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A LISTENER-SENSITIVE ANALYTIC APPROACH TO ELLIOTT CARTER'S LATE CHAMBER MUSIC, 1990–2012

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For my wife Angela, parents Russ and Linda, and sister Susanna,

for helping me think big, and imagine even bigger

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Abstract

This dissertation develops a listener-sensitive analytic approach to Elliott Carter's recent music. Carter's increased output of chamber music since 1990 coincides with a reduced harmonic vocabulary. Rather than beginning with theoretical considerations of musical parameters, I take a cue from the composer himself and develop an analytical method based on perspicuous aural events. In this dissertation, I identify common aural phenomena in Carter's late chamber works and create an approach to mediate between an experiential perspective of his music and score-extracted analyses. Chapter 1, "Listening to Carter," presents a hypothetical listener's experience of Carter's music. Chapter 2, "Aural Cues and Textures," looks specifically at salient events in Carter's music. Chapter 3, "Form and Melody: Aural Boundaries, Ambiguities, Shifts, and Constancy," examines formal relationships that emerge from the phenomena defined in Chapter 2. A synthesis of the concepts in Chapters 2 and 3 with current analytical tools is the goal of Chapter 4. A final Chapter 5 is an analytic essay on one specific piece, Carter's Clarinet Quintet (2007), which demonstrates application of the method established in Chapters 2–4.

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Chapter 1
Listening to Carter

> "I do feel that analysis which starts by assuming the artistic value of a work, and then analyzes it, seldom tells you what it is that makes the work so interesting to hear. All it does is tell you that the chords are this way and that, and that they're inversions of different sorts and so forth, and I keep feeling that I would rather read theoretical articles that explain why it is that the work, when heard, captures our attention, and what is so valuable about it musically, and then show what it is that contributes to this experience."
>
> - Elliott Carter[1]

1 Bernard and Carter 1990, 205.

1.1 Listening to Elliott Carter

An approach to Elliott Carter's music could do far worse than to take a suggestion from the composer himself as a starting point. Many of the theoretical and analytical accounts of Carter's music up until 1990 reveal valuable aspects about his music and his compositional process. Yet the quote from Carter above should give us pause. He expresses his desire to read articles that focus more on explaining what makes a "work so interesting to hear," and on "our experience" of a piece. For Carter, the entryway into analysis is a moment that aurally "captures out attention," rather than a formal relationship that may only be revealed after detailed study of the score. Carter admits that he does not have any ideas for a better kind of musical analysis, but theorists should never be fully content with the status quo of analytical methods, especially with music as recent as Carter's.[1] This dissertation develops a listener-sensitive analytic approach to post-tonal music by examining musical elements based on a listener's experience of Carter's recent music.[2]

Fortunately there has recently been interest in precisely some of Carter's suggestions. Scholars recognize the multifaceted nature of musical experience and continue to offer possibilities for an experiential investigation of not only Carter's music, but other music contemporary with Carter's. Catherine Hirata recalls her frustrations in trying to talk about her experience of Morton Feldman's music, pointing out that the line between how we perceive something and how we talk about that perception is often

1 During his interview with Jonathan Bernard, Carter (1990) was responding to a question regarding studies of his compositional sketches. Thus, the act of composing is in Carter's thoughts at this moment, but he prefaces his reaction to sketch studies by expressing a general frustration at the state of music analysis at the time.

2 Throughout the remainder of this dissertation, "a listener's experience" will be used synecdochically to refer to the broad spectrum of aural experiences that may occur when listening to music. When appropriate, a more specific kind of an aural experience is defined and used.

unclear. She notes that "It's fun to go behind the scenes, fun to uncover the inner workings of the music. But I also worry about it a little. I worry that everything behind the scenes might gradually shift in front of the scenes, that everything in the position of providing some explanation for the objects of our perception, will actually become the objects of our perception. That's a concern which others have voiced" (1996, 16). In other words, an analysis may begin to lose sight of what it is trying to explain. The explanation of one's experience overshadows the actual experience.

In an attempt to comprehend an experience of Carter's music, an analyst must therefore be willing to change an analytic approach if it will accommodate a different perceptual viewpoint. One person will certainly experience a piece differently than another person, or will experience it differently under varying circumstances. Thus any standardized theory of *how* one might hear something should be flexible enough to allow for these different circumstances. David Lewin also encourages the possibility of evolving perception-based analyses: "We should certainly be willing to alter our theoretical discourse…whenever a certain mass of perceptual experience leads us to believe that the alterations might enable us to articulate valuable analytic insights."[3] An analysis could propose a preference for listening, and a certain "hearing" could prescribe how we analyze a piece.[4]

Two experiential viewpoints suggest two temporal possibilities in our interaction with a piece of music. An outward reflection or analysis of a piece would occur outside of the time of the actual music playing, whereas a listener's reaction to something *as he or*

3 Lewin 2006, 91. Lewin goes on to caution us about making fundamental changes to any theoretical discourse. The main concern here is to take into account any perceptions we may have of the music, and how we should be willing to alter our method of analysis if such alterations provide new insights.

4 David Temperley offers a distinction between *suggestive* and *descriptive* music theory. See Temperley 1999.

she hears it can influence their analytic considerations. John Rahn (Rahn and Boretz 2000) offers a binary opposition of temporality called "in-time/time-out" to refer to two possible ways of considering music—either within any given moment, or as a removed reflection of the music. Both perspectives are valuable, offering opposing viewpoints to create a more comprehensive image, and both are crucial to this dissertation. Throughout, however, primacy is given to the listener's "in-time" experience.

Evan Jones reflects on relationships between moment-to-moment experiences of music and potential underlying structures of the music, noting that "[a] growing body of scholarship…considers the musical end-product from an experiential perspective instead of from a compositional or precompositional perspective" (2009, 138). Jones refers specifically to scholarship on Iannis Xenakis, but the same sentiment could apply to Elliott Carter's music. Many scholars are interested in Carter's compositional process, especially on a level of close analytical detail (Link 1994; Mead 1994, 1995; Capuzzo 2004; Roeder 2009, 2012; Mailman 2009), but there is also an increased interest in *experiencing* Carter's music (Bernard 1995; Ravenscroft 2003; Poudrier 2009, 2013; Roeder 2012), and how this experience might influence one's interpretation. Jones goes on to say that "the legitimacy of an interpretation…may not coincide with the process by which the piece came about. The 'special "logic"' of which Xenakis wrote may have nothing to with the music's formulaic origin; it may arise instead from connections and comparisons between successive and/or simultaneous musical units, defined perceptually rather than in terms of compositional structure."[5] Similarly with Carter's

5 Jones 2009, 140. In his essay, Jones analyzes Xenakis's string quartets, showing that there are potential differences between perceptual and compositional music form. Unfortunately he doesn't fully define what he means by "experience" or "perception." Joseph Dubiel offers an extensive

music, it is entirely possible that many analytic strategies do not satisfactorily account for a listener's experience.

David Lewin (2007b) offers two hypothetical questions to try and mediate the tempestuous relationship between a "listening-first" and "analysis-first" approach of musical experience. The first question, "*do* you hear it?" proposes that a listener can, upon a first hearing of something, immediately infer a particular grouping of music elements and structures that might be formed from these elements. "*Can* you hear it?" however, suggests that it is possible to focus our ears on certain acoustical signals and engage with certain signifiers in an analysis.[6] This can happen only *after* a consideration of any number of musical-analytical methods.

Although I am interested in all of these sets of binaries mentioned above—listening/analysis first; in-time/time-out; perception of music/perception of analysis—the focus of this dissertation is on the immediately salient, the sonically phenomenal, and the aurally characteristic passages in Carter's music. Only once a framework for understanding these events is in place will we further incorporate preexisting analytical tools that are grounded in compositional and precompositional design. Ultimately, this dissertation develops a method to mediate between the aurally apparent and analytically abstract by first creating a typology of sonic events, and then showing how these events

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exploration of the experienced effect of a compositional process in his three essays on Milton Babbitt (1990, 1991, 1992).

6 Lewin poses these questions in the midst of analysis on Stockhausen's *Klavierstück III* and does not dwell to long on the issue of hearing. However, in the appendix to this essay, Lewin explores issues of hearing and the experience of a listener at great length, engaging with some of Nicolas Cook's claims. See pp. 43–44 and 53–67. This type of "theoretical listening" is what Joseph Straus calls prodigious listening, which is a privileged hearing in that certain assumptions are made about a certain degree of expertise and knowledge about music. While the present study is of this type of listening and hearing strategies for Carter's music, Straus provides us with some of the recent cognitive studies regarding normal hearing and potential disabilist hearing, as dubbed by Straus. See especially Chapter 8 of Straus 2011.

create a backdrop for detailed investigations of musical parameters. The perspicuous sounds and compositional details of Elliott Carter's music—specifically his late chamber music—provide the ideal laboratory for this study.

1.2 The Listener First: *Hiyoku*

In order to begin an examination of musical experiences in Carter's music, we must *have* a musical experience of Carter's music as a test subject. Such an account is necessary in order to further the investigation of how moments "capture our attention." Since it is impossible to imagine every situation in which a listener might hear a piece, we will have to resort to a hypothetical situation in which a listener (in this case it will be me), *might* perceive a piece in real time. This "listener-first" approach to one of Carter's recent pieces can simultaneously recount the *experience* of a listener while targeting salient aural phenomena. Synthesizing both perspectives may offer a well-formed and meaningful musical analysis. What follows, therefore, is an imagined hearing of the piece *Hiyoku* in real time.

Composed in 2001 for a husband and wife—both clarinetists—*Hiyoku* is a clarinet duet in which each instrument can be viewed as taking on a particular persona. Ayako Oshima explains the title *Hiyoku* as "a very special poetic word originally used by the ancient Chinese poet Bai Juyi and adopted by old Japanese authors, meaning two birds flying together with the connection of eternal love" (Carter 2001). The first seven measures of the piece, shown in Example 1.1, equal about twenty seconds of actual music. Although the visual representation of these twenty seconds in the example is merely a snapshot of the music, I can still imagine how I might react to these opening

measures as I begin listening to a commercial recording of the piece.[7] At first, I hear a single clarinet. What do I make of it as I hear these opening pitches? It would seem that there are approximately evenly spaced notes in time in the *clarino* register of the clarinet. The opening contour provides both opposite and similar motions from pitch to pitch, with both steps and leaps, and I may even decide that this initial gesture is somehow "lifting" me, or projecting up, rather than down. But can I determine anything else in six notes?

