracting the 'some other interval' in two stages: interval class 6 to 4 followed by 5 to 3. However, this progression is obscured in part because Webern employs large compound intervals, three out of four times, to convey the interval class and because these intervals occur in between expressions of the semitone. The unordered pitch intervals of the motives in measures 2 and 3 coupled with their mirrored contours shows a strong similarity between these successive motives. In measures 3 and 4, in addition to their analogous contours these motives also share a comparable expression of successive intervals in terms of their size. For these reasons, I view the motives in measures 2-3 and 4-5 as unfolding two groups. However, one cannot ignore that the representation of semitone-interval-semitone is completely preserved between all four motives. It seems

that Webern creates variation by keeping some aspects the same, like the unordered pitch intervals 11 and 23, while changing others like the order of pitch intervals or contour. I believe this process can be described as developing variation.

As I mentioned earlier, I am concentrating on melodic motives that form tetrachord nexus sets of Kh subcomplexes. However, I would like to highlight one additional melodic motive that forms the chromatic tetrachord, which could not belong to a subcomplex. The opening four notes of the movement form set class 4-1 (0123) on pitch classes {2, 3, 1, 0} with the pitch interval succession < +1 +10 -13 >. Notice the succession not only retains the generalized interval pattern (though the middle interval represents the smallest interval class that could occur as the 'some other interval'), but that the outer intervals of the succession represent the semitone as a minor second, (+1) and its compound interval, (-13), which is analogous to expressing the outer intervals as 11 and 23 as they were in measures 2, 3, and 5. Measure 1 is the only time in the first section that an actual half-step occurs between adjacent pitch classes and it is interesting that Webern chose to do this with the first two pitches of the piece.

The chromatic organization of the first section, (measures 1-5 based on the progression of Kh subcomplexes), seems to fit nicely with many of the stages Hanson puts forth to describe semitone connections and the formation of larger clusters. For example, semitone connections are indeed often expressed: in the individual parts (*i*), and across different registers and/or voices that function as a pitch class group (*iii*) and (*iv*) in

this first section of movement one. However, I do not believe Hanson's stages can accurately account for the varying semitone connections evident in the latter part of the movement.

In the second section of movement one, there is a change in the motivic structure; the number of salient four-note motives in succession has been drastically reduced.[55] More often the motives consist of two successive notes and two simultaneous notes, or alternatively a four-note chord that contain the chromatic successions.

In the second section (measures 6-10), Webern transforms the familiar four-note melodic motive of the first section into two successive chromatic pitch classes and a harmony comprised of two simultaneous chromatic pitch classes. While he does not retain the horizontal structure entirely, he does maintain the chromatically adjacent pitch classes as a double stop. For example, in measure 7a, pitch classes {6, 5, 10, 9} form set class 4-7 (0145), a prominent nexus set. The pitch intervals between the adjacent chromatic pitches, G♭5 and F4, and B♭3 and A4, are -13 and +11 respectively.[56] In contrast, in measure 10, the double stop occurs first, followed by two melodic chromatic pitch classes. Here pitch classes {7, 6, 1, 0} form set class 4-9 (0167), the other

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[55] There are two additional melodic motives that occur in measures 7b, with pitch classes {7, 8, 4, 5}, and 9b, with pitch classes {3, 2, 6, 5}. Both motives form set class 4-3 (0134), a set that contains the semitone-interval-semitone pattern but is not one of the primary or secondary nexus sets of a Kh subcomplex. Further, while each attack of the notes is successive, there is one note in each motive that is still sounding when the adjacent pitch class enters. Pitch class 4 overlaps the start of pitch class 5 in measure 7b and pitch class 3 holds through the adjacent pitch class 2. However, the pitch interval successions for the motives in measures 7b and 9b are <-11 +8 +1> and <-13 -8 +11> respectively. Both motives retain the unordered pitch intervals 11 and 8 but the semitone is expressed as a half-step in measure 7b and a minor ninth in measure 9. The positions of the outer intervals, in effect switch places.

[56] When the pitches of a harmony are sounding simultaneously, I will figure the pitch interval starting from the lowest note.

prominent nexus set of the movement. The pitch intervals between the adjacent chromatic pitches, G3 and F♯4, and C♯4 and C4, are both +11. Despite the change in motivic structure, Webern maintains what would have been interval class 1, ordered pitch intervals ±1, ±11, ±13, or ±23, as the outer intervals if the double stops had been presented linearly.

To summarize, adjacent chromatic pitch classes are presented as a combination of melodic and harmonic successions. The linear chromatic four-note successions prominent in the motives of the first section are more sparse in the second section but retain commonality because the chromatic pitch classes are contiguous.

Unlike the first section, in the second section there is only one melodic motive that belongs to a tetrachord that forms a nexus set of a Kh subcomplex; that occurs in measures 9-10 on pitch classes {5, 10, 4, 11}. These pitch classes form set class 4-9 (0167). Notice however, that the chromatic successions are not adjacent to each other. Webern varies how he presents the melodic motive by making the chromatic connections between successive non-adjacent pairs. In effect, the chromatic successions are interlocking. As we will discover, this new interlocking feature takes on greater meaning in subsequent movements.

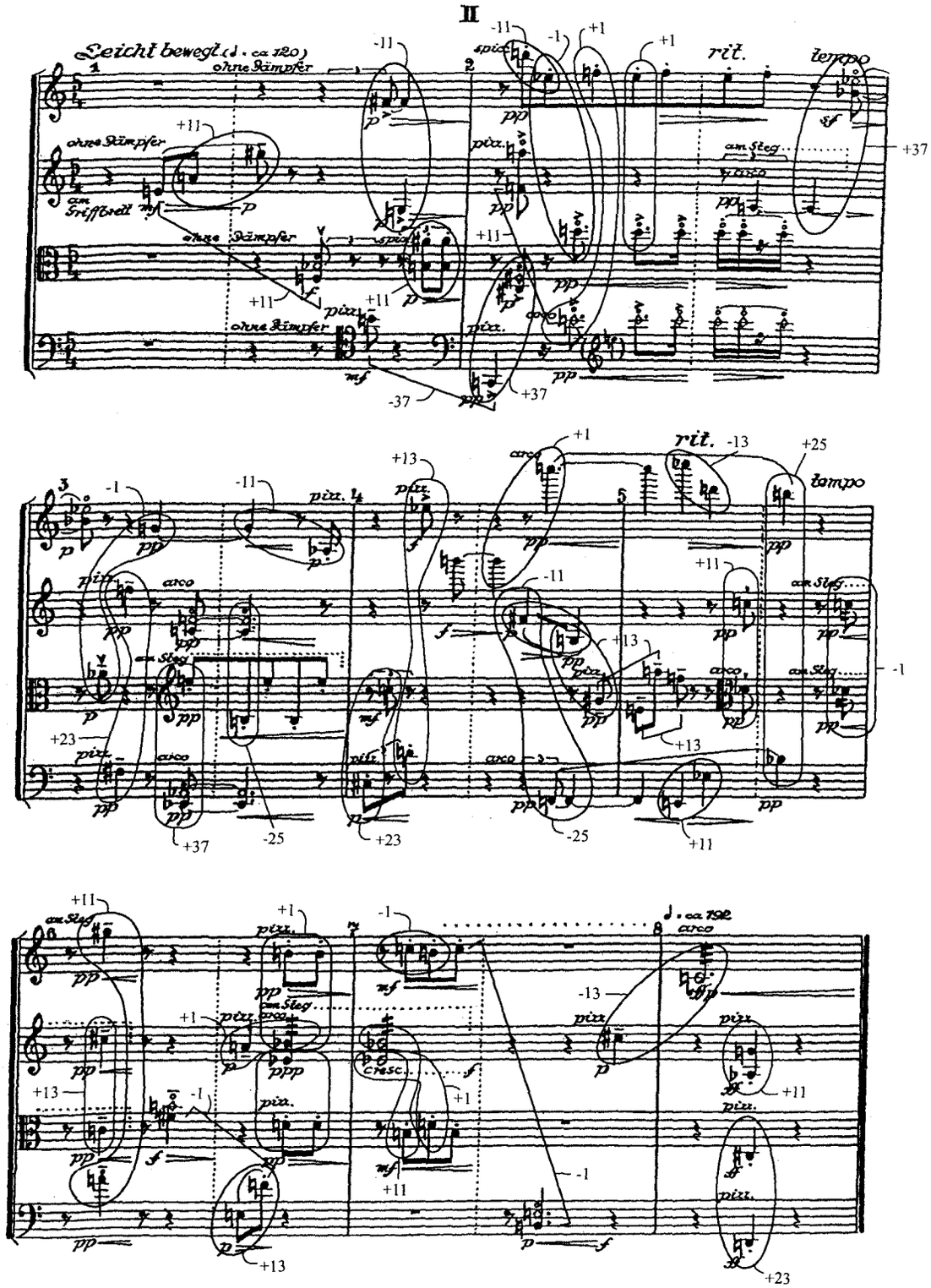
Figuring the pitch interval successions in the same way we did for the motives in the opening section would result in the succession < -7 +6 -29 >, for this motive—none of which represent interval class 1. However, if we consider the pitch classes to be interlocking, the ordered pitch intervals between the non-adjacent pairs, F5 and E5, and

