FORMAL PROCESSES IN POST-TONAL MUSIC:
A STUDY OF SELECTED WORKS BY BABBITT, STOCKHAUSEN, AND CARTER

by

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Abstract

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Advisor: Professor Joseph N. Straus

Most previous studies of musical form have focused on tonal music. Little attention has been given to formal organization in post-tonal music, especially the challenging, systematic repertoire of the postwar period. Many of these works avoid the traditional rhetoric of form, and for this reason they have seemed unapproachable from the standpoint of phrases and larger formal structures. This study seeks to demonstrate that, despite its apparently resistant nature, this music can be meaningfully heard in terms of perceptible formal design.

In the absence of well-established harmonic and melodic processes, formal structures in post-tonal music are created by parametric processes, that is, shapes and patterns that occur in what were previously considered secondary parameters, such as dynamics, register, density, and texture. Similarities and changes within these parameters, singly and in combination, produce audible formal units such as small segments, phrases, and phrase groups. Phrases are formed by the combination of segments, and phrases themselves combine to form larger structures. At all levels, these combinations take place as a result of parametric relations and processes.

This study defines a “phrase” in post-tonal music as a formal unit exhibiting initiation, coherence, and completeness. Aspects of these three features, especially

coherence and completeness, are developed and illustrated in detailed musical analyses. The works examined include Babbitt's *Composition for Four Instruments* (1948), the opening clarinet solo; Stockhausen's *Kontra-Punkte* for ten instruments (1953), the first 116 measures; and Carter's String Quartet No. 2 (1959), the Introduction and the first movement, Allegro fantastico. The study finds five general phrase types based on methods for creating coherence, and demonstrates that the particular type of coherence gives rise to one of three general means of ending the phrase so as to achieve a sense of wholeness or completeness. Throughout the study, an emphasis is maintained on the listener's perspective and the perceptibility of these formal elements.

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Most of all, this dissertation and the entire project of my graduate study in music could not have happened without the unconditional love and support of my mother. Sadly, she did not live to see its completion. With eternal love and boundless gratitude, I therefore dedicate this dissertation to her.

In memoriam

Virginia C. Howland

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Table of Contents

TABLE OF FIGURES

Chapter 1

Toward a Theory of Post-Tonal Musical Form

I. Introduction

Musical form has long been a topic of interest for music scholars. From Burmeister to A.B. Marx to Caplin and Schmalfeldt (among many others), theorists have sought to understand the forces that shape musical phrases, phrase groups, sections, and movements. These are a fundamental part of our aesthetic response to a musical work and play a significant role in interpretation and performance. Most previous studies of form, however, have focused on tonal music. Little attention has been given to formal organization in post-tonal music, especially the challenging, systematic repertoire of the postwar period. Much prewar music retains relatively clear indications of formal features such as theme, development, phrase, and cadence. In contrast, the works of the decades just after the Second World War often avoid the traditional rhetoric of form, and for this reason they have seemed unapproachable from the standpoint of phrases and larger formal structures. In this study I will argue that, despite its apparently resistant nature, this music can be meaningfully heard and discussed in terms of perceptible formal design.

In the absence of tonally based structural features, many composers in the postwar period turned their attention to what were previously considered secondary characteristics, such as timbre, density, and texture. These and other musical parameters, affecting the overall sound or sound-quality, are the means by which post-tonal formal structures are created. Patterns of changes in the magnitude or intensity of such

parameters, such as louder and softer, or faster and slower, can produce audible shapes, sound-objects, and sound-processes which may be readily heard as intelligible formal units. Smaller units, which I will call "segments," often combine in groups of three or four to produce "phrases," and in many cases the latter also combine to form larger units (these terms are further discussed below). The process of combination occurs as a result of relations among formal units, relations which are themselves produced by parametric factors. In this way, form is built up synthetically, based upon content and context. Postwar composers, having rejected traditional thematic processes, thus adopted parametric processes as the structural elements in the creation of musical form.

In the course of this study, certain parameters emerged as most prominent in the creation and projection of formal structures. They include the individual sonic properties of pitch, duration, dynamics, timbre, and articulation; the group sonic properties of pitch interval, register, spatial density (number of sounding voices), and temporal density (speed of attacks); and the global sonic properties of contour and texture. These parameters, which are discussed in detail later in this chapter, arose from the musical analyses that will be presented in the following chapters. The works examined in this study are Babbitt's *Composition for Four Instruments* (1948) (opening clarinet solo) in Chapter 2, Stockhausen's *Kontra-Punkte* (1953) for ten instruments (mm. 1-116) in Chapter 3, and Carter's String Quartet No. 2 (1959) (Introduction and Allegro fantastico) in Chapter 4.

The concept of parameters as structural factors in music is not new. In the twentieth century alone, one thinks immediately of composers such as Debussy, Bartók, Messiaen, and Varèse, all of whom made particular use of timbre in shaping the

expressive qualities of many of their compositions. The use of density and texture together with timbre became virtually the entire basis of form in works by Ligeti, Penderecki, and Xenakis, as well as much electronic music. And of course the turn to integral serialism in the postwar period placed a new structural weight on the now-serialized parameters of duration, dynamics, and mode of attack, eventually spreading to include "global" or "statistical" features such as density.[1]

Several music theorists have focused on parameters. Berry (1976) defines texture as the "sounding components" of music, which include density, dissonance and compression, timbre, dynamics, and the interactions and interrelations among these (ibid., 184-85); the processes involving textural events and changes are highly significant "in the delineation of forms and structures" (186). Perle (1991) notes that the theme of a twelve-tone work, because it is determined by the ordering of pitch relations in the set, "is not in general characterized by its intervallic structure [in contrast to a tonal theme] but by attributes that formerly performed a subsidiary, though essential, role: rhythm, texture, dynamics, color, shape..." (115). Roeder (1995) proposes a theory of accent based on a "timepoint of change" in parametric values, in which the accent is produced by parametric processes leading to and receding from the point of accent (ibid., 13-14). While these and other writers (e.g., Lilly 2005; Klein 1999; Cogan 1984; Cogan and Escot 1976) provide valuable insights on the role of musical parameters, none of them applies these ideas to the formation of phrases and larger formal units in post-tonal music. James Tenney (1964/1988, 1980) and Christopher Hasty (1981b, 1984, 1997), on

[1] Ligeti 1965, 5. Integral serialism was more widespread in Europe than in America, though Babbitt and a few others followed this practice. See Straus 2008; 2009.

the other hand, have done so to varying degrees; their theories are discussed in detail below.

A number of empirical studies in music perception suggest the importance of parametric features to the perception of form in post-tonal music.[2] The studies fall into two general categories, depending on whether the focus is on segmentation of the music or on judgments of similarity among musical extracts.[3] Addessi and Caterina (2005) found that listeners based the segmentation of a complete short piece, the fifth movement of Kurtág's String Quartet op. 1 (1959), on changes in parameters including dynamics, timbre, rhythm (acceleration, deceleration, change of pattern), thickening or thinning of sound, introduction and repetition, sense of concluding or suspending, and pauses; the most common of these were dynamics, timbre, rhythm, and repetition.[4] In addition, there was general agreement on the overall location of boundaries by professional analysts and both musician and non-musician subjects. Clarke and Krumhansl (1990), Deliège (1989), and Deliège and El Ahmadi (1990) are in substantial agreement.[5]

In the area of similarity judgments, McAdams et al. (2004) found that, in comparing extracts from Roger Reynolds's *The Angel of Death* for orchestra (2001), listeners based judgments of similarity on five broad categories of musical

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[2] A good deal of work in music perception and cognition has been developed from the grouping principles set forth in Lerdahl and Jackendoff's *A Generative Theory of Tonal Music* (1983). See Deliège 2001; Clarke and Krumshansl 1990.

[3] In the music psychology literature, the terms segment and segmentation usually refer to the main sectional divisions of a piece or movement, while in the music theory literature, discussed below, these terms indicate small groupings of tones in the nature of motives or gestures.

[4] This study was part of a larger project by the Gruppo di Analisi e Teoria Musicale (GATM), based in the Department of Music at Bologna University, whose aim is to investigate the "macroform" in post-tonal music, that is, the problem of the overall form of a piece. Addessi and Caterina 2005, 94-95; see Baroni 2003. The project uses an adapted version of Christopher Hasty's theory of "domains," that is, parameters, in investigating listeners' segmentation of a work into its main sections. Addessi and Caterina 2005, 99.

[5] The piece used in Clarke and Krumhansl 1990 was Stockhausen's *Klavierstück IX* (1961); in Deliège 1989 two pieces were used: Berio's *Sequenza VI* for solo viola (1967) and Boulez's *Eclat* for orchestra (1965-70); Deliège and El Ahmadi 1990 used the Berio *Sequenza VI*.

characteristics: timbre, melody, rhythm, articulation, and gesture. The categories included multiple specific aspects. For instance, melody included register, conjunct versus disjunct intervals, pitch range, contour features (alternation, smoothness or choppiness of trajectory), directionality, element repetition, and singleness or multiplicity of line, while rhythm-related terms included tempo variations (acceleration, elastic fluctuation), accentuation and syncopation, regularity or even spacing, and rhythmic repetition. In a similar study by Lamont and Dibben (2001), judgments of similarity in a tonal piece, Beethoven's Piano Sonata, op. 10, no. 1, first movement, and in an atonal piece, Schoenberg's *Klavierstück*, op. 33a, were compared and found to be based on essentially the same factors: dynamics, articulation, texture, register, and contour in the Beethoven, and relative tempo, dynamics, and texture in the Schoenberg.[6] These perception studies provide support for the notion that, for both tonal and post-tonal music, listeners are highly responsive to the effects of similarities and changes in musical parameters.

The issue of large-scale form in post-tonal music has been addressed by a handful of music theorists. Of these, Wennerstrom (1967) has provided the most in-depth investigation. Her study of ten compositions from the 1950s and 1960s found, among other things, that movements and intra-movement sections are differentiated primarily by the parameters of successive density (speed of attacks), simultaneous density (number of sounding voices), timbre, and dynamics, while pitch parameters such as interval sets, melodic motives, and chords, together with rhythmic patterns are most prominent in

[6] Surprisingly, motivic/thematic relations were not found to be a factor in judgments of similarity for either piece (Lamont and Dibben 2001, 256, 259).

providing internal cohesion to the sections.[7] Borders (1979) examines three single-movement works by Babbitt, concluding that the various internal sections are articulated either by the arrays of the pitch structure or by rhythmic features derived from the duration series.[8] François (1991) finds in Varèse's *Ionisation* that the large-scale sectional divisions of the piece are delineated by three recurring "structures" identified on the basis of timbre, register, density, and rhythm. Dubiel (1992) analyzes the fifteen sections of Babbitt's *Composition for Four Instruments*, grouping them into five larger parts on the basis of relations of instrumental succession and, in some cases, notable connections at the boundaries between sections. Although large-scale form in this repertoire remains undertheorized, it is apparent that analysis focuses to a greater or lesser extent on the formative effects of musical parameters.

The focus of the present study is the formation of small- and medium-scale formal units, that is, segments, sub-phrases, phrases, and phrase groups.[9] A *phrase* in a post-tonal context is defined as a formal unit characterized by initiation, coherence, and completeness, usually consisting of two or more segments. A *segment* may be defined as a small group of tones or other elements that bind together as a single unit.[10] An *element* is a temporally indivisible unit such as a tone, a simultaneity, or a percussive attack. This

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[7] The ten pieces analyzed in Wennerstrom 1967 are: Berio, *Serenata I* (1957); Boulez, *Structures I* (1952); Carter, String Quartet No. 2 (1959); Foss, *Echoi* (1963); Henze, Sonata for Piano (1959); Krenek, *Eleven Transparencies* (1954); Nono, *Incontri* (1955); Schuller, *Music for Brass Quintet* (1961); Stockhausen, *Refrain* (1959); and Stravinsky, *Movements* (1959).

[8] The three pieces analyzed in Borders 1979 are *Composition for Twelve Instruments* (1948; rev. 1954); *Sextets* for piano and violin (1966); and String Quartet No. 3 (1970).

[9] Each of the following analytical chapters examines one or more large sections or movements of a work. In this sense, large-scale form will also be addressed, but from the point of view of building up the internal contents and design of the section rather than dividing the complete work into smaller and smaller parts.

[10] Dora A. Hanninen has provided a number of formulations of the definition of a segment. "A segment is a grouping of tones *heard as such*, recognized through the influence of one or more segmentation criteria" (1996, 1, emphasis in original); "A segment is a grouping of musical notes or other sound-events recognized through an interpretive (or analytic) act as a musical phenomenon" (1997, 63); and "A musical segment is a grouping of tones an analyst recognizes as a readily audible unit" (2002, 16).

study will identify five post-tonal phrase types, based on methods of producing coherence. The five phrase types are tension and release, departure and return, symmetry, directed parametric change, and similarity. The characteristics of each phrase type are defined by particular parametric actions and patterns of actions. These concepts will be discussed in detail later in this chapter. The remainder of the chapter will provide an overview of segmentation theory, a discussion of Christopher Hasty's approach to post-tonal phrases (which serves as a major basis for the present study), some comments on the nature and function of parameters, and an outline of the principles of phrase formation that will be developed in this dissertation.

Segments are usually easily identified in tonal music; they are the motives, the basic ideas, and the short subparts of a phrase. In post-tonal music, however, the lack of well-established harmonic and melodic structures often hinders the recognition not only of segments but of larger formal units as well. In response to this concern, an important body of music-theoretical literature has developed which deals with issues of segmentation. The goal of segmentation theory has been to uncover ways in which human perception may parse the stream of sonic events in post-tonal music, thus locating intelligible and meaningful formal structures. The principal architects of segmentation theory are James Tenney, Christopher Hasty, and Dora Hanninen, each of whom is discussed below.

The present study is not primarily about segmentation. Rather, it is directed toward discovering the processes and relations by which larger units such as phrases and phrase-groups are formed. However, this necessarily entails segmentation as an initial analytical step, since in most cases phrases are formed through the combination of

smaller segments. Moreover, phrases themselves constitute segments (in the generic sense of the word) at a higher level, and hence the location of their boundaries will be an important part of the analysis.

II. Segmentation Theory

Initially, two strands of segmentation theory were developed independently, one by James Tenney (1964/1988; with Polansky 1980), extended by Uno and Hübscher (1995) and Lefkowitz and Taavola (2000), and the other by Christopher Hasty (1981b). More recently, a third strand has been established in the work of Dora Hanninen (2001), who extends and generalizes Tenney's segmentation theory and proposes an associative approach to large-scale form. Tenney's theory, and the segmentation aspect of Hanninen's theory, may be understood as a method to locate the boundaries of segments; Tenney and Polansky, Uno and Hübscher, and Lefkowitz and Taavola also focus on delineating the boundaries of larger formal units. Hasty's theory includes the location of boundaries, but his work is inextricably bound up with an investigation into the nature of segments—how they are formed, how they cohere internally, how they relate to each other within a given context, and how they combine to form larger units. This fundamental difference of approach will have consequences for the lines of development flowing from Tenney and Hasty.

A. Tenney's Larger Interval

James Tenney proposes that a larger interval preceded and followed by smaller ones marks a perceptual boundary (Tenney and Polansky 1980, 212-14). This procedure was derived from his observation that segment boundaries are determined by successive segment initiations (208). The interval that forms the boundary was initially thought to

be either a pitch interval or a duration interval, and in principle could also occur in other parameters such as dynamics and timbre. To get at the effect of two or more parameters acting simultaneously, Tenney combined the parameters of pitch, duration, and dynamics into a single measure of change by the use of a metric—a measure of distance in a multi-dimensional space. Each parameter is weighted with respect to the others, although apart from indicating that optimum weightings are determined on a trial and error basis, piece by piece, the method and rationale for assigning weightings are not described (211-12). A computer algorithm was created based on these principles, and applied to works by Varèse, Webern, and Debussy (222ff.). The algorithm is applied recursively, generating larger forms by taking the average or mean values of units at one level and locating boundaries among these at the next higher level.

Tenney's theory is based on the gestalt principles of proximity and similarity, thought to be the basis for the grouping of objects in visual perception (Tenney 1964/1988, 28). These principles were applied by analogy to aural perception. In Tenney's formulation, proximity in time or similarity of values in other parameters tends to form musical units in perception, while relative separation in time or dissimilarity of values in other parameters tends to produce segregations (29-32). In his 1980 article, Tenney shifted the focus from the grouping effects of similarity to the segregating effects of dissimilarity, which paved the way for the above described developments (1980, 208-09).

The idea that closeness in time and/or similarity of values in other parameters motivates the formation of musical units in perception is a valuable insight and has been highly influential. Its application to the works mentioned above produced results that are

largely consistent with an intuitive sense of where formal boundaries might be located. This approach, however, fails to acknowledge that there are other ways to create a boundary. A salient change of timbre, for example, or dynamics or temporal density creates a disjunction that may project a boundary, even when the precise formula of larger-interval-surrounded-by-smaller-ones does not occur. Moreover, in music that features constant large pitch intervals, or constant changes of durations, dynamics, and so forth, the "larger interval" may occur either too frequently, segregating almost every note or pair of notes from the next, or too infrequently, encompassing several perceptible segments before an appreciable intervallic disjunction appears.

Another concern is that the algorithm applies only to monophonic music. This problem was addressed by Uno and Hübscher (1995), who develop a computer algorithm that effectively reduces or compresses the multiple parts to a single composite line. This solution, however, is prohibitively complex for most analysts and is problematic in its treatment of the multiple parts, failing to take account of matters such as the overall texture and density created by the parts, and the presence of notable salience within certain parts. Lefkowitz and Taavola (2000) present both an algorithm and a theory, the latter of which proposes that segmental boundaries be located on the basis of "change in the rate of change" within a parameter, rather than Tenney's "larger interval" construct. This interesting approach does solve some counterintuitive analyses produced by Tenney's formulation (Lefkowitz and Taavola 2000, 173-74), and the authors apply their method to music with multiple parts.

Neither Uno and Hübscher nor Lefkowitz and Taavola, however, apply their respective approaches to the sort of highly complex textures that are found in the works

considered in this study, nor is it apparent how this could be done. The works in their published analyses feature relatively simple textures. All are piano solo pieces except for Ligeti's *Ten Pieces for Wind Quintet*, No. 1 (1968). Uno's analysis of this work is quite insightful, but these insights are largely found in her discussion of the piece (Uno and Hübscher 1995, 29-31) rather than in the results of the computer analysis (ibid., 17, 26). The basis for the formal units designated in mm. 1-5 (ibid., 17), presumably identified by the algorithm, is neither stated nor readily apparent from the score or from listening. And the texture functions in essentially a homophonic rather than polyphonic manner. Although the five instrumental parts do not move together rhythmically, they are substantially integrated in register and dynamics, and particularly in the activities and processes that characterize each of the larger sections—sustained tones with imitation in the first section, stretto entries in the second, rhythmic intensification in the third, and so forth (see ibid., 29-31). Thus, the segmentation procedures developed by Tenney and Polansky, Uno and Hübscher, and Lefkowitz and Taavola are not well adapted to the complex textures of much post-tonal music.

B. Hasty's Change of Value

Christopher Hasty's approach to segmentation is based on the presence of continuity and discontinuity in the values of the various parameters (which he calls domains) (Hasty 1981b, 58). A succession of tones, discontinuous because of their differing values of pitch and temporal appearance, may be heard as a unity if they possess identical values in some other parameter, for instance, if all have the same durational value or the same degree of loudness. The shared parametric values create continuity, uniting the series of tones as a "structure" within that parameter. A discontinuity in the

same parameter marks the boundary of this structure. "A change of value in a particular domain creates a discontinuity—a difference which isolates distinct objects for our attention" (58). It is this "process of structural formation, the action of structures producing formal articulations," which gives rise to segmentation (59).[11] Hasty views segmentation as something that the music itself "does." Segmentation may be understood "not as something imposed upon the work, but rather as something inherent—something to be discovered" (ibid.).

Discovery is accomplished through analysis of a passage to determine which notes share the same values in each parameter that is active in the passage. A single passage may generate several segmentations, some of which may be incompatible, but any or all of which may have consequences for the work. Thus, Hasty does not choose the one "correct" segmentation but rather ranks them in strength. Stronger segmentations are those which are supported by the greater number of parameters. He acknowledges that not all parameters will be equal in their "aural immediacy" but notes that stronger segmentations are usually "more apparent to the ear" (ibid., 59).

One of Hasty's many contributions was to greatly expand the parameters invoked in a segmentation analysis. In addition to pitch, duration, and dynamics (which Tenney used), Hasty includes timbre, articulation, register, contour, order of intervals, pitch-class interval, interval class, and set class.[12] These are not quantified but rather are evaluated in terms of continuity or discontinuity within each parameter. He also looks at patterns,

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[11] Hasty uses the term "segmentation" in two senses: as the act or process of segmenting ("segmentation is the process of structural formation" [59]) and as the product or result of that act ("many structures may share a single segmentation" [ibid.]). In the latter sense, a segmentation is equivalent to a structure. But in the former sense, the terms are slightly different: segmentation is the "formation of boundaries… which result from structures" (ibid.).

[12] For ease of reference, I will include such theoretical concepts as pitch class and set class in the term "parameters" during this overview of the literature. Later in this chapter, however, I will distinguish these and will discuss my approach to parameters.

for example, the alternation of two intervals, the retrograde presentation of parameters such as duration or timbre in addition to pitch, the return of earlier material such as register, dynamics, intervallic patterns, and the transposed or varied repetitions of a motive. These sorts of patterns function as a means of internal unity within a segment and as a form of relationship between segments.

Hasty's idea that continuity unifies and creates a structure while discontinuity articulates and creates a boundary is essentially the same as Tenney's early formulations with regard to proximity and similarity. Tenney (1980), however, focuses exclusively on segregation and boundaries while Hasty (1981b) is more interested in the process of formation. Tenney's focus on boundaries facilitates the development of rigorous, objective criteria for identifying segments. A boundary is a relatively finite point in time which can be located and, to some degree, measured. The difficulty with this approach is that, while boundary location is a necessary first step, it tells us little about the content of the segment, neither its internal relations nor its (potential) meaning and function in the larger context. Hasty's emphasis on the formative process, on the other hand, allows us to investigate these aspects of a segment, particularly with a view toward the perceptual factors that influence formation. His approach is a heuristic one, based upon sensitive, well-reasoned interpretations of the sound-objects and their interrelations, but has been criticized for its lack of sufficient distinctions, quantifications, and metrics (Hanninen 2001, 351-52 and n. 6).[13]

I use an adapted version of Hasty's change of value, which I generally refer to as change of material, though I differ with him in two respects. While Hasty requires

[13] Hanninen also takes issue with Hasty's method, discussed above, of identifying stronger segments as those supported by the greater number of parameters. Her own method, however, follows essentially the same procedure under her concept of "coincidence." See Hanninen 2001, 358, 391, and 419 n.13.

identity of value within a parameter to create continuity, many passages will consist of a constant mix of values. For example, there may be a combination of both loud and soft tones. In such cases, I take a more flexible approach in which continuity may be created if the passage is mostly, rather than entirely, loud, or if the loud tones, while fewer than the soft ones, are somehow more prominent because of instrumentation or other compositional treatment. In addition, I differ with Hasty in his extensive reliance on set class and other equivalence-based entities. As will be discussed below, these play little role in my analyses.[14]

C. Hanninen's Sonic and Contextual Criteria

Dora A. Hanninen presents a complex general theory of segmentation (Hanninen 2001) that is further elaborated and applied in an extensive series of publications.[15] Her segmentation theory begins by grouping all parameters into two categories of criteria—sonic and contextual.[16] Sonic criteria consist of attributes of individual tones, including pitch, duration, timbre, dynamics, articulation, and attack point (359, 362). A disjunction in sonic criteria determines a boundary, and Hanninen adopts the Tenney and Polansky approach of "larger interval" to make this determination (426, n. 52). Contextual criteria, on the other hand, represent attributes of groups of tones (363). This category is very broad, reflecting many of the ways in which a group of tones may be characterized. Some examples include pitch interval, pitch contour, pitch set, pitch-class set, set class, set-class complementation, pitch-class interval, interval class, dynamics contour, and

[14] In a number of subsequent publications, Hasty develops the concept of phrase formation in post-tonal music, and it is this aspect of his work, discussed below, which has served as a major model and launching point for the present study.
[15] See Hanninen 1997, 2002, 2003, 2004a, 2004b, 2004c, 2006, and 2009.
[16] A third category, structural criteria, identifies relevant theoretical constructs such as row segment or tonic prolongation when these are reflected in segments already identified by sonic and contextual criteria.

rhythmic pattern.[17] Contextual criteria are used to associate two or more segments on the basis of repetition, equivalence, or similarity; the segments may be adjacent or non-adjacent but they must be in the same musical passage or context (ibid.). While not explicitly stated, it is clear from the discussion that contextual criteria do not arise unless a segment is repeated, thus producing two or more instances of, say, a particular contour or set class within the same passage. Hanninen describes the roles of sonic and contextual criteria as follows: "Sonic criteria define boundaries and imply segments" (359), while "contextual criteria define segments and imply boundaries" (363).[18]

Analysis in accordance with these principles follows a highly structured procedure, and entails two additional concepts. A *genosegment* or *genoseg* is defined as a "potentially perceptible" grouping of notes or other events (388). A genoseg is a segment supported by a single criterion, either sonic or contextual (ibid.). At this stage, it appears (though this is not stated) that both sonic and contextual criteria define both boundaries and segments. Disjunctions in pitch, duration, and so forth create boundaries and therefore sonic genosegs, while completion of a contour, set class, and so forth also creates boundaries and therefore (pairs of) contextual genosegs. The various genosegs supported by the various criteria may be conflicting, that is, they may produce different groupings with different boundaries (389). A *phenosegment* or *phenoseg* is a "readily perceptible" grouping (389), which is formed in one of two ways. Either two or more genosegs encompass the exact same notes and hence do not conflict (this is called coincidence) or a single genoseg is sufficiently strong to be readily perceptible as a

[17] Most of these are found in the chart on pp. 366-67; some appear in the analyses beginning on p. 393. Many other contextual criteria are used throughout her published analyses.

[18] These statements summarize two of my principal difficulties with Hanninen's theory, namely the distinction between sonic and contextual criteria, both in content and in function, and the distinction between segments (i.e., their internal contents) and boundaries.

phenoseg (391).[19] In the latter case, this will typically be a sonic genoseg, since a contextual genoseg alone is rarely strong enough to be readily perceptible as a phenoseg without coincident support from at least one sonic criterion (ibid. and n.59).[20]

Hanninen's theory of segmentation is intimately related to her theory of associative sets, introduced in Hanninen 1997 and elaborated in Hanninen 2002 and elsewhere.[21] To briefly summarize, an associative set is a collection of two or more segments related by contextual criteria (1997, 65). Each segment in a set is related to, or associated with, at least one other segment by one or more contextual criteria (ibid.). In a set that contains more than two segments, some segments may be unrelated to each other, as long as each of them is related to some other segment(s) in the set (2002).[22] Associative sets may become fairly large (e.g., 2002, 33-35, set *A* contains 20 segments), and they may extend over a lengthy span of time (e.g. 1997, 84, set *E* spans mm. 5-26). Segments in a set may be adjacent or non-adjacent (2002, 18); most often they are the latter. Associated segments are often conceived as motives, with each segment representing a varied statement of the motive (e.g., 1997, 90-91). All of these characteristics of associative sets produce multiple short- and long-term connections throughout a work or section, a complex web of relations that draws the work together as a whole.

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[19] A third means of producing a phenoseg occurs when one genoseg is a proper subset of another, that is, when a genoseg is embedded within another and they share a single boundary; the two genosegs are said to be compatible (392).

[20] This evaluation of the comparative strengths of sonic and contextual criteria restates her earlier opinion (Hanninen 1997, 64) but has since been reversed (Hanninen 2004a, 175), where she holds that sonic criteria alone are insufficient (or often so) and contextual criteria alone may be sufficient. See also Hanninen 2002, 18, Ex. 1b; 20, Ex. 2a and n. 20, in which two segments are related by contextual criteria (set class and pitch interval ordering from low to high) but are unsupported, and contradicted, by sonic criteria.

[21] Hanninen's 1997 article presents a detailed analysis of Richard Swift's *Things of August* (1985), while the 2002 article analyzes Stefan Wolpe's *Form for Piano* (1959) and *Form IV* (1969).

[22] This is not explicitly stated but is clear from virtually all of the examples, e.g. 2002, 20, Ex. 2a and b; 33-35, Ex. 8, set *A*; and passim. On the other hand, this does not seem to occur in Hanninen 1997.

Hanninen's comprehensive theory is painstakingly thorough, far more so than this summary has shown. Nevertheless, her work raises a number of concerns for the present study. One that may be dealt with quickly is the limitation of bases for segmental association to repetition, equivalence, and similarity. Although repetition is unquestionably important, there are a number of other sorts of relationships that may obtain between two segments, such as expansion or contraction, acceleration or deceleration, complementary parametric factors, and continuation or completion of a process. These and many other relational bases are the primary means of coherence within phrases, and will be illustrated in the following chapters.

The two groups of parameters or criteria, sonic and contextual, are severely restricted in their functions: sonic criteria are used only (or primarily) to mark boundaries, and contextual criteria are used only to define segments—that is, to characterize the content of the segment. This approach overlooks the strong perceptual effect of the sonic criteria in unifying the elements of a segment and thus in defining its content. It also fails to acknowledge the ability of at least some of the contextual criteria to mark boundaries (discussed above in connection with Tenney). The division itself seems arbitrary, as many of the contextual criteria—such as pitch interval, contour, duration and dynamics patterns—are actually sonic factors, in that they are characteristics of audible sound. In this study, I refer to all such factors as parameters and allow all to operate in ways suggested by the musical context itself.

My greatest concern is the separation of content and boundaries. In most cases, these are in fact intricately related. The content of a segment is determined by the action of parameters in the formation of parametric shapes, structures, and relations. These

constitute the material of the segment, and a salient change of material marks an audible boundary. Quite often, the new material also marks the beginning of the next segment, creating an integrated, organic connection. The artificial separation of content from boundary imposes unnecessary restrictions on how one may hear and perceive the music, portraying it as a series of discrete boxes rather than a fluid, dynamic process in motion.

* * *

My own procedures for segmentation are varied, and depend entirely on the musical context. In the matter of determining boundaries, I do not precisely follow Tenney, Hasty, or Hanninen. As I have suggested throughout the preceding discussion, in many cases their methods seem to be inapplicable to the highly complex music considered here. Perhaps the most general principle that may be invoked in the segmentation of these works is that of *salient change*, and specifically *change of material*. This is the fundamental principle in the work of each of the theorists discussed above. The difference is in how the principle is applied. My segmentation methods and rationales will be discussed in detail in connection with specific analyses in the following chapters.

III. Post-Tonal Phrase Formation: Hasty's Approach

As noted above, Hasty's segmentation theory is an integral part of his larger project to investigate the nature of form in post-tonal music. A major part of this work has been the identification and analysis of phrases in this repertoire.

A phrase, according to Hasty, arises from internal coherence and structural closure (1984, 172, 174). Internal coherence is a product of unification, a process in which the discrete components acquire "sufficient interdependence to cohere as a single

object such that when the last element is sounding the first is still in some way present" (ibid., 169).[23] Within the phrase, groupings of elements cohere to create a sense of "wholeness or completeness" (171). This wholeness or completeness is the hallmark of a phrase. It is the result of a "complete reciprocity" among the components in which all derive their functional significance from one another (168). Throughout his writings, Hasty uses various terms interchangeably to indicate the process of acquiring coherence, including unification, integration, interrelation, interdependence, and continuity. These terms give us a sense of how the parts of a phrase must somehow hold together in perception.

In post-tonal music, Hasty notes, this sort of structural unification takes place in a great variety of ways (1984, 174). Rather than listing and categorizing these, Hasty typically illustrates them through musical examples. A review of his principal writings on this topic reveals that the essence of unification is the presence of relations between and among the component parts of the phrase.[24] These relations may be based on characteristics of the parts—that is, the similarities and differences between them—or they may take the form of a dynamic interaction. Most often, both of these types of connections are present; the similarities and differences give rise to the dynamic interaction. The following is a list of relations among parts identified in Hasty's various published analyses:[25]

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[23] The last clause is a reference to the concept of the "perceived present" in which psychologists posit an enduring present capable of including successive stimuli (1984, 169-70). Estimates of the duration of the perceived present range from 1 to 36 seconds (ibid.). However, the degree of organization of the stimuli increases the duration of the perceived present (172). Thus, Hasty suggests that the structural resources of music could create spans of integration considerably longer than those created merely from a series of pulses—long enough to readily encompass a musical phrase, which he estimates at 10-15 seconds or longer (ibid.).

[24] See Hasty 1981a, 1981b, 1984, 1986, 1988, and 1997.

[25] The list is unorganized, except that it begins with characteristics and proceeds to dynamic interactions.

Parameters: duration, timbre, contour, rhythmic pattern, register, articulation, texture, tempo
Pitch and pitch class
Set class
Intervallic associations
Metrical relations
Structural similarities
Retrograde
Repetition
Elision
Intensified replica
Transformed replica
Parts of a continuous process, e.g. rhythmic reduction
Reconcile differences, mediation (incorporate intervening contrasts)
Return
Statement-departure-return
Abbreviation, compression
Acceleration or deceleration
Extension
Intensified development
Expansion of
Complication of (repetition with significant differences)

These sorts of relations (and many more can be found in post-tonal music) impart a sense of organization and directedness to the phrase, thus enabling the unification of the parts.[26] Relatively brief phrases need not be highly organized, provided there is a clear articulation of the boundaries (1984, 188). However, as the phrase becomes longer and more complex, the component parts must be more strongly interrelated. "This interrelation of parts both holds the constituents together and articulates the phrase, protecting it from the accretion of neighboring elements" (ibid.).

The matter of articulation brings us to Hasty's second fundamental aspect of a phrase, structural closure. Closure and coherence are in fact closely related: some degree of articulation is essential to the unification of a series of elements. "When the number of elements or the duration exceeds certain limits or the organization of elements cannot

[26] A theory of directed motion in music, with an emphasis on post-tonal music, is developed in Hasty 1981a.

bear extension, the entire structure begins to fall apart" (1984, 171). Hasty distinguishes articulation and closure in this way (172-73): Articulation is a surface discontinuity. A component part of a phrase ("segment" in my terminology) is brief and can be held in short-term memory; therefore surface articulation is sufficient to unify its internal parts (individual tones, chords, and so forth). A phrase, on the other hand, must have some sort of structural closure in which all elements are related and derive their structural meaning from one another. Closure is a necessary implication of coherence, and is itself the articulation of the unit since unrelated elements are thereby segregated. Hasty does not say explicitly, but it appears that the greater duration of a phrase, relative to a segment, requires a greater degree of articulation to achieve coherence.

For Hasty, structural closure in a phrase is embodied in the notion of return. In Hasty 1981b, the term "opening" in connection with a phrase is defined as a movement away from a particular value or quality, and "closing" as a return to that value or quality (60). "Return" is not just a simple repetition, but rather a development or fulfillment of various processes (ibid.). Three types of closure are described: completion of an interrupted process, mediation of intervening contrasts, and retrograde (63). Each comprises some degree of return of initial material in conjunction with the particular process. This does not usually involve recapitulation of a melody, but rather a reenactment of parametric or other qualities of the opening, such as timbre, register, interval relations, or set class.

In the completion of an interrupted process, there is a "renewal" (60) of the initial process which now is allowed to reach completion. Mediation of contrasts involves a return that incorporates at least some of the intervening differences. Hasty has

characterized this as analogous to the resolution of dissonance in tonal music—an element is introduced which does not cohere with the previous ones but is subsequently integrated (1984, 178). "It is not simply a matter of departure and return but of setting up a tension in the material which demands resolution to a state of equilibrium" (ibid.). In retrograde, the return is of course presented in reverse. Its unifying effect results from the fact that each element's meaning is dependent on all the other elements (179). Closure is produced by in effect undoing what has been done. "When the last element appears in retrograde the structure is completed as if by being emptied of its contents" (ibid.). There can be no further accretion of elements; therefore the structure is articulated as a unit.

Much of Hasty's theoretical work in this area has been concerned with the psychological bases for the perception of musical form.[27] In addition, his detailed analytical observations of post-tonal phrase formation have laid much of the groundwork for the present study. However, his approach has not gone beyond the level of observation to that of identifying patterns and forming general conclusions. Such patterns do exist, as the present study will demonstrate, and an understanding of their nature and mechanisms of action can serve as a starting point for the development of a comprehensive theory of post-tonal form.

Hasty's ideas on closure do identify important patterns and general principles. But he has not addressed the frequent occurrence in this repertoire of formal units that may be perceived as phrases even though closure is lacking. This issue, briefly mentioned in Hasty 1981b (72), arose in full in his analysis of Schoenberg's *Phantasy for*

[27] See, for example, the discussion of musical motion and the perceived present (Hasty 1981a); the relation of part and whole, and the effects of echoic and active memory (1984); and the principles of continuity and discontinuity in a temporal process (1986).

Violin with Piano Accompaniment, op. 47 (1949), where closure of the first phrase is dubious and in the next three is absent (Hasty 1997). Hasty recognizes the lack of closure and points to other aspects of the music that signal the end of the phrase. In the present study, I will examine these other aspects and develop some general principles, including a discussion of how a phrase may project completeness by means of various types of structural articulation rather than closure.

Lastly, my overall approach to post-tonal form differs in a significant way from that of Hasty (and of Hanninen). I will focus substantially on matters of audibility and perceptibility of formal structures, as I believe that a phrase or other formal unit that cannot be heard by an attentive listener thereby loses much of its strength as a meaningful and expressive force in the music. This may partly explain why abstract entities such as interval class and set class rarely contribute to the formal analyses in the following chapters.[28] Rather, I argue that post-tonal formal structures are created largely by the acoustical characteristics of sound, such as pitch, duration, and dynamics, and the effects of these characteristics on groups of sounds, such as density and contour. These features, which I call parameters, are the agents that not only motivate the formation of segments, phrases, and larger formal structures but also audibly project these to the listener.

IV. Parameters as Agents of Form

Parameters are essential to the formation of structural units. Parametric values—such as louder and softer, or greater and lesser in density—function as a grouping mechanism, producing coherence by allowing the listener to hear a series of musical elements bound together as a unit. Parameters act initially to create segments, either

[28] This point is further discussed below.

through similarity of values or through a parametric process that occurs during the segment such as becoming louder or faster or descending in register. At higher levels, parameters produce relations among segments that permit them to cohere as a phrase, and among phrases that create larger units.

The principal parameters that I have found to be active in generating formal units include the familiar sonic properties of individual tones—pitch, duration, dynamics, timbre, and articulation—as well as those attributable to groups of tones, such as register, pitch interval, spatial and temporal density, contour, and texture.[29] The group features are derived from the individual features; hence all are sonic characteristics. Figure 1 illustrates my understanding of these interrelations:

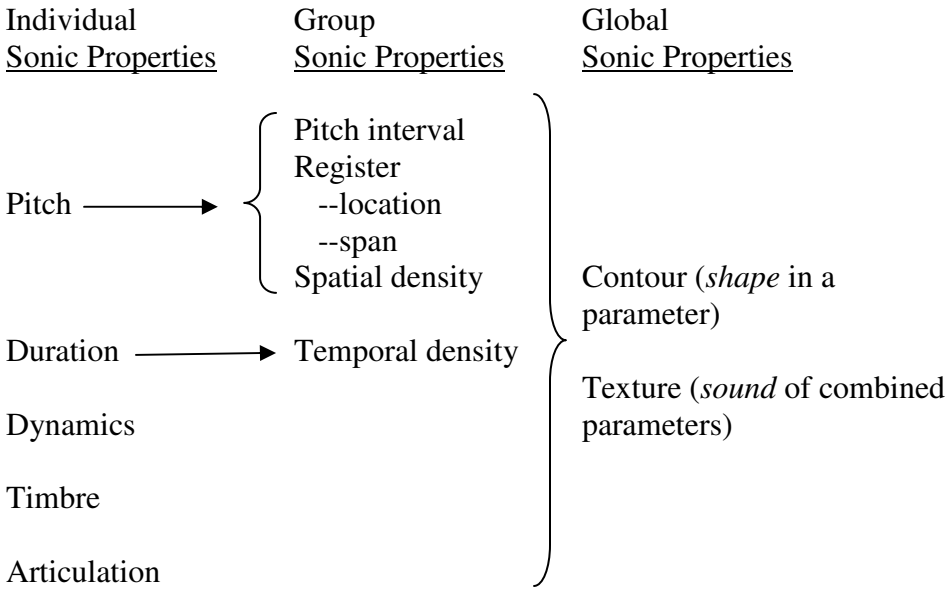

Figure 1 Relations among parameters

The individual sonic properties give rise to group sonic properties, as indicated by the arrows. Both individual and group properties contribute to contour (individually) and to

[29] Although for convenience I will usually speak of "tones" or "notes," it should be understood that my approach to form includes non-pitched sounds and silences, which may be accounted for within the parameters mentioned.

texture (collectively). Ordered segments are understood to be included within each relevant parameter. Several of the parameters are discussed in more detail below.[30]

These are essentially aspects of sound that we as listeners use to characterize what we hear. In post-tonal music especially, they have a direct and immediate impact on the listener and can readily be heard to create meaningful shapes, processes, and relationships. They are also, it is important to note, aspects of the surface of the music. In the course of analyzing the works in this study, it became apparent that certain conceptual sound-objects, though prominent in post-tonal music theory, rarely participate perceptually in the processes that generate formal units. For this reason, I have not included in the above list of parameters many of the equivalence-based entities that have been developed in post-tonal theory, such as pitch class, pitch-class set, set class, pitch-class interval, and interval class. Rather than aspects of the musical surface, these are properties of the underlying musical structure. As such they are crucial to a comprehensive understanding of a particular work, but they do not as a rule actively contribute to the perception of form. I do not mean to assert that these entities are never audible. But I do mean to suggest that their audibility, and hence their role in the creation and perception of form, is often dependent on the extent to which they are brought to our attention through the use of the above-mentioned parameters. This can and does happen, as we will see in Babbitt's *Composition for Four Instruments* (see Chapter 2).

The parameters generally function in a relative manner. This means that parametric values are perceived and will be described in relative terms such as high, middle, and low, or in comparative terms such as higher, faster, and so forth. Many of

[30] This is not meant to be an exhaustive list of form-generating parameters. It represents those that were found to be relevant in the works considered in the following chapters.

the parameters listed above can be measured objectively—pitch, duration, interval, register, spatial and temporal density, and contour. But the listener ordinarily will not be able to know, for example, that a particular group of tones is located in the span from F#5 to A6, or that the temporal density is equal to seven attacks per second. Rather, this hypothetical passage will be perceived as high in register and fast in tempo. Moreover, this passage will then be compared to a following one which may be heard as lower in register (or, say, in the mid-to-lower register) and slower in tempo (or, say, moderately fast). Parametric changes such as these create an interval, and the general size of that interval—large, medium, small—can be perceived even though its precise measurement is not known.[31] These sorts of straightforward relationships, such as higher and lower, or louder and softer, give rise to the shapes and sounds whose interrelations create formal units. This approach draws on Tenney's concept of the larger interval and on Hasty's change in value, but shifts the focus to what the listener hears (or may hear) rather than what the analyst can measure and identify in the score.[32]

Many of the parameters are self-evident in meaning, including pitch, duration, dynamics, timbre, articulation, and pitch interval. I use each of these terms in its generally understood sense. The remaining parameters may benefit from some clarification.

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[31] This is supported by the music perception studies discussed above.

[32] This is not a music perception study in which listener-subjects are asked to perform tasks and answer questions in order to test a hypothesis. Assertions about listener perception are based on my own responses to the music, although this also includes my estimation of how others might hear the music. The findings and conclusions of this study, however, are testable, and one potential avenue of future research would be to examine these findings through follow-up empirical studies.

The term *register* is used to denote the relative highness or lowness of pitch. In this study, it is most often used to characterize a group of tones. Thus, a series of tones[33] may be heard as all or mostly within a given registral span. Generally, I do not specify the boundaries of particular registers, since this would neither reflect nor assist the listening experience.[34] Rather, I focus on the general width of the pitch band (for example, narrow, or moderately wide, or spanning all registers) and the general location of that band in registral space (such as high, low, mid-to-upper). These are subjective descriptions based on my own responses, and I fully acknowledge that other listener/analysts may hear it differently. What is important is to recognize the changes or contrasts of register, as well as the spanning of or traversal through several registers. As we will see in the following chapters, register is one of the most frequently invoked parameters in the projection and perception of post-tonal formal units.

The term *contour* is used as defined and illustrated in the extensive literature on this topic.[35] However, in many cases I do not employ the symbols "+" and "–", nor numeric ranking, to indicate the shape of a contour. Instead, I often use verbal descriptions enclosed in angle brackets in order to communicate a stronger sense of the perception of these changes. A three-note pitch contour of <+, –> might thus be represented as <up, down> and its duration contour of <–, +, –> may be written as <short, long, short>. When more specific characteristics of contour are important to the formal

[33] A series of tones for this purpose may be consecutive, simultaneous, or nonadjacent, depending on the context.
[34] An exception will occur in the discussion of the clarinet solo from Babbitt's *Composition for Four Instruments* in chapter 2, where in certain passages registral boundaries contribute to the formation of phrases.
[35] See Friedmann 1985, 1987; Marvin and Laprade 1987; Marvin 1991, 1995; Lewin 1991; Morris 1993.

analysis, such as pitch interval <+4, –3> or ranking of pitch height <021>, I use these more standard labels.[36]

Density cannot be overstated as a formative factor in post-tonal music. Together with register, it is fundamental to the creation and perception of form. I distinguish two types. *Spatial density* refers to the number of simultaneously sounding elements. This is the traditional understanding of density, incorporating the simultaneous presence of one, two, or more pitches or other sounds, as well as the concept of the number of active "voices" or "parts." Relative descriptive terms such as high and low spatial density correspond to the conventional perceptions of thickness and thinness. *Temporal density*, on the other hand, refers to the speed of attacks. This parameter encompasses distinctions between faster and slower moving passages, as well as the very important processes of acceleration and deceleration. The regularity or irregularity of attack patterns, and the presence of polyrhythm, may also influence the sense of temporal density. These two types of density, singly or in combination, contribute much to the perceived level of complexity of the music.

The term *texture* is used to indicate the overall pattern of sound created by the combination of parameters in a segment, phrase, or other passage. This concept has traditionally been rather vague in meaning, most often referring to what I call spatial density together with the particular behavior of melodic lines, as in monophonic, polyphonic, homophonic or chordal textures. In this study, the texture of a given passage is described in terms of the general levels of the parameters. For instance, the passage

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[36] The verbal descriptive format circumvents the problem of interpreting the same set of symbols—plus and minus signs and integers—in different domains, such as pitch, duration, and dynamics. On the other hand, symbolic labels may be more effective for longer contours, where the verbal description can become awkward: <up, down, down, up, up, up, down> as opposed to the more efficient <+, –, –, +, +, +, –>. In chapters 2 and 4, I use adapted forms of nodes and lines to indicate various types of contour.

may be high in register, mostly low in spatial and temporal density, soft in dynamics, and dominated by string timbre. Changes in some or all of these parameters create a different texture. In the discussion of Stockhausen's *Kontra-Punkte* (Chapter 3), texture is somewhat formalized as a set of "textural types" which recur frequently and recognizably; the types are largely defined by duration values, temporal density, and spatial density. In Carter's Second String Quartet (Chapter 4), on the other hand, although texture is a vital element of the formal process, its manifestations are not reducible to a set of finite types. The many and widely varied textures in this work are produced through a complex web of factors, including multiple different combinations of parameters, parametric changes that range from obvious to subtle, and not least the "characters" given by the composer to each instrument. Changes from one texture to another are very salient in both of these works and are critical to the creation of formal units.

Texture has little role in the clarinet solo of Babbitt's *Composition for Four Instruments* (Chapter 2). This is because the texture is largely unvarying throughout the section. Some parameters are nearly constant with little or no change: timbre, articulation, spatial density. Others are constantly changing, often note to note: pitch intervals, pitch direction, dynamics, durations, register, and temporal density. The continuous rapid flux in these latter parameters results in a kind of "virtual sameness," different from the actual sameness in the other parameters but having a similar effect. As a consequence, the "overall pattern of sound created by the combination of parameters" remains relatively steady throughout, and texture is thus not available as a means to create and to discern formal units.

This points up a situation that occurs frequently in music with serialized parameters such as duration and dynamics in addition to pitch, as well as music in which wide intervals predominate. Changes, often substantial ones, happen so often that they cannot provide a perceptual basis for the grouping of notes or events, and hence cannot be heard to generate formal units. A number of factors, however, may help to ameliorate this difficulty. First, any remaining parameters will become more perceptually prominent and more active in projecting formal units. In the Babbitt clarinet solo, for instance, contour comes to the fore as a formal agent; both pitch and duration contours play an important role, often highlighted by other parametric activity. Second, in parameters that are subject to either constant sameness or constant change, departures from that norm can have a major impact on listener perception. While dynamics change very frequently in the clarinet solo, some passages stand out as mostly loud or mostly soft, thus rendering distinct units in that parameter. Finally, a parameter that is in constant flux at the literal surface of the music may nevertheless produce audible shapes and processes at a first remove from the surface. The presence of mostly wide leaps in the clarinet's melodic line produces a constantly varying register from one note to the next. But we will find that the first three phrases all feature a registral expansion, the fourth has certain pitch structures audibly arrayed by register, the fifth features the very salient phenomenon of continuity in register, and the sixth presents a series of gestures shaped by registral span. Thus, even when some parameters are severely restricted in effect, perceptible formal units may still be generated by these powerful musical characteristics.

V. Some Principles of Post-Tonal Phrase Structure

This study has identified three basic elements that are essential to the formation of a post-tonal phrase: initiation, coherence, and completeness. Figure 2 summarizes these basic elements and their component parts:

- **Initiation**
  - Change of material
  - Start of a new process
- **Coherence**
  - Process
    - Tension and release
    - Departure and return
    - Symmetry
    - Directed parametric change
  - Similarity (stasis)
- **Completeness**
  - Closure
  - Articulation
    - Internal articulation
    - External articulation

Figure 2 Elements of post-tonal phrase structure

Initiation is typically projected by a change of material—for example, a change of register, dynamics, or density relative to the preceding material. This change may have a greater or lesser degree of salience. In some cases, perception of a new phrase is based on the strength and clarity of completion of the previous phrase, such that we accept whatever happens next as the beginning of something new. In other cases, the initiation itself is made clear through some contextually established means—for example, a recurring figure that is recognized as having previously initiated new phrases. Many times, however, initiation will be a retrospective perception, as we gradually become aware of the unfolding of a new process, and hence, of a new phrase. In principle,

initiation is not just the beginning of a phrase but also the beginning of a process or other condition that will impart coherence to that phrase.

Coherence refers to the perceptual ability to hear the internal elements and parts of a phrase as a single unit. The phrase is usually segregated in various ways from preceding and following passages. But coherence implies that the parts of a phrase are associated not just by external segregation but also by audible internal relationships. Five types of coherence are identified in this study. Four of these consist of relationships that take the form of a process. A *process* is a series of changes in one or more parameters that produces a distinctive aural result.[37] A process facilitates coherence by enabling the integration and organization of the parts of the phrase as a complete unitary event. In post-tonal music, the internal parts are likely to be widely varying—there will be high and low notes, loud and soft, short and long, and so forth. In many cases, however, these can be heard to coalesce into a general trajectory, in which the overall sonic characteristics combine to create the perception of an unfolding process.

The four processes found in this study are called tension and release, departure and return, symmetry, and directed parametric change. A fifth means of phrase coherence is called similarity, a condition of relative stasis within the parameters. In each case, it is the particular pattern or combination of parametric values that provides coherence and thus defines the phrase type. Figure 3 summarizes the parametric functions in each phrase type:

[37] Cf. Roeder (1995, 4), who defines a linear process as a "temporally ordered series of transformations of some entity from a beginning state to a final state through a series of intermediate states."

Phrase type	**Parametric values**
Tension/release	Increase for tension; decrease for release
Departure/return	Change of parametric definition in contrasting middle section
Symmetry	Increase or decrease, followed by a reversal
Directed parametric change	Increase or decrease, without a reversal
Similarity	Steady values in some or all parameters

Figure 3 Parametric Functions

Figure 3 should be understood as a very general description of parametric functions. In any given passage, there will often be both increases and decreases in certain parameters, but the overall effect may be perceived as one or the other. Not all parameters act in the same way. In the case of register, for instance, an increase may refer to an ascending motion or a widening span, while a decrease indicates a descending motion or narrowing span. And several parameters, such as timbre, articulation, contour, and texture, do not actually increase or decrease at all in magnitude. Rather, they act by means of gradual or abrupt changes from one state or condition to another.

Tension and release is a process in which musical tension is generated by high or increasing magnitudes in one or more parameters, and is released by a reduction of magnitudes.[38] The creation and manipulation of tension is, of course, the fundamental basis of tonal phrases; in post-tonal music, however, this effect relies on parametric rather than on tonally directed harmonic and melodic processes. In most cases, the parameters involved are spatial and temporal density and dynamics.[39] A sense of accumulating and dissipating energy is produced by the process of thickening, speeding up, and getting

[38] For discussions of the relations between musical tension and parametric values, see Tenney (1964/1988); Berry (1976); Cogan and Escot (1976).
[39] An unusual use of contour to generate tension will be found in the Babbitt clarinet solo (Chapter 2).

louder, often leading to a climax, and followed by a decrease in those parameters. These processes may also be understood collectively as an increase and decrease in the complexity of the texture. The continuity of the audible buildup and release of energy provides coherence to the phrase.[40]

Departure and return is a ternary process in which an initial state is replaced by a contrasting middle section, followed by a return to the initial state. Like tension and release, this process also harks back to tradition; the modern version features parametric rather than harmonic contrast. The process may occur in any of the parameters or any combination thereof. The three parts (which usually form individual segments) may display either a dynamic quality such as registral motion, or a condition of stasis, that is, relatively steady values in one or more parameters, such as consistency in timbre or dynamics. The return of the initial state binds the three parts together as a unit.[41]

Symmetry, which has many shades of meaning in music, is used here to indicate a process based on reflection or mirror symmetry. This usually occurs as a retrograde structure, although inversion can also operate as a phrase process when it is audible, as in pitch rather than pitch-class inversion. Symmetry may occur in the familiar form of a pitch structure (that is, a pitch segment is then presented in reverse order), but it also frequently occurs in other parameters such as register or dynamics, where it takes on the characteristics of a contour in that parameter. For instance, a rise and fall or expansion and contraction in register, or a crescendo and decrescendo in dynamics, may be

[40] For some examples of tension-and-release phrase types, see Examples 3-6 (Stockhausen, phrase 1) and 4-11 (Carter, phrase A-5), and text accompanying these.
[41] For examples of departure-and-return phrase types, see Examples 2-3 (Babbitt, phrase 1, register) and 3-12 (Stockhausen, phrase 3, timbre and textural types), and text accompanying these.

perceived as a retrograde-symmetric phrase type.[42] The perception of a forward-and-then-backward process within a given parameter provides the means of coherence.[43] Symmetry is distinguished from departure and return by the presence of a contrasting middle section in the latter.

Directed parametric change refers to an overall unidirectional series of parametric changes, that is, a process of either increasing or decreasing values in one or more parameters. There may be small opposing motions, but the general perception will be that of a single direction of change, for example, becoming louder or softer, descending in register, or decelerating in temporal density. This phrase type, largely a product of the postwar modernists, typically ends rather abruptly without a reversal of parametric direction, thus distinguishing it from the preceding types. Coherence is supplied by the relatively constant motion in the same direction.[44]

Similarity, in contrast to the four methods of coherence just described, is not a process but rather a condition of stasis in which parametric values remain largely unchanging during the course of the phrase. Individual segments are usually discernible within the phrase but the differences among segments are fairly small. Segments cohere as a unit on the basis of their overall parametric similarities.[45] This type of phrase closely resembles Stockhausen's idea of "moment form," a concept that will be discussed in Chapter 3.

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[42] In principle, a symmetric phrase could consist of decreasing and then increasing values in a parameter, although I have not seen this type of formation.
[43] For examples of symmetry as a phrase type, see Examples 2-25 and 2-28 (Babbitt phrases 4 and 5) and 4-4 (Carter, codetta to Introduction), and text accompanying these.
[44] For examples of directed parametric change, see Examples 2-14 to 2-17 (Babbitt, phrase 2), 3-17 (Stockhausen, phrases 7 and 8), and 4-16 (Carter, phrase C-1), and text accompanying these.
[45] For examples of similarity, see Examples 3-21 (Stockhausen, phrase 9) and 4-10 (Carter, phrase A-1), and text accompanying these.

These five types of coherence in a post-tonal phrase may be expressed in a great variety of ways. All occur at least once in each of the three works considered in this study, and most are distributed fairly equally among the works. Thus there is reason to believe that they may have a more general application. Coherence is the lifeblood of the phrase, the source of its identity, and the basis for our perceptual ability to distinguish one from another and, in many cases, to relate one to another. This crucial element, however, is itself dependent on the presence of some level of closure or articulation, some act of completion that encloses and segregates the phrase.

Two basic means of completing a phrase are identified. *Closure* is defined as the completion of a process. By this definition, closure can occur only in phrases based on one of the processes listed above. However, the process of directed parametric change is not subject to closure for reasons discussed below. Thus, closure may occur only in phrases based on tension and release, departure and return, and symmetry. Each of these processes inherently contains a logical point of completion—the release of tension, the return of the initial state, and the end of the retrograde statement, respectively. A feeling of closure is brought about by the completion of these processes; there is a sense that nothing more needs to be added. In the case of directed parametric change, on the other hand, there is no inherent point of completion. In principle, the process could continue indefinitely, and hence closure ordinarily cannot take place.[46] Phrases based on similarity also cannot experience closure since similarity is not a process. These two phrase types, however, can be completed by articulation.

[46] An exception will be found in Chapter 2, where the Babbitt phrases 2 and 3, built on directed parametric change, are closed by liquidation of the motive.

Articulation is the completion of the structure, which occurs when a salient event marks the end of the phrase. Articulation may be *internal* when the salient event arises out of the material of the phrase, or *external* when the event consists of the clear beginning of a new phrase. In both cases, the structure is closed in the sense that nothing more *can be* added. Articulation occurs most often in connection with phrases based on directed parametric change or on similarity (that is, phrases that cannot experience closure), but can also occur in the other phrase types as a kind of interruption or cutting off of the closural process.

Closure and articulation may be understood as points (or regions) along a continuum of conclusiveness, in which the former represents a greater degree of conclusiveness than the latter. This may result from the fact that closure involves the return of some aspect of the initial material. Moreover, both closure and articulation can have degrees of strength or weakness which will affect the sense of completeness of a given phrase. A weaker closure does not usually diminish the perceptibility of a phrase, but it does leave the phrase open for further development and, importantly, for potential combination with one or more other phrases to form a larger structure. Weak articulation, on the other hand, because it is already a less conclusive event, can so obscure the phrasal boundary as to jeopardize any sense of completeness and put into question whether a phrase has actually been formed.[47]

These principles of phrasal coherence and completeness developed gradually in the course of analyzing the following works by Babbitt, Stockhausen, and Carter. My analytical approach begins with intensive listening, attending to parametric phenomena and making note of salient events, followed by score consultation to identify the details

[47] Closure and articulation are discussed in more detail in Chapter 3, part IIIC, and in Chapter 4, part II.

of those events.[48] This process is repeated several times, as more and more details emerge, eventually including larger shapes, patterns, and relations. This may be understood as the synthetic stage of the process, in which knowledge of the piece is acquired bit by bit, moving from the small to the large. The final stage involves actual analysis, in which the whole is taken apart to examine its parts and their interrelations more closely, to test preliminary thoughts and intuitions, to seek explanations for the resulting data, and eventually to formulate conclusions. It is during this latter stage that an understanding of the formal organization gradually takes shape. It should be noted that my analyses are in no way meant to be prescriptive or normative. While I have tried to include possible alternative hearings, I acknowledge that other listeners may hear it differently.

Most of our analytical attention in the challenging repertoire of postwar music has been focused on pitch relationships, especially those arising from systematic precompositional materials. As a result, we have tended to overlook the audible features of the musical surface, especially the powerful organizing capability of parametric relations. Careful attention to these features will reveal the formal processes at work in the music, processes that can generate perceptible coherent structures ranging from small- to large-scale formal units. This music, which has often been thought to be formless, in fact has rich, multi-leveled ways of projecting intricate and engaging formal designs. Some of these will be demonstrated in the following analyses, which will also serve to refine and elaborate the principles of post-tonal phrase formation discussed in this chapter.

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[48] The recordings used in this study are listed in the Selected Discography.

Chapter 2

Contour and Register: Babbitt's *Composition for Four Instruments*

One of Milton Babbitt's earliest works, the *Composition for Four Instruments* (1948) for flute, clarinet, violin, and cello is part of a group of pieces from the late 1940s in which the composer introduced several fundamental twelve-tone techniques. His *Three Compositions for Piano* (1947), the first of the group, presented the use of a four-element duration series, with dynamics and mode of attack organized so as to correlate with the pitch and duration series, respectively.[49] The *Composition for Four Instruments* continued the use of the duration series, but its most significant contributions to Babbitt's overall practice were the four-part trichordal array and the derived row, which together would form the foundation for all of his works in the 1950s and many others thereafter. Dyanamics, mode of attack, and register are used in systematic though varying ways in this piece to reinforce the pitch and duration series. The *Composition for Twelve Instruments* (1948; rev. 1954) introduced the twelve-part trichordal array and a twelve-element duration series based on pitch order numbers, while the *Composition for Viola and Piano* (1950) returned to four-part trichordal arrays but expanded this practice to include, among other things, the structural use of overlapping as well as discrete trichords.[50] The *Composition for Four Instruments* thus played a significant role in the historical development of one of the most important American composers of the twentieth century.

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[49] This piece is the first to serialize non-pitch parameters, having preceded Messiaen's *Mode de valeurs et d'intensités* (1949) by two years.

[50] For elaboration of these developments, see Mead 1994a, 54-89. The twelve-tone structure of *Composition for Four Instruments* has been widely discussed. See, e.g., Babbitt 1976, 1987; Swift 1976; Borders 1979; Dubiel 1990, 1992; Perle 1991; Mead 1994a; and Lewin 1995.

The piece is divided into fifteen sections articulated by complementary pairs of instrumental subsets, forming a list of all the possible subsets of the four instruments. Each pair of sections presents either a solo followed by the remaining trio or a duo followed by the remaining duo, with each possible subset appearing once; the piece concludes with the full ensemble. This arrangement produces the large-scale form of the work, though Dubiel (1992) has suggested some interesting possibilities for grouping various numbers of sections into larger parts based on the particularities of instrumental succession.

One aspect of the twelve-tone structure that influences the perception of form in the clarinet solo is the trichordal content of the array lynes.[51] As Mead (1994a) discusses, the array for the clarinet solo is derived from the (014) trichord with the interval pattern <4, 3> or its retrograde, and every lyne of the array contains some ordering of the same four trichordal pitch-class sets: B-Eb-C, Db-Bb-D, G#-E-G, and F#-A-F (or their retrogrades, in the second half of the array).[52] These pc sets are distributed registrally, one in each of four registers. Most of the time, the statement of a given trichord is interspersed with one or more notes from other trichords in other registers, making it difficult for the listener to perceive these structures individually. Each trichord, however, occurs one time during the clarinet section with its tones given consecutively, usually in a musical context that draws attention to it. The piece opens with a consecutive statement of B-Eb-C, which by its subsequent treatment becomes a motive that informs the rest of

[51] The array of the clarinet solo is discussed in Dubiel 1992 and Mead 1994a.
[52] Some of the named pitch classes occasionally appear as their enharmonic equivalents, e.g., Db may occur as C#. Four types of derived rows are used as array lynes throughout the work, two based on (013) and two on (014), each with a different interval pattern. Each type of row associated with a given set class comprises the same four trichordal pitch-class sets, concatenated in different ways to form distinct rows.

the section in various ways. Consecutive statements of the other three "signature" trichords occur at important formal junctures, as I will discuss in the formal analysis.

Apart from this, however, the twelve-tone structure has little impact on the creation of form in the opening clarinet solo. The array does determine the end of the section, and the retrograde that occurs at its midpoint is locally reflected in the formal scheme. Formal units and serial structures sometimes interact in interesting ways, and I will discuss these as they arise during the analysis. In general, though, the formal organization and the serial organization co-exist, independently of each other. For example, phrases do not coincide with aggregates. Rather, attention to the patterns and processes found on the musical surface will allow us to become aware of the fascinating formal detail of this music.

This chapter will examine the small-scale internal structure of the clarinet solo section, presenting a detailed formal analysis. I will suggest that the section comprises six phrases, plus two brief fragments at the end. Part I will focus on the first three phrases, which primarily rely on contour as a formative agent, while Part II discusses the last three phrases and the effects of register. Part III will turn to some unusual aspects of the large-scale form. The phrases are typically composed of three or four segments, and three of the phrases are divided into two subphrases. As discussed in Chapter 1, phrases are formed by the presence of three essential factors: initiation, coherence, and completeness. The element of completeness may be satisfied either by closure (completion of a process) or by articulation (completion of the structure), and in Babbitt's clarinet solo we will find that closure is present in all six phrases. Coherence is usually supplied by processes such as motivic development, registral expansion, or retrograde

symmetry. The articulation of segments is generally based on some combination of contour, register, and dynamics, but is also heavily influenced by associative relationships or functional considerations in the larger context, that is, by the role of particular groups of tones in the cohesive processes that generate the phrase. A good deal of the discussion will be devoted to segmentation. The score for the complete clarinet solo is provided in **Example 2-1**.

I. Contour and Motivic Development

The first three phrases are characterized by the presentation, development, and liquidation of a motive. The motive, a three-note figure based on the underlying trichordal array, is strongly delineated by its pitch and rhythmic contours. The three phrases and their internal segments are highly influenced by the evolution and fragmentation of the motive.

A. The First Phrase

The first thirteen measures of the opening clarinet solo, which incorporate the first three phrases, are set forth in **Example 2-2**. The first phrase is isolated in **Example 2-3**, with brackets indicating three segments. Setting aside the low E3 for a moment, we can see in **Example 2-3** that each of the three segments comprises three notes, and each shares the contour <+, –> or <up, down>, as I will call it. Segment 1a, which sets the pattern, is formed by its continuity of register and dynamics, and it is differentiated from what follows by the pronounced changes of register and dynamics as well as the short rest. As I will argue below in more detail, once we have heard segment 1a, the similarity of contour of segments 1b and 1c will relate them back to 1a as varied repetitions of a motive, thus defining them as individual segments and uniting them as parts of a larger

unit. The low E, of course, affects both the contour and the cardinality of segment 1b, but does not change the perception of it as a development of the opening motive.

Segment 1a opens the piece with one of the signature trichordal sets of the array, B-Eb-C. As brief as it is, this figure displays strong motivic characteristics. **Example 2-4** shows its pitch contour <+4, –3> or <up, down>, and its rhythmic profile <021> or <short, long, short>.[53] In this and the following examples, I use "pitch interval networks" or PINs, in which the nodes generally represent the first, highest, and lowest pitches in a segment or other formal unit, with connecting lines labeled with the ordered pitch interval. The concluding C4 here is not the lowest pitch of this segment, but it is the lowest pitch following the first one. Thus the nodes represent the first pitch, and then the highest and lowest pitches within the remainder of the segment (or longer unit). This gives us a sense of the overall shape and dimensions of the segment, its registral span, and the trajectory of motion followed by the music.[54]

While the specific intervallic content of segment 1a, <4, 3>, will continue to be active at the middleground level in the registrally distributed trichords, in the foreground these small intervals are quickly overwhelmed by a variety of large leaps. But the essential up-then-down outline of the contour will serve as a principal force for motivic coherence in these opening measures. Segment 1b displays the <up, down> contour (through the Ab), now emphasized by the sudden change of dynamics (*mp* to *f*) and especially the "hairpin" crescendo and decrescendo. See **Example 2-5**. Although the

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[53] The <up, down> contour could also be represented as the CC or cseg of <021>, and as the CAS <+ –>. And the rhythmic profile of segment 1a could be described as a dseg of <0 2 1>. See Friedmann 1985; Marvin and Laprade 1987; Marvin 1991, 1995. In general, I will refer to both contour and rhythm with descriptive terms ordered within angle brackets, such as <up, down> and <short, long, short>, as these are at once more direct and more generalized representations of a listener's perceptions.

[54] The PINs are adapted from Morris's contour reductions (1993, 212ff), except that the last note of the formal unit is omitted.

precise intervallic size of segment 1b, <+5, –22>, differs substantially from that of 1a, the retention of factors such as the three-note grouping and the overall shape suggests that 1b represents a varied repetition of 1a. It is this perception of similarity in cardinality and especially contour that allows us to hear 1a and 1b as distinct, though related, units.

The rhythmic profile, however, of 1b eventually becomes substantially altered from that of 1a. At first, the Db5 and Gb5 may be heard as a partially augmented version of the <short, long, short> rhythm. As the Ab3 is drawn out, however, we begin to perceive that the rhythmic contour has evolved to something like <short, long, very long>. And the addition of the E3, another long tone, further obscures the relationship between 1a and 1b.

The low E introduces a degree of formal ambiguity—it could be interpreted either as the end of the preceding segment 1b or as the beginning of the following segment 1c (or neither). In **Example 2-3**, I have shown this note as an extension of 1b, by means of a dashed bracket. This analysis posits the low E as connected to 1b on the basis of closeness in register and, especially, the continuing downward direction. The smaller interval between Ab and E (four semitones) and the continuing motion in the same direction help to group them as parts of the same unit, whereas the following change of direction as well as the large interval (eighteen semitones) create a disjunction between E and Bb. These factors encourage hearing the Ab as a temporary "stopping point" along the way from the high Gb to the low E. **Example 2-6** illustrates this notion, and suggests that the full descent occurs from Gb to E, with the twenty-six-semitone interval subdivided into two unequal parts of twenty-two and four semitones. The positioning of the smaller of these two intervals on the bottom suggests hearing the move

from Ab to E as simply a further "step" down in the long descent of segment 1b. In this view, then, the initial three-note cardinality of segment 1a has been extended to four notes, and its rhythmic profile has become lopsided, with an excess of long notes. The relatively extreme duration of the Ab has so stretched the confines of the original compact, tightly knit, figure that the appending of one more note may be accepted without affecting its character as a variation—at least where, as here, the overall shape of the original is maintained and the additional note merely extends the final leg of the figure. (Rhythmic factors are discussed in more detail below.) The durations of the Ab and the E (sixteen and twelve sixteenths, respectively), which stand out prominently in the admittedly brief context of short notes to this point, also help to associate them as parts of a single long gesture.[55]

Additionally, in segment 1b there is a registral and intervallic expansion of segment 1a. Emphasized by the sudden change in dynamics, this expansion produces a wedge effect as the music reaches upward to the high Gb and downward to the low E. See **Example 2-7**. The wedging motion helps to unite segments 1a and 1b as parts of a larger gesture, which I call segment 1a-b. At the same time, the low E completes two symmetric formations centered on the first note of the piece, B3. As can be seen in **Example 2-7**, the low E, a perfect fifth or seven semitones below the starting B3, complements the highest pitch of the piece so far, Gb5, a compound perfect fifth or twelve-plus-seven semitones above. And the ascending major third at the beginning, B3-Eb4, is answered by the descending major third, Ab3-E3. These symmetries reinforce the

[55] These and other "long" notes throughout the piece result from augmentation of the duration series, <1 4 3 2>, used by Babbitt in this work. For discussions of the duration series, see Swift 1976; Mead 1994a. Although rhythm, especially the contrast between long and short durations, plays a major role in the formation of segments and phrases, the duration series itself, like the pitch series, is unrelated to the formal organization.

interpretation of segments 1a and 1b as a single gesture, 1a-b. A look back at **Example 2-3** will also reveal a symmetrical formation of dynamics: <*mp f ff f mp*>. At the same time, the perception of 1b as not just a varied repetition but also an expansion of 1a contributes to the sense of a boundary between them.

The return to *mezzo piano* with the low E suggests that some level of closure may be approaching. Segment 1a had presented a clear and unambiguous initial idea, which was rapidly and substantially developed in the continuation of segment 1b. The symmetries and the similarity of contour help to relate 1a and b, but strong contrasts have also been introduced. Segment 1c brings several of these changed parameters to a full or partial return of their original states. In addition to retaining the familiar <up, down> contour, this third segment reestablishes both the steadily soft dynamics and the three-note cardinality of the initial segment. Rhythmically and registrally, however, segment 1c still seems a long way from the opening. I will discuss each of these parameters in turn.

The essential characteristic of the opening rhythmic profile is the balanced alternation of its relative durations: <short, long, short>. It is this relation that makes the durational contour of segment 1a so distinctive and memorable. The change to <short, long, long, long> in segment 1b presents a substantial contrast, not only in cardinality but, more importantly, in the loss of balance. Segment 1c responds to this disruption by incorporating the prevailing long durations, and adapting them to the original rhythmic profile. **Example 2-8** illustrates this evolution. **Example 2-8a** sets out the profile of the first segment, and labels the three elements as *x*, *y*, and *z*. The changes of the second segment are shown in **Example 2-8b**, and **Example 2-8c** shows the return in segment 1c

to a balanced alternation: <long, short, long>. The new form is the inversion of the original—its first and last notes are now the long ones, while the middle note is short.[56] The specific durations of the opening 1a (measured in sixteenth notes) can be represented as <1, 4, 2>.[57] The first and last durations are quite close to each other in length and are approximately one-quarter to one-half of the central duration. In comparing this arrangement to that of segment 1c, <8, 3, 11>, we find that the first and last durations are fairly close to each other, and now the central duration is approximately one-quarter to one-half of the outer ones. Thus, although they are not identical, the rhythmic profiles of 1a and 1c both display a sense of proportional balance.

Registrally, the large leap in segment 1c from A5 down to G3 seems only to continue, rather than to resolve, the registral expansion of segment 1b. Yet, two points may be noted. The Bb4 and G3 of segment 1c can be heard as a partial return to the initial register. **Example 2-9** shows how they are respectively lower and higher than the previous registral boundaries, thus moving closer to the more central register of the opening. And the high A5, which actually exceeds the previous upper boundary, nevertheless can be heard as an integration of the intervallic disjunction of 1b. See **Example 2-10**. The wide descending leap from A5 to G3, a distance of twenty-six semitones, recalls the (subdivided) descent in 1b from Gb5 to E3, transposed a minor third higher. In 1b, this interval represented a significant level of contrast, disrupting the apparent unity of 1a. When, however, the twenty-six-semitone leap occurs again in 1c, together with a return of the opening dynamics and cardinality, and a partial return of rhythm and register, the disruptive effect is to some extent normalized—that is, embraced

[56] The rhythmic profiles of segments 1a and 1c could be described as dsegs of <021> and <102> respectively; the latter is the retrograde inversion of the former.
[57] Durations in this analysis include rests within a segment or other formal unit, but not between units.

as part of the new "norm"—and the element of intervallic disjunction (like the rhythmic disjunction) is brought into a kind of balance with the other musical elements of the prevailing context (Hasty 1984, 176). Thus, closure of the phrase is effected by means of the return of the initial cardinality, dynamics, and rhythm, the integration of the registral contrast, and the overarching continuity of the <up, down> contour.

This first phrase, then, consists of three individual segments. These form an overall process of registral expansion and partial contraction, which supplies both coherence and partial closure to the phrase. In addition, the phrase is characterized by a process of motivic development. The first segment, 1a, presents itself as a highly concentrated yet sharply defined musical unit, very much in the tradition of a "head motive." Segments 1b and 1c are delineated by their immediate varied repetition of the opening, and this factor also works as an element of connection among the three segments. Because segment 1c is defined by its relative replication of the opening motive, succeeding events must be understood either as an extension of 1c or as a new segment. Several factors strongly suggest a boundary at this point, including the change of direction, the brief rest after the low G3, and the wide interval up to the following D5. In addition, the function of segment 1c as a closing unit stems from relations developed during the earlier segments. A disruption presented in 1b, the registral and rhythmic expansion, is "resolved" in 1c, at least to some degree. The process of registral contraction in 1c does not continue with the following D5 and F5, both of which reach above the Bb4 established in 1c. Rather, as I will discuss below in connection with the second phrase, the D and F initiate a new structure. These considerations suggest that the boundary after 1c marks not just the end of the segment but also the end of the phrase.