It is not until the seventh pitch—a different clarinet or the same one?—that a *different* type of aural feedback reaches me. Immediately, this difference informs my decisions about what is still fresh in my ears. As I hear each subsequent pitch, I may confirm to myself, "Ah yes, this is certainly *more* angular than before, with *larger* leaps, *more* percussive attacks, *greater* and *louder* dynamics, and a *larger* range of register." Alternatively I might decide, perhaps concomitantly, that the first several pitches are *less*, *smaller, softer*, and otherwise *different* from what I am currently hearing. In other words, as the music unfolds before me, I group what I hear by musical sameness, difference, opposition, and congruence. I might think of the moments that delineate the audible changes from note to note, phrase to phrase, or even section to section, as a type of sonically articulated boundary. Based on articulations, timbre, dynamics, and melodic contour I have heard only one particularly stark boundary so far—between the sixth and seventh pitches. I have, however, only listened to a few seconds of music and have already spent a greater amount of time discussing it than the actual amount of time the music lasts.

7 It is important to note that this is an idealized listening of the piece without visual cues.

A few seconds ago, at this first boundary, I may have made a decision whether or not one or two clarinets occupy the sonic landscape. But right *now* (I'm currently listening at measure 4), I hear a definite, albeit short, overlap of instruments. There are two clarinets after all, and…yes, what I now hear is *different* from what I just heard. The clarinet is currently softer, sweeter, and slower from the immediately preceding sounds of a different clarinet, which has now stopped playing. In fact (I speculate), what I hear now is really quite similar to what I heard some ten seconds ago. Clearly my musical discrimination of the piece further defines a second boundary. I decide that, up to this point, there are two opposing forces (or at the very least, two *different* forces) at play. Both are clarinets, and both have different approaches to dynamics, range, contour, note-length, and perhaps a number of different audible facets of the music. But wait, I hear something else. There are three pitches—a high pitch that leaps down to two more pitches (measure 5) just after this second boundary. It sounds just like the three pitches (measures 3–4) that precede this boundary. But that means I'm hearing a specific arrangement of sounds that are very similar, but lie in two passages that are separated by other musical differences. What am I to make of that? The back and forth progression of the clarinets makes me believe there is a call-and-response interaction; since I haven't really heard the clarinets play at the same time…until right now!

As the seconds tick by (I am now listening to measure 5), the other clarinet returns (or perhaps *another* clarinet, to my ears), this time playing only two pitches, close in proximity and repeated in fairly quick succession. The two clarinets now seem to be doing very much the same thing. They are similar in register, rhythm, and even dynamics. As I listen, I cannot seem to really distinguish them from each other. While I

currently hear the clarinets behaving similarly, I also realize that this collective sound is different than anything that has come before, thus a third boundary must have just happened a few moments ago. Does anything that I am hearing now—an ever widening oscillation of pitches in both clarinets—have anything to do with the opening pitches and phrases that I heard? I begin to speculate about what has *not* happened yet. How much longer will this oscillation of pitches continue? Will the clarinets continue to behave in similar fashion? Will the piece return to the sounds of the opening phrases?[8]

My questions are quickly answered as I hear a slight hesitation or pause in one (or is it both?) of the clarinets. Perhaps, I predict, I will soon arrive at another shift in momentum. Indeed, I hear (in measure 7) a similar up-and-down oscillation of pitches, although the range quickly extends in both directions. A sudden increase in energy and dynamics from each melodic line drives the piece to a climactic (at least, so far) flurry of notes. Both clarinets catapult away from each other as though identical magnetic poles were brought into too close proximity, resulting in a widening registral wedge. My sonic experience pauses for an intervening thought—hmm, this "wedge" gesture reminds me of moments in some other Carter pieces. I wonder if they are similar in ways other than the gestural… The rests that follow this wedge bring my ears back into focus. The silence creates yet another boundary, blocking off everything that has happened in the previous twenty seconds. So much has happened! I hope that what I have heard so far will inform what I might hear for the remainder of the piece.

8 David Lewin engages in an important theoretical discourse surrounding this and similar types of phenomenological "hearings" of music. See Lewin 2006. For a consideration on Gottfried Weber's account of Mozart's music, see Moreno 2003.

1.3 Goals and Overview of Dissertation

Although this imagined experience could continue, it is more than enough to raise several questions regarding an aural engagement with the piece. To begin, what phenomena stand out to the listener? He takes notice of several contours, timbres, dynamics, and makeup of the ensemble. Do these sonic events relate in any way, and if so, how? He organizes some of the more salient moments as aurally similar or different, such as the qualities of sounds and melodies of the two clarinets. Although the listener reports that he can *hear* moments of similarity between the instruments—either simultaneously or successively—how did he interpret these? One strategy groups similarities together and keeps them separate from other like-sounding events by imagining a dividing boundary between them.[9] This happens in real time, from moment to moment, but also through making comparisons to the musical past, and what is anticipated to happen soon. What effect did these similarities and differences have? At one point, it was not clear whether there were one or two clarinet players, and once the listener did realize there are two separate instruments, there are times in which he cannot differentiate one from the other. What new information might he glean, or how might his perceptions change if he returns to the score for a closer examination of pitch content? The listener-now-analyst groups the first six clarinet pitches together before drawing a boundary, and now sees that the last four of these pitch-classes (pc) in measures 1–2 (B, D, C, F♯), are the same pcs that follow the second boundary in measures 4–5, only in a different order (F♯, C, B, D).[10] Did he hear this connection?

9 For an expansion of this strategy, see Hasty 1981.

10 The reader should take note that the clarinet is a transposing instrument. Thus, the clarinet's notated pitches are two semitones higher than actual concert pitch. This discussion uses the clarinet's notated pitch-space, and not sounding pitch.

Could he hear it if he tried, and what would that mean as part of his experience? These same four pitches appear within the context of the final six pitches of Clarinet 1 in measure 7, just as they do within the context of the initial six pitches of Clarinet 1. Are these pitches related? Is it possible to hear this relationship? Does it matter?

These are precisely the types of questions I ask myself when studying Carter's music. I want to know why I continually find his music aurally inviting and intriguing, and what lies behind these sounds. Carter's increased output of chamber music in his final two decades coincides with his use of a reduced harmonic vocabulary.[11] This fact, and the desire to understand the immediacy of aural relationships in an idealized experience of a piece drove me to write this dissertation, which I organize in the following way: The remainder of Chapter 1 offers relevant scholarship to account for the observations above, specifically on Carter's music, and generally on possible analytic avenues for aurally interpreting musical events. Chapters 2–4 mirror the progression of queries about the hypothetical *Hiyoku* experience. Chapter 2, "Aural Cues and Textures," looks specifically at salient events in Carter's music. Chapter 3, "Form and Melody: Aural Boundaries, Ambiguities, Shifts, and Constancy," examines some of the larger formal relationships that emerge from the various cues and textures defined in Chapter 2. A synthesis of the concepts in Chapters 2 and 3 with current analytical tools is the goal of Chapter 4. A final Chapter 5 is an analytic essay on one specific piece, Carter's Clarinet Quintet (2007), which demonstrates application of the method established throughout Chapters 2–4.

11 In the preface to his *Harmony Book* (2002), Elliott Carter remarks that his recent compositions (since around 1990) are primarily based on only three primary set classes. These are discussed in more detail in Chapter 4.

1.4 A Retracing of Scholarship

1.4.1 Retracing I: On Musical Sounds and Analysis

Several of the exploratory questions relate to issues of temporality, musical salience, phenomenology, and analysis. Many of these fields broadly engage with philosophical and analytical concepts far beyond the scope of this dissertation, but also intersect in some of their goals and conclusions. The goal of this dissertation is *not* to explicitly account for how all of these strategies intersect, but rather to provide a solid foundation for a listener-sensitive analytic method. Some scholarship directly involves discussion of Carter's music, while other studies do not. Sections 1.4.1 and 1.4.2 present pertinent studies, and draw a rough distinction between Carter-specific scholarship and general approaches. At times, these studies overlap.

To begin, consider the issue of time and temporality in music analysis. As noted above, John Rahn develops an "in-time/time-out" binary approach to analysis, in which an analyst should not only consider a musical passage in "real-time," but also a post-listening reflection or "out-of-time" contemplation—just as we did with *Hiyoku*.[12] From an early stage in his career, Carter's interest in the meaning of time extends primarily to its implications for composition. Jonathan Bernard examines the effects of time and temporality on Carter, stating that Carter's use of time is even more paramount than his use of harmony: "Carter has demonstrated an ability to follow the ebb and flow of time in his music that is often breathtaking, even uncanny. Even more than his harmonic practice, it his temporal practice that seems to be the true seat of his originality" (1995, 644). Bernard also explores some of the possible early influences on Carter in the arts

12 See Rahn 2001.

other than music, including literature, dance and film. Common to all of them are varying types of time, either within the given medium or with one who experiences the medium either as a participant or observer. For instance, essays by Charles Koechlin and Pierre Suvchinsky divide time into various categories of real (or ontological) time and "psychological" time. Bernard explains in the following way:

> Composers create musical time or *khronos*…by the ontological and psychological in different relative strengths: music by Haydn, Mozart, or Stravinsky, for example, tends to emphasize real time and hence could be termed "chronometric," because the sense of time is more or less equivalent to musical process. Wagner, by contrast, tends more to emphasize psychological time and hence is "chronoametric." The classification…explicitly acknowledges that there can be more than one kind of musical time.[13]

Carter's interest in different types of musical time clearly influences his thinking. While much of his musical process might be considered chronometric, the *Hiyoku* experience points toward a varied account of the music's passage through time. Thus a chrono*ametric* consideration of Carter's music may be fruitful for further explaining the musical experience.