B♭4 and B2, are -1 and -23 respectively. Webern not only reduces the number of melodic motives related to nexus sets, but he obscures the link between chromatic pitch classes by alternating the adjacent horizontal pitch classes to form interlocking dyads.

In measure 9a there is one salient four-note chord, set class 4-7 (0145) that expresses adjacent chromatic dyads in an individual instrument on pitch classes {0, 1, 9, 8}. In the viola, pitch classes 0 and 1 create the ordered pitch interval +11 from lowest to highest. In the first violin, pitch classes 9 and 8 also create +11 from lowest to highest. This is a good example of Hanson's stage *i* with semitone movement within individual parts. However, if you consider the actual sounding pitches, then the link between adjacent chromatic pitch classes occurs as *vertical* interlocking dyads. As a vertical sonority, the chord summarizes the interlocking feature that unfolds linearly from measures 9-10.

The opening movement of Op. 9 summarizes how Webern creates motivic unity across the work. First, four-note adjacent chromatic successions are presented melodically, then these motives are developed by presenting two of the four notes as a single sonority. Finally, the motives are further obscured by interlocking chromatic successions between non-adjacent pitch classes in either vertical or horizontal presentation. In addition, Webern reduces the number of motives that involve chromatic successions altogether. This process amounts to essentially three categories of motives that express semitone connections in different ways. As we will see, the different types of motives established in movement one are varied in following movements to project a two-stage process.

EXAMPLE 37: Ordered Pitch Intervals of Chromatic Successions in Op. 9/2



In movement two, finding adjacent chromatic successions is not as easy as movement one, but there is still an abundance of adjacent interval class 1s. Example 37 isolates the chromatic dyads in this movement. Like movement one, there is only one pitch class that resists being connected to an adjacent pitch class. In measure 2, pitch class 9 in violin II cannot easily link to an adjacent pitch class that is not already involved in a chromatic succession. In general, there are many more larger compound intervals of interval class 1. The largest unordered pitch interval in movement one was 25, but in movement two unordered pitch intervals 35 and 37 are much more common. However, in some cases the chromatic succession is not an adjacent pitch class. For example, in measure 1 in violin II, pitch class 4's closest chromatic succession occurs later in the measure on pitch class 5 in the viola. We must skip over pitch classes 9 and 8 in violin II in order to create this link. It seems that Webern may be trying to make chromatic successions less easily apprehended.

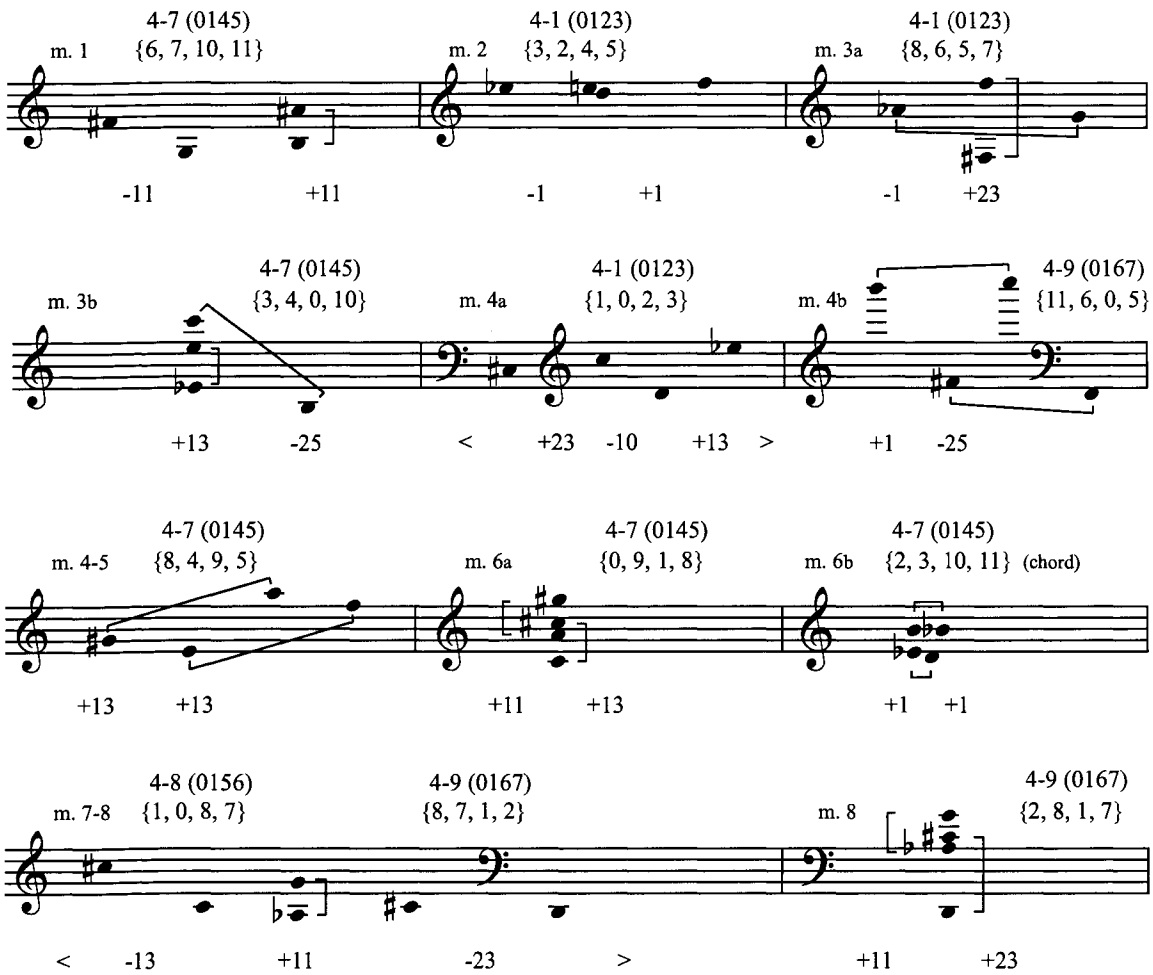
However, what is more typical in this movement is that there is more than one choice for the chromatic succession, which results in an overlap of successions. In measure 1, pitch class 11 in the cello presents just such a challenge. The question arises whether this pitch class links to pitch class 10 in the viola (which already creates a chromatic harmony with another pitch class 11 in the viola) or does it link to pitch class 0 in the cello in measure 2, skipping over several notes to find it? In both cases there is no adjacent chromatic succession and if pitch class 11 in the cello is linked to either instance it would result in an overlap of chromatic dyads.

Several other overlapping chromatic successions occur in measures 4-5 and 6. In measures 4 and 5 in the viola there are several different ways chromatic pitch classes may be linked depending on whether you focus on vertical or melodic successions. I have given preference to melodic successions, except when adjacent chromatic pitch classes occur simultaneously as chords like measure 1 with pitch classes 11 and 10 in the viola or measure 8 with pitch classes 2 and 1 in the cello and viola.