A different sort of process is also at work in the first phrase, illustrated in **Example 2-11**. A series of pitch interval networks is used to show a particular type of relationship among the three segments. **Example 2-11a** shows the "triangular" shape of the initial segment as measured by directed pitch intervals: up 4 semitones and down 3, with a total motion of +1.

A look at the overall pitch relations of the phrase shows how the three segments may be perceived as a single, unitary process. In **Example 2-11b**, segments 1a and 1b are combined into a single PIN on the left, and segment 1c (beginning with Bb4) is shown on the right. Thus, the segment 1a-b begins with B3 and moves up nineteen semitones to Gb5 followed by a descent of twenty-six semitones to E3. Segment 1c, using completely different pitches, also descends twenty-six semitones, now from A5 to G3. This intervallic relationship forms a common bond between 1a-b and 1c that helps to bind them together as a larger whole. The A-to-G interval of segment 1c is shifted upward a minor third from the Gb-to-E interval of 1a-b, as shown by the dotted lines connecting the highest and lowest pitches of each pair (**Ex. 2-11b**). In addition, the Bb4 starting point of 1c is eleven semitones above the starting B3 of 1a-b. **Example 2-11c** eliminates that Bb4 and posits the first note of the phrase, B3, as the starting point for both networks, which now are nested one within the other. This example tries to show visually an important formal aspect of this phrase. There is a sense that the first formal juncture occurs in mm. 2-3, achieved by means of the extreme high and low points Gb5 and E3, and supported by the dynamics and the longer durations. The continuation brings us to a second formal juncture, similarly achieved, but one that, at least in retrospect, is understood as having originated not with the Bb4 but with the very beginning of the

phrase. This understanding derives from the registral and rhythmic expansion and integration discussed above. The phrase describes essentially a single, unified gesture, punctuated with a "medial caesura" of sorts and brought to a conclusion with a rhyming closural caesura. A pitch interval network for the entire phrase is diagrammed in **Example 2-11d**, and reveals an additional formal feature. The lowest pitch of the phrase, E3, occurs in segment 1a-b while the highest pitch, A5, is brought into play with segment 1c, further grouping these segments as a unit.

In the first phrase, we have seen formal units generated by a number of parametric factors. Two of the most important of these are contour, specifically alternating direction of motion, and rhythm, specifically alternating long and short durations. These are the parameters that audibly define the opening motive and establish an initial set of norms for the piece. In turn, the motive helps to define the following segments of the phrase by means of repetition. Registral expansion and partial contraction exert a strong force in shaping the phrase, as do other aspects of register such as pitch span and boundary pitches. The two principal processes that occur during the phrase—motivic development and registral expansion—point up an additional and critical aspect of the formal organization, one that involves memory and retrospective hearing. These processes unfold against the background of the opening segment, and are not likely to be apprehended unless a recollection of the opening is retained in the "perceived present."[58] Such recollection is enhanced for the listener by the sharp definition of segment 1a, as well as its separation from what follows by a rest. The notion of process will continue to play a significant role in the formation of the remaining phrases of the clarinet solo.

[58] The "perceived present," discussed in Hasty 1984, 169-71, is a psychological concept that posits an enduring present in which successive events or stimuli may be stored for interpretation.

B. The Second Phrase

After hearing the first phrase, with its largely trichordal organization, we may be disposed to hear trichords in the continuation. As a listening strategy this works fairly well for both the second and the third phrases, but it is complicated by overlapping and sometimes conflicting segmentation bases. Both phrases are somewhat similarly organized, particularly in their subdivision into two parts, and this two-part structure may be the easiest way to approach their smaller scale formal units. **Example 2-12** shows the second phrase, with its subphrases labeled 2x and 2y. The boundary between the two subphrases has to do with distinctly different methods of organization in 2x and 2y; hence I will leave discussion of that point until after the two subdivisions have been separately examined. What connects them as parts of a single phrase (also discussed below) is the registral expansion that takes place from 2x to 2y, together with a strong closure at the end of 2y that marks the end of that process.

Subphrase 2x may be heard in a number of ways, depending on how we interpret the combination of rhythmic and intervallic relations, pitch relations, and dynamics. Some of these possibilities are illustrated in **Example 2-13**.[59] In **Example 2-13a**, the ascending and descending minor thirds D-F and Eb-C (segments 2a and 2c) surround a central unit that states a form of the original motive. Segment 2b reproduces the <up, down> contour of the motive, and to a lesser extent the rhythmic profile, <short, long, short>. (The Bb is somewhat long, and only slightly shorter than the central half note.) This middle segment also features an interesting intervallic relationship with the initial motive. Segment 2b is a retrograde augmentation of segment 1a by a factor of three, plus

[59] Each part of **Example 2-13** reinterprets the segmentation of subphrase 2x, but uses the same labeling system of 2a, 2b, and so on. Thus, the label 2a, for instance, represents different segments in different interpretations.

one additional semitone in each interval. See **Example 2-13a'**. The intervals of segment 1a, 4 and 3, progress from larger to smaller; this is reversed in 2b, smaller to larger. Thus, the first interval of 2b, ten semitones, is three times the second interval of 1a, plus one more semitone (3 x 3 = 9 + 1 = 10). And the second interval of 2b, thirteen semitones, is three times the first interval of segment 1a, plus one more semitone (3 x 4 = 12 + 1 = 13). In other words, segment 2b is just over three times larger than 1a. This relationship may be more easily heard if we attend to the internal proportions of the two segments. See **Example 2-13a''**. In each figure, the larger interval (labeled X) is about one-and-one-third the distance in semitones of the smaller interval (Y). The identical melodic contours of 1a and 2b, combined with their very similar internal proportions, project segment 2b as a variation of the original motive, decorated by the symmetric minor thirds. The main factor that contradicts this hearing is the dynamics. Each of the three notes has a different dynamic level, with two loud notes surrounding a soft one. The following interpretations attempt to address this issue.

Example 2-13b highlights the decorative minor thirds. It is closely related to the structure of **Example 2-13a**, but now the first and last notes of segment 2b are heard as forming an additional minor-third dyad, completing the "circle" of such intervals surrounding the centrally isolated B4. The C# and Bb are associated on the basis of register and the prevalence of that interval in the passage, but perhaps even more strongly by the similarity of dynamics—they are the only two loud notes in a context otherwise characterized by soft, or getting-softer, dynamics. The middle segment is labeled 2b with the understanding that it is partitioned by the minor-third dyad below enclosing the B4 singleton above. **Example 2-13c** represents a further evolution of **Example 2-13b**. Here

the centrally isolated B4 is surrounded by two three-note figures that have a number of ties between them. Rhythmically, segments 2a and 2c both exhibit a pattern in which durations gradually become shorter, producing a parallel relationship between them.[60] Dynamically, there is a de facto crescendo in 2a and a decrescendo in 2c. Of course, 2c traverses a much wider scale, *ff* to *ppp*, and in a shorter time, than does 2a (*mp* to *mf*) but the motion from soft to loud in the one and louder to softer in the other forms a perceptible retrograde relation between the two segments. And their pitch-interval patterns form a nearly exact retrograde: <+3, –16> in 2a and <+17, –3> in 2c. These associations help to bind the elements of each trichord, D-F-C# and Bb-Eb-C, together as members of a unit, while the units themselves are distinguished (to some extent) from the central B4 by the marked change of dynamics (*mf* to *p* and then *p* to *ff*).

A very different hearing of this little phraselet is illustrated in **Example 2-13d**, one that takes a more nuanced view of the dynamics. **Example 2-13d-i** shows the segmentation, and **2-13d-ii** provides a reduction. The D, F, and B are grouped together—despite the intervening C#—on the basis of all being soft. The C#, perhaps because of its short duration relative to the other three, sounds as a (louder) grace note embellishing the following B. The notion of C#-as-grace-note points up another basis of association among D, F, and B: they are all relatively long in duration. Similarly, the lowness of the C# in contrast to the D, F, and B further groups those three on the basis of register. This segment is labeled 2a with the understanding (as with segment 2b in **Ex. 2-13b**) that it is partitioned by the trichord above enclosing the singleton below. The following Bb, Eb, and C are strongly grouped by the dynamics—this time, though, by the rapid progression from very loud to very soft. The sudden *fortissimo* separates this segment from the

[60] In this view, the C5 of segment 2c is interpreted on the basis of its sounding duration of one eighth note.

previous one, and the continuous decrescendo forms its content. (I will discuss below the following D4.) In addition, the rhythmic pattern of gradually shortening durations (noted above in connection with **Ex. 2-13c**) supports the grouping of Bb, Eb, and C.

The presence of at least four possible interpretations of subphrase 2x demonstrates the complexity of its formal structure. Differing perceptions result from attention to differing combinations of parametric factors. Yet, the fundamental formal shapes in each case are the trichord and the interval-3 dyad, both of which may be traced back to the original motive. The trichords themselves have a greater or lesser degree of resemblance to segment 1a, but all exhibit the <up, down> contour as well as some arrangement of the minor third. At the surface of the music, the motive is clearly weakening during this passage, but it continues to exert an influence on the formal structure.

In the second subphrase, 2y, the figure that most closely relates to the motive occurs in segment 2d, where we find the <up, down> contour and the inverted rhythmic profile <long, short, long>. See **Example 2-14.**[61] The equal durations of the D and F# of segment 2d, five sixteenths each, surrounding the very short G#, produce a strong sense of segmental balance and articulation. In segment 2e, the very short A now occurs just before a three-eighth-note figure, E-F-G, that marks an unprecedented moment in the piece. The figure could well be heard as a variant of the original motive, but with a very important difference: The rhythmic profile of alternating relative durations has been replaced with three equal durations. Up to now, the context has been characterized either

[61] **Example 2-14** shows the complete phrase, so that subphrase 2y may be seen in context. Of the four possible interpretations of the first subphrase 2x, I have selected the fourth one from **Ex. 2-13d** for use in **Ex. 2-14**. As a result, there is no segment 2c. Thus, the second phrase as shown in **Ex. 2-14** comprises segments 2a, 2b, 2d, and 2e.

by the <short, long, short> motive and its inversion, or by the gradually shortening durations of the previous subphrase. This "flattening out" of the original rhythmic contour in segment 2e thus marks a substantial change from the previously heard music. It functions as a liquidation of the motive by eliminating one of its most characteristic features, and in this way has the effect of closure. The preceding sixteenth note A is heard as a grace note decorating the three-note figure. The two segments, 2d and 2e, while differing in their rhythmic profiles, are markedly related by their prominent twenty-six-semitone leaps, G#5 down to F#3 and then F3 up to G5, recalling the same-sized leaps of the first phrase.

Despite the differing rhythmic shapes of 2d and 2e, the D4 of segment 2d initiates a rhythmic phenomenon that unites the two of them and audibly distinguishes subphrase 2y from the preceding subphrase 2x. See **Example 2-15.** The particular concatenation of durational values suggests a meter of 3/8. This occurs because of the rhythmic sequence: 5 + 1 sixteenths (D and G#) followed by another unit of 5 + 1 sixteenths (F# and A). The quickness of the G# and the A make them sound like "pickups" to the next "measure" and hence project the D and F# as "downbeats." Segment 2d is thus defined by two "measures" (excluding the last "pickup") of 3/8 meter. The three eighth-note durations in the next 3/8 "measure" (segment 2e) confirm the implied meter and close the phrase.[62] This metrical projection has the effect of grouping the D4 with the following material and thus locating a boundary after the preceding C.

The articulation of this second phrase into two parts is achieved in part by the retrograde symmetry of the minor thirds in subphrase 2x, which brings an ending, if not

[62] I frequently hear this passage as being "in" 6/16 meter, with the last three eighth notes forming a hemiola.

closure, to that formal unit. Additionally, and perhaps more saliently, the apparent metric organization of subphrase 2y differentiates it from the symmetrical organization of 2x. What unites the two subphrases as parts of a single phrase is the registral expansion that takes place over the course of the phrase. **Example 2-16** shows the progression of increasingly wide leaps, and **Example 2-17** looks at the boundary pitches as the phrase proceeds to illustrate how the large leaps in 2y complete the rising top voice and especially the descending bass line. Thus the second phrase is formed by varying aspects of fundamental sonic attributes such as pitch, rhythm, dynamics, and contour, melded together as a unit by the process of registral expansion.

C. The Third Phrase

The structure of the third phrase has a number of similarities with that of the second phrase, though it is considerably less complex. See **Example 2-18**. As in the second phrase, this one is subdivided into two parts, begins with a minor third, B-G#, and ends with three (nearly) equal eighth-note durations, E-C#-G, embellished by the "grace note" Ab. Two of the pitches in this closing segment, E5 and G5, are identical to those in the closing of the second phrase, producing a strong bond of parallelism between the two phrases that is enhanced by the closely preceding G#5/Ab5 in both cases. **Example 2-18a** illustrates one way of hearing the first subphrase, 3x. The pair of thirds, B-G# and Bb-D, frame a central three-note figure that sweeps downward through all but the uppermost registral space of the clarinet solo. The thirds (segments 3a and 3c) are not of the same quality, but their equal durations link them aurally, and the shortness of those

durations distinguish them from the relatively longer durations of the central segment.[63] Their opposing directions lend an air of retrograde symmetry to the subphrase. The central segment 3b is marked by the fairly rare occurrence of two successive intervals in the same direction, here downward, and by the near-equality of those intervals, ten and eleven semitones. The rhythm of this segment—two nearly equal long durations surrounding a very short one—is reminiscent of segment 2d in the second phrase, and has the same effect of balance and articulation. It also has the same effect of recalling the alternating durations of the original motive, although now, the <up, down> melodic contour is entirely absent. **Example 2-18b** shows an alternate hearing of subphrase 3x, in which the long notes serve as segmental boundaries, and the slur from E to Bb connects those two segments to form the larger unit, 3b-c.

The <up, down> contour of the original motive does return in the latter part of the third phrase, just before the closing segment. In fact, the F#-A-F figure in segment 3d is one of the signature (014) trichords of the underlying array, and represents the first time since the opening that we have heard the elements of a (014) trichord stated consecutively within a single register.[64] This produces an audible sense of "return" that is marked for our attention by the suddenly loud dynamics, the suddenly high register, and the flurry of quick notes. The pitch contour of the figure, <+3, –4>, is the exact retrograde of the opening <+4, –3>, and the brief sounding duration of the F-natural gives the impression of a near retrograde of the opening rhythmic profile. See **Example 2-19.** In **Example 2-18a**, I have grouped the low C and G with the F#-A-F of segment 3d, forming a kind of

[63] Both of the recordings of this piece, 1960 with Stanley Drucker et al. and 1970 with the New England Conservatory, feature a large number of durational errors. One of the most unfortunate errors occurs in the Drucker recording, where the eighth note G# of m. 10 is lengthened almost to a dotted quarter.

[64] The beginning of the second phrase, D-F-C#, also forms a (014) trichord, though distributed over two registers.

double pickup to the (014) trichord, based on the short durations and the loud dynamics beginning with the G.[65] It is very possible, however, to hear the C-G as a separate segment, articulated by the large change of register. In either case, we may notice the twenty-six-semitone distance between the low G3 and the high A5. This leap is subdivided by the F#5, in much the same manner as the leap in the first phrase from Gb5 to E3 was subdivided by the Ab3. In both cases, the "stopping point" along the way falls within a few semitones of the goal note—four in the first phrase, three in the third phrase. This is the fifth occurrence of a twenty-six-semitone leap (it is also the last in the clarinet solo). The formal significance of these structures will be discussed below.

In a further similarity to the second phrase, this second part of the third phrase features another triple meter, which I have interpreted this time as 3/16. See **Example 2-20.** Beginning with the C4 of subphrase 3y, there are four "measures" of a regular 3/16 meter, encompassing segment 3d (the first measure might be heard as syncopated, with an accent on the longer G). The last three notes—with durations of an eighth, an eighth, and a dotted eighth—form a hemiola within the 3/16 metrical context, which contributes both to the definition of segment 3e and to its function as a closing unit. One is reminded of Bach's frequent practice of using hemiolas when approaching cadences.

Returning to subphrase 3x for a moment (see **Ex. 2-18**), there is little in either of the two readings to suggest closure. The framing nature of the thirds B-G# and Bb-D (**Ex. 2-18a**), which often does give a sense of conclusion (as in the second phrase), here is weakened by the non-equivalence of the two intervals, three and four semitones respectively. In the alternative reading of **Example 2-18b**, in which the initial segments comprise one or two short notes followed by a "strong beat" long note, the last two short

[65] In both recordings, the loud dynamics actually begin with the C.

notes are left seemingly incomplete, lacking a subsequent long note. The absence of closure marks 3x as a component of some larger formal unit, rather than a phrase in itself. It is brought to an end essentially by the beginning of the following subphrase 3y, which differentiates itself by the substantial increase of temporal density and dynamics in the latter. The factor that links 3x and 3y as parts of a single phrase is register. The opening up of the high register in 3y, beginning with F#5, fills in the registral space that was "missing" in 3x, thus in a sense completing an expansion in which the rapid descent to the lower extreme, E3 in the first subphrase, is complemented by the upward reach of the second subphrase. As with the second phrase, this third phrase is formed by interactions among pitch, rhythm, dynamics, and contour, and is united by a registral expansion. The return in subphrase 3y of the opening motive as another signature (014) trichord, F#-A-F, produces the strongest closure so far in the piece.

D. The First Three Phrases: Large-Scale Forms

The previous discussion has identified a number of parallelisms between the second and third phrases. **Example 2-21** reproduces mm. 1-13 for reference. Both phrases 2 and 3 are divided into two subphrases. The subphrases are distinguished by differing means of organization: symmetrical structures followed by a projection of triple meter in the second phrase; reduced tempo and dynamics followed by an increase in those parameters, plus a projection of triple meter, in the third phrase. Each phrase unfolds a registral expansion that begins in the first subphrase and is completed in the second, unifying the two as parts of a single phrase. Both phrases begin with a minor third. And both end with a segment of three equal eighth notes (dotted eighth at the end of the third phrase), which contrasts sharply with the prevailing rhythmic texture of

constantly changing note values, and which includes two identical pitches, E5 and G5, in each phrase. In addition, the second and third phrases are both engaged in the process of erosion of the motive presented in the first phrase. These factors encourage us to hear phrases 2 and 3 as a related pair, which I call a "parallel period."

The first phrase also participates in some of these processes, though it is not equivalent to the second and third phrases—the two-part structure of segments 1a-b and 1c is not so organized as to constitute subphrases; the registral expansion in phrase 1 is followed by a partial contraction that does not occur in phrases 2 and 3. Rather, the first phrase seems most concerned with introducing the motive. The varied repetitions of the opening three-note figure help to establish it as a motive, while at the same time preparing for the motivic erosion that will follow in the second and third phrases. While the motive gives shape in various ways to all three phrases, its larger function is to introduce the underlying trichordal structure. The initial (014) trichord B-Eb-C is presented plainly and clearly, and the low-register Ab-E-G is sufficiently isolated in pitch level and connected in its long durations as to be fairly easily apprehended.

These considerations suggest a large-scale shape in which the first phrase acts as an introduction, while the second and third phrases—as a unitary group—serve as continuation and development. This implies an open form, which might be expected to continue developing. As we will see below, the next two phrases form another "parallel period," and a final single phrase, with additional brief fragments, will close the section. Thus, we begin to see the outlines of an overall form for the clarinet solo:

	A	B	B'	A'
Phrases:	1	2, 3	4, 5	6

The letter pairs, A and A', B and B', do not indicate thematic or other content-based relationships. Rather, they are simply meant to suggest relationships based on phrase-grouping characteristics: <1 2 2 1>. Thus, A is related to A' prime because both comprise a single phrase. And B is related to B' because both comprise two parallel phrases. In this sense, two pairs of related phrases, B and B', are framed before and after by singletons, A and A', that function as initiation and conclusion. This structure reflects the retrograde symmetry of the underlying array, as well as the small-scale retrograde forms that we have encountered in the piece so far.

There is, however, an alternative possibility for hearing the form of the first three phrases, one that conflicts to some degree with the open-ended form described above. A ternary structure may be perceived, based in part on the opening signature (014) trichord, B-Eb-C, and the return in the third phrase of a transposed retrograde form, F#-A-F. A deeper level ternary form is illustrated in **Example 2-22**, which sets out a pair of pitch interval networks for each phrase.[66]

The figures on the left of **Example 2-22** show pitch interval networks for the two parts of each phrase. The smaller outer triangle represents the first part; the larger inner triangle shows the second part, conceptualized as beginning with the first note of the phrase. On the right side of the example is a composite PIN for each phrase. The first phrase, **Example 2-22a**, was discussed above with reference to **Example 2-11**. **Example 2-22b** shows on the left the PIN for the second phrase, which begins on D5, reaches the high and low points of F5 and Bb3 in the first subphrase, 2x, and then proceeds further to G#5 and F3 in subphrase 2y. The leap of twenty-six semitones from G#5 down to F#3

[66] Recall that the nodes of a PIN indicate the first, the highest, and the lowest notes in the phrase.

and the one from F3 up to G5 are shown in **Example 2-22b-left** with dotted lines and parenthetical pitches and intervals. On the right of **Example 2-22b** is a composite PIN for the second phrase. The third phrase is illustrated in **Example 2-22c**. On the left, the phrase begins with B3 and moves outward initially to E3 and D5 in subphrase 3x, continuing on to G3 and A5 in 3y. The G-to-A interval of twenty-six semitones is subdivided by the F#, just as in the first phrase the Gb-to-E interval was subdivided by the Ab.

In surveying the left column of **Example 2-22**, one notes not only the prevalence but also the locations of the twenty-six-semitone leaps. These occur at or near the end of each of the three phrases (twice at the end of phrase 2), and they also articulate the two parts of the first phrase. The frequency of this unordered pitch interval—five times in thirteen measures—has almost a motivic quality that helps to bind the elements of this passage into a unit. Despite the presence of nearly constant wide leaps, the salience of this interval and its placement at strategic locations allow it to function as a cadential gesture, effectively marking important formal junctures such as the ends of phrases and subphrases.

The ternary form of the three phrases may be seen by examining the right side of **Example 2-22**. Comparison of the composite PINs reveals the rather surprising fact that the pitch outlines for phrases 1 and 3 are identical. Both phrases begin on B3, and they share the same lowest and highest pitches, E3 and A5 respectively. Moreover, the boundary pitches of phrase 2, the "contrasting" middle, wedge inward and back outward by a semitone. The upper pitches of each phrase progress through the pattern A-G#-A,

and the lower pitches E-F-E. These relationships are a consequence of the registral structure and the overlay of phrases upon aggregates.

The clarinet solo contains eight aggregates, and these feature alternating pitch extremes. **Example 2-23** recopies the score, with aggregate boundaries indicated. Aggregates 1, 3, 6, and 8 are bounded by A5 above and E3 below, while 2, 4, 5, and 7 are bounded by G#5 and F3. This results from an overall pattern of alternating pitch levels in alternating aggregates, together with the retrograde that begins with the fifth aggregate. If we take the pitch class B, for example, and follow its registral locations, we find that in the first aggregate it occurs as B3 (m. 1), in the second aggregate as B4 (m. 7), in the third as B3 again (m. 9) and in the fourth as B4 (m. 14). This pattern is reversed in aggregates 5 through 8 because of the retrograde of the array, but the pitch class B always occurs in either the third or the fourth octave. A similar pattern informs the realization of the other eleven pitch classes. Thus, when A5 of the first aggregate (m. 4) is shifted down to A3 of the second aggregate (m. 8), G#5 becomes the highest pitch (also m. 8).

As mentioned at the beginning of this chapter, phrases do not coincide with aggregates. They do, however, incorporate portions of aggregates, and the registral structure of those aggregates inevitably defines the registral structure of the phrases. The relation between phrases and aggregates is illustrated in **Example 2-24**. Aggregates are separated by a space; boundary pitches in each aggregate are shown in bold. Here we can see that phrase 1 ends before the completion of aggregate 1 but includes the high A and low E. Phrases 2 and 3 do in fact end and begin respectively with the boundary between aggregates 2 and 3, but phrase 3 extends for four notes into aggregate 4, and incorporates both the high A of aggregate 3 and the high Ab of aggregate 4. This will have a

significant impact on phrase 4, whose upper pitch boundary will therefore be markedly lower than the norm established in the first three phrases. The wedging motion of the boundary pitches of the first three phrases thus results from the particular juxtaposition of phrases and aggregates, and the compositional decision to alternate pitch extremes in each aggregate.

The following schematic suggests the large-scale ternary form of this opening section:

	A	B	C
Phrases:	1, 2, 3	4, 5	6

In this view, the first three phrases are perceived as a unified group on the basis of the registral pitch relations described, as well as the motivic processes that characterize all of them, the ubiquitous twenty-six-semitone leap, and the registral expansion that occurs in each. The fourth and fifth phrases will be analyzed below as another type of parallel period, and the sixth as a singleton.

In the first three phrases, then, formal units are generated by a number of parametric processes. As in the first phrase, two of the most important of these are contour and rhythmic profile, critical to the formation and development of the motive. A third forming feature is the twenty-six-semitone leap, with its cadential-like function punctuating significant formal events. Register, in the sense of distinctions among different registers, plays little role in the formal techniques of the first three phrases. This is because it is almost immediately opened up to its extremes, E3 and A5, and all registers remain about equally occupied throughout the first three phrases. Registral expansion, however, exerts a strong force in shaping each of the phrases, as suggested by

the PINs. Finally, pitch relations contribute to longer-term structural designs, such as the wedging inward and outward of the pitch boundaries of each phrase, and the parallel endings of the second and third phrases.

II. Register and Retrograde Processes

In the remainder of the clarinet solo, the influence of the original motive becomes much more subtle. The next two phrases, 4 and 5, are governed by symmetry. We have observed a number of small symmetrical structures already, such as segment 1a-b and subphrase 2x. Now, however, symmetry is used to generate two large phrases. Both the fourth and the fifth phrases feature retrograde pitch and contour structures, and the fifth is characterized by inversion as well. Register is a crucial factor in projecting these structures, and is the primary formative agent in the sixth and final phrase.

A. The Fourth Phrase

As the fourth phrase begins, the ascending Bb3-D4 sounds as if it could be the start of a new statement of the motive. See **Example 2-25**. However, this incipient motive-form is interrupted; after a short rest the music moves upward to B4 instead of downward. The B completes an inverted form of the original rhythmic profile, <long, short, long>, but the slur connecting it to the following D#5 seems to contradict grouping the B with the preceding Bb and D. The following figure B-D#-F# does in fact conform to a motivic interpretation, with an <up, down> contour and a <long, short, long> rhythmic profile. And those three notes are well associated with each other, first by the slur and closeness of register between B and D#, and then by the continuity of the *mf* dynamics from D# to F#. The following C5 substantially changes both the dynamics and the register of the F#, forming a segmental boundary between those two notes and thus

segregating the first five notes of the phrase as a unit. Though the F# connects with the immediately preceding D# (and therefore the B) by way of dynamics, it may also be heard as associated with the initial Bb and D by means of register. In fact, the F# supplies the "missing" third element of the Bb-D figure: it is lower in register than the D, thus forming an <up, down> contour, and it is longer in duration than the D, creating a <long, short, long> rhythmic profile. In retrospect, we may interpret the initial Bb-D as an incomplete motive statement, or we may hear the F# as a delayed completion of that statement. In this way, the F# plays a dual role: it is the third and final note of both the local motivic figure B-D#-F# and the longer-term statement Bb-D-F#. On this basis, I have labeled the first five notes as segment 4a.

As we listen to this first segment of phrase 4, there is another phenomenon that will almost certainly catch our attention—the first four notes, Bb-D-B-D#, are continuously ascending. This represents the first time in the piece that three successive intervals, all in the *same direction*, have occurred. Up to now, the texture has been saturated with constant changes of direction, as reflected in the <up, down> contour of the original motive. Though there have been a few instances of two successive intervals in the same direction, this first occurrence of three upward leaps in a row stands out in sharp contrast to the previous material. The four tones are further linked by their partitioning into two equivalent dyads of rising major thirds, by the similar dynamics within each dyad—soft to loud, and by the similar duration patterns—long followed by short. This is a fairly strong segmentation, yet it conflicts with the motivically derived five-note segmentation described above. As often happens, however, a later event will help to clarify this figure. Thus in **Example 2-25** I have labeled this unit as segment 4a'.

In the remainder of the fourth phrase, there is no sign of the original motive. Rather, the music moves in a series of short gestures, mostly descending in direction: C-A-F in segment 4b, and Eb-B-C#-F# in 4d. Segment 4c may also be heard as a pair of descending gestures, D-F and C-Bb-A, separated by the large interval between F3 and C5, though the short durations of those two notes and the immediate return to the lower register suggest hearing the two gestures as a single unit. The three segments are articulated by their generally downward motion followed in each case by a change of direction that initiates the next segment; the very short segment 4b is further delineated by the staccato indication for its last note, F3 (m. 16; this is the only staccato marking in the clarinet solo section). The length of the F#3 at the end of segment 4d, together with the change of register with the following G5 (not shown in the example), suggests hearing a phrase boundary. The question that arises, though, is whether there is anything in the content of these measures that unifies them such as to support the hearing of a phrase. The musical factor that provides coherence for this phrase is retrograde symmetry.

The D4 at the approximate center of this passage (m. 16; see **Ex. 2-25**) has several roles. Durationally, it represents the exact halfway point in the clarinet solo: the dotted eighth begins the fiftieth quarter note in this 100-quarter-note section. It is also the point at which the array lynes, and thus the registrally distributed (014) trichords that form the basis for this section, begin to be stated in retrograde.[67] The D4 of m. 16 thus serves as the pivot point of a large-scale retrograde form for the section as a whole. The audibility of this phenomenon is difficult to assess, but it may well be assisted by a small-scale form that is also centered on that D.

[67] Mead 1994a discusses and illustrates this retrograde aspect of the array.

Example 2-26 recopies the score of this fourth phrase, with annotations below. The D4 of m. 16 forms the central point of several nearly symmetric pitch structures embedded within the phrase. The innermost of these, segments 4b and 4c, involves the C-A-F figure before the D and the F-C-A figure after. (See the first layer of annotations below the score.) The figure is not an exact retrograde. The C and A of m. 17 occur in the same order rather than the reverse, and the interpolated Bb is outside the structure. Yet the repetition of especially the F3 and the C5 immediately after the D is not difficult to hear, despite their short durations. The listener's attention is strongly directed to this retrograde structure by the striking presence of an F major triad, and even more so by its apparent "resolution" to the Bb. Awareness of the C-A-F retrograde figure signals to the listener the presence of two larger structures.

In the second layer underneath the score in **Example 2-26**, the trichord B-D#-C recurs shortly after the D4 at the same pitch levels but in retrograde form as C-Eb-B, and likewise the trichord F#-A-F returns as F-A-F#, shown in the third layer of the example. In the music, these two canon-like layers are basically equal in length (approximately ten quarter notes from the first B to the second, mm. 14 to 18, and from the first F# to the second, mm. 14 to 19), with staggered entrances at a distance of five eighth notes. Their wide separation in register and the relative lack of pitch activity in the intervening registers help to make them audible. All of the pitches of the shorter C-A-F figure participate in these two trichordal retrogrades, contributing to the integration of the three layers. The two trichords involved in this structure, B-D#-C and F#-A-F and their retrogrades, are two of the signature (014) trichords of the array. This passage is one of the clearest projections of the serial structure. At the same time, however, it is not the

array that allows the retrograde figures to participate in the formation of this phrase; rather, it is the registral distribution of pitches that audibly projects them as formal units.

These retrograde figures span all four segments of the phrase, but do not include the initial Bb and D of m. 13. That dyad, however, is part of a retrograde contour pattern that frames the passage, shown in **Example 2-26** immediately above the staff. As noted above, segment 4a', Bb-D-B-D#, comprises a succession of three continuously ascending intervals. This four-note ascending figure is answered at the end of the phrase with a four-note descending figure in segment 4d, Eb-B-C#-F#. The phenomenon of three leaps in the same direction once again captures the attention. The descent begins with the same two pitches that ended the ascent, which further associates 4a' and 4d, and segment 4d generally reverses the rhythmic pattern of 4a', producing an overall sense of <short, long, short, long>. The particular direction of segment 4d—descending—as well as the long duration of the final F# in m. 19 contribute to the sense of a boundary at this point. The phrase is framed at either end by a directional retrograde that elegantly reflects the internal pitch retrogrades.

The upward and downward contours of the outer segments reflect on a larger scale the <up, down> contour found in the opening motive. **Example 2-27** shows a pitch interval network for the fourth phrase. It is immediately apparent that this PIN differs from earlier ones. The skeletal outline of the phrase is shown with open nodes and solid lines. Starting on Bb3, the phrase moves to its highest point of D#5 and its lowest point, F3, spanning twenty-two semitones between the upper and lower boundaries. A look back at **Example 2-22** reveals that the first three phrases spanned twenty-seven or twenty-nine semitones. This fourth phrase is five to seven semitones smaller than the

previous phrases, and the "missing" space is in the upper register, a result of the phrase starting after the highest pitch (Ab5) of the corresponding aggregate (see **Ex. 2-24** above and discussion). The filled-in nodes and dotted lines in **Example 2-27** indicate other important pitch relationships in the phrase. The repetition of D#/Eb5 and of F#3 projects a static registral band within which most of the phrase's activity takes place. At the same time, the external arrows show how the phrase is opened and closed with sharply ascending and descending motions, respectively. The phrase is thus formed almost exclusively by associations of contour and register, with the process of retrograde symmetry binding the segments together as a unit.

B. The Fifth Phrase

The fifth phrase is set out in **Example 2-28**, with four segments indicated and several additional annotations. Overall, this phrase is formed by retrograde symmetry, as was the fourth. But the interrelationships among the parts of the fifth phrase are considerably more varied and complex. I will begin with an overview of the structure of the phrase, followed by a more detailed discussion of the internal relationships and perceptual features.

The phrase is essentially divided into two equal parts, with each part further divided into two sub-parts. Segments 5a and 5b combine on the basis of being all in the upper register, and segments 5c and 5d likewise occur all in the lower register. Thus the two large parts of the phrase are labeled 5a-b and 5c-d, and they are related in several ways. Both consist of nine notes, subdivided 3 + 6 in the first part and 6 + 3 in the second. They are members of set class 9-3, the complement of the original motive 3-3, and as unordered sets they are related at T_6. The opposition of upper and lower registers

is enhanced by the dynamics: despite note-to-note changes in both parts, segment 5a-b is generally louder while segment 5c-d is generally softer. The registral structure of the phrase—first upper, then lower—recalls once again the <up, down> contour of the original motive.

The outer segments 5a and 5d are two of the signature trichords, G-E-G# and D-Bb-Db. They are related by retrograde at R_6. Their contours are the retrograde-inversion of each other, with ordered pitch intervals <–3, +4> and <–4, +3> respectively.

The inner segments 5b and 5c consist of six notes each, subdivided 5 + 1 by a short rest (see **Ex. 2-28**). They are members of the hexatonic collection, set class 6-20, also known as hexachord E or the third-order all-combinatorial hexachord. As such, the unordered sets of segments 5b and 5c can be related in a variety of ways, including T_2, T_6, T_{10}, T_1I, T_5I, and T_9I. Of these, the most relevant are T_6, which duplicates the relationship between 5a and 5d as well as between 5a-b and 5c-d, and T_1I. This inversional relation, which may also be notated as $I^{F\#}/_{G}$, occurs in pitch space about the axis F#4/G4. On the other hand, as ordered sets of pitch classes, segments 5b and 5c have no exact relationship. They are, however, related at what I will describe as "near-R_6," a relation close enough to allow the listener to comprehend the two segments and indeed the entire phrase as built of retrograde symmetry.

Before discussing the fifth phrase in more detail, it will be helpful to examine an important aspect of the registral structure. In the opening solo section, the clarinet's registral space is bounded by E3 at the lower edge and A5 at the upper, spanning 29 semitones. The signature (014) trichords that form the structural background are defined by four registral bands within this space. See **Example 2-29**. Each band or layer spans

five semitones. Every (014) trichord of the array falls within one of the bands marked S, A, T, or B in the example. There is a "gap" in the middle register, E4 to A4, which is never visited during the clarinet solo. As a result, the full registral space is partitioned into essentially two active registers during the section, extending from E3 to Eb4 in the lower region (T and B in **Ex. 2-29**) and from Bb4 to A5 in the upper region (S and A in **Ex. 2-29**). Thus, as can be seen in **Example 2-28**, segments 5a and 5b fall within the upper registral band, and 5c and 5d in the lower. This division into two active register, with an unused space between them, will have significant implications in the formation of the fifth phrase.

The phrase begins in a deceptively simple manner with the highly salient (014) trichord, G-E-G#, labeled 5a in **Example 2-28**. This is heard as beginning a new phrase, in part because of the long duration of the preceding F# which so firmly closes the fourth phrase, and in part because of the substantial changes in dynamics and register between the F#3 and the G5. Listeners who are familiar with the structural background of the clarinet solo will know that this is one of the four statements of (014) using tones that are consecutive, rather than separated in time. (It is the third such statement, following those of mm. 1 and 12; these are further discussed below.) However, even the uninitiated listener will notice this figure. Its suddenly high register and loud dynamics, and its relatively long and relatively equal durations, lend the impression of a call to attention. Its <down, up> contour, particularly as comprised of the minor and major thirds, recalls the original motive of m. 1, and even without the original rhythmic profile many listeners would recognize the figure as a retrograde inversion of that motive.

The following segment, 5b, may be heard as closely associated with 5a for two reasons. The A5 (m. 22) seems to "resolve" the previous G#. More importantly, the entirety of 5a and 5b sounds all within the same register. Bounded by the A5 and Bb4 at mm. 22-23, this pair of segments is easily perceived as occurring solely within the upper register, a perception that is enhanced by the sharp changes of register from the low F# preceding it and the low G following it. Like the three successive intervals in the same direction found in the previous phrase, the phenomenon of a passage of this length entirely contained within the space of eleven semitones is unprecedented in the piece thus far, and hence functions strongly to unite these two segments. Thus, 5a and 5b may be perceived as parts of a single unit, 5a-b, on the basis of sounding all in the same register. The following pair of segments may also be associated on the basis of same register, now the lower one, suggesting a segment 5c-d.

The outer segments 5a and 5d serve once again as framing units, as a result of the retrograde pitch and contour relationships between them (see **Ex. 2-28**). At the end of the phrase, segment 5d provides another statement of (014), D-Bb-Db, less prominent than its partner 5a, principally because it is not strongly distinguished from the preceding segment by large changes in register or dynamics, as was the case with 5a. And its integrity as a unit suffers from the large change that does occur within the segment: the D and Bb are heard at *mezzo piano* followed by a sudden increase to *forte* with the Db. Segment 5d in fact represents a kind of elision between this phrase and the next; I will discuss below its function as a "pivot chord" and its foreshadowing of the upcoming fragmentation in the rest of the clarinet solo section. These factors tend to weaken the effect of closure achieved by the retrograde element of segment 5d. On the other hand,

5d is the fourth (and final) consecutive statement of (014) in the clarinet solo, and it is not difficult to hear it as a lower-register answer or complement to the similarly constructed upper-register segment 5a. This perception is strengthened by the retrograde processes and relationships of the inner segments: once we have heard 5b and 5c, segment 5d sounds as an extension of those processes, relating back to the last uncompleted segment, 5a, which is still ringing in our ears.

The inner segments 5b and 5c are related in much more complex ways. Two features that are readily audible suggest some sort of symmetric structure. First, the two segments have the same contour, CAS <+ + – + –> (Friedmann 1985), which supplies a strong association between them. This contour relation adds another layer of parallelism to the similar note division mentioned above (5 + 1). Second, and perhaps most importantly from a listener's perspective, a pitch retrograde figure straddles the bar line (mm. 23-24) between the end of 5b and the beginning of 5c. The descending perfect fourth F#-C# in the upper register is "answered" by an ascending perfect fourth G-C in the lower register. This tiny by aurally striking intervallic retrograde figure, clearly and simply presented, acts as a signal. Like the C-A-F pitch retrograde figure in the previous phrase, it directs our attention to the presence of a larger structure.

As noted above, each of the segments 5b and 5c comprises one of the four hexatonic collections: [C#,D,F,F#,A,Bb] or $HEX_{1,2}$ in Segment 5b, and [Eb,E,G,Ab,B,C] or $HEX_{3,4}$ in Segment 5c. Because of the high degree of transpositional and inversional symmetry of these hexachords, they can be related in a variety of ways including T_2, T_6, T_{10}, T_1I, T_5I, and T_9I. Of these possible relationships, T_6 reflects the (unordered) T_6 between the larger units, 5a-b and 5c-d, as well as the R_6 between the outer segments 5a

and 5d, and T_6 will figure prominently in a later part of this discussion. For now, I would like to focus on the inversion T_1I, which can also be notated as $I^{F\#}/_G$. The latter notation is especially appropriate here because the inversional relationship between 5b and 5c is realized in pitch space. As **Example 2-30** shows, each tone of segment 5b maps onto its inversional partner in 5c such that both are equidistant in pitch space from the F#4/G4 axis. These axial pitches are not sounded in the passage,[68] but it is not hard to notice a feeling of balance between the upper and lower registers of the two segments and to sense that a central point exists somewhere in the registral space between them. In this way, a third type of parallelism is added to the relations between 5b and 5c, in addition to the above mentioned similarities of contour and note subdivision: as segment 5b sounds a certain "distance" above the axis, so 5c sounds the same distance below. This inversional relationship, however, applies only to the unordered collections of 5b and 5c. The relationship of the actual lines is a more complicated one, which might be characterized as "near" retrograde combined with aspects of "near" retrograde-inversion.

If we consider each segment as an ordered set, there are of course four transformations that might be operative in associating them. **Example 2-31** shows the results after applying each of the canonical operations to segment 5b in such a way as to maintain the actual pitches of segment 5c in their original registers. I will discuss this example in detail below, but first some general comments. Among other things, **Example 2-31** illustrates the dyadic invariance that characterizes this hexachordal set class—at these particular levels, transpositions and inversions share the same dyads in the same order, while the retrograde and retrograde-inversion forms share those same dyads in reverse order. I will return to this dyadic structure in a moment. The example also

[68] F#4 and G4 lie in the registral "gap" discussed above in connection with **Ex. 2-29**.

establishes that segment 5c is not in fact related to 5b under any of the traditional serial operations. None of the pitch-class orderings that result from the transposition, retrograde, inversion, or retrograde-inversion of 5b exactly matches the ordering of 5c. Yet, the retrograde perfect fourths that respectively end and begin the two segments powerfully suggest some type of retrograde relationship. To understand the precise structure of these segments, it will be helpful to examine the results shown in **Example 2-31** and to compare them with segment 5c. In the example, the actual ordering of segments 5b and 5c are shown above, and the results of each operation applied to 5b are shown in a column below 5c.

Examples 2-31a and **2-31b** show that both the transposed and the inverted forms of segment 5b have an inverse dyadic relationship to segment 5c. Each of them begins with the "wrong" notes, Ab and B or the reverse. This is because the first and third dyads of both T_6 and I_1 are exchanged in segment 5c, and in T_6 the members of these dyads are reversed in order (Ab-B instead of B-Ab; C-G instead of G-C). Both forms "correctly" locate the middle dyad, but in I_1 the members of this dyad are reversed in order (E-Eb instead of Eb-E). Thus although T_6 and I_1 have the right pitch classes, partitioned into the right dyads, their overall orderings do not seem to have a significant influence on the ordering of segment 5c. This leaves retrograde and retrograde-inversion, and I will take the latter possibility first. In comparing the RI_1 shown in **Example 2-31c** to the actual tones of segment 5c, we find that the dyads themselves are aligned with those of 5c but the members of the first and third dyads are reversed in order: C-G becomes G-C in the music, and Ab-B becomes B-Ab. Had these dyads been "correctly" ordered, the first note of 5b would correspond inversionally to the last note of 5c, the second to the second-

to-last, and so forth (see again **Ex. 2-30** for inversional partners). We might say that the two segments are related by RI_1, *except that* instead of an inverse note-to-note correspondence there is an inverse dyad-to-dyad correspondence: the first dyad of 5b, D-F, relates inversionally to the third dyad of 5c, B-Ab, the second dyad to the second, and the third to the first, with the dyads themselves being unordered.

On the other hand, the R_6 ordering of tones, shown in **Example 2-31d**, comes very close to the actual order found in segment 5c—only the E and Eb are reversed. In this view, there is a retrograde note-to-note correspondence, transposed by six semitones, between 5b and 5c for order positions 1, 2, 5, and 6 (that is, C# of 5b corresponds to G of 5c, F# to C, F to B, and D to Ab), while order positions 3 and 4 correspond via direct transposition (A to Eb and Bb to E). Thus we might say that the two sets are related by R_6, *except that* the middle dyad of 5c is reversed. As noted above, it is evident that none of the classical operations is an exact fit with the actual music. Some independent compositional decision(s) intervened to shape this phrase in a determinate manner. Yet it is also clear that the actual ordering of tones in segment 5c relative to 5b closely approximates R_6, and to a lesser extent RI_1. Each of these "near" transformations has an impact on the formal shape of the phrase and on our perceptual response. For analytical purposes, I have selected the label "near-R_6" as the closest and most useful means of describing the note-to-note order relation between segments 5b and 5c, with "nearness" specifically referring to the reversal of order positions 3 and 4. See **Example 2-31e**. Several perceptible musical effects result directly from the specific orderings within segments 5b and 5c, effects that could not have been achieved *in toto* with any other orderings.

As noted above, the two segments have the same contour, <+ + – + –>, resulting in a parallel structure on the level of contour. This would appear to explain, in part, the reversal of order positions 3 and 4; a literal R_6 form at the same pitch levels would have produced a retrograde-inversion contour, <+ – + – –>, in segment 5c (see **Ex. 2-31d**). Reversing the E and Eb of R_6—in order but not in register—changes the contour such that it becomes identical with that of segment 5b. In addition, R_6, whether "true" or "near," begins with the ascending perfect fourth G-C. Once we hear this very noticeable figure, and recognize it as a retrograde of the immediately preceding descending fourth F#-C#, our ears are "primed," and we are open to the possibility of hearing the rest of segments 5c and 5d as a logical continuation and closing of the structure initiated by 5a and 5b. Segment 5c is not an exact retrograde of 5b, but the fact that it begins (and ends) as one heavily influences our sense that there is some type of symmetric relationship between the two.

The ordering of notes in segment 5c, brought about by the near-R_6 transformation, also results in a specific pitch/register layout of the segment. It is no accident that the E and Eb were reversed. The parallel contour series described above could have been achieved with the "true" R_6, simply by placing E in the fourth octave and Eb in the third. That this was not done points up the crucial significance of the particular pitches E3 and Eb4—they are the boundary pitches of the lower registral region.[69] This, it would appear, is the principal reason that the E and Eb of R_6 were reversed in order but not in register: to preserve the contour *and* at the same time to maintain the boundary pitches of the lower register. Segment 5c is thus a miniature summary of the lower registral space of the clarinet solo (though not chromatically filled in). And, looking back at segment 5b, it

[69] See the discussion on registral organization, in connection with **Ex. 2-29** above.

is now clear that that segment likewise summarizes the upper registral space, outlined by the boundary pitches Bb4 and A5. (This compositional reference to the registral structure will occur again in a different format at the end of the clarinet section; the links between this current phrase and the last passage are discussed below.)

Though a few important factors remain to be discussed, it is now possible to understand the general shape of this phrase as well as the aspects that allow us to hear that shape (refer again to **Ex. 2-28**.) The phrase falls into two relatively equal parts, 5a-b and 5c-d. The two parts are equivalent in cardinality, set class, and contour, and complementary in register and dynamics. The registral distinction is especially strong: it is not just that the two segments occur in different registers (though this is relevant), but rather that they occur within and touch the boundaries of *the* two registers of this clarinet solo section. Additionally, and what most compellingly defines the interrelationship, the outer segments are related by R_6, and the inner segments are related by "near" R_6. Segment 5c cannot be heard as a true retrograde of 5b, yet it is indeed very close, and the multitude of symmetries combine to create a strong sense of the passage as a single structure of binary design, unified by a type of "reverse" relationship between the two halves. The phrase is strongly opened by the prominent (014) trichord G-E-G#, and the completion of the retrograde processes at the end of segment 5d brings the phrase to a close. All of these parametric factors are quite audible, permitting the listener to perceive both the internal segmental structures and the associations that produce initiation, coherence, and closure of the phrase.

The surface relationships of R_6 and near-R_6 are supported and to some extent clarified by a deeper-level structure. Each hexachord of segments 5b and 5c may be

partitioned into three vertical dyads based on contiguous pairs of pitches. See **Example 2-32**. In the example, each dyad is arranged in pitch space so as to reflect the actual pitches of the music. This results in dyads of pitch intervals 3, 11, and 5, which are presented in that order in 5b and in reverse order in 5c. This dyadic retrograde structure is in part a reflection of the "near-RI_1" relationship between the hexachords of 5b and 5c, discussed earlier. It occurs because each pair of notes in the melodic line may be understood as the upper and lower tones of a harmonic interval that is presented melodically. In the music of segments 5b and 5c, the respective upper and lower tones are not given in a consistent order; the first dyad in each segment is linearly unfolded from bottom to top, while the second and third dyads are composed from top to bottom. The retrograde ordering of the dyads by pitch interval, together with the specific compositional ordering within the dyads (derived from the near-R_6 relationship), enables us to begin hearing the symmetric structure, as the ip-5 dyads are juxtaposed so as to respectively mark the end of segment 5b and the beginning of 5c.

Dyads that share a common intervallic span are related to each other by pitch-space inversion about F#4/G4. For instance, in the pair of ip-5 dyads, F#5 inverts to G3 and C#5 inverts to C4 (see **Ex. 2-32**). Within each corresponding pair of pitch dyads, the top note of one dyad inverts to the bottom note of the other, and vice versa, creating a sum-1 index relationship between those respective pairs of notes. Thus, while the note-to-note relations at the surface of the music evince neither an exact retrograde nor an inversion, the underlying dyads produce both—the pitch intervals are ordered in retrograde (3-11-5 and 5-11-3), and the pitches themselves are arranged in mirror inversion. The inversional relationships among the dyads are not likely to be audible to

most listeners, since the sum-1 pairs are for the most part separated in time. It is easier to hear the inversion between the unordered collections of the two segments, and even more so the near-retrograde relationship of the melodic lines, the latter of which is a realization of the more abstract dyadic structure. The retrograde presentation of the pitch intervals, however, is quite salient. The descending interval 11, Eb to E, that follows the perfect fourth of segment 5c, is easily related back to the descending interval 11, A to Bb, that precedes the perfect fourth of segment 5b.

In addition to the inversional symmetry between the hexachords of 5b and 5c, each hexachord is itself symmetrically arranged in pitch space. This may be seen in **Example 2-32**, above**.** In segment 5b the members of each dyad are inverted about D#5/E5, and in 5c each dyad is inverted about A3/Bb3. It is not difficult for the listener to become aware of this intra-segmental symmetry. In segment 5b, the consecutive pitches A5 and Bb4 stand out both as the largest interval and as the highest and lowest tones since the beginning of the phrase. The following pair of pitches F#5 and C#5 can be heard as centrally located within the space of the A-Bb interval—the F# sounds a minor third below the A, and the C# sounds a minor third above the Bb. Hearing this relationship is substantially aided by the identity of cardinality and contour between the two pairs of tones, reducing the amount of information the listener must process as the F#-C# interval is occurring. Their temporal arrangement also assists; the F#-C# interval occurs after our attention has been captured by the large A-Bb interval. The lack of these factors, especially the upward instead of downward contour, makes it more difficult to realize that the preceding D-F interval is also centrally located. In effect, there is a wedging motion from dyad to dyad, outward from D-F to A-Bb and then inward to F#-

C#, but the first motion is obscured by the partitioning of the first four notes directionally as 3 + 1, that is, three tones ascending and one descending. It becomes difficult to hear a 2 + 2 grouping, and even more challenging to hear that the relation of first to fourth note is the same as that from second to third (as opposed to a parallel relation of first to third and second to fourth). On the other hand, awareness of the symmetric motion from A-Bb to F#-C# may make the connection more apparent retrospectively. The same wedging process occurs in segment 5c, though of course the succession of intervals is reversed and the audibility is increased due to the "preparation" of 5b and the retrograde perfect fourths. Finally, perception of the inversional symmetry within segments 5b and 5c is greatly enhanced by awareness of the registrally distributed (014) trichords. As can be seen in **Example 2-32**, within each hexachord the upper and lower tones respectively form inversions of this set class. Order positions 1, 4, and 6 form the lower trichord while order positions 2, 3, and 5 form the upper.

In this fifth phrase, then, register is perhaps the dominating formal factor. After the initial (014) trichord G-E-G#, which opens the phrase with its prominent placement in the high register, the two parts of the phrase (5a-b and 5c-d) gradually become perceptible by their locations in the upper and lower registers respectively, and the phrase is closed by the framing function of the answering (014) trichord, D-Bb-Db, in the lower register. Contour, an aspect of register, relates segments 5b and 5c, helping to prevent a complete disjunction between the two halves, and contributes to the audibility of some of the deeper-level dyadic and inversional relationships. The retrograde figures, F#-C# and G-C, critical to apprehension of the larger structure, are dependent on the perception of pitch interval, another aspect of register. The division of the overall space into upper and

lower registers, with a "gap" between them, works in two ways. On one hand, this important structural aspect of the clarinet solo, which may have been only subliminally perceived up to now, is made clear and fully apparent by the registral partitioning of the fifth phrase. At the same time, the organization of the phrase is strongly projected by the partitioning of the registral space itself, which articulates the pitch-space inversion of segments 5b and 5c and signifies the structural importance of the registral boundary pitches, Eb3 to E4 and Bb4 to A5.

In both the fourth and the fifth phrases, rhythm in the sense of particular patterns used to articulate segments is much less salient than it was in the first three phrases, and the process of registral expansion is absent. Contour and pitch relations, however, continue to be active, perhaps even more prominently. Pitch relations are the essence of the retrograde structures in each phrase, while direction of motion defines and relates corresponding segments, especially the "bookend" segments surrounding each phrase. And, in addition to the registral functions described above, that parameter now becomes an important articulating factor in distinguishing formal units. Register separates the various components of the retrograde structures, making them more readily perceptible, and is an integral aspect of the pitch-space inversion that articulates segments 5b and 5c. Intervallic relations play a role as well, as in the embedded retrograde trichords of the fourth phrase, the framing segments of the fifth, and the inversional relationships within segments 5b and 5c.

The first three phrases are formed by means of motivic development and liquidation, while the fourth and fifth rely on symmetric processes, but all exhibit aspects of initiation, coherence, and closure. The last part of the clarinet solo section departs

from these relatively well-organized formal structures, giving way instead to a series of fragmentary gestures. The gestures are closely related to each other, creating a kind of cohesiveness that gives continuity to the passage. Moreover, most of them take up a "theme" introduced in the fourth phrase, thus forming a connection with earlier music. In part on the basis of these relations, I will suggest that a number of these fragmentary gestures do combine sufficiently to form a loosely knit phrase. The final measures, as Dubiel (1992) observes, act as a kind of registral summary of the entire clarinet solo section and at the same time as a bridge leading to the following trio section. Before discussing this last part, it will be necessary to reexamine the ending of the fifth phrase, as it overlaps with the beginning of the sixth phrase.

C. The Sixth Phrase and Closing Fragments

As we listen to the end of the previous phrase, segment 5d (see again **Ex. 2-28**), we may well feel that a strong sense of closure is missing. While the retrograde relationship of this figure to segment 5a provides a solid basis for closure, the integrity of the figure itself is compromised by the sudden increase of dynamics to *forte* on the Db and by the slur connecting that tone to the following C. See **Example 2-33**. This results in an ambiguity of grouping structure. On the one hand, segment 5d can be heard as a three-note group, based on its equivalence with 5a in pitch and contour, which in turn allows us to relate it back to 5a. On the other hand, the change of dynamics projects a grouping of 2 + 1[3] (read as "two plus one-but-really-three"), indicating that the Db is separated from the D and Bb and is instead grouped with the following C and G on the basis of uniform dynamics. The Db may also be grouped with the C and G on the basis of the contour thus created, all ascending—a hearing that is strongly encouraged by the

following segment F-A-D#-E, which replicates the all-ascending shape. Once this ascending contour has inserted itself into our consciousness, the Bb of segment 5d begins to sound, in retrospect, as part of a distinct four-note all-ascending figure, Bb-Db-C-G. This alters the grouping structure of 5d once again, now suggesting a pattern of 1 + 2[4].

I have now proposed three possible hearings of segment 5d, and I would suggest that all three of them are simultaneously present and audible. At the moment of hearing these three simple tones, there is (or can be) a recognition of the retrograde relation to the earlier segment 5a, while also noticing that the third tone, Db, is markedly divided from the others by the dynamics. Its connection to the following C and G is also made clear by the dynamics, and as the next segment F-A-D#-E unfolds, the earlier Bb may be reinterpreted as the starting tone of a four-note ascending line. Segment 5d may thus be understood as a kind of "elision" or "pivot chord," having a closural function with respect to the previous phrase and, at the same time, an initiating function in regard to the following material. Its initiating function is based on the presentation of a new idea, as the short fragments that follow begin to coalesce into a series of ascending gestures.

Turning now to the final passage as a whole, in **Example 2-33** I have labeled the seven segments with lower-case letters, each representing a fragmentary gesture. The first three gestures, segments *q*, *r*, and *s*, resemble each other in their continuously ascending contour, described by Dubiel as "a burst of increasingly rapid wide ascents" (1992, 85). Each begins in the low register and reaches up to the higher register, and with segment *s* there is a sense of increasing tempo as the durations become shorter. The rising profile recalls the same-shaped figure of segment 4a, which so prominently opened the fourth phrase (**Ex. 2-25**). Perhaps because, in that earlier case, the ascending gesture

was answered by its descending complement in segment 4d, we may now find ourselves anticipating a similar descending gesture.

A number of patterns are apparent in these segments. First, each of segments *q*, *r*, and *s* spans a slightly larger pitch interval, forming the progression <+21, +23, +26>. The last of these may remind us of the twenty-six-semitone leaps of the first three phrases. Second, the number of ascending intervals generally decreases with each gesture: three each in segments *q* and *r*, reducing to two in segment *s*. This process is continued and completed in segment *t*, which is compressed to a single ascending interval, producing the pattern <3, 3, 2, 1>. At the same time, segment *t* marks a change from the preceding gestures, both in the longer duration of its starting note and, especially, in its register—for the first time, the gesture does not reach down into the depths but, rather, begins and ends in the upper register. This segment is further marked by the dramatic crescendo, *ppp* to *mf*. A third pattern is found in the generally shortening lengths of segments *q*, *r*, *s*, and *t*: in eighth notes, <8, 10, 5, 5>. Segment *u* finally breaks the ascending pattern with its descending contour, beginning with the *fortissimo* C4 that seems to be the goal of the crescendo. The shortening-length pattern is reversed as well, now expanding to eleven eighth notes. The steadily longer durations in segment *u* further encourage us to hear this gesture as an important arrival, arguing for a strong boundary at this point. For this reason, segments *v* and *w* will be set aside for the moment; I will return to them later in the discussion.

It seems clear that this is not a random collection of fragments, but there are a number of ambiguities that render the passage liable to different interpretations. The ambiguities relate to the question of how, if at all, to group these gestures. Three possible

boundary locations are suggested by the musical context. The first occurs between segments *s* and *t*, based upon the significant changes in duration and register at that point. This would produce two segment-groups, <*qrs*> and <*tu*>, the first of which is eminently comprehensible due to the similarities of contour and registral span. The suggested group <*tu*> is less straightforward: the differences of register and contour create a marked disjunction between the two segments, but we may well hear a connection on the basis of the *de facto* continuing crescendo from F to C.

A second potential boundary location falls between segments *t* and *u* on the basis of the disjunction just described. The resulting segment-group <*qrst*> is strongly supported by the progression of decreasing cardinality of intervals, <3321>, which achieves completion in segment *t*, and by the progression of shortening lengths of the segments. This leaves a "group" consisting of a single segment, <*u*>. In principle there is nothing to prevent a segment from existing independently, detached from adjacent segments, though we would expect substantial parametric disjunctions supporting such a hearing, and few if any connecting factors. In the present case, segment *u* may be heard as isolated by the pronounced changes in contour and register between it and the preceding segment *t*, and the changes in durations, contour, and registral span between it and the following segment *v*. On the other hand, as noted above, the *ff* dynamics of the C of segment *u* sounds like a continuation of the preceding crescendo from *ppp* to *mf*.

Moreover, segment *u* seems to be not just the goal of the preceding crescendo but also the goal of the entire preceding passage. There is a subtle but noticeable buildup of tension throughout segments *q*, *r*, *s*, and *t* as the pattern of ascending gestures is constantly reiterated. Each gesture has the aura of an anacrusis, but it is repeatedly cut

off from its anticipated downbeat. The *fortissimo* C of segment *u*, followed by the long-awaited descending contour and the longer durations, discharges the accumulated tension and has the effect of a structural downbeat. These factors tend to support a hearing of all five segments as a single group, <*qrstu*>, one that is shaped by the arc of tension and release.

If we hear the five segments as divided into two groups, either as <*qrs*> and <*tu*> or as <*qrst*> and <*u*>, then it is unlikely that any of the individual groups will form a phrase. The segment-group <*qrs*> has no closing element, and <*tu*> seems to lack the necessary internal substance to be perceived as a relatively complete utterance. The group <*qrst*> does have a conclusion of sorts, with its completion of the ever-decreasing-number-of-ascending-intervals pattern in segment *t*, but hearing this as a closure is immediately contradicted by the much stronger closural function of the following segment *u*. And segment *u* would project a stand-alone closure with no preceding material for which it might actually function as a closure. On the other hand, the pair of segment-groups <*qrs*> and <*tu*> might be heard as subphrases that together form a phrase, though neither is as well-formed as the subphrases that comprise phrases two and three. The strongest perception, to my ear, is an undivided phrase consisting of all five segments. The segments are formed and articulated by interactions among perceptible parameters on the surface of the music, particularly contour and dynamics, and they are bound together by the progressive buildup and release of tension.

Segments *v* and *w* stand apart from this structure and, to some extent, from each other as well. The phenomenon of three ascending intervals in segment *v* recalls the similar gestures just heard, *q*, *r*, and *s*, though the pitch span has now expanded to twenty-

nine semitones. The clarinet's "hopping off through all its registers," as Dubiel described it (1992, 85), is that and more. It is a hopping through the specific boundary pitches of the two registral bands, E3 to Eb4 and Bb4 to A5, thus summarizing the registral space of the entire clarinet solo. In **Example 2-33**, I have indicated a segmental boundary between the high A of segment *v* and the low Ab of segment *w*, even though they are essentially consecutive sixteenth notes and thus closely bound temporally. Segment *v* is a well-defined unit, structured very much like the earlier segment 4a'. It is heard as a pair of rising major sevenths, both pairs articulated rhythmically as <long, short>. The break in the continuity of direction with the downward leap suggests a "starting over," in part because we have just heard three similar gestures in which the downward leap clearly projected the start of a new unit. Here, the Ab does not lead to another statement of the same gesture, as was the case in segments *q*, *r*, and *s*, but it does lead to a new unit. Segment *w* sounds like a new unit because of its contour. The four tones are grouped, once again, as two pairs by means of parallel registral placement and directional motion: low/high, low/high. Thus the segments *v* and *w* are distinguished by their differing contours, and the wide downward leap to Ab signals the boundary between them.

Segments *t*, *u*, *v*, and *w* represent the final aggregate of the clarinet solo. **Example 2-34** reproduces the music, and shows underneath the dyads formed by each discrete pair of consecutive notes, except that the last two dyads are grouped registrally rather than temporally. All are index-7 inversional dyads, and they are the same pitch-pairs as those found earlier in the fifth phrase (segments 5b and 5c; see **Ex. 2-32** above). In the fifth phrase these dyads were grouped registrally—upper-register pairs together in segment 5b, followed by lower-register pairs in 5c. Here at the end of the section, the

dyads are reordered so as to create something like a "stepwise" melody through registral space, with the dyadic elements acting as "scale steps" in what might be thought of as a registral scale: first the descending D[F]-C-G-E, then the ascending E-Eb-Bb-A, and finishing up with a reference to the wide leaps and <up, down> contours found earlier in the piece. The recurrence of the dyads of the fifth phrase, in their specific pitch realizations, might suggest hearing this last aggregate as a phrase or other unified passage corresponding to the unitary nature of the earlier segments 5b and 5c. In those earlier segments, however, the dyads were not only organized by register, they were also organized by pitch-space inversional axes. The upper-register dyads of 5b were arrayed about D#5/E5, and the lower-register 5c dyads about A3/Bb3. The inversional quality is much more difficult to perceive when the dyads are hopping about from one inversional axis to another, as in the last aggregate.[70]

While the form of the sixth phrase and the closing fragments differ considerably from earlier phrases, the means of formation remain essentially the same. The principal factors that shape this passage are contour and register, with some input from dynamics and rhythm. The sixth phrase is initiated by a change of material—the wide ascending gestures—and closed by the descending segment *u*. The continuity of the ascending gestures as well as the larger process of tension and release supplies coherence to the phrase. The form of this final passage is thus created by readily audible events at the surface of the music.

[70] For an illuminating discussion of how this last passage of the clarinet solo acts as a transition to the following trio, see Dubiel 1992.

III. A Final Look at Large-Scale Design

I have examined the pitch-space inversional dyads of the fifth phrase and of the closing passage in some detail. In fact, the entire clarinet solo is arranged inversionally in pitch space. **Example 2-35** shows the three inversional axes previously discussed. **Example 2-35a** shows the midpoint of the upper register, D#5/E5, in open noteheads and the dyads wedging outward through the space of the upper register in filled-in noteheads. **Example 2-35b** similarly shows the midpoint of the lower register, A3/Bb3, and its dyads. Since the two axes are tritone-related, the pitch classes of the dyads are invariant. Thus the three-semitone dyad D-F in the upper register becomes the nine-semitone dyad F-D in the lower. In both of these examples, the dyads consisting of the axial pitches themselves, D#-E and A-Bb, are not shown. They do occur but they are treated in a special way, discussed below. **Example 2-35c** shows the axis at the center of the clarinet's entire pitch space (about which the upper and lower axes are inversionally related), and the resulting dyads. The potential dyads F#-G, F-G#, and E-A in the fourth octave are not shown, as they constitute the registral "gap" in the clarinet solo and hence do not occur. I will refer to these respectively as the upper, lower, and central axes. In **Example 2-36**, the eight aggregates of the clarinet solo are set out in pitch reduction. Brackets above and below the staves indicate the two pitches of each sum-7 dyad related inversionally about the upper and lower axes. Thus in Aggregate 1, B is inverted to Ab about the lower axis, and Db is inverted to Gb about the upper axis. This example reveals a wealth of patterns and relationships; I will discuss just a few of them.

Apart from Aggregate 6, where its presence is made fairly explicit, the central axis is difficult to detect on the surface of the music. Rather, its influence is felt in the registral distribution within the aggregates. Each aggregate consists of six notes in the

upper register and six in the lower. Each note in one register has its sum-1 inversional partner somewhere in the other register, though the pattern of sum-1 dyads is different in each aggregate. The wide leaps so prevalent in the music may be traced to the impact of the central axis, which otherwise has little effect on the formal organization. The upper and lower axes, on the other hand, have a significant influence on form and perception.

In the first aggregate, the pitch-members of the sum-7 inversional dyads in the upper register are presented contiguously.[71] As a shorthand, I will call this the "contiguous dyad" pattern. In the lower register, dyadic pitches are given non-consecutively but in an ordered pattern: the first pitch relates inversionally to the fourth pitch, the second to the fifth, and the third to the sixth. Since the resulting dyads are overlapping, I will call this the "overlapping dyad" pattern. Aggregates 1, 3, 5, and 7 all display the contiguous-dyad pattern in one register and the overlapping-dyad pattern in the other register, in an alternating-aggregate pattern that is reversed in the second half. Aggregates 2 and 4 use the overlapping pattern only—that is, in both registers—and Aggregates 6 and 8 use the contiguous pattern only (except the last two dyads of Aggregate 8, which follow the overlapping pattern in a truncated form). The contiguous dyads of Aggregate 6 are themselves given contiguously in register. This back-to-back arrangement of pitch dyads inverted about the same axis explains why segments 5b and 5c of the fifth phrase, which contains Aggregate 6, are so perceptibly organized by inversional symmetry, and why the last aggregate, with the same pitch-pairs though not ordered in register, is less salient in that respect. It also explains why the pitch-space inversion that characterizes the rest of the section is much less audible. When the pitch-

[71] Mead 1994, 69-70, points out these sum-7 dyads of the first aggregate.

pairs related by inversion are separated in time, it is difficult to apprehend the imaginary central axis that connects them.

The importance of the upper and lower axes is emphasized by the special treatment of the axial pitches. Throughout the clarinet solo, motion by a semitone occurs only two times. Near the beginning of the fourth phrase (m. 17) we hear Bb-A in the third octave, the pitches of the lower axis (refer to **Ex. 2-23** above). And the pitches of the upper axis, D#-E in the fifth octave, are presented in the middle of the sixth phrase (m. 29). The semitonal motion stands out prominently in a texture of otherwise constant leaps. With a bit of effort we may be able to hear the significance of these pitches by means of the sum-7 dyads that occur shortly before and after them. The D-F of m. 16 and the C#-F# of m. 19 are inverted in pitch space about the Bb-A. Similarly, the C-G of m. 27 and B-G# of m. 30 are pitch-space inversions about D#-E. These may also be seen in **Example 2-36** in Aggregates 5 and 7.

As noted earlier, each aggregate contains six notes in the upper register and six in the lower. Each of these registral hexachords (as distinguished from successive-note hexachords) is an all-combinatorial E-type hexachord of set class 6-20. Each registral hexachord is partitioned by two (014) trichords, which are distributed differently according to whether the registral hexachord is of the contiguous-dyad pattern or the overlapping-dyad pattern. Aggregate 1 will serve as an example. In the upper register, which displays the contiguous pattern, the trichordal elements are separated in time but associated registrally. Thus the lower notes of the three dyads, Db, Bb, and D, form a (014) trichord, as do the upper notes Gb, A, and F. This type of trichordal partitioning occurs in all registral hexachords organized by the contiguous-dyad pattern. In the lower

register of Aggregate 1, which uses the overlapping-dyad pattern, the trichords are arranged consecutively within register—that is, considering only the lower register, the first three notes, B-Eb-C, and the next three notes, Ab-E-G, form (014) trichords. This arrangement likewise holds for each registral hexachord organized by the overlapping pattern.[72] These various trichordal partitions of the registral hexachords are, of course, the registrally distributed trichords of the vertical aggregates from the underlying array.

In the odd-numbered aggregates, there is a pattern within each of the overlapping-dyad hexachords: the six notes are grouped by contiguity as either 3-2-1 or 1-2-3. Thus in Aggregate 1, the tones of the lower register occur as B-Eb-C, Ab-E, and then G, or 3-2-1. The same pattern obtains in Aggregate 7, and the reverse is found in Aggregates 3 and 5. This pattern enables the composer to project, and the listener to perceive, the four uninterrupted statements of the signature trichords. In **Example 2-36**, these can be found at the beginning of Aggregate 1, B-Eb-C, the end of Aggregate 3, F#-A-F, the end of Aggregate 5, G-E-G#, and the beginning of Aggregate 7, D-Bb-Db. Reference to the score in **Example 2-15** above will illustrate how they are realized in the music. In addition, the 2 + 1 trichord in each of these aggregates is relatively easily perceived since two of the tones are given together. On the other hand, the trichords embedded in the contiguous-dyad registral hexachords may be more difficult to recognize, with each tone widely separated in time.

The four uninterrupted signature trichords are located at strategic points within the clarinet solo. The first opens the solo and the entire piece, and serves as the initial declaration of the trichordal basis of the work. The second and third occur respectively at

[72] This produces an inverse relationship between dyads and trichords. When the dyads are contiguous, the trichords are separated; and when dyads are separated, trichords are contiguous.

the approximate "short" and "long" golden sections of the solo. See **Example 2-37**. The golden section is a proportional relationship in which the lengths of two unequal sections of a whole are such that the ratio of the whole to the long section is the same as the ratio of the long to the short section; the ratio is 1.618…. The length of the long section is roughly 62 percent of the whole, and that of the short section is roughly 38 percent. **Example 2-37** illustrates this relationship schematically as it applies to the clarinet solo. The solo is exactly 100 quarter notes in length. The trichord F#-A-F occupies quarter notes 38 to 39, marking the short golden section, and G-E-G# extends over quarter notes 58.5 to 62, the long golden section. Both trichords function prominently in the music: F#-A-F represents a strong return of the opening motive at the end of the third phrase (m. 12), helping to close off the first three phrases as a unit; G-E-G# initiates the strikingly symmetrical fifth phrase (mm. 20-21). Both are played in the high register, preceded by a large leap out of the lower register, and with loud dynamics, drawing extra attention to them beyond their structural identity as signature (014) trichords. The latter trichord may be the more salient of the two, because of its longer durations and especially because it follows a lengthy passage marked by the absence of the high register. The fourth signature trichord, D-Bb-Db, occurs approximately three-quarters of the way through the solo. It serves several important purposes, including closure of the fifth phrase and initiation of the sixth phrase. It also marks the point at which the more tightly organized material preceding it, ending with the fifth phrase, gives way to the more fragmentary and loosely organized material that brings the clarinet solo to a close. Thus the four trichordal statements act as critical structural pillars, not unlike a recurring motto, supporting and unifying the entire section.

Chapter 3

Texture and Density: Stockhausen's *Kontra-Punkte*

In the early 1950s, Karlheinz Stockhausen's compositional approach began to evolve from the pointillist style, as in *Kreuzspiel* (1951), to the group style famously exemplified in *Gruppen* (1955-57). Among the transitional pieces of that period, *Kontra-Punkte* (1953) for ten instruments is notable for its literal enactment of that evolution.[73] As several writers have noted, *Kontra-Punkte* is through-composed, with a number of unidirectional processes that unfold as the piece proceeds.[74] One such process is the gradual transformation of the texture from primarily points to primarily groups.[75] "Points," in Stockhausen's theory, are individual tones that are isolated from one another by their distinctive values of pitch, duration, timbre, and dynamics. "Groups" are collections of two or more tones that share the same or nearly the same value in at least one of those parameters, usually timbre or dynamics.[76] In *Kontra-Punkte*, most groups move at a greater speed of attacks than pointillist passages, resulting in marked differences of temporal and spatial density. Over the course of the piece, groups occur more and more frequently, for longer and longer periods, and eventually overlap to form a "counterpoint" of groups (Griffiths 1995, 71). This dialogue between differing levels of density is one of the most salient features of the work and plays a significant role in the creation and perception of formal units.

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[73] *Kontra-Punkte* is scored for flute, clarinet, bass clarinet, bassoon, trumpet, trombone, piano, harp, violin, and cello. Other transitional works of that period include *Klavierstücke I – IV* (1952) and the electronic pieces *Studien* I (1952) and II (1953).

[74] See Stockhausen 1973, preface; ibid, 1963b (*Texte II*), 20; Maconie 1976, 54; Harvey 1975, 22.

[75] Other processes include the well-known dropping out of instruments one by one until piano alone remains, the progression from a wide variety of note durations to consistently short durations, and the transition from a mixture of dynamics to mostly soft.

[76] Stockhausen's theory of form is further discussed below.

In addition to points and groups, *Kontra-Punkte* uses two other formal elements that have previously been attributed to later compositions. A type of sound formation known as a "statistical complex" (or collective)—a unit of extreme density in which the component sounds are difficult to perceive individually—first became prominent in the mid-1950s with *Gruppen*, *Zeitmasze* (1955-56), and *Gesang der Jünglinge* (1955-56). Yet a number of brief, embryonic complexes make an appearance in this earlier piece. Similarly, Stockhausen's concept of "moments" was first fully realized in works such as *Kontakte* (1959-60) and *Momente* (1961-64). A "moment" is a complex notion, further discussed below, which might be briefly described as a passage that is non-goal-directed, lacks closure in the sense of this study, and is characterized by a distinctive combination of parametric values or patterns. As we will see, Stockhausen was using a version of moment form as early as 1953, less developed than in the later compositions but still quite audible. Thus, in many ways *Kontra-Punkte* represents an important turning point in the composer's stylistic evolution, and something of a laboratory for his developing thoughts on musical form.