A slightly different—but equally pertinent—conception of time comes from Jonathan Kramer's important monograph, *The Time of Music*. In his second chapter, Kramer distinguishes between different types of *linear* and *non-linear* time. Even though Carter's music is not tonal, other factors (such as rhythm, dynamics, timbre, and atonal harmony) often create a sense of motion and directedness toward some end, even if the listener is not sure what this end will be. Kramer concludes that "for a post tonal composition to be temporally linear *with goals*, there must be a clear sense of continuity, provided by voice leading or perhaps by other directional processes in some

13 Ibid., 647

parameter" (Kramer 1988, 39). Yet some moments of Carter's music also seem to be moving in a singular direction without an apparent goal. Kramer's distinctions of *directed, nondirected,* and even *multiply-directed* linear time can potentially have an effect on how a listener interprets Carter's music. Furthermore, depending on the focus of an analyst or listener, Kramer's *moment* time of his *non-linear* distinction could also apply.[14]

Steven Rings explores several modes of listening in his multifaceted interpretation of Debussy's *Des pas sur la neige*. Rings offers several nuanced possibilities using different types of temporal "hearings." Of his six levels (temporally congruent hearing, chronologically ordered but variably paced hearing, anachronous hearing, temporally polyphonic hearing, instantaneous hearing, and temporally indeterminate hearing), some may be better suited for an analysis of Carter's music than others.[15] For instance, in a temporally polyphonic hearing, "music might present incommensurate temporalities unfolding at the same time: different contrapuntal strata of the music, for example, might enact events in the imagined world that unfold at different rates" (202). Carter's music can work well in this sense, especially in terms of the unfolding pulse strata that often occur. Polyrhythms that happen over a long span could be construed as polyphonic hearings. Perhaps less useful would be an anachronous hearing. "In this hearing, the events depicted in m. n+1 of [a piece] need not necessarily occur after those depicted in m. n in the imaginary world" (201). Part of

14 Kramer 1988. Refer to Chapter 2, "Linearity and Non-Linearity" for an expanded discussion of linear and non-linear musical time. Kramer also addresses some of the psychological implications of musical time in order to come to terms with how listeners cognitively engage with music. See especially Chapter 11, "The Perception of Musical Time." These ways of listening to or "hearing" music may provide another avenue toward a musical experience.

15 See Rings 2008, 200–202.

the problem with this and other "hearings" is the dependence on a "depiction" of something within the piece. Aside from some short instances of depiction in Carter's music (such as the seagull/trumpet pairing in *A Symphony of Three Orchestras*), much of his music does not explicitly portray a scene or image.[16]

A number of studies examine musical *salience*, which is an important part of aural recognition of events through time. Wide-reaching studies examine the organization of music through salient musical parameters (Hanninen 2012), the separation of individual and complex sounds (Bregman 1990), a focus on melodic and rhythmic factors that affect salience (Nardo et al. 2006), and how "salience points" lead to song recognition and memory (Jensenius 2002). Studies of salience in post-tonal music (Doersken 1994; Dibben 1999) also have immediate relevancy to music such as Carter's. The broader implications of salience studies have to do with cognitively processing sonic events. Lerdahl and Jackendoff's *A Generative Theory of Tonal Music* (1983) systematically explores hierarchical organizations of experienced listeners. Its publication ignited new debates in cognitive music theory and musicology.[17] Other studies favor a more culturally sensitive approach to cognition, including issues of musical gestures and language (Zbikowski 2002; in preparation). Precedents set in these studies on salience and cognition help answer questions as to how some sounds are more conspicuous than others in Carter's music, how we might process these sounds, and how they might be relevant during a musical performance.

16 My Chapter 2 expands on this idea as a "Referential cue," in which a specific aural phenomenon might refer to a physical object or abstract idea (See Section 2.1.5). For a hermeneutic approach to Carter's music dealing with imagery depiction and anthropomorphic interpretations, see Noubel 2012.

17 For expanded studies on the influence of Lerdahl and Jackendoff, see Hansen 2010, and Bigand, Lalitte, and Dowling 2009.

Intertwined with scientific and cognitive accounts of music are humanistic, interpretive, and phenomenological studies. Around the same time as Lerdahl and Jackendoff's monograph, David Lewin produced a foundational, reinvigorating study of phenomenology and perception (1986), and Judith Lochhead's careful studies bring a phenomenological insight to a wide range of music—including Carter's (1982, 1986).[18] Much of phenomenology stems from Edmund Husserl's philosophical work and was continued by others, including Martin Heidegger, Maurice Merleau-Ponty, Paul Ricœur, and Jacque Derrida, just to name a few.[19] Specific musical applications of phenomenology and psychology have their roots in Hugo Riemann's "Ideas for a Study 'On the Imagination of Tone,'" (Wason and Marvin 1992), Gottfried Weber's analysis of Mozart's "Dissonance" Quartet in his *Versuch einer geordneten Theorie der Tonsetzkunst* (1817–21), Karl Stumpf's *Tonpsychologie* (1883–90), and Hans Mersmann's *Versuch einer Phänomenologie der Musik* (1922–23) and *Zue Phänomenologie der Musik* (1925).[20] Much of this work takes tonal music as its frame of reference, however, thus a need for adaptations to include post-tonal music. Lewin's and Lochhead's work achieves some of this, as does Thomas Clifton's (1983), but there is still much to be done in post-tonal and contemporary music, which is one goal of this dissertation. My interests mirror those of Steven Rings, who focuses on "the *effect* of tonal phenomena for the listener—the manifold ways in which an awareness of a tonic can color the sounding elements in the musical texture, seeming to invest them with characteristic qualities and affects, kinetic energy, syntactic purpose, and so on" (2011,

18 For a comparative study of Lerdahl and Jackendoff, Lewin, and Lochhead, see Hindman 1994
19 An introductory account of phenomenology can be found in Sokolowski, 2000.
20 For more on these studies, see Moreno 2003, Cook 2002, 96, Green and Butler 2002, 262–66, London 2002, 702–03, and Rothfarb 2002, 946–47.

3). There is no reason to believe that the word "tonal" cannot be substituted with "post-tonal," or "tonic" with the notion of a "source-chord" in Carter's music. Fortunately, many of the general approaches presented above have already been adapted in some way to reflect the music of Elliott Carter.

1.4.2 Retracing II: On Elliott Carter

Marguerite Boland and John Link's 2012 edited volume, *Elliott Carter Studies*, is an example of how varied and continued interests in Carter's music are very much alive and relevant. Furthermore, both Boland and Link are editors of the new *Elliott Carter Studies Online*, the first issue of which is set to be launched in 2016.[21] Between the recent edited volume, imminent online journal, and the multitude of existing scholarship on Carter, one may wonder why there is a need for another dissertation on Elliott Carter.[22] The reasons are manifold. Some of Carter's most recent music, particularly his chamber music, has yet to be given full attention. As performances of Carter's most recent pieces continue to fill the concert halls and reach new audiences, it is only natural that new ways to engage with his music will emerge. This dissertation is part of that dialogue. While the current study is very much about Carter's music, it is also interested in projecting Carter into a wider consideration of phenomenology, analysis, and pedagogy. Furthermore, a "listener's experience" should be wide-reaching, not only including scholars of high modernist composers, but also the casual concert-goer who hears Carter for the first time; the young student who hasn't yet developed listening strategies for post-tonal music; or the performer, who is trying to decide the

21 See "Elliott Carter Studies Online" 2015.
22 For a bibliographic guide for existing Carter scholarship up to the year 2000, see Link 2000.

best performative expressions while preparing one of Carter's pieces. Thus the current study is aimed at scholarly and casual readers alike.

Even though multifaceted approaches continue to challenge our understanding of Carter's music, the majority of these studies typically concentrate on "musical materials," especially compositional and precompositional details. The goal of the current study is not to dismiss the value of any of these studies, but rather to prioritize their possible utility for the listener. For example, specific studies on pitch and pc relationships are wide and varied (Roeder 2006, 2009, 2012; Heinemann 2012; Capuzzo 2000, 2004, 2012a, 2012b; Mead 1983–84, 1994, 1995). Many of these valuable studies elucidate relationships in Carter's music, and even recognize some connections to the listener's experience. But the complexities of pitch and pc relationships, while fascinating, sometimes cause us to lose sight of the aural effect of Carter's music. This is precisely the reservation Carter expressed in the quotation at the start of the chapter.

Still, questions of aural perspicuity often arise in analyses of "complex" music. In reference to serialism in music, Leonard Meyer declares that "the absence of a stable stylistic syntax, archetypal schema, audible compositional order, and patent 'natural' patterning results in a level of redundancy so low that communication is virtually precluded."[23] Although it could be argued that Carter's music *does* have a harmonic syntax, does Meyer's claim hold true? Is Carter's pitch organization inaudible to the point that nothing is communicated to the listener? Put differently, is it possible to *hear* Carter's primary harmonies, or is it even appropriate to try? Is it easier to hear these

23 L. Meyer 1967, 290. By "redundancy," Meyer is referring to a listener's ability to understand a musical passage even though certain elements of the given syntax might be omitted.

pitch-sets and set-classes when they are presented melodically (horizontally) or harmonically (vertically)? Furthermore, analytical tools that focus on set-classes as their subject often compare these sets in some way, typically to reveal similarities, properties, and transformations. Rather than having the aural facets of these concepts as afterthoughts, this dissertation reverses the priority.

Credit should be given to studies that do carefully incorporate aural analysis. For example Andrew Mead (2012) concentrates on defining form in terms of Carter's rhythmic and temporal considerations. Mead develops an analysis that might suggest "the ways that issues of rhythm and tempo play a significant role in shaping the large-scale formal designs of Carter's music" (2012, 141). While his primary focus is on how rhythmic compositional procedures are tied with larger formal processes, he does at times draw attention to whether notated meter is aurally privileged (142–143), although this is more on a local level than on a large, formal one. Others, including Darbellay (1995), Noubel and Müller (1998), Vermaelen (1999), and Theisen (2010) similarly discuss form in Carter's music, attending to the aural components of form, and not merely the compositional materials.

In addition to taking stock of Carter scholarship that either does or does not center on issues of a listener's experience, it is also fruitful to consider which current approaches could expand to include more of an aural analysis. Some approaches to Carter's music incorporate the various aspects of sonically oriented studies outlined above, while others only tangentially discuss aural facets of his music—if they discuss them at all. This is not to say that these approaches are not valuable, as many of them reveal important compositional components of his music, or situate Carter both

culturally and historically. In order to generate an aurally driven analysis, however, we must decide which of these approaches can appropriately coexist with a listener-sensitive approach.