The first overlap occurs when pitch class 8 links to the non-adjacent pitch class 9 in measure 5 by skipping over pitch class 4 in the viola. Pitch class 8 already creates a chromatic succession with pitch class 7 in violin II. In this way Webern makes the chromatic melodic successions unclear. Another example occurs in measure 6, on pitch class 6 in the viola, which only links to the non-adjacent pitch class 5 in the cello. However, pitch classes 4 and 5 in the cello are chromatic successions forming their own group. This kind of overlapping that occurs as the result of non-adjacent chromatic successions is one way Webern obscures successions of chromatic pitch classes. Consequently, there is a development of the four-note motives in movement two.

In movement one there were many melodic motives that expressed the generalized interval pattern, semitone-larger interval-semitone. In contrast, Webern drastically reduces the number of melodic motives in movement two that reflect this pattern to one. Example 38 illustrates the four-note motives in movement two. In measure 4a, pitch classes {1, 0, 2, 3} (in order of occurrence) create set class 4-1 (0123) and have the ordered pitch interval succession < +23 -10 +13 >. There are two additional melodic motives in movement two that do not reflect the generalized interval pattern.

EXAMPLE 38: Four-note motives in Op. 9/2



In movement two, the melodic motive in measures 4-5 is analogous to the non-adjacent chromatic successions in measures 9-10 of movement one. Here pitch classes {8, 4, 9, 5} form set class 4-7 (0145) and the chromatic dyads G♯4—A5 and E4—F5 both have the ordered pitch intervals +13. In measure 4b, however, the non-adjacent chromatic succession of pitches B6—C7 (+1) is registrally salient while the other chromatic succession, F♯4—F2 is not (-25). In both cases, non-adjacent pitches form chromatic successions in four-note melodic motives.

In movement one, Webern also created motives that contained two notes in succession plus a dyad sonority. In movement two, we see some of those same constructions but they have also been developed.

In measure 1 of movement two, there is one of these successive/simultaneous motives from movement one with pitch classes {6, 7, 10, 11}, forming set class 4-7 (0145). The ordered pitch intervals for the chromatic dyads F♯4—G3 and B3—A♯4 are -11 and +11, respectively. This is the only time two notes occur in succession with a chord. Webern develops this motive by shifting the two-note chord to the middle so that a single note occurs on either side. This first instance of this variation occurs in measure 2 with pitch classes {3, 2, 4, 5}, creating a chromatic tetrachord. The ordered pitch intervals for the dyad E♭5—D5 and E5—F5 are -1 and +1, respectively. This is the most compact a motive can be with all pitches an actual semitone apart. In some respects, this motive retains the generalized interval pattern, if we figure the intervals of the chord, resulting in the ordered pitch interval succession < -1 +2 +1 >.

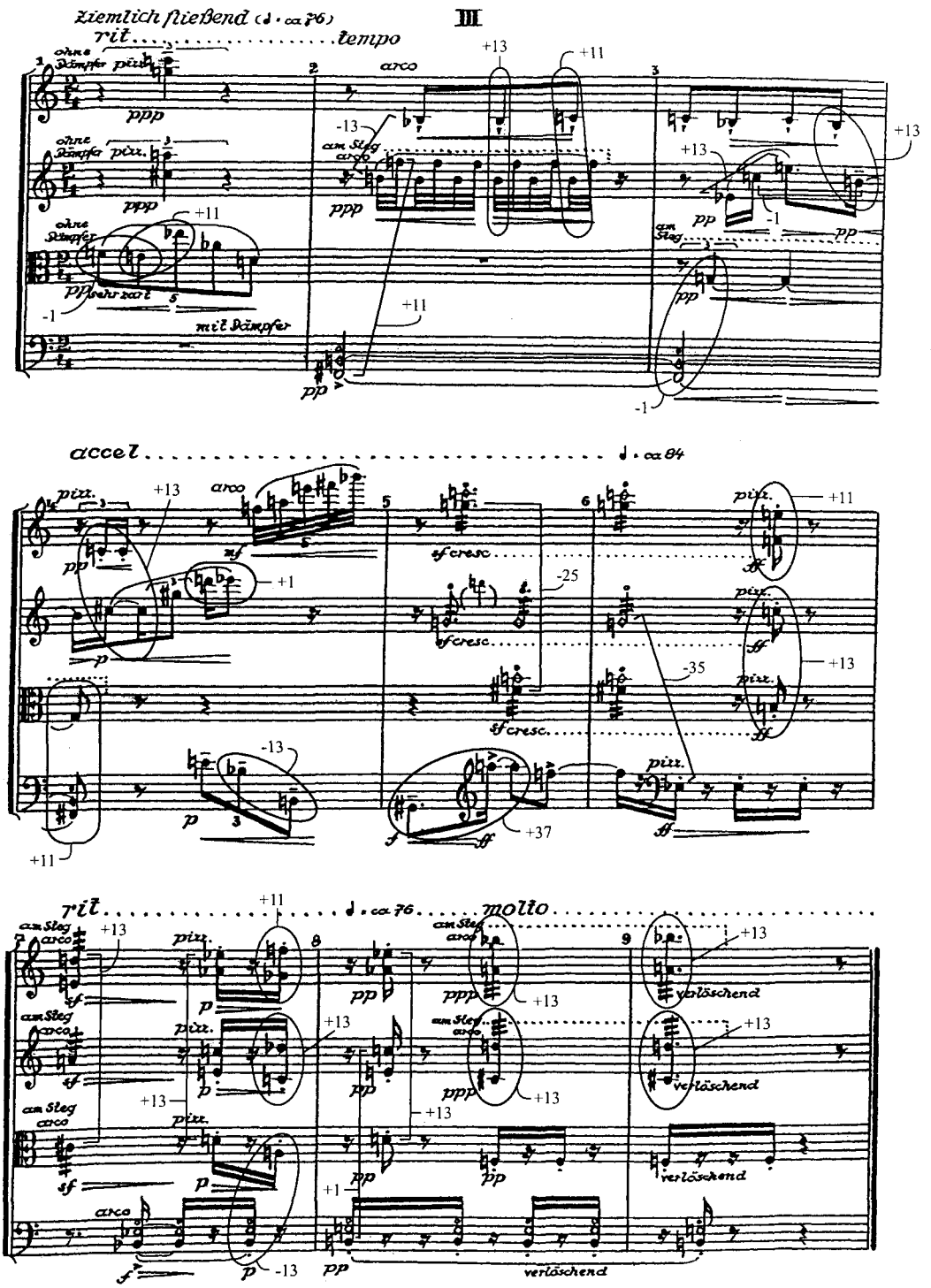
In measure 3a, this motivic construction is developed further by having non-adjacent single pitches be chromatic successions of each other. Pitch classes {8, 6, 5, 7} form set class 4-1 (0123); and notice that the pitch A♭4 and G4 on either side of the chord are ordered pitch interval -1 while the vertical forms ordered pitch interval +23. Webern retains interval class 1 but disguises the chromatic succession with non-adjacent pitch classes.

Webern creates a new motive by combining all four notes into a single chord. In measure 6a (pitch classes {0, 9, 1, 8}) and measure 8 the vertical structures create interlocking chromatic dyads further obscuring the expression of interval class 1. In measure 6b, however, the chromatic successions in the chord (pitch classes {2, 3, 10, 11}) are not interlocking. Measures 6a and 6b are the first time the motive does not have a melodic component.

In movement two, there is a shift away from melodic motives that express the generalized interval pattern, semitone-larger interval-semitone, to interlocking of non-adjacent chromatic successions in both melodic and harmonic motives. Webern further develops the motive that contains a succession of two notes and a two-note sonority by breaking up the succession of pitches. The semitone is expressed in a different way from movement one and this adds a level of complexity to the motivic structure of movement two.