Stockhausen discussed his theoretical ideas on form in a number of articles written during the 1950s and 1960s, most extensively in "Momentform" and "Erfindung und Entdeckung" ("Invention and Discovery") (Stockhausen 1963, hereafter *Texte I*). His theory, which will be discussed in some detail later in the chapter, encompasses three fundamental categories: (1) *elements*, including points, groups, and statistical complexes; (2) *connections*, referring to the use of determinacy or indeterminacy in connecting the elements; and (3) *forms*, describing the continuity of the resulting work as developmental, sequential, or moment form. In my discussion of *Kontra-Punkte*, I will show how

Stockhausen's elements may be grouped into larger units, forming a perceptible hierarchical structure.

In this chapter I will examine the first large section of the piece, mm. 1-116. The presence of a fermata, a rare silence, and a substantial change of material all point to measure 116 as a significant large-scale boundary.[77] After a brief opening gesture, twelve phrases will be identified, of which the first six are completed by closure. The last six, however, introduce a type of completion which I call "articulation," that is, completion of the structure in which a salient event marks the end of the phrase. Phrases 7 through 11 present "external articulation," that is, the perceptible initiation of a new phrase; phrase 12 is completed through "internal articulation," in which the salient event arises from the material of the phrase itself. These latter six phrases are constructed on the basis of either directed parametric change (phrases 7 and 8) or similarity (9-12), accounting for the absence of closure. Because of the type of construction and the lack of closure in these latter phrases, they closely resemble "moments" in the sense of Stockhausen's theory. On a larger scale, most of the twelve phrases combine in groups of two or three to form higher-level units.

The term "phrase" is defined in the same manner as in the Babbitt analysis, that is, as a formal unit consisting of two or more segments and exhibiting the factors of initiation, coherence, and completeness through either closure or articulation. The term "moment" may be preliminarily defined as a unit consisting of two or more segments and exhibiting initiation, coherence, and articulation only (not closure). Thus, Stockhausen's

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[77] A canon-like passage of imitation begins after the fermata. This first large section represents about one-fifth of the duration of the work. It is followed by a short transitional section (mm. 117-136). In the remainder of the piece, there are no other pronounced sectional boundaries—the music moves continuously in "moment"-like phrases that tend to grow longer and longer as the piece proceeds. See Maconie 1976 for a different, though not contradictory, view of large-scale organization.

moments are a subcategory of phrases; they will be further elaborated below in the discussion of Stockhausen's theory. The basic element in the formal hierarchy is the segment. In the discussion of Babbitt's *Composition for Four Instruments* (see Chapter 2), the process of segmentation was presented by example, as the note-by-note analysis of the clarinet solo revealed the various ways in which segments were formed. In *Kontra-Punkte*, segments are defined largely by textural characteristics, and the presence of a number of recurring textural types allows a more generalized approach to segmentation.

The remainder of this chapter is divided into four parts. Part I explores segmentation from the point of view of texture and its effect on the perception of musical form. In his writings, Stockhausen identified three specific textures, which he called "elements": points, groups, and complexes. After a discussion of these, I will propose several additional textural types found in *Kontra-Punkte*, and describe the bases for segmentation used in this study. Parts II and III present my analysis of this first large section of the work. Part II focuses on the opening gesture and the first six phrases, while Part III examines the remaining six phrases, discusses the implications of closure versus articulation, and engages with Stockhausen's theory of moment form. Part IV looks at the large-scale form, finding that phrases 1 and 2 form a "parallel period," phrases 3 through 10 are grouped into cycles, and phrases 11 and 12 act as a closing passage for the section as a whole. I will demonstrate that all of these formal types—segments, phrases, moments, periods, and cycles—are created and audibly projected by musical parameters at the surface of the music, with an emphasis on the effects of texture and density.

I. Segmentation: Stockhausen's Elements and Additional Textural Types

As a leader of the postwar generation of composers, Stockhausen was especially concerned with the question of form. Opposition to the thematic and developmental forms of Schoenberg and others was based on the notion that the new language and materials of music should generate their own new forms.[78] Stockhausen's solution was to use varying textures—points, groups, and statistical complexes—as the fundamental building blocks of form. Over the course of several articles written during the 1950s and early 1960s, he developed an extensive formal system, much of which is summed up in the 1961 article "Erfindung und Entdeckung" where his larger theory of "morphogenesis" is outlined:

> There are usually several formal types thus combined in one work, simultaneously and in sequence. These combinations can be seen in the following representation:
>
> The genesis of:
>
> 1. pointillist forms
> 2. group forms
> 3. collective forms
>
> I. determined forms
> II. variable forms[79]
> III. polyvalent forms[80] [*vieldeutigen Formen*]
>
> A. development forms ('dramatic')
> B. sequence forms ('suite')
> C. moment forms
>
> 1, 2, and 3 can be combined with each other and with all the others. (For example: pointillist moment formation determined; statistical sequence formation polyvalent; groups in development formation variable.) Or, simultaneous combinations can take place within one work. (*Texte I*, 250-51)[81]

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[78] See Boulez 1948/1968, 1951/1968; Stockhausen 1959a, 1959b, 1961; Schnebel 1960; Ligeti 1965.
[79] Variable form refers to indeterminacy of performance, in which the performer determines certain aspects of the composition such as durations, dynamics, instrumentation, or order of parts. See Wörner, 101-05.
[80] Polyvalent forms are those in which the performer chooses which of several versions provided by the composer to use in a given performance. See Wörner, 105-07. The term *vieldeutigen* is sometimes translated as "multivalent" or as "ambiguous."
[81] "*Dabei warden meistens mehrere Formungsarten in einem Werk kombiniert, gleichzeitig und nacheinander. Diese Kombinationen ersieht man aus folgender Darstellung:*
Genese von:

The use of three different numbering systems together with Stockhausen's several examples indicate that each series of three items on the list may be grouped together under some larger category. Stockhausen identified the three categories as:

Elements:	collective	group	point
Connection:	determined	variable	polyvalent
Form:	development	sequence	moment

(Kirchmeyer 1982-83.[82]) Heikinheimo (1972, 103) gives this chart in a slightly different format:

Elements	*Connections*	*Forms*
Point	Determined	Development
Group	Variable	Sequence
Collective	Polyvalent	Moment

Judging from the items contained in the categories, "connection" refers to the method of compositional decision-making (that is, the means of connecting the elements), and "form" is a characterization of the progression of elements—that is, a piece may progress in a dramatic, developmental manner, or in an ordered, sequential manner, or in a non-developmental and non-sequential manner known as moment form. Thus, any of the individual elements may be combined, by determinate or indeterminate compositional

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1. Punktuellen Formen
2. Gruppen-Formen
3. Kollektiv-Formen
I. Determinierten Formen
II. variablen Formen
III. vieldeutigen Formen
A. Entwicklungsformen ('dramatischen')
B. Reihungs-Formen ('Suite')
C. Moment-Formen
1, 2, and 3 sind untereinander und mit allen anderen dombinierbar. (Beispiel: punktuelle Momentformung determiniert; statistische Reihungsformung vieldeutig; Gruppen in Entwicklungsformung variabel). Oder innerhalb eines Werkes können gleichzeitige *Kombinationen stattfinden"* (quoted and translated in Heikinheimo 1972, 94).

[82] This chart originally appeared in the extensive liner notes by Helmut Kirchmeyer for the 1963 WERGO recording of *Kontakte*. According to Heikinheimo (1972, 209), Stockhausen verbally gave the categories to Kirchmeyer, who then produced the above chart in his essay. The liner notes are reprinted in Kirchmeyer (1982-83, 153).

means, resulting in any of the three formal types. As I will discuss below in Part III, the term "moment" may also indicate an element-type, as well as a form-type, even though not listed as such by the composer.[83]

A. Stockhausen's Elements

Points

In 1951 at the Darmstadt summer festival, Stockhausen heard a recording of Messiaen's *Mode de valeurs et d'intensities*, the fourth of his *Etudes de rhythme* (1949) for piano, and was overwhelmed by the beauty of this "fantastic music of the stars" (Wörner 1963, 81). In a later conversation between Stockhausen and Herbert Eimert about the piece, Eimert used the term *punktuell* ("punctual" or "pointillist") to describe Messiaen's music, and the term has continued to be used in reference to this style of music (ibid.).[84] Stockhausen's first "pure" pointillist composition, *Kreuzspiel*, was written in the autumn of the same year.

Stockhausen described pointillist form as "equality between all the individual elements—i.e., of the individual tones with their various properties" (*Texte I*, 230).[85] The properties refer to the basic parameters of a musical tone: pitch, duration, intensity, and timbre. In a reference to Messiaen's *Mode de valeurs*, Stockhausen told Karl Wörner that the term pointillism is appropriate "because we hear only single notes, which might almost exist for themselves alone, in a mosaic of sound…formulated individually and in considerable isolation from each other" (Wörner 1963, 81). In Messiaen's piece, the

[83] More accurately, a moment functions as a kind of super-element, one that contains within it the sub-elements of points, groups, and complexes. This is discussed below.
[84] See, however, Sabbe (1994) for a spirited argument that Goeyvaerts invented the term.
[85] "*In der Genese punktueller Formen versuchte ich eine Gleichberechtigung aller individuellen Elemente herzustellen – der Einzeltöne mit ihren unterschiedlichen Eigenschaften"* (quoted and translated in Heikinheimo 1972, 53).

notes are isolated from each other by means of their fixed registers, durations, and articulations (timbre). Thus, "equality…of individual tones" indicates that each tone has its own parametric profile, independent of and separately determined from the other tones. While Stockhausen generally did not use the technique of fixed parameters,[86] he created pointillist textures from the wide distribution of values within each of the four parameters, thus adopting the sound of that earlier work.

A "point," therefore, may be understood as a single tone, characterized by its pitch, duration, intensity, and timbre, and isolated from the preceding and following tones by changes in these parameters.[87] Isolation may also be achieved by the use of silence, before and after a tone. In *Kontra-Punkte*, instances of literal silence are rare and brief, and usually serve a larger articulative function. Instead, Stockhausen uses rests in individual parts to isolate a tone in that part.[88] **Example 3-1** illustrates the concept of points, which are found through m. 6 in all parts except the piano at the end of m. 6.[89]

Groups

Two or more tones may be combined into a group. A group is "a number of tones which are combined through related proportions to a supra-ordered quality of experience, i.e., a group" (*Texte I*, 63).[90] Groups represent "equality of higher organized forms,"

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[86] *Studie I* (1953) is one exception, in which lower pitches are associated with shorter durations.
[87] Coenen (1994, 212) (citing *Texte I*, 76) refers to five parameters, including "place" (spatial location), which plays a role in many later compositions but is not applicable in *Kontra-Punkte*.
[88] See also Sabbe 1994, 68-71, for a detailed discussion of the structure of points in the music of Goeyvaerts.
[89] In the discussion of textural types in part I-B below, I will make a distinction in which durations up to a quarter note are designated as points and longer durations as sustained tones.
[90] "*Mit 'Gruppe' ist eine bestimmte Anzahl von Tönen gemeint, die durch verwandte Proportionen zu einer üubergeordneten Erlebnisqualität verbunden sind, der Gruppe nämlich"* (quoted and translated in Heikinheimo 1972, 124).

created "with characteristic group formations" (*Texte I*, 232).[91] As with points, each group has its own character and shape, formed—and distinguished from others—by its individual parametric profile. The tones within a group all share some value in some parameter (cf. Wörner 1963, 92). They may all be of the same dynamic level, or in the same register, or of the same timbre (the latter is the most common feature in *Kontra-Punkte*). With several tones rather than one, a number of new parameters become operative, such as spatial density (the number of parts sounding simultaneously), temporal density (the speed of attacks), direction of motion, interval, contour, and pitch span or ambitus. Thus, the tones of a group may share a certain direction of change within a parameter, becoming louder or denser, or higher in register. This common characteristic, whatever its nature, unites the tones into a single unit and at the same time distinguishes one group from another. It also allows considerable variety in the other parameters without damage to the integrity and perceptibility of the group. **Example 3-2** shows groups in the clarinet, flute, and piano (see also the piano at the end of m. 6 in **Ex. 3-1**).

Statistical Complexes (or Collectives)

The statistical complex, or collective, is a group-like structure whose density level is extremely high. Stockhausen speaks of statistical forms, which "mediate between collectives organized according to the laws of large numbers, on the one hand, and groups and points on the other" (*Texte I*, 235).[92] Complexes are heard as "aggregations

[91] "*In der Genese von Gruppen-Formen versuchte ich, die Gleichberechtigung in höher organisierten Organismen mit charakteristischen Gruppenbildungen zu komponieren"* (translated by the author; quoted and translated slightly differently in Heikinheimo 1972, 53).

[92] "*In der Genese statistischer Formen versuchte ich, nach Gesetzen der grossen Zahl organisierte Kollektive mit Gruppen und Punkten zu vermitteln*" (translated by the author; quoted and translated slightly differently in Heikinheimo 1972, 92).

of impulses with a high particle density" (Heikinheimo 1972, 96), and as elements that "fuse into a whole from which they can no longer be disentangled" (Wörner 1963, 96-97). A complex is described in terms of the statistical averages in each of its parameters (the "laws of large numbers"). For example, "in a certain complex the predominant dynamic level is [perceived as] *forte*; yet this does not mean that each single note must be *forte*, but that *forte* represents an average value" (Wörner 1963, 97). A complex, then, is a sound made up of several densely packed component sounds, so blended that the individual characteristics of the component sounds cannot be distinguished. **Example 3-3** shows a passage from *Zeitmasze*, cited by the composer as an example of a statistical complex (*Texte I*, 235). Stockhausen does not say, but it seems evident that high levels of both spatial and temporal density are necessary to create a complex: there must be multiple simultaneous parts, and each part must feature a rapid attack tempo. Thus, we may say that a complex consists of two or more groups sounding simultaneously. From this perspective, the flute and clarinet parts in **Example 3-2** create a complex.

Complexes may be understood as one extreme on a continuum of density, with points at the other extreme and groups occupying the middle (Wörner 1963, 99). The lower the density of the texture, the more a listener will tend to hear individual points with their particular pitches, durations, intensities, and so on. The higher the density, the greater the tendency will be to hear a complex characterized by its average parametric values.[93] As with groups, complexes may exhibit a more or less continuous change in one or more of the parameters such that there will be a perception of parametric direction (Wörner 1963, 99).

[93] Heikinheimo (1972, 54-55, 93, 98) notes the "slippery" boundary that exists between points and groups, and between groups and complexes.

In *Kontra-Punkte* there are a number of passages that project what might be called precursor complexes, featuring thick, dense textures the components of which are tightly merged and difficult to separate. For the most part, these passages stand out dramatically from the textures that prevail in the rest of the piece. In each case, I will analyze them as representing one of the six types of "moments" identified by Stockhausen, a concept that will be discussed below in part III.

B. Textural Types in Kontra-Punkte

From a listener's perspective, several other textural types may be identified, some of which are subcategories of Stockhausen's points and groups. A total of eight textural types are described below, variously based on differences of duration, temporal density, and spatial density. In some cases, the effect of dynamics is also discussed. The first four types—points, sustained tones, groups, and melodies—are by far the most frequent, the most salient, and the most significant in the perception of formal units.

Points are defined as tones of very short duration, ranging from one to eight thirty-seconds (up to a quarter note). They are isolated within the particular instrumental part, preceded and followed by rests. In dynamics, they may be static (indicated in the score by a tenuto mark) or, for tones longer than approximately one sixteenth, they may feature a crescendo or diminuendo (the shortest of these may be the cello's triplet-eighth in m. 5; see **Ex. 3-1**). A series of successive points in different instruments may occur at any tempo, from relatively slow to relatively fast, and thus may produce a texture that ranges from sparse to dense. In **Example 3-1**, above, points as defined here occur in the clarinet, mm. 4 and 6; bass clarinet, throughout; bassoon, m. 1; trumpet and harp throughout; and cello, mm. 2, 5, and 6.

Sustained tones (or *pedal points)* are longer versions of points. They have durations from nine thirty-seconds up to nine quarters (or six measures[94]). Like points, they are isolated by rests in the instrumental part and they may have either static or fluctuating dynamics. A series of sustained tones may also proceed at any tempo, producing varied states of either temporal or spatial density.[95]

Within this category there is a wide range of durations. Thus we may perceive relatively short, medium, and long sustained tones. For ease of reference, I will provisionally define short sustained tones as those lasting up to two measures, medium from three to four measures, and long from five to six measures. It should be understood, however, that the boundaries are not fixed and these categories will frequently overlap at the edges. Moreover, both actual and perceived durations will vary according to the prevailing tempo, which ranges from 120 to 200 eighths per minute.

Similarly, the boundary between points of up to eight thirty-seconds and sustained tones of nine or more thirty-seconds is an arbitrary one, based on my own subjective perception, and could easily be shifted somewhat in either direction. Most sustained tones are longer than two measures, making it easier in practice to hear the difference between them. In **Example 3-4**, long sustained tones occur in the bassoon and cello, a medium one in the clarinet, and short ones in the flute, bass clarinet, and violin.

One important sub-category of sustained tones should be noted. The presence of an uncontradicted crescendo on a sustained tone of medium to long duration usually

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[94] While no meter signature is given in the piece, all measures contain a notated duration of three eighths.
[95] Stockhausen most likely would have included my "sustained tones" within the larger category of points, as both may be understood as single isolated notes with individual properties. Similarly, my category of "melody," discussed below, likely would be classified as a group. Perceptually, however, there is a pronounced difference between short and long tones, and between fast and slow groups of tones. It is these differences, among others, that give shape and formal structure to the music.

signals an impending, formally significant, event. An "uncontradicted" crescendo means that there is no other simultaneous sustained tone in another instrument on a diminuendo, and that the crescendo is not followed by a decrescendo in the same instrument on the same pitch. In **Example 3-4**, a crescendo of this type occurs in the cello and in the clarinet. On the other hand, in **Example 3-1** above, the brief crescendo in the bass clarinet is contradicted by the immediately succeeding diminuendo, and the crescendo in the trombone is contradicted by the opposing dynamic motion in the bassoon. These and other examples of the uncontradicted crescendo and its formal role will be discussed in the analyses below.

Groups consist of two or more tones played rapidly and consecutively in the same instrument (see **Ex. 3-2** above, in the flute, clarinet, and piano). A mix of very short durational values will be present, generally less than an eighth note, including quintuplet and septuplet thirty-seconds, thirty-seconds, triplet sixteenths, sixteenths, and dotted sixteenths. In longer groups, short rests may be interpolated. Some groups may contain values of an eighth note or longer, but typically a majority of the tones will be quick. As a result, groups are perceived as moving at a rapid tempo, and thus producing a relative increase in temporal density. Multiple simultaneous groups will also affect spatial density, as was the case in the statistical complex shown above in **Example 3-3**. Individual tones of a group often have varying dynamics, but there is usually a single predominant dynamic level for the total group.

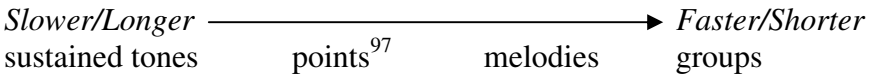
Melodies are slow groups—that is, two or more consecutive tones in the same instrument, with note values of generally an eighth up to a quarter. Again, some melodies may contain shorter values but the overall perception will be one of longer

durations and, hence, a slower tempo. Melodies are usually *legato* in articulation, as opposed to groups in which the successive tones are often detached. In dynamics they are much the same as groups. **Example 3-5** shows melodies in the clarinet, mm. 10-11, and the trombone, m. 12. The two-note figures in the piano and harp contain short internal rests, suggesting points, but might also be heard as connected melodies on the basis of closeness in time. The flute and clarinet figures in m. 8 represent groups because of their faster tempo.

A number of other textural types occur in *Kontra-Punkte* less frequently. *Complexes*, as discussed above, are textures of extremely high density and complexity in which the individual components are difficult or impossible to perceive separately. *Cumulating chords* are built up from the staggered entries of sustained tones, while *disintegrating chords* decay with the staggered exits of sustained tones.[96] *Simultaneous attacks* occur with some frequency, and may be classified according to the number of distinct pitch classes attacked. Simultaneous *unisons* are heard occasionally at the beginning (e.g., mm. 4, 18, 24), becoming more frequent and very prominent in the latter half of the piece (e.g., mm. 184-88; 360-75). Simultaneous *intervals* may involve either two points (e.g., m. 82, bass clarinet and harp), two sustained tones (m. 15, bassoon and cello), or one point and one sustained (m. 1, clarinet and harp). Simultaneous *chords* of three or more pitch classes may likewise contain any combination of points and sustained tones. Unisons, intervals, and chords also occur with non-simultaneous attacks (i.e., cumulating). Disintegrating chords may commence with simultaneous attacks (e.g., mm. 78-79). Simultaneities that contain at least one sustained tone frequently play an important role in initiating a new segment or phrase.

[96] See Kohl 2002 on cumulating and disintegrating chords.

It is clear that the primary factors in projecting individual textural types are temporal density (the speed of attacks) and the related concept of sounding duration. On the continuum of these two parameters, the four principal textural types would be located as follows:



Spatial density (the number of simultaneously sounding voices) is a secondary factor, created and affected by the piling up or thinning out of the textural types. As we will see, dynamics and register are used as additional compositional tools to give definition and character to the texture. Textural types almost always occur in simultaneous or temporally overlapping combinations, such as points and sustained tones, or those two plus groups. It is the change, abrupt or subtle, from one combination to another that will prove most significant in the perception of formal units.

C. Segmentation in Kontra-Punkte

Segments are defined primarily by their textural content, together with additional parametric factors such as register and dynamics. In some cases there may also be a process occurring during the course of the segment, such as becoming louder, or faster, or thinner in density, which contributes to the segment's definition. These characteristics and processes enable the basic elements—pitches—to cohere as a single gesture-like unit. An audible change of content signals a boundary. On a higher level, segments

[97] Within a given instrumental part, points will tend to be at the slower end of the temporal density continuum because they are separated by rests in that part, often for long stretches. On the other hand, a listener does not normally attend (in this piece) to individual parts alone but rather to the overall sound-fabric produced by the entire ensemble. As a result, points sometimes move at moderate to fast speeds, changing instruments with each attack, producing a higher level of temporal density. This is theoretically true for sustained tones as well, although rapid attacks of sustained tones are quite rare in the piece.

themselves will bind together to form larger units to the extent that there is both a contextual basis for coherence and a perceptible differentiation between units.[98]

As I have indicated, the twelve phrases in the first section of *Kontra-Punkte* may be divided into two subsections based on the type of completion: phrases 1 to 6 feature closure while phrases 7 to 12 lack closure; the latter are completed by articulation and have a moment-like character. There is, however, another type of change in formal organization that occurs after the second phrase, one that is reflected both in the larger phrases and especially in the small-scale segmental structure. In the early part of the piece, some segments are characterized by a forward-driving dynamism that creates a buildup of tension and leads to a climax, while other segments have a less active nature that functions as a release of tension. These segmental processes are defined by unidirectional quantitative changes in parameters such as temporal density, spatial density, dynamics, and register, and result in a type of organic construction of the first two phrases.

After m. 27, dynamic processes of this sort become rare, and virtually all segments are characterized instead by some level of stasis. They are not necessarily inactive—there may be extreme density and complexity—but there is little or no increase or decrease of magnitude in the parameters, and no sense of a buildup or dissipation of energy within the confines of a given segment. Rather, there is a relative steadiness of parametric factors during the course of the segment. Each segment becomes more of a sound-object, a building block, placed in juxtaposition with other sound-objects.

[98] Segments tend to be relatively brief, ranging approximately from 3 to 15 seconds with an average duration of 4-5 seconds.

Dynamic processes do continue to occur in phrases 3 through 12, but the structure of these units becomes modular rather than organic.

This stasis of segmental content affects the larger phrases by reducing or eliminating the dramatic curve found in phrases 1 and 2, a change that is very audible with the onset of the third phrase.[99] It does not prevent the formation of phrases but, as we will see in the discussion of phrases 3 through 12, this type of segmental organization produces a different basis for coherence within the phrase.

II. The Formation of Phrases with Closure

A "phrase," as mentioned above, is a formal unit characterized by initiation, coherence, and completeness through either closure or articulation, and this section will be concerned with phrases completed through closure. Initiation is generally achieved through a salient change of material. Coherence is supplied by the unfolding of a process, and in *Kontra-Punkte* there are two types of processes used to build phrases. Phrases 1 and 2 follow the model of tension and release, in which there is an audible accumulation of tension leading to a climax followed by a dissipation of the tension. The climax is characterized by a relatively sudden, loud event that halts the rising tension and triggers the release phase. Closure is marked by the completion of this process and a change of material that signals the beginning of a new phrase. All of these functions are expressed through the particular compositional treatment of parameters such as texture, density, dynamics, and register. The tension/release model is discussed in section A below.

[99] Certain exceptions in phrases 4, 7, and 8 are discussed below.

The change in segmental organization, mentioned above, results in an alternate model based on the process of departure and return, found in phrases 3, 4, 5, and 6 (phrase 4 may also be understood as based on the symmetry model). Each phrase displays an ABA' structure. The return of some aspect of the initial material following a contrasting middle section—as Hasty (1984, 178) puts it, the sense of resolution of a dissonance—assures both coherence and closure of the phrase. Initiation occurs, as before, with an audible change of material. The departure/return model of phrase formation is discussed in section B.

A. The Tension/Release Model: Opening Gesture and Phrases 1 and 2

In this section, I discuss the opening gesture and the first two phrases, with particular attention to the role of textural types in the delineation of form. The score for these units (mm. 1-28) is given in **Example 3-6**, with annotations. The formal organization of these initial passages is fairly complex, and rich in detail. We will find, somewhat surprisingly, that the phrase structure becomes generally looser and more simplified as the piece proceeds.

The Opening Gesture

The succinct opening gesture (mm. 1-3) is composed of points and short sustained tones. A series of seven tones (arranged as six attacks, with clarinet and harp in temporal unison) steadily descend in register from the clarinet's F#4 to the bass clarinet's D2.[100] Each tone is isolated by means of a rest preceding and following in that instrument's part. Variable dynamics contribute to the pointillist character. The low D firmly articulates the end of this miniature formal unit in cadence-like fashion, preceded by its "supertonic" in

[100] Both pitches and dynamics are serialized. See Kohl 2002 for a discussion of Stockhausen's approach to serialism in this piece. The serial structure, however, plays no role in the formal organization.

the cello, by its "dominant" in the harp, and prominently by its "Neapolitan" in the piano. The D-majorish quality of this passage does not recur and is surely an accidental result of factors such as register, pitch content of the series used here, and individual note durations and dynamics. Nevertheless, it is easy to hear a cadential articulation projecting closure of the initial gesture. The feeling of closure is strengthened, first by the brief but noticeable pause after the low D, and then by the sense of a new unit beginning in m. 4 with the sustained unison of the bassoon and trombone on C3, embellished by the clarinet's B4 "grace-note."

Despite their pointillist isolation, the tones within this opening gesture exhibit two types of connectedness, illustrated in **Example 3-7**. In the first type, points occur during the course of a sustained tone. See **Example 3-7a**. Both the bassoon's G and the piano's Eb enter while the clarinet's F# is being sustained. Similarly, the cello's E and the bass clarinet's D enter while the harp's A is sustained. These overlappings, together with the longer duration of the Eb, help to divide the gesture into two parts: the first extending from the initial C#-F# dyad to the piano's Eb, and the second beginning with the harp's A and ending with the bass clarinet's D. A different type of connectedness begins with the harp's C#. See **Example 3-7b**. It is immediately followed by the bassoon's G, which in turn is immediately followed by the piano's Eb. This rhythmic pattern of immediate succession continues through the passage, forming an essentially unbroken *Klangfarben* melodic line: C#4, G3, Eb3, E2, and D2. The sustained tones F# and A may be interpreted as two successive pedal points "accompanying" the melody. This melodic continuity serves to unite the two subparts into a single gesture. Together, these two

parametric processes enable the individual elements to cohere as a perceptible formal unit.

The First Phrase

Returning to **Example 3-6**, the segments of phrase 1 (mm. 4-14) are labeled 1a, 1b, 1c, and 1d. The overall shape of this phrase may be heard in two large parts: first, there is a two-stage buildup of tension leading to a climax with the trombone figure of m. 9 (segments 1a and 1b), followed by a two-stage release of tension resulting in closure (segments 1c and 1d).

Segment 1a is characterized both by the C3 pedal point that sustains throughout the phrase (first in bassoon and trombone, then in piano) and by the sense of drive that takes the unit rapidly from a tentative beginning in m. 3, consisting of relatively quiet and slow-moving points and sustained tones, to the suddenly loud and aggressive piano group at the end of m. 6. This driving progression results from the increasing speed of attacks as well as the thickening of the texture as sustained notes are added. The piano figure picks up the low D2 that ended the opening gesture (m. 3) and carries it down to C#1. Like the opening, this segment 1a follows a primarily descending trajectory, beginning slightly higher than the opening—B4 rather than F#4—and ending at a point eleven semitones below the end of the opening, thus expanding the lower register nearly to its extreme. Segment 1a, the first stage in the buildup of tension, is thus defined by increasing temporal and spatial density, increasing dynamics, and a descending register. Its ending is articulated both by the climax-like effect of the piano group, as all of these parametric processes reach their extremes, and by the start of the next segment.

Segment 1b begins immediately after the piano figure, and does so with a new type of sonority, a simultaneously attacked trichord (**Ex. 3-6**). It is heard as a new beginning partly because of the substantial changes that occur over the bar line of mm. 6-7. The rapid accumulation of attack points suddenly becomes a sustained sonority, the piano timbre changes to non-piano (bassoon, violin and cello, with the strings most salient because louder), and the register moves abruptly from extreme low to middle. These changes in rhythm, timbre, and register create a pronounced disjunction or discontinuity that signals the end of segment 1a and the beginning of 1b. In addition, the continuation of the sustained tones, especially the bassoon's Bb, seems to confirm hearing the simultaneity as part of a new formal unit rather than the previous one. After a moment of sustained sound alone in m. 7, the texture begins to build again with additional sustained tones: first the harp's low G, then the flute's F5 and the clarinet's B4, both of these following a small flurry of rapid attacks (groups). This reiteration in 1b of the process of increasing density and tension just heard in 1a further contributes to the differentiation of the two segments. The harp's low C#-G figure punctuates this buildup just before the climax arrives with the trombone's *forte* Eb-D. Thus segment 1b, the second stage of the buildup, is characterized by increasing temporal and (somewhat) spatial density, as well as increasing volume, and its ending is delineated by the climax.

Segments 1c and 1d provide the two-stage release of tension (see **Ex. 3-6)**. A pause after the trombone figure (except for the sustaining bassoon) is followed by quiet, slow-moving melodies in the clarinet and trombone (segment 1c) and a few isolated points in the bass clarinet, piano, and harp (1d). Both density and overall dynamics are

noticeably reduced, and the register steadily descends from the clarinet's C6 to the harp's F#1. These two segments will be discussed in more detail shortly.

The trombone figure of m. 9 is heard as a climax because of the nature of the material that precedes and follows it. The process of generally increasing temporal and spatial density and dynamics of segments 1a and b is reversed after the trombone figure, producing a general decrease in those parameters. This parametric contour is the principal feature that projects a sense of rising and falling tension during the phrase, and accounts for both the coherence of the internal segments and the closure of the phrase (more on this below). Perhaps the most salient event, though, is the near-silence following the climax. As the trombone enters, all other instruments except for the quietly sustaining bassoon drop out—all rhythmic activity abruptly ceases. It is this sudden cutoff of accelerating attacks and accumulating energy that produces a sense of climax and triggers the following reduction of tension.

In the first half of the phrase, the simultaneity of m. 7 (at the beginning of segment 1b) forms a clear disjunction with the preceding material and thus signals a new segment. At the same time, it also creates connections with what has gone before and with what comes after. The trichord is voiced as an open fifth on the bottom, Eb3-Bb3, with Ab4 above. As **Example 3-8** suggests, these intervallic relations help to associate the chord with earlier segments. The compound perfect fourth in the strings, Eb-Ab, recalls the perfect fourth C#-F# that opened the piece (clarinet and harp, m. 1), as well as the descending fourth A to E in m. 2 (harp and cello). The perfect fifth, Eb-Bb, may be heard as a reference to the descending fifth that closes the opening gesture (A to D in harp and bass clarinet, m. 3), and the minor seventh Bb-Ab of the trichord reflects the

same interval connecting the low D2 at the end of the opening gesture to the C3 pedal that begins the first phrase. From an intervallic standpoint, then, the chord of m. 7 forms strong ties with the opening gesture.

Meanwhile, the pitches of the m. 7 chord form another layer of long-range connections by means of registral invariance (see **Ex. 3-6**). The cello's Eb3 picks up the same pitch prominently heard earlier in the piano (m. 1-2); the bassoon repeats the cello's Bb3 of m. 5 (where it was heard to begin the acceleration toward the piano gesture); and the violin's Ab4 restates the harp's G#/Ab4 of mm. 5-6. These pitch connections are reenacted throughout most of the remainder of the phrase. The bassoon's Bb3 is sustained for five measures (mm. 7-11), after which it is restruck in the piano in m. 12 and again as a grace note in m. 13. In addition, the clarinet in m. 11 plays this pitch in unison with the bassoon. The cello's Eb3 is held for two measures and then becomes the bass of the trombone's two-note climactic figure (m. 9). When the trombone repeats its figure transposed eleven semitones down (m. 12), the pitch Eb3, now written as D#3, becomes the upper note, and is sustained for the duration of a full quarter note. And the Ab4, after being held by the violin for two measures, is briefly recalled by the clarinet in m. 10. **Example 3-9** illustrates these pitch relations and shows the near-symmetric structure formed by them. The "bass" and "tenor" voices produce parallel overlapping lines on Eb and Bb respectively, both of which enclose the "soprano" line on Ab. This structure encompasses essentially the entire phrase, and its near-symmetry helps to produce both internal coherence and external closure.

In addition to these effects, the first phrase is brought to a close by a reduction in rhythmic density, a descent in register, and a liquidation of the trombone motive. In the

five measures preceding the trombone climax, mm. 4-8, a total of nineteen separate attacks are heard. See **Example 3-10**. This relatively high degree of temporal density is significantly reduced in the five measures following the climax, mm. 10-14, to a total of eleven attacks (including the grace note of m. 13). Spatial density is also reduced, as simultaneities are substantially less frequent in this latter part of the phrase. Following the climax, the register reaches up to the clarinet's C6 and then gracefully descends to the harp's F#1. All of these parametric processes contribute to the lessening of tension as the phrase winds down to a close.

At the same time, the musical structure of these closing segments is built of transposed variations of the trombone's two-note ascending figure, Eb3 up to D4. The clarinet first expands the figure to a major tenth (Ab4-C6, m. 10), and then presents the figure as a compound form of the original major seventh (Bb3-A5, m. 11). An exact transposition by the trombone itself (E2-D#3, m. 12) leads to two final statements of the motive with inverted contour in mm. 13-14: the piano's Bb3 down to A2 invokes pitch-class identity with the clarinet's second figure, and the harp's C2 down to F#1 contracts the original interval to six semitones. In this way, the defining characteristics of the trombone figure—interval and contour—are gradually removed, the motive is thus liquidated, and a sense of closure is confirmed.

In this first phrase, the lower register is opened up nearly to its extreme (C#1) and remains active throughout the phrase, but the upper register remains largely unexplored. The pitch B4 forms the upper boundary, except for a few brief forays by the flute and clarinet (mm. 8, 10-12). It will be the second phrase that expands the upper register.

The Second Phrase

A structural pattern of tension and release, very similar to that of the first phrase, is also found in the second phrase, mm. 15-27 (see **Ex. 3-6**). The first-stage buildup, segment 2a, is reinforced as a unit by the bassoon's D2 pedal point as well as the overlapping sustained tones of the cello and clarinet, and leads to the piano's mostly loud and high-pitched figures of m. 20. A feeling of goal-directed motion is created by the bassoon's loud and relentless sustained tone on the low D, the uncontradicted crescendo in the cello and clarinet, and the increasing temporal density from m. 17 on. The sudden cutting off of the sustained tones—especially of the crescendos at their loudest points—highlights the piano figure of m. 20 as the climax-like goal. It is followed by what begins as a diminution of tension as the volume, register, and density generally decrease (mm. 21-22, marked as segment 2a' because the overlapping A5's of the violin and flute give a sense of continuation of 2a). But the violin's high G harmonic, with its surprisingly loud crescendo, contradicts the sense of relaxation and ushers in the brief second stage of the buildup, segment 2b. The rhythmic acceleration of the flute and clarinet groups is complemented by the crescendo of the clarinet and strings. Together with the piano's two-note figure touching the registral extremes, these dynamic gestures lead to the phrase's climax on the trumpet's G5 (m. 25).

As with the trombone climax of the first phrase, the trumpet figure cuts off all rhythmic activity, though for a shorter period of time—a quarter note here versus more than a half note in the first phrase. The dissipation stage (segment 2c) follows. Although it moves much more rapidly than before, this stage features a significant reduction in density levels and a registral descent to the low C2 of the harp and cello, all within the space of two measures. Once again, a sustained tone—the violin's Eb5, accompanied by

the piano's simultaneous high E7 of m. 28—seems to signal the beginning of a new phrase. This is due in part to the change of register (albeit anticipated by the harp's F#6 of m. 27), but also to the effect of the contextually established norms of the piece so far, in which simultaneously struck sustained tones tend to initiate a new formal unit (the unison C's of m. 4; the trichord of m. 7; the D and C# of m. 15). Thus, much like the first phrase, this second phrase is formed by the increasing and then decreasing magnitudes in the parameters of density, dynamics, and register.

The second phrase does not exhibit the same sorts of internal pitch relations found in the first phrase. There are, however, a number of connections between the two phrases that suggest hearing them as a related pair. The bass clarinet's Bb3 midway through the second phrase (m. 22) audibly recalls the bassoon's lengthy statement of the same pitch in the first phrase (mm. 7-11). The flute and clarinet groups toward the end of the second phrase (mm. 23-24) are easily related back to the brief flurry of the same instruments in the first phrase (m. 8, perhaps also the clarinet of m. 10); indeed, the later event may be heard as an expansion of the earlier one, adding both depth and complexity. More importantly, the two phrases produce parallel structural designs. Both begin with a two-stage buildup of tension, both lead to a climax in the brass section that temporarily halts all rhythmic activity, and both close with a reduction of tension by way of parametric diminutions. Finally, as suggested above, there is a strong registral relationship between the two phrases: the first opens up and largely occupies the lower register, while the second does the same for the upper register. See **Example 3-11**. Phrases one and two are thus related in ways that are projected by audible musical features such as register and timbre. This larger unit may also be heard to incorporate the opening gesture, based on

the invariant pitch structure discussed above (see **Ex. 3-9**) as well as the connection between the bass clarinet's conclusion of the opening gesture with the low D2 (m. 3) and the bassoon's initiation of phrase two on the same pitch (m. 15).

We have seen the formation of an initial fragment and two substantial phrases based on the tension/release model. The phrases are formed by an organic process of accumulation and dissipation of tension that enables the internal segments to cohere and the larger phrase to close. Both segments and phrases are delineated by their parametric definition, especially in the domains of texture and density. Formal functions (initiation, buildup, closure, and so forth) are implemented through the manipulation of parametric values, such as gradual or abrupt changes in density, dynamics, and register. A number of relations link phrases 1 and 2 as well as the opening gesture, making it possible to hear them as a larger unit. After the second phrase, however, the formal organization moves away from this tightly knit, organic style and begins to take on a more modular organization.

B. The Departure/Return Model: Phrases 3 through 6

Beginning with phrase 3, segments no longer exhibit a forward-driving buildup of tension leading to a climax. Rather, they most often occur as unified blocks of sound, essentially static, and relatively differentiated from one to the next. These smaller units do, however, continue to combine into larger units. In phrases 3, 4, 5, and 6, the segments combine on the basis of the departure-and-return model. A starting state, defined by textural and parametric factors, is succeeded by a contrasting state; a return to the starting state completes the process. This symmetric process provides both coherence

and closure, thus allowing these units to be heard as phrases.[101] **Example 3-12** sets out the score of phrases 3 through 6, mm. 28-56, with annotations.

Phrase 3 is primarily formed by the departure/return model, although similarity (discussed in more detail in Part III) also plays a role. The phrase comprises three segments that are individually delineated by a particular textural type. The first is strongly characterized by the sustained tone in the violin, accompanied by points in the piano (segment 3a). An abrupt change to a fragmentary melody in the upper woodwinds (3b) is followed by another sustained tone in the violin (3c), which begins early and overlaps with 3b. The brass on D4 punctuate the melody, while isolated points in the cello, piano, and harp provide a varied background to the violin's sustained tone of 3c. Similarities among the three segments are evident in their high register, low spatial density, and generally quiet dynamics. At the same time, there is a noticeable progression of textural types, as the sustained tone gives way to melody, followed by a return to another sustained tone. See **Example 3-13a**.[102] The textural departure and return is reinforced by a parallel progression in temporal density, which begins low, increases suddenly in segment 3b, and diminishes again in 3c. See **Example 3-13b**. These symmetries supply both coherence, grouping the three segments as a unitary process, and closure as the process is completed with the return of the starting state. The unit may thus be heard as a phrase, albeit shorter and differently organized than the earlier two. The uncontradicted crescendo on the violin's high G# gives a sense of

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[101] As noted in Chapter 1, the process of departure and return is differentiated from that of symmetry by the presence of a contrasting middle section in the former. Nonetheless, there is a strong sense of symmetry associated with the departure/return process, and my comments will sometimes reflect this perceptual phenomenon.

[102] In **Examples 3-13 to 3-16**, the following abbreviations are used: P = points; S = sustained tones; G = groups; and M = melody.

"leading" to something, and its sudden cutoff at m. 35 helps to demarcate the boundary with the following phrase 4.

The violin's crescendo does indeed lead to something, namely a rapid descent in register (segment 4a) followed by a unique textural passage in which there is a near-tutti on sustained tones (4b). See **Example 3-12**. The brass's Eb and Ab are the most prominent, because of their duration, loudness, and distinctive timbre, and the hairpin crescendo and decrescendo in these instruments provide the experience of departure and return that characterizes phrase 4 as a unit. The relatively steadily loud passage at mm. 38-40 represents the contrasting middle section. The dynamic process spans and unites the two segments, and the completion of the trumpet's diminuendo (m. 42) marks a strong sense of closure. A parallel rise and fall in spatial density is produced by the rapidly accumulating number of voices on sustained tones, followed by an equally quick reduction as voices exit one by one. See **Example 3-14**. This phrase could also be heard as based on symmetry, in which there is no actual contrasting middle state but rather a continuous gradient from soft to loud, followed by a retrograde diminuendo.

The general profile of increasing volume and density followed by a decrease in those factors may also suggest the tension/release model of phrase structure. There are similarities between those two structural types, and the boundary between them is not always clear. One important difference is the absence of a climax. In phrase 4, there is no event that marks the crest of the dynamic swelling. The music simply moves, smoothly and unobtrusively, from a condition of growing louder to one of growing softer. The passage gives the impression of a single gesture, like the inhaling and exhaling of a single breath.

Phrase 4 is the first of three passages that resemble Stockhausen's concept of the statistical complex. As we will see, this concept is nearly identical with one of Stockhausen's moment-types, the "gestalt." This form will be discussed below in part III-D, but it will be helpful to point out here some of the relevant characteristics. The passage is a simultaneous multi-part construction in which the high level of spatial density makes it difficult for the listener to distinguish at least some of the individual parts. The disparity in dynamics and timbre permits the loud sustained tones of the trumpet and trombone to dominate. We are aware of the presence of some background sound, but the soft tones in the woodwinds and cello generally cannot be made out individually. The combination of multiple sustained tones of relatively long durations produces the sensation of an immobile sound object, a sound mass that—apart from the dynamic envelope of the brass—is largely without definition. It is this thick dense texture whose component parts cannot easily be perceived separately that corresponds to Stockhausen's idea of a "gestalt" (and of a "complex"). Phrase 4 is in distinct contrast to the delicately etched lines of the preceding phrase. Its gestalt-like characteristics will return, to an even greater degree, in the following phrase 5 and again in phrase 10.

What I have labeled segment 5a in **Example 3-12** sounds very much like a "starting over," as if the music of phrase 4 were about to begin again, transposed a major third higher from the trumpet's Ab4 to C5. Instead, the sparse sustained tones of the trumpet and flute rapidly give way after a crescendo to another unusual passage in which multiple groups moving at relatively quick tempos are counterpointed against one another (5b). Like phrase 4, phrase 5 features a rapid increase and decrease in density, this time in both spatial and temporal density, and including dynamics. **Example 3-15** illustrates

the symmetry of temporal density. Phrase 5 is closer to Stockhausen's conception of a "gestalt" than phrase 4. It is true that individual parts can be made out at times, especially in the progress of the top-most voice from the clarinet's A5 and Db6 to the flute's B6 (mm. 45-46). But the cacophony of polyrhythmic voices, mostly occupying the upper register, produces a much greater level of textural density and complexity than ordinarily occurs in this piece (it will occur only once more, in phrase 10). This passage stands out as the most complex formal unit we have yet encountered in the work, a fact that will be significant in the later discussion of large-scale form. The passage is essentially brought to an end by the trumpet's sforzando G3, doubled by the clarinet and echoed in the strings. A very brief winding-down stage follows in segment 5c, whose quiet dynamics and sustained tones relate back to the similar texture and low density of segment 5a. Segments 5a and 5c thus act as framing units, setting in relief the eruptive passage of 5b, and the sense of departure and return provides the coherence and closure that define phrase 5 as a unit. Closure is enhanced by the lower register in segment 5c.

Phrase 6, the last example of the departure/return phrase model, has many structural similarities to the third phrase. Texturally, both phrases feature two outer segments with mostly quiet sustained tones, while the louder and more active middle segment (melody in phrase 3, groups in phrase 6) is perceived as a discontinuity. See **Example 3-16a** (and compare **Ex. 3-13a**). Both phrases also undergo a rise and fall in temporal density. In phrase 6, each outer segment contains a measure in which no attacks occur (mm. 50 and 56, indicated in **Ex. 3-12**), resulting in very low temporal density and dynamic levels. This contemplative atmosphere is interrupted by the flurry of activity in segment 6b, as a number of brief but loud groups in the clarinet, bassoon, trumpet, and

cello suddenly raise the density and dynamic levels. See **Example 3-16b**. The stark contrast of 6b makes it easy to hear the near-silence of 6c as a return to the starting state of 6a.

Up to this point, the boundaries between phrases have been relatively clear, articulated by changes in register and texture (refer to **Ex. 3-12**). Phrase 3, which is entirely in the upper register, is followed by a generally descending passage (4a). Phrase 4, while occupying all registral spans, is primarily heard as a middle- and low-register event (most of the louder tones are in those registers), and phrase 5 similarly sounds mostly in the middle and upper registers. These registral changes are reinforced by pronounced changes of content, as the sparseness of phrase 3 changes to the thickened textures of phrase 4, followed by the dense contrapuntal texture of phrase 5.

The beginning of phrase 6 is articulated in similar ways, although the parametric discontinuities are perhaps less strongly asserted. The large but mostly soft simultaneity of m. 49 is emphasized as a formal juncture by the harp's resonant G#/Ab1 in the low bass register, contrasting with the higher register of the previous phrase. The tones of the simultaneity are sustained, a phenomenon that has been used before in the piece to signal initiation: phrase 2 (m. 15) and phrase 3 (m. 28). And there is a substantial change of timbre, as all instruments sounding in m. 48 (flute, bass clarinet, bassoon, trumpet, trombone, and cello) drop out and are replaced by all the other instruments in m. 49 (clarinet, piano, harp, and violin). These parametric changes in register, texture, and timbre suggest that m. 49 marks the beginning of a new unit, and this is confirmed as the ABA' structure of phrase 6 unfolds.

In the preceding discussion, each of the phrases 1 through 6 exhibits the identifiable functions of initiation, coherence, and completeness via closure. Closure in these phrases is achieved through the completion of a process, one of tension and release in phrases 1 and 2, and of departure and return in 3 through 6. In the following phrases, there is either a failure of closure (phrase 8) or a complete absence (7 and 9-12). Yet each phrase projects a perceptible sense of unity and articulation. This combination of internal coherence and external differentiation without closure is the essence of Stockhausen's idea of "moment."

III. The Formation of "Moment"-like Phrases without Closure

A phrase has been defined to require completeness, and up to now the phrases we have encountered have all been completed through closure—that is, completion of a process. In contrast, closure is lacking in the phrases discussed in this section. The absence of closure, however, does not necessarily prevent the formation of a phrase, provided there is articulation sufficient to complete the structure, thus closing it off to further accretion of elements. Such phrases may be thought of as "moment-like" precisely because they exhibit coherence without closure. (The term "moment" will be defined in greater detail below.) Coherence is achieved in one of two ways: the process of directed parametric change in phrases 7 and 8, and the parametric similarity among segments in phrases 9 through12. The following two sections discuss these phrases from the point of view of coherence, while the implications of the lack of closure are addressed in section III-C.

A. Directed Parametric Change: Phrases 7 and 8

The term "directed parametric change" describes a formal unit in which there is a unidirectional increase or decrease of values in one or more parameters. There may be small opposing changes, but the overall perceived trajectory will be a single direction—for example, becoming louder or softer, ascending or descending in register, and the like.[103] Having reached a certain magnitude on the continuum of the particular parameter, the unit ends; there is no resolution and no return to the starting state.[104] Cohesion of the segments is supplied by the relatively constant motion in the same direction.

Phrase 7 begins with quiet dynamics and a low level of density at the start of segment 7a, though both parameters represent a noticeable increase after the near-silence at the end of phrase 6. See **Example 3-17a**. (For reference to the end of phrase 6, see **Ex. 3-12.**) The initial points are soon joined by a few sustained tones, which begin a gradual increase in spatial density.[105] Segment 7b is delineated by the entry of the violin's sustained high G#6. There is a subtle change of texture between 7a and 7b, as the added sustained tones of the violin, flute, and clarinet quicken the rate of increase in spatial density. At the same time, the violin's high register, initial loudness, and especially the crescendo act together to increase both the dynamics and the overall tension level of the passage. The chord of segment 7c serves as the goal of the violin's crescendo, but rather than releasing tension, the chord produces a marked increase in dynamics and spatial density. **Example 3-18** illustrates the density pattern in this phrase.

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[103] The concept of directed parametric change is adapted from Stockhausen's concept of "process," associated with his six specific types of moments, and will be discussed below in part III-D.

[104] We have seen this formal type in the clarinet solo of Babbitt's *Composition for Four Instruments*, in the registral expansion without contraction of phrases 2 and 3 (Chapter 2).

[105] Segment 7a includes a number of pitch doublings, some simultaneous—D#/Eb5 in strings and harp, A4 in harp and trumpet, and others in succession—the low Gb in trombone and piano, F3 in bass clarinet and piano, E4 in violin and flute.

The chord's multiple simultaneous attacks and its unusual wide spacing (see **Example 3-19**) create a unique sonority that has the effect of an augur, a signal of something important to come, thus further raising the tension level.[106] The density and volume of phrase 7 increase gradually in 7a, and then by leaps in relatively discrete stages in 7b and 7c, together producing an ongoing unitary direction of change that enables the segments to cohere as a unit.[107] Another crescendo, this time within the chord of 7c, leads after a brief delay from the flute's high F# to the explosion of the piano solo.

The piano of phrase 8 is the first extended solo passage in the piece, and this as well as its virtuosic display render the phrase particularly salient. See **Example 3-17b**. In addition to its unique timbre, the phrase is defined by an initially high spatial and temporal density in segment 8a, followed by a significant drop-off in 8b, and finally a reduction to a few isolated points in 8c.[108] See **Example 3-20**. It is this basic trajectory of decreasing density that provides the directed parametric change and supplies cohesion to this phrase. There is a slight increase in spatial density in 8a as single notes are largely replaced by chords in m. 69, but the rapid and relatively regular tempo of the single tones results in an overall perception of a thick texture. Similarly, there is a slight increase in temporal density in 8a, but the general sense is that of a highly active and intense texture at the beginning of the phrase that gradually becomes less so, in discrete stages, toward the end.

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[106] The very interesting dynamic shape of this chord resembles the marking *sfp cresc,* often seen in brass or woodwind parts. The initial loud attacks in piano and harp immediately begin to decay, while the initial soft attacks in the other instruments gradually grow louder.

[107] The chord of 7c is intimately connected to the preceding segments of phrase 7 by a number of pitch repetitions: clarinet and harp's B5 takes over from the flute; bassoon and piano's Bb3 from clarinet's A#; piano's Ab6 from violin; piano and violin's D6 from harp. Other doublings within the chord include C3 in trombone and harp; A2 in piano and cello; and E2 in bass clarinet and harp.

[108] In my analysis, there is an overlap of segments 8c and 9a in mm. 75-77, in which the piano part is the continuation of 8c while the strings initiate 9a. This is discussed below.

Phrases 7 and 8 act as a transition of sorts from this dynamic mode of directed parametric change to the more static one discussed below as "similarity." Within each phrase, there is some aspect that is perceived as relatively unchanging. In phrase 7, except for the brief segment 7c, the texture is mostly quiet, sparse, and pointillist. Phrase 8 is dominated by a single timbre in a primarily loud, dense, fast-moving texture. These intra-phrase parametric consistencies serve as preparation for the remaining phrases in this first large section.

B. Similarity (Stasis): Phrases 9 through 12

In contrast to the previously discussed phrases, phrases 9, 10, 11, and 12 do not feature any process. Rather, there is a general similarity of content and structure within individual phrases, and it is this homology that provides the coherence of each phrase. At the same time, these phrases differ from each other markedly in their individual sonic attributes, their overall sound. Partly as a result of this, they will be seen to have very different functions in the large-scale form. **Example 3-21** provides the score for phrases 9, 10, 11, and 12, including the end of phrase 8.

An overlap occurs at the juncture of phrases 8 and 9; material from each phrase is disposed as separate contrapuntal streams in mm. 75-77. The piano part is heard as the continuation and, indeed, the winding down of phrase 8's piano solo, while the cello's low E at the end of m. 74 sounds as a new character tentatively entering the stage before the soloist is finished, joined shortly by the violin. This layered effect is created by the wide registral spacing between the piano and strings, by the sustained tone in the cello (as opposed to the staccato punctuation of the harp and strings in m. 73), and by the disparity in temporal density—although the piano is much less active in these measures than

during the solo, it is notably more active than the strings, which remain motionless on the perfect fifth G#-D# until the rest of the ensemble enters at m. 78. At that point, the melodic motion from the cello's D#5 to the clarinet's A5 reveals that the strings are an integral part of the subsequent ensemble material, rather than part of the previous piano passage or a stand-alone unit. Both the strings and the piano then become absorbed into the fabric of the new phrase.

Phrase 9 thus begins with the cello's E2 at the end of m. 74, leading to the sustained perfect fifth G#4-D#5 in the violin and cello. Segment 9a is primarily composed of sustained tones, as the strings' perfect fifth is followed by the simultaneously attacked sustained chord in the winds and high piano (m. 78-79). A brief melody asserts itself in the top voice as the cello's crescendo on D#5 is followed by the clarinet's entry on A5 at the same dynamic. Segment 9b is prominently defined by the repetition of this melody, now in the trumpet (Eb5, m. 80) and the violin (A5, m. 81), while texturally this segment comprises a mixture of sustained tones and points. The transposed repetition of the strings' perfect fifth from G#-D# in 9a to D-A in 9b further relates these two segments. The sustained tones largely drop out in segment 9c, leaving a relatively quiet pointillist texture in the low-to-middle register.

Although the segments of phrase 9 are texturally differentiated as just described, there are a number of parametric similarities among them that contribute to a sense of relative stasis within the phrase. The spatial density moves from moderate in 9a and 9b to low in 9c, and temporal density from low in 9a to moderate in 9b to a kind of low-moderate in 9c. Dynamics similarly range from moderate to low, and the passage gravitates from a mostly middle-high to middle-low register. Changes certainly occur,

but they are relatively small and undirected, and the extremes are mainly avoided. There is neither a symmetrical arrangement of segments nor a unitary direction of parametric change. There is no strong sense of contrast, either in textural types or in parametric values. The passage as a whole is perceived as essentially similar—and essentially moderate—in density, dynamics, and register.

Several distinctive pitch configurations reinforce this interpretation. In addition to the repeated D#-A melody and the transposed perfect fifth (as perfect twelfth), segment 9c begins with the harp's loud and resonant D4, picking up the cello's immediately preceding pitch, and ends with the cello's noticeable octave transposition of that pitch (D3, m. 87). Moreover, the ascending tritone of the upper melody is symmetrically answered with a large-scale descending tritone from the violin's long-sustained G#4 to the cello's (and the harp's) D4. These pitch relations within phrase 9, summarized in **Example 3-22**, create a pervasive sense of repetition, of similarity by way of pitch content, that suggests the essential non-progressive nature of stasis.

Although phrase 9 is primarily characterized by similarity, the concept of directed parametric change may also play a role. There is an overall textural progression from sustained tones (9a) to sustained-plus-points (9b) to points alone (9c), and some listeners may hear this as an example of a directed progression. Formal coherence is achieved in many ways, and two or more methods may be combined within a single unit, as we saw in phrase 3 where both departure/return and similarity were present.

After the quiet points of segment 9c, the abrupt onset of extreme density and loudness at m. 88 marks a clear boundary at the start of phrase 10 (see **Ex. 3-21**). Like the earlier phrase 5, the passage marked as segment 10a presents a highly complex

"gestalt" (in Stockhausen's terms) whose several parts, moving at very rapid tempos, are difficult to separate into individual components. One hears basically a single, multi-colored group. This brief monolithic sound block, located mostly in the upper register, is brought to an equally sudden halt by the piano's sforzando D4 (m. 90), followed by a brief winding-down stage (segment 10b) of drastically reduced density. The phrase is analyzed as one of similarity because, even though its two segments move from greater to lesser values in all parameters, it is dominated by the great outburst of activity and complexity of segment 10a, while 10b sounds as a kind of breathing space, almost as a literal pause in the music.

I have analyzed measures 85-87 as the last segment of phrase 9, but another interpretation is quite possible. See **Example 3-23**. In this view, the segment is heard as the beginning of phrase 10, segment 10a, and the high-density music of mm. 88-89 becomes the contrasting middle segment 10b, followed by a return to the quiet dynamics and lower density in 10c. The sense of return in 10c projects a symmetric structure of the sort seen earlier in phrases 3 through 6. This interpretation is both strengthened and weakened by the ambiguous role of the pitch D4. As described above, the cello's D4 in segment 9b (m. 83) is prominently repeated by the harp at the start of 9c, making a strong and direct connection between these two segments and supporting my original interpretation of mm. 85-87 as part of phrase 9. On the other hand, the piano uses the same pitch to punctuate the end of the high-density passage (m. 90). The audible relationship with the harp's earlier D4, preceding that passage, encourages hearing the questioned measures as the beginning of phrase 10. This segment may be an example of

a true elision, in which the same material serves as both the end of phrase 9 and the start of phrase 10.

Another marked change of texture brings the extended melodies of phrase 11 (**Ex. 3-21**). Phrase 11 stands out for its lack of subdivision—there are no noticeable changes of content that would indicate the presence of segments. At the same time, it bears no similarity or other relationship with the preceding and following material, and for this reason I hear it as an independent unit. The emphasis on the flute and clarinet reminds us of the earlier brief passages involving melodic motion in those instruments (see segments 1c and 2b in **Ex. 3-6**, and 3b in **Ex. 3-12**). The relative steadiness of texture, density, and dynamics gives coherence to the phrase. While the temporal density is relatively high, it is much lower than the complexity of the previous phrase. This comparatively low density, together with the legato articulation and soft dynamics, produces a kind of step-down unit that bridges the gap between the explosive eruption of phrase 10 and the pronounced stasis of the following phrase 12.

This final phrase of the first large section of *Kontra-Punkte* slips in almost unnoticed, marked primarily by the cessation of the preceding melodies. Phrase 12 is characterized by a nearly total stillness and calm, unprecedented in the piece in its depth and its duration. Segments 12a and 12c are alike in character—low in density, mostly quiet (after some initial loud tones), mostly low register, texturally comprising points and sustained tones—and they make up the majority of the phrase (16 of the 20 measures). Segment 12b, with its flurry of activity heralded by the trombone's sustained crescendo, acts as a brief interruption, like the tossing of a pebble onto the placid surface of a lake. But the interruption is a controlled one, evidenced by the rhythmic coordination of the

five participating instruments, all moving together through a set of triplet sixteenths plus two thirty-seconds. And the ripple effect is minimal, as the music returns almost instantly to an even greater level of stillness than before the interruption. Segment 12c ends with approximately two measures containing no attacks (middle of m. 113 to middle of m. 115) and only a single, very soft, sustained tone in the bass clarinet, producing a significant drop in density and dynamics. Sustained tones disappear in segment 12d. A few pointillist tones interspersed with short silences lead to the longer silence of the fermata.[109] The textural and parametric similarities of 12a and 12c give coherence to this longest phrase of the piece so far. The brief interruption of 12b and the slight changes of 12d act only as punctuation of what is otherwise a prolonged diminuendo.

C. Problems of Closure and Articulation

In the preceding discussion, I have shown how formal coherence may be achieved in a number of ways: the arc of tension and relaxation in phrases 1 and 2; the symmetrical departure and return in phrases 3 through 6; the directed parametric changes of phrases 7 and 8; and the internal parametric similarities in 9 through 12. I have also indicated that the first six phrases are differentiated from the last six by the presence of closure in the former and its absence in the latter. The absence of closure raises the question of whether these formal units may in fact be perceived as phrases—whether there is a sufficient integration and unification of the component parts to produce the sense of "wholeness or completeness" (Hasty 1984, 171) that we associate with a phrase.

[109] It is possible to hear segments 12a, b, and c as a single phrase, organized on the departure/return model in density and dynamics, with 12d as a brief, stand-alone unit acting as a codetta.

Closure is an internally motivated event that is derived from the logical completion of an internal process. One purpose of closure—perhaps the main purpose in post-tonal music—is to put an end to the accretion of internal elements, so as to enable those elements to cohere (Hasty 1984, 179, 188).[110] Thus, the completed process that produces closure is normally the same one that provides coherence. The release of built up tension (phrases 1-2) or the return to a starting state (3-6) brings the process to an end and is felt as closure of the formal unit.[111] The absence of closure in phrases 9-12 occurs because they are structurally based on similarity of their internal segments, rather than on a process. Their very similarity of content—the lack of salient changes in texture, density, and overall parametric values—prevents such processes from arising. Phrases 7 and 8 do engage a process, the directed parametric changes discussed above. In phrase 7, though, the changes create an increase of tension that is left unresolved within the boundaries of the phrase. The process gives the impression of being incomplete, thus negating a sense of closure. The end of phrase 8, segment 8c, may be heard by some listeners as closing off the unit, because of the reduced density in the piano solo. But the closural function is contradicted by the simultaneous initiation of phrase 9 in the strings, as well as by the essentially unchanging wide registral span and loud dynamics from beginning to end of phrase 8. Despite the absence of closure, however, phrases 7 through 12 present distinct, well-defined "chunks" of music that are readily perceived as independent formal structures.

There is another factor besides closure that has a significant role in creating the boundaries of any formal unit, namely, the perceived initiation of a new unit. In contrast

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[110] As Hasty (1984, 171) notes, too many elements or too long of a duration prevents integration.
[111] The feeling of closure resulting from the completion of a process could, in principle, be contradicted or cancelled outright by other events.

to Hasty's (1984) concept of closure, Tenney (1980) relies exclusively on successive initiations as the means of delineating the end of preceding units. Tenney's discussion is expressly limited to monophonic music (208), but we have already seen examples in *Kontra-Punkte* in which the ending of a phrase is clarified by the start of a new one (the endings of phrases 1, 2, and to some extent 5). In each case, the new phrase is initiated by a perceptible change of material, for example, a sustained simultaneity following a more pointillist passage.[112] Phrases 7-12 are significantly different from each other in their individual sonic attributes, as can be seen in the following tabulation which lists each phrase's dynamics, density level, and textural type(s):

Phrase 7 – mostly quiet; low density; points and sustained tones
Phrase 8 – loud; high density; groups
Phrase 9 – moderate dynamics and density; points and sustained tones
Phrase 10 – loud; high density; groups
Phrase 11 – quiet; moderate density; melodies
Phrase 12 – mostly very quiet; low density; points and sustained tones

Thus, considering dynamics alone, the phrases move from mostly quiet to loud, moderate, loud, quiet, and ending with very quiet. These prominent differentiations produce clear initiations of new phrases, marking the ends of the preceding ones and resulting in unambiguous boundaries. Where the parametric distinctions are less clear, as between 11 and 12, the boundaries are correspondingly weaker. The perception of initiation substitutes for closure in stopping the accretion of elements, enabling both coherence and segregation of the unit.

These latter six phrases can, I think, be perceived as phrases despite the lack of closure, because they are prominently articulated. In phrases 7, 8, 9, and 10, the

[112] We have also seen examples of this technique in the clarinet solo of Babbitt's *Composition for Four Instruments* (endings of phrases 1, to some extent 3, and 5), where the changes of material involve motivic, intervallic, and/or rhythmic alterations.

articulation at the end of the phrase, produced by the perceptible initiation of a new one, creates an unambiguous boundary which, together with the distinctive content of each phrase, allows the perceptual integration of those contents. The boundary of phrase 11 is less clear because the initiation of phrase 12 is less clear. Yet the unique content of phrase 11—a counterpoint of melodies—sets it apart from the very different content of phrase 12, and the replacement of the one sort of texture by the other signals the start of a new phrase. Phrase 12 is articulated differently; rather than the initiation of a new phrase, it is followed by the silence of the fermata. In itself, the silence forms a strong boundary, and in this case it seems to occur naturally as the inexorable conclusion of the long diminuendo of the phrase. Thus, each of these phrases is brought to completion by the occurrence of a salient event. Phrases 7 through 11 exhibit *external* articulation in which the phrase is ended by means of the perceived start of a new phrase. Phrase 12 presents an instance of *internal* articulation in which the closing event—silence—grows out of the material of the phrase.

I have argued that articulation may serve as an alternative to closure in satisfying the completeness requirement of a phrase (this will be addressed further in Chapter 4). Nevertheless, articulation will often be perceived as less conclusive than closure, in part because such a phrase lacks the goal-directedness associated with processes that lead to closure. This less conclusive, non-goal-directed nature of phrases 7 through 12, in combination with a perceptible level of coherence and distinctiveness, closely resembles Stockhausen's idea of "moments." The following section provides an overview of Stockhausen's theory of moment form, with particular attention to the characteristics of the various moment-types.

D. Stockhausen's Theory of Moment Form

For purposes of this study, we may distinguish two general aspects of Stockhausen's theory of moment form. One has to do with the philosophical and aesthetic notion of "unending form," that is, "forms in a state of always having already commenced, which could go on as they are for an eternity" (*Texte I*, 198-99).[113] Such forms are non-dramatic, non-developmental, and non-goal-oriented (ibid.). They do not begin and end in the sense of something that rises from its origins and then returns to extinction; rather they simply start and stop, as a section of a larger temporal continuum (*Texte I*, 207).[114] In this type of form,

> Every present moment counts, as well as no moment at all; a given moment is not merely regarded as the consequence of the previous one and the prelude to the coming one, but as something individual, independent and centered in itself, capable of existing on its own. (*Texte I*, 199)[115]

Stockhausen later added that, although self-sufficient, a moment "always can be related to its surroundings and to the entire work" (*Texte I*, 250).[116]

Kontra-Punkte is not a moment-form composition in this sense of the term. Although far from traditional, the piece has a clear dramatic curve and directional orientation, as evidenced in the several progressive transformations that occur over its course (dropping out of instruments, shortening of durations, overall diminishing of dynamics, and so forth). Stockhausen himself classified the form of the piece as pointillist (*Texte I*, 230), though the progression from a texture of mostly points to one of

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[113] "*Die immer schon angefangen haben und unbegrenzt so weiter hehn könnten*" (quoted and translated by Heikinheimo 1972, 120).
[114] See also Heikinheimo 1972, 121; Kramer 1978; ibid. 1988.
[115] "*In denen entweder jedes Gegenwārtige zāhlt oder gar nichts; in denen nich rastlos ein jedes Jetzt als blosses Resultat des Voraufgegangenen und als Auftakt zu Kommendem, auf das man hofft, angesehn wird, sondern als ein Persönliches, Selbstāndeges, Zentriertes, das für sich bestehn kann*" (translated by Heikinheimo 1972, 120).
[116] "*…und das als Einzelnes auch immer auf seine Umgebung und das Ganze beziehbar ist*" (translated by Heikinheimo 1972, 122).

mostly groups suggests a hybrid pointillist-group form.[117] However, these points and groups combine to form larger units and, as we have seen, the absence of closure in phrases 7 through 12 creates the type of less conclusive, non-goal-oriented formal unit that Stockhausen describes.

The other aspect of moment form has to do with the structure of individual moments. In the article "Momentform," which comprises a detailed discussion of *Kontakte* (1958-60) for electronic tape, piano, and percussion, Stockhausen tells us that a moment is "any formal unit that is recognizable by some personal and unmistakable characteristic" (*Texte I*, 203).[118] This may be understood as a requirement for distinctiveness, a unique characteristic, and to some extent also includes the concept of coherence. The definition is elaborated with some categorical distinctions:

> From a formal point of view, a moment can be a gestalt (indivisible), a structure (divisible), or a mixture of both; and from a temporal point of view, it may be a state (static), or a process (dynamic), or a combination of both. (*Texte I*, 201)[119]

Heikinheimo suggests (1972, 146-47) that Stockhausen's concepts of structure and gestalt are essentially the same as Ligeti's concepts of structure and "texture." Ligeti writes:

> With the word 'structure' I intend to refer to a differentiated kind of material in which the separate parts can be discerned, a construction that can be regarded as the product of the inter-relationships between these separate parts or details. The

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[117] The large-scale progressions over the course of the piece actually suggest a form based on directed parametric change, which, as we will see shortly, is synonymous with Stockhausen's concept of "process."

[118] *"[Ich sagte, daβ ich] jede durch eine persönliche und unverwechselbare Charakteristik erkennbare Formeinheit [einen Moment nennen will…]*" (translated by the author, and somewhat differently in Heikinheimo 1972, 192; see also *Texte I*, 200).

[119] "*Ein Moment kann – formal gesehen – eine Gestalt (individuell), eine Struktur (dividuell) oder eine Mischung von beiden sein; und zeitlich gesehen kann er ein Zustand (statisch) oder ein Prozeβ (dynamisch) oder eine Kombination von beiden sein*" (translated by the author). Translation of the terms *individuell* and *dividuell* is problematic. The former would normally be rendered as "individual." But the two terms are clearly meant to be an antonymic pair, and neither "*dividuell*" nor "dividual" are actual words in their respective languages. The following discussion will suggest that perceptual divisibility of the component parts is the principal factor in distinguishing the formal types, gestalt and structure, and hence I have used that concept in my translation.

> word 'texture,' on the other hand, refers to a more homogeneous, less articulated complex, in which the constituent elements can hardly be discerned. The difference between the two words can be characterized thus: A structure can be analyzed in terms of its components; a texture is better described in terms of its global, statistical features. (Ligeti 1965, 14 n. 29)

These descriptions seem to capture Stockhausen's idea of the *individuell* gestalt and the *dividuell* structure, and hence I will incorporate them as part of the understanding of the concept and characteristics of moments.

Stockhausen (*Texte I*, 201-02) describes six types of moments, based on different ways of combining the formal and temporal categories just mentioned. In his terminology, the six types are:

1. Gestalt as a state
2. Gestalt as a process
3. Structure as a state
4. Structure as a process
5. A mixture of gestalt and structure as a state
6. A mixture of gestalt and structure as a process

Apart from the above quotation, these terms are not defined by Stockhausen; rather, they are illustrated with examples from *Kontakte*.

Examples of the "gestalt" form include a simultaneity mixing piano, percussion, and electronic sounds (see **Example 3-24** at 7' 23.6"); a glissando (**Example 3-25** at 26' 58.6"); another simultaneity of electronic sounds only (**Example 3-26** at 15' 56.7" to 16' 1.2", upper part of column); and a sustained trill in percussion (**Example 3-26**, same time point, middle part of column) (*Texte I*, 201-02). In each case, the sound comprises a fairly high level of spatial and/or temporal density and complexity in such a way that, as Ligeti suggests, the component parts will be difficult to perceive separately. These gestalts appear to be identical with Stockhausen's notion of statistical complexes. Examples of the "structure" form are less clear, as they are described only in terms of

"repetition" (*Wiederholung*): repetition of isolated points, small groups, timbres, intervals and pitches (**Example 3-26**, at 16' 8.2" to 16' 33.6"); of durations, statistical sound mixtures, entries, and accents (**Example 3-25**, at 26' 62.8" to 27' 45.5"); and of dynamics and the number of tones in a simultaneity (**Example 3-26**, at 16' 1.2" to 8.2") (ibid.).

The emphasis on repetition as the defining aspect of a structure is puzzling; such repetition would seem to have little to do with Stockhausen's larger categorical distinctions of *individuell* gestalt and *dividuell* structure, which seem on their face to have more to do with density. This factor may refer, at least in part, to the presence or absence of audible discrete attacks. Thus, "repetition" of individual attacks—whatever their pitch, interval, duration, and so on—produces a structure whose components (the attacks with their various characteristics) are divisible, separable in perception, such as a series of points or groups. On the other hand, the lack of such audible repetition of attacks, as in a cluster or a glissando, creates a gestalt with indivisible, inseparable components. The difference, as in the earlier discussion of elements and of textural types, is one of density. Stockhausen's use of the term "repetition" in this context should perhaps be understood as a recurrence of the process of producing a sound, the re-production of sound.

A "state"—that is, a static condition or stasis—is described by Stockhausen as "no directed tendency of changes in any of the parameters" (*Texte I*, 201).[120] This concept does not necessarily mean an absence of change. As Heikinheimo observes (1972, 143), there may be several changes in a parameter—a passage may rise in register initially, then fall, and then rise again. Such a passage would be considered static because the changes do not form a directed tendency, in which the change proceeds

[120] "*…statisch: keine gerichtete Verānderungstendenz in einem der Parameter"* (translated by Heikinheimo 1972, 140; see also *Texte I*, 202, and Heikinheimo 144).

generally in one direction. A "process," on the other hand, refers to the presence of such a directed tendency. Stockhausen gives the example of a rising glissando which, after reaching its peak, curves downward very briefly before being cut off (**Ex. 3-25**, upper left column) (*Texte I*, 201; Heikinheimo, 143). The ascending pitch direction predominates, the overall tendency is upward, and the moment is therefore classified as one in process.[121] Thus we see that stasis and process are not mutually exclusive. They may coexist within a given moment, but it is the ability or inability to perceive some single direction of change—becoming louder, faster, higher, thicker—that determines this temporal aspect of the moment-type.

Although Stockhausen lists "moment" as one of the three large-scale types of form (see chart above in part I of this chapter), a moment must also be understood as one of the elements, along with points, groups, and statistical complexes. This is implicit in his listing and description of six types of moments.[122] A piece or passage that is in moment form, as opposed to developmental or sequential form, is one that contains some number of individual moments, which may be any of the six different types. In other words, moments are the elements of moment-form. At the same time, two important distinctions should be noted between moments and the other three elements. Points, groups and complexes have by definition a specific and limited range of density; in contrast, a moment may be of any density. Moreover, as a formal unit that is constructed from some combination of points, groups and complexes, a moment is a kind of "super-

[121] Stockhausen's "process" is essentially the same as my "directed parametric change," discussed above.
[122] Stockhausen's statement (quoted above) that the temporal aspect of a moment may include a combination of a state and a process suggests two additional moment-types: gestalt as a mixture of state and process; and structure as a mixture of state and process. No examples of these two types, however, are given.

element" that always contains one or more of the three "sub-elements." In the formal hierarchy, moments thus represent a middle level between elements and forms.