It would take far too long to consider every angle of Carter studies and decide whether they could be infused with a listener-sensitive adjustment. Taking one approach, however, and considering how it might be "aurally infused" should suffice. Take, for instance, this issue of sketch studies. Carter is skeptical about sketch studies, telling Jonathan Bernard that "it could be that at the present stage of musical analysis, it's necessary to carry on the sort of detailed work that you allude to in the case of my sketches, but I'm not sure that it would produce a useful result, because very often the sketches are simply brief passages working out some little problem—about the harmony, for instance" (Bernard and Carter 1990, 205). He goes on to discuss the issue that many decisions are often mental, and are not recorded in his sketches. The sketches, rather, serve as a visual workspace for his mind. "One decision piles on the other, and then I begin to see what in a chord would contribute to this effect. The sketches don't show this, because there's an awful lot of mental work that's never put on paper" (205). Because sketch studies often elucidate precompositional designs, how much could be added to include aural effects for the listener? Perhaps the only thing to do is imagine what a piece *could have* sounded like had Carter made other decisions. Unless someone undertakes an elaborate project to reconstruct a passage of Carter's music from his sketches, prepare a performance, and then compare these results with the final version, such an experience will not ever exist.

Many of Carter's sketch studies (F. Meyer 2012; Soderberg 2012) are primarily concerned with historically situating Carter's sketches. In examining specific pieces, Felix Meyer points out that "the Sonatina also merits special attention because it gives us a more precise understanding of the decisive period of change during which Carter parted ways with the neoclassical premises of his earlier music and sought a more "rational" approach to the musical material" (F. Meyer 2012, 218–19). A similar sentiment is echoed by Stephen Soderberg, who examines the many sketches (over 17,000 pages) in the Library of Congress: "As Carter gradually moves away from the neoclassical style of his early compositions, there is an emergence in the sketches of new materials that would become significant in the creation of his mature works" (Soderberg 2012, 236). These types of sketches aren't necessarily concerned with how the music sounds but rather the historical significance of a piece, and when Carter was altering his compositional approach.

Luckily, sketch studies and aural analysis *can* fruitfully coexist. John Link observes that, "by examining the sketches it is possible to trace the basic outline of Carter's compositional process from his first thoughts about the piece to the finished score, and to witness the development of harmonic and rhythmic ideas that became the foundation of his compositional practice throughout the 1980s and into the 1990s" (1994, 67). By understanding Carter's tendencies and methods during precompositional stages, Allen Edward, John Link, and David Nadal were able to closely read Carter's notes and drafts in order to finalize the piece *Epigrams* for publication, since Carter was not able to do this himself before his death in 2012. The piece was only finally published in April of 2014, with a list of various edits compiled through this process. Since most of

these edits involve the decision of one or two notes, the overall change in the aural experience of these pieces may not be all that different if an alternate note were present.

Others do try to refine what a listener might hear by examining Carter's sketches. John Aylward accomplishes this by pointing out that surface phenomena in Carter's Fifth String Quartet are more closely connected than we may realize: "These interpretations of this short excerpt, gained through sketch study, provide an opportunity to hear Carter's music differently. While we most likely hear this excerpt as containing one harmony, the sketches reveal that Carter uses two harmonies related by an octatonic collection. Also, we may not hear any connection between the end of "Interlude No. 1" and the beginning of the "Lento espressivo," but the sketches show that the opening of the "Lento espressivo," is harmonically linked to the interlude's closing gesture" (2011, 45).

The essays in Patricia Hall and Friedemann Sallis's, *A Handbook to Twentieth-Century Musical Sketches* (2004) deal primarily with reconstruction of sketches, transcriptions, and catalogs of various composers' thoughts in their composition process. Denis Vermaelen's informative essay on Elliott Carter offers insights into harmonic considerations of "Anaphora," the first song in *A Mirror on Which to Dwell*. Vermaelen's goal in the second half of the essay is to "consider how the listed pitch structures can be interpreted in terms of specific compositional detail of a given piece." (165). Again, this study is primarily concerned with finding aspects of music structure within the sketches. In the first part of the essay, however, Vermaelen explores Carter's ambivalent attitude toward sketch studies and technical analysis. In his conversation with Jonathan Bernard, Carter again emphasizes his relative hesitation toward sketch

materials, saying, "You must realize that all those pages of sketches are truly sketches, in the sense that some technical problem having to do with interval or rhythm or figuration is considered and solutions are worked over until certain artistic demands like 'expression,' 'character,' 'emphasis' are satisfied in a way that seems to me relatively 'fresh' sounding. Solutions that sound 'dead,' 'dry' (unless specifically needed at a certain moment) are discarded and sometimes no 'life-like' solution can be found so the whole process is discarded. All that takes paper and time" (Vermaelen 161; Vermaelen quoting Carter). Although Vermaelen focuses mostly on Carter's ambivalence toward sketch materials, we can instead focus on what the sketches reveal about how the passage *sounds*. If the core focus is ultimately on how a passage sounds, and not necessarily the harmonic process, then clearly the sonic outcome outweighs the harmonic procedure. Rather than using sketch studies to explore a composer's procedure for constructing harmonies, we can instead focus more on how the composer wanted a passage to sound, such as what constitutes "dead," "dry," and "lifelike" sonic events.

Other possibilities for expanding current scholarship include texts, intertexts, letters, and interpretations of Carter's music.[24] Correspondence, interviews, program notes, and other forms of personal interaction allow us to examine Carter's direct thoughts on the *sounds* of his music. Fortunately, excellent sources of personal interactions with Carter include the numerous recorded interviews (Boretz 1970; Bernard and Carter 1990; Carvin 1994; Bons 2003; Porter 1986; Edwards, 1972, Restagno 1991). Meyer and Schreffler's *Elliott Carter: A Centennial Portrait in Letters*

24 For a study on intertextuality in music, see Klein 2005.

and Documents (2008) provides the opportunity to see firsthand interactions with Carter, and listen closely to his words regarding musical sounds.

Informal communications not directly involving Carter can be just as valuable, as they provide indirect or impartial observances of what people hear in Carter's music. An abundance of impersonal reflections and observations waits for musicological discovery in the form of online blogs, social media interactions, and website comments. Comments like the following—"I found Carter's work sort like getting hit in the face by sleet. This is not to say that I did not like the music or that it made me uncomfortable. But, like sleet in your face, there is no question that something really dramatic is going on"—not only paints a vivid description of a listener's experience, but opens the potential for further scholarly inquiry.[25] It is not likely (but not impossible), that the blogger is aware of the current scholarship on Carter's "dramatic" interactions (Mailman 2009; Roeder 2012), or the numerous adaptable theories on musical drama and narrative that could certainly appeal to how they might hear his music.[26] Nevertheless, a study such as this one aims to supply feedback for such observations.

It is clear that Carter scholarship is far from being exhausted, especially with the realization that so many additional strategies for an experiential approach remain. Regardless of any new listening strategies and adapted analytical methods, we should certainly heed the desires of the composer, who emphatically puts the listener first: "It may take many years for the listener to be convinced, but I believe that my training and

25 See comments at http://www.artsjournal.com/postclassic/2008/12/master_class_of_the_pod_people.html

26 Both musical drama and narrative by themselves open up an abundance of adaptable scholarship for a listener's experience of Carter's music—far too many to list here. For some key studies on music and drama, see Cone 1974 and Maus 1988. For pertinent studies on narrativity, see Almén 2008, Nattiez 1990, and Klein and Reyland 2012.

experience as a composer enable me to prejudge a possible future listener. In my opinion, the idea of writing a piece of music that no listener would ever be able to understand or enjoy is utterly incomprehensible."[27] This dissertation offers a means toward such listener comprehension.

27 Edwards 1972, 77. See also Schmidt 2012.

Chapter 2
Aural Cues and Textures

"…the work, when heard, captures our attention…"

"Isn't it true that *all* musical elements music draw a listener's attention?" On a general level the answer to this question is "yes," but depending on a listener's context (musical focus, expertise, temperament) and environmental factors (performance practices, acoustics, surrounding audience), specific aural phenomena will emerge more readily than others. A listener might attend to specific events or musical textures, perhaps via program notes that ask the audience to "listen for the main theme to return." Conversely, prominent sonic events or timbral consistencies may emerge organically for a listener after multiple hearings. These sonic details—which we will presently call aural *cues* and aural *textures*—can behave similarly in both tonal and post-tonal music, with a primary difference being functional harmony's presence or absence. In pieces *not* based on functional harmonic progressions, these aural events can obtain a greater phenomenal presence, especially in establishing a system of expectancy. Furthermore, aural cues and textures in Carter's late music can help define local and global formal considerations. We will first consider how these aural cues and textures behave in a recent piece.

Having already written five string quartets and several pieces involving the clarinet (including a concerto and numerous chamber pieces), Carter finally married the string quartet to the clarinet in his 2009 Clarinet Quintet. He is straightforward about the piece's large formal construction, stating that "the clarinet follows its own musical

character in contrast to that of the quartet. There are interlocking movements with no pauses" (Carter 2007). The following "observations by ear" show how different aural phenomena might strike a listener during an interlocking transition from one movement to another. From this, we can begin to build a framework for an aurally focused analysis.

In the Clarinet Quintet, a listener may not realize when one movement ends and another begins, due to their "interlocking" nature. There are, however, certain aural markers (and accompanying visual markers in the score) that help delineate movements.[1] In the written score, four metric modulations occur in the piece, marking approximate shifts from one movement to the next. To aurally perceive the precise moment of a written metric modulation is likely difficult (if not impossible), but conspicuous sonic events in the vicinity of these metric modulations can instead be a guide.[2] Upon listening to this passage, we may decide in retrospect that a sonic marker has propelled us into a new movement. Conversely, these sonic markers may be something to anticipate on subsequent hearings, preparing us for the change of movements.

Example 2.1 illustrates the shift from the first movement to the second, highlighting various conspicuous aural events. At measure 57, a metric modulation seems to provide a distinct *written* marker for a boundary between movements. Even though there is an emphatic punctuation in the clarinet at measure 57, there is not necessarily any clear aural marker that allows one to hear this as a metric modulation.

1 An expanded consideration of visual markers might include cues by performers for communication between themselves, or perceived cues *of* performers by an observer.