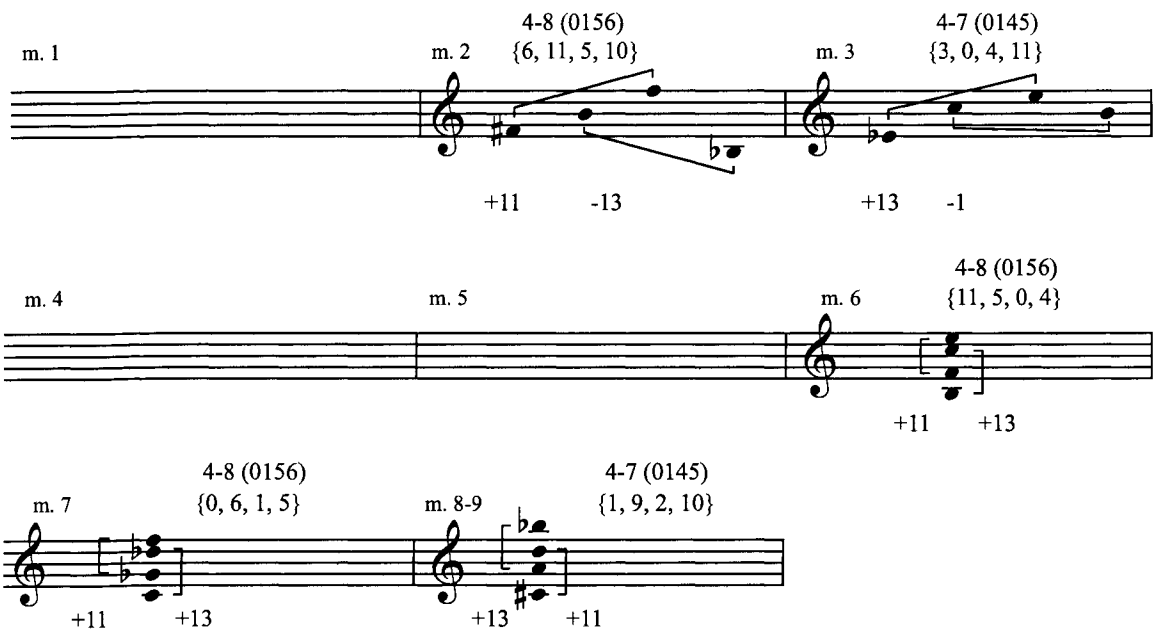
In movement three, the chromatic successions only rarely occur as adjacent pitch classes. As a result much less of the music can be accounted for in this way. Example 39 outlines the chromatic successions and their ordered pitch intervals in the third movement.

EXAMPLE 39: Ordered Pitch Intervals of Chromatic Successions in Op. 9/3



As you can see from the example, large portions of the music do not express interval class 1 as a chromatic succession. Some of the chromatic successions outlined here are non-adjacent like the outer intervals of the chords in the viola and first violin in measure 7 with pitch classes 1 and 2, and pitch classes 2 and 3 in measure 8. These three instances form the ordered pitch interval +13. However, there are occasions where the chromatic successions do occur as adjacent chromatic successions, either as melodic dyads or chords, but there are far fewer instances than in movements one and two.

EXAMPLE 40: Four-note motives in Op. 9/3



Because of the limited number of chromatic successions, there are only a handful of motives and only two types. The motives in movement three are either chords or melodic motives with interlocking interval class 1s as illustrated in Example 40. There are no melodic motives that express the generalized interval pattern (semitone-larger

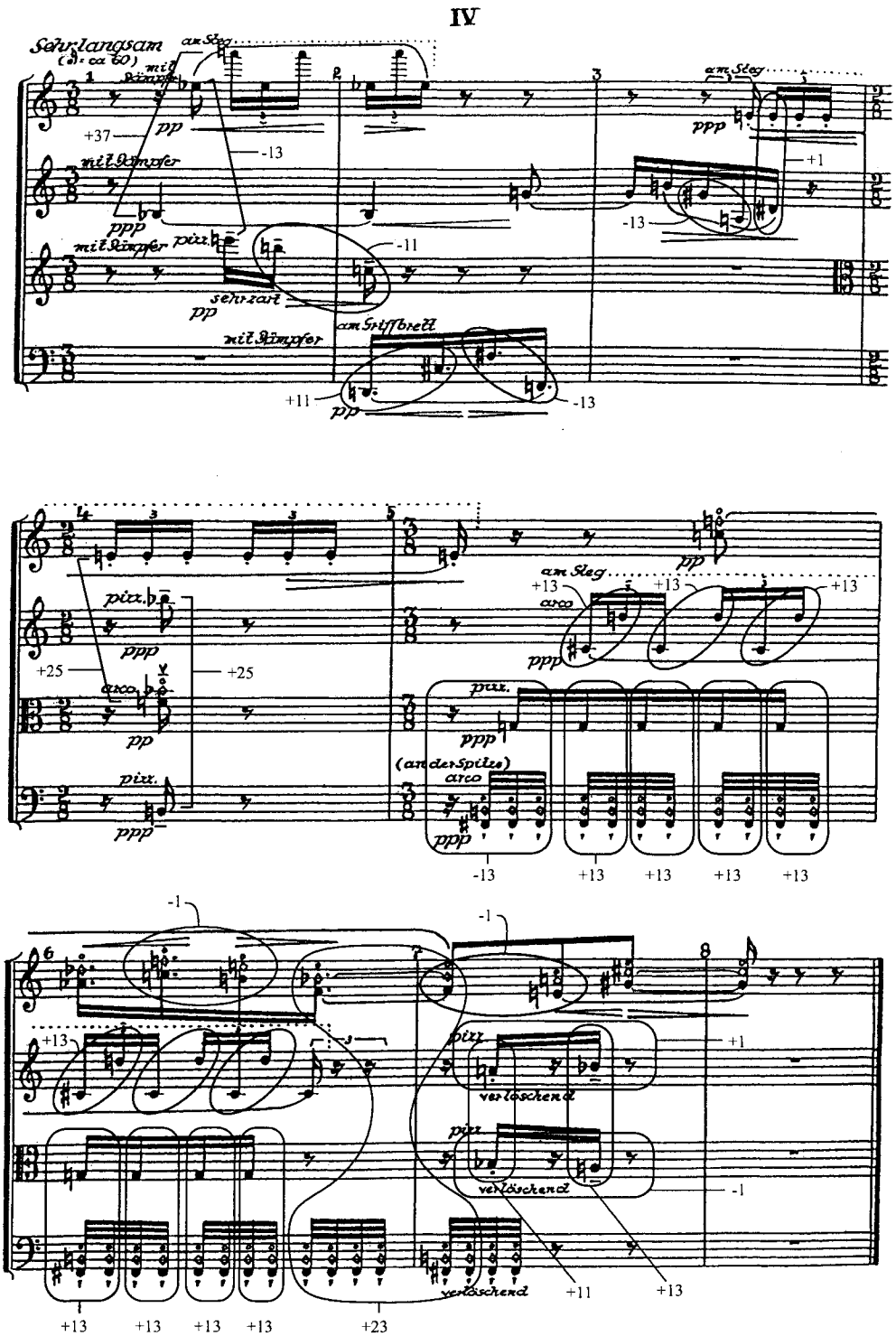
interval-semitone) established in movement one, nor are there any motives that have a succession of two notes plus a dyad sonority. In movement three, the melodic motives occur in measures 2 and 3 with interlocking chromatic successions. In measures 6-9 there are three chords that also have interlocking chromatic successions. In all these cases the interlocking occurs between the first and third pitch class and the second and fourth pitch class moving from left to right for melodic motives and lowest to highest for the chords. While none of the motives in movement three express the generalized interval pattern, the motives all form set classes that reflect the pattern in their prime forms. Notice that the first melodic motive and the first two chords form set class 4-8 (0156) and the second motive and the last chord form set class 4-7 (0145). Webern disguises how interval class 1 appears on the surface of the music, through the interlocking of non-adjacent chromatic pitch classes, but at the same time uses the harmonic materials that projects the semitone-larger interval-semitone pattern at a more abstract or deeper level.

There is a process whereby melodic motives with interval class 1 as the outer intervals are reduced in number in movements two and three. Webern first expresses the semitone as adjacent chromatic successions in movement one, then reduces their number in movement two and introduces non-adjacent, interlocking chromatic successions into the motivic structure. In movement three, the number of adjacent chromatic pitch classes is drastically reduced resulting in only a small number of motives. In fact, all motives in movement three have interlocking chromatic successions.