Stockhausen's moments, then, are effectively identical to two of the phrase types that I have described: directed parametric change (his "process") and similarity (his "state"). Like these phrase types, moments may be composed of the smaller units that I have called segments.[123] Also like the phrases, moments do not exhibit closure—none of Stockhausen's moment types could be construed as a process of tension and release, departure and return, or symmetry that would give rise to closure. As mentioned earlier, the concept of moments was not fully developed until around 1960 with *Kontakte*, yet it seems clear that his thought was already moving in that direction as early as 1953. Three of the six moment types described by Stockhausen are present in *Kontra-Punkte*:

Structure as a process	Phrases 7, 8
Structure as a state	Phrases 9, 11, 12
Gestalt as a state	Phrase 10

Phrase 10, with its high temporal and spatial density and complex construction, corresponds to a gestalt, and its similarity of content (discussed above) results in a lack of directed tendency of change in any parameter, producing a "state" or static condition. Phrases 9, 11, and 12 consist of much lower density levels and hence correspond to structures, though their similarity of content again produces stasis. Phrases 7 and 8 represent moderate to high density levels (spatial in the former, temporal and spatial in the latter), yet they do not seem to meet the test of "indivisibility" of the component parts as compared to the much greater complexity of phrase 10.[124] Thus for this study I will

[123] Stockhausen notes that moments may be divided into smaller parts, which he calls "partial moments" (*Teilmomente*), and that moments may be grouped into larger units (*Momentgruppe*) (*Texte I*, 200-01).
[124] Phrase 8 may be a hybrid, a "mixture of structure and gestalt," particularly with regard to the big cluster-like chords of the piano.

classify phrases 7 and 8 as structures. They are structures "as a process" because of the directed parametric change that takes place within each of them (discussed above).

IV. Large-Scale Form: Parallels and Cycles

Example 3-27 sets out the complete *Kontra-Punkte* excerpt (excluding the opening gesture) in schematic form. The upper three rows show the formal hierarchy: the segments of the third row combine to form the phrases of the second row, and the phrases in turn are grouped in the top row into a parallel period, three cycles, and a closing section.

In Part II, I discussed the connections between phrases 1 and 2 that suggest hearing them as a related pair. In addition to a number of pitch relations, the two phrases stand in a complementary relationship with regard to register: the first is largely in the lower register while the second is primarily in the upper. Perhaps the strongest element that connects the two phrases is the pronounced similarity in structure of each phrase: buildup-climax-release. These factors encourage hearing the two phrases as a parallel period, "parallel" in their internal organization and forming a "period" because the second completes the first registrally.[125]

On a much different basis, phrases 3 through 10 group themselves into three larger units of three, three, and two components respectively. In each case, the larger units are delineated by a progression from a state of quiet and relative stillness to one of extreme tension, usually passing through an intermediate stage of restlessness or unease. These progressions form a repeating cycle, and I have labeled the three stages as stability,

[125] A similar construction occurred in phrases 2 and 3 of the Babbitt piece (see Ch. 2). The relationship here may be somewhat weaker, as there are fewer connections in the Stockhausen, and no identities. In the Babbitt, both phrases contain a segment projecting triple meter, both begin with a minor third, and both end with a rhyming pitch and rhythmic figure.

instability, and eruption. See **Example 3-28**. In cycle I, these functions are carried out separately by the individual phrases 3, 4, and 5. In cycle II, the stability function extends through phrase 6 and into the first part of phrase 7, and the instability stage arises in segment 7b. And in cycle III the stability and instability functions are combined in a kind of hybrid within the first of its two phrases. In the example, the segment in which the eruption occurs is given in bold font and underlined.

The cycles are formulated largely on the basis of increasing levels of density or dynamics, or both. In this sense, they may be regarded as large phrases based on the model of directed parametric change. The stability function is manifested in a generally quiet and sparse texture of low temporal and spatial density and a reduced level of activity and energy. Phrase 3, for example, initiating cycle I, features mostly soft dynamics and a very thin texture, with relatively few attacks. See **Example 3-29**. Destabilization begins with the descending register and increasing temporal density of segment 4a of phrase 4, and segment 4b continues that process with its thickened textures and increased dynamics. A brief but tense pause in segment 5a (tense because of the crescendo in the trumpet and flute) leads to the eruption of 5b, a tutti passage of high density, polyrhythmic complexity, and loud dynamics. The sudden cutoff of this passage by the trumpet's sforzando G leaves the tension created by the eruption unresolved. The very brief segment 5c is perceived more as a reverberation from the cutoff than as a dissipation of energy.

The following phrase 6 initiates cycle II with a return in segment 6a to the relative calm of the earlier phrase 3. See **Example 3-30**. A state of relaxation is induced by the soft dynamics and the sustained tones of the chord struck in m. 49, reinforced by the deep

bass notes of the harp and piano. The brief interruption of segment 6b quickly recedes, as 6c reclaims the earlier quiet and reduces the level of density still further. Perhaps because of the interruption, the stability phase is extended into the first segment of phrase 7. Although the temporal density picks up in segment 7a (accounting for the formal division at that point), both spatial density and dynamics remain relatively low; the punctuation provided by the loud tones in the bass clarinet and in the harp and strings do not seriously disturb the overall quiet. A significant disturbance does occur, however, with the violin's high G# in segment 7b. Its high pitch, in a context of otherwise mostly low register, and especially its crescendo create a sense of unease that begins the instability phase, which is extended by the high spatial density and further crescendo of the multi-part chord of 7c. The following piano solo of phrase 8 acts as the eruption stage of this cycle, with its high levels of temporal and spatial density and of dynamics. In this case, there is some diminution of tension as the piano slows down in segment 8b and thins in texture in 8c. However, the overlap of segment 9a (cello and violin) with 8c lessens the effect of resolution; once again, the cycle ends at a relatively high level of tension.

Cycle III has a somewhat different configuration than the first two cycles. See **Example 3-31**. It consists of only two units, and the first of these, phrase 9, serves almost simultaneously as both stability and instability. As discussed earlier, there is little change of texture, density, or volume over the course of this phrase. Each of these parameters is at a more or less moderate level, higher than that of previous stability phases and lower than previous instability phases, resulting in a corresponding moderate level of tension. It is possible to hear segment 9a as a reference to stability, with its

sustained tones and relatively low temporal density, and segment 9b as the beginning of instability; I have so indicated in **Examples 3-28** and **3-31**. Whether we hear two separate stages in phrase 9 or not, the fairly active texture and frequent loud tones of this phrase project a kind of restlessness, which in light of the two cycles just completed may give rise to a feeling of expectancy. The eruption of the following phrase 10 amply fulfills the expectation. Tension rises abruptly with the extreme density and loud dynamics, and once again the eruption is suddenly cut off, this time by the piano's *sfz* D4 (m. 90). Segment 10b seems to begin a winding-down process but is interrupted by the change of material to the melodies of phrase 11.

One might ask whether the tension of the eruptive unit at the end of each cycle is resolved by the calmer textures of the following unit. The temporal relationship—one following right after the other—would seem to suggest such a hearing. Any resolution, though, is blunted by the great disparity between the units, as a texture of extreme density and dynamics changes abruptly to one of sparseness and quiescence. This creates a substantial discontinuity that weakens the connection between the two units, and gives the impression of a juxtaposition of opposing sound-blocks rather than an organic relationship. The sudden onset of quieter textures after the eruption sounds less like a resolution than a substitution—the tension of the preceding unit has simply been replaced by the calm of the next. Resolution is thus ambiguous at best. Despite the buildup of tension, which recalls the first part of a tension/release model of phrase structure, the cycles more closely resemble an enlarged phrase constructed on the model of directed parametric change.

The three tension-based cycles described here are rather easily brought to the listener's attention by the salience of the constantly recurring eruptive phrases. As Stockhausen himself has observed, "You will notice in *Kontra-Punkte* … that pronounced explosions take place … [which become] ever more numerous and longer, quite progressively, from beginning to end" (quoted in Kohl 2002).[126] It is not just the "explosions," however, that catch the attention. The cyclic waxing and waning of tension occurs throughout the piece—sometimes in shorter or longer cycles, sometimes with less clear-cut stages, but continuously present and always delineated by controlled quantitative changes in density, supplemented by dynamics and register. These repeating textural patterns become the principal structural element in the formal organization of the piece, and are largely responsible for its dynamic sensibility.

Phrases 11 and 12 serve as closure for the entire first large section of the piece. The gentle melodies of phrase 11 refer back to earlier melodic passages in the flute and clarinet (segments 1c, 2b, and 3b), now expanded to include the bass clarinet, piano, harp, and cello. This "recapitulation" of sorts is followed by the written-out *ritardando* and *diminuendo* of phrase 12.[127] The passage begins with relatively loud points and sustained tones (mm. 97-101) in a moderate temporal density. Except for the interruption of segment 12b, there is a steady decline in both density and dynamics until the complete silence and stillness of the fermata is reached. Also except for 12b, this phrase is predominantly in the lower register. These factors of decreasing density, dynamics, and register, extending over a relatively long period of time (the phrase lasts approximately

[126] Kohl describes in detail the historical and compositional background of these "inserts," which were added by Stockhausen in the spring of 1953 after he became dissatisfied with the initial score.
[127] The indicated tempo during most of phrase 12, eighth note = 184, is considerably faster than previous tempo markings, which range from 120 to 152 with an average of about 130. Thus the slowing effect is achieved with longer note values and inter-onset attack durations.

25 seconds), combine to produce a sense of dying away, *morendo al niente*, that effectively and satisfyingly closes this section. The depth of the closural effect may even be sufficient to provide a feeling of delayed resolution of the tension generated in the earlier eruptions.

Chapter 4

Tension and the Large Phrase: Carter's String Quartet No. 2

During the 1950s, Elliott Carter was preoccupied with the search for a "new flow of musical thought and expression" (Carter 1997, 270). This search had actually begun around 1945 when he became interested in ideas of time, "real" versus "psychological" time and how these interact with musical time (ibid., 263). He began a thorough reassessment of basic musical materials—pitch, rhythm, dynamics, and timbre (265). Thus the Piano Sonata (1946) displays great variety and flexibility of rhythm, frequent changes of character, and pronounced contrasts of register, articulation, and tempo, all of which would become increasingly important in later compositions (213). In the Sonata for Cello and Piano (1948), chronometric or clock time in the piano is simultaneously contrasted with "chrono-ametric" (free or psychological) time in the cello, and this and other rhythmic procedures (metric modulation, polyrhythm, notated *rubato*) are used to create methods of continuous change (266). These devices also produce a stratification of the texture, though Carter has noted that the differing contributions of the instruments are intended to come together as a whole, as one large motion (230).

With the *Eight Etudes and a Fantasy* for wind quartet and *Eight Pieces for Four Timpani*, both composed in 1949, Carter turned his attention to the nature of musical ideas and the reduction of these to their simplest, most minimal forms. Many of the pieces in these sets are built on small, economical musical ideas ranging from one to four notes. With such reduced pitch material, the basic discourse in the *Etudes* relies on contrasts of timbre, articulation, and dynamics, and in the timpani pieces on polyrhythmic patterns such as a regular pulse against an accelerating one (266-68).

In the First String Quartet (1951), many of these ideas coalesced into two broad concepts that may be described as *simultaneous oppositions* and *interrupted continuity*. In the Fantasia portion of the first movement, each of the four main themes has its own tempo and character, and some or all of them are often heard simultaneously so as to create both stratification and interaction at the same time (226). The second-movement Adagio places the two violins in high, quiet, long-sustained tones against the loud, rapid, lower-register activity of the viola and cello (234, 268-69), and the final Variations movement introduces the idea of overlap in which the cello begins the movement before the other instruments have completed the previous Adagio (233-34). The Allegro scorrevole portion of the first movement features, on the one hand, a reduction of texture to continuously streaming sixteenth notes and, on the other, several prominent interruptions including episodes of contrasting sustained tones and a pronounced pause. The movement resumes after each interruption except the last, which serves as the beginning of the following Adagio movement (269).

During this period, Carter also undertook a rethinking of the concept of musical discourse. Along with his interest in matters of time and memory, he began to focus on the shaping and connection of musical ideas, on methods of continuity, and on the possibilities for musical flow and change (213, 229). He was dissatisfied with the prevailing techniques, such as static or block repetition, ostinati, and serialized rhythm, and sought what he called a "more significant temporal thought" (270). Carter's temporal thought was beginning to take shape as a kind of largeness of idea. He made this explicit in his essay "Shop Talk by an American Composer," in connection with the

Variations for Orchestra (1955): "As in all my works, I conceived this one as a large, unified musical action or gesture" (217). In the same discussion, Carter writes:

> Serious music appeals to a longer span of attention and to a more highly developed auditory memory than do the more popular kinds of music. In making this appeal, it uses many contrasts, coherences, and contexts that give it a wide scope of expression, great emotional power and variety, direction, uniqueness, and a fascination of design with many shadings and qualities far beyond the range of popular or folk music. Every moment must count somehow, as must every detail. (217)

These comments suggest that at least part of the "new flow of musical thought and expression" mentioned at the beginning of this chapter, and the "more significant temporal thought" mentioned above, was the notion of relatively long musical utterances, containing "many contrasts, coherences, and contexts" that contribute to a complexity of design in which every detail matters. Carter has also spoken of the importance of music as an "ongoing process or pattern," of the dynamic process that gives a sense of "ongoing musical *motion*," and of the "constant change-process-evolution" that is a primary factor of music (Edwards 1971, 87, 90, 91).

All of these ideas came together in the Second String Quartet (1959), the subject of this chapter, to produce a new kind of musical form. Quick, economical gestures, successive and simultaneous contrasts, frequent changes of register, tempo, and other parameters, interruption, and the resumption of an ongoing process—these technical devices are used to produce a kind of discontinuous continuity. Phrases are often made up of brief fragments of contrasting character, held together in most cases by a process of steady or increasing tension. Tension is generated in a straightforward way, by high or increasing magnitudes in density, dynamics, and register. However, the usual arc of tension and release is often cut short, reducing or eliminating the release stage. Many

phrases are left open-ended, so to speak, and it is this simple fact that produces the ongoing motion Carter sought. Phrases with weak or absent closure have a perceptible sense of inconclusiveness that sets up an implication of further continuation. Such phrases are more likely to combine with each other to form a larger unit, especially when crafted so as to function as building blocks in the unfolding of a larger process. This is precisely what happens in the Second String Quartet. Phrases combine to form a large phrase in the same way that segments combine to form a small phrase.[128] Coherence in the large phrases is supplied by the same processes that are often seen in small phrases; in the passages that we will examine, this will be either tension and release or departure and return. Unlike the majority of the small phrases, however, the large phrases usually exhibit a stronger sense of closure.

The weakness or absence of closure in the small phrases brings us squarely to the question of a how a phrase may project completeness without closure. This issue, which was briefly raised in Chapter 3 in connection with phrases 7 through 12 of Stockhausen's *Kontra-Punkte*, will be treated in full in part II of this chapter. I will argue that some phrases may be formed without closure, provided there is good articulation. This occurs when a salient event perceptibly marks the end of a phrase. While closure represents the completion of a process, articulation may be understood as the completion of the structure: a boundary is imposed which closes the formal unit, ending the accretion of elements and enabling the integration of the component parts. *Internal articulation* occurs when the salient event arises out of the material of the phrase, while *external articulation* refers to the clear initiation of a new phrase which, in turn, establishes the

[128] For this reason, there will be little discussion of segments in this chapter. Rather, I will focus on the formation and "segmentation" of small and large phrases.

end of the previous phrase. Articulation is capable of producing the sense of "wholeness or completeness" that is the hallmark of a phrase, and thus serves as an alternative to closure.

As is well known, each of the four instruments in the Second String Quartet represents a particular "character," manifested by the assignment of a distinct set of intervals, rhythms, and expressive styles:

Instrument	Character	Rhythm	Intervals
Violin I	fantastic, ornate	extreme contrast	m3, P5, M9, M10
Violin II	steady, laconic	regular, MM 70	M3, M6, M7
Viola	expressive	2:3 and 3:5	A4, m7, m9
Cello	impetuous	accel. and ritard.	P4, m6, m10 [A11][129]

Carter has also described three types of relationships among the instruments, or, as he terms it, types of responsiveness: discipleship, companionship, and confrontation (Carter 1997, 234-35). Very generally, the four movements—Allegro fantastico, Presto scherzando, Andante espressivo, and Allegro—represent discipleship, as each is led by one instrument that is to some extent imitated by the others. The three cadenzas interspersed between each pair of movements—one each for Viola, Cello, and Violin I—express confrontation between the soloist and the others, and the Introduction and Conclusion feature companionship.[130] This dramatic plan with individualized characters, derived from opera,[131] represents, I think, the essence of Carter's idea of a new musical flow: continuous forward motion driven by the relationships, conflicts, and emotional interactions among the characters. This forward motion is facilitated in part by the

[129] Compiled primarily from Carter 1997, 227-28, and Carter 1998, preface; see also Schiff 1998, 36; Wennerstrom 1967, 90. Although Carter nowhere mentions the compound tritone as an interval assigned to the cello, Bernard 1988 pointed out its prevalence in the cello part. The second violin's tempo of MM 70 is sometimes expressed as a multiple, MM 140 and occasionally MM 280.
[130] See Schiff 1998, 73-74, for a discussion and diagram of the large-scale form.
[131] See Carter 1997, 234, 273; Edwards 1971, 101-02. See also Schiff 1998, 73.

structural features of small and large phrases, discussed above, as well as through the use of such staple operatic devices as simultaneity and interruption.

Most theoretical discussions of this piece have focused on its pitch-class structure.[132] Others have addressed one of Carter's signature compositional interests, the rhythmic structure.[133] As with the other works in this study, the formal organization in Carter's Second Quartet is largely independent of pitch class, although certain pitch relations will play a role, especially in the domain of register. Rhythm, on the other hand, is a fundamental parameter in the formal process, and we will find that temporal density (speed) and polyrhythm are important factors in shaping both the small- and the large-scale form of the piece.

In this chapter I will examine the first two sections of the work: the Introduction and the first movement, entitled Allegro fantastico. The Introduction is organized as a single large phrase comprised of smaller ones, while the Allegro fantastico falls into three discrete sections which I label A, B, and C. Section A, like the Introduction, forms a single large phrase, while sections B and C each contain two large phrases. Part I of this chapter explores the Introduction, part II takes up the issues of closure and articulation, and parts III, IV, and V respectively discuss the three sections of the Allegro fantastico.

I. Phrases with Weak Closure: The Introduction

The opening section of the piece, labeled "Introduction," consists of three phrases, each longer and more complex than the preceding one, followed by a codetta that also forms a phrase.[134] Each phrase is formed by a number of discrete gestures which are

[132] Harvey 1989; Bernard 1993; Mead 1994b, 1995; Koivisto 1997; Schiff 1998.
[133] Gass 1981; Bernard 1988; Ungar 2006; Poudrier 2009.
[134] In general, the term "phrase" in this chapter refers to a small phrase; a large phrase will be specified as such.

presented either successively or simultaneously. These gestures, which will recur throughout the Introduction, may be identified as:

a. melody
b. sustained double-stop
c. tremolo or rapid figuration
d. added double-stop
e. two-note figure
f. regular pulse

Example 4-1 illustrates the six gestures as found in mm. 1-20.

The melody of gesture *a* comprises five to seven notes played *legato* by a single instrument in which at least the first few tones are of relatively longer durations. The melody is most often played by the cello and has an accelerating durational structure as in mm. 1-2. Gestures *b*, *c*, and *e* are self-explanatory. The added double-stop of gesture *d* refers to a double-stop that begins, and usually sustains, while one or more others are still sounding. The distinction is based on the difference in density between a single double-stop and the simultaneous presence of two or more. The audible presence of a regular pulse, gesture *f*, usually against a background of irregular or absent pulsations, is one of the most salient events in the piece and plays an important role in the form. It is most often, though not always, played by the second violin, at its signature tempo of MM 140 or 70. In general, the perception of regularity is established by a minimum of two equal durational intervals, such that the listener can recognize the second interval as being the same as the first. Hence, three or more attacks are necessary to project a regular pulse, of which all but the last must be of equal durations. The last attack may be of any duration since its function is simply to mark the end of the preceding attack's duration, and this is fulfilled by the attack itself. Thus, the fact that the first violin's G in measure 2 is longer

than the other tones in the triplet-quarter-note figure (its duration being extended by the eighth-note rest) does not affect the perceived regularity of the pulse.

The four phrases of the Introduction (including the codetta) combine to form a single large phrase based on the tension-and-release model. The first three phrases are organized as a bar form, AA'B, or enlarged sentence form. Phrases 1 and 2, despite their differing lengths, are closely related in that they begin and end alike and feature a relatively similar deployment of gestures. Phrase 3 begins somewhat like the first two but then develops into a contrasting formal unit through the prominent expansion of gesture *d*, the added double-stop, and to a lesser extent gesture *e*, the two-note figure. In addition, the overall structure of phrase 3 substantially differs from that of phrases 1 and 2. Each of the first three phrases exhibits closure, but closure is weakened by the incomplete return of initial parametric values. The codetta (phrase 4) serves as full closure to the large phrase.

A. Phrase 1

The cello's opening melody (gesture *a*) comprises four descending tones followed by one ascending tone. See **Example 4-2**, which sets out phrases 1 and 2, and the first part of phrase 3. This contour and its transformations—several tones moving in one direction followed by a single tone in the opposite direction—will become an important motivic element in the Introduction, and will be discussed further below in Part I-F. In addition to its contour, the melody is characterized by a rhythmic *accelerando* and a rapid increase in dynamics from *piano* to *forte*. The acceleration is both written out, in the ever-shortening note values, and indicated by Carter's special notation for the cello in this

piece, a dotted arrow.[135] While the cello has a number of *accelerandi* (and *ritardandi*) indicated with the dotted arrow, both the cello and the viola will occasionally feature accelerating or decelerating melodies produced by the written notation alone, without a dotted arrow. At the conclusion of the opening melody, the cello plays a soft double-stop that is sustained for some time (gesture *b*), thickening the texture slightly and acting as an accompaniment to the first violin's initial gestures.

The first violin enters with a three-note regular pulse (m. 2, gesture *f*) followed by a tremolo (gesture *c*) and then a sustained double-stop (gesture *d*) on G4-Bb4, added to the cello's ongoing Db4-Gb4 double-stop. The triplet-quarter-note figure (MM 157.5) has the effect of contrast with the cello's accelerating melody. The latter two gestures, *c* and *d*, produce an effect of gradually increasing density, primarily spatial density although the tremolo and its embellishing rapid tones may also be heard as affecting the temporal density.

The sudden burst of activity in measure 4 marks the climax of the phrase, as both dynamics and density reach their peak. Although the first violin and cello remain *pianissimo* on their double-stops, the second violin's added double-stop (gesture *d*) and the viola's two-note figure (gesture *e*) are played *forte*. And the presence of seven simultaneous voices at the beginning of measure 4 raises the spatial density to its highest point so far. As the instruments begin dropping out one by one, the second violin presents another passage of regular pulse (gesture *f*), longer than the earlier gesture in the first violin and made highly distinctive in timbre by the three different types of *pizzicato*. The *forte* dynamics level is slightly reduced to *mezzoforte* at the end of the regular pulse.

[135] In the performance notes to the score, Carter writes that the first and last notes under the dotted arrow should be played in time, while the notes in between should be played as a continuous *accelerando* (or *ritardando* if the note values are successively longer). See Carter 1998.

The end of the phrase overlaps with the start of a new phrase, clearly signaled by the cello's varied repetition of its opening melody.

This collection of disparate gestures forms a phrase based on the tension and release model, although not without some ambiguity. Several parameters are involved in the formation process. In spatial density, the phrase begins with the cello's monophonic texture, gradually builds to a moderate level at the climax, and returns to monophony in the second violin. This return to the starting magnitude of a parameter produces a release, or "resolution," of the tension associated with the buildup stage. In this case, however, the resolution is only partial. Significant differences between the starting and ending textures exist both in timbre, *arco* versus *pizzicato*, and in temporal structure, acceleration versus regular pulse. Similarly, the dynamics level increases from generally *piano* to *forte*; this is followed by a diminuendo, but only to *mezzoforte*. These partial returns in density and dynamics do not negate the sense of resolution, and therefore of closure, but they do weaken the degree of conclusiveness which, in turn, leaves the phrase open to continuation and further development.

One element of this phrase, however, significantly strengthens the sense of wholeness or completeness that closure may bring. The two-note figure B4-F4 in the viola (m. 4), marked *molto espressivo*, recalls the opening A4-E4 of the earlier cello melody in several respects. It is in the same register; it follows the same descending contour; it consists of similar, relatively long, durations; and it slightly enlarges the initial interval from a perfect fourth to an augmented fourth. The viola's figure thus represents an abbreviated return of the opening motive. A return of opening material is one of the strongest means of closure, though here its effect is somewhat lessened by the

incompleteness of the viola figure and by the ambiguity of dynamics and density described above.

The weakness of closure in this first phrase will be a repeated phenomenon throughout the piece. It usually occurs in one of two ways. In some cases, there is a resolution of some but not all of the parameters that participated in the formation of the phrase. One or more parameters may be left unresolved or only partially resolved. In other cases, the closing stage is too short relative to the length of the buildup and/or the climax, leaving a sense of having been cut off too quickly. The former occurs most often at the ends of small phrases, and the latter at the ends of large phrases. Both techniques, which may also be combined, result in a lesser degree of dissipation of the energy generated during the phrase, and hence a less conclusive ending. These effects contribute significantly to the forward-striving motion of the piece, and, as we will see shortly, they are crucial in enabling small phrases to combine into large ones. Aspects of closure and the related concept of articulation are discussed in more detail below in Part II.

Another technique that Carter uses to generate forward motion is that of *overlap*. As noted above, the ending of phrase 1 overlaps with the beginning of phrase 2. The presence of overlap, which will recur frequently in later passages, has two important effects. It forms a relatively seamless connection between otherwise discrete phrase structures, providing a degree of continuity from one phrase to the next that minimizes the inherent discontinuity of segmented phrases; this will be instrumental in the formation of large phrases. At the same time, overlap can obscure the ending of a phrase (and the beginning of the next), thus weakening the degree of articulation and in some cases hindering the recognition of a phrase. Both of these effects tend to drive the music

forward and contribute to a feeling of, as Carter puts it, ongoing musical motion (Edwards 1971, 90).[136]

B. Phrase 2

The second phrase (mm. 5-12) uses the same pool of gestures as did phrase 1, but is expanded by the interpolation of additional occurrences. See again **Example 4-2**. The beginning and ending are virtually identical to those of the first phrase. The cello's varied restatement (m. 5) of its original melody, the first and third notes of which reiterate the viola's two-note figure just heard, is immediately followed by a sustained double-stop. Thus, gestures *a* and *b* are held order-invariant, reinforcing the perception of parallelism. And the phrase ends with gesture *f*, a regular pulse in the second violin (mm. 10-12), just as phrase 1 did. The *pizzicato* pulse in phrase 2 readily recalls the same earlier timbre, and the *arco staccato* that begins in m. 11 is sufficiently similar to maintain the association. Internal gestures are unordered with respect to the first phrase but are easily recognized: sustained double-stop (*b*) in violin II, m. 8; rapid figuration (*c*) in violin I, mm. 8 and 11-12, and cello, m. 8; added double-stops (*d*) in viola, m. 6, cello, mm. 7 and 8, and violin I, m. 9; and the two-note melody (*e*), still in viola, m. 7 and again in m. 8. These similarities help to link the first and second phrases as a pair.

Phrase 2, though, has a much more complex structure, which may be heard in two parts (shown in **Ex. 4-2** above m. 8).[137] The first part, mm. 5-8, moves from soft dynamics and low density to a climax in m. 7 (very similar to that of phrase 1), and seems to reach closure early in m. 8. The climax features high dynamics and density and marks the registral high point C#5, having climbed above phrase 1's upper boundary of Bb4.

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[136] A related concept, which I call *merger*, is discussed below.
[137] The second violin's sustained double-stop Bb-D forms a bridge between the two parts of the phrase.

This is followed by a winding down to closure with the viola's expressive two-note figure, the decreasing temporal and spatial density, and a complete reduction in dynamics by the beginning of m. 8. The viola figure D-Ab brings the upper pitch boundary down to Ab4, a registral contraction that further supports closure. However, the phrase is revived in the latter part of m. 8, first by the cello and then by the viola. The cello's sustained double-stop Ab4-Db5 reinstates the upper boundary and counteracts the sense of registral closure. Then the viola's second two-note figure, A-Eb, contradicts the closure in dynamics and density: it is quicker than the first one, it is louder than the immediately preceding music, and it is more emphatic with *tenuto* and accent marks and without either *legato* or *glissando*. This triggers a small flurry of activity in the first violin and cello (m. 9), each at relatively loud dynamics and high temporal density. The second violin tries to end the phrase with its regular pulse, as had occurred at the end of the first phrase. But the first violin ignores the signal and proceeds with another tremolo. Seemingly, it is only the viola's entrance in m. 12 with a melody (by now, the established method of initiating new phrases), and with *forte* dynamics lending authority, that finally puts a stop to this phrase.

A closer look at phrase 2, however, suggests that the first part is incomplete and that the second part is an extension with the purpose of achieving a fuller completion. There are two elements missing in the first part (mm. 5-8) that were prominent in phrase 1, the tremolo and the phrase-ending regular pulse.[138] These are precisely the two elements that make up the extension in mm. 9-12: two tremolos in the first violin plus rapid figuration in the cello, and a lengthy regular pulse that becomes more emphatic

[138] There is a regular pulse in the second violin at mm. 6-7, but it is absorbed into the climax and does not serve to close the phrase, as this gesture did in phrase 1.

toward the end with *arco*, *marcato*, and *staccato corto* ("short") articulations. This greater emphasis seems to be induced by the first violin's second tremolo, m. 11, which begins after the *pizzicato* regular pulse and is rather assertive, with its larger interval than before (perfect fifth rather than minor third) and its *forte*, *marcato*, and *ruvido* ("coarse, rough") indications.

Thus the extension in mm. 9-12 allows phrase 2 to recover the missing gestures, but there is a significant trade-off: the strong closure of m. 8 is almost entirely lost. Only the parameter of register, which actually undergoes a greater degree of contraction than earlier, provides some sense of resolution. The upper pitch boundary descends from the cello's Db5 (m. 8) to the first violin's G4 (m. 9) to the cello's F4 in m. 10, which is maintained in the first violin through the end of the phrase (the second violin reaches G4 at the very end of its line in m. 12).[139] On the other hand, the phrase ends with loud dynamics and fairly high temporal density from the tremolo, weakening a sense of closure in those parameters. And the second violin's phrase-ending regular pulse, still perceived as such because of the association with the first phrase, is nevertheless contradicted by the "interference" of the long-held tremolo.

Closure of the second phrase is thus weak and fragmented. Coherence is threatened as well. While the first part of the phrase exhibits a clear process of tension and release manifested in density, dynamics, and register, the second part has no such organizing factor. Instead, the second part is held together partly by its fairly strong articulation—the beginning marked by the cello and viola figures in the latter half of m. 8 (as discussed above), and the ending signaled by the occurrence of the regular pulse as well as the clear sense of a new phrase starting with the viola melody in m. 12. In

[139] The lower pitch boundary, Bb3, has been in effect from the beginning of the piece.

addition, there is a pedal point on F4 that begins with the viola in m. 9 and continues almost unbroken to the end of the phrase.

C. Phrase 3

The third phrase (mm. 12-28) continues to use the same set of six gestures that are the basic elements of the Introduction. The phrase also begins very similarly to the first two phrases, but then develops into a completely new sort of texture that sets it apart and allows it to serve as the B section of the overall bar form. See **Example 4-3**. With a total of 17 measures, all but one of which is in 4/4 meter (at MM 140), it is a very long phrase. But we will see that it is tightly organized, with a clear sense of parametric process that enables the perception of a single elaborate phrase based on tension and release. In the example, I have shown the phrase in four segments, labeled 3a, 3b, 3c, and 3d.

As with the first two phrases, the third phrase begins with a melody. It is recognizably similar to the earlier melodies, with its moderately long durations, *legato* articulation, and expressive quality. It is in the same register as those previous melodies, and although it is now played by the viola rather than the cello, the general timbre is not far removed from the original. There are, however, significant differences. First, the contour of this melody is an inversion of the earlier ones. Where previously there were several tones descending followed by one tone ascending, here the directions are reversed and the melody begins with a long ascent, followed by a short descent.[140] Secondly, although the viola does not produce a great change of timbre, it does produce a change of interval content, based on the interval repertoire associated with each instrument. The cello's earlier melodies featured the perfect fourth, while this one is focused on the

[140] In the cello melody of the second phrase, mm. 5-6, the one-note ascent occurs in the move from C4 to F4 (end of m. 5). The two sixteenths, E and B, form an extension to the contour. This and other contour relationships are discussed below in Part I-F.

tritone. And lastly, this third melody has an "echo," as the cello enters near the end of the viola's line with a slightly varied version—the two lines feature differing intervals but both begin on B3 and rise to Db5, producing a kind of heterophony.

These distinctions between the opening of the third phrase and that of the first two already hint that this phrase will be different. After the viola and cello melodies, which constitute an extended gesture *a*, the cello plays a sustained double-stop (m. 15) that maintains the connection between gestures *a* and *b*. But the first violin's line (mm. 15-16) strengthens the sense that change may be coming. It serves as gesture *c*, a rapid figuration, but the mostly *staccato* articulation and short, irregular bursts of activity create a feeling of nervousness that raises, ever so slightly, the level of tension.[141]

Up to this point (m. 16) the third phrase has largely followed the path set out in the first two phrases, albeit with the differences noted above.[142] Now, in segment 3b the phrase takes a major detour, as the added double-stops of m. 17 (gesture *d*) are coupled with a significant crescendo, leading to more double-stops and, in m. 19, a rapid expansion of register. We may be expecting added double-stops in m. 17, since gestures *a*, *b*, and *c* have previously been followed by a short climax, of which gestures *d* and *e* serve as the principal material. But the prolonged building up of density and dynamics, and eventually register, is a new phenomenon. The piling up of multiple double-stops leads to a declamatory high point in m. 20 with the first violin's *fortissimo* ascending two-note figure G#5-D#6 (gesture *e*). The D#6 is clearly the highest pitch so far, and the cello reaches its lowest note, E2, in the previous measure.

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[141] This line closely adumbrates the opening of the following section, Allegro fantastico (mm. 35-36), in its general character, in the initial rhythm of three short notes and one longer, and in aspects of contour.

[142] This is the reason for the segmentation at m. 16. Other considerations suggest that segment 3a comprises either two parts (mm. 12-14 and 15-16) or three parts (mm. 12-13 viola, 13-14 cello, and 15-16 violin I).

After a short interlude of suddenly quiet dynamics (segment 3c, discussed below), the climax is achieved with the first violin's D7 (m. 24). The second violin reiterates the earlier D#6, forming a voice-leading connection across the interlude and acting as a kind of grace note to the high D. At the same time, the cello descends to the lowest pitch in the Introduction, C#2, completing the outward expansion to the registral extremes. A fairly rapid registral contraction ensues (segment 3d, mm. 24-28), initiated by another perfect-fifth gesture *e* in the first violin, now descending D7 to G6. The second violin's phrase-ending regular pulse (gesture *f*, mm. 26-27) is brought to our attention by its *fortissimo* dynamics and its faster speed relative to the surrounding music. The gesture leads to the establishment of almost the original registral span, Db5 at the upper boundary (viola) and G3 instead of Bb3 at the lower (second violin). This strong registral closure, together with the suddenly quiet material beginning in m. 29, marks the end of the third phrase. There is also a slight decrease in temporal density as the double-stop attacks become slower (mm. 27-28), but closure is weakened by the absence of resolution in spatial density and in dynamics.

The interlude (segment 3c, mm. 21-23) acts as an interruption; the preceding buildup seems to be cut short, and the completion of the climax is delayed. This is the first instance in the piece of what Wennerstrom (1967, 102) calls "interposition," a technique favored by Carter in this quartet in which a passage of a certain character is briefly interrupted by a highly contrasting event, following which the passage resumes. It is especially prevalent in the first movement, Allegro fantastico (discussed by Wennerstrom, and below). Its purpose is not always clear, but the resumption of the passage often involves a significant event, as is the case here where the climax of the

third phrase, and indeed of the entire Introduction, is reached. Thus, one important effect of the interposed segment is to highlight the following material by means of delay and the concomitant heightening of tension.

D. Codetta (Phrase 4)

The sudden drop in dynamics level from *forte* to *piano* at m. 29 marks the start of a short closing passage (mm. 29-34) for the Introduction as a whole. See **Example 4-4**. The codetta functions to resolve the high level of dynamics and the relatively high level of temporal density left open at the end of the third phrase (and at the end of the first and second phrases as well). There is an overall crescendo and decrescendo in dynamics, and an accompanying rise and fall in temporal density, as attacks speed up in the *forte* middle part (end of m. 30 to m. 32) and then slow down at the *piano* ending of the phrase. These two parametric processes give shape and coherence to the codetta based on the model of symmetry. Closure is achieved with the completion of those processes. There is also a brief expansion and contraction both in register, from G3-Db5 (mm. 29-30) to E2-Db5 (m. 31) to A3-B4 (mm. 32-34), and in spatial density, from six sounding voices to eight to six. The closing registral span is essentially the same as it was at the end of phrase 3 (G3-Db5), as well as in the first part of the piece (Bb3-Db5). See **Example 4-5**. Thus, except for the brief "reaching over" of the cello in m. 31, register during the codetta is held steadily in a state of resolution. (Register is further discussed below.) Spatial density also remains at a relatively steady level in the codetta, with nearly continuous multiple double-stops, but decreases toward the end with the rests and the staggered entrances of the final gestures. The virtually complete closure of the codetta produces the

lowest level of tension since the beginning of the piece, and in this way provides closure for the Introduction as a whole.

E. Large-scale Form(s) of the Introduction

The presence of a bar form, or extended sentence, was noted above. The first phrase forms the A section or the basic idea. The second phrase, because of its similarities to the first in content and partial ordering of gestures, serves as the A' section or the varied repetition of the basic idea. The third phrase seems at first to be another variation but soon blossoms into a contrasting B section or, in sentence terms, the continuation. A cadence of sorts may be heard in the registral contraction, and the whole is concluded with a short codetta.

The overall expansion and contraction of register during the Introduction was first observed by Cogan and Escot (1976), whose graph of this important process is reproduced in **Example 4-6**. Their analysis identifies three large parts, which they call "space fields" (59). Field A, mm. 1-18, is characterized by a steadily narrow registral span; field B, mm. 18-27, "explodes outwards in both directions" (ibid.) to the extremes; and field C, mm. 27-34, resumes the narrow span.[143] This process not only gives shape and "spatial design" (ibid.) to the Introduction, but also contributes to the formation of a single large phrase.[144]

In his Second String Quartet, Carter perfected a technique he had been working with at least since the Cello Sonata (1948), which I call the technique of the large phrase. The Introduction provides an excellent example. Although I have described four phrases

[143] Their field A corresponds to my first and second phrases and the first part of the third, field B to the remainder of the third phrase, and field C to the codetta.
[144] The registral structure of the Introduction is further discussed below in Part III, in connection with its resemblance to that of section A of the Allegro fantastico.

(including the codetta), the entire section may be heard as one large structure having the phrasal characteristics of initiation, coherence, and completion through closure. The small phrases serve as building blocks which combine to form the large phrase, much as segments or gestures do in forming a small phrase. In the large phrase of the Introduction, coherence is achieved through the process of tension and release. Two very different methods are used, consecutively, to build up tension. In the latter part of the large phrase (mm. 17 and following, **Ex. 4-3**), the rapid increase in dynamics and density, in conjunction with the expansion of register, takes the phrase to its climax. The use of increasing magnitudes in these three parameters is a common tension-building technique for both large and small phrases, and we will see it again in the next movement.

What is perhaps most interesting is the use, in the first part of the Introduction (mm. 1-16, **Ex. 4-2**), of the actual structure of the small phrases as a means of gradually increasing tension. The multiplicity of short, discrete, fragmentary gestures imparts a degree of nervousness and fragility to the texture from the start. The constant circulation of the gestures, and the relentless confinement within the registral boundaries of Bb3 and C#/Db5 (a minor tenth), create a sense of constriction that begins to generate a desire to escape these confines. Each of the first two phrases reaches a climax that seems both to have arrived too soon and to dissipate too quickly. Moreover, both climaxes dissipate incompletely, leaving dynamics and/or density unresolved. The initial part of the third phrase moves to the other extreme, taking much longer to develop a sense of motion because of the repeated melodic gesture and the relatively long passage of figuration. All of these factors contribute to a steady increase of tension that eventually merges with the more active parametric processes of the second half. Each weakly closed phrase gives

rise to a need for continuation, a need for resolution of the unrelieved tension, which is not completely fulfilled until the strong closure at the end of the section. The arc of tension and release in the large phrase thus comprises a long stretch of slowly increasing levels of tension, a rapid increase to the climax, and a two-part dissipation stage—first in register (mm. 24-28), then in dynamics and density (mm. 29-34).

F. A Contour Motive in the Introduction

The cello melody that opens the quartet forms a particular contour that is replicated on multiple levels throughout the Introduction. As described above, the contour entails several tones (four in this instance) moving in a descending direction, followed by one tone ascending. This simple <– +> contour is made distinctive by the disparity in length of the two "legs," one long and one short. The first leg is described as "long," both because of the greater number of tones relative to the second leg, four versus one, and because of the greater span in semitones, eleven versus five. These special features of the contour help to make it recognizable even in vastly different contexts than that of the opening cello melody.

Example 4-7 lists a series of contours from passages throughout the Introduction. **Example 4-7a** gives the initial appearance in the cello and labels this the prime form. Pitch letter names indicate the starting and ending pitches for each leg (the long leg includes additional pitches not named). In the far right column, the span of each leg is given in semitones with the chronologically first leg given to the left of the diagonal and the second leg to the right. The contours in the example are not drawn to scale. The length and height of each leg of the contour represent relative values; thus the long leg is shown with a longer line, the short leg with a shorter one, and higher pitches are placed

above lower pitches. Contours are listed in the order in which they appear during the Introduction.

The first four contours, **Examples 4-7a**, **b**, **c**, and **d**, reflect the four melodic gestures that open each small phrase. **Example 4-7b** shows how the cello melody of mm. 5-6 is extended by the extra dyad E4-B3 (shown with a dashed line); the contour proper, as measured against the initial statement of m. 1, ends with the return to F4 at the end of m. 5. On the other hand, the quickness of the descending sixteenths E-B is an integral part of the gesture and relates back to the same durational figure Bb-Eb of the initial statement. This may engender some ambiguity, but it is not difficult to hear the contour of the second melody as a slight variation of the first.

Example 4-7e shows the contour of the highest voice in mm. 17-21 (segment 3b), the period of rapid increase in register, dynamics, and density prior to the interlude. **Example 4-8a** shows the actual pitches and the instruments that play them. Since the pitches are produced by various members of the ensemble, this is a composite voice; it represents the linear segment heard by a listener attending to the highest pitches. **Examples 4-7f, 4-7g,** and **4-7h** are likewise composite voices: **f** and **g** again show the highest voice, and **h** represents a prominent inner-voice gesture. The actual pitches of the contours in **Examples 4-7f**, **4-7g**, and **4-7h** are given in **Examples 4-8b**, **4-8c**, and **4-8d**.

The contour examples demonstrate not only the prevalence but also the structural importance of this simple contour. Each occurrence marks one or both boundaries of a salient formal unit. Referring to **Example 4-7**, contours a, b, c, and d initiate phrases 1, 2, and 3 (c and d together begin the third phrase). Contours e, f, and g encompass entire segments: respectively, the rapid parametric increase of segment 3b, the interlude of

segment 3c, and the climax plus registral contraction of segment 3d. The presence of the contour further delineates these segments, but it also helps to unify them as parts of a larger process. Contour h is formed by the second violin's familiar regular pulse, replicating the simultaneous registral descent of the ensemble and concluding with the viola's return to the registral ceiling, Db5, established earlier.

Moreover, the registral expansion and contraction over the course of this large phrase is reflected in the increasing and decreasing spans of each leg of the contour. In the nine contour forms shown in **Example 4-7** (with two forms in **Ex. 4-7g**), the long leg increases from 11 semitones to 11, 14, 14, 20, 21, 29, and 29, and then decreases to 22 (see the far-right column of **Example 4-7**). While the contraction phase is incomplete, there is a clear progression of widening spans. Likewise, the short leg increases from 5 semitones to 5, 6, 8, 10, 7, and 11, and then decreases to 4 semitones, although the decreasing progression becomes ambiguous at the end (contour h, inner voice). If we hear the viola's lower note Eb4 as the ascending leg, because of its registral connection with the preceding Cb4, then the final short leg of the contour remains small at 4 semitones. If, on the other hand, we hear the viola's upper note Db5 as the tone that completes the contour, the span of the short leg increases to 14 semitones, which is still recognizably "short" relative to the long leg of 22 semitones. Thus, both the contour itself and its dimensions interact with and participate in the larger registral process that shapes the entire Introduction.[145]

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[145]Koivisto (1997, 33-35) alludes to the contour of the solo melodies, describing the viola and cello melodies at mm. 12-14 (my contours c and d) as "ascending *crescendo* lines that rebound down from their climactic penultimate pitches" (33). She finds an imitation of this contour in the topmost pitches of the first violin at mm. 21-24: Eb5-B5-G6-C7-D7-G6 (for reference, see my **Ex. 4-8a** and **4-8b**). This analysis represents a compressed and elided version of my contours f and g (see **Ex. 4-7**), one that may be more apparent in the notated score than in a listener's perception. Koivisto's contour ignores the segregating effect of the very prominent change in dynamics at m. 24, from *pianissimo* for the first four pitches to *forte*

II. Closure, Articulation, and "Completeness" of a Phrase

Each of the first three phrases of the Introduction displays a weak or ambiguous closure. All are structured on the basis of the tension/release model, in which tension is generated by an increase in parametric values and is released by a reduction in those values (that is, a return to, or nearly to, the original values). In the first phrase, there is a return of the opening solo texture (spatial density) but with significant differences of timbre and of temporal structure; and in dynamics there is only the slightest diminution from *forte* to *mezzoforte*. There is also a reference back to the opening melody, a more traditional form of tension reduction and closure, but it is abbreviated. In the second phrase, a slight registral expansion is resolved but dynamics and temporal density are not; the "premature" closure, which is fairly complete, is largely undone by the extension of the phrase. In the third phrase, a substantial registral expansion is fully resolved but dynamics and spatial density remain at high levels.

Despite the weak closures, each of these phrases may be readily perceived as a distinct formal phrase with integrated content and clear boundaries. This is because each phrase is strongly articulated, and this condition serves as a substitute for closure—or, here, as a supplement to weak closure—by stopping the accretion of elements within the phrase and providing a sense of completeness.

Articulation occurs when an audible musical event indicates the boundary between two successive phrases or other formal units. Two general types may be distinguished: internal and external. *Internal articulation* entails a prominent event at the

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for the last two, and overlooks the second violin's F6 (m. 23) that is so easily heard as completing the contour because of its dynamic and registral associations with the previous pitches. Cogan and Escot (1976, 67) also discuss the "field-spanning" solo gestures of the cello and viola (my contours a, b, c, and d), noting their intervallic and registral expansion, but they do not mention the contour relations nor the additional occurrences of the gestures.

end of the phrase that contrasts in some way with the material of the phrase, but at the same time remains connected to the phrase. The event is heard to grow out of the main body of the phrase. This may occur through a buildup that seems to lead to the event; at other times, the event may simply emerge from the immediate surroundings to become a salient moment. Often there is a durational disjunction after the articulating event, prior to the start of the next phrase. Examples of internal articulation include a regular pulse (in a context of irregular rhythm), a climax (without a subsequent release stage), a sudden cutoff event, longer durations, and in some cases a rest or silence. All of these involve some degree of parametric change within the immediate context. The regular pulse that ends phrases 1, 2, and 3 in the Introduction produces internal articulation through its contrast with the otherwise irregular rhythms of those phrases. At the same time, it is heard as a part of the phrase during which it occurs (not as a part of the next phrase). In the case of phrase 3, the effect is less pronounced because the regular pulse occurs in an inner voice within a complex texture. In these cases of internal articulation, there is no durational disjunction after the articulating event since the regular pulse either overlaps with the beginning of the next phrase (1 and 2) or does not occur precisely at the end of the phrase (3).

External articulation involves an audible indication of the start of a new phrase, which in turn communicates that the previous phrase has ended.[146] The recurring cello melody in the Introduction clearly signals the beginning of the second and third phrases (with viola in the latter), and as such also clearly signals the end of phrases 1 and 2. And the sudden decrease in dynamics indicates the beginning of the codetta, thus articulating the end of phrase 3. In most cases, external articulation takes the form of a marked

[146] This type of articulation is discussed briefly in Hasty 1997.

change of material, manifested in parametric changes such as the change of dynamics at the end of phrase 3.

Articulation can serve equally as well as closure to fulfill the completeness requirement of a phrase, which is based on the perceptual need for the phrase to impart a sense of wholeness or completeness. Completeness is to be understood as completeness of the structure. Completion of a process (that is, closure) produces completeness in the sense that "nothing more needs to be added." Articulation, on the other hand, produces completeness in the sense of a closed and bounded structure. Articulation literally completes the structure by placing a boundary at the end of the formal phrase: "nothing more *can be* added." The presence of perceptible boundaries at the beginning and end of a formal phrase permits the listener to apprehend a distinct object that is structurally independent and therefore necessarily complete.[147]

Articulation may occur in varying degrees. As with closure, there may be stronger or weaker articulations, depending largely on the treatment of parameters such as dynamics, density, and register. The strength of internal articulation depends mainly on the salience of the articulating event. The regular pulse at the ends of phrases 1 and 2 of the Introduction stands out both because it contrasts significantly with the otherwise irregular rhythms and because little else is happening at the same time. At the end of phrase 3, however, the regular pulse is in an inner voice in a very dense and active texture. Its effect is less salient and the degree of articulation is correspondingly weaker. On the other hand, the strength of external articulation depends entirely on the degree of contrast between the two adjacent phrases. Where the two phrases have distinctive and

[147] The phrase is structurally independent but not always functionally independent, since it may and usually does combine with others to form a larger phrase.

well-differentiated materials, external articulation will be strong, as is the case at the end of phrase 3 in the Introduction. Where, however, the content of the two phrases is relatively nondescript, or there is little differentiation between them, external articulation will be much weaker. In some cases, an *overlap* between the end of one phrase and the beginning of the next produces a weak articulation by obscuring the boundary.[148] In other cases, there may be a *merger*, in which the new phrase seems to emerge from the old one, with no caesura and only the slightest change of content (that is, minimal parametric change).

Internal and external articulation may occur together in the same phrase, and either or both may also be combined with closure. This is what happens in the Introduction, where phrases 1, 2, and 3 all display weak closure, internal articulation (the regular pulse), and external articulation (the clear initiation of the next phrase, largely due to the recurring melody and the sharp change of texture with the codetta). The perceptual strength of a phrase boundary can be greatly enhanced by the combination of two or more phrase-ending methods.

The first movement of the quartet, Allegro fantastico, is in the nature of a concerto with the first violin as soloist. In the analyses that follow, I will sometimes refer to the group consisting of second violin, viola, and cello as the "trio," in contradistinction to the soloist. The movement is divided into three sections, which I have labeled A, B, and C. The sections are strongly delineated both by closure, consisting of a significant reduction in density, dynamics, and registral span, and by internal articulation in the form

[148] The overlap at the ends of phrases 1 and 2 of the Introduction did not have this effect, mainly because of the concomitant presence of closure and internal articulation.

of a brief silence. In each case, though, especially at the ends of sections A and C, closure is weakened by the disproportionate brevity of the closing passage. The A section forms a single large phrase, while the B and C sections contain two large phrases each. The two large phrases of the C section are separated by a single, very unique, small phrase. **Example 4-9** provides an outline of the large-scale form of this movement.

In the Allegro fantastico, we will have an extensive opportunity to explore the various types and degrees of phrase articulation. The great majority of small phrases in this movement are based either on similarity or on directed parametric change. Closure is therefore usually absent, and most phrases are completed through articulation. The three sections may be differentiated on the basis of the degree of ***contrast and*** articulation among their small phrases***. In the A section, most of the phrases are weakly contrasted but present fairly strong internal articulation. This allows us to readily hear distinct phrases and to perceive them as component parts of the large phrase.*** The phrases of the B section are also weakly ***contrasted*** for the most part. Here, however, many phrases are characterized by external articulation, and the low degree of contrast between adjacent phrases means that this articulation will be very weak. As a result, many of the small phrases are not easily recognized, though the large phrases that they combine to create are readily perceptible. In the C section, phrases are both strongly ***contrasted*** and strongly articulated internally.[149] This combination makes for the most conclusive degree of articulation. This conclusiveness might seem to inhibit the ability of the phrases to combine into a large phrase, but as we will see, Carter has found effective techniques to

[149] The main phrases in the last part of the C section are not themselves highly contrasting. However, they are made perceptually distinct by the interpolation of short interrupting segments that *are* highly contrasting.

override this tendency. Each of the three sections is discussed separately in the remaining three parts of the chapter.

III. Phrases with Moderate Articulation: Allegro fantastico, section A

The first part of section A, mm. 35 to 46, is dominated by the first violin as soloist. See **Example 4-10**, in which I have indicated four phrases in this passage, labeled A-1, A-2, A-3, and A-4. Each phrase comprises a run of rapid figuration by the soloist, a closing two-note gesture of longer durations (reduced to one note in A-4), and a pause in the soloist's part. Phrases A-1, A-2, and A-3 are structurally based on similarity in the parameters of timbre, spatial and temporal density, and dynamics. In addition, a steady level of tension is noticeably maintained by means of the rapid figuration as well as the fits-and-starts character of these phrases. Phrase A-4 is something of a hybrid, suggesting similarity in temporal density but also directed parametric change in the increasing dynamics and overall level of tension. In general, the music of the "trio"—the second violin, viola, and cello—forms a separate stream in this passage, which is discussed below.

A number of associations between phrases A-1 and A-2 suggest hearing them as a parallel period. In content, both phrases consist of discontinuous bursts of rapid figuration, and, with the exception of the cello's low A2 (m. 36) and the first violin's brief run up to the high F6 (m. 39), both phrases are concentrated in the middle register. The opening figure, G#4-B4-A3-C4, which will become an important motive for the entire work, is reflected in the penultimate figure of phrase A-2 (m. 40): F#4-A4-D4-F4. The pitches differ but the contour, <+ – +>, and the rhythmic profile, three short and one

long, are the same, and both gestures present a pair of ascending minor thirds. In addition, phrases A-1 and A-2 have rhyming endings.

At the end of phrase A-1 (m. 38), a two-note gesture D4-G#3 is shared by the soloist and the viola. Although there is a one-sixteenth-note overlap between the two tones, the aural effect is that of a single melodic motion. This gesture serves as internal articulation of the phrase: it grows directly out of the figuration that forms the body of the phrase, and its contrasting longer durations signal an end to the phrase. This perception is strengthened in two ways. First, the resumption of rapid figuration in the first violin following the two-note gesture seems to begin a new phrase (although overlapped with the sustained G#), thus signaling that the previous phrase has ended. Second, the presence of a similar gesture, F4-C5, at the end of phrase A-2 (mm. 40-41) clarifies in retrospect the function of the earlier one. The two gestures may be heard as a complementary pair, the first descending by a diminished fifth, the second ascending by a perfect fifth. The longer durations of the gestures have the effect of releasing some of the tension produced by the rapid tempo of the preceding material. The first closing gesture is weaker than the second: its two notes are shorter in duration than those of the second, and it is interrupted by the first violin's overlapping resumption of the rapid tempo, initiating the second phrase. The second closing gesture is uninterrupted,[150] producing a greater reduction of tension and a feeling that this stronger gesture serves to close off the first two phrases as a whole, much like the antecedent-consequent relation of a period. At the same time, the upward direction of the second gesture suggests an open-endedness that leaves room for continuation.[151]

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[150] That is, there is no resumption of rapid figuration by the first violin before the gesture comes to an end.
[151] Phrase A-1 is discussed in greater detail below.

Phrases A-3 and A-4 are more ambiguous, both in their relation to each other and in their relation back to the first period. Several features encourage hearing phrase A-3 as part of the initial period. The phrase begins on B4, one semitone below the end of the second phrase. This stepwise relation creates a strong and audible connection, as if the intervening time were merely a pause for breath. The downward direction and slower tempo of A-3, and its concluding minor third E4-C#4 on longer durations (mm. 44), combine to project a sense of closure for the first three phrases as a whole, creating a type of compound period. The following melodic figure D#5-B4 (mm. 44-45, shared between first and second violins respectively) sounds as an echo, slightly enlarged to a major third. The greater continuity of phrase A-3 may also act to resolve the whimsical gestures and fits-and-starts motion of the first period. The descending minor third, though of a different interval, can be heard as a varied statement of the two earlier closing gestures by way of the longer durations as well as the *espressivo* indication and hairpin dynamics.

Conflicting considerations suggest that phrase A-4 may be heard either as related back to the preceding phrase or as associated with the upcoming one. Phrase A-4 presents an agitated line in the solo violin that generally increases in tempo and dynamics as it proceeds. The phrase reaches a high point at the downbeat of m. 46 with an accented, *forte*, retrograde form of the initial motive, Bb4-G4-A5-F#5. The higher register of the falling minor third A-F#, and the longer duration of the F#, together bring this two-note figure prominently to our attention, and it is not difficult to recognize a transposition of the recently heard minor third E4-C#4 at the end of phrase A-3. This

rhyming connection between phrases A-3 and A-4 provides a link that encourages hearing them as a related pair.

On the other hand, many features of phrase A-4 distinguish it from A-3 and, in some cases, link it more closely to the following phrase A-5. These features result from the weakening organization of A-4. The A-F# figure does not fully correspond to the earlier closing gestures; only the second of its two notes is of a longer duration, and the figure does not in fact close the phrase, which continues with another group of sixteenth notes. This last segment of the phrase (B4 to Eb5, mm. 46-47) overlaps with the gathering forces of the trio, as they begin to build tension toward the climax (m. 49 and following). We may notice the stopping on F#5 of the first violin's sixteenth-note run, and this may be perceived as an internal articulation of the phrase. But articulation is much obscured by the overlap and by the lack of a well-defined two-note gesture, and there is a strong possibility that A-4 will be heard either as part of or as closely related to the following phrase A-5. Throughout the first three phrases, there is essentially no motion away from the beginning of the movement. It is not until phrase A-4 that the section begins to develop. Indeed, the general character of A-4, particularly in dynamics and temporal density, differs considerably from the first three phrases and can be heard as the beginning of phrase A-5's drive to the climax. These aspects of phrase A-4 tend to connect it more closely with the following phrase than the previous one.

Returning to phrase A-1 for a moment, the fits-and-starts motion referred to above results in a high level of discontinuity. Yet this disjunction does not prevent the formation of a unitary phrase. The phrase is divided into four segments or gestures, indicated with brackets in **Example 4-10**. The main body of the phrase comprises

segments *a*, *b*, and *c*, while segment *d* represents the two-note closing gesture. The three principal gestures are closely related by similarities of timbre, density (monophonic and rapid), and register (middle range), and by their very character as short, episodic, fragmentary utterances. The first two gestures are extended by the technique of interruption plus partial repetition. Gesture *a* begins with the four-note opening motive. The second violin's Eb5 and the first violin's quadruple-stop chord together form an "interposition," an interruption that, as noted above, serves to emphasize the following event. In this case the following event is a repetition of the last two tones of the initial gesture, A3-C4. This partial repetition audibly relates back to the opening gesture and, with the longer duration of the last tone, has the effect of closing off gesture *a*. A similar pattern occurs with gesture *b*, which moves from D5 to Gb4. The gesture is again interrupted, this time by the cello's low A, and resumes with another partial repetition, now emphasizing the third- and second-last tones Bb4-Eb4. (The two repeated tones in each gesture highlight two of the three intervals assigned to the first violin, minor third and perfect fifth.)

Gesture *c* begins with the F#4 and continues to the D4 of m. 38. While the longer duration of F#4 might suggest that it forms the ending of gesture *b*, as is often the case, here that tone is much more closely connected to the following figure by way of dynamics, articulation (slur), and the repetition of the F# on the second beat of the quintuplet.[152] The D4 is an elision, serving as both the end of gesture *c* and the beginning of the closing gesture *d*, D-G#. The viola's G#3 is heard as a closing rather than an

[152] Bernard 1993 suggests that the F#4 constitutes the end of gesture *b* (or, as he calls it, phrase 2) on the basis of a pattern in the first violin's part: "a burst of rapidly articulated notes followed by a final, longer one" (257). However, there are no connections between the F# and the preceding material, whereas there are strong connections, described above, between the F# and the following material.

interruption, partly because of the melodic connection with the D4 described above, but also because it behaves differently than the previous interposed figures. It is markedly longer than those figures, and it is not followed by a partial repetition of the preceding gesture. Rather, it is followed by the (overlapped) beginning of a new phrase, significantly different from the previous phrases in its length and its continuity of direction. It is this perceptible change of function with the viola's G# that concludes the first phrase and enables the four gestures *a*, *b*, *c*, and *d* to cohere as a single unit. The overall coherence of this phrase is based on similarity—the gestural and parametric similarities described above—but there is also an overlay of steadily maintained tension, generated by the rapid tempo and the start-and-stop nature of the line, and some level of release of that tension may be felt in the longer durations of the closing two-note gesture.

In this first large part of the A section, the trio forms a separate and independent stream from that of the soloist. In dramatic terms, one has the impression that the first violin takes authoritative command of the stage at the start of the movement and holds it for some time. The second violin, viola, and cello seem hesitant to interfere, and only gradually—one note at a time—begin to join the conversation. Although several writers have noted that each instrument plays a single tone during the soloist's first phrase, they have overlooked the progression in cardinality that ensues.[153] At the end of phrase A-2, each instrument repeats its single tone (mm. 41-42), and then does so again, now as part of a two-note figure (mm. 42-43). The viola and cello each form a melodic two-note figure, thus imitating the cadential-like closing gesture of the solo violin, but the second violin's two notes are simultaneous. The trio falls silent again during phrase A-3. Then, as if to correct the earlier mistake, the second violin's two notes, D#5 and B4, are restated

[153] Bernard 1993; Koivisto 1997.

once more at the end of A-3 (mm. 44-45), now as a melodic figure shared between the two violins (the "echo" of the closing E-C# discussed above). At the same time, the viola and cello each manage to produce a three-note figure, although both begin with repeated tones: G#3-F#4, reversed, in the viola, and D3 in the cello. The trio again subsides during phrase A-4, but finally gets underway with an upswing of energy toward the end of that phrase (m. 46), albeit with two further repeated tones in the viola, F#3-A4.

Despite the apparent disjunction between soloist and trio, the two streams interact contrapuntally in ways that help to shape the overall passage. Some of these have been noted above in regard to the single tones during the first phrase. Perhaps the most salient interaction occurs at mm. 41-43, when the members of the trio first begin to evince a degree of motion. This short passage, which I have circled and labeled the "bridge" in **Example 4-10**, serves as both a divider and a connector between the first and second phrase-pairs. The pause in the soloist's line during the bridge passage suggests a separation between phrases A-1/A-2, on the one hand, and phrases A-3/A-4 on the other, a separation that is reinforced by the differing characters of the two periods. At the same time, the Janus-like structure of the bridge has the effect of relating those two periods. Falling largely between phrases A-2 and A-3, the bridge looks both backward with the repetition of its earlier singletons, and forward with each instrument's added second tone, which in turn will be repeated at the intersection of phrases A-3 and A-4. And the flurry of activity in the viola and cello at that intersection (m. 45) seems to motivate the stepped-up emotion and drive of the soloist's fourth phrase. There is a sense of growing

coordination and cooperation between soloist and trio as the four phrases unfold, which reaches completion with the approach to the climax.[154]

The fifth, and final, phrase of the A section comprises a rapid buildup of tension (mm. 46-48) to a prolonged climax (mm. 49-51) and an initial winding-down stage that fails to adequately release tension (mm. 52-53). In a kind of "one more time" technique,[155] a second climax occurs, followed by a more effective winding down that leads to closure (mm. 54-56). Phrase A-5 is shown in **Example 4-11**.

Phrase A-5 begins in m. 46 with the viola and cello, overlapping with the end of the soloist's previous phrase. Spatial and temporal density increase rapidly through mm. 47 and 48, due in large part to the onset of polyrhythm (defined here as two or more regular pulses heard simultaneously). In the prevailing quarter-note tempo, MM 112, the cello's triplet-eighths (MM 336) are placed against the viola's duplet-eighths (MM 224) and both of these against the second violin's unusual beat of seven sixteenths in duration (MM 64). In m. 48 the second violin drops out, but the cello and viola rhythms are now heard against the first violin's quintuplets (MM 560), forming the ratio 2:3:5. This complex combination of differing speeds drives the music forward, accompanied by an increase in dynamics and a widening of the registral span, particularly in the descending bass.

The climax extends over three measures and consists of three sets of declamatory double-stops in all instruments. A high level of tension is maintained in the sustained double-stops and the still-increasing dynamics, *forte* to *fortissimo*, but the registral span unexpectedly diminishes, wedging inward from C#2-C6 to D2-B5 to G#2-Bb5 (the Bb5

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[154] This is an example of Carter's notion of "discipleship" (1997, 234-35).
[155] Schmalfeldt (1992) discusses the 18th-century convention in which, after an evaded cadence, the composer backs up and repeats the approach to the cadence "one more time" in order to gain closure (3).

is played by the second violin). Following the third climactic statement, there is a rapid decrease in dynamics and spatial density (mm. 52-53) but the first violin moves upward in rapid figuration, ascending to F#6. The elevated temporal density of this line, and especially its registral height—reaching above the highest note of the climax, C6—produce an inconclusive ending, a sense of irresolution that projects this winding-down stage as a failed attempt at closure. The second climax and its winding-down stage resolve these irregularities. The registral span of the single exclamation, C2-G6, exceeds that of the earlier three statements in both lower and upper boundaries, and exceeds as well the F#6 reached during the failed closure. The following successful closure brings structural completion, including a marked registral contraction that concludes with the boundaries C4-Gb4. The closing stage, however, is extremely brief relative to the length of the buildup. This brevity lessens somewhat the strength of the closure and, by avoiding the sense of a full stop, sets up an implication of continuation.

Like the Introduction, the A section as a whole forms a large phrase on the basis of tension and release. Phrases A-1, A-2, and A-3 create and maintain a moderate level of tension. This is accomplished mainly by the steadily high temporal density, though there is some reduction at the end of phrase A-3. Phrase A-4 begins to increase tension with its agitated character and its ascent into the higher register. Phrase A-5 builds on this foundation, augmenting the tension through increased temporal and spatial density and the descending bass line, and leads to a lengthy climax. The subsequent decrease in dynamics and density, but not in register, results in a weak closure. A "corrective" second climax is followed by full closure, now including registral contraction.

The overall shape of the A section also resembles that of the Introduction, though with a number of distinctions that affect the formal function of each part. In both cases, a prolonged stage of relatively steady, low to moderate parametric values leads to a substantial expansion and contraction in register as well as dynamics and density, followed by a closing stage with a return to moderate levels. A graph of the registral boundaries for each part is given in **Examples 4-12** and **4-13**.[156] The graphs show that the initial steady stage, concentrated in the middle register, is more consistent in the Introduction than in section A, where there is frequent overreaching toward the extremes. Nevertheless, there is a clear mid-range band in section A through the middle of the section. The graphs also show that the expansion is quicker, smoother, and more coordinated in the Introduction, while in section A the expansion is longer, the bass and soprano lines are staggered, and the soprano line in particular follows a kind of hound's-tooth pattern. Finally, we can see that the closing stage of registral contraction is longer in the Introduction and much shorter in section A.

As a further basis of comparison, the figure below shows the four stages with respect to register, the measure numbers associated with each stage, and the approximate percentage of the total occupied by each stage:[157]

	Steady	Expansion	Contraction	Steady	
Introduction:	1-18 (53%)	19-24 (18%)	25-27 (9%)	28-34 (20%)	T=34
Section A:	35-46 (52%)	46-54 (39%)	55 (4.5%)	56 (4.5%)	T=22

[156] Measure numbers are given across the top of each graph and pitches along the sides, with octave designations noted for each pitch-class C. Each square represents one measure, and the pitch shown for a given measure is the highest or lowest pitch in that measure. The highest and lowest gray squares in a column represent the pitches for that measure.

[157] The percentages apply to measures, not to quarter notes or some other regular duration common to both sections. Measures are not all of the same duration, though the great majority in each part are either 3/4 or 4/4 meter.

Although the percentages are not precise, they provide a rough basis for comparison of the two parts. Thus, we see that both parts devote slightly over half of their total duration to an initial stage of steady, middle-range register. The differing lengths of the expansion stage, noted above, are quantified here: approximately 18 percent of the Introduction versus 39 percent of section A. What the percentage figures are most helpful in showing is the greater proportional balance in the Introduction than in section A. The closing stage of the Introduction occupies roughly 20 percent of the total—slightly more than the expansion and slightly less than the combined expansion and contraction. This longer period of "normal" registral boundaries following the explosion translates for the listener into a greater relaxation of the built-up tension and hence a greater degree of closure. In contrast, the closing steady stage of section A is only a fraction of the vastly larger expansion stage, and the contraction is likewise extremely brief. The figures and graphs illustrate a point that is aurally clear to a listener: while there is a complete resolution of parametric values at the end of section A, and a strong articulation with the following brief silence, closure is significantly weakened by the disproportionate brevity of the closing stage. Some level of tension, perhaps unquantifiable, remains. In this way, the large phrase is well defined but left sufficiently open to allow continuation of the larger movement.

IV. Phrases with Weak Articulation: Allegro fantastico, section B

The second section of this movement brings with it a noticeable change in the formal organization. While the phrases of the Introduction are closed, although weakly, and those of the Allegro fantastico, section A, present a moderately strong degree of internal articulation, most of the phrases of section B entirely lack both closure and

internal articulation. Rather, they are distinguishable principally by external articulation, and in many cases we will find the degree of articulation to be rather weak. There are seven phrases, partitioned into two groups which I will call section B-I, comprising phrases B-1 to B-3, and section B-II with phrases B-4 to B-7. Each of the sections forms a large phrase. Section B-I begins at a high level of tension, which decreases and then builds again to a climax, forming a large phrase based on departure and return. Section B-II features a sustained moderate level of tension that leads to a point of great intensity followed by a diminution of tension. Within each of the two large phrases, the small phrases tend to be weakly contrasted, and they are often connected by overlap or merger, resulting in weak external articulation and the perception of a single, relentlessly driving motion. The entire B section is highly characterized by the presence of polyrhythm, a device that contributes substantially to the creation and maintenance of tension through the high levels of temporal density.

A. Section B-I, phrases B-1 to B-3

The first phrase, labeled B-1,[158] begins with an explosion, suddenly loud and extremely fast. See **Example 4-14**. At the initial notated tempo of quarter-note at MM 112, the first violin's quintuplets, and the sixteenths beginning at m. 59, are moving at MM 560. This very long run of figuration, which so contrasts with the whimsical fragments of section A, is further intensified by the *accelerando* in the cello, and by the assertive regular pulse in the second violin (MM 70), which forms a polyrhythm in the ratio of 4:5 with the first violin. The resulting high temporal and spatial density levels are accompanied by steadily loud dynamics and a registral span in the middle to high

[158] The small phrases of the B section are labeled B-1, B-2, and so forth, using arabic numerals consistent with those of the A section, while the two large subsections B-I and B-II use roman numerals.

range. The tension is unabated until the first violin suddenly stops on Db5, followed by a sustaining of that tone together with winding-down residues in the second violin and cello that result in rapid diminution of all parameters (mm. 60-61).

The long-sustained Db5 merges into the beginning of phrase B-2, which is completely the opposite in character. The dynamics are quiet, the density is low to moderate, and the register varies but remains mostly in the middle range. Despite these low parametric values, which are usually associated with low tension, this phrase has a nervous, fluttering sound due to the series of short fragmentary gestures and especially to the ambiguity of rhythm and meter. After the metric modulation of mm. 59-60, the new tempo of dotted-eighth at MM 186.7 results in a compound meter of 12/16, which may be divided either as four dotted eighths or as six eighths. Both of these beat values and their subdivisions are heard in phrase B-2, contributing to the feeling of restlessness. The cello begins a long melody in m. 64. With its graceful continuity of line and gradually increasing dynamics, the melody slowly enters our awareness and begins to impose a sense of certainty and direction, in contrast to the somewhat aimless material of the first violin (mm. 64-65). The cello accelerates (though without the dotted arrow) and crescendos, and it is these increases that seem to lead to and motivate the first violin's sudden *forte* gesture in m. 66, which begins the next phrase.

Phrase B-3 comprises a buildup of tension throughout the ensemble, with rapid increases in dynamics, density, and rhythmic complexity, and a rising register, all leading to a climax (mm. 70-71). The climax is structured much like earlier ones (e.g., mm. 49-51, 54) with multiple-stop chords, loud dynamics, and a wide registral span. A top-voice melody in dotted rhythm emerges: Ab5-D#6-D6-Ab5 (played respectively by violin I,

violin II, violin II, and viola), and the end of this melody (m. 72) marks the end of the climax. There is no winding-down stage. The second violin and cello simply come to a stop and the tension of the climax is left unresolved. In the meantime, the first violin has already begun the next phrase, with its quiet sustained F4 (m. 72) which will blossom into a rapid run of figuration.

These first three phrases of the B section exhibit differing types and degrees of completeness. Coherence in phrase B-1 is supplied by similarity, especially in temporal density—the continuous rapid motion of the first violin—but also in spatial density and dynamics. The body of the phrase is quite clearly defined, but its ending is ambiguous. The first violin's sudden stop on Db (m. 60) constitutes internal articulation, a salient event that seems to indicate the end of the phrase. However, the note is sustained for some time, and the second violin and cello continue into the next measure with residues of their material. These "after-sounds," while bringing about a closural reduction in density and dynamics to phrase B-1, also have the effect of merging with the beginning of phrase B-2; that is, there is little contrast between the "after-sounds" and the material of B-2 and hence it is difficult to pinpoint the boundary. In **Example 4-14**, I have placed that point at the end of m. 61 when the first violin first moves off of the long-held Db and the cello enters with its lowest note since the section began, though other listeners may hear it differently. This gradual and uncertain awareness that B-2 has begun represents a weak form of external articulation of B-1, which in turn weakens the earlier internal articulation of the sudden stop on Db. Phrase B-2 is also based on similarity in dynamics, density, and register. The ending of this phrase lacks any form of internal articulation, and its definition is further obscured by the cello melody, which begins in B-2 but seems

to continue into B-3, creating an overlap. There is, I think, a degree of external articulation at the moment (end of m. 66) when the first violin reenters at a *forte* dynamic level, injecting energy into the subdued restlessness of B-2 and thus signaling the presence of the new phrase B-3.

For phrases B-1 and B-2, then, there is some level of external articulation as we gradually become aware that a new phrase has begun, but in both cases the endings are unclear. These weak articulations make it difficult to perceive the phrasal boundaries, but they also contribute to the sense of ongoing motion in this passage, and to the ability of the individual phrases to combine as parts of a single large phrase. In phrase B-3, coherence is provided by the directed parametric changes as the phrase moves from lower to higher values in dynamics, density, and register, producing an arc of increasing tension. The climax provides strong internal articulation of B-3, but there is no adequate winding-down stage and, as I will discuss below, the following phrase does not release the accumulated tension. Thus, there is a distinct sense of unresolved tension at the end of phrase B-3.

These three phrases form a large phrase based on the process of departure and return. The symmetry of this process is quite audible in the alternation of tension from high to low and back to high, created primarily by the alternation in values of dynamics and density. The three phrases move from loud to soft and back to loud, and a similar pattern occurs in both temporal and spatial density. In addition, the first violin's rapid figuration in phrase B-1 (mm. 57-60) returns in phrase B-3 (mm. 69-70), as does the second violin's regular pulse and the polyrhythm associated with it. There are differences of context: in B-3, the figuration is of a shorter length, the regular pulse is less

prominent, and the viola and cello contribute more actively to the texture. Still, the reference is not difficult to hear and creates a perceptible association between phrases B-1 and B-3. Phrase B-2 forms the contrasting middle section, with much lower density and dynamic values and a lesser degree of tension.

The large phrase of this section B-I is closed by the completion of the departure/return process, and is further supported by the strong internal articulation of the climax. Closure usually entails a reduction of tension, and the return of earlier material is typically one of the strongest means of closure. Here, however, there is a contradiction: the completion of the departure/return process occurs in a context of high tension. This seeming paradox has the effect of setting up a need for continuation, thus avoiding a sense of coming to a full stop before the end of section B.[159] The large phrase of B-I functions literally as an opening—it opens up the new section and serves as preparation for the following large phrase of B-II. We will see another phrase of very similar construction and effect at the beginning of section C.