2 The concept of "hearing" metric modulations is examined more closely in the next chapter, under considerations of form.

An alternative approach to *hearing* the shift from one movement to the next is to be cognizant of several significant aural cues prior to measure 57. At measures 51–52, the upper three strings play a uniform *pizzicato* gesture, ending with triple-stops in all three instruments. This is reminiscent of numerous rhythmic string figures that permeate the piece from the beginning. One noticeable difference in this figure, however, is that a significant silence precedes it. The "significance" comes by comparing this instance to the piece's previously established tendencies. There is no noticeable, lengthy silence in the piece up to this moment. The entire ensemble shares this "new" silence in measure 51, though only a half-measure in length. This silence potentially sets the *pizzicato* figure in measures 51–52 as something functioning differently from the similar preceding rhythmic gestures.

Immediately after this, a new melodic line emerges in the cello, beginning with a long sustained pitch, marked *espressivo*. The clarinet follows suit with its own soft, sustained pitch. At this point, the overall soundscape or *texture* is changing. The emergent, sustained pitches are distinct from the rapid array of pitches heard before. Amid these sustained pitches, a single snap *pizzicato* interrupts the new texture in measure 54. This distinct sound is nothing new to this piece; its repeated recurrence establishes it as a significant aural cue throughout the piece, or at least in the first movement. Immediately following the snap *pizzicato*, the cello finally begins a lyrical descent into its lower register. This new single-line melody is unlike anything that has happened thus far.[3] Due to its "newness," it is possible that the cello has drawn a listener's primary focus. The clarinet follows the cello's melodic descent with a similar

3 The origins of this melody lie in several ensemble moments in the first movement, and will be explored in further detail in Chapter 5.

figure in measures 55–56, but it is at a much more rapid pace and sounds similar to many previous clarinet gestures. The upper strings take an apparent accompanying role to the cello's melody, while the clarinet continues to use angular leaps and quick melodic flourishes. These events likely capture our attention to some extent, and to a greater degree than the notated metric modulation at measure 57.

What, if anything, can we take away from this brief consideration of a few measures from Carter's Clarinet Quintet? If nothing else, there is a clearer sense of how these two movements aurally "interlock." Established sounds begin to overlap and collide with new material. The aural components drive this realization without any consideration of Carter's formal harmonic language. Similar to the hypothetical listener's "experience" of *Hiyoku* (discussed in the previous chapter), this example illuminates salient sonic events. Chapters 2 and 3 closely examine and develop a typology for these and similar aural events in Carter's music. The current chapter divides into two halves. The first refines the notion of *aural cue*, focusing on conspicuous sonic events such as the rhythmic multi-stops and snap *pizzicato* moments in Example 2.1. The chapter's second half defines *aural textures*, particularly as they emerge in Carter's later music. We will see an expanded analysis of the Clarinet Quintet in Chapter 5.

2.1 Aural Cues

2.1.1 Introduction

In brief, an aural cue is a salient musical gesture. A short repeated motive, a dramatic "stinger" at the end of military march, or musical bird song imitations are all

conspicuous signals that relay information to a listener's ears. In tonality's absence, these motivic, referential, or characteristic sonic events often take on a prominent status for a listening audience, creating a common, recognizable ground on which to organize the music. Some musical gestures appear multiple times within a single piece, or are common across a composer's output, and some are so frequent that they are representative of Carter's style.[4]

While musical gestures can be a useful way to talk about aspects of Carter's music, the notion of "gesture" might lack specificity. For instance, a "rhythmic gesture" could refer to a specific notated rhythm or groups of similar rhythms. It could span a relatively short or long time frame, and might involve one or many instruments. A rhythmic gesture may refer to a polyrhythm or successive individual rhythms. One way to further refine musical gestures is to define specific categories in order to facilitate a more thorough discussion. The following categories, to be explored in detail in sections 2.1.2—2.1.6, are based both on my own heuristic discoveries while listening to Carter's late music, as well as existing approaches to salient musical events in general. It is important to note that the following categories are *not* mutually exclusive. Some sonic events can encapsulate one or many of the following functions:

4 The literature on musical gesture, and more generally on gesture, is wide, varied, and continuously expanding. For a paramount study in musical gestures, see especially Hatten 2004. Godøy and Lemen 2010 is an edited volume exploring a variety of studies on the meaning and application of musical gestures. For expanded studies of musical gestures related to musical grammar and cognition, see Gritten and King 2006, Gritten and King 2011, Kozak 2010, Lerdahl 1988, Smart 2004, Zbikowski 2011, and Zbikowski in production. Music topics are also closely related to the notion of my aural cues, as well as musical gestures and semiotics. For representative studies on these, see Agawu 1991, Caplin 2005, Mirka 2014, Monelle 2000, and Nattiez 1987. More recent adaptations of topical theory to music of the twentieth-century include Köksal 2013, and Narum 2013. Patricia Howland's recent article (2015) defines an "element" as a "temporally indivisible sound," and is a more general term in relation to my specific aural cues.

Motivic: A short sonic event with a specific arrangement of musical parameters. The degree to which motivic aural cues relate may be dependent on both parametric structural factors as well as a listener's interpretation in a given musical context. Motivic cues may permeate an entire piece or emerge in only one particular musical passage.

Gestural: These sonic events tend to be slightly longer than motives, or involve combined motivic cues. Contour and rhythm are typically the most prominent musical parameters for these cues. A listener might identify these "sound-shapes" as similar without regard to instrumentation, thus the same gestural cue can be present in multiple styles and genres. Carter employs gestural cues throughout his music; some are more distinct to his style while others have application across a large range of music, both tonal and post-tonal. For the purposes of Carter's later chamber music, we will focus on four primary gestural cues: Rhythmic Offset; Harmonic Accent; Wedge; and Directional.

Characteristic: A characteristic aural cue is an event that is unique under specific circumstances. It does not necessarily need to be a fully developed motivic or gestural cue, nor does it necessarily occur more than once in a single piece. Characteristic cues often refer to a single event that serves as an identifying marker for a specific instrument or "instrument-character." They can also be frequently occurring events such as a single isolated pitch, chord, or timbral cluster, and are often unique to a particular piece.

Referential: Referential cues point toward a different musical or extra-musical idea. Referential cues may be motivic, gestural, or characteristic, and are likely

dependent on some outside factor to convey specific meaning. Text painting and mimetic musical gestures are examples of referential aural cues.[5]

Intrinsic and *Extrinsic:* These types of events function differently than the previous cues in that an intrinsic or extrinsic event subsumes the other categories. That is, every sonic event can be defined as either intrinsic or extrinsic. Within a composition, musical "norms" establish themselves through frequency or prominence. Based on the piece's constructed syntax, these ingrained, *intrinsic* cues can occur throughout the work and may even become expected. Events that contrast with intrinsic cues are at first external to the listener's sound expectations. One, several, or all musical parameters could be altered to deviate from expectations, creating an *extrinsic* cue. Intrinsic and extrinsic cues can have a recursive relationship: at first all new sounds are extrinsic, but soon become ingrained and are intrinsic. Later in the piece, initial intrinsic cues become lost over time. Their re-introduction may be locally extrinsic, yet globally intrinsic.[6]

2.1.2 Motivic Cues

The first type of aural cue is *motivic*. Carter is very careful about producing aural connections between instruments through small melodic fragments. Although Carter does not often explicitly discuss these moments in program notes, John Roeder and

5 Referential cues are especially tied to musical signs, and music semiotics. Mimetic cues and text-painting are similar to iconic signs, whereas extra-musical cues might be symbolic or indexical. Largely based on the works of Charles Sanders Peirce, the field of music and semiotics is well represented by Nattiez 1987, Agawu 1991, Monelle 2000, and especially Tarasti 1994.

6 This resonates especially with Kofi Agawu's "introversive" and "extroversive semiosis." Agawu adapts Roman Jakobson's linguistic model, engaging with syntagmatic and paradigmatic relationships. My distinction differs from Agawu's in that both of my intrinsic and extrinsic events relate to the listener's familiarity with the event, and both types are contained within the music. Agawu's extrinsic events refer to extra-musical meaning, and are more closely aligned with my "referential cues." See Agawu 1991, especially chapters 2 and 3.

others emphasize the aural importance of these "moment-to-moment interaction[s], contrasting or imitative, of pitch and rhythm among the streams" (2012, 111). Example 2.2 demonstrates how a small musical gesture in the song "Am Klavier" becomes aurally motivic due to its near repetition in close proximity. With the text, "God of meaning," the vocal line descends through the pitches (G, F, C♯, A). By themselves, these pitches may not be aurally conspicuous, but become so due to what follows in the piano. Through the piano's independent yet overlapping pulse streams, the pitches (G, F, C, D) imitate the vocal gesture almost exactly. Carter emphasizes the piano pitches by writing a specific phrase slur and *mezzo forte* marking, as well as writing the pitches in an identical register to the voice. Imitative echoes such as this heighten awareness of both short gestures, connect them aurally, and mark them as motivic.

The motivic cue in "Am Klavier" occurs only once, but motivic cues can also connect a work's non-proximate passages. Example 2.3 exhibits motivic connections in the woodwind quintet *Nine by Five*. After the piece's opening ten measures, Carter promotes the oboe to a *hauptstimme* and the first extended melodic line (see Example 2.3(a)). Similar to the imitative motivic cue in *Am Klavier*, the clarinet presents an "echo" of the oboe's first four melodic pitches. Even though the pitches are different, the relative contour shape remains the same. Marked in the example as "motive *x*," the relative contour positions for all four pitches are (3124). That is, the third highest pitch in the motive falls to the lowest pitch, which precedes a rise from the second lowest pitch to the highest pitch. The motive's initial falling gesture is particularly aurally salient as well, thus connecting these two independent lines. The clarinet soon follows with its own extended *hauptstimme* statement. Motive *x* also expands to include an

additional pitch, but keeps the same basic contour shape (marked as *x'* (31245)). A listener could likely connect the melodies' initial four pitches as very similar, even though the latter melody continues past four pitches. A similar aural motivic connection happens again after the clarinet descends to its low, climactic F♯. The oboe once again picks up the *hauptstimme* line. Even though the line does not start with a descending leap, a new version of motive *x* emerges in measure 17, through dynamics and relative note durations. The overall motivic contour is the retrograde of the original motive *x*, yet similarities include a downward leap followed by an upward leap, which is enough to aurally connect this motive to the previous ones. This final motive is marked x^R (4213) in the example.