In movement one, melodic motives with the generalized interval pattern, semitone-larger interval-semitone, become melodic motives with non-adjacent interlocking interval class 1s in movements two and three. The motive with the two-note succession plus a chromatic vertical dyad, prominent in movement one, is developed in movement two by splitting up the two-note succession. After that, tetrachord verticals including many of the same intervals become prominent (by the end of movement two). In movement three, only the chord remains. The development of the motivic structure shows a departure from what is established in movement one over movements two and three, culminating in the first stage of the process.

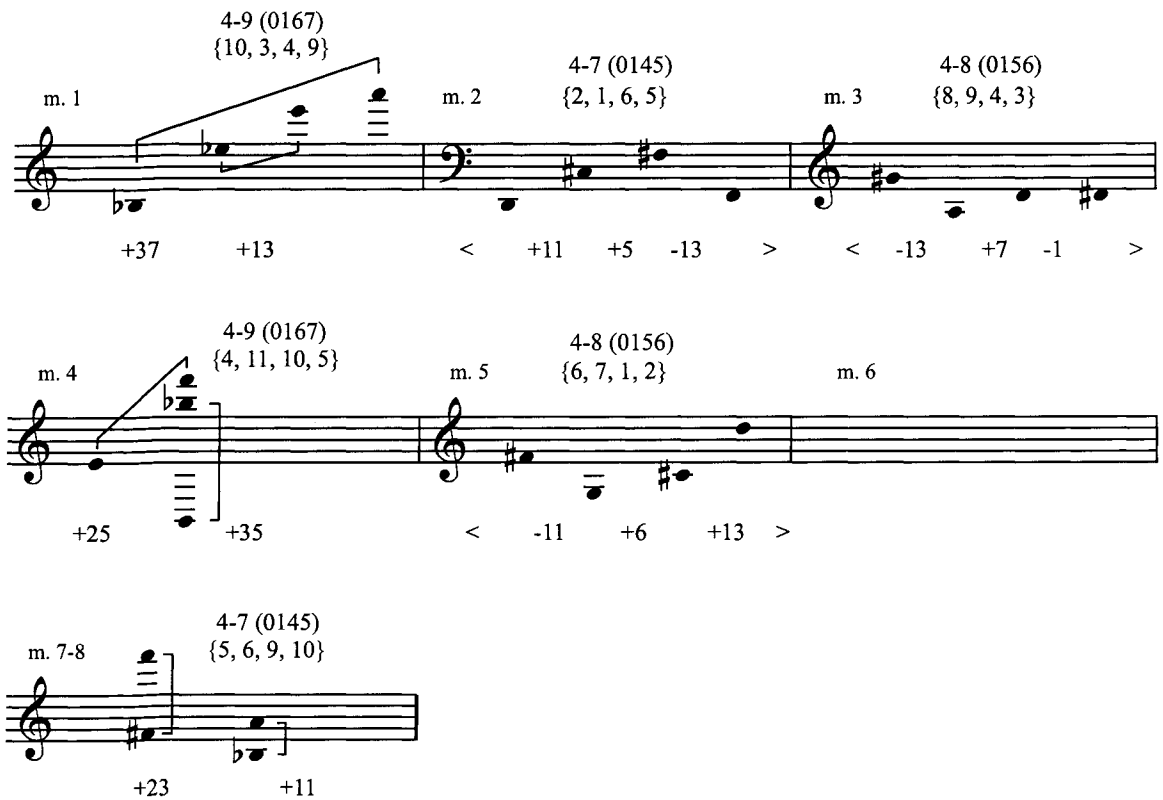
In movement four, the long successions of repeated notes either produce a chain of adjacent chromatic pitch classes like measures 5-6 in the cello, viola, and violin II, or result in some pitch classes not having a chromatic succession like measures 1-2 with the alternation of pitch classes 3 and 11 in violin I and the repeated pitch class 4 in measures 3-5 in violin I. Example 41 illustrates the chromatic successions and their ordered pitch intervals. Not all of the pitch content in movement four can be linked to chromatic successions to the degree we saw in movements one and two, but there are fewer instances of unaccounted for chromatic successions than in movement three. The majority of semitones are expressed as unordered pitch interval 13, primarily as the result of exact replications of pitch classes.

EXAMPLE 41: Ordered Pitch Intervals of Chromatic Successions in Op. 9/4



Movement four marks the return of the melodic motive prominent in movement one. In fact, half of the motives in this movement have the construction—semitone-larger interval-semitone. Example 42 illustrates these motives. Also notice that all the motives form set classes that reflect this intervallic pattern in their prime forms. The motives in measures 2 and 5 have the same unordered pitch intervals as their outer intervals, 11 and 13, and a comparable middle interval, only a half-step difference, but they have opposite contours.

EXAMPLE 42: Four-note motives in Op. 9/4



In contrast, the motive in measure 3 expresses interval class 1 as a minor ninth and minor second (unordered pitch intervals 13 and 1). There is one additional melodic motive that is introduced in this movement that still needs to be addressed.

Recall that in movement one the melodic motive with the generalized interval pattern (semitone-larger interval-semitone) was varied in measures 9-10 with non-adjacent interlocking chromatic pitch classes, shown in Example 36. It occurred only once in movement one, but made a change to the motivic structure that would be featured more prominently in movements two and three. The interlocking feature appeared more consistently in the melodic and harmonic motives in movement two, and then, in movement three, all of the motives could be described in this way. In movement four, however, there is a shift away from interlocking non-adjacent chromatic pitch classes, evidenced first by the return of the generalized interval pattern in the melodic motive then by bringing back adjacent chromatic successions as seen in the melodic motive in measure 1 as shown in Example 42.

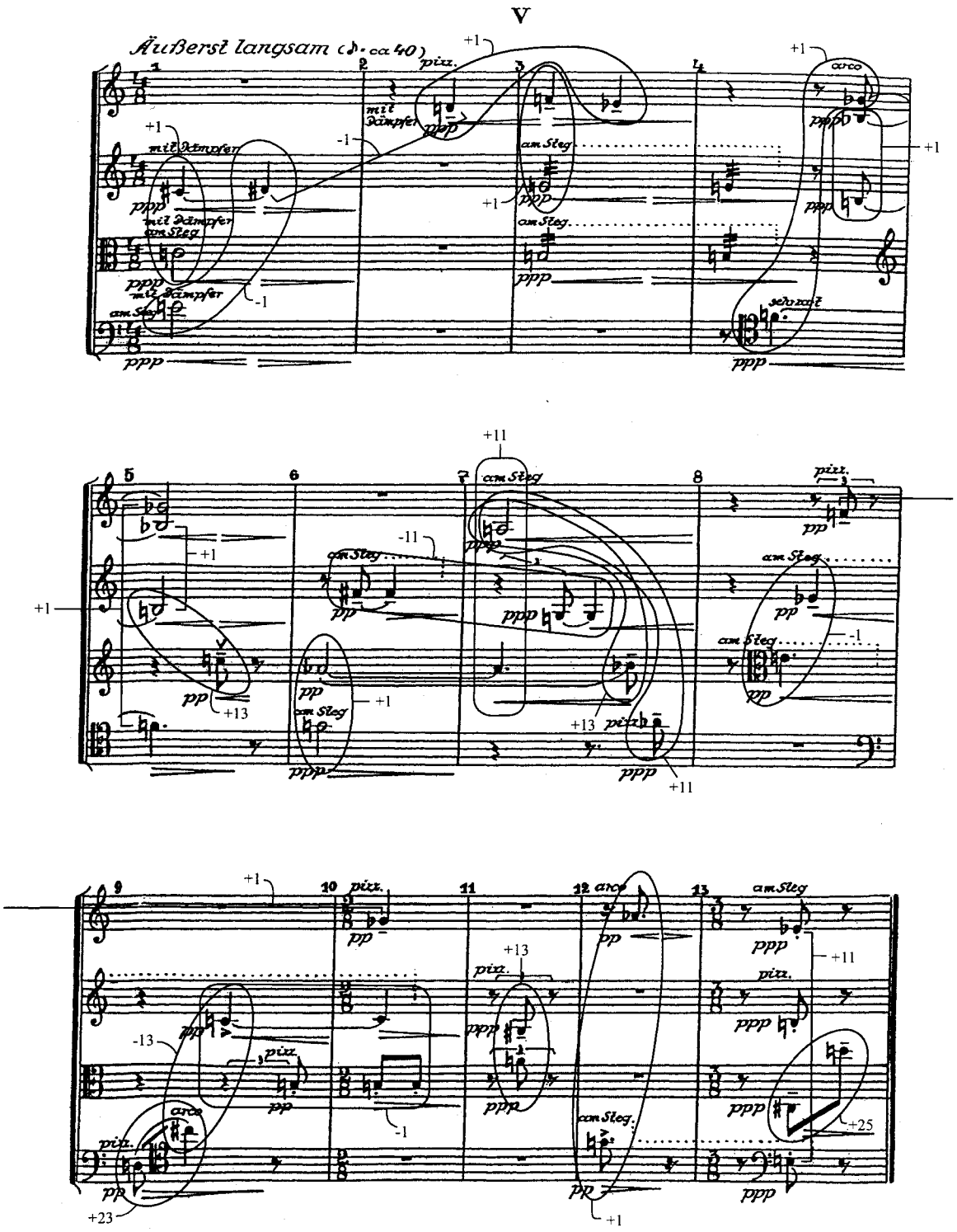
In measure one, the outer pitch classes, 10 and 11, are non-adjacent chromatic successions and pitch classes 3 and 4, in the middle, are indeed adjacent chromatic pitch classes. Previously these kinds of melodic motives had every other pitch class as a chromatic succession, which can make the chromatic connection more difficult to hear. In this case however, I think the adjacent chromatic pitch classes in the middle help inform the connection between the outer pitch classes. Further, the attack of pitch class 10 in violin II does occur before successive pitch classes but it is sustained through the