B. Section B-II, phrases B-4 to B-7

As with the first three phrases of the B section, phrases B-4, B-5, B-6, and B-7 function as large segments that combine to form a large phrase, in this case based on the tension and relaxation model. This passage, however, is highly ambiguous in its formal structure. Section B-II is shown in **Example 4-15**. The boundaries of the individual phrases are, once again, blurred by merger and overlap. All except phrase B-7 feature weak external articulation. In content, there is little to relate one phrase to another, and coherence among the phrases is therefore attenuated. There is, however, a moderate to

[159] Phrase B-3 constitutes the closing stage of the large phrase, but it does so because of its associations with phrase B-1 (thus representing a return of the latter) rather than any inherent closural factors.

high level of tension throughout phrases B-4, B-5, and B-6, primarily due to temporal density, with an overlay of increased intensity in B-6 with the first violin's high-register melody. It is this continuity of tension, followed by a release in phrase B-7, that binds the elements of this large phrase as a whole.

In phrase B-4, the first violin sets the tone of high temporal density in the long run of sixteenth notes. This line is shaped by the rise and fall in register (Eb4 up to Ab6 and down to G5) and in dynamics. While the dynamics make a full return to *pianissimo*, the register descends only halfway to its starting point, leaving a sense of open-endedness. The sparse accompaniment in the trio is coordinated with the first violin in dynamics, and the cello dips to its lowest point, C2, simultaneously with the first violin's high point, forming a wedge-like structure. The second violin sounds a regular pulse throughout the phrase but this is largely overshadowed by the processes in the other instruments. There is an overall process of departure and return in this phrase which normally would produce closure, but the ending of the sixteenth-note figuration merges with the viola melody that forms the next phrase, blurring the juncture between the two phrases and substantially weakening the sense of closure. This merger also results in weak external articulation of B-4, whose ending is not clearly indicated by the beginning of the next phrase.

Phrase B-5 consists almost entirely of the viola's melody. Beginning in the latter part of m. 76 (though the cello accompaniment begins slightly earlier), the melody seems to emerge out of the first violin's running sixteenths; there is little or no caesura between the phrases. Since the two instruments are similar in timbre, especially with the viola in its higher register, the melody itself comes to our attention only through the slight change in tempo from very fast in the first violin to somewhat slower in the viola. The

fragmentary one- and two-note gestures, all played at very quiet dynamic levels, are responsible for the expressive intensity of this brief melody, which fades back into the first violin's material (m. 78) as quietly as it arose. The coherence of this phrase is quite weak, but we may perhaps hear the continuity of the viola melody, together with the low dynamics and density levels, as a thread of similarity holding these elements together. As with B-4, phrase B-5 is weakly articulated. Apart from the cessation of the viola melody, there is no strong contrast between this phrase and the next, and hence no clear initiation of the following phrase.

Phrase B-6 is complicated by the presence of two separate layers: the trio at first, which is then joined by the first violin. The trio itself comprises three independent rhythmic streams, yet produces a composite polyrhythmic texture that moves continuously throughout the phrase, albeit with slight changes in the pulse structure of each part.[160] This layer is characterized by fairly high levels of temporal and spatial density and, ironically, very quiet dynamics that rise only to *mezzoforte* (m. 81). The first violin's anguished melody forms a second layer. The louder dynamics and the long dramatic high note differentiate it entirely from the trio. This melody is symmetrically shaped in register, as it moves from the middle-high range to very high and back to middle-high. A similar pattern is seen in the temporal density of the first violin: a series of short tones is followed by a single long-sustained tone and then a return to shorter values. The sustained Bb6, which is the highest pitch in the movement so far, triggers a

[160] In mm. 79-80, violin II's half-note pulse falls on beats 2 and 4; viola's quarter-note pulse falls on the "and" of each quarter in the measure; and cello's triplet-eighths and triplet-quarters fall on each quarter with an emphasis on beat 3 (and by implication beat 1). All are consistent with the 4/4 meter but in syncopation. In mm. 81-82, violin II's beat value decreases from a half note (A5, G#5) to a dotted quarter (D#6) to a quarter (D6) and continues, but the quarter falls on the "and" of each beat of the measure; viola has triplet-quarters and then triplet-eighths; and cello's dotted-quarter pulse (G2, C#5, F#3) reduces to beat values of five eighth notes (D4, G#2, C2).

belated crescendo in the trio (m. 81). While the first violin's melody evinces a departure-and-return pattern, the overall phrase coheres on the basis of similarity. This phrase is never louder than *mf* in dynamics; its intensity stems from the mostly high register, high temporal and spatial density, and the polyrhythm.

Phrase B-7 is initiated by a sudden drop in all of these parameters, and this phenomenon provides strong external articulation of the ending of B-6. The diminution continues throughout the phrase as the first violin's *cantabile* line gradually becomes slower and the instruments drop out one by one. The release of tension is palpable. The cello's acceleration at the end, which might seem to be a tension-generating factor, is completely counteracted by the pronounced diminuendo to *ppp* and the greatly reduced spatial density. These parametric reductions and the short rest that follows supply internal articulation to B-7.

Over the course of phrases B-4, B-5, and B-6, there is no trajectory of gradually increasing tension, of gradually increasing parametric values. Rather, a disparate series of seemingly unrelated phrases maintains a relatively steady level of tension, largely through temporal density. What helps to group these phrases together is the clear sense of closure in phrase B-7. The slowing tempos, lowered register, and vastly reduced dynamics and spatial density produce an unambiguous release of tension, all the more noticeable because it has been pent up since the unresolved climax in phrase B-3 (mm. 70-72). The accumulated energy and tension of that passage are not dissipated in the following phrases, but rather are tamped down only slightly and then maintained. Resolution does not occur until the closing material of B-7, whose relatively long duration creates a strong enough sense of release to relate back to the unresolved climax

of phrase B-3. It is this relation that may allow us to hear B-4, B-5, and B-6 as a group, one whose effect is to prolong the tension generated by the earlier climax and to delay its resolution. The overall large phrase of section B-II is thus characterized by relatively high tension throughout, followed by release at the end of the phrase.

V. Phrases with Strong Articulation: Allegro fantastico, section C

Section C comprises nine formal units. Two of these, labeled C-6 and C-8, are stand-alone segments that serve as brief interruptions to the ongoing motion. The remaining units are phrases, and unlike section B, most of the phrases here are strongly contrasted with one another. This means that they will have good external articulation; the ending of each phrase will be readily perceived by the clear initiation of the new phrase. In addition, however, these phrases generally display strong internal articulation, an audible event that grows out of the phrase itself and provides a kind of punctuation. The presence of both internal and external articulation makes for a rather conclusive ending to a phrase. Yet, we will find that many of these phrases combine to form larger units. Subsection C-I comprises the first three phrases, C-1, C-2, and C-3, which together form a large phrase on the basis of departure and return. Subsection C-II consists of the single small phrase C-4. And subsection C-III is made up of phrases C-5, C-7, and C-9, together with the intervening segments C-6 and C-8; these combine to form a large phrase based on tension and release.

Many features of this third section of the Allegro fantastico movement suggest that it is developmental in both character and function. Some of these features also point to the analytic utility of considering the A and B sections as roughly analogous to the first and second themes or theme groups of a traditional sonata-allegro form. It should be

noted, however, that there is no suggestion of a "recapitulation"—at least, in this movement.[161] Phrases C-1 and C-3 respectively develop the soloist's "first theme" from section A (m. 35) and "second theme" from section B (mm. 57-60). Phrase C-4 stands alone as a rigorous polyphonic treatment of certain rhythmic features, namely accelerando and polyrhythm, found primarily in section B. In the final subsection C-III, the remaining phrases C-5 through C-9 comprise a long buildup of tension culminating in a substantial passage of "argument," an impassioned climax, and an all-too-brief closing passage. **Example 4-16** sets out section C-I, including phrases C-1, C-2, and C-3.

A. Section C-I, phrases C-1 to C-3

The C section begins with the prominent restatement of the solo violin's four-note opening gesture from the beginning of the Allegro fantastico movement (m. 35, **Ex. 4-10**) at *forte* dynamics and with accents on each tone (m. 88).[162] This memorable figure, however, is in the "wrong key." The original G#4-B4-A3-C4 has been transposed down one semitone. While the durational pattern is considerably changed from the original, the intervallic structure is preserved exactly and the varied form of the theme is easily recognized. It is followed by another unexpected event, namely, a canon at the unison in viola and cello on the wrong-key theme (mm. 89-90). Since each of those instruments has a different repertoire of intervals from that of the first violin, the tones of the theme cannot be stated in direct succession. Having some fun, it seems, in this passage, Carter solves the problem by emphasizing the thematic tones with *forte* dynamics and accents (the same performance indications as those of the solo violin) while de-emphasizing the non-thematic tones with *piano* dynamics. An effort has been made to bring this varied

[161] But see the *Cadenza for Violin I*, mm. 378 (literal "first theme") and 393-396 (apparent reference to "second theme").
[162] The second violin's part in mm. 87-88 is discussed below.

theme and its canonic imitation to our attention. The canon is very brief, however, and quickly devolves into a chaotic 2:3 polyrhythm (m. 91) that is suddenly brought up short by the commanding quadruple-stop of the second violin (calling to mind, perhaps, the solo violin's similar chord just after its initial statement of this theme at m. 35). The polyrhythm actually begins earlier, in mm. 89-90 during the canon, where the viola's dotted-eighth pulse (MM 186.7) is pitted against the cello's eighth-note pulse (MM 280). The relationship is then reversed: the viola's triple rhythm in mm. 89-90 becomes duple in m. 91 (MM 280), and the cello's duple rhythm becomes triple (MM 420).

Phrase C-1 actually begins with the second violin in m. 87, which initiates its own four-note figure, Eb5-C6-Db5-F5. This figure, at the second violin's signature tempo of half-note at MM 70, is a contour imitation of the first violin's main theme, <+ – +>. In this way, all four instruments participate in the imitative development of the theme. The second violin's figure will return shortly (mm. 96-97), an octave lower and in retrograde, to herald the development of the "second" theme.

A well-articulated formal structure is clearly projected in phrase C-1. The phrase is composed of three segments: first, a statement of the subject, with an overlay from the simultaneous variation in the second violin; second, a canonic imitation of the subject; and third, a "closing" of sorts with rhythmic elaboration and punctuation. This sequence may be heard as a process, but the third segment does not represent closure in the sense of completion of that process. The impression is rather one of a stately, civilized debate that deteriorates into a raucous squabble, a turn of events that foreshadows the "argument" in the latter half of the C section. A stronger basis for coherence is the directed parametric change of increasing temporal density. The speeding up of attacks is

very audible as the phrase proceeds. The absence of a corresponding slowdown prevents closure, but the phrase is unambiguously ended with the second violin's chord, producing a strong internal articulation.

The imitative texture briefly continues in phrase C-2, as the first violin's ascending two-note gesture C#4-E4 is followed by similar figures in the cello, G3-C4, the viola, Eb4-A4, and again in the first violin, now inverted, F#5-B4 (see again **Ex. 4-15**). The four gestures form a sequence of expanding intervals of 3, 5, 6, and 7 semitones respectively. A similar sequence, slightly altered and in reverse order, will occur at the end of the movement (mm. 133-34). The inverted form of the last gesture, with its change of direction and the increase of dynamics to *mf*, prompts the following longer melody in the first violin, which acts as a kind of spinning out of the gesture. The similarities of timbre and spatial density in this passage, dominated by the solo first violin, supply the coherence of phrase C-2. The quiet dynamics of the first three gestures act as a "cooling off" period after the previous heated exchange, but tension begins to mount again as the melody in the first violin becomes louder, faster, and more emphatic.

Midway through this melody (m. 96), the second violin begins to restate its earlier figure in retrograde, F-Db-C-Eb, still at the MM 70 tempo. This figure represents the initiation of phrase C-3, resulting in an overlap with the end of phrase C-2. The first violin's melody straddles the entrance of the second violin's regular pulse; the continuation and conclusion of that melody define the boundary of C-2. The half-measure rest in the first violin's part (m. 97) brings a halt to the melody, providing internal articulation for phrase C-2. At the same time, the regular pulse straddles the ending of the melody and continues throughout the following passage, thus defining

phrase C-3. The second violin's pulse has a substantial effect on the first violin, causing a slight reduction of tempo and change of direction in the melody, followed by a dramatic pause and the synchronized launching of the septuplets. While the pause and the sudden onset of very rapid figuration marks phrase C-3 for our attention, it is the insistent pulse of the second violin, beginning a measure earlier, that forms the infrastructure of the third phrase.

The first violin's septuplets (changing to sextuplets at m. 99 with the metric modulation) may be heard as a varied restatement of the "second theme" that initiated section B (mm. 57-60; cf. **Ex. 4-14**). As with the earlier passage, this one begins with a pause and then a long, loud, very fast, and mostly ascending run of figuration that stops suddenly on a single tone. The earlier tone Db5 was sustained, while here the tone F6 is cut short. At the same time, the overall texture in phrase C-3 becomes more complex as the other instruments become active. During the main body of C-3 (mm. 98-99), the viola and cello present irregular rhythms while the second violin's regular pulse forms a polyrhythm with the first violin. The textural similarities in phrase C-3—high levels of dynamics and temporal and spatial density throughout—provide coherence. The first violin's abrupt stopping on F6 forms a strong internal articulation, followed by brief residues of energy in the viola and cello until they too come to a halt. The *tranquillo* melody beginning in m. 100 initiates the next phrase.

As noted above, the first three phrases, which form section C-I, are organized as a large phrase based on departure and return. The unifying feature is the four-note regular pulse in the second violin that occurs at the beginning of phrase C-1 and again at the overlapped beginning of phrase C-3. The return of this pulse forms a strong and audible

connection back to its earlier appearance. In both instances, the pulse forms a simultaneous contrapuntal stream with the first violin, and is followed by a passage of high temporal density and polyrhythm which is brought to a relatively abrupt stop (less so in C-3 because of the briefly continuing viola and cello). The mostly monophonic texture of phrase C-2 creates the contrasting departure, consisting of the imitative two-note gestures and the resulting longer melody in the first violin.

Phrases C-1 and C-3 exhibit strong internal articulation. Phrase C-2, despite the overlap with the regular pulse that begins the next phrase, has fairly strong external articulation because of the pronounced contrast (m. 97) between its slower-moving line and the much faster septuplets of C-3. Perhaps surprisingly, the degree of articulation does not prevent these phrases from combining to form a larger unit. This is because the model chosen for this large phrase, departure and return, typically displays a modular construction among its three parts. The most important marker of this phrase type, apart from the contrasting middle section, is the perception of correspondences between the first and third parts. In this case, such correspondences are readily audible, as described above. The large phrase of section C-I is closed by the completion of the departure/return process and, like the first large phrase of section B, it ends on a note of high tension, producing a palpable sense of the need for continuation.

B. Section C-II, Phrase C-4

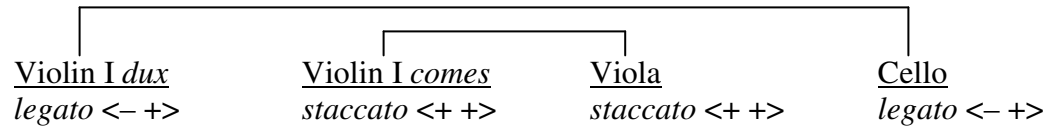
The fourth phrase of section C stands alone as a single phrase. It is the only small phrase in the excerpt under study that does not combine with others to form a larger phrase. This distinction is a result of its unique content and character. In the formation of the overall section C, phrase C-4 acts as a large-scale interruption which intensifies the

large-scale drive to the climax that will take place in the passage following this phrase. At the same time, phrase C-4 looks back to earlier passages in a stylized development of previously heard rhythmic features.

Phrase C-4 presents a modified five-voice prolation canon, with two "verses," in which a sixth voice is added in the second verse. See **Example 4-17**. A prolation (or mensuration) canon is one in which the *comes* voices alter the note values of the *dux* melody in specified proportions, resulting in the same melody being performed at different speeds. Two principal modifications are made to the traditional procedure. First, with the exception of the second violin, the voices do not sound simultaneously; each voice commences after the preceding one has stopped. Among other things, this enables the four instruments to play five and six voices. Second, and more importantly, the *comes* voices do not imitate the pitch structure of the *dux* melody. Rather, as discussed below, they imitate the cardinality of the melody.

After the buildup of phrase C-3, there is a sudden drop in dynamics, density, and register as the first violin begins a brief *tranquillo* melody (mm. 100-101). The melody contains three notes, each having a duration of nine thirty-seconds at a speed of MM 108.8. This is the *dux* voice. In the following measures, the *comes* voices present their own three-note melodies in successively shorter note values: the first violin in durations of six thirty-seconds at MM 163.3 (m. 102, thus serving consecutively as two distinct voices), the viola in four thirty-seconds at MM 245 (m. 104), and the cello in two thirty-seconds at MM 490 (m. 104). The proportion of speeds is 9:6:4:2. The four voices just described—violin I *dux*, violin I *comes*, viola, and cello—are also engaged in imitation

by retrograde articulations and contours: violin I *dux* and cello play *legato* in the contour <– +>, while violin I *comes* and viola play *staccato* in a <+ +> contour:



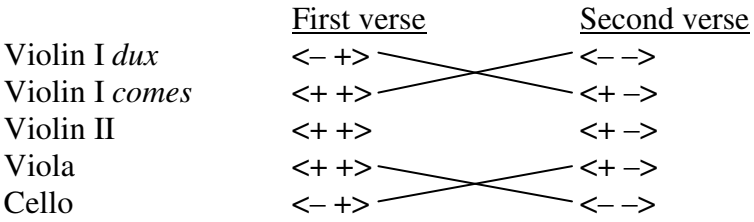
The order of the four voices in regard to their articulation and contour is ABBA. (The pitch content of the melodies is discussed below.)

The second violin (mm. 102-103) seems to stand somewhat apart from this scheme. Its three-note melody is played in much longer note values, fourteen thirty-seconds, and it departs from the established association of articulation and contour, playing *legato* with the <+ +> contour. However, the second violin's durations should be understood as double the length of its basic unit, which is a quarter note at MM 140. Its tempo in mm. 102-03 is seven sixteenths at MM 70, identical to its earlier tempo of half-note at MM 70 in mm. 96-97 (the metric modulation at m. 98 converts the preceding half-note duration to a double-dotted quarter, or seven sixteenths, both moving at MM 70). If we consider the second violin's durations in the canon as augmented, then its basic pulse is half the given value, or seven thirty-seconds (instead of fourteen). The ratio of speeds, now including the second violin, is 9:7:6:4:2.

A rather dramatic exclamation point in mm. 105-106 marks the end of the first "verse" of the canon. This gesture represents another example of interposition, that is, an interruption of a passage that resumes afterward. The sparse, quiet texture of the canon is briefly interrupted by a substantial increase in density and dynamics, followed by a return of the canon. By its very difference, the gesture highlights the presence of the canon and demarcates the boundary between the end of the first verse and the beginning of the

second. Three of the previous note values are featured, plus a new one in the cello of three thirty-seconds at MM 326.6. This new duration will be incorporated into the canon in the second verse.

The second verse again begins with a *tranquillo* melody in the first violin, and largely mimics the first verse in rhythmic diminutions and in relations of articulation and contour. Some interesting differences may be noted. Contours in the second verse are exchanged and inverted, as shown in the figure below (viola in the second verse refers to the dotted sixteenth figure, m. 109):



Violin II's contour follows that of violin I *comes* in strict imitation in both verses. Articulations in the second verse remain the same in each voice, except that in the early part of m. 109 the viola's four-thirty-second figure is played *legato* with a glissando, rather than the expected *staccato*. This figure also departs from the expected contour, presenting as <– –> rather than <+ –>, but this departure is remedied in the following dotted sixteenth figure. The dotted sixteenth figure in the latter part of m. 109 adds another voice, sounding note values of three thirty-seconds. With a total now of six voices, the ratio of speeds becomes 9:7:6:4:3:2. The cello brings the canon to an end as its three-note melody merges with the start of a much longer run of figuration.

As mentioned above, the canonic imitation does not involve the pitch structure. The eleven melodic figures heard during the canon are unrelated to one another either by identity or by any of the four classical transformations. All, however, are related by

cardinality. The three-note grouping is made audible primarily by the regularity of durations within each group as well as the change of durations between groups. The changing articulations also help to differentiate each statement. It is the constant "repetition" of the three-note figures that allows us to hear this passage as, in some sense, a canon.

The canon serves as a development of two important rhythmic features, largely associated with section B: polyrhythm and acceleration, particularly the cello's *accelerandi*. As discussed above, polyrhythm is a major presence in section B, noticeably more so than in section A or in the Introduction. All of the note values found in the canon occur in section B. These are shown in **Example 4-18**, where mm. 62-63 feature all but one of them: nine thirty-seconds in cello B2-G3-[Eb4]; seven thirty-seconds, occurring as fourteen thirty-seconds or seven sixteenths, in viola F3 (and cello C2 starting in m. 61); six thirty-seconds or three sixteenths in viola E4; four thirty-seconds or two sixteenths in viola F#3-C4-Bb4; and two thirty-seconds or one sixteenth in first violin C6-A5. The missing note value, three thirty-seconds, is found in the cello, m. 66, B4. Thus the canon may be heard as a summary of previous speeds. What is more apparent to the listener, however, is the acceleration within each verse of the canon. As the durations become shorter and shorter, the tempo of each melodic figure becomes faster and faster. This speeding up may be heard as a reference both to the cello's *accelerandi* and to the more generalized effect of increasing temporal density that occurs in each of the formal sections so far (Introduction, Allegro fantastico sections A and B).[163]

[163] The canon may also be heard as a development of the regular pulse that figures so prominently throughout the piece, perhaps referring especially to the three-note regular pulse in the first violin in m. 2.

From a formal point of view, coherence in phrase C-4 is provided in several ways. Except for the interruption, there are a number of strong parametric similarities throughout the passage: quiet dynamics, low spatial density, and a generally middle to lower register. At the same time, a directed parametric process of increasing temporal density, produced by the diminishing note values and increasing speeds, unifies each verse of the canon. The two-verse structure of the passage may be understood as a sequential process, in which the first verse serves as the model and the second as the sequence. The canonic process itself, however, longer than the earlier one and therefore more salient, is the strongest factor that unifies this passage and sets it apart from its neighbors.

Since neither the canonic nor the sequential process has a fixed point of completion, closure is absent. Internal articulation is lacking as well. The precise boundary between this phrase and the next is blurred by the merger of the cello's final sixteenth-note canonic figure with the continuing run of sixteenths that follows. Despite these factors, articulation of this phrase is surprisingly clear because the highly distinctive, canonic content of phrase C-4 contrasts so thoroughly with that of the following phrase. Although there is no marked event signaling the end of phrase C-4, the length of the cello's figuration and the high register and sustained tones of the first violin (m. 110 and following) clearly indicate the start of a new phrase. This is an example of external articulation which, as we saw in the B section, often produces a weak formal delineation. Here, however, the effect is more pronounced because of the greater contrast, resulting in a structure that is perceptually strong and well defined.

C. Section C-III, phrases C-5 to C-9

This final part of the final section of the Allegro fantastico movement consists of a prolonged drive to the structural cadence of the movement. Section C-III forms another large phrase, and its internal components are arranged symmetrically: phrases C-5, C-7, and C-9 advance the discourse by means of, respectively, rising passions, heated argument, and climactic explosion, while C-6 and C-8 represent brief interruptions that serve to intensify the drama. As may be obvious from this description, the large phrase of C-III is built on the model of tension and release. The strong rhetorical character of this section is created primarily by the compositional treatment of temporal and spatial density and dynamics.

Phrase C-5 comprises a single unidirectional process of growing tension, manifested primarily by increasing dynamics in the solo violin and the cello. Other factors are either neutral or contradictory relative to this process, yet they do not diminish the powerful effect of the crescendo. See **Example 4-19**. The viola is absent until the climax (m. 117), and the second violin is mostly on quiet dynamics; thus they do not contribute to the crescendo. There is some increase of spatial and temporal density as the second violin joins (m. 112), but its soft dynamics as well as the lack of a further increase of density result in little overall effect on the level of tension. The first violin's melody gradually increases in both dynamics and temporal density, as its initial soft singing moves to more assertive one-note gestures and finally rapid figuration leading to the climax. The cello similarly crescendos and becomes more emphatic as its single notes grow longer and change to double-stops.

One of the most interesting features in this passage is the long *ritardando* in the cello, mm. 109-115 (and continuing to m. 117). All of the note values of the previous canon are presented in reverse order (that is, by increasing durations). These are indicated in **Example 4-19** with numerals under the cello part: two thirty-seconds beginning with C5 in m. 109; three thirty-seconds with F#4 in m. 111; four thirty-seconds with C4 in m. 111; six thirty-seconds with G3 in m. 112; nine thirty-seconds with E2 in m. 112; and seven thirty-seconds (doubled to fourteen thirty-seconds or seven sixteenths) with the double-stop D3-Ab4 in m. 113. From a parametric point of view, the *ritardando* produces a decrease in temporal density which would normally be associated with decreasing tension. Here, however, that process is contradicted by the cello's crescendo. The combination of lengthening note values and increasing dynamics results in declamatory one-note or double-stop gestures of great rhetorical power. It is the expressive intensity of the long tones in cello and first violin (mm. 113-15) that creates a sense of buildup, driving this phrase to the climax.

The climax (m. 117), however, is somewhat anti-climactic. The precisely detailed performance indications produce a fragmented quality and an overall lower dynamics level than might be expected. The cello drops out, removing the bass line. The initial *forte* dynamics rapidly diminish to *mezzoforte* and then *mezzopiano* while viola plays its short melody. At the last moment (m. 118) there is a brief crescendo but it is interrupted by the suddenly quiet and sparse texture of segment C-6, an interlude that is itself cut short by the resumption of high dynamics and density in the next phrase. The climax serves as internal articulation for phrase C-5, providing structural completeness. But the

lowered intensity of this climax also produces a feeling of incompleteness; there is a need for continuation in order to realize the implications of the powerful crescendo.

The passage marked C-6 in **Example 4-19** is not a phrase. Its brevity and sense of fragmentary incompleteness rather suggests a segment, one that is detached from the phrases before and after it. Segment C-6 does, however, have an important function, namely, to interrupt the high drama of the larger passage and thus to intensify the following phrase C-7.

The long and highly complex phrase C-7 represents a final dramatic buildup of tension, leading to the overall climax of the Allegro fantastico movement. See **Example 4-20**. The phrase is structured as an "argument" between the solo violin on the one hand and the viola and cello on the other. Alternating textures project the back-and-forth of the argument. The soloist is characterized by rapid sixteenth-note runs, while the viola and cello speak in long, expressive melodies (marked in the score with brackets indicating important secondary parts). The soloist tries several times to "take control" of the conversation (mm. 120, 123, 125, 127). Each time, one or both of her opponents interrupt (viola mm. 120-23; cello mm. 123-25; viola m. 125; cello m. 126; viola mm. 126-28). In the final attempt (mm. 128-29), the soloist resorts to dotted thirty-second notes in an apparent effort to "out shout" the others; at a speed of MM 653, this is by far the fastest tempo in the piece. However, it is the second violin, having remained apart from the fray with a steady marking of its MM 70 tempo, who stops the dispute with an authoritative *fortissimo* quadruple-stop. This turns out to be only a momentary pause, though, as the four characters gather their thoughts for the final outburst during the

suddenly quiet and sparse interlude of segment C-8, which, like segment C-6 discussed above, acts as an intensifying interruption.

Two important temporal processes help to shape phrase C-7: a *ritardando* in the viola, mm. 120-23, and an *accelerando* in the cello, mm. 123-29, that eventually spreads to the other instruments. The viola's lengthening note values at high dynamic levels have the same effect as earlier in the cello (phrase C-5), adding intensity to the expressiveness of the line. Durations increase successively from the initial dotted sixteenth to two, three, four, five, six, and seven sixteenths. For reasons of register and dynamics, the high Ab5 (m. 122) forms the climax of the viola's melody and seems to trigger both the renewed argument in the first violin and the complementary *accelerando* in the cello. The latter starts with very long durations, twenty-five thirty-seconds or a dotted half-note plus one thirty-second (A#4 in m. 123-24), and proceeds through twenty-two, sixteen, fourteen, and ten thirty-seconds. The acceleration does not really become noticeable until near the end, mm. 127-28, when a higher rate of increase of speed occurs, moving through durations of nine, six, five, four, and three thirty-seconds. In the latter part of m. 127, the viola also begins to accelerate with durations of six, four, three, and two thirty-seconds. And, of course, the first violin's dotted thirty-seconds add a final burst of speed at the end of the passage.

The formal structure of phrase C-7 is based on a hybrid model of both similarity and directed parametric change. During most of the phrase, dynamics and temporal and spatial density remain generally high, and register remains steadily in the mid-to-upper range. Only at the very end is there a marked increase in all parameters including register, as the outer parts move further outward, the bass register is restored, and the

upper boundary is raised to G6 by the second violin's chord, which also acts as a strong internal articulation.

The parties seem to be momentarily stunned and disoriented during the interlude of segment C-8, but this impression is deceptive. They are merely preparing for the final onslaught of phrase C-9, which will form the climax both for the large phrase of section C-III and for the overall movement.

This closing phrase features the most intense climax of the piece so far (mm. 131 plus the upbeat). See **Example 4-21**. Ten multiple-stop chords occur within about two-and-one-half seconds of clock time, all but the last (cello's C-Ab) *fortissimo*. Both density and dynamics have surely reached their extremes. Registrally, the bass is held by the low C2, while the upper register is taken initially by the first violin's high F5, and then by the second violin's B6 (m. 131). This is the highest pitch in the movement, representing a small triumph of the second violin over the soloist, who had previously held that distinction with Bb6 (mm. 80-81 and 110-111). Thus, all parameters are at their highest values, marking a point of extreme tension.

The climax is followed immediately by a very short and rapid dissipation stage (mm. 132-134). Spatial and temporal density decrease only slightly until the last measure, when they are drastically reduced almost instantaneously. Dynamics diminish gradually, but still quickly, to *pianissimo*. Both the bass and the soprano close in toward the middle register, although the upper boundary remains relatively high, especially in the second violin. Thus, all parameters undergo some diminution. Register remains somewhat high, but density and dynamics are reduced essentially to zero. The following rest, which may be heard as the concluding stage of these parametric diminutions,

constitutes internal articulation of the phrase. Such a reduction normally would also produce a strong resolution of tension and a strong closure, but here there is a sense that this passage is inadequate. The level of preceding tension is simply too high, and the buildup to it is too long, for this quick winding-down phase to be effective. There is a "technical" closure brought about by the parametric reductions, readily perceptible by the listener. Tension, however, remains largely unresolved.

The large phrase of section C-III, comprising phrases 5 through 9, is constructed on the model of tension and release, though the latter stage is partial. The buildup of tension in phrase C-5, manifested by growing dynamics, is at first maintained and then further increased in phrase C-7 with the increasing magnitudes of temporal and spatial density. The climax and subsequent parametric reductions of phrase C-9 serve to close the large phrase, albeit with the stipulations noted above. In addition, because of its greater intensity relative to earlier climaxes, we may well hear the explosion of C-9 as the culmination and structural close of the movement as a whole.

This final phrase itself closes with a series of ascending two-note *legato* gestures, each instrument stating one of its signature intervals, marked in **Example 4-21**. The gestures begin with the viola's F4-B4 (m. 133), then cello's G#3-C#4, second violin's Bb5-D6, and—having the last word—first violin's Eb5-Gb5. The four figures present a descending series of pitch intervals: six, five, four, and three semitones. This may be heard as a reference back to the similar two-note gestures that begin phrase C-2 (mm. 92-94), although there the interval series is ascending, omits the major third (because the second violin, to whom that interval is assigned, does not participate), and adds the perfect fifth.

A less obvious but more structurally significant association may be found with the initial measures of the Introduction. Throughout mm. 1-10, all harmonic and melodic intervals are limited to a maximum of six semitones.[164] (Refer to **Example 4-2**.) Beginning with the metric modulation at m. 11, intervals gradually increase in size: seven semitones in m. 11, eight in m. 14, nine in m. 17, and ten and eleven in m. 18 (no interval larger than a major seventh occurs during the Introduction). Thus, in addition to the registral expansion that occurs during the Introduction, there is also an intervallic expansion that plays a role in the overall progression from a sense of constriction to a feeling of opening up. Now, at the end of the Allegro fantastico movement, a complementary progression (though more freely structured) moves from the massively wide intervals of the climactic double-stops to the small ones of the two-note gestures. Although the movement generally remains open-ended, because of the inadequate length of the winding-down stage and the residual tension discussed above, the intervallic progression in the successive two-note gestures provides a sense of local closure—a literal closing down of musical space—that prepares the stage for the following cadenza for the viola.

[164] Cogan and Escot (1976, 68) first observed this phenomenon.

Chapter 5

Conclusions and Reflections

Milton Babbitt, Karlheinz Stockhausen, and Elliott Carter represent the essence of high modernism, not only in their adoption of post-tonal musical languages but also in their rejection of traditional formal techniques. Their music is resolutely non-periodic, non-thematic, and non-developmental. Repetition, at least in the melodic and harmonic realms, and familiar cadential progressions are largely avoided. Neither keys nor tonal centers are present, and the music is not organized in reference to any known scales or modes. Most of the conventional large forms, such as sonata-allegro, rondo, and ternary, will not be found in this repertoire. One might well be justified in asking whether and, if so, how formal design may be created and perceived in this music.

This dissertation begins to investigate these questions, which are immensely important to a full understanding of post-tonal music. Extensive excerpts from three representative yet stylistically differentiated works from the postwar period are closely analyzed, with the purpose of discovering what may be said about them from a formal perspective. Further research should address other compositional styles from the same period, such as works by Berio, Boulez, Cage, and Stravinsky, as well as both earlier and later post-tonal composers such as Schoenberg, Messiaen, Varèse, Wuorinen, and Ligeti. A very useful approach would be to interview performers of this music and to study and compare different performances of a given work to determine how practicing musicians make decisions about phrasing and other formal matters. In addition, research in music perception and cognition is needed to explore how listeners hear and comprehend post-tonal phrases, including issues such as the grouping of small segments, the identification

of phrase beginnings and endings, and the durational limits of what may be perceived as a relatively complete phrase. Notwithstanding these avenues for further research, the present study has made a number of findings with respect to post-tonal form.

We have seen that phrases are formed by the actions and interactions of certain musical parameters. In the three representative compositions, more than forty phrases have been isolated and examined.[165] The most significant parameters in forming these phrases have proved to be dynamics, register, temporal density, and spatial density. The three composers may be distinguished stylistically by their usage of these parameters. The Babbitt excerpt relies almost exclusively on register, often in conjunction with contour. Stockhausen's phrases are formed primarily by temporal and spatial density, which together with durations are used to create the textural types that characterize formal units. Carter, on the other hand, uses all four parameters in virtually every phrase, with perhaps a slightly greater emphasis on dynamics and register. These associations reflect each composer's particular interests. Babbitt's rigorous serialization of non-pitch parameters highlights register as one of the principal elements left to the composer's choice Stockhausen's focus on temporal and spatial density seems a natural outgrowth of his concern with texture as a new means of formal design. And it is Carter's widely varied combinations of density, register, and dynamics that create the dramatic curve and operatic expressiveness associated with his music.

Parameters may be understood to work in three ways. A given passage of music may exhibit a particular parametric *state*. For example, the passage may be high in register or soft in dynamics. The combined states of active parameters produce a

[165] The Appendix provides a tabulation of all phrases identified in this study according to method of coherence.

particular texture, and may also create a contour. Another (or the same) passage may exhibit parametric *motion*, usually manifested as a relatively continuous increase or decrease, or both, in magnitude of one or more parameters, such as descending in register or accelerating in temporal density. Together, parametric states and motions characterize the segments and phrases of the music, giving each an individual identity that allows us to perceive the various elements and parts as a single unit. This sonic character is the essential quality that enables the perception of coherence among the parts. In some cases, parametric motion is also responsible for closure. Finally, parametric *articulation* occurs when a particular state or motion, or combination thereof, is replaced by another. Such changes produce the conditions necessary for initiation and differentiation of formal units, including segments, phrases, and larger sections. Moreover, in many cases, it is parametric articulation that completes a formal unit, allowing the structure to be closed and the unit to be comprehended as a whole.

The present study has identified five post-tonal phrase types based upon the method of coherence within the phrase. Three of these—tension and release, symmetry, and directed parametric change—employ parametric motion. In the first two types, the motion in one direction reverses itself, returning fully or partially to its starting levels and thereby producing closure. Directed parametric change, on the other hand, features motion in one direction only and is brought to completion through articulation. The remaining two phrase types—departure and return, and similarity—are constructed from parametric states. Departure/return comprises an initial state that moves by articulation to a contrasting state and then returns, again by articulation, to the initial state, thus

reaching closure. And similarity is characterized by a relatively continuous parametric state that is completed through articulation.

Several of the phrase types bear some relation to traditional tonal procedures. Tension and release represents the basic paradigm of tonal harmony, and is particularly analogous to the quintessential I-V-I progression. Departure and return also relates to this paradigm, as well as to the more specific small ternary form. In this regard, we might consider Babbitt's use of a motive as a kind of reference to earlier practices (most likely to that of his mentor, Schoenberg). Similarly, the use of dramatic curves and climaxes by Stockhausen and Carter seem to mimic traditional ideas of musical construction.

These and other apparent allusions to formal conventions of previous eras represent, I think, a thoughtful and practical reconsideration of former procedures. There was not, after all, a wholesale rejection, but rather a careful rethinking of those earlier practices to determine what could be retained, what could be adapted, and what would have to be eliminated. For each composer, this reconsideration and the resulting decisions were not (or not entirely) based on political grounds but rather on urgent musical concerns, as each sought those particular formal designs and techniques that would best express his particular language and style. This is evident in the successful integration of tradition and modernity in the three divergent works studied here. These composers retained some of the basic conceptual aspects of traditional phrase form, such as tension, motion, and return, but radically changed both the material subjected to these techniques and the ways in which they were organized. Thus, harmonic and melodic processes as the carriers of form were largely replaced with the form-building properties

of parametric characteristics. And despite the references to tonal practice found in the phrase types of tension/release and departure/return, other phrase types such as directed parametric change and similarity are original to the modern era. These two types may in some sense be understood as anti-traditional: the former usually generates tension and motion but denies release and return, while the latter eschews tension, motion, and return altogether and relies on stasis for its organization. Symmetry as a phrase type may be something of a hybrid in this schematic. Although symmetry as a general aesthetic principle, and retrograde as a structural process, have been present in various ways throughout the history of music, the use of retrograde symmetry as a means of small-scale phrase construction rarely occurs before Ives and Webern.

In addition to these phrase types, we have seen three methods of completion of a phrase. Closure occurs with the completion of a process, such as tension and release, departure and return, and symmetry, and involves some degree of return of earlier parametric values. Articulation, on the other hand, is the completion of the structure by means of a salient event that signals the end of the phrase. Articulation may be internal when it arises from the material of the phrase itself, or external in the form of the perceived initiation of a new phrase. Problems of closure and articulation have arisen repeatedly in this study, and they remain questions that require further research and investigation.

Perhaps the most challenging perceptual issue in post-tonal form is the ability to hear and recognize boundaries. Closure, which is posited as the more conclusive method of completion, can nevertheless be difficult to perceive, especially when it is weak or seemingly contradicted by other events. Articulation, paradoxically, can be quite strong

in some cases (a climax, a big chord, an unambiguous change of material), but at other times may be so subtle as to be nearly imperceptible. As the list of phrase types in the Appendix demonstrates, the majority of phrases found in this study are based on either directed parametric change or similarity. This means that they are necessarily completed by articulation rather than closure, and points up the need for additional studies to better understand the nature of these two phrase types and to identify strategies for the perception of their completion.

Finally, the analytical approach taken in this study has the advantage of highlighting some subtle musical relationships that might otherwise be overlooked. When listening and analytical attention are directed toward parametric phenomena, a wealth of fascinating information about the music emerges. Two of the works considered here, Babbitt's *Composition for Four Instruments* and Carter's Second String Quartet, have been extensively discussed and analyzed in the literature. Yet in the course of this study, a number of new details about these works have come to light. In the clarinet solo in Babbitt's piece, these include the dyadic and registral patterns associated with sum-7 dyads, and the distribution of trichords in accordance with those patterns.[166] In the Allegro fantastico of Carter's work, one delightful discovery is the presence of a modified prolation canon.[167]

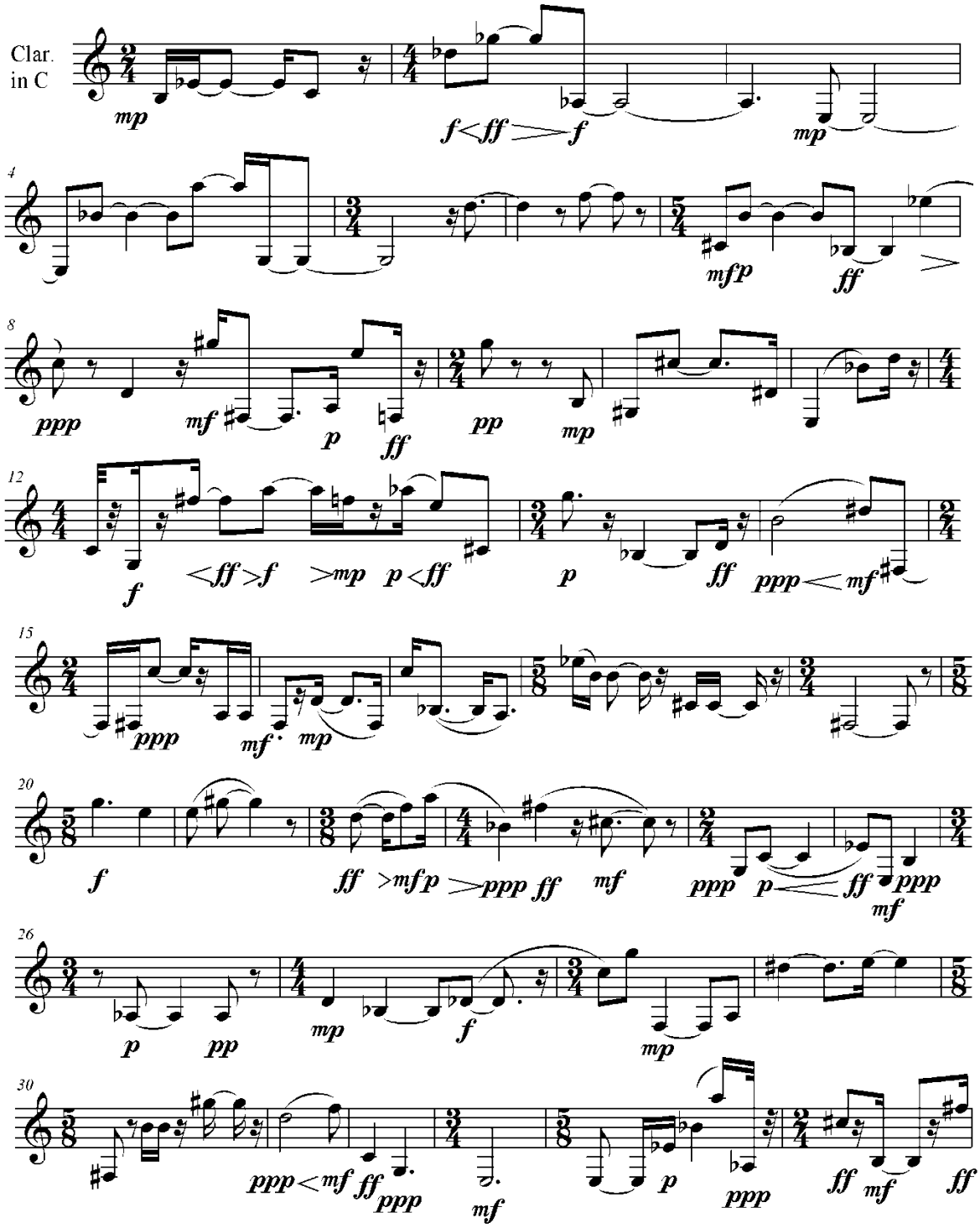
Musical form can be a challenging and multi-faceted phenomenon. In the case of post-tonal music, especially that of the postwar period, the form may be unknown, unfamiliar, or difficult to recognize or remember. But this should not lead us to conclude that the music is without form, nor discourage us from investigating the music from a

[166] See **Ex. 2-36** and related text.
[167] See **Ex. 4-17** and related text.

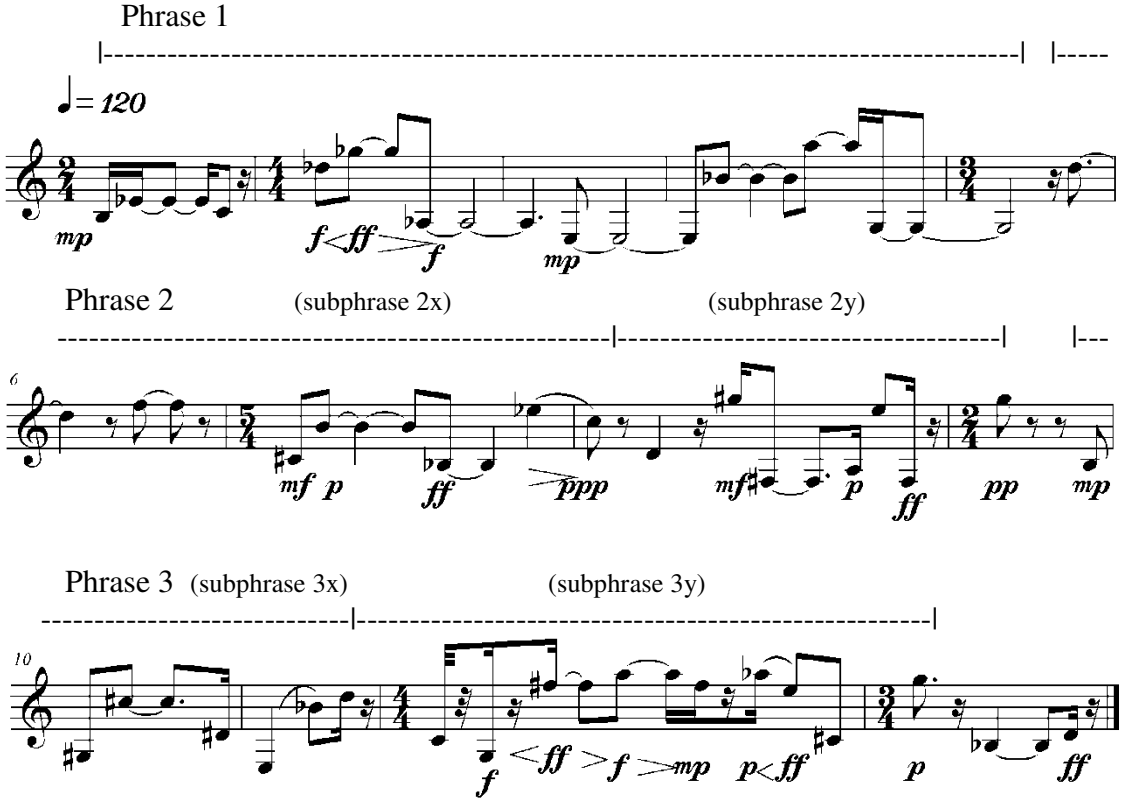
formal perspective. Rather, it is my hope that we will embrace this challenge and, in doing so, arrive at a deeper and more comprehensive understanding of this repertoire.

Examples for Chapter 2

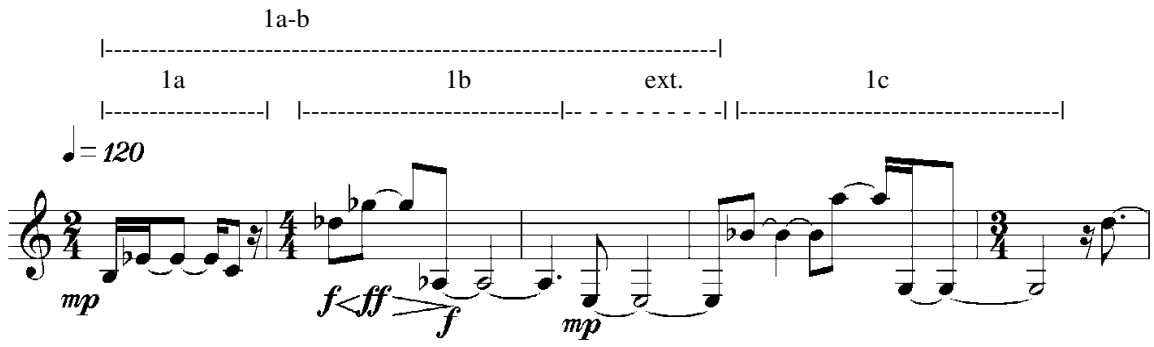
Example 2-1. Babbitt, *Composition for Four Instruments*, opening clarinet solo



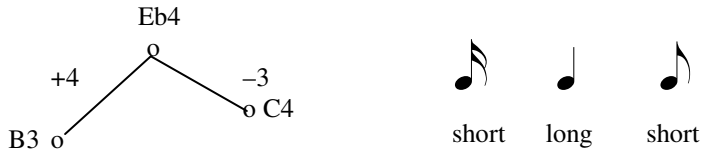
Example 2-2. The first three phrases, mm. 1-13



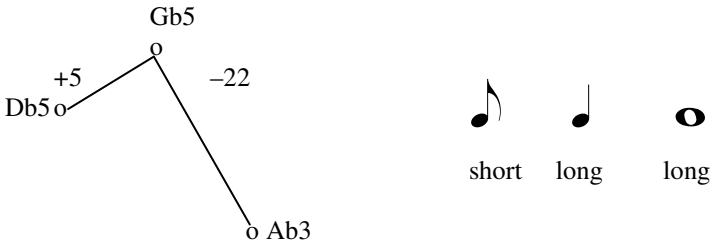
Example 2-3. The first phrase, mm. 1-5



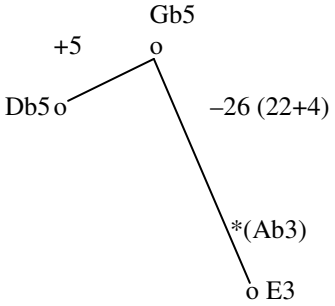
Example 2-4. Segment 1a, pitch interval network (PIN) and rhythmic profile



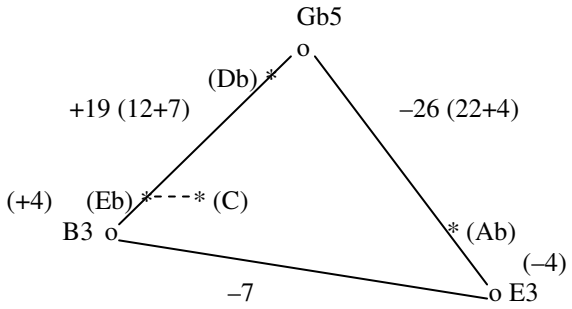
Example 2-5. Segment 1b, PIN and rhythmic profile



Example 2-6. Ab as "stopping point"

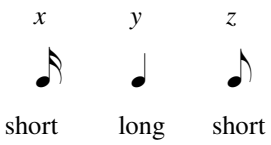


Example 2-7. Segment 1a-b, wedge and symmetric formations

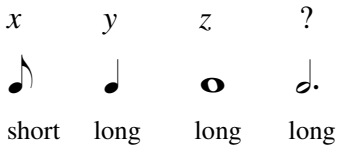


Example 2-8. Rhythmic profiles

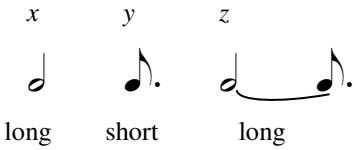
a. Segment 1a



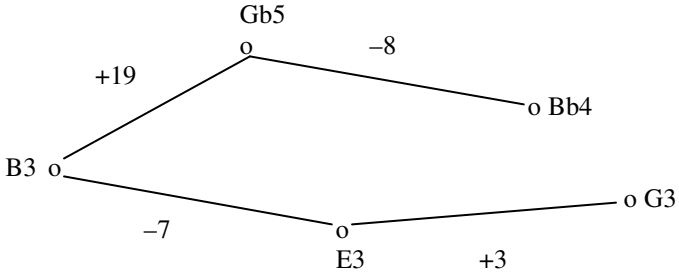
b. Segment 1b



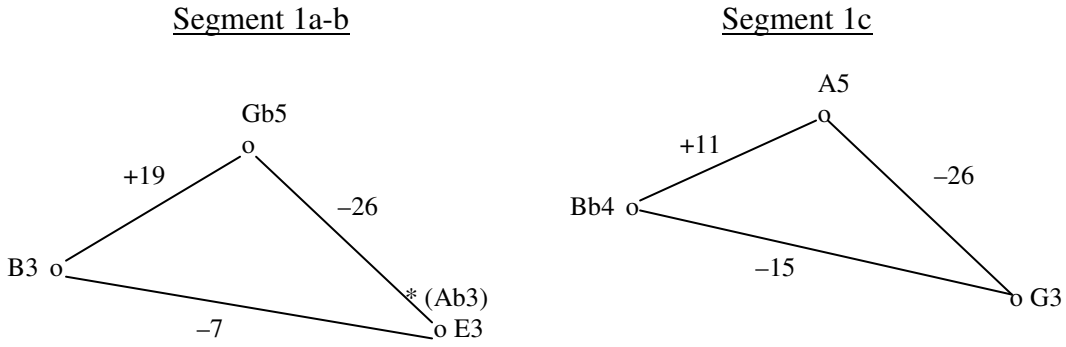
c. Segment 1c



Example 2-9. Partial return to central register

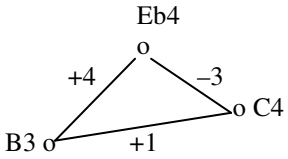


Example 2-10. 26-semitone leaps in each segment

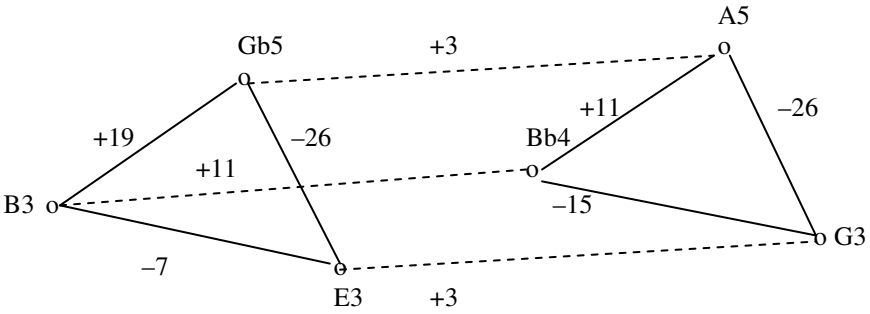


Example 2-11. A series of PINs for Phrase 1

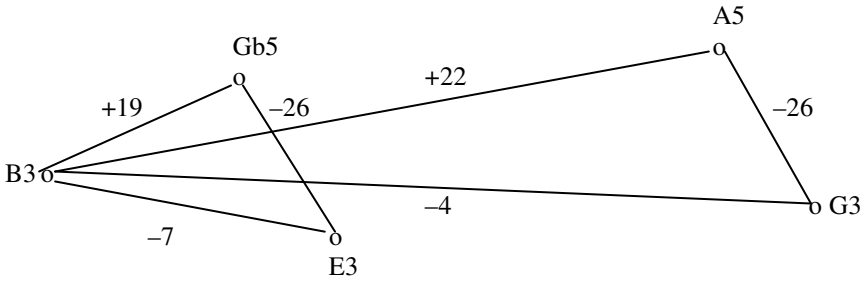
a.



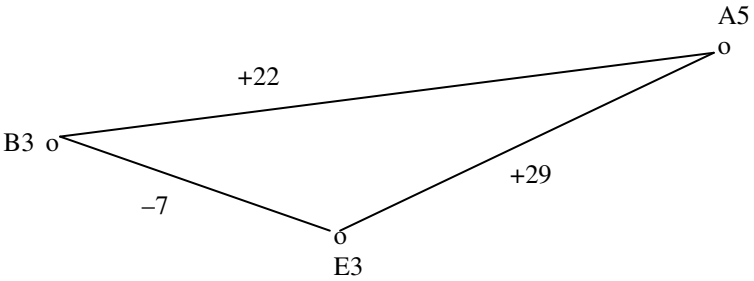
b.



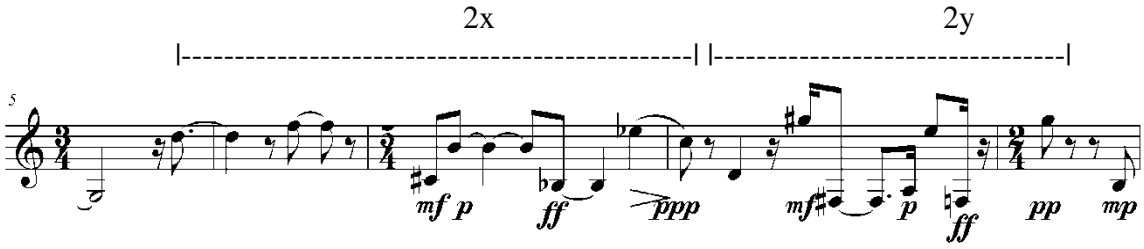
c.



d.

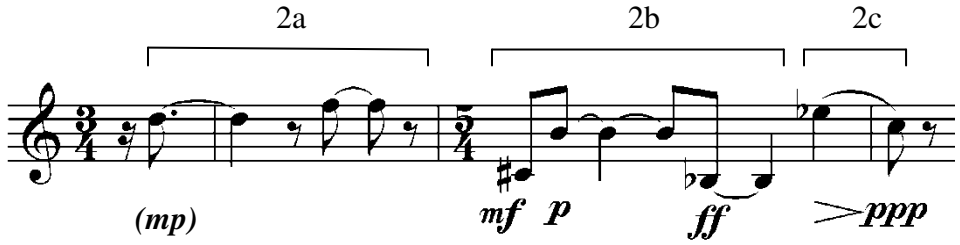


Example 2-12. Phrase 2 with subphrases, mm. 5-9.

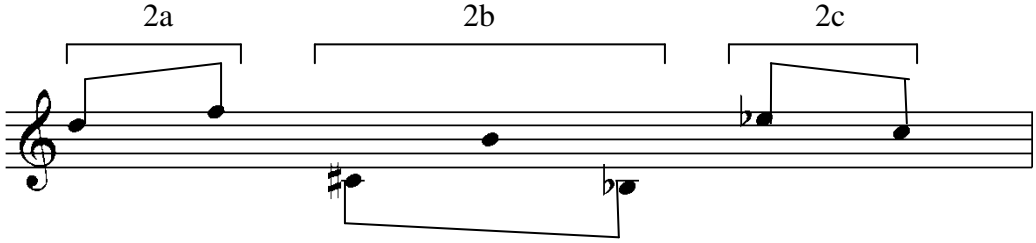


Example 2-13. Four interpretations of subphrase 2x

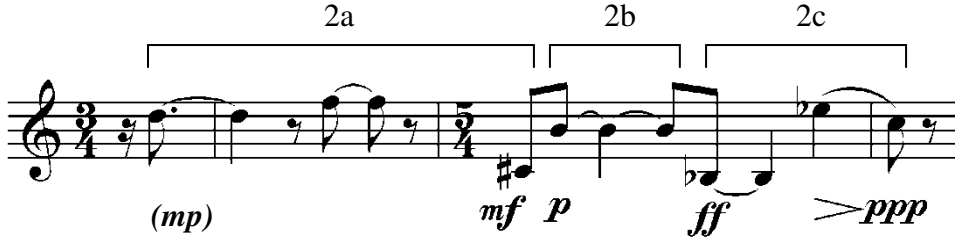
a.



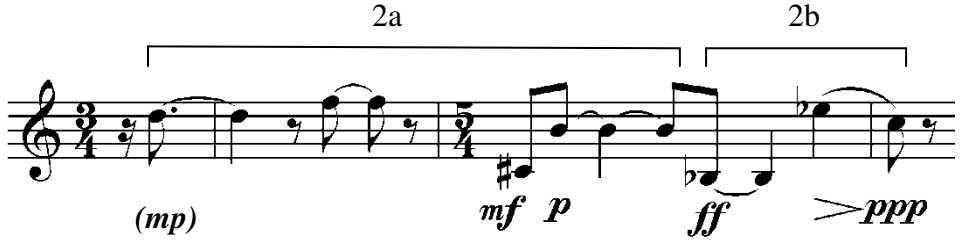
b.



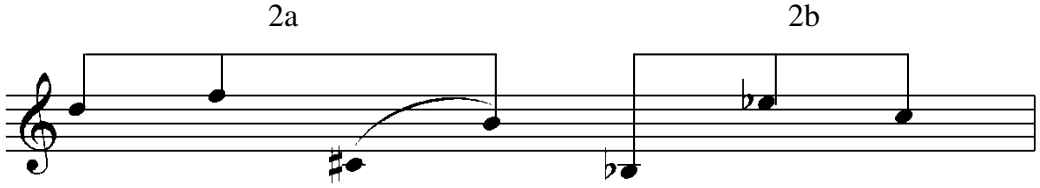
c.



d-i.

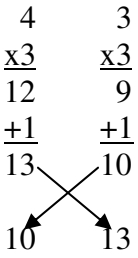


d-ii.



Example 2-13a'. Segment 1a augmented in segment 2b.

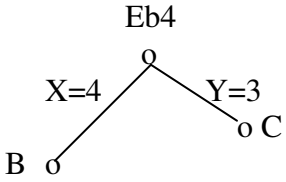
Seg. 1a = +4 –3



Seg. 2b = +10 –13

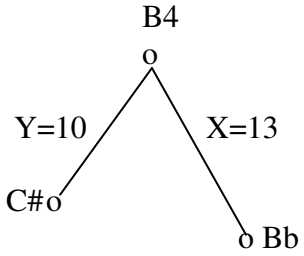
Example 2-13a''. Proportional augmentation (X and Y represent semitones; X is the larger interval)

Segment 1a



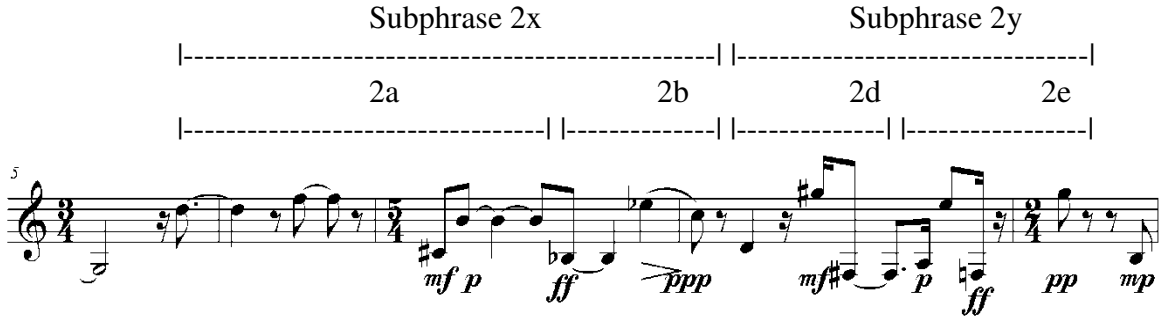
Ratio of X to Y = 1.333…

Segment 2b

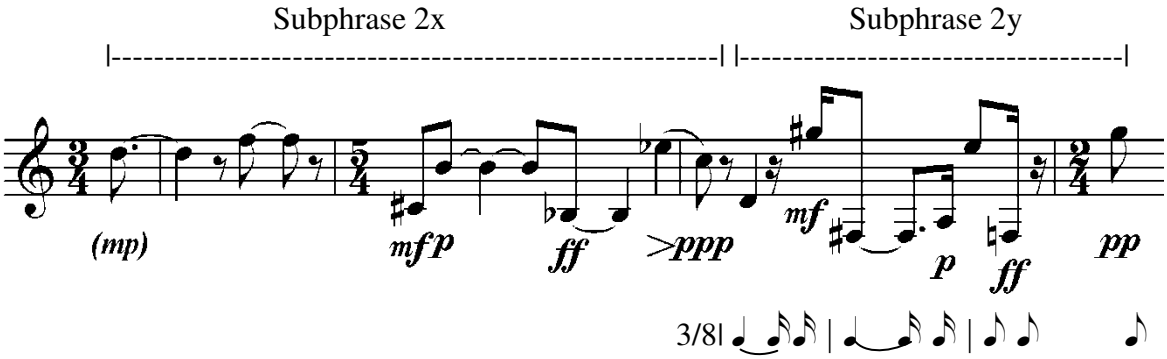


Ratio of X to Y = 1.3

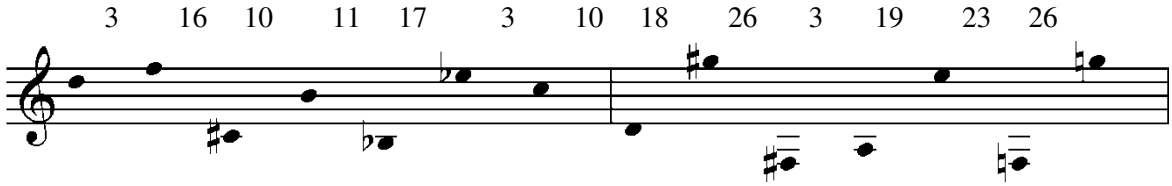
Example 2-14. The second phrase (with 2x as in Ex. 2-13d)



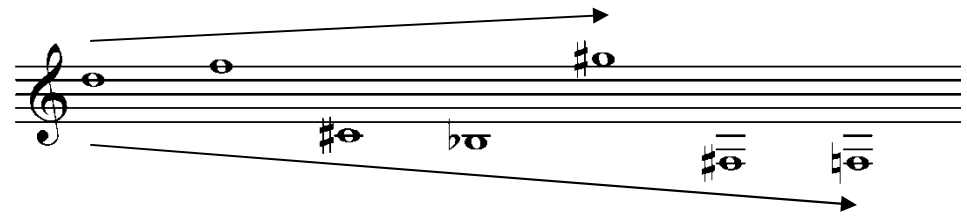
Example 2-15. Metric analysis of subphrase 2y



Example 2-16. Increasingly wide leaps from 2x to 2y

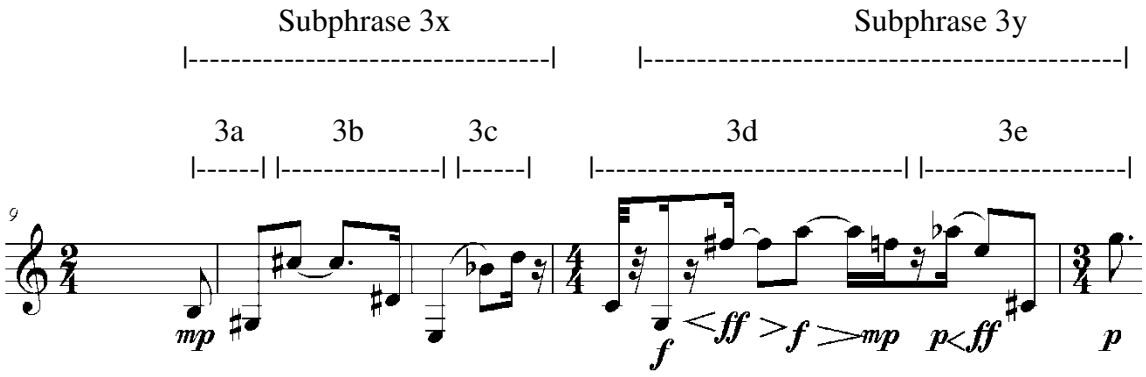


Example 2-17. Registral expansion by progression of boundary pitches

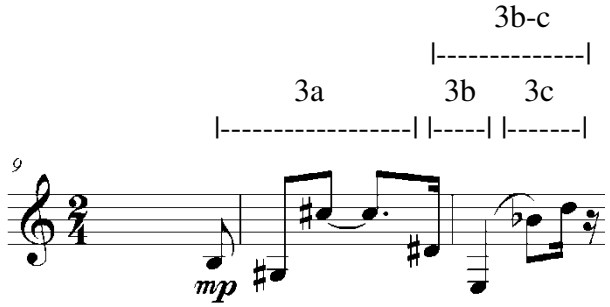


Example 2-18. The third phrase, mm. 9-13

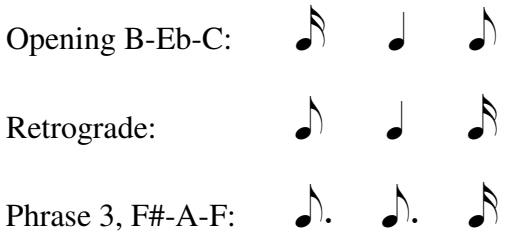
(a) One interpretation of subphrase 3x



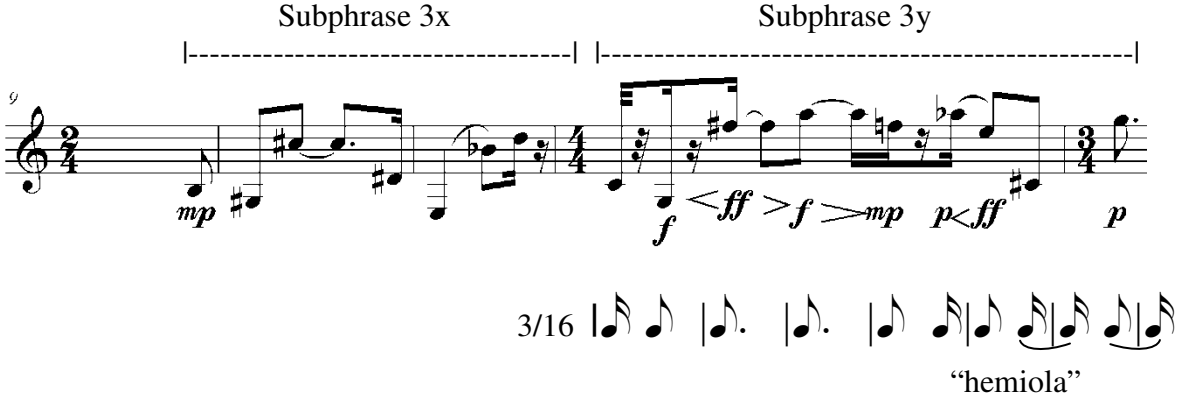
(b) Alternate interpretation of subphrase 3x



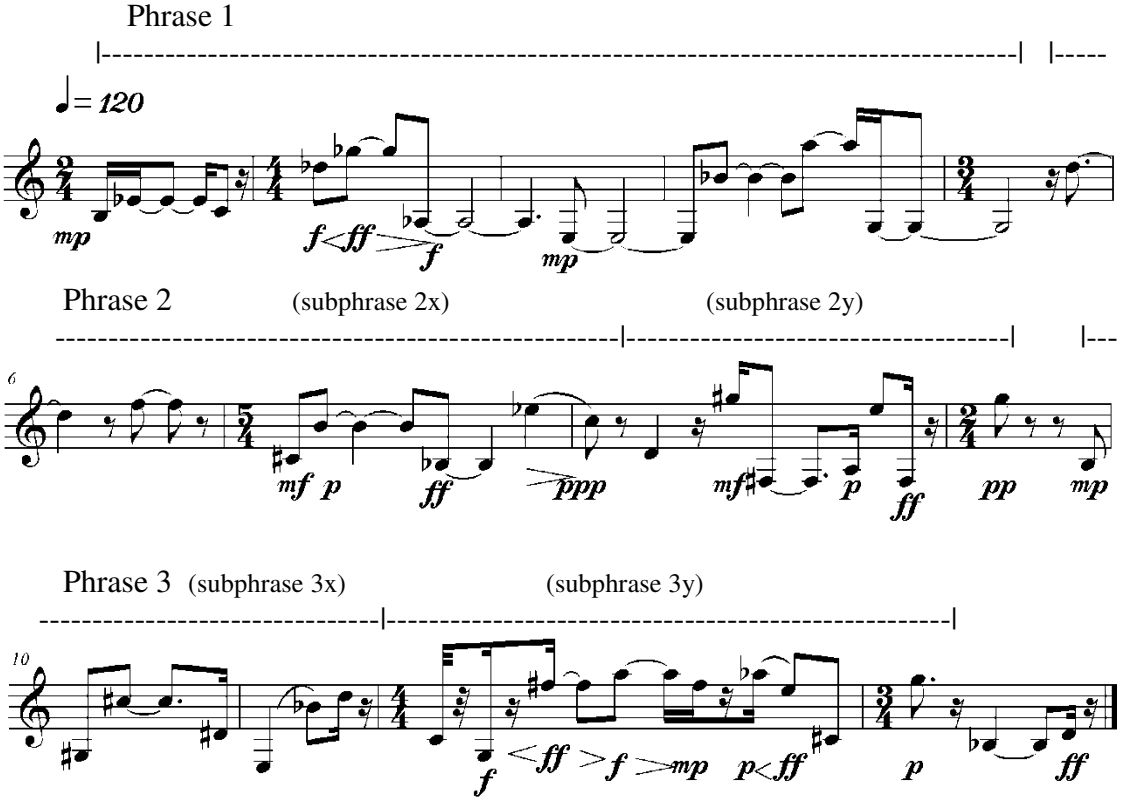
Example 2-19. Rhythm of <F#-A-F> as near retrograde of opening <B-Eb-C>



Example 2-20. Metric interpretation of subphrase 3y

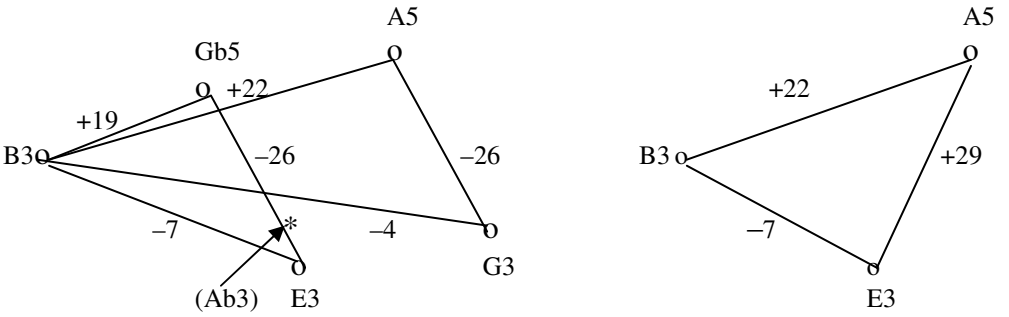


Example 2-21. First three phrases (recopied)

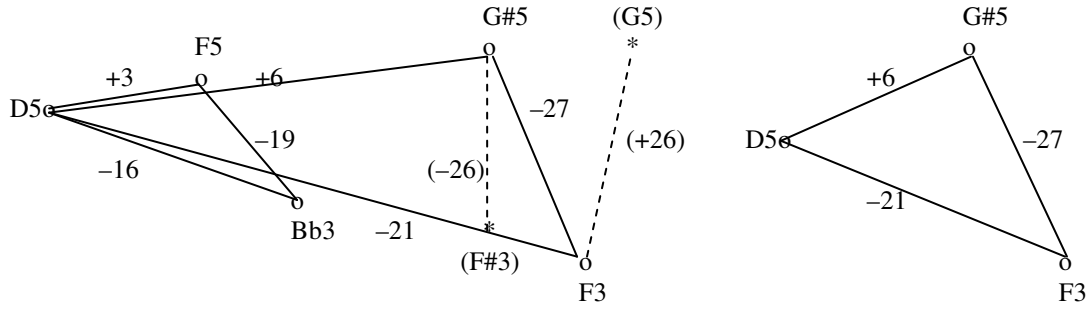


Example 2-22. Comparison of PINs, phrases 1, 2, and 3

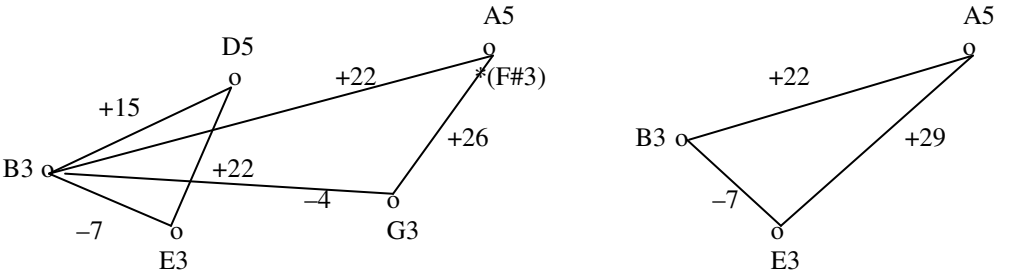
a. Segment: 1a-b 1c Phrase 1



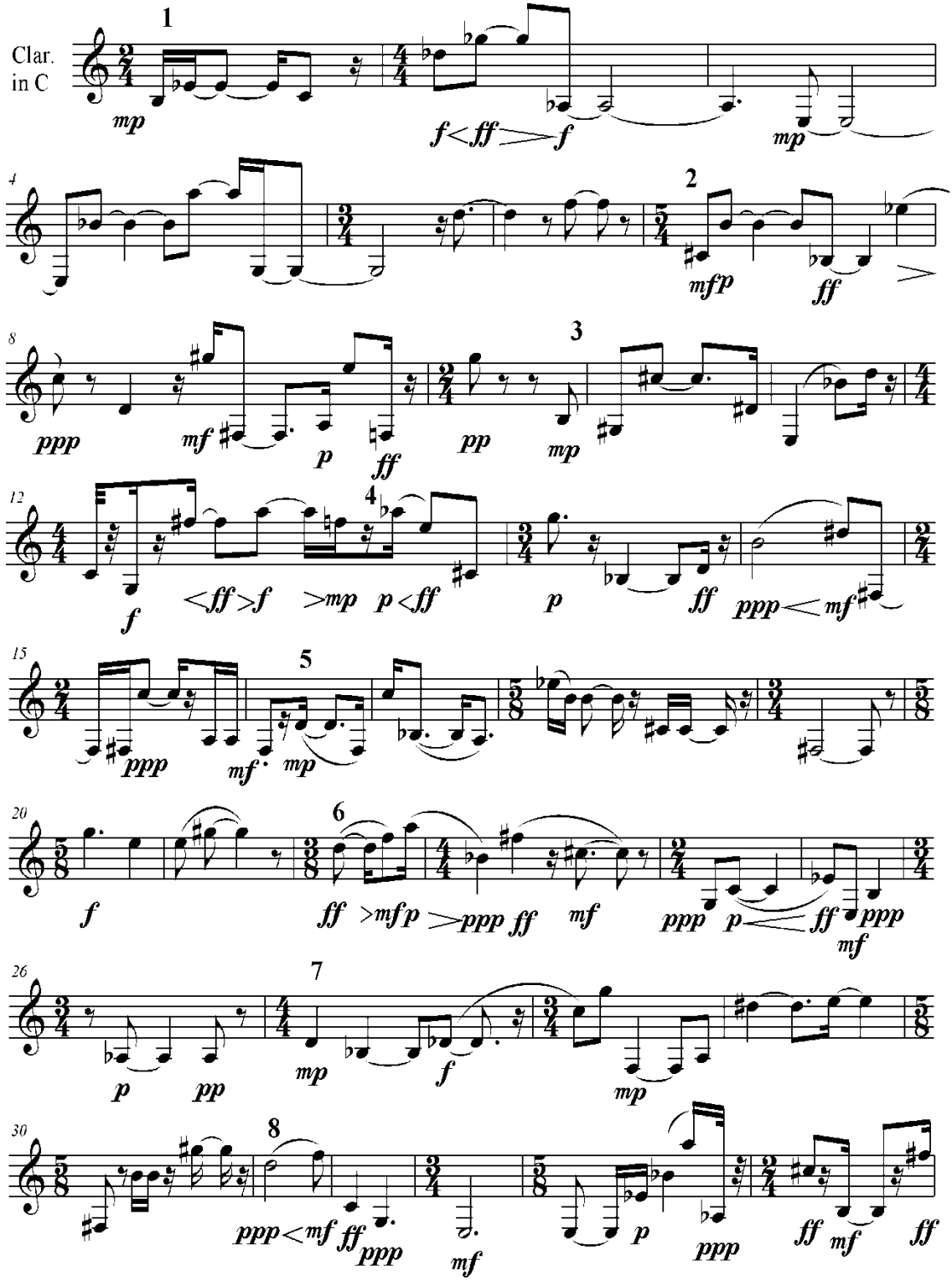
b. Subphrase: 2x 2y Phrase 2



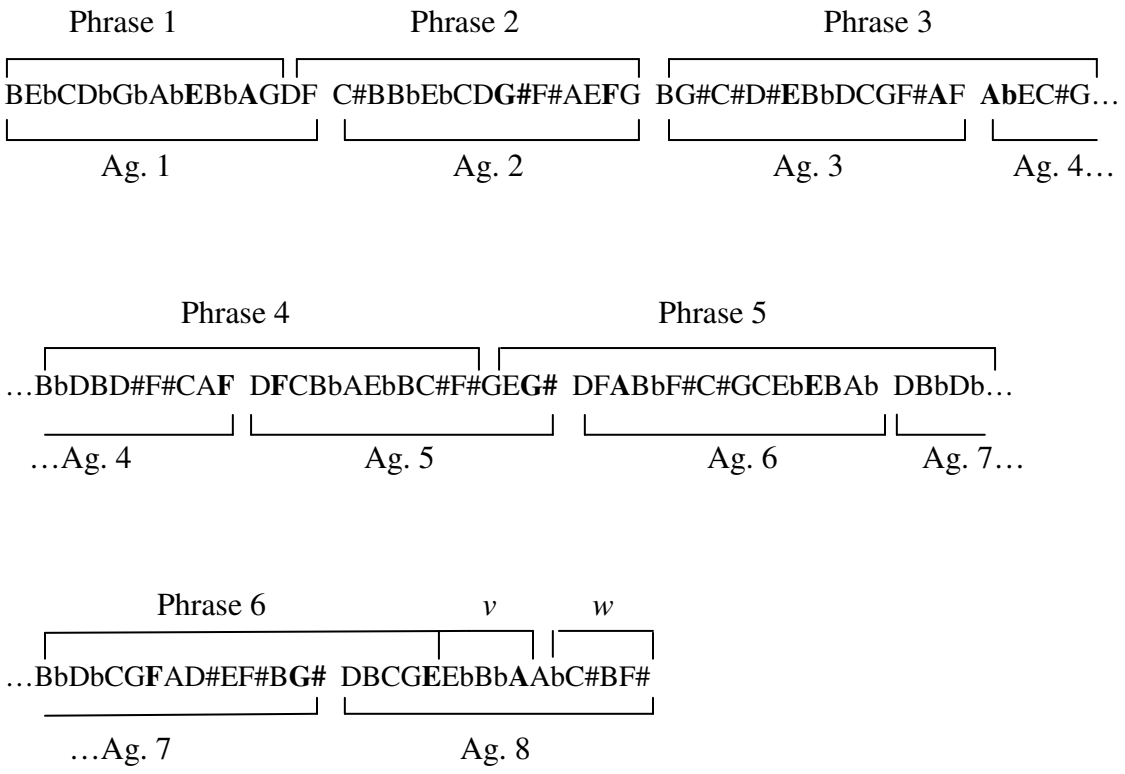
c. Subphrase: 3x 3y Phrase 3



Example 2-23. Clarinet solo with aggregates marked as numbers 1-8.