Throughout the piece, similar motivic connections emerge. Example 2.3(b) shows two such instances that occur later in the piece. In measure 83, the bassoon restates the extended melody from earlier, beginning with the same motive *x'* as before. The initial falling gesture is again prominent, connecting the beginning and end of the bassoon's melody, as well as the beginning of the horn's statement in measure 89. *Exact* motivic reiterations are hardly ever present in Carter's music.[7] Due to his predilection for assigning different intervallic components to instruments (as is the case in the *Nine by Five* examples), "motive *x*" refers to events constructed with potentially different compositional parameters. But the aural similarities are such that we can identify them as instances of the same, or nearly the same short musical motive. Aural cues such as these are quite common in Carter's later work, but are often fairly specific to only one

7 We could argue that exact motivic reiterations are uncommon in most music. For a relevant discussion refer to Lawrence Zbikowski's discussion of Beethoven in *Conceptualizing Music* (2002). See especially Chapter 1.

single piece or movement.[8] The next type of cue involves similar events that extend across many pieces.

2.1.3 Gestural Cues

2.1.3.1 Rhythmic Offset

Carter often uses different pulse streams, based on preconceived ratios. Some ratios occur over a large portion of the piece as a long term polyrhythm, while others occur in a more immediate—and perhaps more aurally apparent—way.[9] This latter type appears when tuplets of dissimilar cardinalities simultaneously interact. Essentially a brief polyrhythm, the result is a succinct rhythmic ratio. This first type of gestural aural cue is called a "rhythmic offset." Rests often isolate the gesture, thus *offsetting* it from its musical surroundings. Furthermore, each stream's onset attacks are typically offset from each other and do not happen at the same time, though coincident simultaneities happen more frequently in offsets with low ratios. This aural cue's relatively rapid nature provides very little (if any) silence between each attack. Although created by two or more independent streams, a listener can likely perceive the combined sound as one succinct aural event.

8 The first few times a listener encounters these cues (Example 2.3(a)), they are "new" sonic events, and thus *extrinsic*. Familiarity of the motive comes over time (and will vary, depending on the listener), but later in the piece (Example 2.3(b)), a listener would likely recognize them as *intrinsic* to the piece. I explore the nature of intrinsic and extrinsic events in further detail below.

9 For studies on Carter's long-range polyrhythms and multilayered metric considerations, see Link 1994, Koivisto 2009, and Mead 2012.

Several rhythmic offsets in Example 2.4 demonstrate their qualities. Examples 2.4a and 2.4b are drawn from Carter's violin and cello duets *Duettone* and *Duettino*.[10] Example 2.4(a) shows how each instrument follows its own melodic tactus in divisions of threes or fours. The melodic lines suddenly halt and simultaneously create a multi-stop offset cue with a 4:3 offset ratio. Example 2.4(b) is from a different piece, yet has the same overall aural effect, even though offset ratio is 5:4. Example 2.4(c), from Carter's String Trio (2011), builds on three different pulse streams in three different instruments, creating a 4:5:3 offset in measure 24. This example offers an additional aural possibility for a rhythmic offset, however. The accented pitches build a rhythmic offset at a different pulse rate. The violin (top staff) accents every fifth sixteenth-note, while the viola (middle staff) accents every third quintuplet eighth-note, and while the cello accents every fourth eighth-note triplet.[11] This "hyper-offset" comes out to ratio of 75:72:80! Example 2.4(d) offers an additional kind of offset cue. The ratio here is only 4:3, although it is spread out across the entire ensemble, and is done so melodically. That is, alternating pitch dyads create the offset between two different pulse rates.

2.1.3.2 Harmonic Accents

The second gestural aural cue is called a "harmonic accent." Harmonic accents and rhythmic offsets are closely related in that they both succinctly and simultaneously present multiple pitches. While the offset cue has two or more instruments in rhythmic tension, the harmonic accent presents all pitches simultaneously across the entire

10 *Duettone* and a companion piece, *Duettino* were written for violinist Rolf Schulte and cellist Fred Sherry, and both pieces were dedicated to Milton Babbitt. Both duets were published separately, but later published together, along with an additional duet, *Adagio*, as *Tre Duetti* (Carter 2009b).

11 The violin accents create a pulse every 5/16 of the notated measure; the viola accents create a pulse every 3/10 of the notated measure; the cello accents create a pulse every 1/3 of the noted measure.

ensemble. Like the offset cue, harmonic accents are often isolated, and sometimes serve as beginnings or endings of sections.

Example 2.5 highlights two different harmonic accents. In the second of his twelve *Epigrams,* Carter brings each instrument's individual musical gestures to a halt and joins them together to present four identical harmonic attacks, though with increasing dynamic tension. These presentations are succinct, although a more sustained harmonic accent might also take place, as shown in Example 2.5(b). Here, a *tutti arco* harmonic accent in all three strings aurally announces this passage before each instrument quietly breaks off and proceeds in their own fashion. Although the presentations of these two harmonic accents are different, their aural effects are still similar. These and other sudden *tutti* sonorities are frequent in Carter's pieces, and often signal significant moments.

2.1.3.3 Wedge

Whereas the first two gestural types are largely dependent on rhythm and synchrony, the final two gestural aural cues—"Wedge" and "Directional"—are largely dependent on contour. These latter two types consist of shared compositional strategies in that many composers spanning different time periods use similar musical gestures. Due to their aural salience in Carter's pieces, however, they deserve distinction. In the first of these contour-driven gestures, two (or more) instruments either diverge from or converge toward each other. One moves suddenly down in register while the other moves up. Example 2.6 displays several of these aural "wedges."

We have already seen one clear instance of an outward wedge in Chapter 1, in *Hiyoku*'s opening measures. Another very similar instance appears in *Duettone* in Example 2.6(a). Earlier in the same piece an inward wedge immediately follows a rhythmic offset cue, shown in Example 2.6(b) (which extends Example 2.4(a) from above). Example 2.6(c) shows an extended wedge cue in *Epigrams VIII*, contained only in the violin and cello. At first, the two lines appear to converge together, but ultimately move away from each other in another outward wedge figure. Finally, Example 2.6(d) isolates a combined wedge cue between three instruments. The flute and oboe work in parallel fashion, with opposite directional contour to the clarinet. The resulting aural effect is an outward wedge immediately followed by an inward wedge. Not all aural wedges in Carter's music are as conspicuous as the ones shown in Example 2.6, but their frequent appearance in isolation (Example 2.6(b)) or as a melodic climax (Examples 1.1, 2.6(a), 2.6(d)) allows the listener to recognize this cue fairly easily in many pieces.

2.1.3.4 Directional

The final gestural cue is similar to the wedge cue in that the primary defining aural characteristic is contour. Rather than diverging or converging lines, however, directional cues lead the listener in one primary direction. While there are certainly abundant moments where melodic lines rise or fall, a directional aural cue often extends to include more than two or three notes. That is, they expand beyond a short motivic fragment. Directional cues can occur with one or several instruments. Unlike the wedge, they are often contained in the middle of Carter's melodic sections, but are still aurally salient.

Example 2.7 provides two melodic rises, each from two different instrumental duets. The rise in 2.7a splits a series of sustained pitches in both instruments, whereas the rise in 2.7b emerges from a continuous stream in one of the instruments. Sustained pitches only follow the rise in 2.7b, and do not precede it. Although we can aurally recognize these as gesture with similar contour, they are dynamically opposite: the first instance has an abating dynamic tension while the second instance increases intensity.

Example 2.8 provides two falling directional aural cues. In *Epigrams II*, the piano descends into a low register. It is aurally perspicuous not only because of its clear contour direction, but also because it is the only melodic fragment between two rhythmically emphatic sections (see Example 2.5(a) for the immediately preceding measures). The piano sounds more like a single downward melodic gesture than a continuously developing melody. The *Oboe Quartet* in Example 2.8(b) involves both the oboe and violin descending together in a continuously melodic passage. This combined melodic fall is again conspicuous due to what precedes and follows. In measure 257, the violin's motivic imitation launches the melodic fall for both instruments, which ends in measure 258 with similarly accented motives. While these directional cues are only isolated moments within a larger and varying expressive context—as are all gestural cues—they serve as frequent aural markers across many of Carter's chamber pieces. These four main types of broad gestural cues become increasingly familiar in Carter's later pieces, suggesting that his increase in compositional output later in life—particularly after 1990—might be linked with reusing common materials.

2.1.4 Characteristic Cues

The next type of aural cue is called a "characteristic cue," and differs from the previous types in that it can take a variety of shapes and sounds, and is often individualized depending on the instrumentation and ensemble. Carter designs his "instrument-characters" in such a way that distinct aural features separate one from another. Of the String Trio, Carter intentionally wanted to "make the viola have its own voice and be the most prominent member of the ensemble." One way he gives the viola its own unique voice is to assign it a particular technique that the other instruments do not use. Example 2.9(a) shows the String Trio's final measures, where the viola offers its final melodic statement. The viola is the *only* instrument that uses a left-hand *pizzicato* (marked with a "+"). The final pitch features the left-hand *pizzicato* preceding a sustained bowing on the same pitch. This "sustained *pizzicato*" is the viola's characteristic cue throughout the piece, and has a certain unique aural quality. Other characteristic aural cues involve extended instrumental techniques, such as several isolated musical ideas in *Mosaic*, shown in Example 2.9(b). Characteristic cues may happen multiple times in a piece or only once, but their significant aural presence as unique identifying markers gives them their status as a characteristic cue.

Example 2.10 shows two additional characteristic aural cues, which serve as significant aural markers within each piece. The snap *pizzicato* used in *Duettino* is not unique to only one instrument, but it does provide a distinct aural cue. In much of Carter's string writing, the snap *pizzicato* becomes a frequent marker, occurring during melodic or textural change. In 2.10(a), two snap *pizzicato* cues precede a clear rhythmic offset cue. Example 2.10(b) involves sustained overlapping pulse streams, with

intermittent *mezzo forte* accented pitches in measures 100, 102, and 103 (which can be interpreted as birthday candles in celebration of Carter's friend, Goffredo Petrassi). Both characteristic cues in Example 2.10 help mark "significant events" within each piece, either structurally or within the piece's characteristic aesthetic.