measure, which also helps us hear pitch class 11 in violin I as its chromatic succession. The interlocking feature prominent in movements two and three has been further developed to include one adjacent and one non-adjacent chromatic succession.

In measures 7-8 there is also a return to side-by-side two-note chromatic harmonies. In movement one, there were two successive dyads created by adjacent chromatic pitch classes 9 and 8, and 0 and 1. Return to Example 36. But movements two and three contain no motives of this kind. In movement four, a pair of adjacent chromatic dyads returns in measures 7-8 on pitch classes 6 and 5, and 10 and 9. In movement four, Webern brings back familiar motivic structures from movement one and initiates the second stage of the process of motivic development.

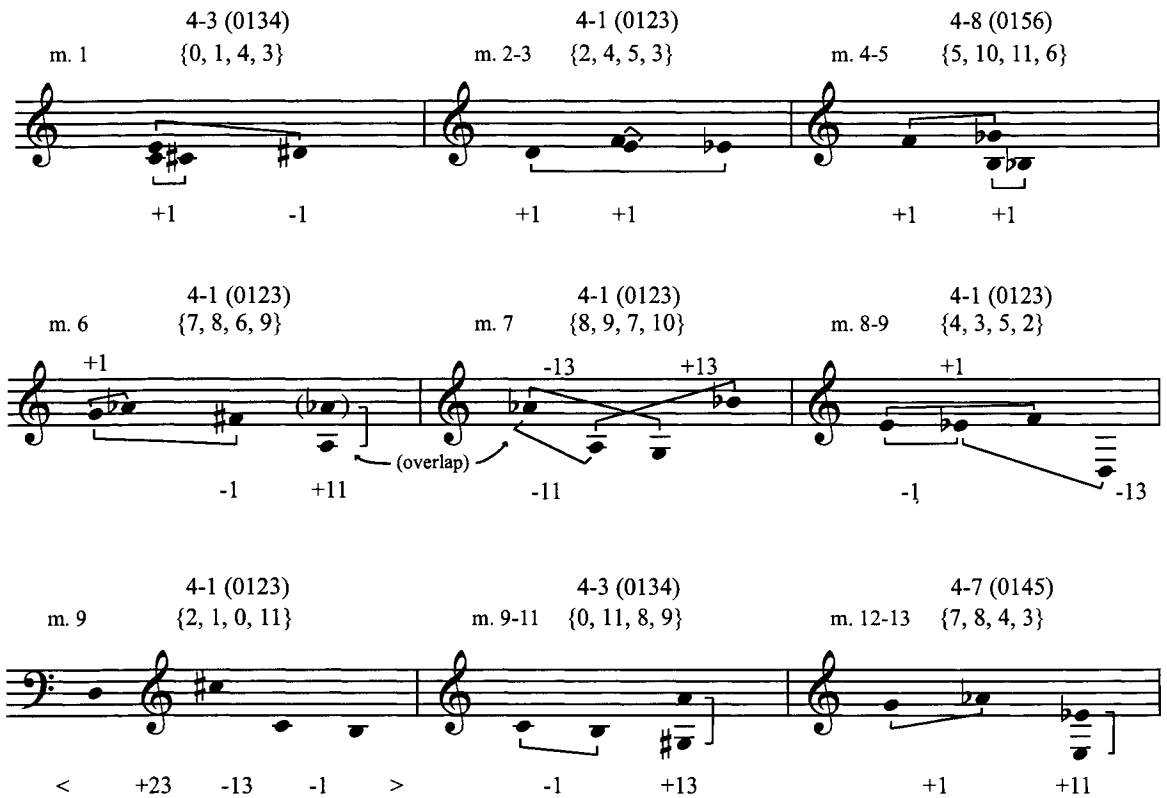
In movement five, there are fewer adjacent chromatic successions than previous movements, due in part to the minimal pitch material and sparse texture. Example 43 illustrates the ordered pitch intervals of chromatic successions. It is important to notice the abundance of actual half-steps between adjacent chromatic pitch classes. We will see that this is reflected in the motivic structure. Movement two also had many semitones in the music but they were accompanied by many other expressions of interval class 1. In movement five, interval class 1 rarely appears as a large compound interval. Most of the intervals are minor seconds, with some minor ninths and major sevenths. There is one instance of unordered pitch intervals 23 and 25 in measures 9 and 13 respectively.

EXAMPLE 43: Ordered Pitch Intervals of Chromatic Successions in Op. 9/5



The motivic structure of movement five departs from the characteristic motives established in movement one illustrated in Example 44. There is only one melodic motive with the generalized interval pattern semitone-larger interval-semitone in measure 9. In fact, this is the first time the middle interval has been expressed as unordered pitch interval 13, an interval class 1. This is not surprising considering the ordering of the pitch classes, {2, 1, 0, 11}, but the chromatic tetrachord has appeared in movements one and two with interval class 2 as the middle interval.