Example 2-24. Relationship of phrases to aggregates

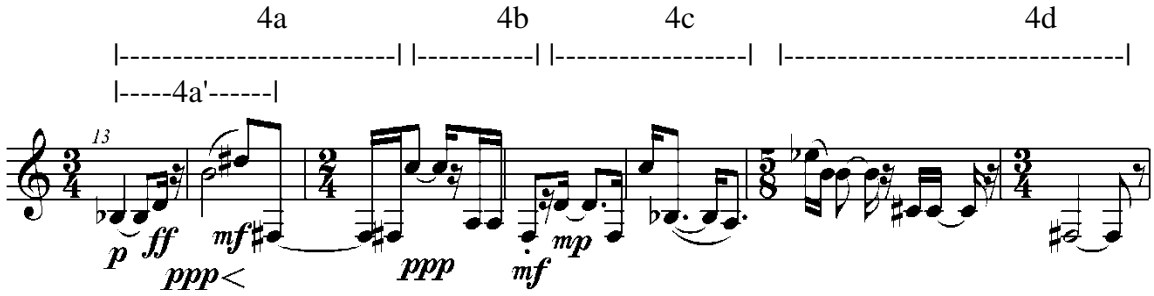


Bold-font pitch classes E and F occur in the third octave, and constitute the lower boundary in alternating aggregates. Bold-font pitch classes G# and A occur in the fifth octave, and constitute the upper boundary in alternating aggregates.

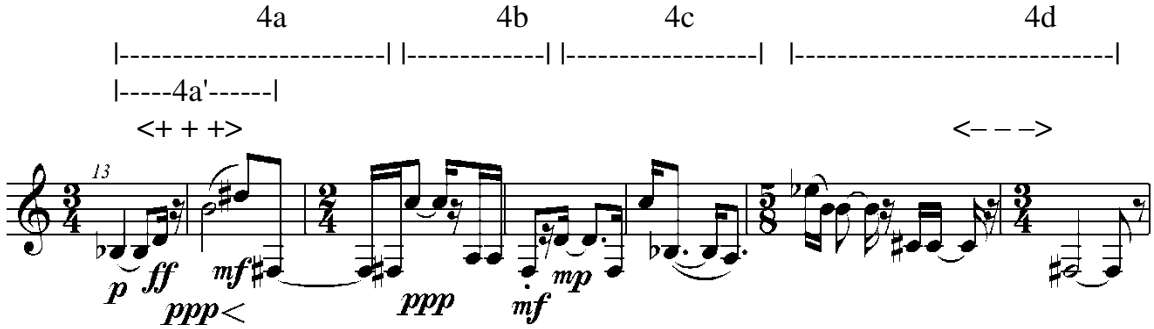
Phrase locations:

Phrase	mm.
1	1-5
2	5-9
3	9-13
4	13-19
5	20-27
6	27-33
v	34
w	34-35

Example 2-25. The fourth phrase, mm. 13-19



Example 2-26. Retrograde pitch structures

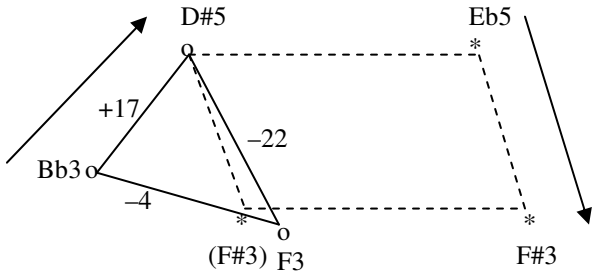


1. <C A F> **D4** <F C . . . A>

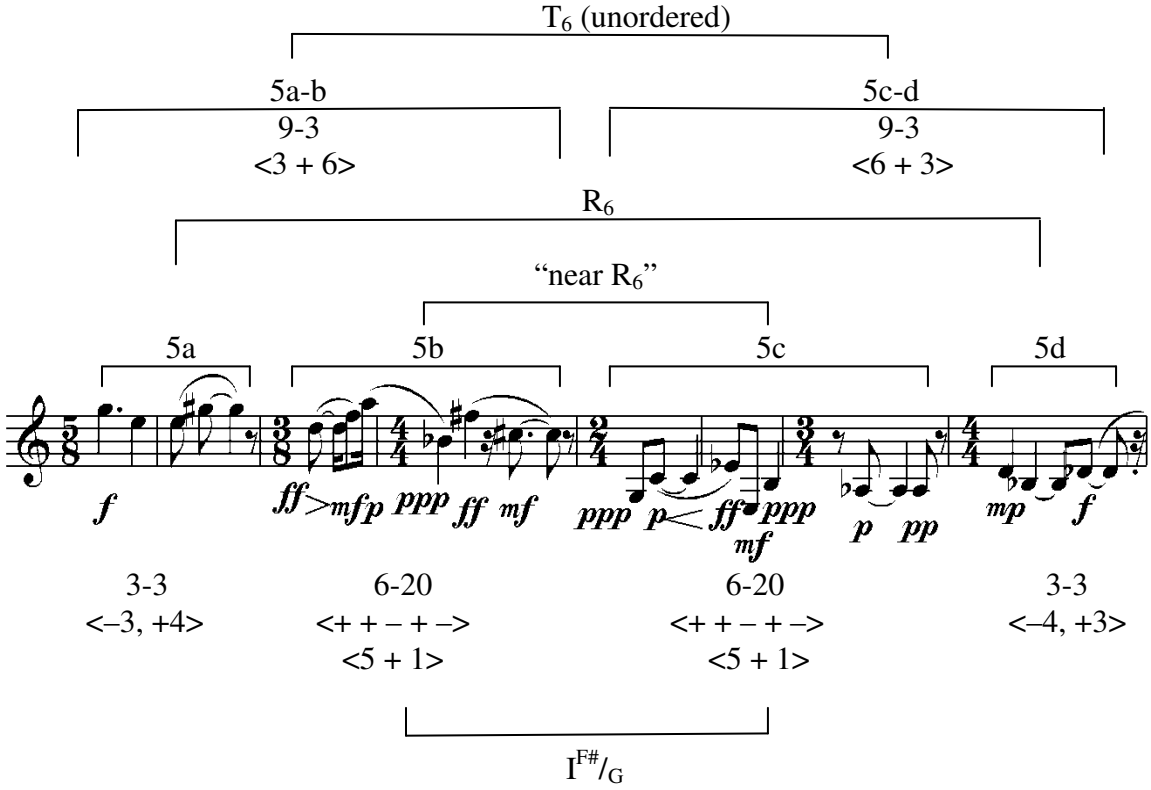
2. <B D# . . . . . C> <C . . . . . Eb B>

3. <F# . . . . . A F> <F . . . . . A . . . . . F#>

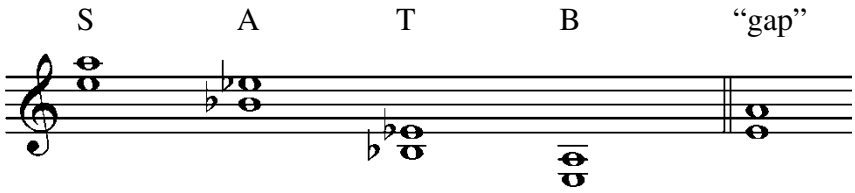
Example 2-27. PIN for the fourth phrase



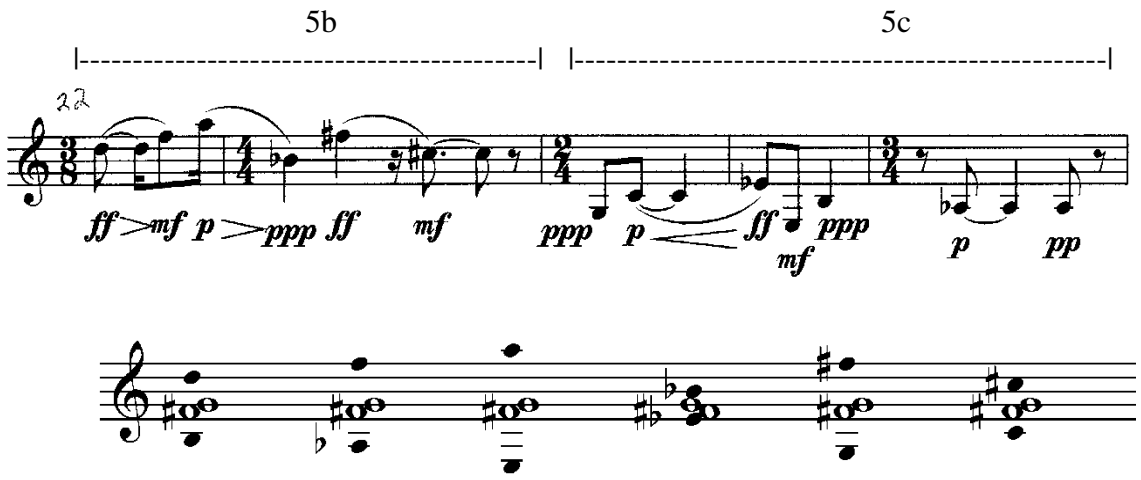
Example 2-28. The fifth phrase, mm. 20-27, with retrograde and inversional structures



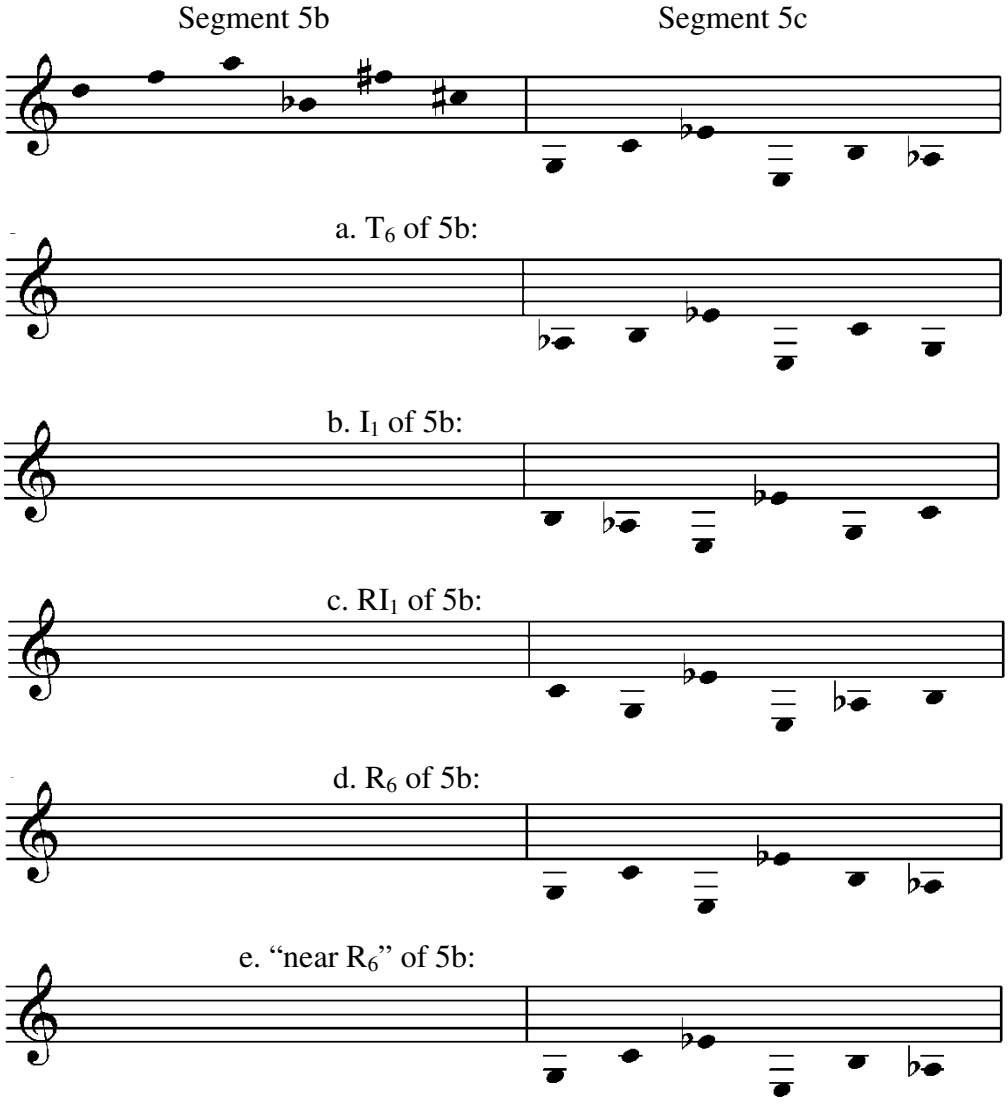
Example 2-29. Four registral bands and a gap



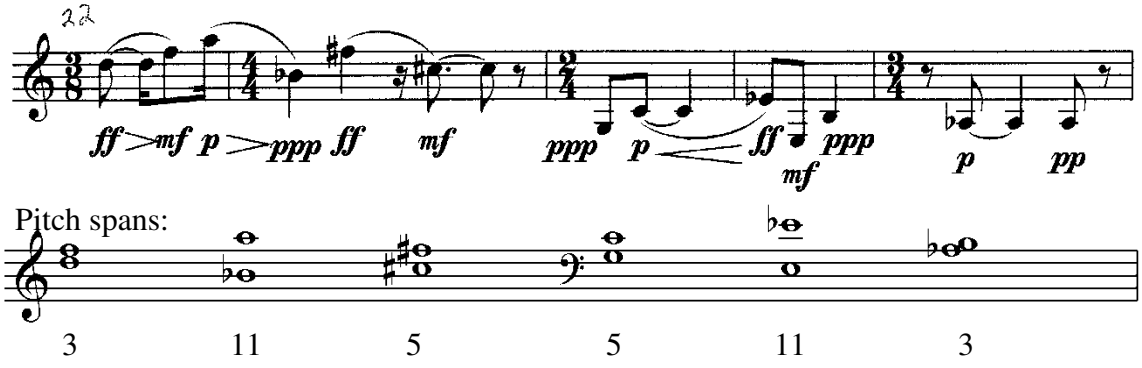
Example 2-30. Pitch-space inversional partners about F#/G (upper note-heads are from 5b, lower note-heads from 5c)



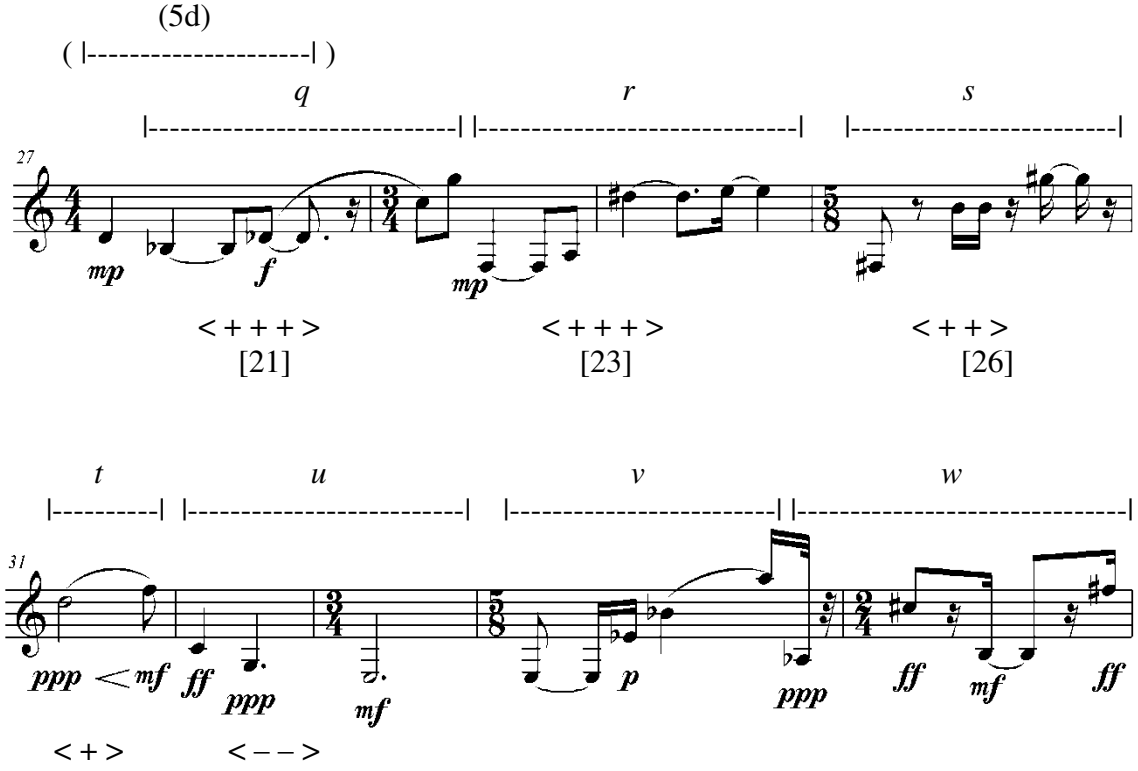
Example 2-31. Transformations of segment 5b in comparison to segment 5c



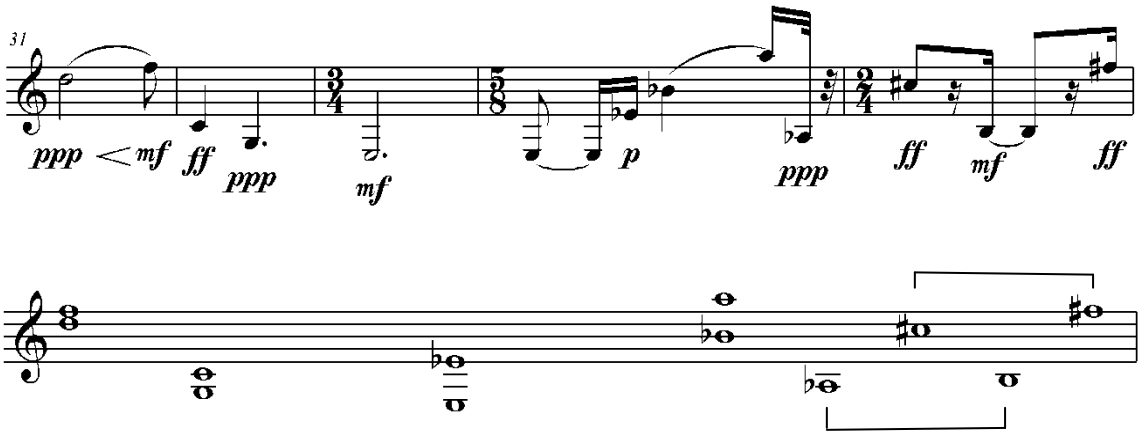
Example 2-32. Segments 5b and 5c partitioned into vertical dyads



Example 2-33. Series of fragmentary gestures, mm. 27-35 (end of clarinet solo)

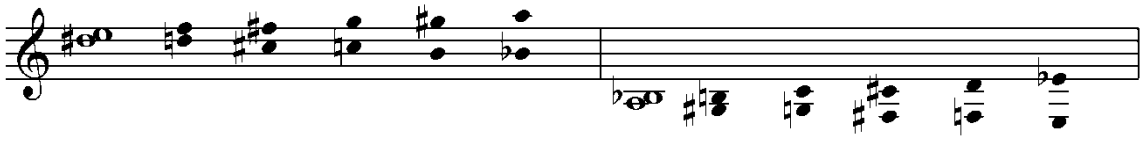


Example 2-34. Final aggregate, with index-7 dyads below

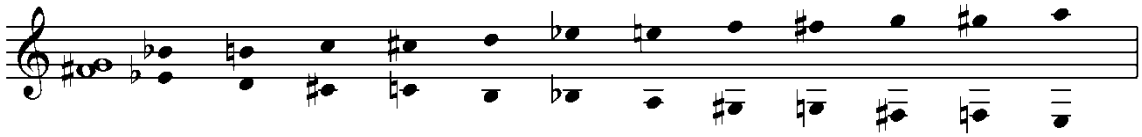


Example 2-35. Three axes and resulting dyads

(a) Upper axis D#5/E5 (b) Lower axis A3/Bb3

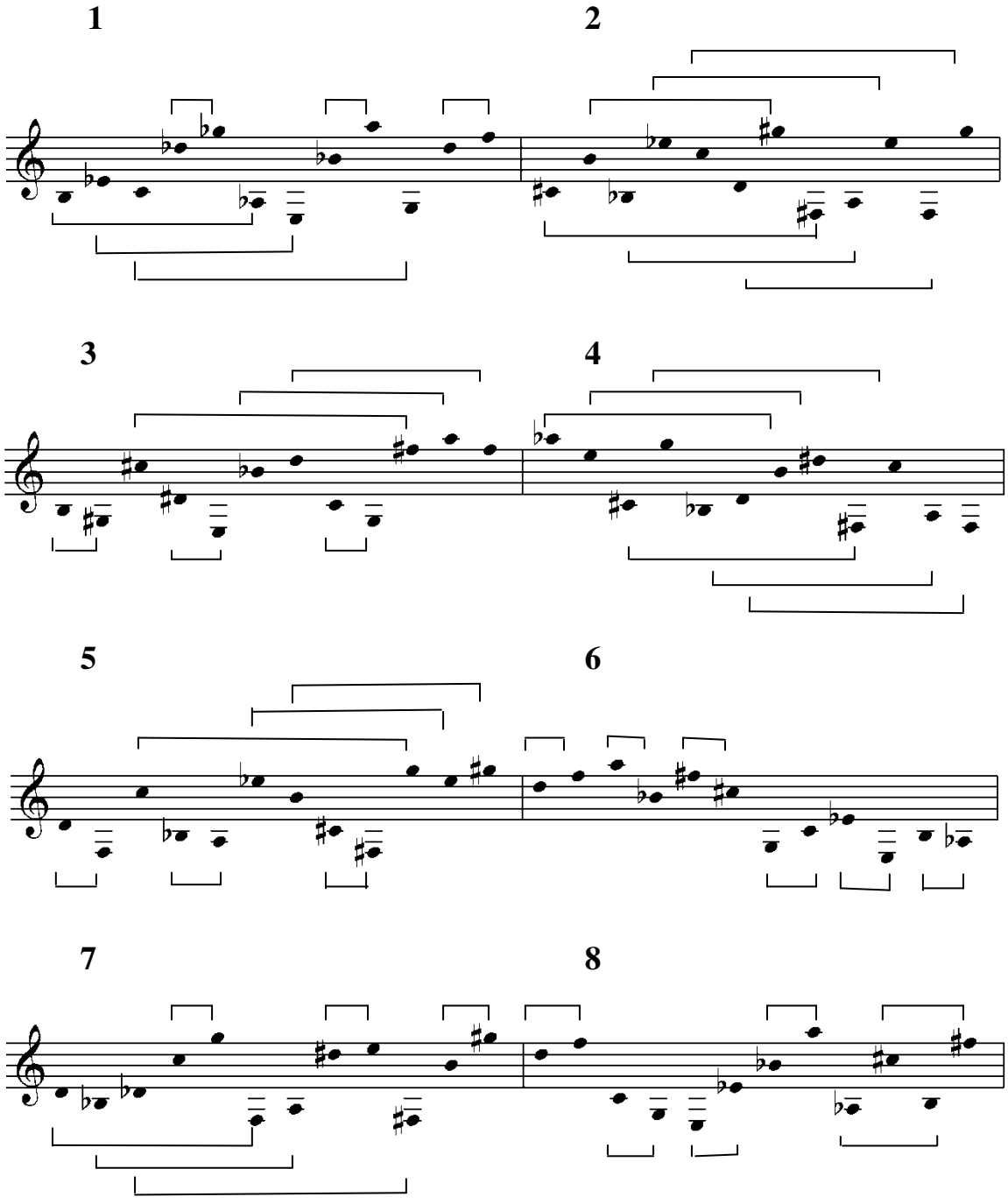


(c) Central axis F#4/G4 (pitches of the registral gap omitted)

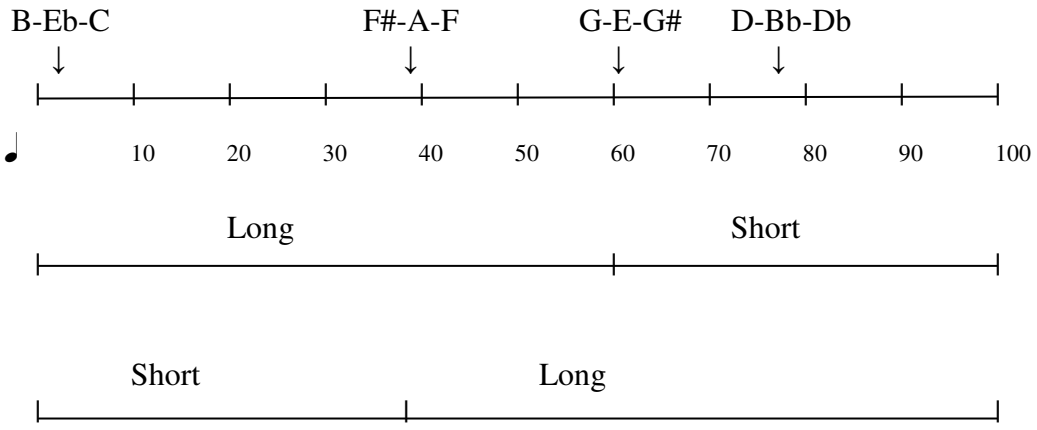


Example 2-36. Pitch reduction of clarinet solo with sum-7 dyads bracketed

Aggregate:

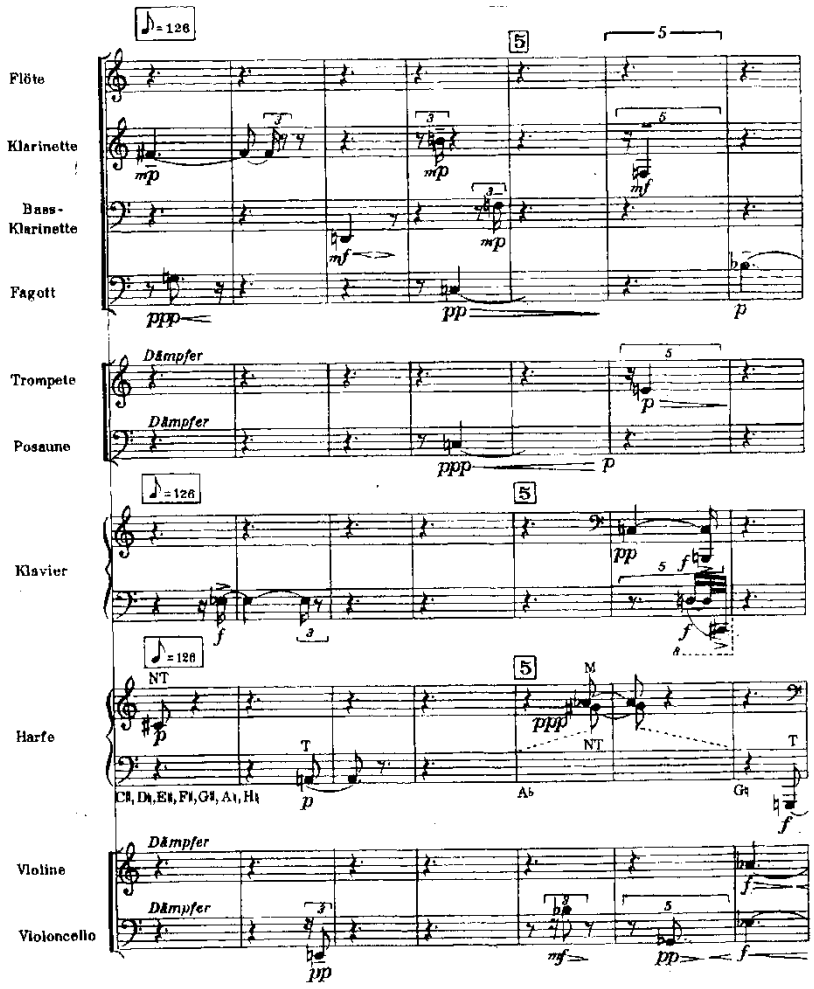


Example 2-37. F#-A-F marks the short golden section (quarters 38-39); G-E-G# marks the long golden section (quarters 58.5-62).

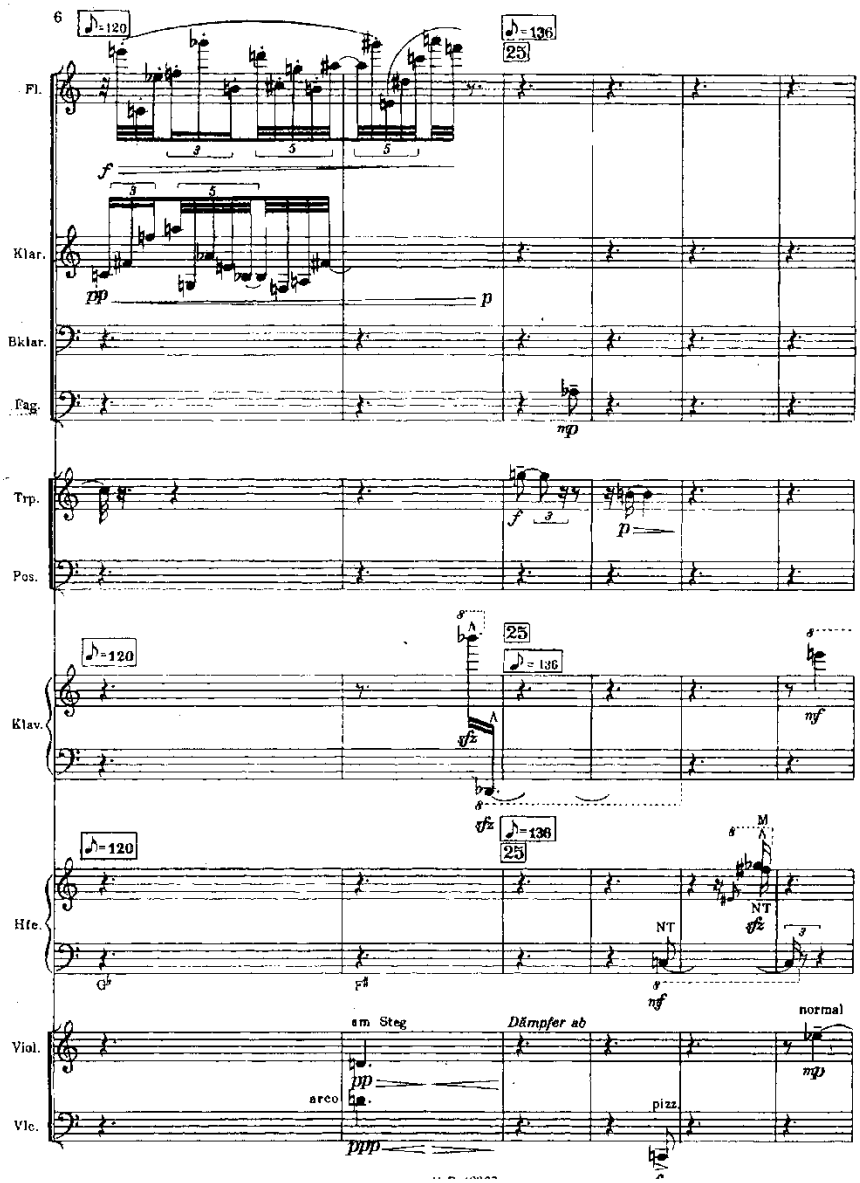


Examples for Chapter 3

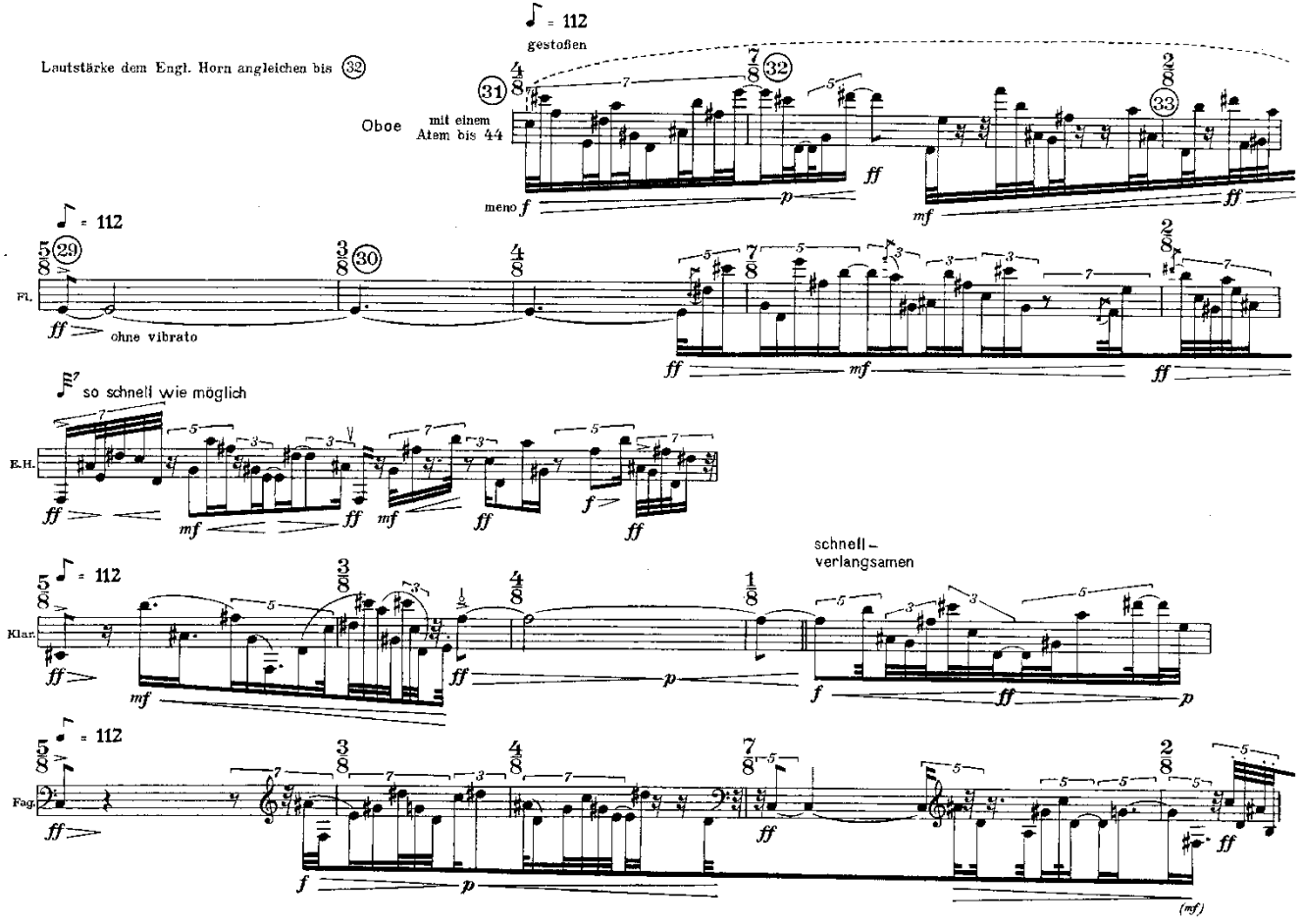
Example 3-1. Stockhausen, *Kontra-Punkte*, points in all instruments through m. 6



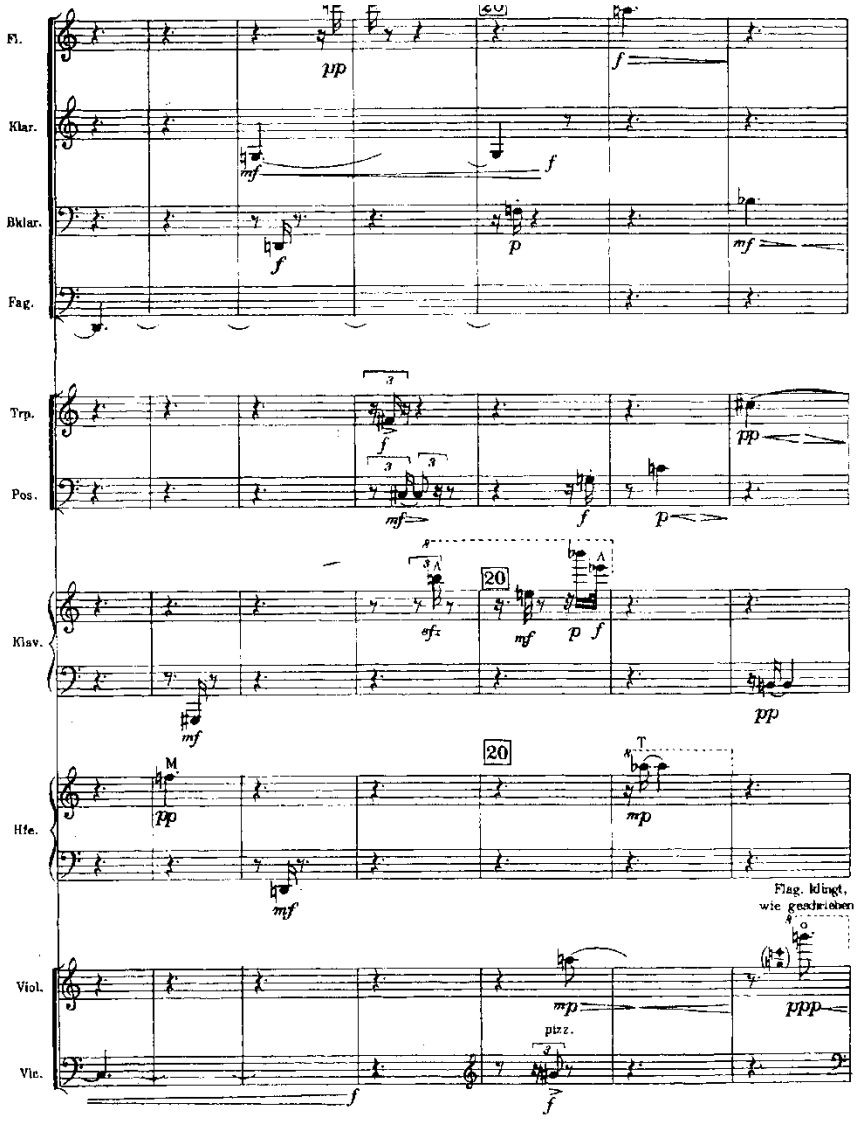
Example 3-2. *Kontra-Punkte*, groups in flute, clarinet, and piano



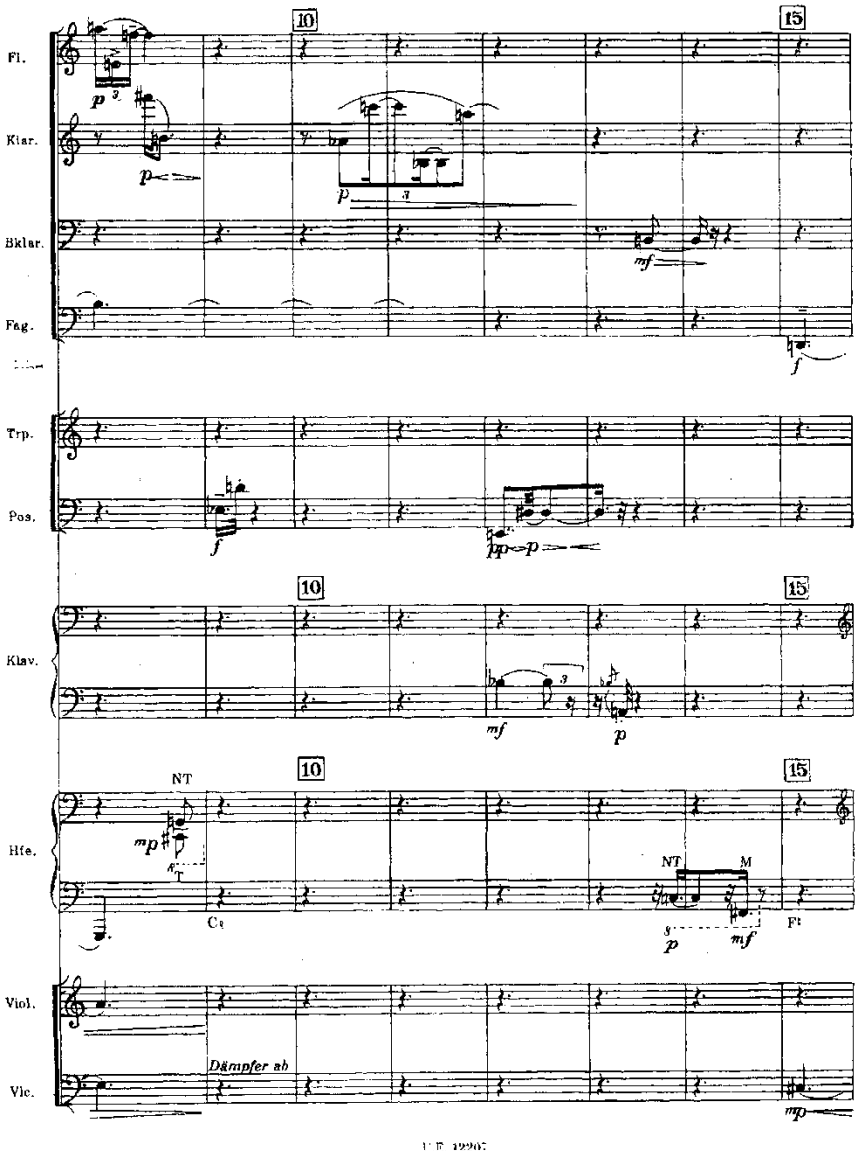
Example 3-3. Stockhausen, *Zeitmasze*, a statistical complex



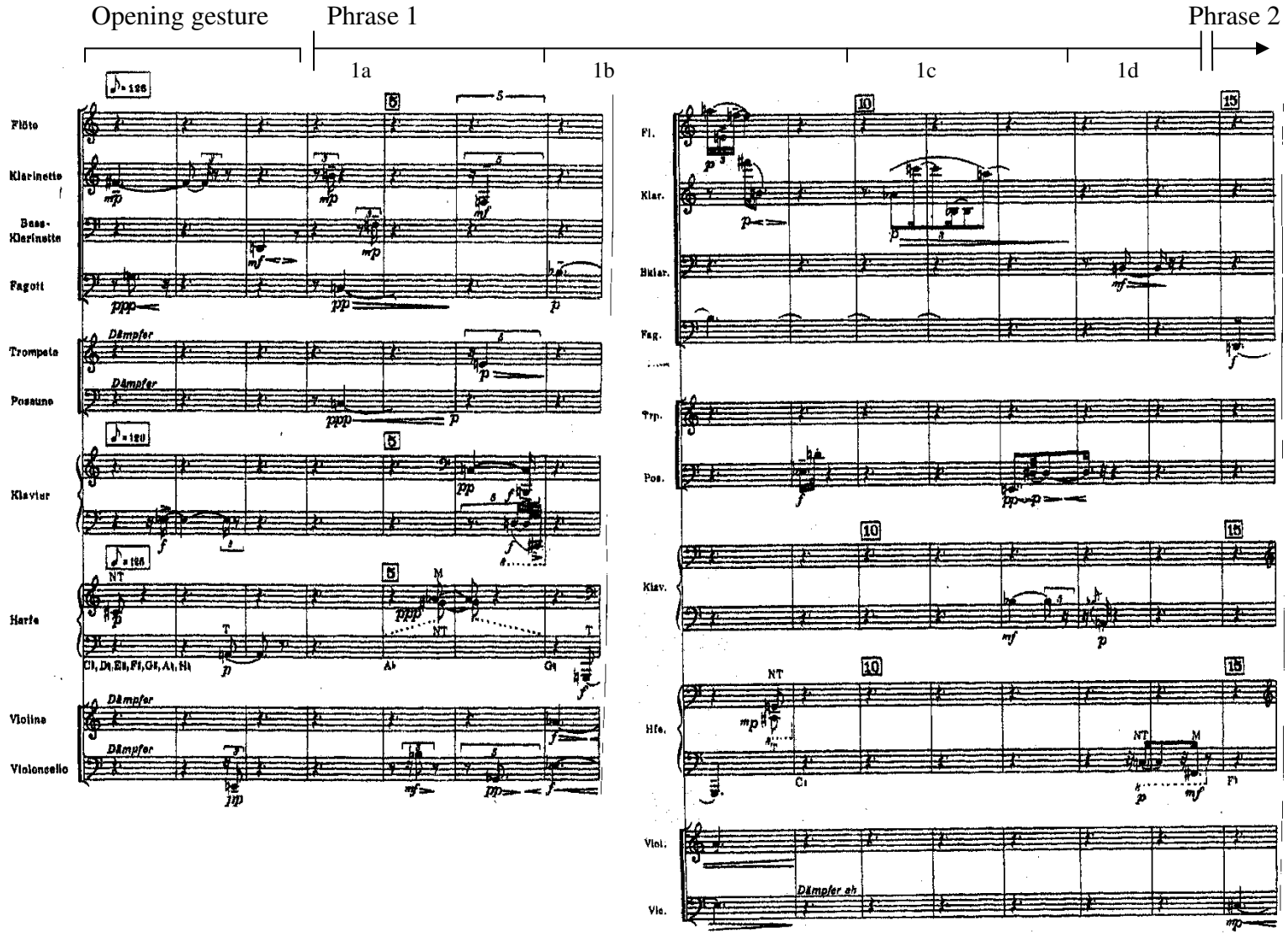
Example 3-4. *Kontra-Punkte*, sustained tones: long in the cello and bassoon; medium in the clarinet; short in the violin and flute



Example 3-5. *Kontra-Punkte*, melodies in the clarinet and trombone

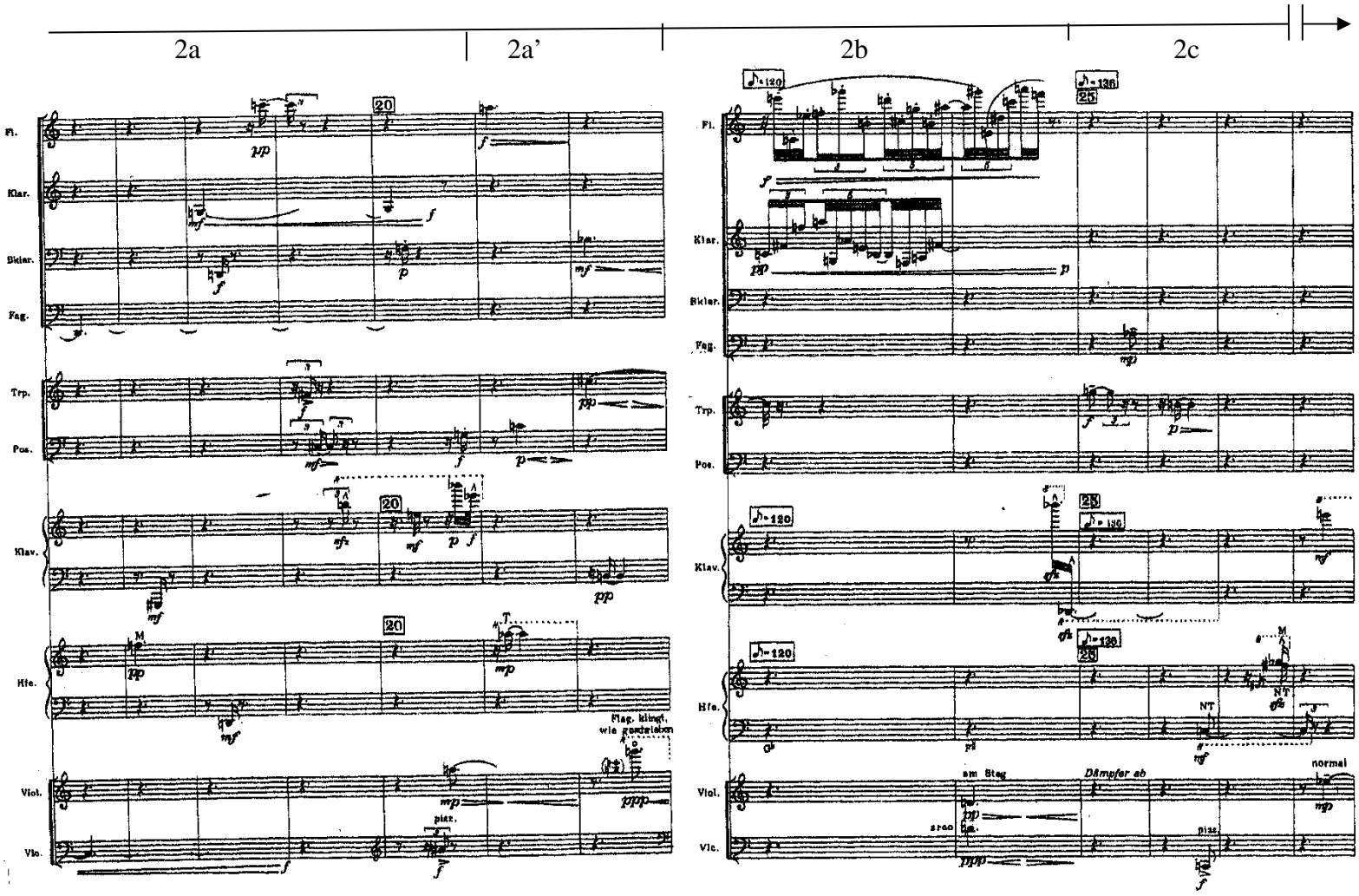


Example 3-6. *Kontra-Punkte*, opening gesture and phrases 1 to 2 (mm. 1-28) (cont. next page)

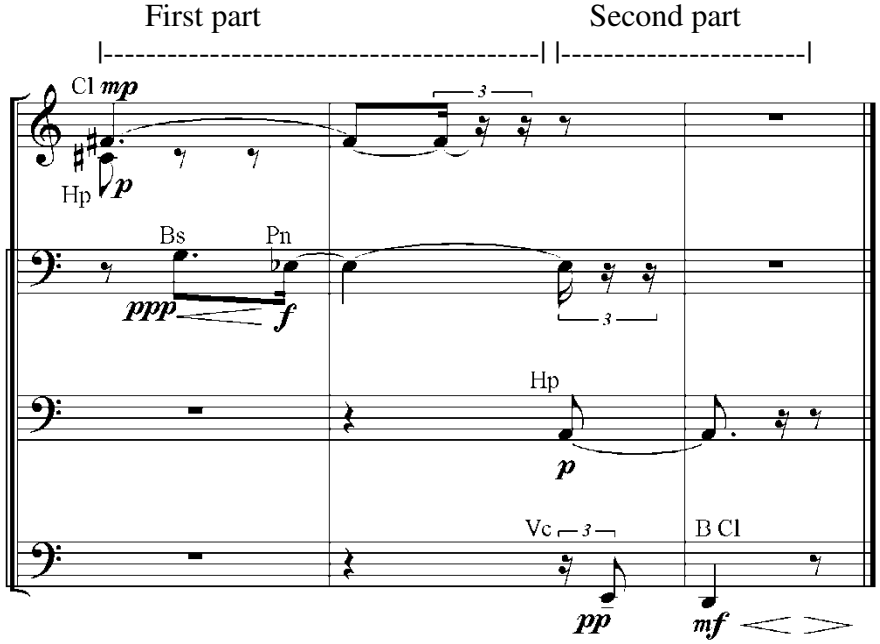


Example 3-6. Cont.

Phrase 2 (cont.)

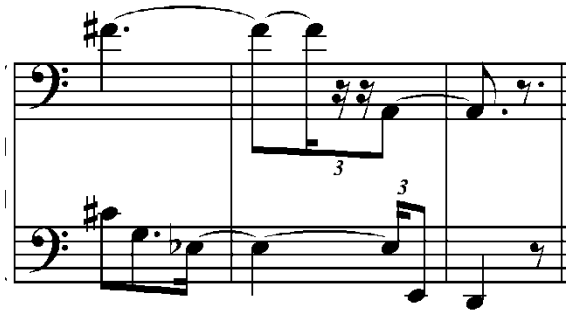


Example 3-7a. Subdivisions of the opening gesture



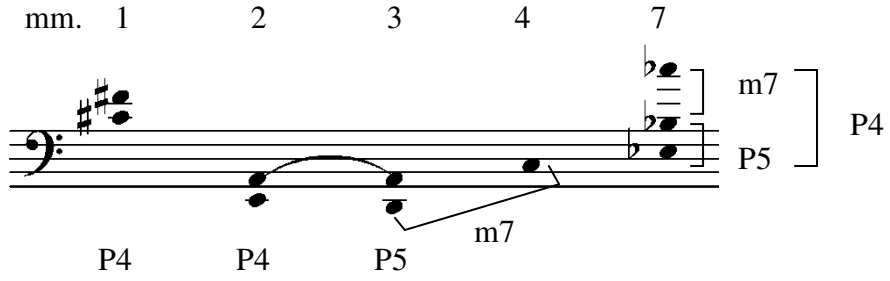
Example 3-7b. *Klangfarben* melody with accompanying pedal points

Pedal points on F# and A

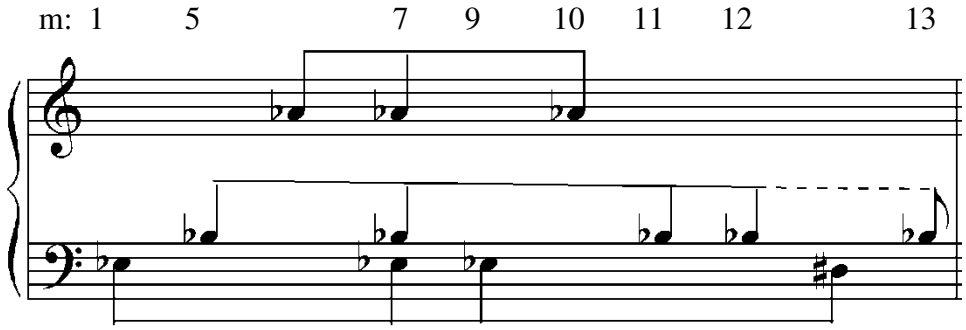


Melody

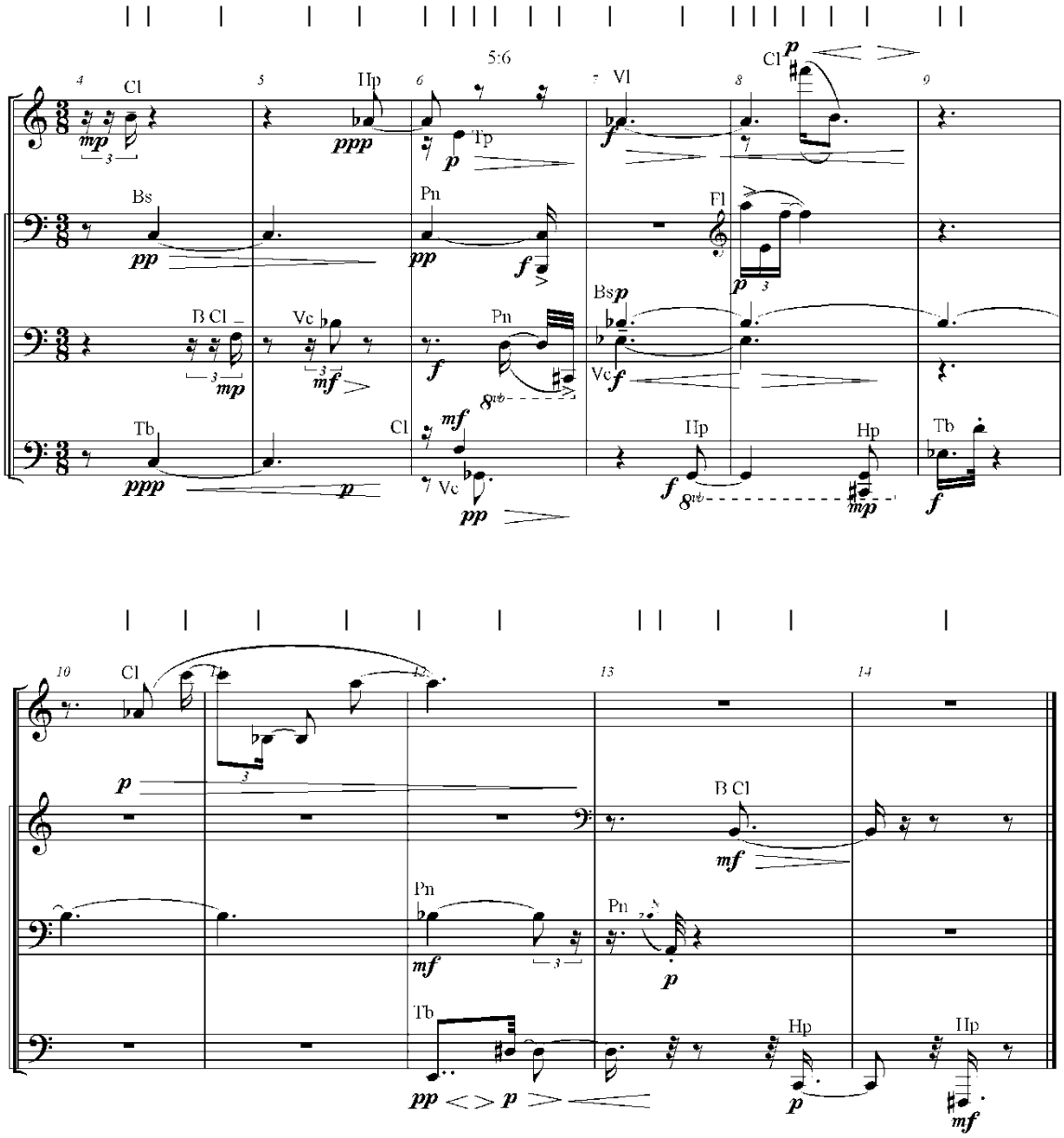
Example 3-8. Intervallic relations between the chord of m. 7 and preceding material



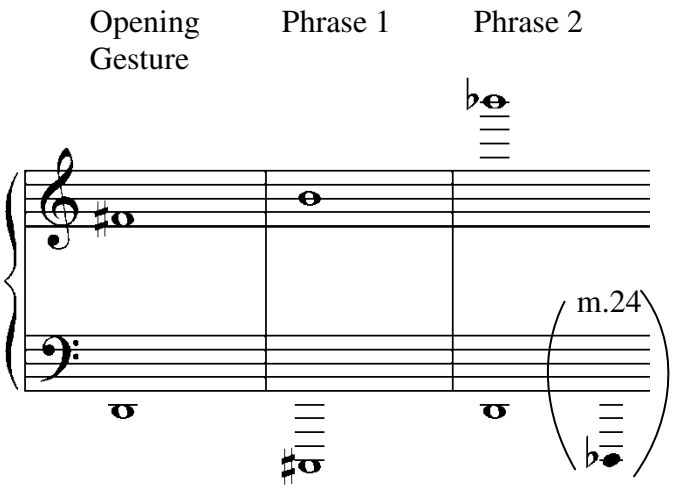
Example 3-9. Invariant pitch relations within the first phrase



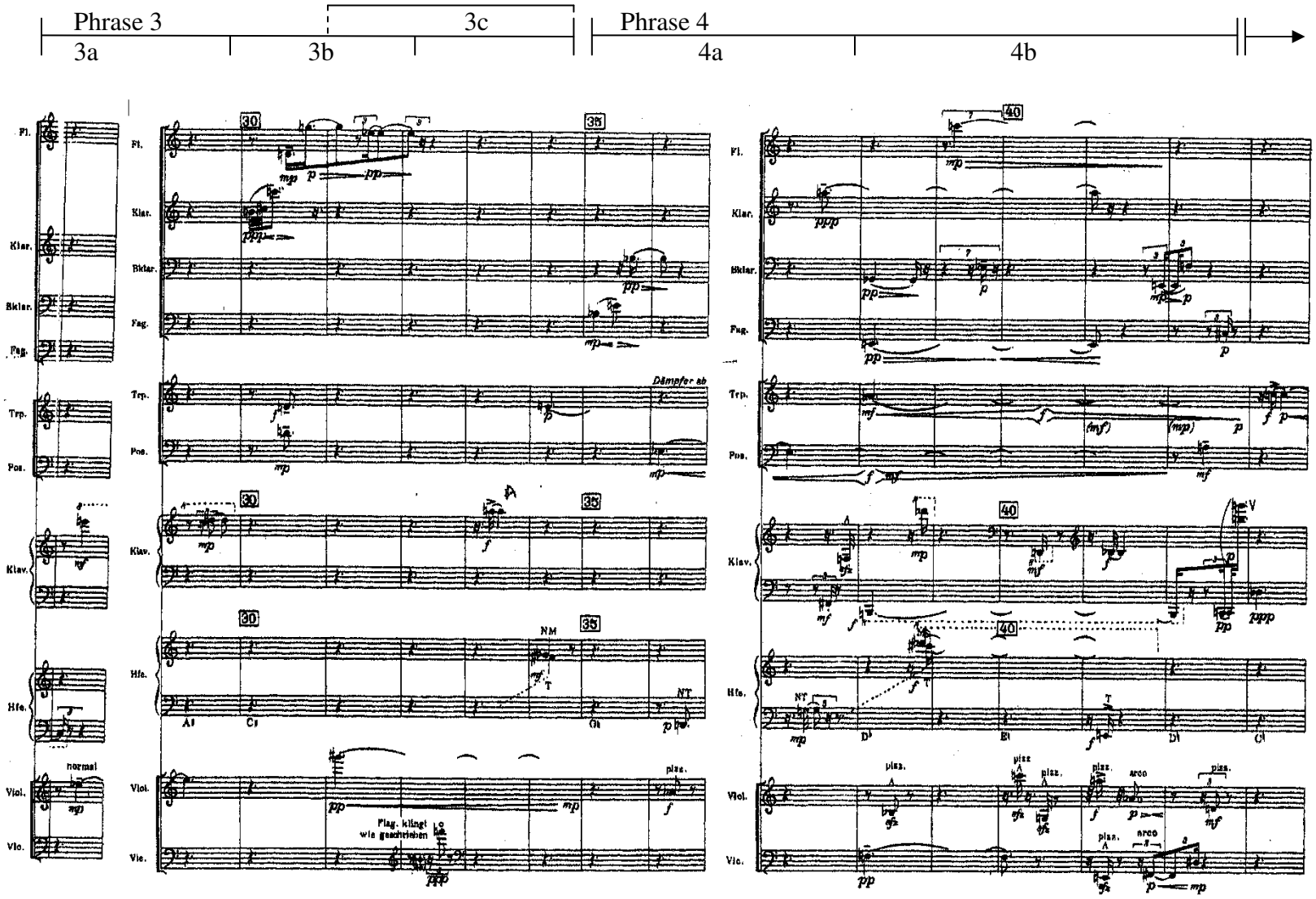
Example 3-10. Temporal density (tic marks indicates attacks)



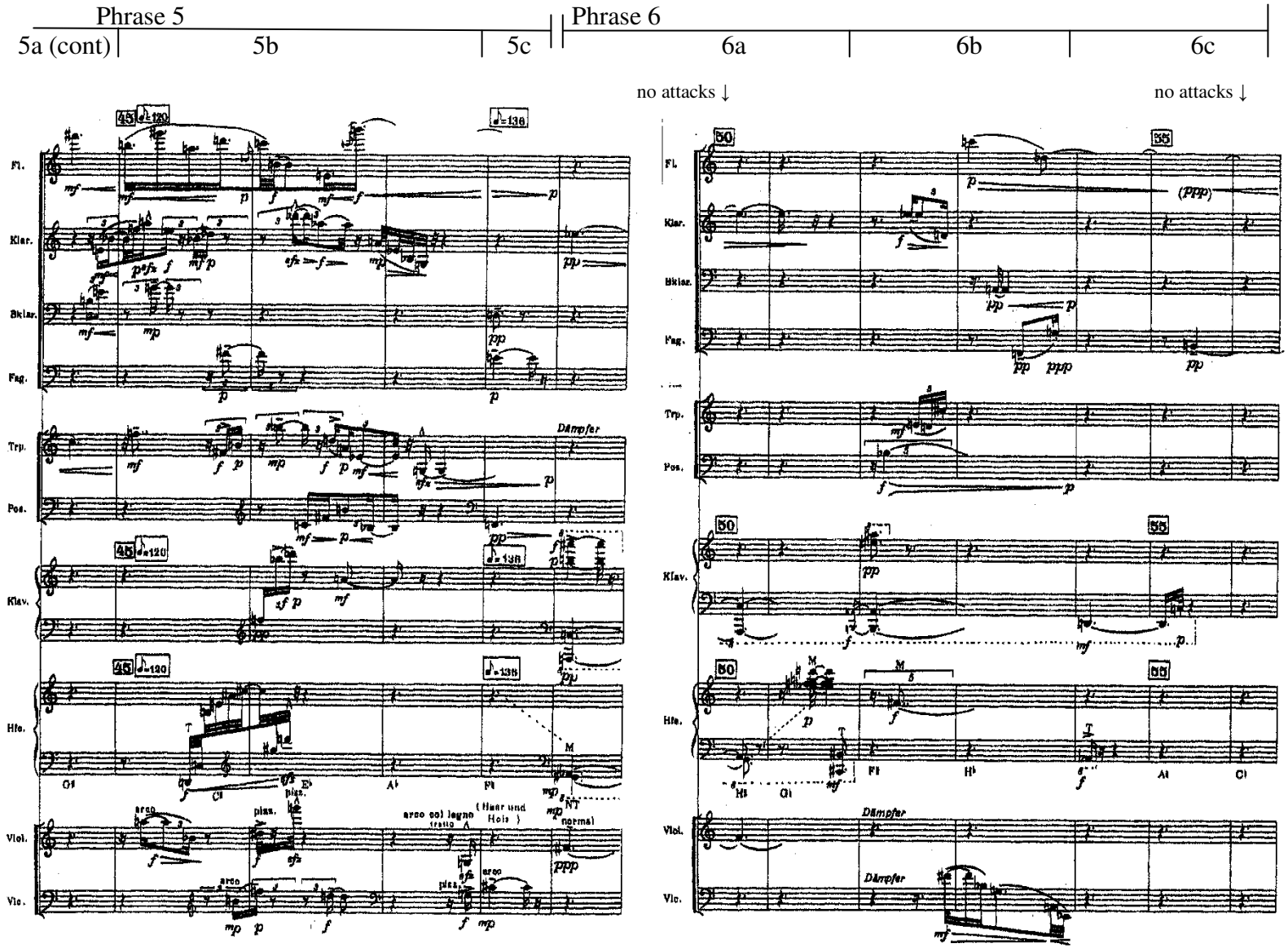
Example 3-11. Registral boundaries of opening gesture and phrases 1 and 2



Example 3-12. Phrases 3 to 6



Example 3-12 cont. Phrases 3 to 6 cont.