2.1.5 Referential Cues

In addition to its sonic aspects, the cue in Example 2.10(b) has an extra-musical meaning, referencing something outside the piece itself. This is the critical defining feature of a *referential* aural cue. Referential cues are any of the previous aural cue types, *plus* an added indexical meaning. Carter often forges these references via text-setting, but such meanings can also arise without explicit textual indices.[12] Even if the "candle" characteristic cues in *90+* do not refer specifically to candles, the composer's intended tribute to Goffredo Petrassi transforms the cues from mere salient sonic event to an extra-musical payment of respect.

A glimpse at an early piece provides both an example of another referential aural cue and sets the stage for *intrinsic* and *extrinsic* cues. "The Line Gang" is the third song from *Three Poems of Robert Frost* ([1942] 1975), which Carter set relatively early in his career.[13] Example 2.11 shows the song's final measures. A "telegraph-like" gesture in the piano musically illuminates the text, "They bring the telephone and telegraph." That is, the pianist's physical gestures and the resulting musical output mimic the physical gestures and sounds of a telegraph operator and machine. A mimetic gesture such as this might lead us as listeners to imagine that we are *hearing* a telegraph, when in fact

12 For essays on Carter's text settings and engagement with poetry, see Calahan and Wilding 2014.
13 The song was originally published in the early 1940's for piano and voice, and later orchestrated in 1975 for chamber orchestra.

we are hearing the piano.[14] The physical performative gestures of both the piano and a telegraph allow the listener to make this analogy.[15] Arnie Cox's (2011) "mimetic hypothesis" provides connections between audible musical events and possible embodied perceptions of these events. Whether or not a listener draws a connection between the physicality of the piano and that of the telegraph is highly dependent on that individual's experiences with piano performance or similar physical gestures. The imitative nature of the phrase—regardless of any listener's embodied experiences—is enough to label it as mimetic, and therefore, *referential*. Regardless, the passage has a different aural quality than anything prior, largely due to its rhythmic differentiation. The cue's salience is noteworthy even without the mimetic correspondence, and also demonstrates what Robert Hatten (1994) calls musical "markedness": the "valuation given to difference" (34). The markedness is explicit in the Carter song: this is the first and only time in the piece that he uses a rhythmic "telegraph" musical gesture. The music at this point deviates from previously established musical expectations.

Carter wrote "The Line Gang" relatively early in his career, before he solidified his rhythmic manipulations and set-based compositional style. Example 2.12 shows a similar referential example in more recent music. Carter composed "Am Klavier," the third and central song of the cycle *Of Challenge and of Love* (1994), nearly five decades

14 During the development of the telegraph in the 19th century, William Thomson (a.k.a. Lord Kelvin) developed and built many prototypes and models of telegraphs. In 1856, Thomson delivered a paper on the possible efficiency and rapid performance of the telegraph, saying, "That it would be possible to work by hand at this rate there can be no doubt, when we consider the marvels of rapid execution so commonly attained by practice on the pianoforte" (Thompson 1856, 303–307). He was thinking about the performative aspects of both mechanisms. Carter's song reverses the analogy, proceeding from the piano to the telegraph.

15 Lawrence Zbikowski develops a theory of metaphor in music that uses mapping across different domains in order to develop sonic analogs of dynamic processes. This broad-based approach allows for the mapping of telegraph and piano "operators" to be conceived as synonymous. See especially Chapter 2 of Zbikowski 2002.

after *Three Poems of Robert Frost*. At a particularly striking moment in "Am Klavier," however, the music deviates from previously established pulse-streams with a referential aural cue. Example 2.12 shows this moment, when the primary pulse-stream in measure 29 breaks apart in measures 30, just as the singer proclaims "These soft hammers give gentle blows to all their strings."[16] The piano—as an instrument—becomes the musical focus during this passage, but not merely because the text refers to "these soft hammers." The piano rhythms here deviate from the pulse-streams, and thus draw the listener's attention. Early in the piece, the piano establishes an accompaniment to John Hollander's poem. But beginning in measure 29, rhythmic expectations suddenly become broken, refocusing the piano from merely accompaniment to reference object. These rhythmic gestures are thus referential: the deviation from the pulse-streams allows the accompaniment to be heard *as a piano*.

2.1.6 Intrinsic and Extrinsic Cues

The previous example from "Am Klavier" is not only a referential cue, but also offers a particularly clear example of how any type of cue has either an *intrinsic* or *extrinsic* status. This final category of aural cues is less discrete as the others, as the status of being intrinsic or extrinsic encompasses all of the previous types of cues. Intrinsic and extrinsic cues define a work's aurally established expectations, including when these expectations are broken or abandoned. These types of cues can have a cyclical (or recursive) relationship. That is, an extrinsic cue may begin as a slight

16 By the 1990s, Carter's use of *pulse-streams* and *polyrhythms* was already well-developed. His pulse-streams have been much studied in the theoretical literature. See, for example, Restagno 1991, Link 1994, Schiff 1998, Poudrier 2008 and 2009, Wierzbicki 2011, and Coulembier 2012.

divergence from an established aural pattern. If repeated enough, it can become the accepted intrinsic cue within a movement or smaller musical section. The extrinsic cue becomes the new intrinsic cue, while an older established intrinsic cue could now be interpreted as a local extrinsic cue.

Carter states that "every single piece of music sets up its own frame of norms and deviants, and that the only question about this is the 'linguistic' level on which the identity of the piece and of its norms and deviants is established" (Edwards 1972, 85–86). Carter clarifies that he seeks a musical syntax beyond tonality. "In post-tonal music," he continues, "it's simply that each composer, every time he writes a piece, has the opportunity of 'making up his own language,' so to speak, conditioned only by the requirement that it be a *language*, i.e., that from the point of view of the imagined listener the morphological elements have a recognizable identity in each case and that their status as musically relative 'norms' and 'deviants' (as [Leonard] Meyer puts it) be clearly established in the works" (Edwards 1972, 86). If aural cues are the "recognizable morphological elements" to which Carter refers, then "The Line Gang" phrase in Example 2.11 and the "Am Klavier" phrase in Example 2.12 show referential cues that deviate from an earlier established "norm."

To better exemplify an intrinsic/extrinsic relationship in "Am Klavier," Example 2.13 shows the opening measures of the song, in which the piano's left hand establishes a regularly occurring pulse, just prior to the singer's entrance. This pulse-stream is based on a periodicity of five sixteenth-notes with a sextuplet division, and is present throughout the majority of the piece. A secondary pulse-stream begins a short time later (not shown in the example), and is also present for much of the piece. The two pulse-

streams intersect for much of the song, creating a polyrhythmic "norm" for the piece. Though not a specific aural cue, the nature of this established musical process marks it as *intrinsic*. In the context of the entire piece, the "piano hammers" section may sound slightly adventitious, particularly regarding the intrinsic, pulse-stream polyrhythmic interplay. It is thus *extrinsic*, in addition to being referential.

While the referential significance of these aural deviations is readily apparent in both "The Line Gang" and "Am Klavier," our goal is a deeper connection between the aural surface and underlying (potentially *non*-aural) structural events. The combination of aural experience and compositional frameworks can lead the listener to establish what Leonard Meyer calls *implicative* relationships. Meyer (1973, 113) explains that these inferences "are like hypotheses that experienced listeners entertain (perhaps unconsciously) about the connections between music events—past and present, present and future ones—on the several levels of hierarchical organization in a particular movement or work."[17] Even though Meyer is talking specifically of tonal melodies, it is possible to imagine a similar treatment of Carter's melodies, "instrument/characters," and aural relationships. Section 2.2 continues to explore phenomenal surfaces events and their connections by examining specific relationships of *aural textures* in Carter's music.

17 Meyer defines an implicative relationship as a relationship "in which an event—be it a motive, a phrase, and so on—is patterned in such a way that reasonable inferences can be made both about its connections with preceding events and about how the event itself might be continued and perhaps reach closure and stability" (1973, 110).

2.2 Textures

2.2.1 Introduction

Looking again at Example 2.1, many individual and short sonic events can now be described in terms of aural cues. When viewed—indeed when heard—in a larger context, the individual cues, as well as other surrounding musical phenomena, combine into a field or sound pattern, which I will refer to as a musical texture. In the transitional measures in the *Clarinet Quintet*, the musical textures interact, and the change is aurally potent, but it's not necessarily obvious that any compositional ordering or re-ordering of harmonies and pitch-sets are at play. Joseph Dubiel examines the relationships between the sonic surface and underlying compositional ordering in his exploration of the music of Milton Babbitt, Carter's friend and contemporary. Dubiel notes that "a listener's conception of the relations among its elements can be affected by the particular way in which its elements are realized" (1992, 85). Recalling Example 2.1, a texture consisting of simultaneous and rapid pitches dissolves and morphs into a new melodic texture, marking a shift between the first two movements of the piece. Dependency on aural relationships between the two textures informs and defines their identities. Dubiel's words are again apt for this excerpt of Carter's music: "The transition into a new section of textural design, for instance, may determine a way of hearing the entire section in relation to its predecessor—in a relation more particular than that of sheer succession, which both affects and depends on the perceived content and progress of the section" (1992, 85). Carter's textural design and the resultant avenues of hearing are therefore of interest.

Textures have traditionally been defined as one of several different patterns that involve the interaction of melodic and harmonic components: melody and accompaniment, monophony, homophony, polyphony, counterpoint, etc.[18] These common textures can be found in both tonal and post-tonal music. Even though only a few representative texture types are common, they still produce an abundant variety of resulting sounds. Additional textures also emerge throughout the nineteenth and twentieth centuries, as new methods for composition, new instruments, and new audiences emerged. Other descriptive and topical textures can be used in combination or in isolation from these textures. We might hear a piece as having a very "heavy" texture, or that a certain movement has an "airy" quality. Often, descriptive textures relate more to something extra-musical, such as a human emotion or condition. While many descriptive and topical textures deal with common-practice music, there has also been an attempt to expand this vocabulary for more recent art music (Köksal 2013).