EXAMPLE 44: Four-note motives in Op. 9/5



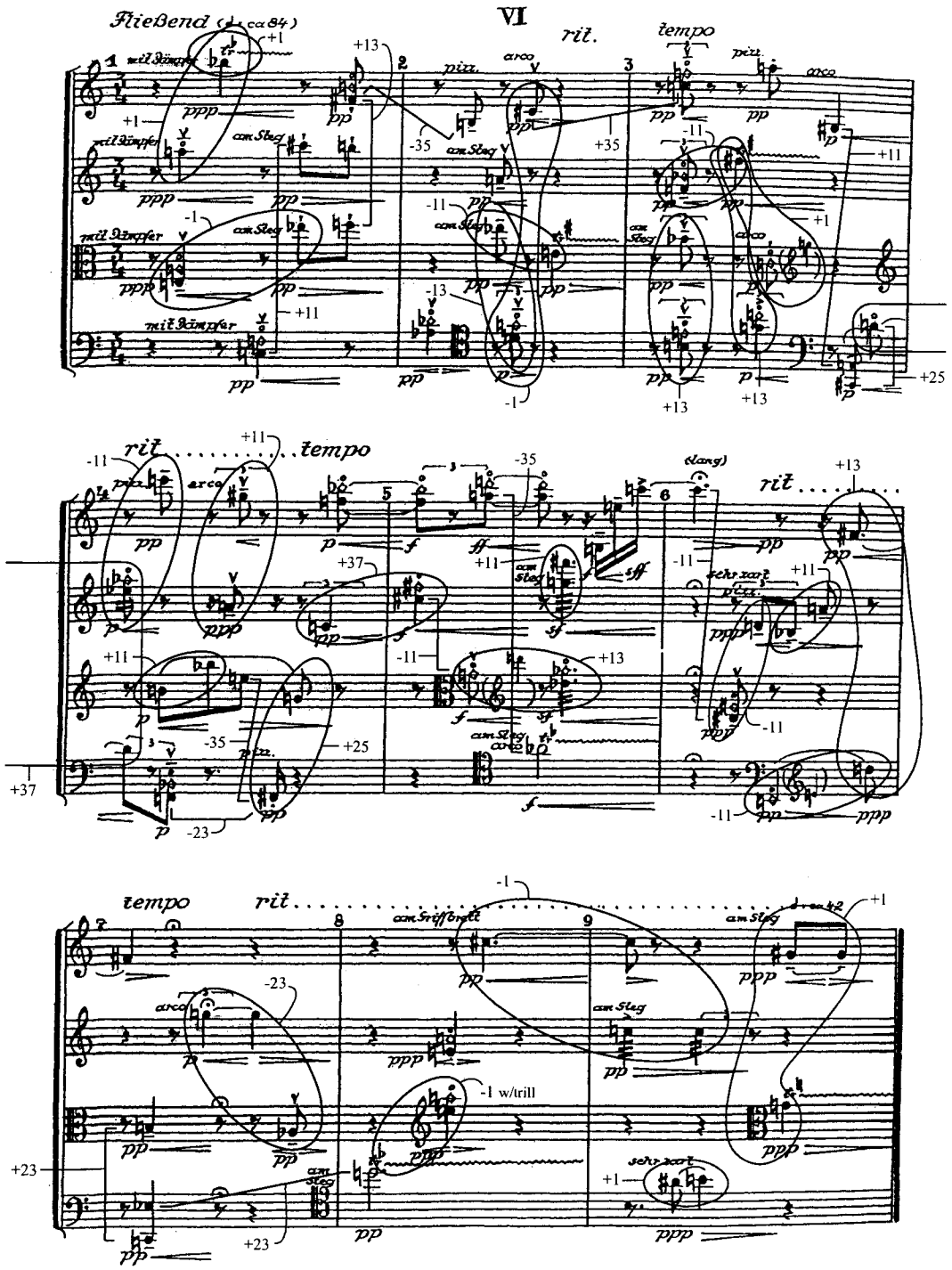
The motives in measures 9-11 and 12-13 of movement five are the familiar two notes in succession plus a chromatic sonority we recognize from movement one. In addition, there is one motive in measures 2-3 that shifts the chromatic dyad to the middle, splitting up the two-note succession like we first noticed in movement two. Despite these similarities, there is a new motivic structure that adds further complexity to linking chromatic successions.

This new type of motive has two interlocking chromatic successions plus one adjacent one creating a triple overlap. The most salient example of this motive type occurs in measures 8-9 with pitch classes {4, 3, 5, 2}. One could describe this melodic motive as two non-adjacent interlocking chromatic dyads, E4—F4 and E♭4—D3 with the ordered pitch intervals +1 and -13 respectively. However, there is also an adjacent chromatic succession with the first two pitch classes, E4 and E♭4 creating the ordered pitch interval -1. The melodic motive in measure 7 is also built in the same manner but with different pitch classes and larger pitch intervals. The final instance of this kind of motive occurs in measure 6 and includes a harmony rather than four successive notes. Pitches G4 and A♭4 in the cello and viola form a chromatic harmony followed by pitch F♯4 in violin II. The next successive pitch occurs in measure 7 with A3 in violin I. This succession of pitches similarly has an adjacent chromatic succession with G4 and A♭4 (+1), and two non-adjacent chromatic successions with A♭4 and A3 (+11) and G4 and F♯4 (-1). The grouping of three consecutive pitch classes in a row results, as in these three motives, in a more complex overlapping of chromatic successions.

I would like to make one additional observation about the harmonic content of motives in movement five. Notice that five of the nine motives form set class 4-1 (0123). No other movement emphasizes the chromatic tetrachord in this way. The set classes of the remaining motives, 4-3 (0134), 4-7 (0145), and 4-8 (0156) however, reflect the familiar generalized interval pattern in their prime forms. In some ways, movement five returns to the harmonic material of movement one.

As I already mentioned, the chromatic tetrachord appears in the motives of movement one, though only twice. In movement five, set class 4-1 (0123) is emphasized through repetition. Recall in movement one, tetrachords that form primary nexus sets and reflect the generalized interval pattern in their prime forms (4-7, 4-8, and 4-9) occur often. In contrast, there is only one appearance each of set class 4-7 and 4-8 in the motivic structure of movement five. In addition, set class 4-3 (0134), (which was not significantly represented in the progression of Kh subcomplexes across the work) appears twice in movement one as melodic motives. This set class does not return to the motivic structure until movement 5. The motives in movements one and five share the same set classes (4-1, 4-3, 4-7, and 4-8. 4-9 is omitted in the fifth movement), but Webern highlights tetrachords with semitones as outer intervals of their prime forms in movement one and chromatic tetrachords in movement 5. In this way, the harmonic materials of the motives in movement one return in movement five. However, in terms of the motivic structure in movement five, the similarities to the motivic structure of movement one, are limited to reflecting motivic development across the work.

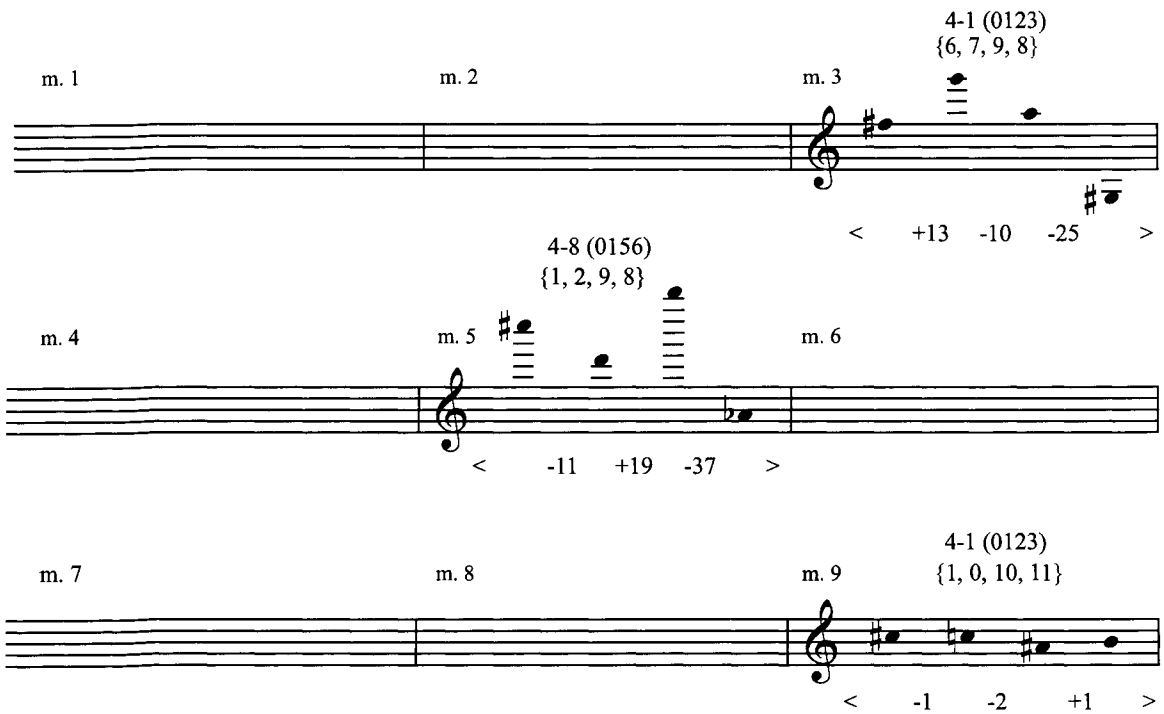
EXAMPLE 45: Ordered Pitch Intervals of Chromatic Successions in Op. 9/6



In movement six, the final movement of the work, we can see in Example 45 that there are many adjacent chromatic successions plus some non-adjacent ones. The total pitch content cannot be accounted for in terms of the proximity of chromatic successions. There are approximately the same number of minor seconds, major sevenths and their compounds in the piece. However, the relative abundance of expressions of the semitone throughout the piece does not yield many motives.