Example 3-13a. Phrase 3, textural relations

Segment:	3a	3b	3c
Texture:	S (+P)	M (+P)	S (+P)

Example 3-13b. Phrase 3, temporal density (number of attacks per measure)

	3a		3b		3c		
Measure:	28	29	30	31	32	33	34
Attacks:	1	1	5	2	1	1	1

Example 3-14. Phrase 4, spatial density (number of simultaneously sounding sustained tones)

Measure:	36	37	38	39	40	41	42
Voices:	1	2	7	8	7	5	1

Example 3-15. Phrase 5, temporal density

Measure:	43	44	45	46	47	48
Attacks:	2	4	17	17	4	1

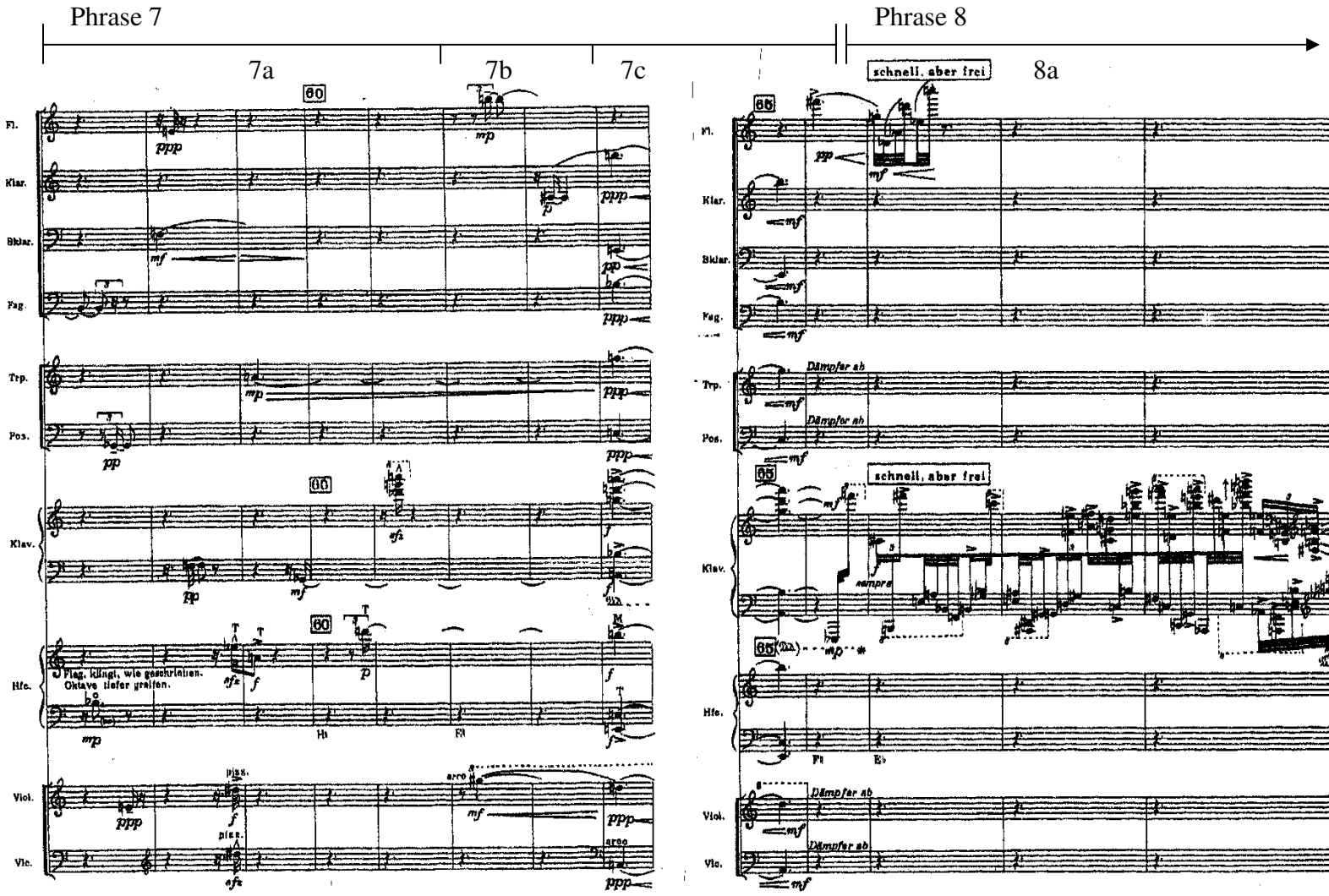
Example 3-16a. Phrase 6, textural relations

Segment:	6a	6b	6c
Texture:	S (+P)	G (+P)	S (+P)

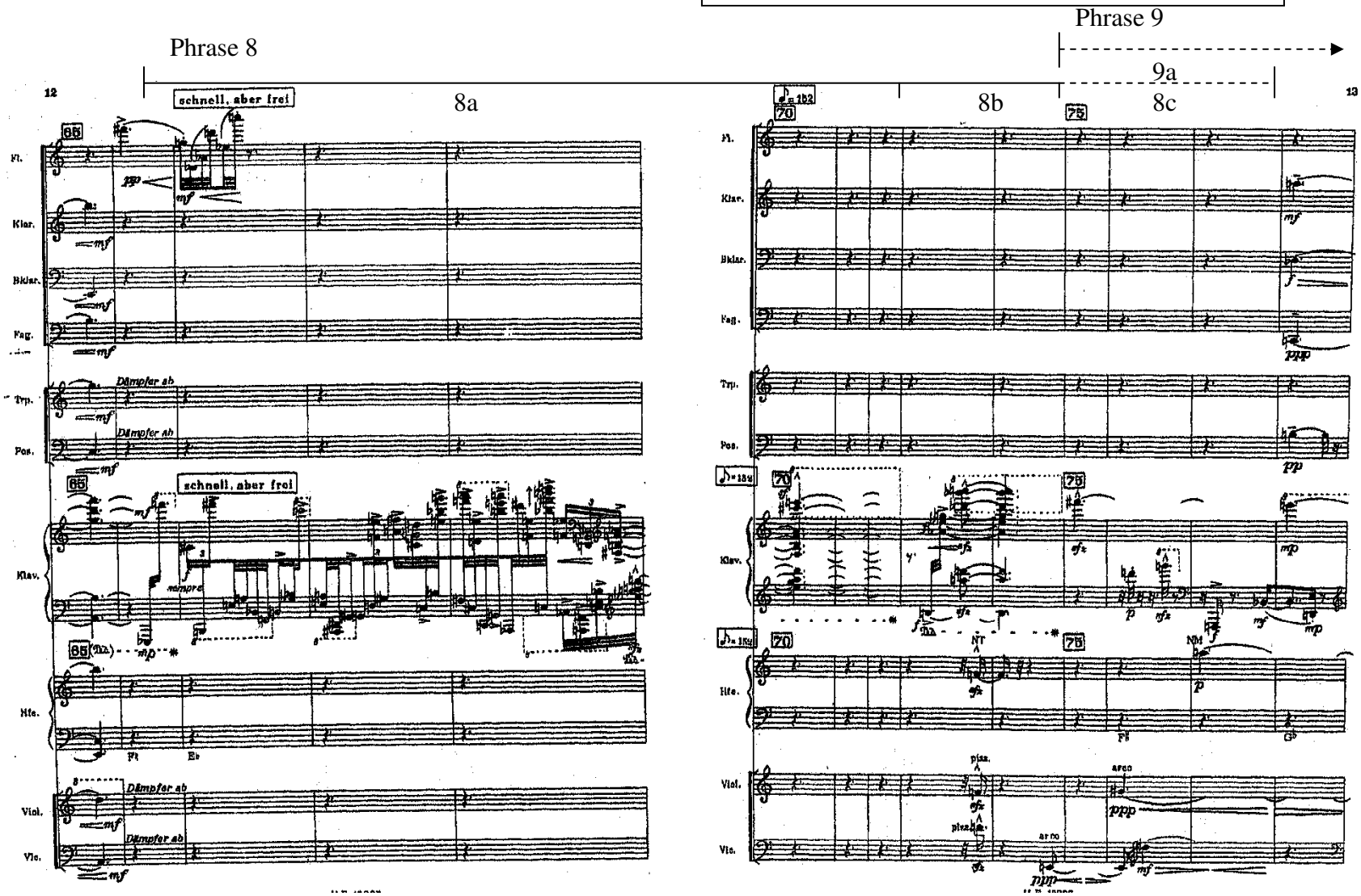
Example 3-16b. Phrase 6, temporal density

Segment:	6a	6b	6c
Attacks:	4	16	3

Example 3-17a. Phrase 7 to beginning of phrase 8



Example 3-17b. Phrase 8 to beginning of phrase 9, with overlap

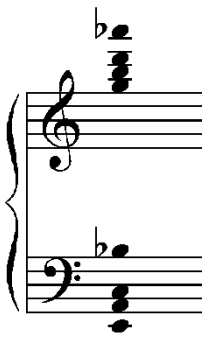


Example 3-18. Phrase 7, spatial density (simultaneously sounding sustained tones)

Segment:	7a					7b		7c		
Measure:	57	58	59	60	61	62	63	64	65	66
Voices:	1	1	2	2	3	5	6	15	15	6

"crescendo" in spatial density

Example 3-19. Wide spacing of chord of 7c, mm. 64-65

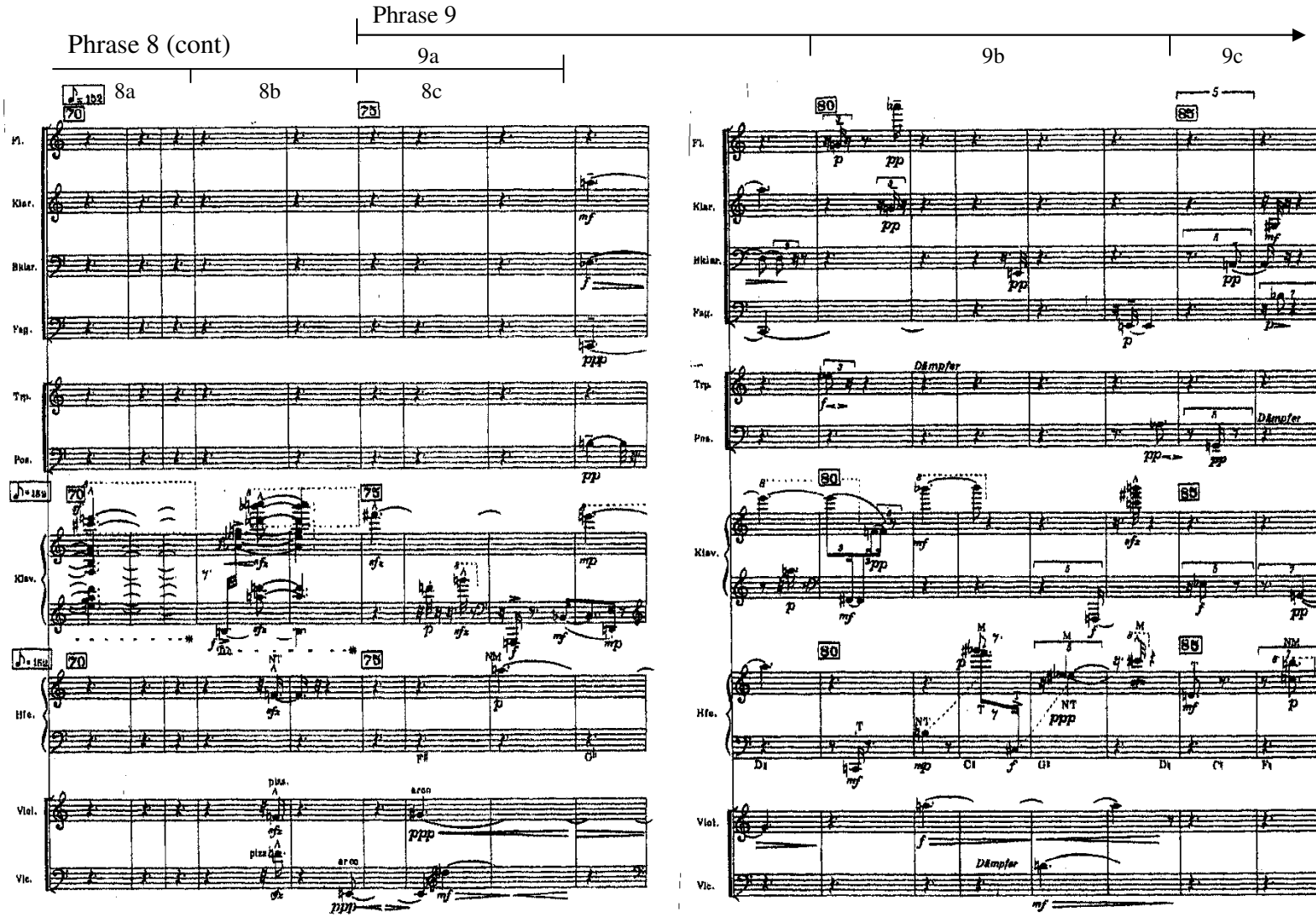


Example 3-20. Phrase 8, temporal density (attacks per measure, piano alone in 8c)

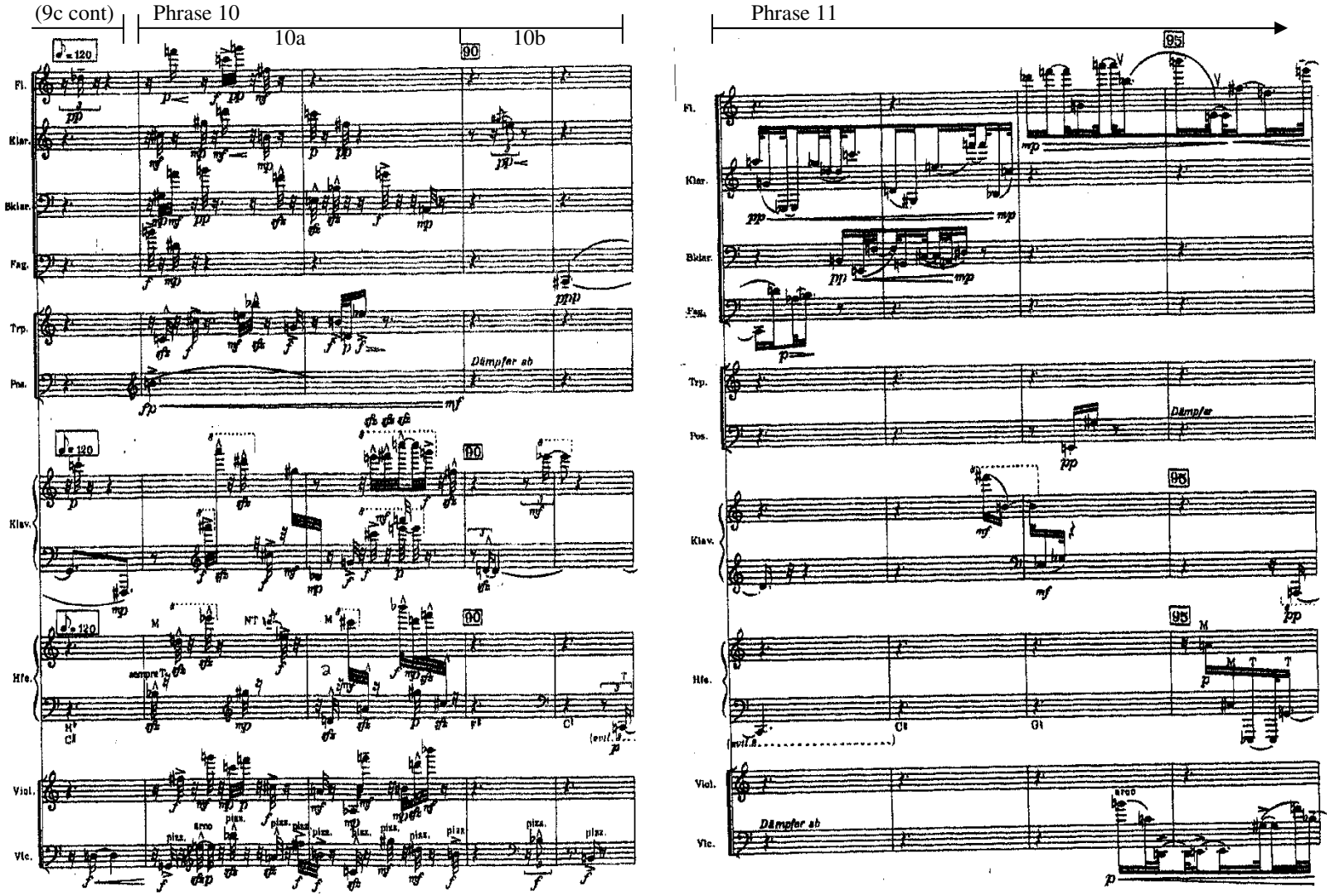
Segment:	8a						8b		8c		
Measure:	67	68	69	70	71	72	73	74	75	76	77
Attacks:	10	10	15	1	0	0	4	0	1	2	2

"decrescendo" in temporal density (in two stages)

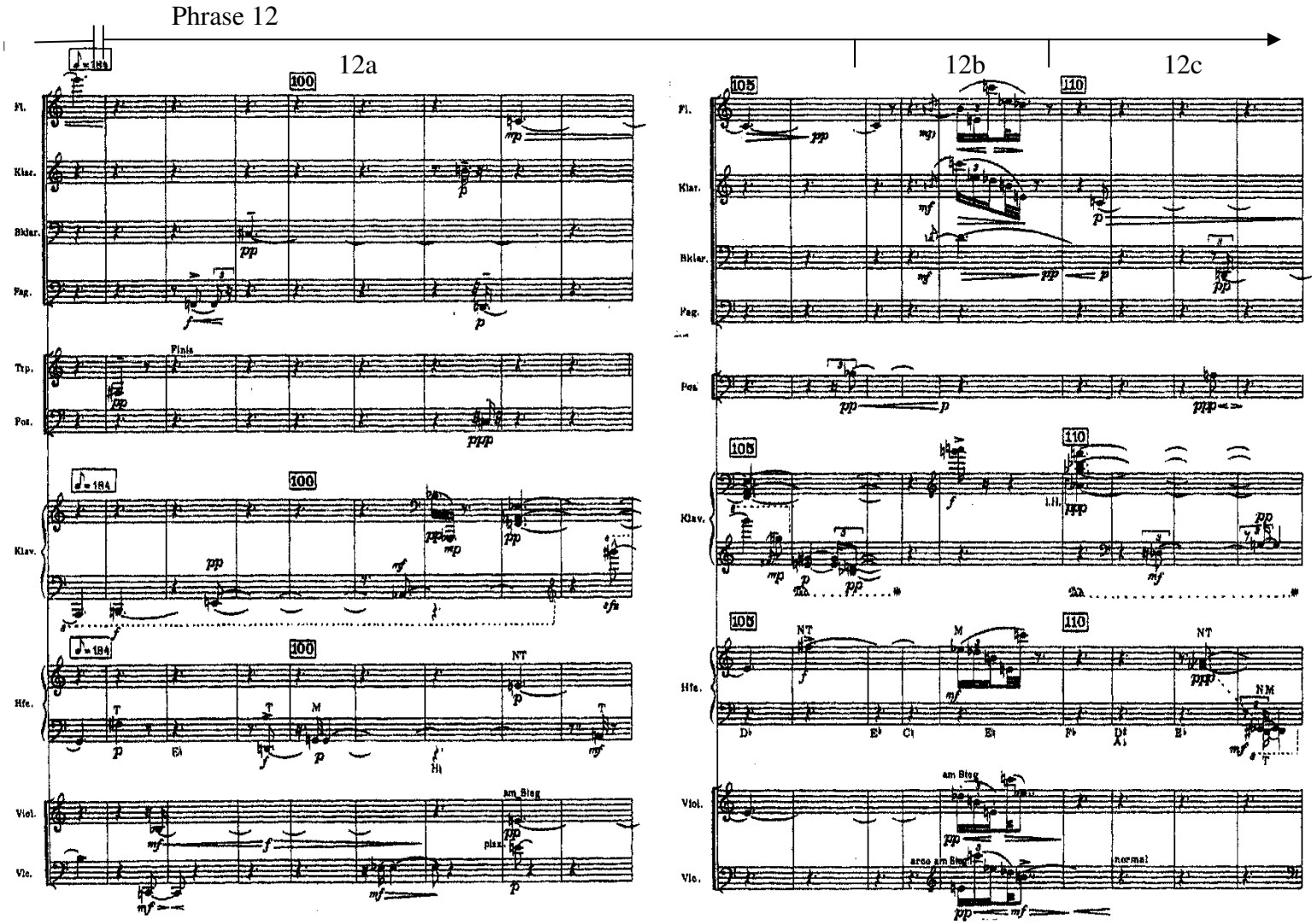
Example 3-21. Phrases 9 to 12

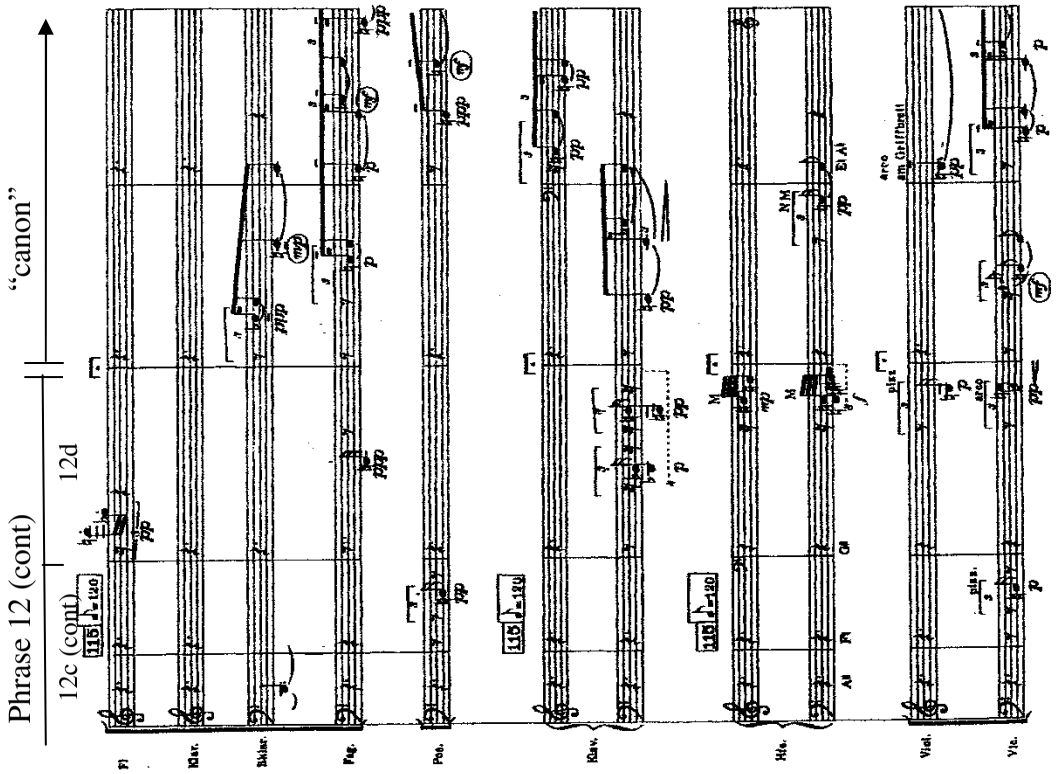


Example 3-21 cont. Phrases 9 to 12 cont.



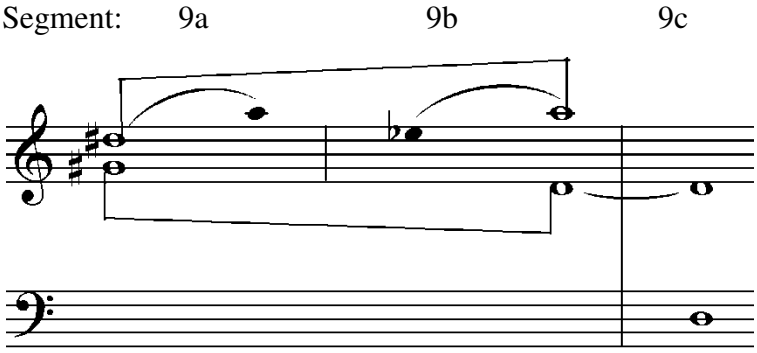
Example 3-21 cont. Phrases 9 to 12 cont.



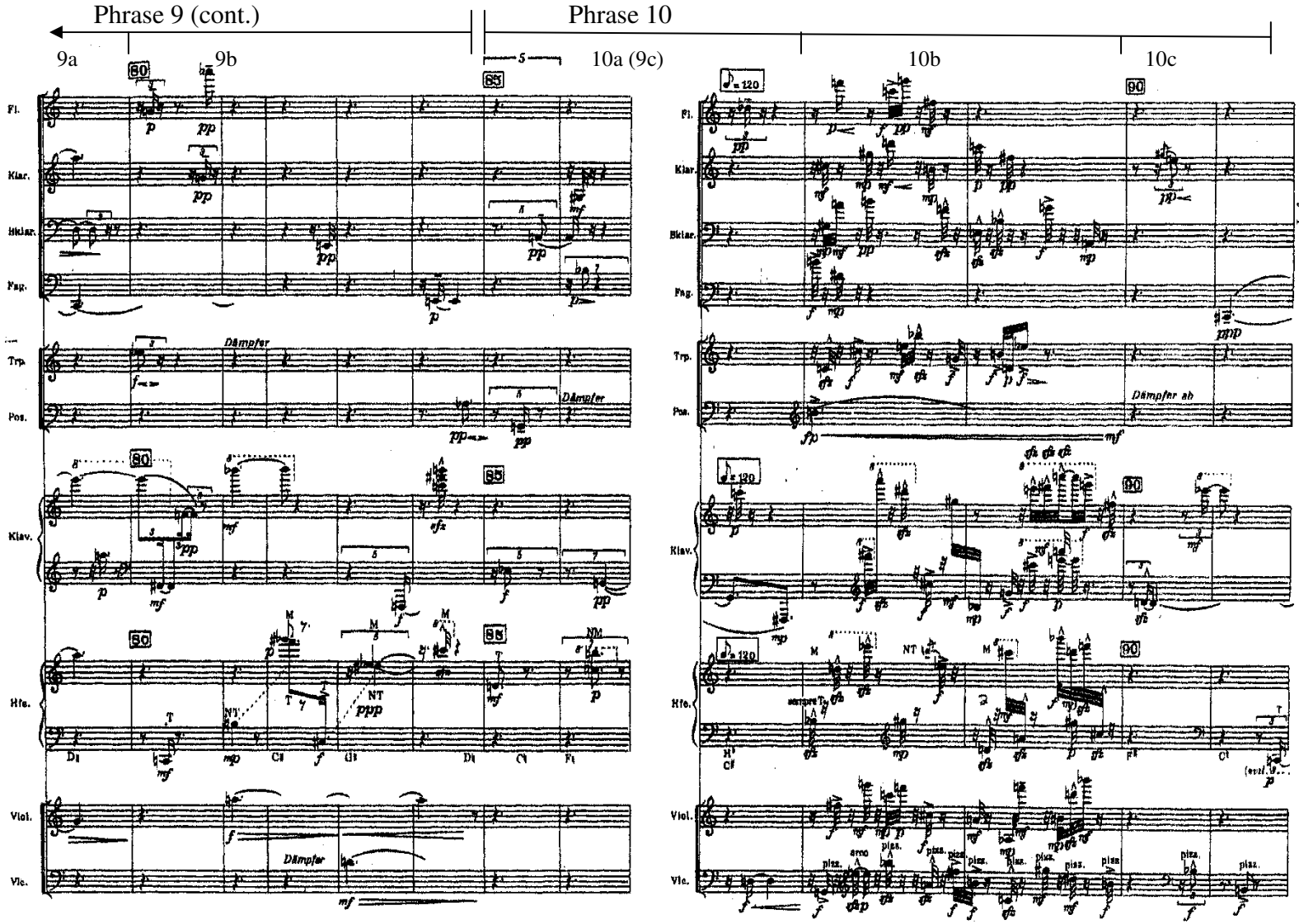


Example 3-21 cont. Phrases 9 to 12 cont.

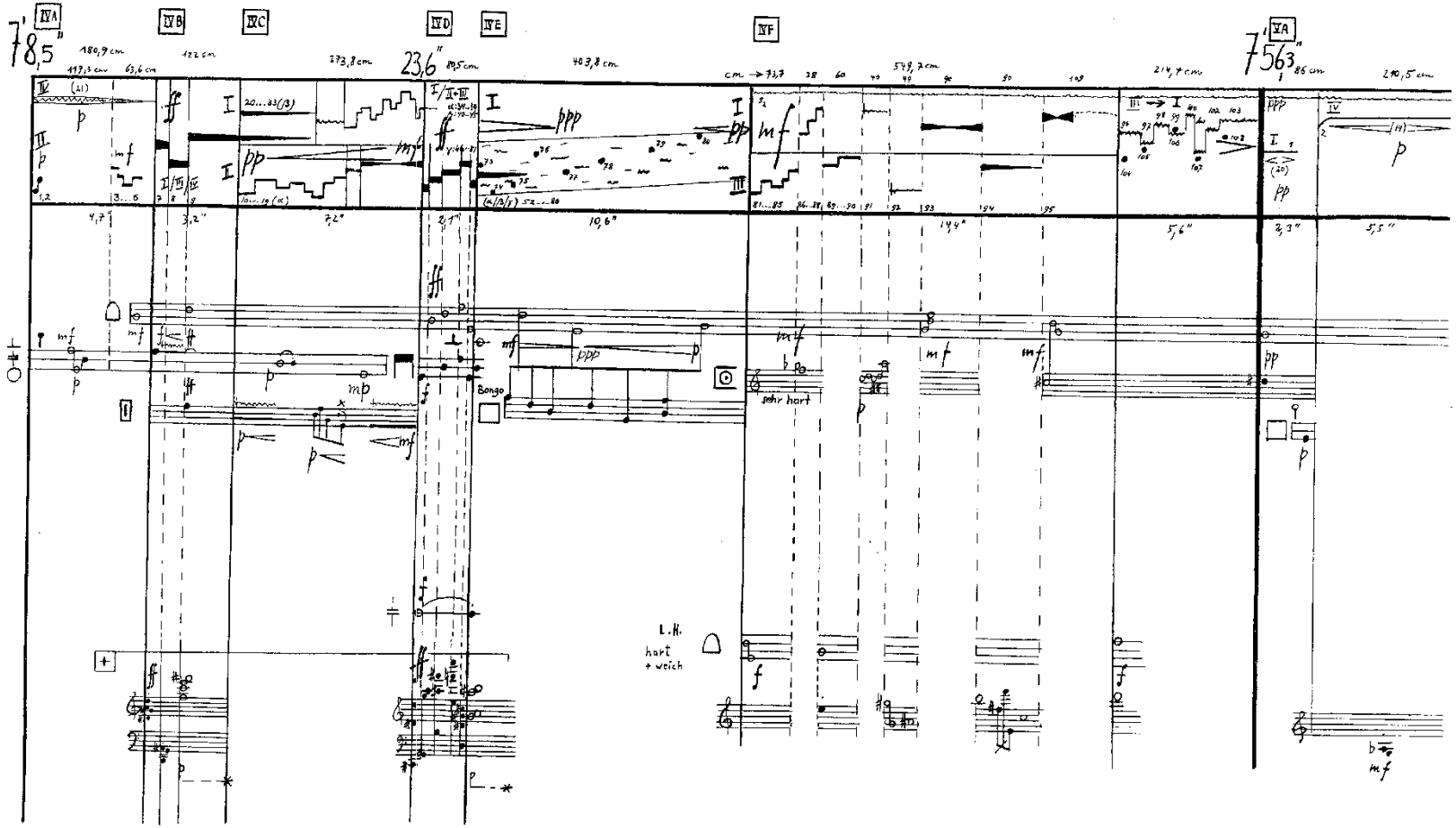
Example 3-22. Pitch relations in phrase 9



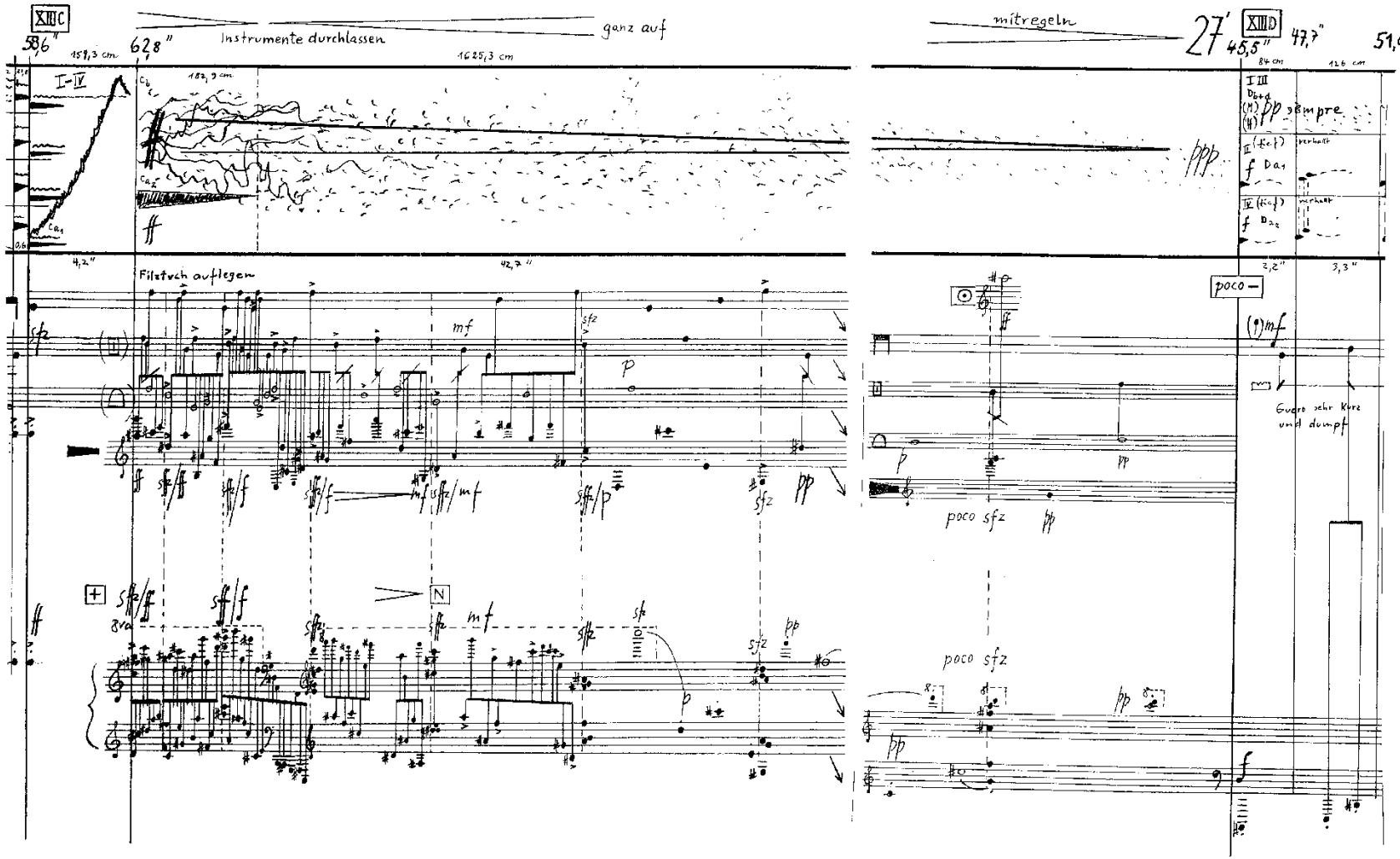
Example 3-23. Alternate segmentation of phrase 10, with 9c as 10a



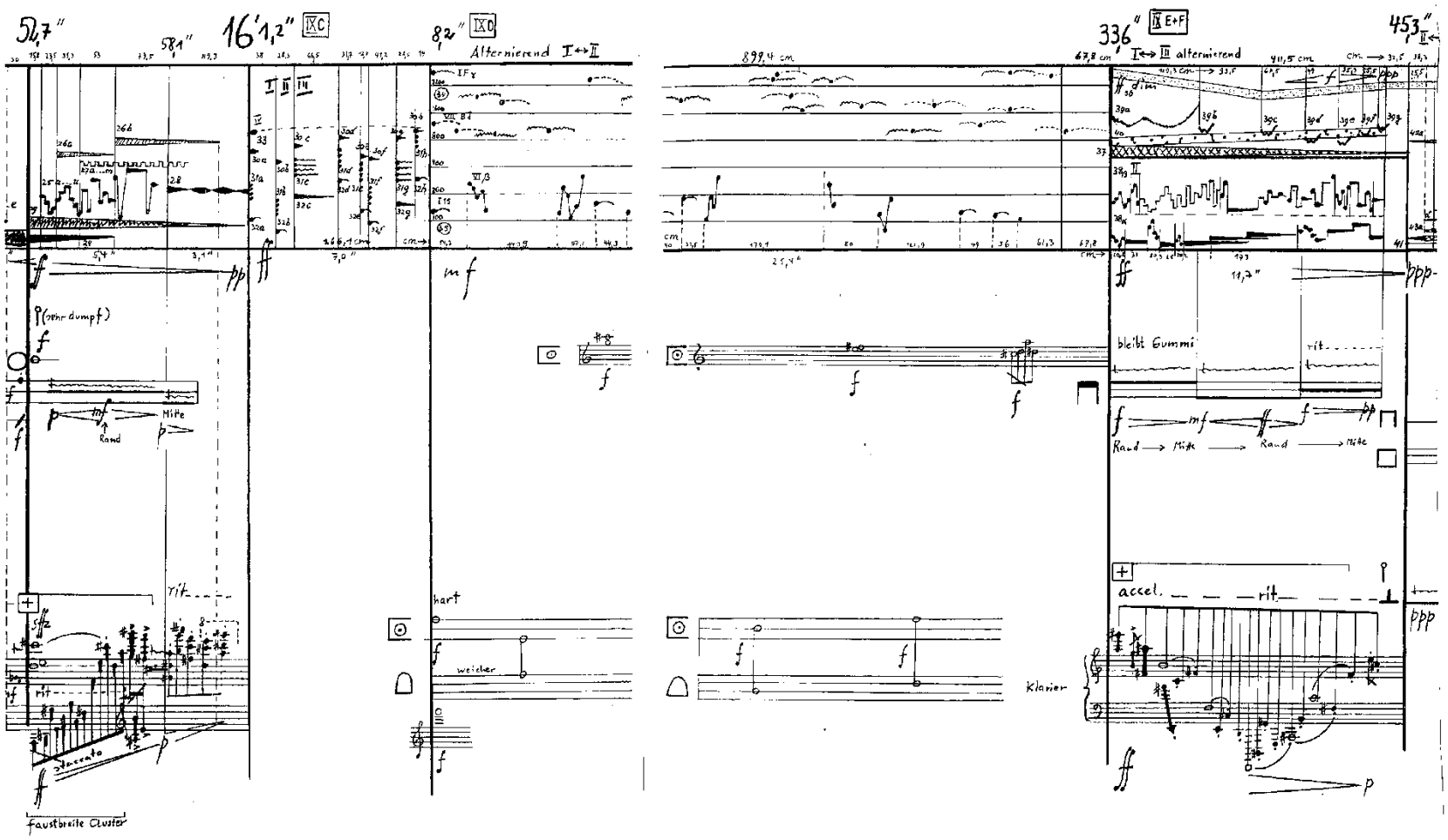
Example 3-24. *Kontakte*, score excerpt, 7' 8.5" to 7' 56.3"



Example 3-25. *Kontakte*, score excerpt, 26' 58.6" to 27' 50"



Example 3-26. *Kontakte*, score excerpt, 15' 56.7" to 16' 45.3"



Example 3-27. *Kontra-Punkte*, large-scale form, mm. 4-116 (opening gesture is omitted)

	"Parallel period"		Cycle I			Cycle II			Cycle III		Closing	
Phrases:	1	2	3	4	5	6	7	8	9	10	11	12
Segments:	abcd	abc	abc	ab	abc	abc	abc	abc	abc	ab		abcd
Measures:	4-14	15-27	28-34	35-42	43-48	49-61	62-66	67-74	75-87	88-91	92-95	96-116
					↑ tutti groups			↑ piano solo		↑ tutti groups		
Time:*	00:05	00:25	00:46	1:00	1:08	1:17	1:40	1:45	2:01	2:20	2:26	2:36 [to 3:01]
Duration: (in seconds)	20	21	14	8	9	23	5	16	19	6	10	25

*Indicates the starting time of each unit, beginning at 00:00.

Example 3-28. Three cycles based on increasing tension

Cycle I

Phrases:			3				4				5	
Segments:	3a	3b	3c			4a			4b	5a	**5b**	5c
Phrase structure:	A	B	A'							A	B	A'
						dynamics density						
Function:			Stability (S)				Instability (I)				Eruption (E)	

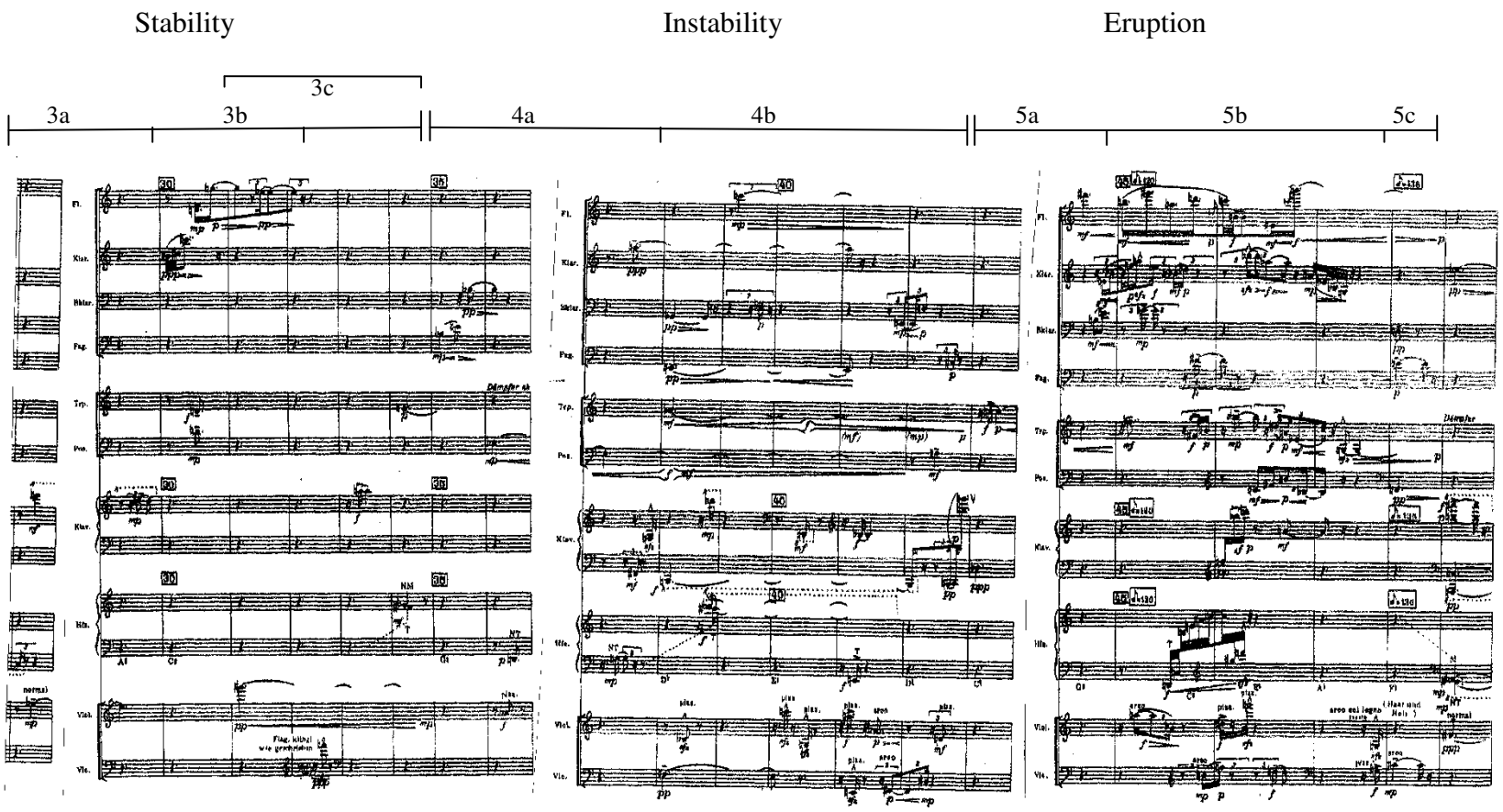
Cycle II

Phrases:			6			7			8	
Segments:	6a	6b	6c	7a	7b	7c	**8a**	8b	
Phrase structure:	A	B	A'	A	B	C	A	B	
						density and dynamics			
Function:		S			S/I			E	

Cycle III

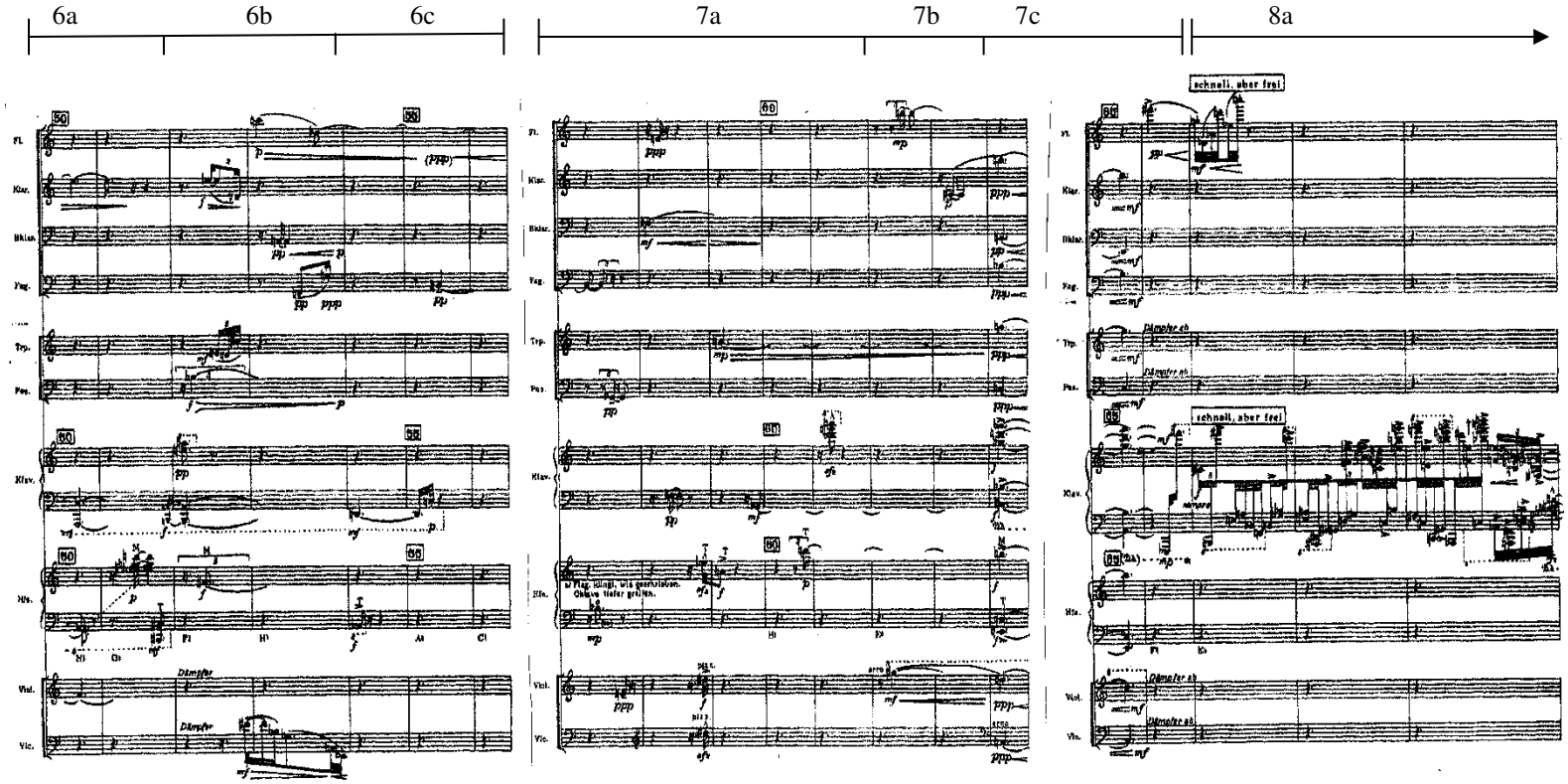
Phrases:		9		10	
Segments:	9a	9b	9c	**10a**	10b
Phrase structure:	A	A'	B	A	B
Function:		S/I		E	

Example 3-29. *Kontra-Punkte*, Cycle I, phrases 3, 4, and 5



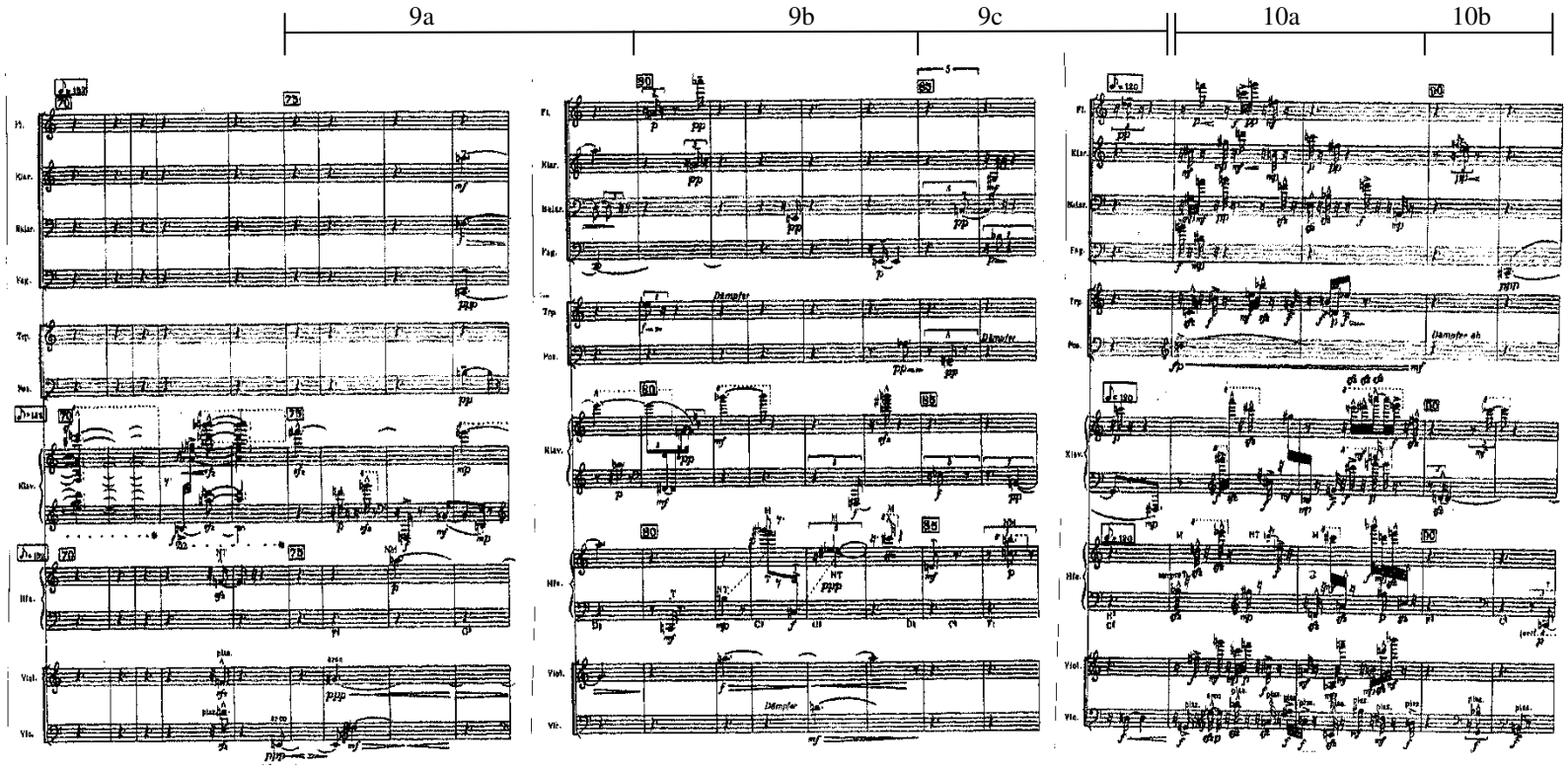
Example 3-30. Cycle II, phrases 6, 7, and 8 (the first measure of 6a and the last few measures of phrase 8 are not shown)

Stability | Stability → Instability | Eruption



Example 3-31. Cycle III, phrases 9 and 10

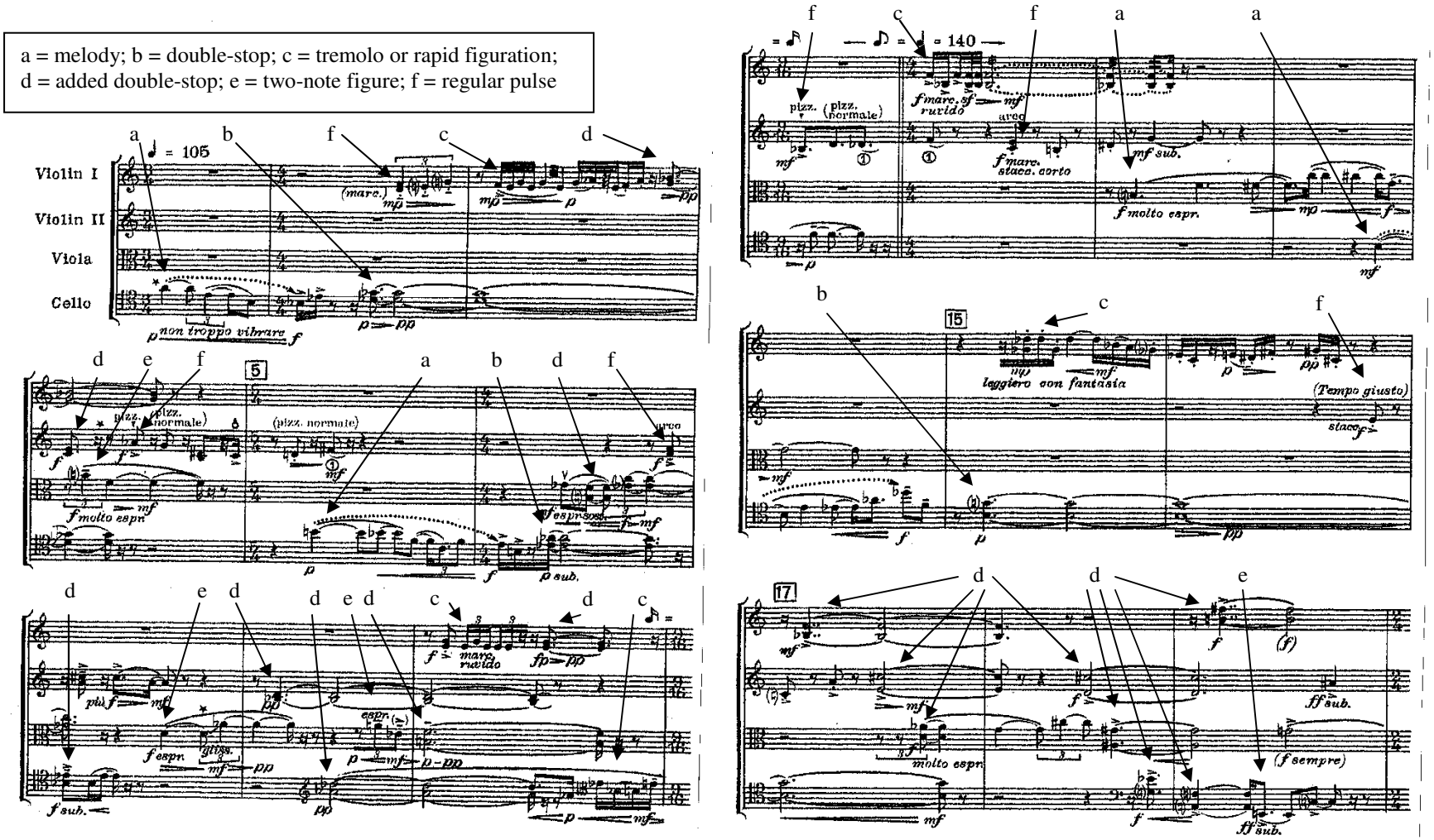
Stability → Instability Eruption



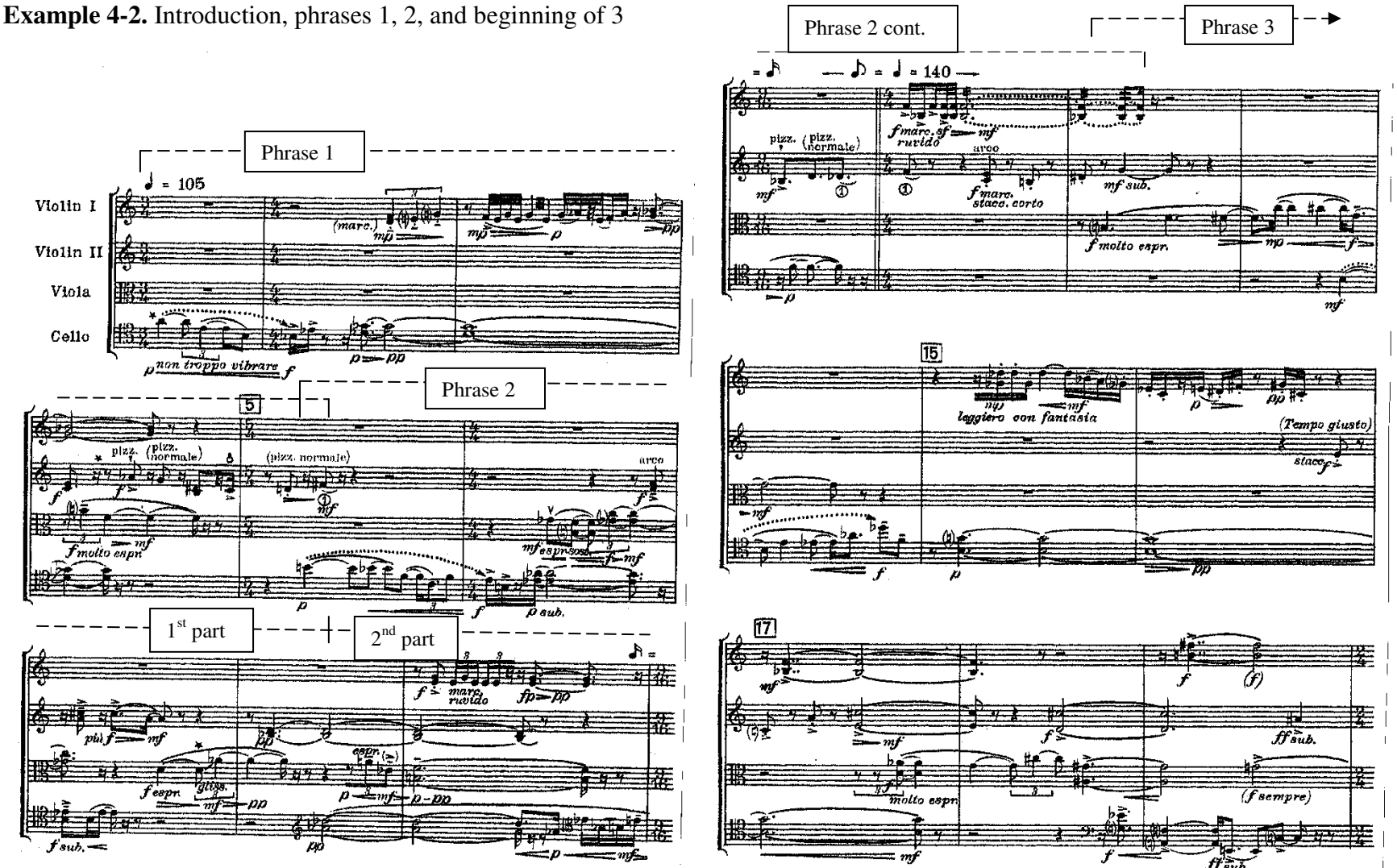
Examples for Chapter 4

EXAMPLES BEGIN ON NEXT PAGE.

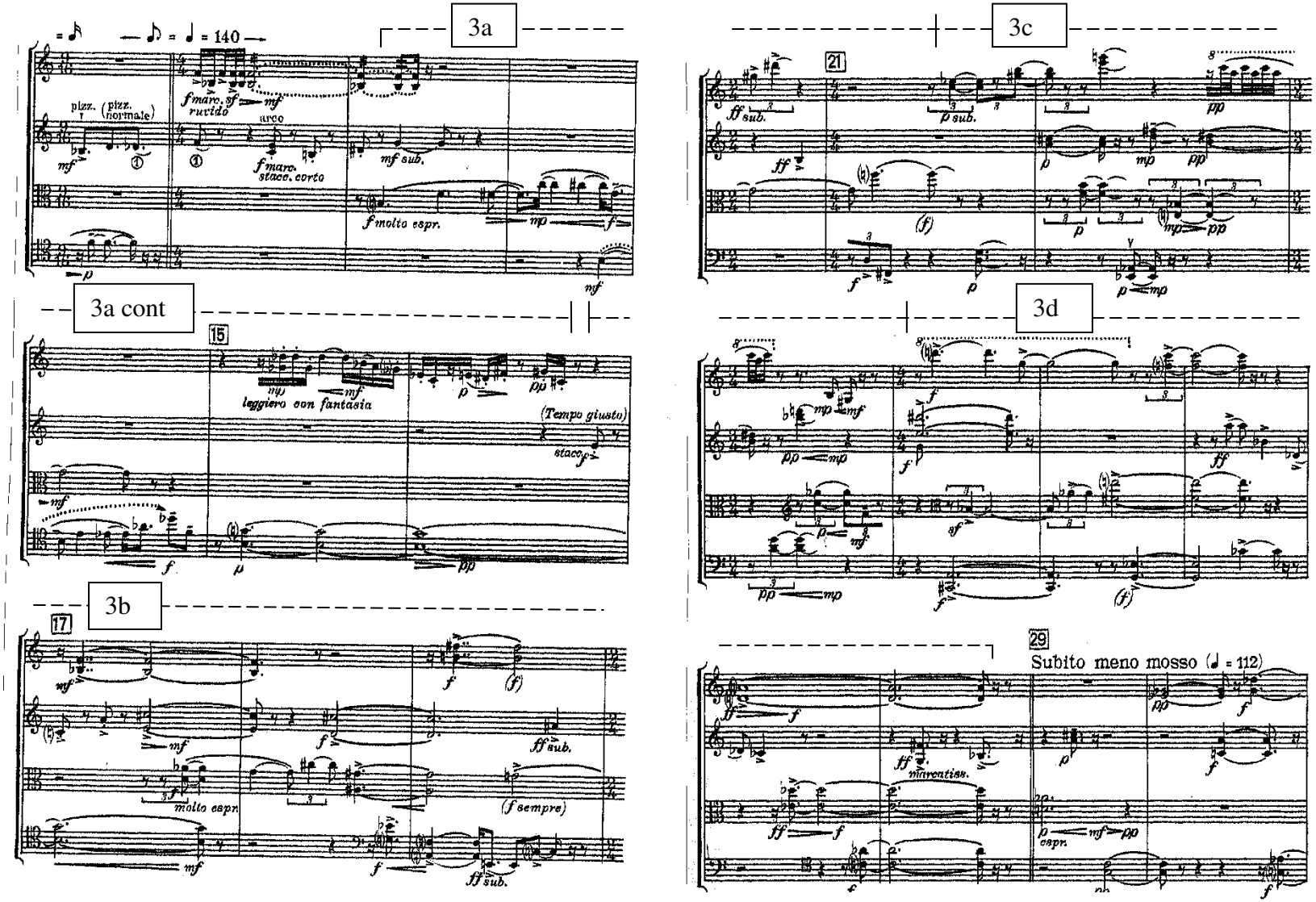
Example 4-1. Carter, String Quartet No. 2, Introduction, mm. 1-20, six recurring gestures



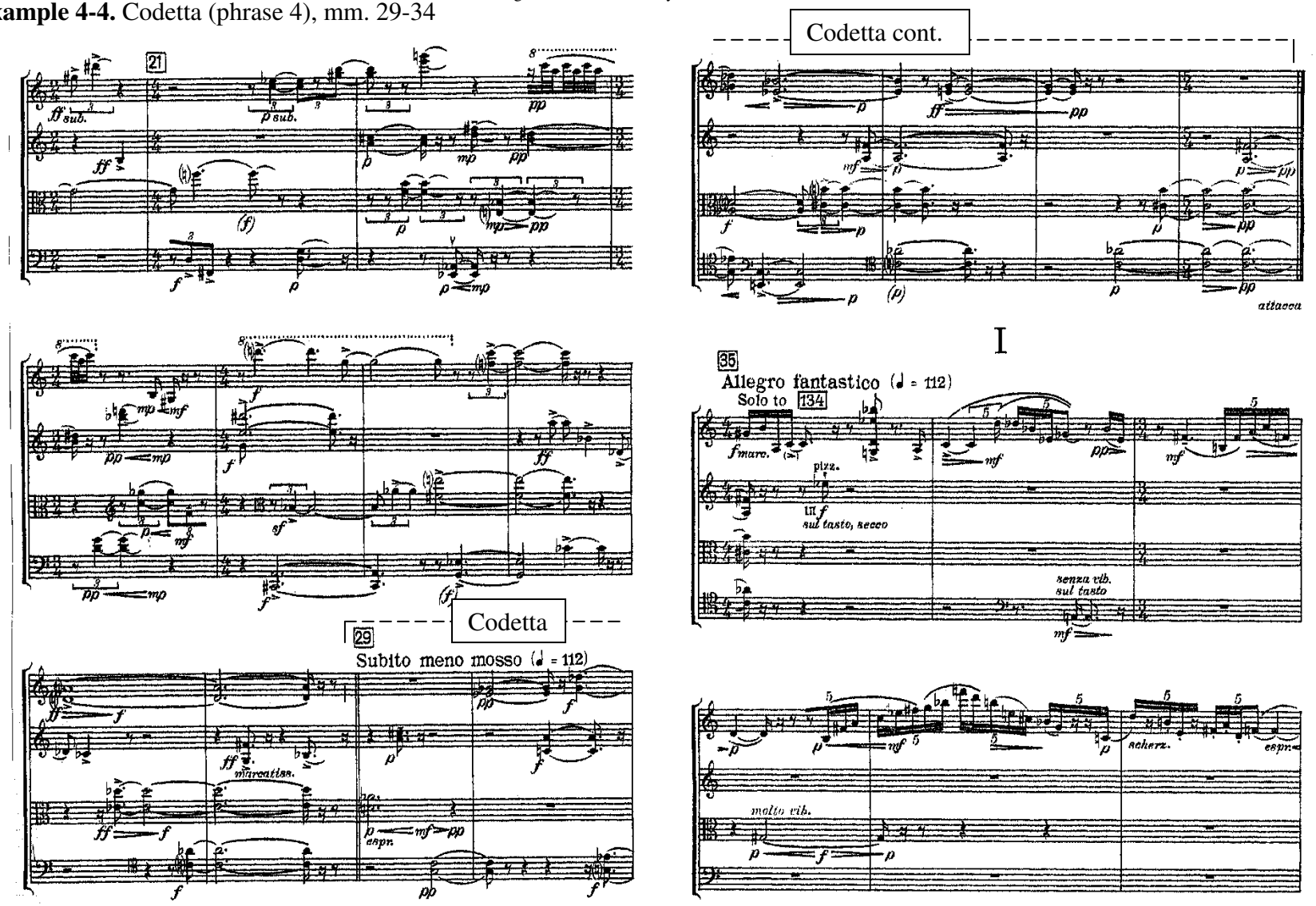
Example 4-2. Introduction, phrases 1, 2, and beginning of 3



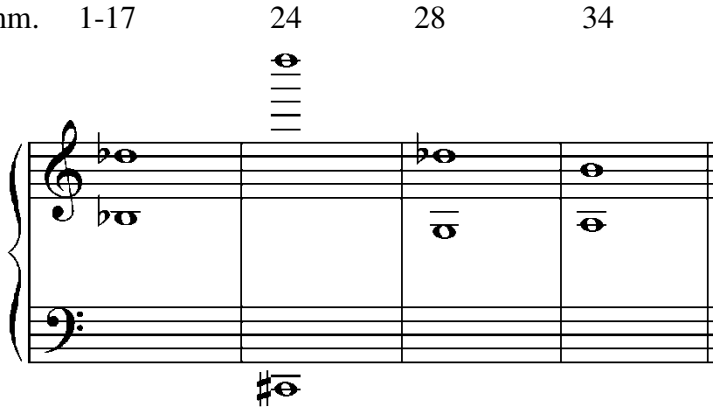
Example 4-3. Phrase 3, with four segments



Example 4-4. Codetta (phrase 4), mm. 29-34

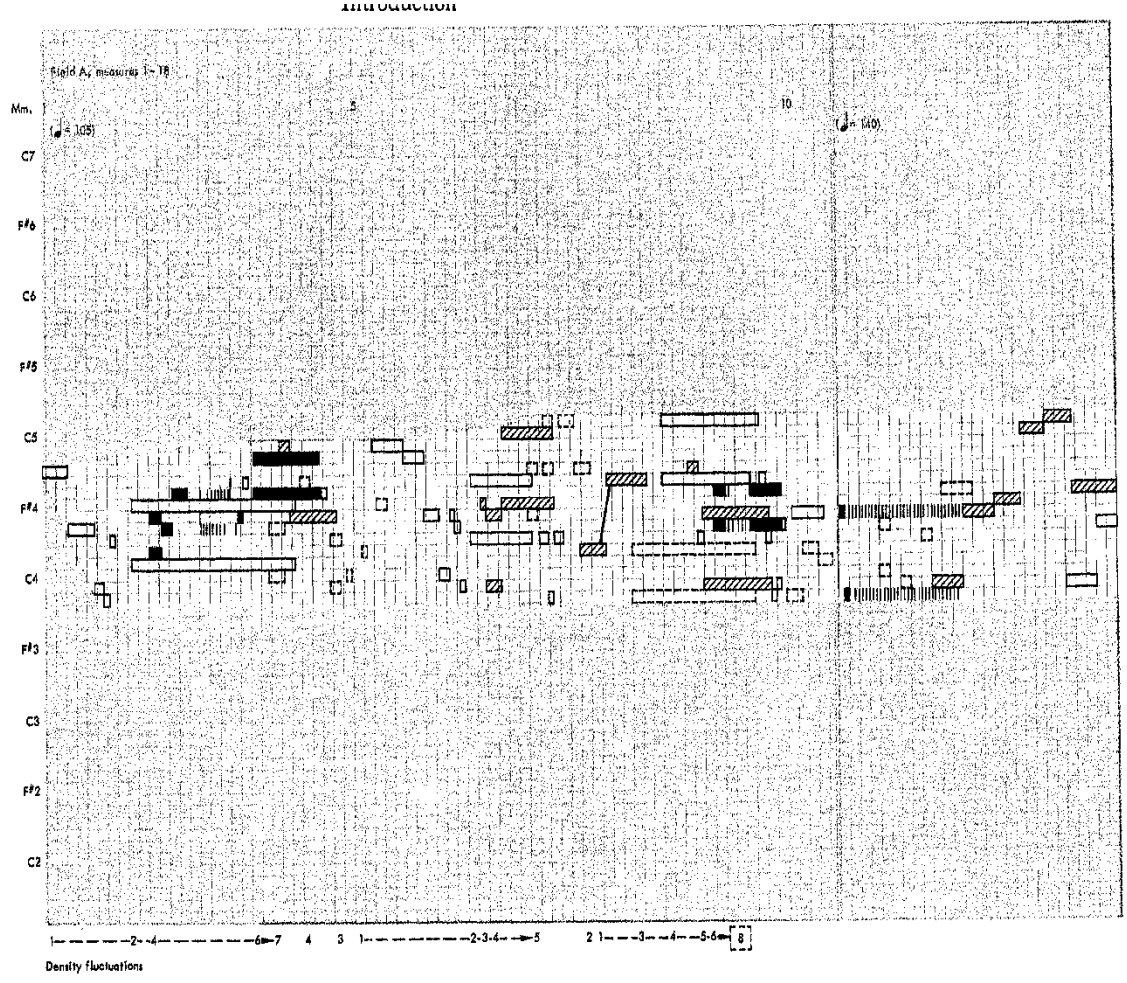


Example 4-5. Introduction, registral spans



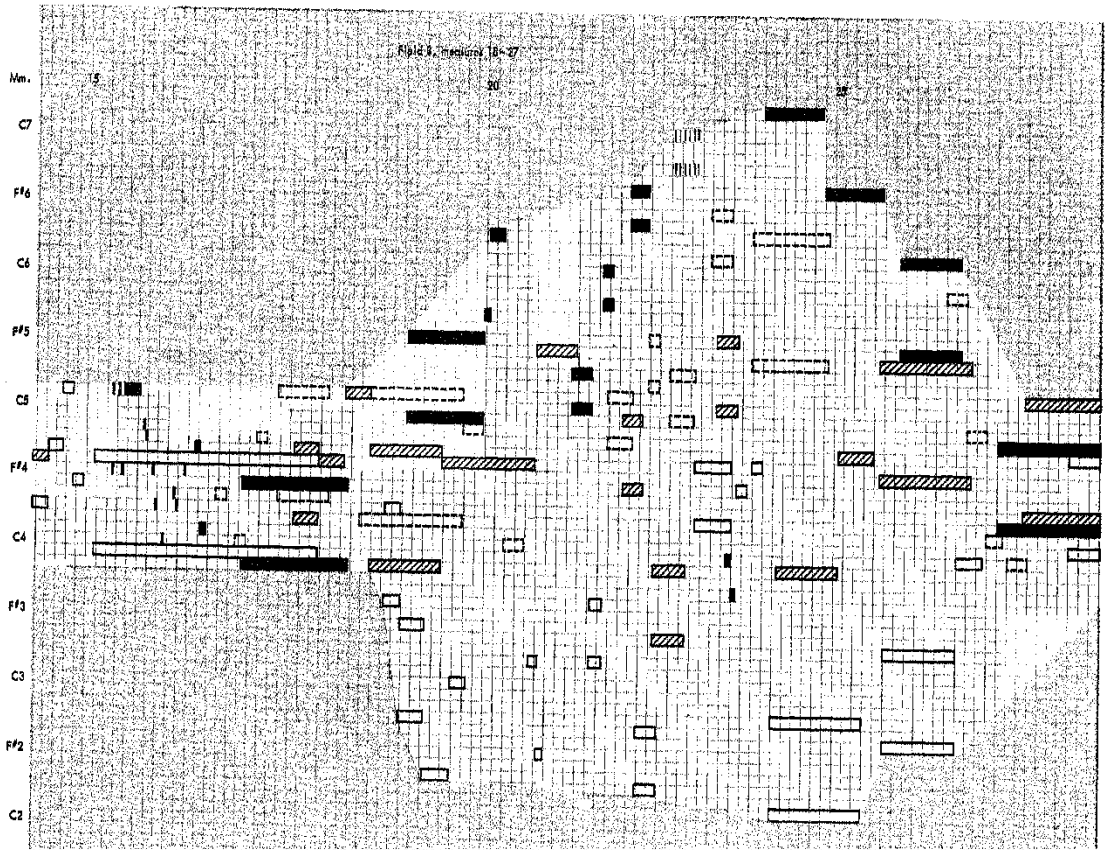
Example 4-6. Introduction, registral expansion and contraction (from Cogan and Escot, *Sonic Design* (1976), Example 1.40, pp. 64-66)

Field A, mm. 1-18



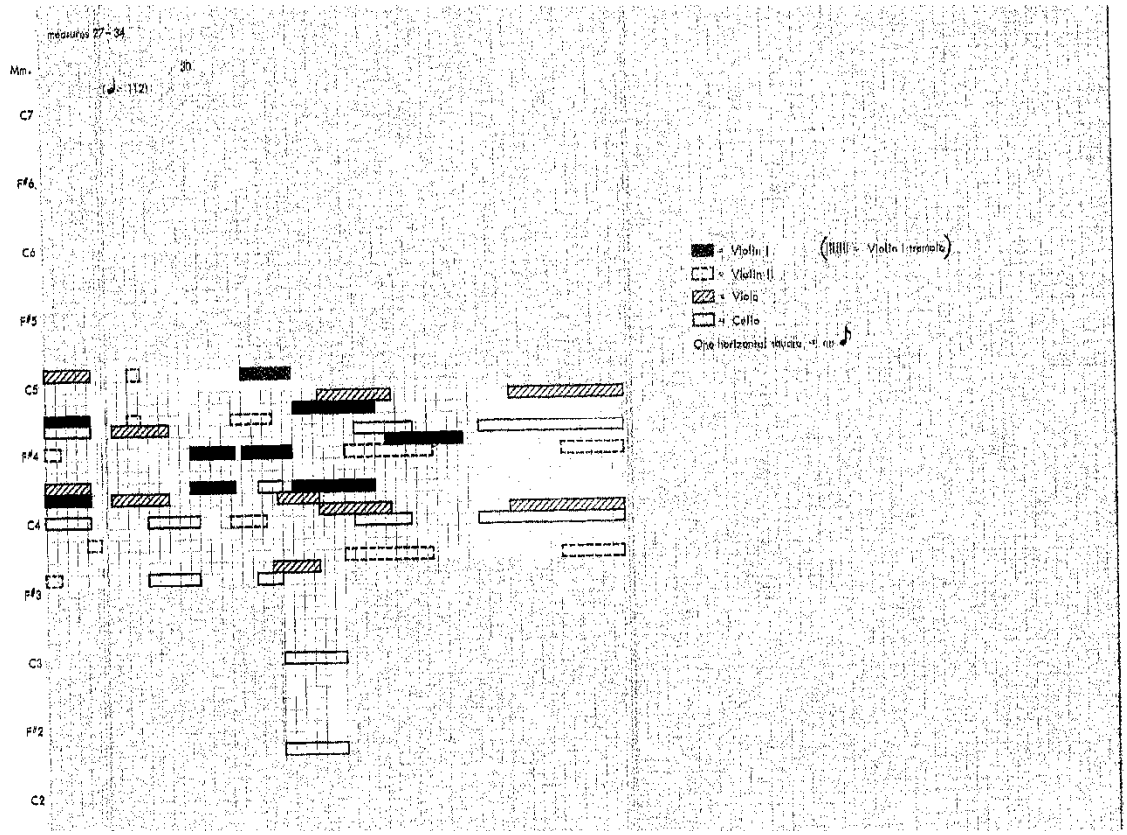
Example 4-6 cont.

Field B, mm. 19-27

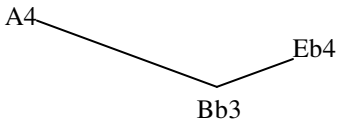
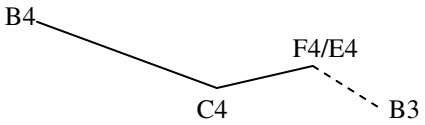
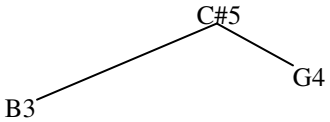
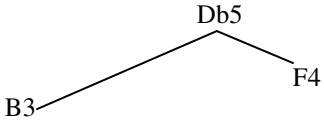
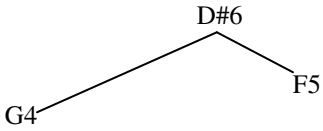
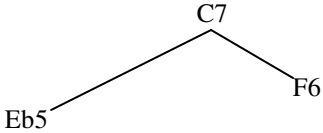


Example 4-6 cont.

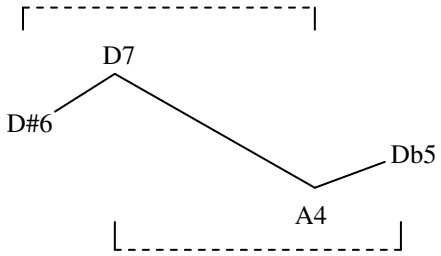
Field C, mm. 27-34



Example 4-7. Introduction: Melodic contours (cont. on next page)

		Contour form	Span of each leg
a. Vlc, m. 1:		Prime	11/5
b. Vlc, m. 5:		Prime	11/5
c. Vla, m. 12:		Inversion	14/6
d. Vlc, m. 13:		Inversion	14/8
e. mm. 17-21: (highest voice)		Inversion	20/10
f. mm. 21-23: (Interlude: Vln I + II, highest voice)		Inversion	21/7

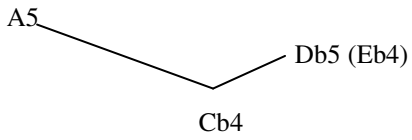
g. mm. 24-28:
(highest voice)



Retrograde Inversion 11/29

Prime 29/4

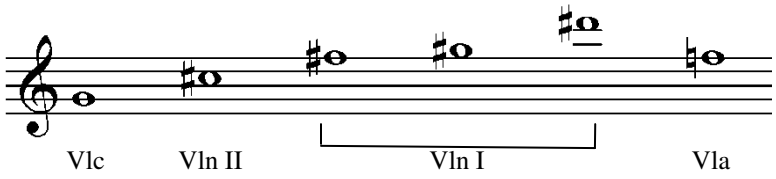
h. mm. 26-27:
(Inner voice:
Vln II + Vla)



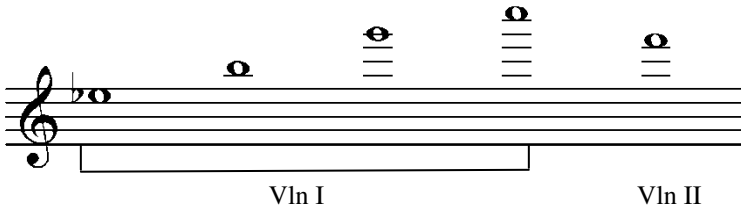
Prime 22/14 (4)

Example 4-8. Introduction: Contour pitches of topmost composite voice

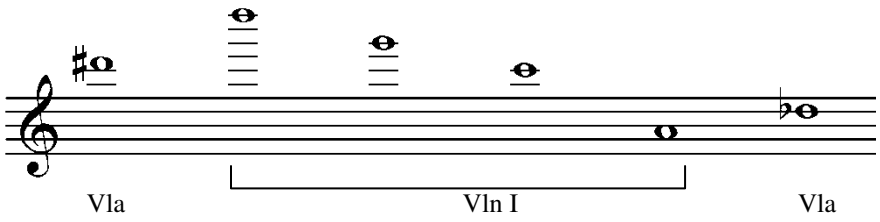
a. mm. 17-21 (segment 3b, contour e)



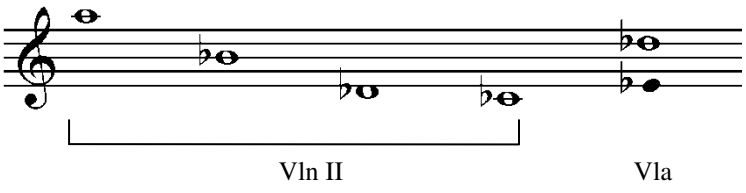
b. mm. 21-23 (segment 3c, contour f)



c. mm. 24-28 (segment 3d, contour g)



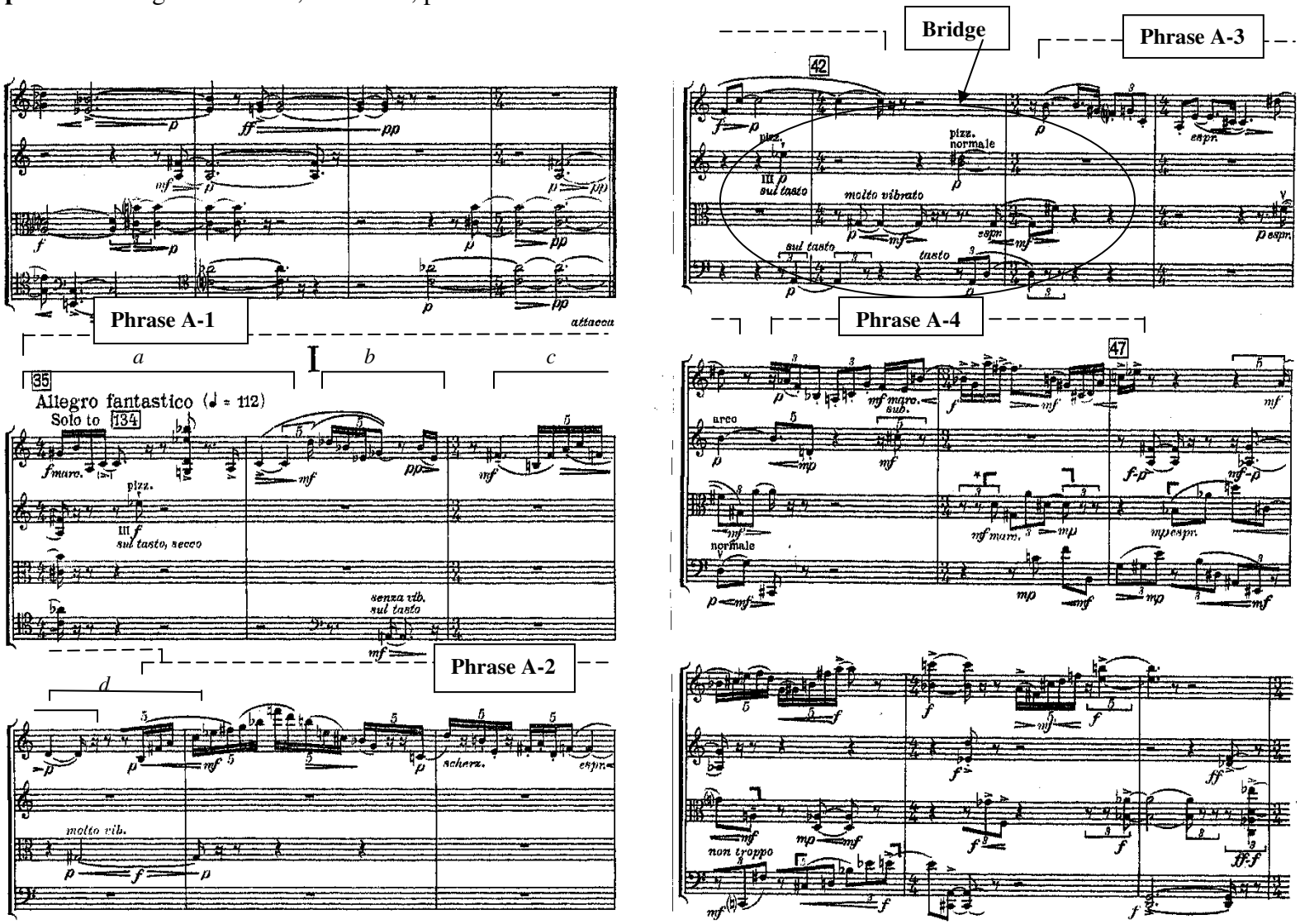
d. mm. 26-27 (phrase-ending regular pulse, contour h)



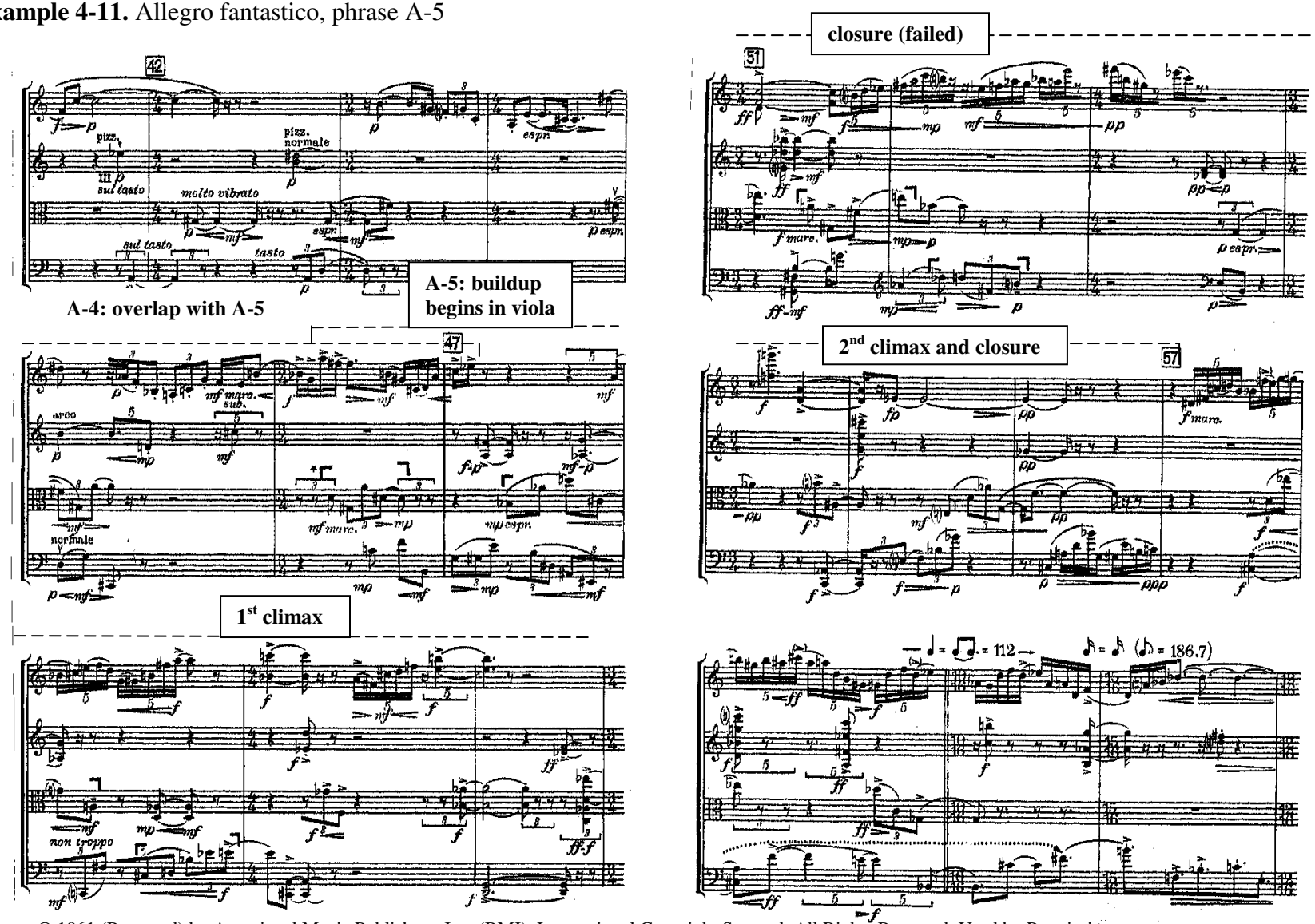
Example 4-9. Allegro fantastico, large-scale form (phrases are listed in a column below the section or subsection in which they occur)

	A		B				C					
			B-I		B-II		C-I		C-II		C-III	
mm.	35	56	57	72	73	86	87	100	100	109	110	134
phr:	A-1		B-1		B-4		C-1		C-4		C-5	
	A-2		B-2		B-5		C-2				C-7	
	A-3		B-3		B-6		C-3				C-9	
	A-4				B-7							
	A-5											

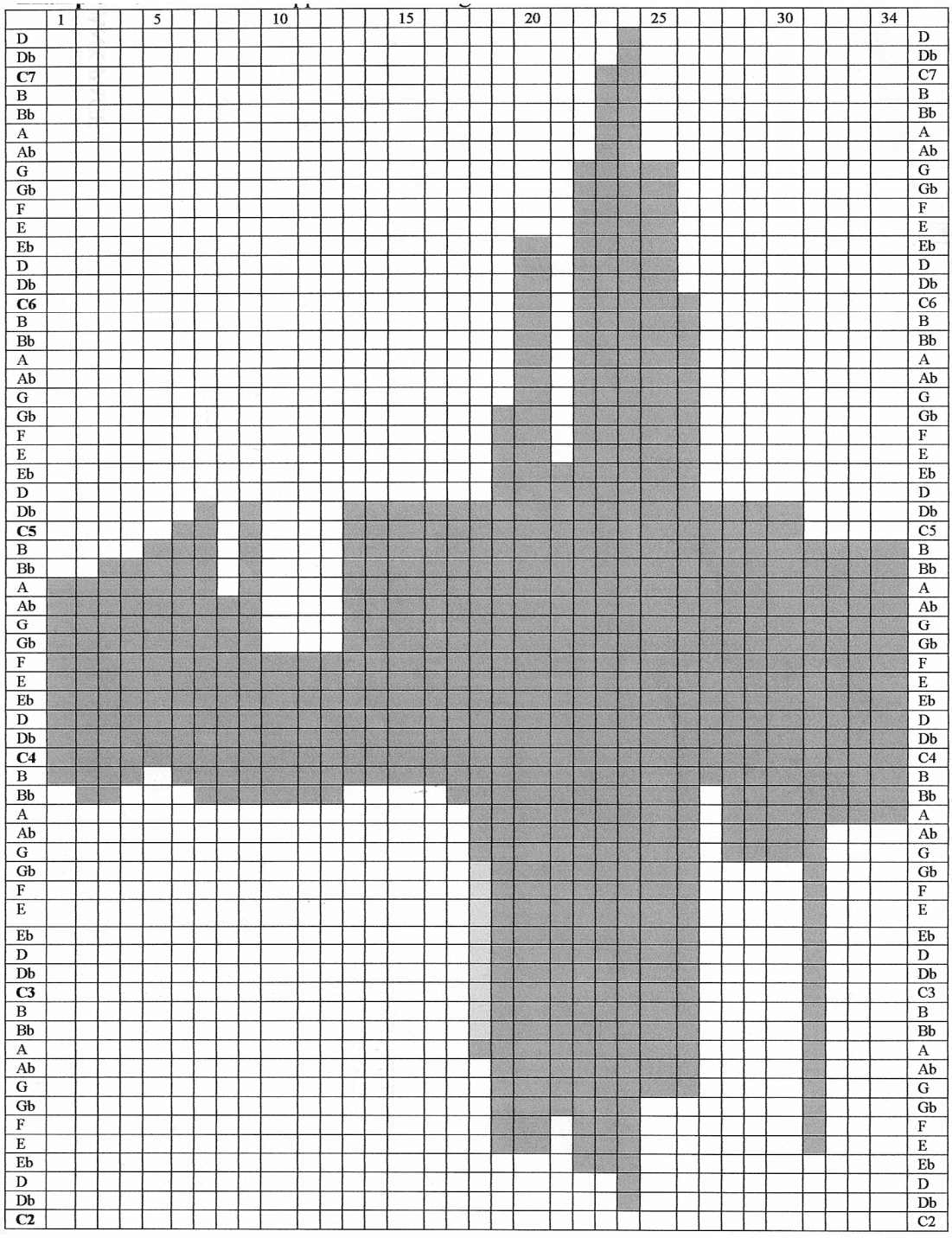
Example 4-10. Allegro fantastico, section A, phrases A-1 to A-4



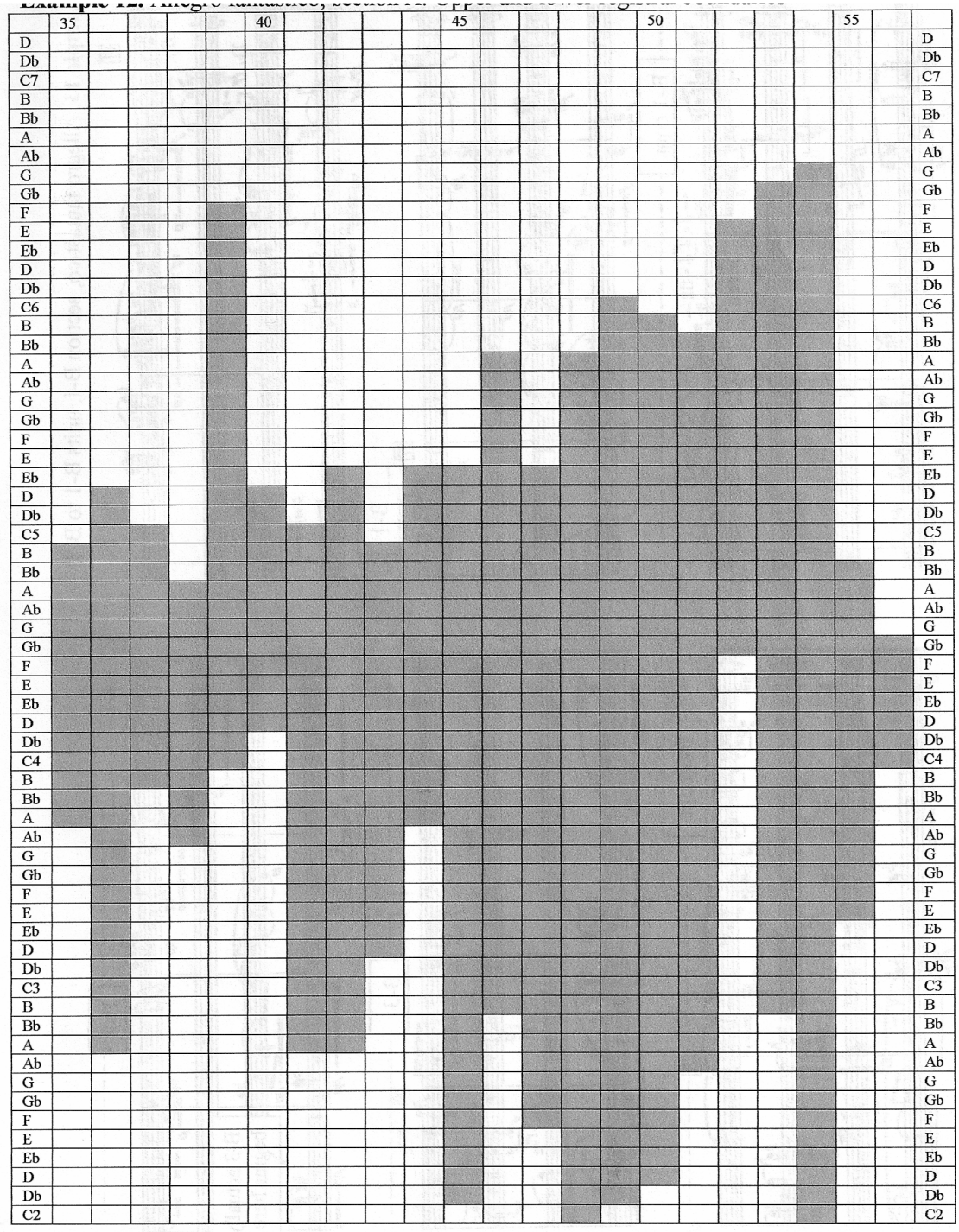
Example 4-11. Allegro fantastico, phrase A-5



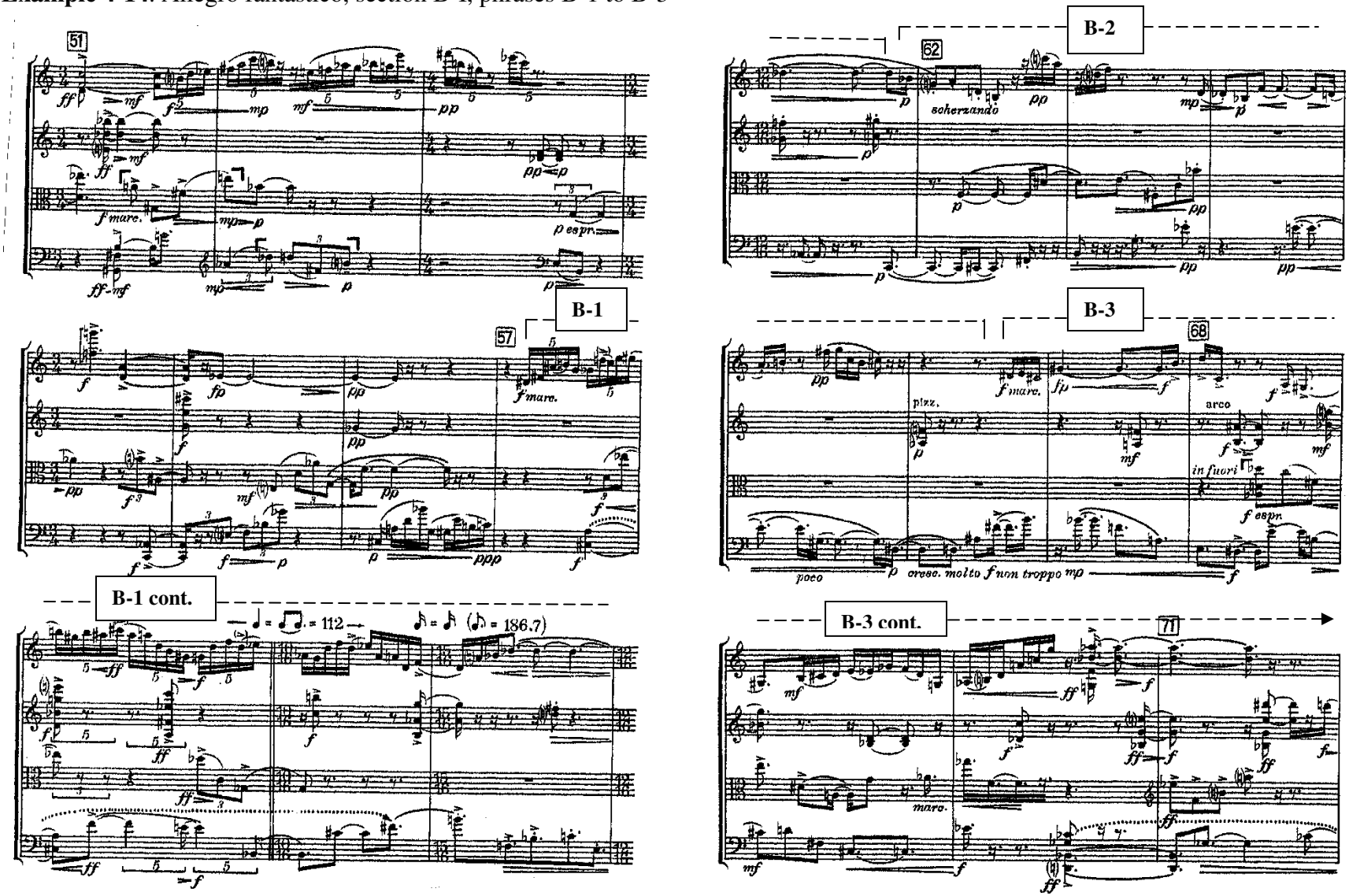
Example 4-12. Introduction: Upper and lower registral boundaries

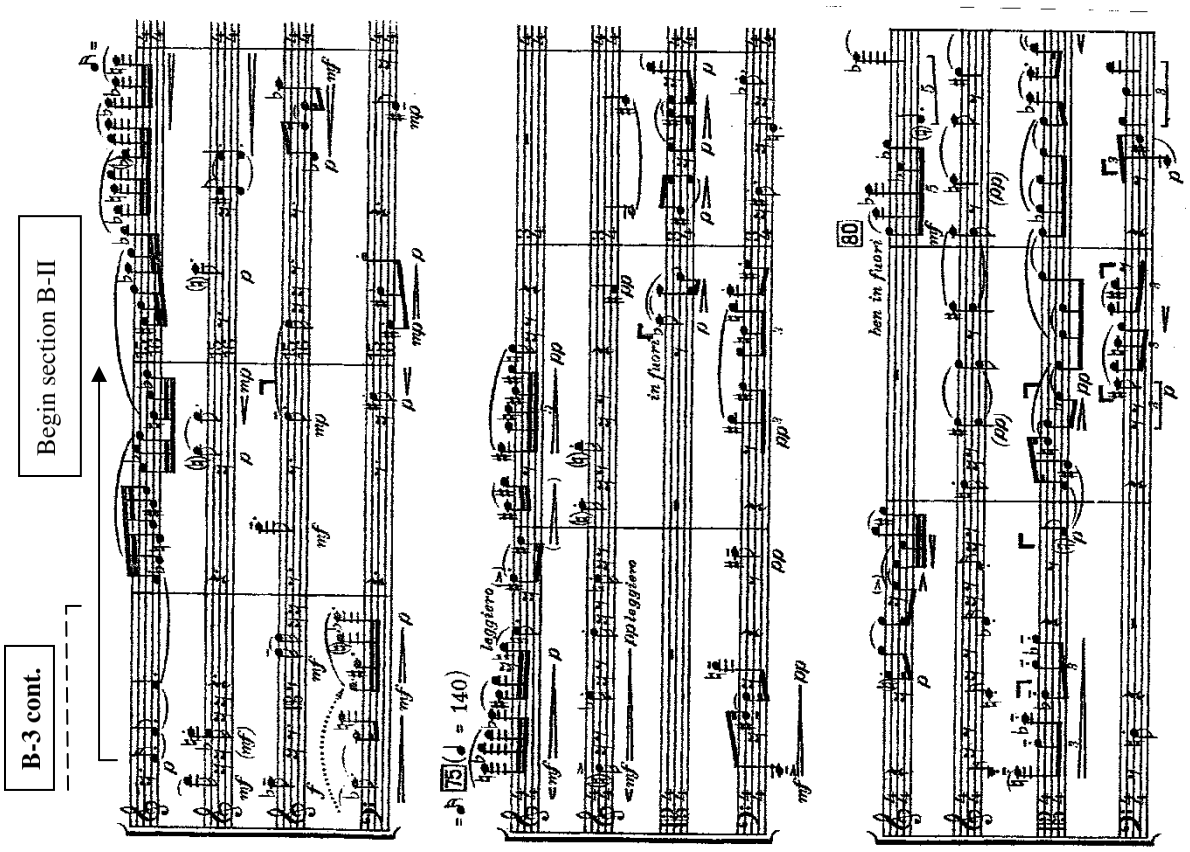


Example 4-13. Allegro fantastico, section A: Upper and lower registral boundaries



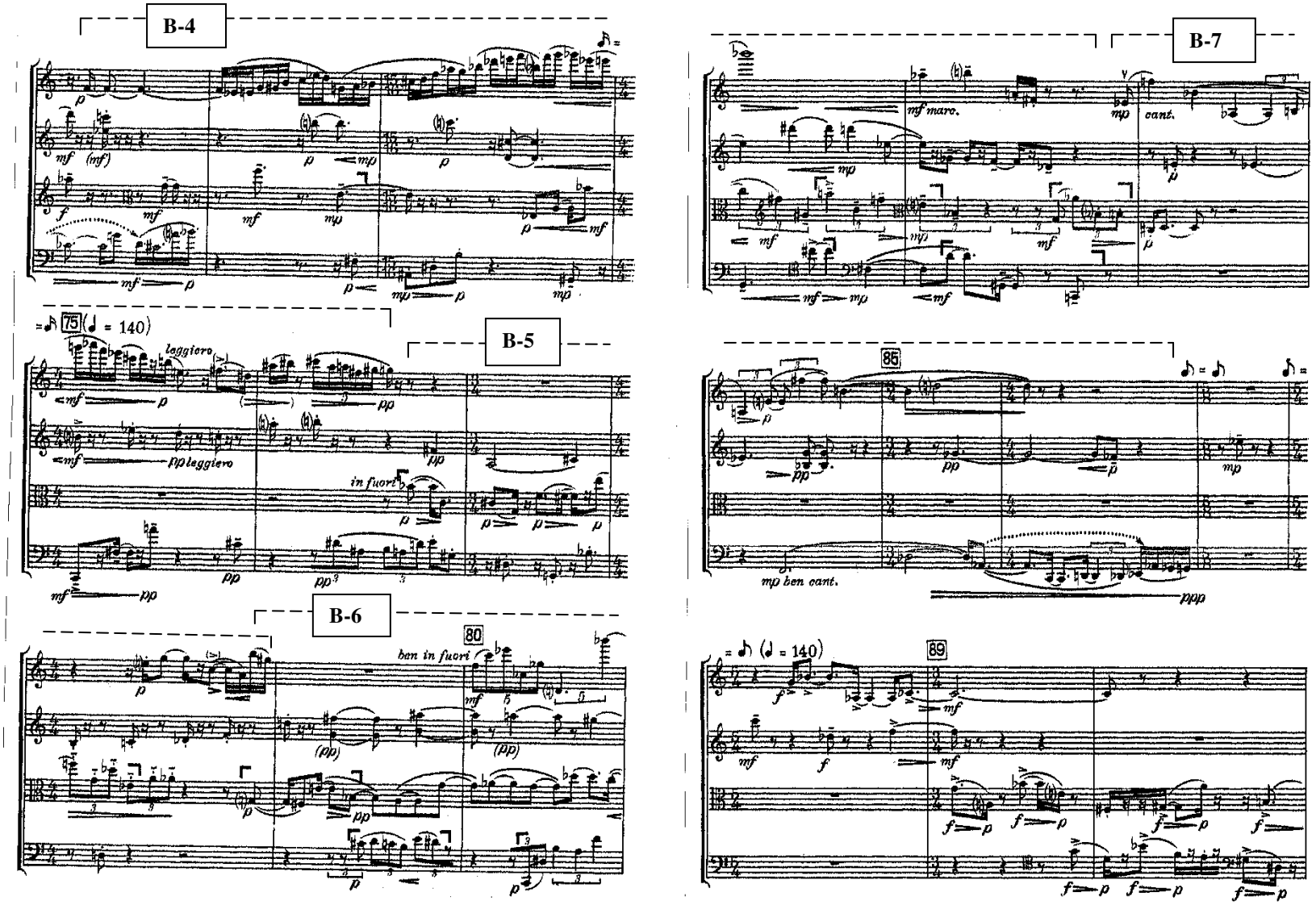
Example 4-14. Allegro fantastico, section B-I, phrases B-1 to B-3



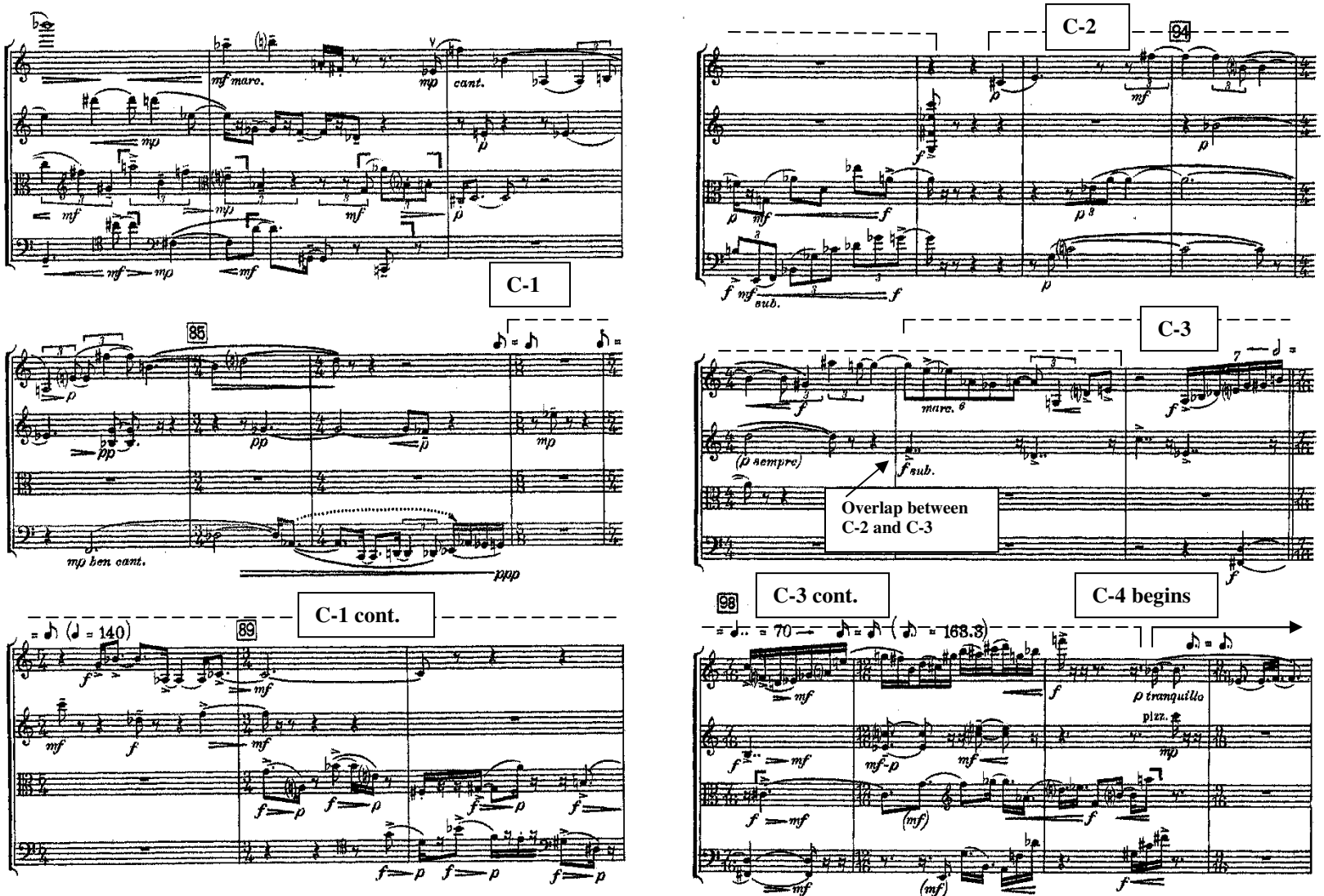


Example 4-14 cont.

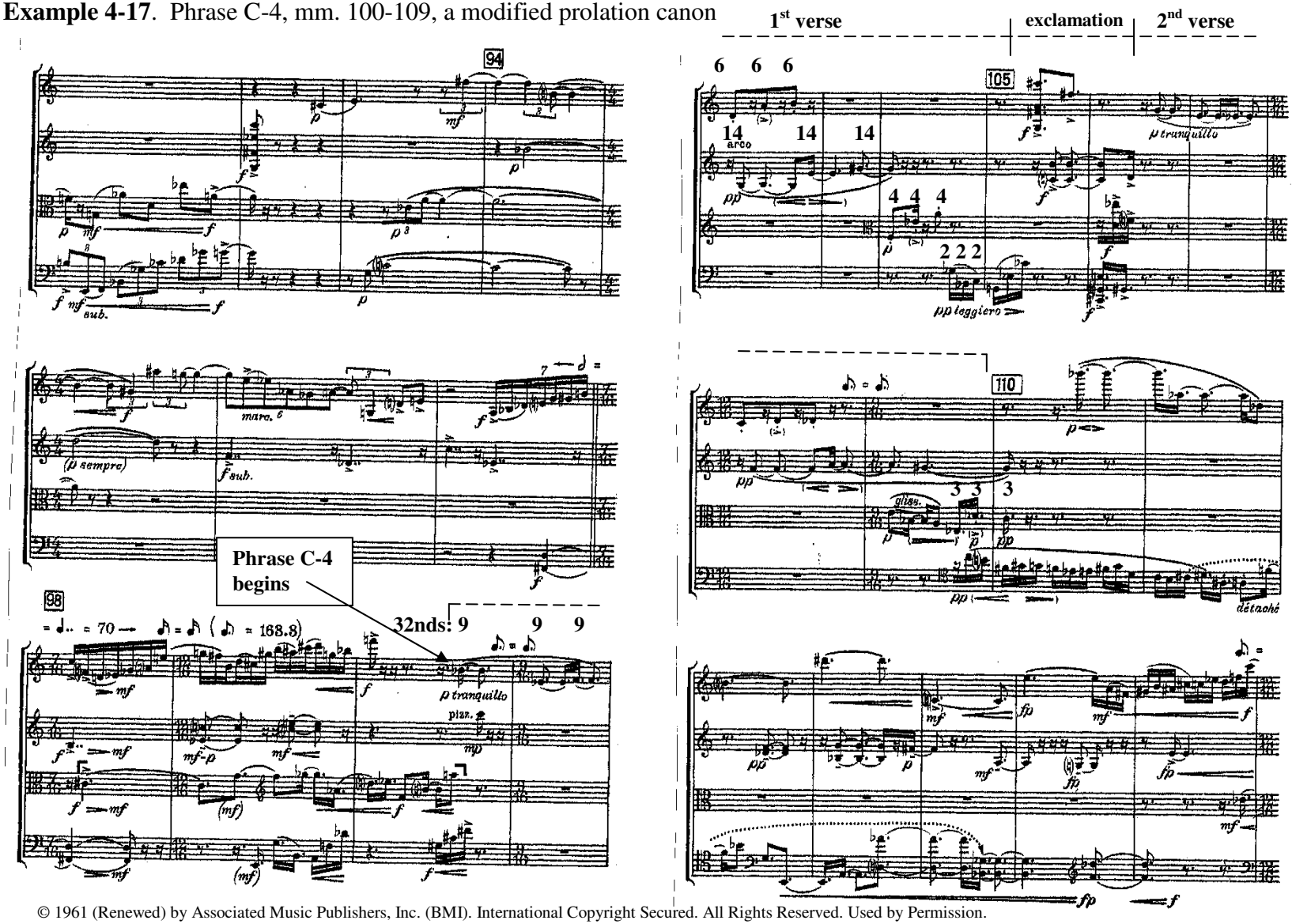
Example 4-15. Section B-II, phrases B-4 through B-7



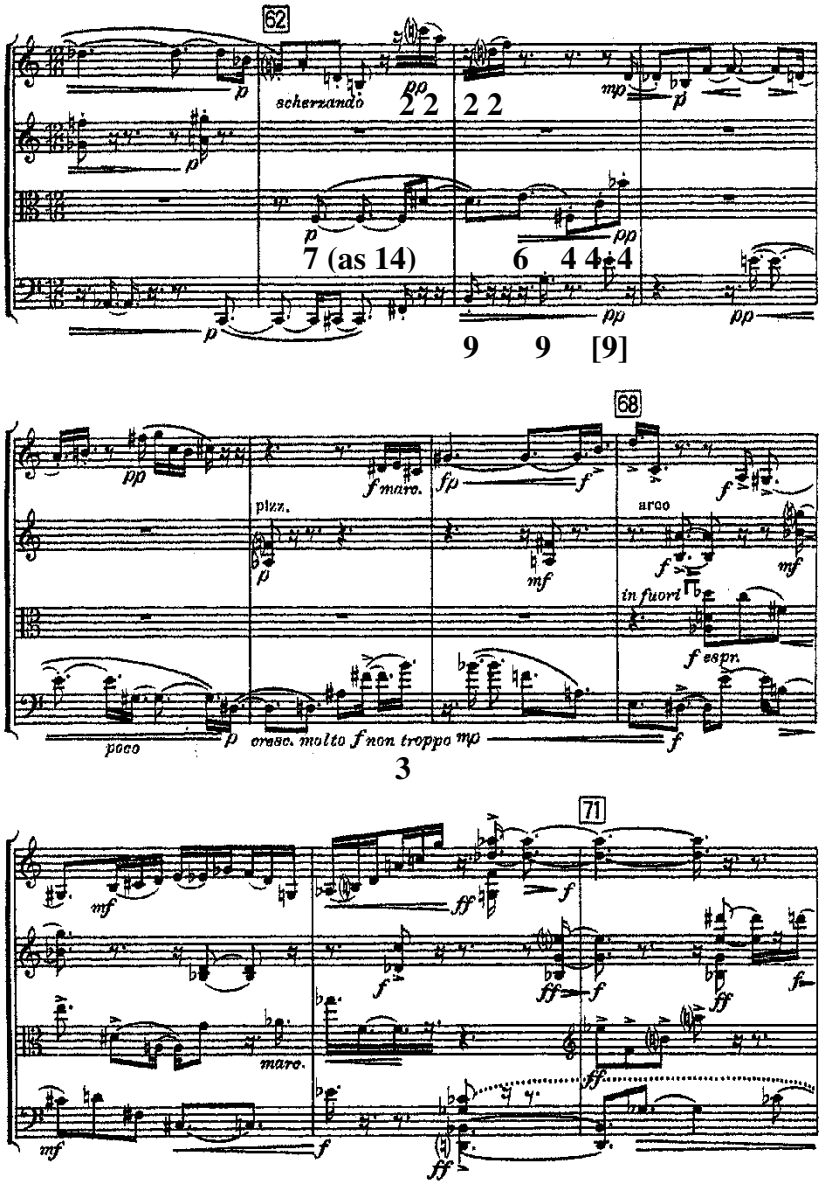
Example 4-16. Section C-I, phrases C-1, C-2, and C-3



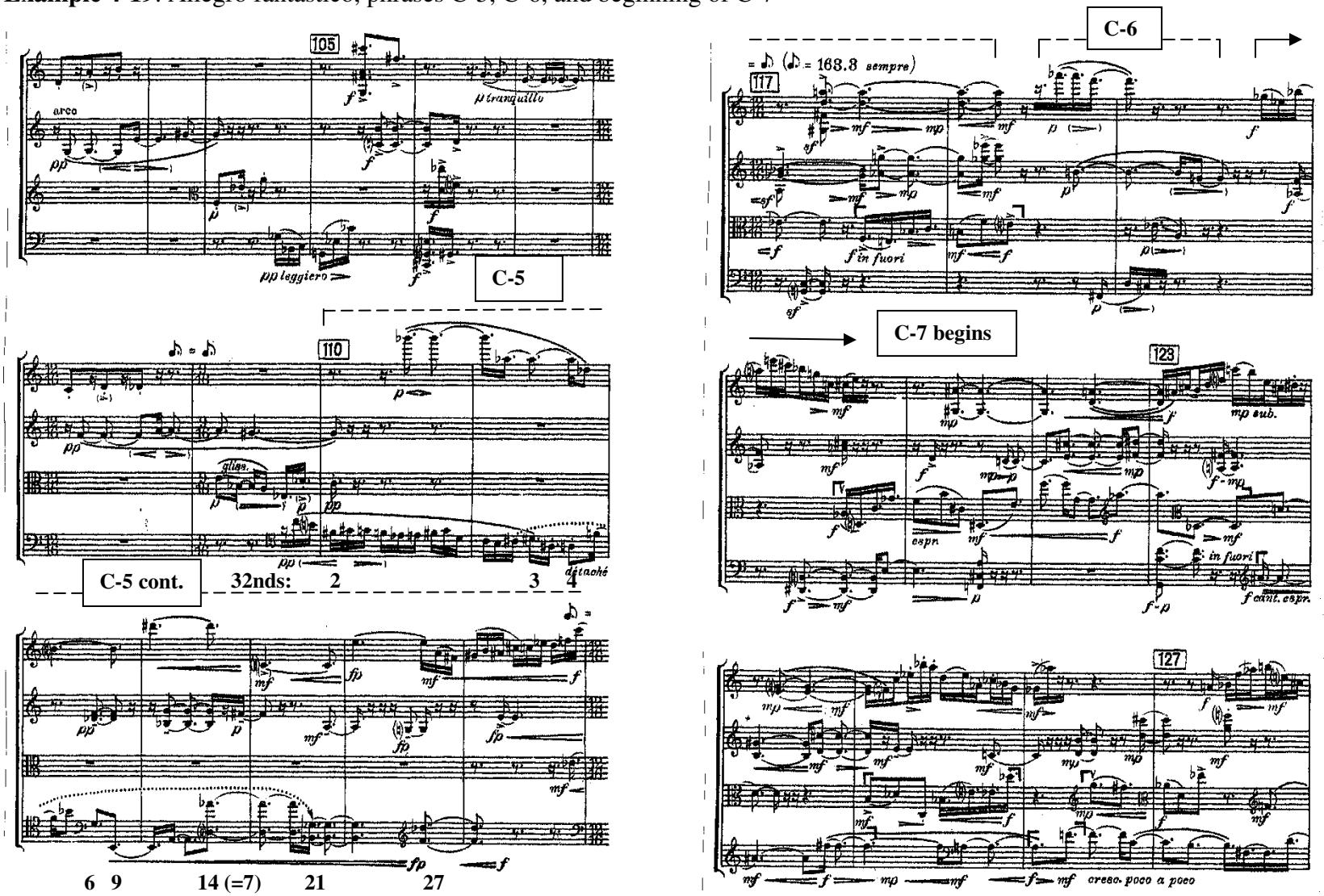
Example 4-17. Phrase C-4, mm. 100-109, a modified prolation canon



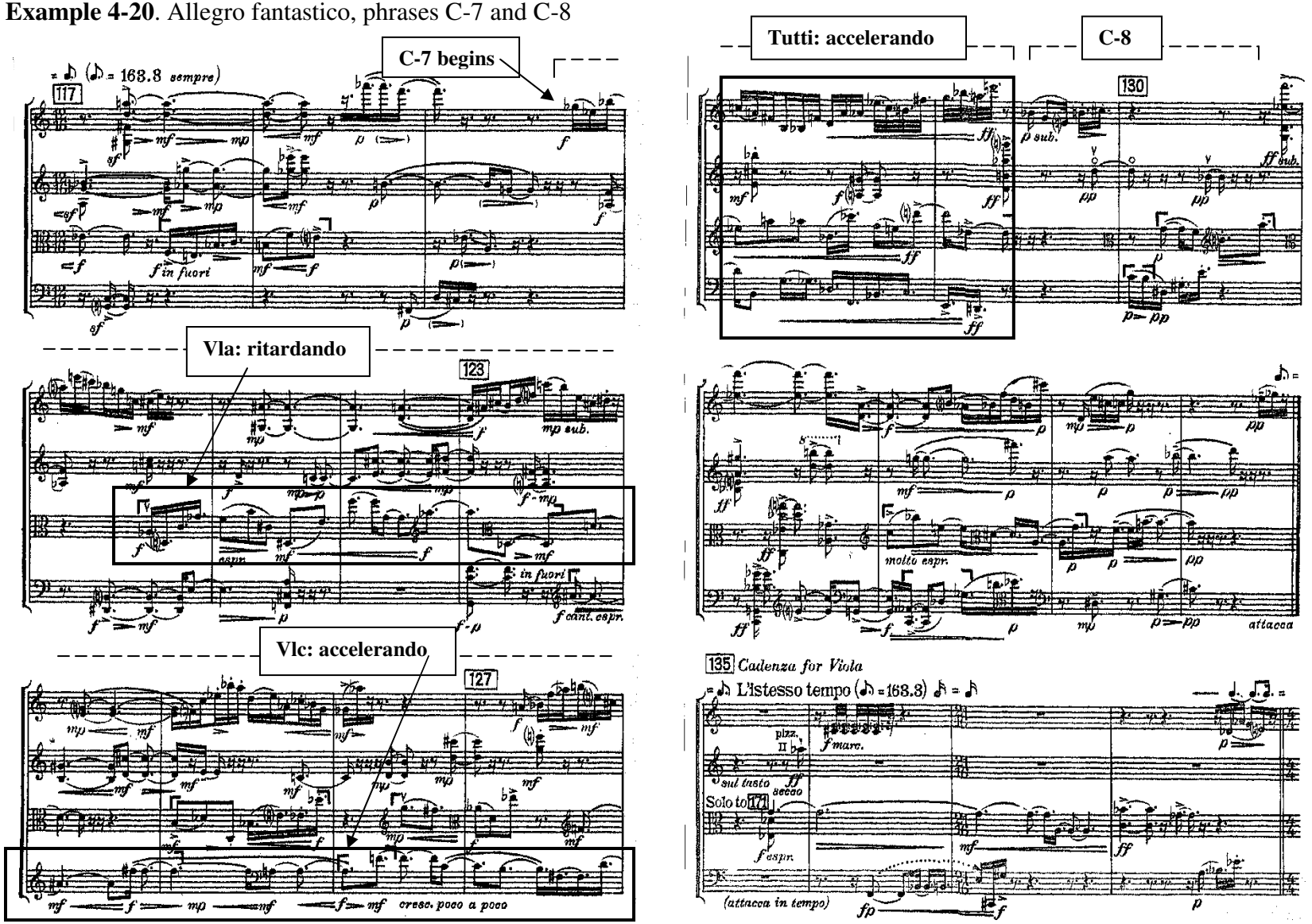
Example 4-18. Earlier source of canon note values (numerals below an instrumental part indicate duration in thirty-seconds)



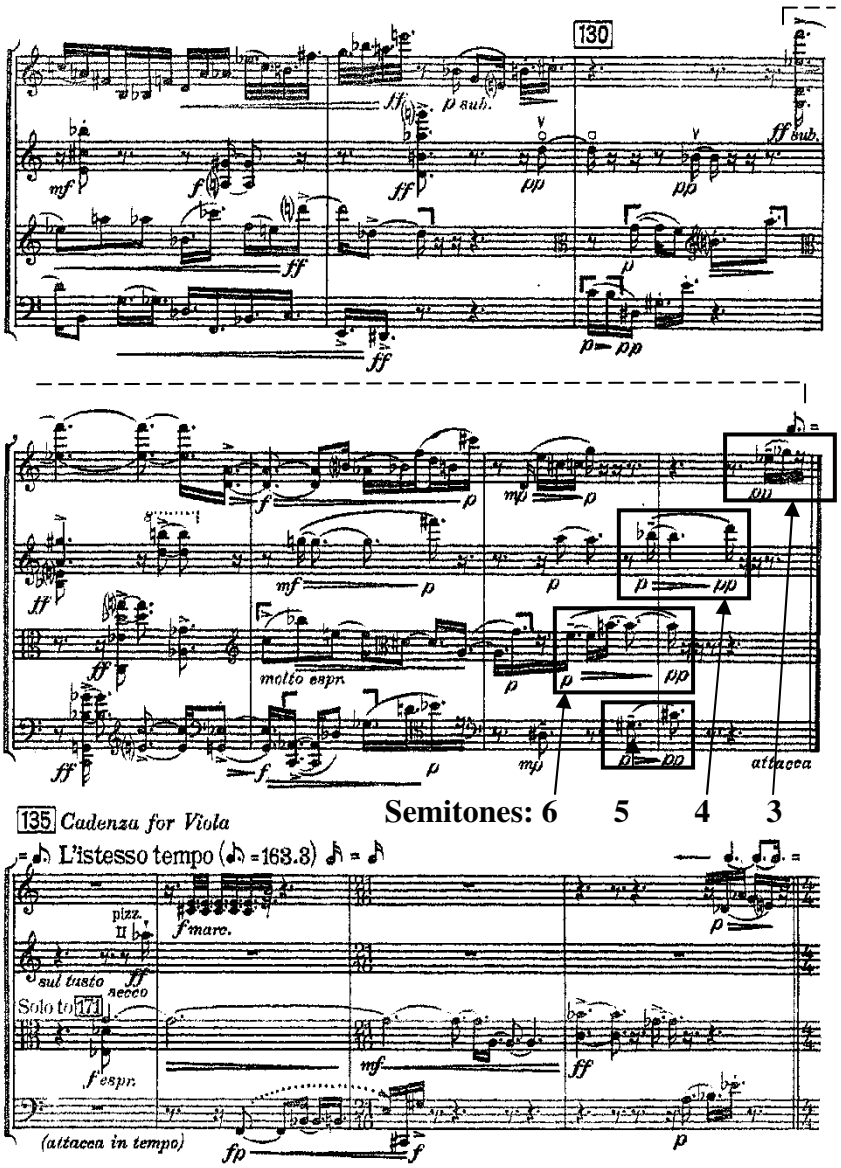
Example 4-19. Allegro fantastico, phrases C-5, C-6, and beginning of C-7



Example 4-20. Allegro fantastico, phrases C-7 and C-8



Example 4-21. Allegro fantastico, phrase C-9, with closing two-note gestures indicated



APPENDIX

Tabulation of Phrase Types

Small and large phrase types are listed below in accordance with the method of coherence used in each. Phrases are identified with the composer's name followed by the number assigned to that phrase in the text. The total number of phrases of each type is given in square brackets.

A. Small phrase types

1. Tension/release [T = 7]
    - Babbitt 6
    - Stockhausen 1
    - Stockhausen 2
    - Carter Intro 1
    - Carter Intro 2
    - Carter Intro 3
    - Carter A-5

2. Departure/return [T = 4]
    - Babbitt 1
    - Stockhausen 3
    - Stockhausen 5
    - Stockhausen 6

3. Symmetry [T = 5]
    - Babbitt 4
    - Babbitt 5
    - Stockhausen 4 (could be tension/release)
    - Carter Intro 4 (could be tension/release)
    - Carter B-4 (could be tension/release)

4. Directed parametric change [T = 11]
    - Babbitt 2
    - Babbitt 3
    - Carter A-4
    - Carter B-3
    - Carter B-7
    - Carter C-1
    - Carter C-4 (also similarity)
    - Carter C-5
    - Carter C-9
    - Stockhausen 7
    - Stockhausen 8

5. Similarity [T = 15]
    Stockhausen 9
    Stockhausen 10
    Stockhausen 11
    Stockhausen 12
    Carter A-1
    Carter A-2
    Carter A-3
    Carter B-1
    Carter B-2
    Carter B-5
    Carter B-6
    Carter C-2
    Carter C-3
    Carter C-4 (also directed parametric change)
    Carter C-7

B. Large phrase types

1. Parallel period
    Babbitt 2 and 3: parallel structure (registral expansion) and endings
    Babbitt 4 and 5: parallel structure (symmetry)
    Stockhausen 1 and 2: parallel structure (tension/release) and climaxes
    Carter A-1 and A-2: parallel structure (similarity) and endings

2. Directed parametric change
    Stockhausen Cycle I
    Stockhausen Cycle II
    Stockhausen Cycle III

3. Tension and release
    Carter Introduction
    Carter Allegro fantastico, section:
        A
        B-II
        C-III

4. Departure and return
    Carter Allegro fantastico, section:
        B-I
        C-I

BIBLIOGRAPHY

Addessi, Rita Anna, and Roberto Caterina. 2000. "Perceptual musical analysis: Segmentation and perception of tension." *Musicae Scientiae* 4/1: 31-54.

———. 2005. "Analysis and perception in post-tonal music: An example from Kurtág's String Quartet Op. 1." *Psychology of Music* 33/1: 94-116.

Arnold, Stephen, and Graham Hair. 1976. "An Introduction and a Study: String Quartet No. 3." *Perspectives of New Music* 14/2 – 15/1: 155-86.

Babbitt, Milton. 1976. "Responses: A First Approximation." *Perspectives of New Music* 14/2 – 15/1: 3-23. Repr., Milton Babbitt, *The Collected Essays of Milton Babbitt*, ed. Stephen Peles, with Stephen Dembski, Andrew Mead, and Joseph N. Straus, 341-66. Princeton and Oxford: Princeton University Press, 2003.

———. 1987. *Milton Babbitt: Words about Music*. Ed. Stephen Dembski and Joseph N. Straus. Madison, WI: University of Wisconsin Press.

Baroni, Mario. 2003. "The Macroform in Post-tonal Music: Listening and Analysis." *Musicae Scientiae* 7/2: 219-40.

Bernard, Jonathan W. 1988. "The Evolution of Elliott Carter's Rhythmic Practice." *Perspectives of New Music* 26/2: 164-203.

———. 1993. "Problems of Pitch Structure in Elliott Carter's First and Second String Quartets." *Journal of Music Theory* 37/2: 231-66.

Berry, Wallace. 1976. *Structural Functions in Music*. Englewood Cliffs, NJ: Prentice-Hall.

Borders, Barbara. 1979. "Formal aspects in selected instrumental works of Milton Babbitt." Ph.D. diss., University of Kansas.

Boulez, Pierre. 1948/1968. "Proposals." In *Notes of an Apprenticeship*, trans. Herbert Weinstock, ed. Paul Thévenin, 61-71. New York: Alfred A. Knopf.

———. 1951/1968. "Schoenberg is Dead." In *Notes of an Apprenticeship*, trans. Herbert Weinstock, ed. Paul Thévenin, 268-76. New York: Alfred A. Knopf.

———. 1971. *Boulez on Music Today*. Trans. Susan Bradshaw and Richard Rodney Bennett. Cambridge, MA: Harvard University Press.

Bryden, Kristy A. 2001. "Musical conclusions: Exploring closural processes in five late twentieth-century chamber works." Ph.D. diss., University of Wisconsin, Madison.

Bujic, Bojan. 1998. "Form and Forming: From Victorian Aesthetics to the Mid-20th-Century Avant-garde." In *Composition-Performance-Reception: Studies in the Creative Process*, ed. Wyndham Thomas, 118-31. Aldershot: Ashgate.

Carter, Elliott. 1997. *Elliott Carter: Collected Essays and Lectures, 1937-1995.* Ed. Jonathan W. Bernard. Rochester: University of Rochester Press.

———. 1998. *String Quartet No. 2*. 1998 ed. Milwaukee, WI: Associated Music Publishers. Score.

Clarke, Eric F., and Carol L. Krumhansl. 1990. "Perceiving Musical Time." *Music Perception* 7/3: 213-51.

Clifford, Robert. 2005. "Atonal Closure: Process, Completion, and Balance." *Tempo* 59 (234): 29-33.

Coenen, Alcedo. 1994. "Stockhausen's Paradigm: A Survey of His Theories." *Perspectives of New Music* 32/2: 200-25.

Cogan, Robert. 1984. *New Images of Musical Sound.* Cambridge, MA: Harvard University Press.

Cogan, Robert, and Pozzi Escot. 1976. *Sonic Design: The Nature of Sound and Music*. Englewood Cliffs, NJ: Prentice-Hall.

Cohen, Dalia, and Shlomo Dubnov. 1997. "Gestalt Phenomena in Musical Texture." In *Music, Gestalt, and Computing: Studies in Cognitive and Systematic Musicology*, ed. Marc Leman, 386-405. Berlin: Springer.

Cott, Jonathan. 1973. *Stockhausen: Conversations with the Composer*. London: Oxford University Press.

Cross, Anthony. 1975. "Form and Expression in Boulez' *Don*." *Music Review, UK* 36/3: 215-30.

Deliège, Irène. 1989. "A perceptual approach to contemporary musical forms." *Contemporary Music Review* 4: 213-30.

———. 2001. "Introduction: Similarity Perception – Categorization – Cue Abstraction." *Music Perception* 18/3: 233-43.

Deliège, Irène, and Abdessadek El Ahmadi. 1990. "Mechanisms of cue extraction in musical groupings: A study of perception on *Sequenza VI* for viola solo by L. Berio." *Psychology of Music* 18: 18-44.

DeLone, Richard. 1975. "Timbre and Texture in Twentieth-Century Music." In *Aspects of Twentieth-Century Music*, ed. Gary E. Wittlich, 66-207. Englewood Cliffs, NJ: Prentice-Hall.

Dibben, Nicola. 1999. "The Perception of Structural Stability in Atonal Music: The Influence of Salience, Stability, Horizontal Motion, Pitch Commonality, and Dissonance." *Music Perception* 16/3: 265-94.

Dubiel, Joseph. 1990. "Three Essays on Milton Babbitt." *Perspectives of New Music* 28/2: 216-61.

———. 1991. "Three Essays on Milton Babbitt (Part Two)." *Perspectives of New Music* 29/1: 90-122.

———. 1992. "Three Essays on Milton Babbitt (Part Three)." *Perspectives of New Music* 30/1: 82-131.

Duckworth, William. 1999. *Talking Music*. New York: Da Capo Press. (Orig. pub. New York: Schirmer Books, 1995.)

Edwards, Allen. 1971. *Flawed Words and Stubborn Sounds: A Conversation with Elliott Carter*. New York: W.W. Norton.

François, Jean-Charles. 1991. "Organization of Scattered Timbral Qualities: A Look at Edgard Varése's *Ionisation*." *Perspectives of New Music* 29/1: 48-79.

Friedmann, Michael L. 1985. "A Methodology for the Discussion of Contour: Its Application to Schoenberg's Music." *Journal of Music Theory* 29/2: 223-48.

———. 1987. "A Response: My Contour, Their Contour." *Journal of Music Theory* 31/2: 268-74.

Gass, Glenn. 1981. "Elliott Carter's Second String Quartet: Aspects of Time and Rhythm." *Indiana Theory Review* 4/3: 12-23.

Granat, Zbigniew. 2009. "Rediscovering 'Sonoristics': A Groundbreaking Theory from the Margins of Musicology." In *Music's Intellectual History*, ed. Zdravko Blažeković and Barbara Dobbs Mackenzie, 821-33. New York: Répertoire International de Littérature Musicale.

Griffiths, Paul. 1995. *Modern Music and After*. Oxford: Oxford University Press.

Grimm, Jim. 1972. "Formaspekte der 2. Klaviersonate von Boulez." *Schweitzerische Musikzeitung/Revue musicale Suisse* 112/4: 201-05.

Hanninen, Dora A. 1996. "A General Theory for Context-Sensitive Music Analysis: Applications to Four Works for Piano by Contemporary American Composers." Ph.D. diss., University of Rochester [NY].

———. 1997. "On Association, Realization, and Form in Richard Swift's *Things of August*." *Perspectives of New Music* 35/1: 61-114.

———. 2001. "Orientations, Criteria, Segments: A General Theory of Segmentation for Music Analysis." *Journal of Music Theory* 45/2: 345-433.

———. 2002. "Understanding Stefan Wolpe's Musical *Forms*." *Perspectives of New Music* 40/2: 8-66.

———. 2003. "A Theory of Recontextualization in Music: Analyzing Phenomenal Transformations of Repetition." *Music Theory Spectrum* 25/1: 59-97.

———. 2004a. "Associative Sets, Categories, and Music Analysis." *Journal of Music Theory* 48/2 (2004): 147-218.

———. 2004b. "Association and the Emergence of Form in Two Works by Stefan Wolpe." *The Open Space Magazine* 6: 174-203.

———. 2004c. "Feldman, Analysis, Experience." *Twentieth-Century Music* 1/2: 225-51.

———. 2006. "'What is about, is also of, also is': Words, Musical Organization, and Boretz's *Language ,as a Music*, 'Thesis.'" *Perspectives of New Music* 44/2: 14-64.

———. 2009. "Species Concepts in Biology and Perspectives on Association in Music Analysis." *Perspectives of New Music* 47/1: 5-68.

Harvey, David. 1989. *The Later Music of Elliott Carter*. New York and London: Garland Publishing.

Harvey, Jonathan. 1975. *The Music of Stockhausen*. London: Faber & Faber.

Hasty, Christopher F. 1978. "A Theory of Segmentation Developed from Late Works of Stefan Wolpe." Ph.D. diss., Yale University.

———. 1981a. "Rhythm in Post-Tonal Music: Preliminary Questions of Duration and Motion." *Journal of Music Theory* 25/2: 183-216.

———. 1981b. "Segmentation and Process in Post-Tonal Music." *Music Theory Spectrum* 3: 54-73.

———. 1984. "Phrase Formation in Post-Tonal Music." *Journal of Music Theory* 28/2: 167-90.

———. 1986. "On the Problem of Succession and Continuity in Twentieth-Century Music." *Music Theory Spectrum* 8: 58-74.

———. 1988. "Composition and Context in Twelve-Note Music of Anton Webern." *Music Analysis* 7/3: 281-312.

———. 1997. "Form and Idea in Schoenberg's *Phantasy*." In *Music Theory in Concept and Practice*, ed. David W. Beach, James M. Baker, and Jonathan W. Bernard, 459-79. Rochester, NY: University of Rochester Press.

Heikinheimo, Seppo. 1972. *The electronic music of Karlheinz Stockhausen: Studies on the esthetical and formal problems of its first phase*. Trans. Brad Absetz. Helsinki: Acta Musicologica Fennica.

Hoffman, Michael. 1999. "Carter's *String Quartet No. 2*: An Overview Analysis." *20th-Century Music* 6/1: 11-17.

Jarman, Douglas. 1969. "Problems of perception affecting formal design in non-tonal music." Ph.D. diss., University of Durham [UK].

Kapp, Reinhard. 1988. "Shades of the Double's Original: René Leibowitz's Dispute with Boulez." *Tempo* New Series 165: 2-16.

Kessner, Dolly E. 1992. "Structural coherence in late twentieth-century music: The linear-extrapolation paradigm applied to four American piano compositions of diverse musical styles (Martino, Rzewski, Crumb, and Adams)." Ph.D. diss., University of Southern California.

Kirchmeyer, Helmut. 1982-83. "Zur Entstehungs- und Problemgeschichte der *Kontakte* by Karlheinz Stockhausen." *Neuland* 3: 152-77. (Orig. pub. 1963 as liner notes to original recording of the electro-acoustic version, WERGO 60 009.)

Klein, Michael L. 1999. "Texture, Register, and Their Formal Roles in the Music of Witold Lutosławski." *Indiana Theory Review* 20/1: 37-70.

Kohl, Jerome. 2004. "'One Superordinate Principle': The Origins of Stockhausen's Serialism." Paper presented at the joint annual meeting of the American Musicological Society and the Society for Music Theory, November 11-14, Seattle, WA.

Koivisto, Tiina. 1996. "Aspects of Motion in Elliott Carter's Second String Quartet." *Intégral* 10: 19-52.

Kramer, Jonathan D. 1978. "Moment Form in Twentieth Century Music." *The Musical Quarterly* 64/2: 177-94.

———. 1981. "New Temporalities in Music." *Critical Inquiry* 7/3: 539-56.

———. 1988. *The Time of Music*. New York: Schirmer Books.

Kurtz, Michael. 1992. *Stockhausen: A Biography*. Trans. Richard Toop. London: Faber & Faber.

Kuusi, Tuire. 2007. "Subset-class relation, common pitches, and common interval structure guiding estimations of similarity." *Music Perception* 25/1: 1-11.

Lake, William E. 1990. "Listening for Large-Scale Form in the Music of Milton Babbitt." *Contemporary Music Forum* 2: Proceedings of the Bowling Green State University New Music & Art Festival: 11-19.

Lamont, Alexandra, and Nicola Dibben. 2001. "Motivic Structure and the Perception of Similarity." *Music Perception* 18/3: 245-74.

Lefkowitz, David S., and Kristin Taavola. 2000. "Segmentation in Music: Generalizing a Piece-Sensitive Approach." *Journal of Music Theory* 44/1: 171-229.

Lerdahl, Fred. 1989. "Atonal Prolongational Structure." *Contemporary Music Review* 4: 65-87.

Lerdahl, Fred, and Ray Jackendoff. 1983. *A Generative Theory of Tonal Music*. Cambridge, MA: MIT Press.

Lewin, David. 1986. "Music Theory, Phenomenology, and Modes of Perception." *Music Perception* 3/4: 327-92.

———. 1991. "Some Problems and Resources of Music Theory." *Journal of Music Theory Pedagogy* 5: 111-32.

———. 1995. "Generalized Interval Systems for Babbitt's Lists, and for Schoenberg's String Trio." *Music Theory Spectrum* 17/1: 81-118.

Ligeti, György. 1960. "Pierre Boulez." Trans. Leo Black. *Die Reihe* 4: 36-62. Bryn Mawr, PA: Theodore Presser.

———. 1965. "Metamorphoses of Musical Form." Trans. Cornelius Cardew. *Die Reihe* 7: 5-19. Bryn Mawr, PA: Theodore Presser.

Lilly, Stephen F. 2005. "Form as an Outgrowth of Timbre and Rhythm: Wesley Fuller's *Sherds of Five*." *Perspectives of New Music* 43/1: 142-70.

Lochhead, Judy. 1989. "The Metaphor of Musical Motion: Is There an Alternative?" *Theory and Practice* 14-15: 83-104.

Maconie, Robin. 1976. *The Works of Karlheinz Stockhausen*. London: Marion Boyars.

Marvin, Elizabeth West. 1991. "The Perception of Rhythm in Non-Tonal Music: Rhythmic Contours in the Music of Edgard Varèse." *Music Theory Spectrum* 13: 61-78.

———. 1995. "A Generalization of Contour Theory to Diverse Musical Spaces: Analytical Applications to the Music of Dallapiccola and Stockhausen." In *Concert Music, Rock, and Jazz since 1945*, ed. Elizabeth West Marvin and Richard Hermann, 135-71. Rochester, NY: University of Rochester Press.

Marvin, Elizabeth West and Paul A. Laprade. 1987. "Relating Musical Contours: Extensions of a Theory for Contour." *Journal of Music Theory* 31/2: 225-67.

McAdams, Stephen, and Daniel Matzkin. 2003. "The roots of musical variation in perceptual similarity and invariance." In *The Cognitive Neuroscience of Music*, ed. Robert J. Zatorre and Isabelle Peretz, 79-94. Oxford: Oxford University Press.

McAdams, Stephen, and Sandrine Viellard, Olivier Houix, and Roger Reynolds. 2004. "Perception of Musical Similarity among Contemporary Thematic Materials in Two Instrumentations." *Music Perception* 22/2: 207-37.

Mead, Andrew. 1987. "'Tonal' Forms in Arnold Schoenberg's Twelve-Tone Music." *Music Theory Spectrum* 9: 67-92.

———. 1994a. *An Introduction to the Music of Milton Babbitt*. Princeton, NJ: Princeton University Press.

———. 1994b. "The Role of Octave Equivalence in Elliott Carter's Recent Music." *Sonus* 14/2: 13-37.

———. 1995. "Twelve-Tone Composition and the Music of Elliott Carter." In *Concert Music, Rock, and Jazz since 1945*, ed. Elizabeth West Marvin and Richard Hermann, 67-102. Rochester, NY: University of Rochester Press.

Morgan, Robert P. 1975. "Stockhausen's Writings on Music." *The Musical Quarterly* 61/1: 1-16.

Morris, Robert. 1987. *Composition with Pitch-Classes: A Theory of Compositional Design*. New Haven: Yale University Press.

———. 1993. "New Directions in the Theory and Analysis of Musical Contour." *Music Theory Spectrum* 15/2: 205-28.

———. 1995. "Equivalence and Similarity in Pitch and Their Interaction with Pcset Theory." *Journal of Music Theory* 39/2: 207-43.

Poudrier, Ève. 2009. "Local Polymetric Structures in Elliott Carter's *90+* for Piano, 1994." In *The Modernist Legacy: Essays on New Music*, ed. Björn Heile, 205-34. Farnham, UK: Ashgate.

Perle, George. 1991. *Serial Composition and Atonality*. 6th ed., rev. Berkeley, Los Angeles, Oxford: University of California Press.

Roeder, John. 1995. "A Calculus of Accent." *Journal of Music Theory* 39/1: 1-46.

Sabbe, Herman. 1994. "Goeyvaerts and the Beginnings of 'Punctual' Serialism and Electronic Music." *Revue belge de Musicologie / Belgisch Tijdschrift voor Muziekwetenschap* 48: 55-94.

Schiff, David. 1998. *The Music of Elliott Carter*. 2nd ed. Ithaca, NY: Cornell University Press.

Schmalfeldt, Janet. 1992. "Cadential Processes: The Evaded Cadence and the 'One More Time' Technique." *Journal of Musicological Research* 12/1-2: 1-52.

Schnebel, Dieter. 1960. "Karlheinz Stockhausen." Trans. Leo Black. *Die Reihe* 4: 122-34. Bryn Mawr, PA: Theodore Presser.

Stockhausen, Karlheinz. 1959a. "…how time passes…" Trans. Cornelius Cardew. *Die Reihe* 3: 10-40. Bryn Mawr, PA: Theodore Presser.

———. 1959b. "Structure and Experiential Time." Trans. Leo Black. *Die Reihe* 2: 64-74. Bryn Mawr, PA: Theodore Presser.

———. 1961. "Two Lectures: I. Electronic and Instrumental Music." Trans. Ruth Koenig. *Die Reihe* 5: 56-67. Bryn Mawr, PA: Theodore Presser.

———. 1963a. *Texte zur elektronischen und instrumentalen Musik*, vol. I. Köln: M.D. Schauberg.

———. 1963b. *Texte zu eigenen Werken zur Kunst Anderer Aktuelles*, vol. II. Köln: M.D. Schauberg.

———. 1973. *Nr. 1: Kontra-Punkte für zehn Instrumente*. Philharmonia No. 396. Vienna and London: Universal Edition. Score. (Orig. pub. 1953.)

Straus, Joseph N. 1986. "Listening to Babbitt." *Perspectives of New Music* 24/2: 10-24.

———. 1987a. "The Problem of Coherence in Stravinsky's *Sérénade en la*." *Theory and Practice* 12: 3-10.

———. 1987b. "The Problem of Prolongation in Post-Tonal Music." *Journal of Music Theory* 31/1: 1-21.

———. 1999. "A Strategy of Large-Scale Organization in Stravinsky's Late Music." *Intégral* 11: 1-36.

———. 2008. "A Revisionist History of Twelve-Tone Serialism in American Music." *Journal of the Society for American Music* 2/3: 355-95.

———. 2009. *Twelve-Tone Music in America*. Cambridge, UK, and New York: Cambridge University Press.

Swift, Richard. 1976. "Some Aspects of Aggregate Composition." *Perspectives of New Music* 14/2 – 15/1: 236-48.

Tenney, James. 1964/1988. *Meta + Hodos and META Meta + Hodos: A Phenomenology of 20th-Century Materials and an Approach to the Study of Form*. 2nd ed. Oakland, CA: Frog Peak Music.

Tenney, James, and Larry Polansky. 1980. "Temporal Gestalt Perception in Music." *Journal of Music Theory* 24/2: 205-41.

Ungar, Deborah. 2006. "Perception of Time and Reflection in Music: Alfred North Whitehead and Elliott Carter's String Quartet No. 2." In *Principles of Music Composing: Creative Process*, ed. Rimantas Janeliauskas, 74-84. Vilnius, Lithuania: Lietuvos Muzikos ir Teatro Akademija.

Uno, Yayoi, and Roland Hübscher. 1995. "Temporal-gestalt Segmentation: Polyphonic Extensions and Applications to Works by Boulez, Cage, Xenakis, Ligeti, and Babbitt." *Computers in Music Research* 5: 1-37.

Wennerstrom, Mary H. 1967. "Parametric Analysis of Contemporary Musical Form." Ph.D. diss., Indiana University.

———. 1975. "Form in Twentieth-Century Music." In *Aspects of Twentieth-Century Music*, ed. Gary E. Wittlich, 1-65. Englewood Cliffs, NJ: Prentice-Hall.

Westergaard, Peter. 1965. "Some Problems Raised by the Rhythmic Procedures in Milton Babbitt's *Composition for Twelve Instruments*." *Perspectives of New Music* 4/1: 109-118.

Whittall, Arnold. 2003. *Exploring Twentieth-Century Music: Tradition and Innovation*. Cambridge: Cambridge University Press.

Wolff, Christian. 1965. "On Form." *Die Reihe* 7: 26-31. Bryn Mawr, PA: Theodore Presser.

Wörner, Karl H. 1973. *Stockhausen: Life and Work*. Berkeley and Los Angeles: University of California Press.

Wuorinen, Charles. 1979. *Simple Composition*. New York: C.F. Peters.

Zuckerman, Mark. 1976. "On Milton Babbitt's String Quartet No. 2." *Perspectives of New Music* 14/2 – 15/1: 85-110.

SELECTED DISCOGRAPHY

Babbitt, Milton. *Composition for Four Instruments*. With John Wummer, flute; Stanley Drucker, clarinet; Peter Marsh, violin; Donald McCall, cello. Composers Recordings, 1960. CRI 138, LP.

Babbitt, Milton. *Composition for Four Instruments*. New England Conservatory, conducted by John Heiss. Boston, MA, and Huntington, NY: New England Conservatory, 1970. Distributed by Golden Crest Records. Series: Contemporary American Music, vol. 9. NEC 109, LP.

Carter, Elliott. *Time & Again: String Quartets 1-4; Elegy*. Arditti String Quartet. Coda BVBA, 2005. ET'CETERA KTC 2507 (2 CDs). Although there are many recordings of Carter's String Quartet No. 2, this is the one primarily consulted in this study.

Stockhausen, Karlheinz. *Kontra-Punkte*. London Sinfonietta, conducted by K. Stockhausen. Recorded 1973. Deutsche Grammophon, 1974, LP. Reissued, Complete Edition, Works: 4, Kürten, Germany: Stockhausen, 1992, CD.