There are only three four-note motives containing adjacent pitch classes and it is telling that they are the melodic motives with the generalized interval pattern, semitone-larger interval-semitone, established in movement one. Example 46 illustrates these melodic motives.

EXAMPLE 46: Four-note motives in Op. 9/6



Notice that the final motive in the piece is the most compact version of the generalized interval pattern with half-steps in the outer positions and a whole step as the middle interval. The set classes that also reflect the interval pattern in their prime forms are drastically reduced to only one, set class 4-8 (0156). The remaining motives in movement 6 create chromatic tetrachords, set class 4-1 (0123). The melodic motives have returned to prominence in movement six and are emphasized because there are none of the other types of motives discussed previously.

To summarize, movement one establishes the motivic repertoire for the entire work and features melodic motives that reflect the semitone-larger interval-semitone pattern. Movements two and three develop the motivic structure by interlocking non-adjacent chromatic successions, while the melodic motive of movement one gradually disappears. By movement three four-note chromatic successions are difficult to find, thereby reducing the appearance of motives. Essentially, movements two and three depart from the motivic structure established in movement one.

In movement four, there is a return to melodic motives first expressed in movement one. Movement five develops the motivic structure even further by combining interlocking and adjacent chromatic successions into a single motive and melodic motives are reduced to one. In the final movement, Webern brings back only the melodic motives from movement one but these instances only account for three of the nine measures of music. Consequently, the number of motives in the piece is drastically

reduced. In effect, movement five departs from the motivic structure in movement four and then there is a return to the melodic motive by itself in movement six culminating the completion of the second stage of a developmental process.

This two-stage process of departure and return with respect to the motivic structure parallels the description of the large-scale progression of the Kh subcomplexes discussed earlier in the analysis. Indeed, the different ways that Webern expresses interval class 1 reflects a developmental process across the entire work and contributes to global coherence.

CHAPTER V

Summary and Conclusions

Summary

The processes that create coherence in the atonal works I have analyzed have different individual characteristics. Therefore, I will begin this section by summarizing the pieces I have discussed, separately. In *Three Short Pieces*, Op. 11, set classes 3-3 (014) and 3-4 (015) represent the primary harmonic materials that are projected in different ways across the work. There is an overarching process of 'focusing' that can be demonstrated through a network of subsets and supersets around 6-Z19 (013478) and 6-Z44 (012569). The network is *suggested* in the first movement, *realized* in the second movement, and then is *condensed* to its bare essentials in the third movement. In movement one, the primary trichords are abundant but not many are emphasized as contiguous subsets within the hexachords 6-Z19 and 6-Z44, resulting in an unclear understanding of the set classes' significance. It is not until movement two that the primary harmonic materials, consisting of set classes 3-3 and 3-4 and their supersets, form the Kh subcomplex around 6-Z19 and 6-Z44, clarifying their role in the work. The segmented subsets of the Kh subcomplex are emphasized contextually within each of these hexachords, more so than in movement one. In the final movement, the larger sets

that we saw playing an important role in contributing to coherence in the first two movements, are now gone. It is primarily set classes 3-3 and 3-4 that are involved in the unifying processes of the piece. This movement can be heard as a condensation of the set-class elements and processes that were suggested in movement one and realized in movement two.

In the *Cello Sonata*, the harmonic repertoire is generated by the various ways trichords 3-3 (014) and 3-4 (015) combine in different ways to create tetrachord supersets. These tetrachords, like set class 4-7 (0145), 4-8 (0156), and 4-9 (0167), are involved in a gradual interval expansion of the intervals of their prime forms that help project the form and unify the piece. While this gradual expansion of the harmonic repertoire happens at the background level, surface level expansions involving pitch interval succession and prime forms of individual trichords reinforce the underlying harmonic expansion of the intervals of tetrachords across the work. Further, there is a process of 'unfocusing' involving the variations of the duration successions and motivic structure. Unlike Op. 11, the process of focusing moves in the opposite direction. The basic motive is patent and salient at the beginnings of sections. As the respective sections progress, the basic motive is distorted becoming less and less easily apprehended or unfocused by the end.

In *Six Bagatelles*, Op. 9 nested structures of subsets and supersets form a relatively small number of Kh subcomplexes around tetrachordal nexus sets to which virtually all of Webern's harmonies belong. The generalized interval pattern, first

introduced by Chrisman, semitone-some other interval-semitone, describes many of the nexus sets of these subcomplexes, like those around 4-7 (0145), 4-8 (0156), and 4-9 (0167), that play an important unifying role. The nesting of sets may also be described through a process of subdividing larger intervals to create larger sets. These patterns of intervals are evident throughout the work and contribute to synchronic coherence. The progression of Kh subcomplexes and motivic development across the work create a pattern of departure and return that contributes to global coherence.

Conclusions

The three works I have studied can be heard as elaborations on a few ways of creating coherence. Several of these methods are common to more than one piece. One of the ways in which Webern expresses coherence is through a process that I call 'focusing'. In general, focusing involves musical materials being unclear or only suggested at the beginning of a piece, then clarified or realized in the middle, and finally focused into their bare essentials by the end.

In *Three Short Pieces*, Op. 11 the process of focusing occurs in the harmonic material. The significance of the harmonic material is unclear at the beginning because a network of subsets and supersets around 6-Z19 (013478) and 6-Z44 (012569) is only suggested. In the second movement, the Kh subcomplex around 6-Z19/6-Z44 is clarified, which is then condensed to its bare essentials in the third movement.

In Webern's *Cello Sonata* the process of focusing occurs in the motivic structure rather than the harmonic structure. It involves contour and duration successions and occurs in the reverse direction, so one might call it 'unfocusing.' At the beginning of the

piece the four-note motive appears in its clearest or most focused form. As the piece progresses, transformations of the durational pattern and other variations of the motives themselves are developed, resulting in the motives being less and less easily apprehended. By the end of the piece the motives have become unfocused.

Another way that Webern expresses coherence is through what may be best described as nascent serial technique. In Op. 11, Wintle (1975) describes the final movement as an early version of derivation based on harmonic and rhythmic relationships.

In the *Cello Sonata* the transformations of rhythmic and contour motives unfold patterns that can be described in terms of prime, retrograde, inversion, and retrograde inversion. The progression of these transformations creates a shape (simple relations to the original motive lead to more complicated relations) that contributes to global coherence.

In *Six Bagatelles*, Op. 9 there is also some evidence of nascent serial technique in the formation of sets and in the progression of Kh subcomplexes across the work. Larger sets are sometimes constructed by adding notes from right to left rather than chronologically, creating something akin to retrograde. Over the large-scale structure, the successions of Kh subcomplexes occur in patterns which can be explained as transformations of a prime form progression. I am not suggesting that these pieces are serial, but aspects of this music show a hint of what will emerge as serial technique a decade later.

The processes associated with 'focusing' and serial technique form successive relationships in various musical parameters including harmony, rhythm, contour, and motivic structure. As I have shown, these processes contribute to global coherence in Webern's atonal music in a number of different ways.

In conclusion, the analytic tools employed in this dissertation including pitch-class set theory, contour theories, pitch interval successions, and rhythm all serve to demonstrate intricate networks of relationships. These relationships in turn form processes that operate to provide global coherence in each movement as well as large-scale coherence over the entire work. Few scholars have attempted to trace such processes within movements and across entire works of Webern's atonal music. Talking about 'process' in Webern's music acknowledges the fact that we experience music as it unfolds over time, and not as isolated segmented pitch-class sets or rhythms on a page. Further, Webern's own notions about coherence as process are reflected in my analyses of these three works.

By examining the processes that contribute to global coherence in *Three Short Pieces* Op. 11, *Cello Sonata*, and *Six Bagatelles* Op. 9, we can provide a thorough picture of how Webern creates unifying structures across an entire work. Indeed, the kinds of coherence displayed by Webern's pieces closely match concepts that many attribute to his teacher, Arnold Schoenberg. This helps us to understand the Second Viennese School itself as a coherent development.

APPENDIX

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