We also might assign certain representative textures to specific composers, as being "Beethovenian," "Brahmsian," or "Wagnerian." These composer-oriented textures arise from the consistency or longevity of compositional practice. Yet again, one tends to identify these aurally, depending on the listener's exposure and training. Referencing an interview from 1971, Marguerite Boland points out that "Carter cites the many coloristic, rhythmic, and textural effects that assist the listener to recognize important structural and thematic returns in Beethoven's music—without the listener necessarily following the underlying tonal harmonic structure" (2012, 83). The same can be said for Carter, as he has his own characteristic and aurally recognizable textures. Boland even goes on to

18 Wallace Berry's monograph (1976) offers several perspectives on varying contexts of musical texture. For an account of textures in twentieth-century art music, see Roig-Francoli 2008.

define a "rain" texture, and its formal role in the *Boston Concerto* ritornellos (2012). The remainder of Chapter 2 examines Carter's characteristic textural designs, which will in turn help inform the formal divisions to be explored in Chapter 3.

2.2.2 Simultaneous Streams (Rapid)

In Carter's later music, two primary aural textures, based on pulse-streams, are commonplace: s*imultaneous streams* and *interlocking streams*. Regardless of their relative speeds, streams either sound at the same time (simultaneous stream) or alternate (interlocking stream). The first texture type under investigation is comparable to the rhythmic offset cue, in which two or more pulse streams interact at the same time. Although a rhythmic offset cue is typically isolated by rests, Carter just as often—if not more frequently—creates longer passages during which this same phenomenon occurs. A continuous, rather than isolated, succession of notes in more than one instrument forms the simultaneous streams texture. This texture has two primary versions, with the only difference between the two being the speed at which they move. Example 2.14 provides several *rapid* simultaneous streams.

Example 2.14(a) gives a two-voiced excerpt from *Call*. The trumpet and horn quickly progress through their melodic streams at their own speeds. The two excerpts from *Epigrams* have similar rapid streams to *Call*, but are slightly varied. In *Epigrams III*, all three instruments fill the rapid streams texture. However, the violin and cello progress at the same rate, thus there are only two streams. A characteristic snap *pizzicato* marks the beginning of *Epigrams XII*, followed by rapid simultaneous streams in all three instruments. There are three different stream speeds, although four discrete

streams exist if one counts the pianist's hands separately. Aurally, all three excerpts in Example 2.14 sound texturally similar, although their respective *densities* are slightly different—the *Epigrams XII* texture likely sounds "fuller" than the texture in *Call*. We can specify whether each speed has one or more streams acting concomitantly. If each instrument is playing only one pitch at a time and traveling at an independent speed, I will refer to this as a *singular* stream. If more than one instrument is playing pitches at the same rate, or if one instrument is playing two or more pitches at the same rate, I will refer to this a *compound* stream texture. Thus the *Call* example involves singular streams whereas the *Epigrams III* example is a compound streams texture, due to both string instruments progressing at the same speed. The *Epigrams XII* excerpt would be called single with regards to three different instruments progressing at their own speed, unless one wants to consider the pianist's hands separately, in which case one could argue that it is a compound stream texture. Carter creates this texture in most of his latter works, sometimes for a long section or entire movement. The distinction between single and compound streams also occurs frequently in the s*ustained* style of the simultaneous streams texture.

2.2.3 Simultaneous Streams (Sustained)

The sustained version of simultaneous streams is much less hurried than Carter's rapid textures, and involves instruments that hold pitches for an extended duration, and sometimes for a significant amount of time. In many later pieces, this texture more often occurs in a middle movement or section of the piece, rather than at the beginning. As in the rapid streams, the sustained pitches typically follow their own pulse rate. Sustained

pulse rate are often dissimilar in length, although they sometimes hold similar ratios to the much shorter pulse rates in contrasting sections.

Example 2.15 gives two instances of the sustained-streams texture, each with only a single stream. In *Hiyoku*, each varying stream speed has a regular pulse, whereas the *Adagio* example is in a similar sustained-stream texture, yet with slightly irregular pulses. The excerpts in Example 2.16 similarly show sustained-streams, although now they include compound streams. The *Duettino* example (2.16(a)) involves only two streams at irregular sustained durations, yet both the violin and cello play two pitches. Both the *Two Diversions* and *Call* excerpts (2.16(b) and (c)) also involve only two sustained pulse streams. In the former, the right hand progresses as a single stream, while the left hand progresses as a compound sustained stream. The *Call* excerpt is similar to this as the trumpets combine to form a multiple sustained stream against the horn. Additionally, the *Call* example can be aurally interpreted as an outward wedge in the outer voices.

2.2.4 Interlocking Streams

The relative speed of streams helps differentiate the rapid and sustained textures described thus far, but due to their process of progressing at the same time links them as simultaneous streams. A compositionally related, but aurally different texture is called "interlocking streams." In this texture, two or more instruments "bounce" stream segment back and forth between each another. When one instrument is playing, the other instrument or instruments are silent, often similar to the *hocket* technique in 13th-

and 14th-century European vocal music.[19] Carter typically uses different pulse rates or speeds for each instrument, just as he does to create the simultaneous streams texture. Example 2.17 shows interlocking streams in the String Trio. Rather than hearing a single stream of notes, an astute listener can instead hear that the differing speeds and short melodic fragments are deliberately kept separate. The interchange of sound and silence is thus a prominent audible component in this texture, and would be equally clear while observing a live performance. Just as we witnessed variety in the simultaneous streams texture, there are a numerous ways we can discern variations in interlocking streams.

Example 2.18 shows two different passages from *Au Quai*. In 2.18(a), the instruments interlock at only one note each. Due to the changes of register in both instruments, as well as the change in bowing (*pizzicato* and *arco* in the viola), we might hear disparate sounds, giving the passage a somewhat sparse and pointillistic texture. At its core, however, this passage involves two interlocking instruments at different speeds. These speeds do not remain consistent, and increase their pace in measure 16, slowly morphing into a simultaneous stream texture. Carter occasionally uses a double slur or dotted line to help indicate to the performers when the streams are passed from one instrument to another. Later in the same piece, a different interlocking stream occurs between the viola and bassoon, shown in 2.18(b). In measure 42 there is a similar single-note interchange between the instruments. This lasts only briefly, until the bassoon picks up the melodic *hauptstimme* in measure 43, aurally identifiable as a melodic rise cue. At this point an interlocking texture remains, but it now involves a longer melodic gesture in the bassoon exchanging with viola multi-stops. Following

19 For a landmark monograph on music of the 13th and 14th centuries, including examples of *hocket* in Guillaume de Machaut's music, see Robertson 2002.

another bassoon melodic rise in measure 44, the two instruments again develop into a simultaneous stream texture, with the bassoon remaining the primary melodic entity in measure 45.

In the String Trio, the texture during measures 80–84 (Example 2.19) consists primarily of interlocking streams between the viola and cello, just as it does earlier, shown in Example 2.17. The two streams involve either triplet eighth-notes or sixteenth-notes. What's different about this instance is that the two instruments *exchange* their pulse rates, thus both instruments have either the triplet eighth-note or sixteenth-note stream. They remain interlocking, and do not overlap. This passage is also similar to measures 43–44 of *Au Quai*, in which there is a multi-stop interlocked with melodic fragments. The viola takes an active role in how the interlocking streams operate. One way we can hear the viola is that it interlocks directly in between the two other instruments' melodic streams. The viola uses multi-stops, however, rather than melodic gestures, and serves as the catalyst for the pulse rates exchange between the violin and cello. That is, the viola multi-stop signals that the violin will change from triplet eighth-notes to sixteenth-notes. The same is true for the cello. While the violin and cello do not have a consistent pattern or rate of their respective melodic gestures, the viola *does* have its own pulse rate, at intervals of exactly one measure. The resulting effect is a steady, slow pulse, around which two more rapid pulses change their speed. We might envision a singular planet, around which two moons circumnavigate in elliptical orbits. As each moon gets closer to or retreats from the central planet, it either accelerates or decelerates. This is especially true in measures 81–84, when the steady multi-stop pulse breaks down, as does the pulse rate exchanges between the interlocking instruments.

2.2.5 Interjections and Static Fields

Another way to view the viola's role is Example 2.19 is that of an interloper, intruder, or disturber of an established order. Had the viola not played at all in these measures, the interlocking texture would still be aurally apparent. Just prior to these measures, the viola is indeed silent, while the violin and cello exchange melodic fragments. That is, until the cello breaks the melodic exchange with something *extrinsic* to the passage. The cello's triple-stop in measure 80 serves as the impetus for the viola's continued multi-stop interpositions for the ensuing measures. Such phenomena are frequent in Carter's music, and will henceforth be considered *interjections*. Interjections can take various forms. In the case of the String Trio excerpt above, an initial interjection serves as an extrinsic aural cue in the cello, but then establishes itself locally as a regularly repeating characteristic during the measures. Thus the interjection becomes the interlocking texture's intrinsic aural cue. Example 2.20 shows a different interjection, this time in the context of a sustained, simultaneous streams texture. In measure 56 of Carter's *Oboe Quartet*, the sustained oboe and cello streams are suddenly interrupted with a single, short pitch. These two interjections aurally disrupt the overall texture of the passage.

The relationship between phenomenal presence and absence relates to the relationship between an aural "figure and ground." Interjections impose their presence onto the musical surface, often forcefully, thereby becoming an immediate presence as a prominent aural figure. Carter also creates the opposite effect by making an event with initial salience fade into the musical background, yet remain present. I call this a *static field*; such fields occur when all or nearly all musical parameters of one or more pitches

remain in stasis for an extended time period, while other musical gestures come to the fore. In other words, there is exchange of the aurally salient music figures and grounds. Static fields "fade" to the background. The field is still present, and with focus is certainly perceivable. Interjections and static fields often have reciprocal relationships, as they move in and out of aural prominence. Example 2.21 shows a static field in Carter's *Oboe Quartet*. The sustained oboe pitch at measure 197 (and previous), becomes less aurally prominent as the strings promote themselves with articulated multi-stops, culminating in a rhythmic offset cue in measure 199. The oboe interjects again in measure 200, but again becomes a static field as the harmonic accents begin again in the strings.

2.2.6 Uniform Spread and Individual Focus

Another aural delineation in Carter's textures either distinguishes one or more specific instruments, or treats them equally. A *uniform* aural texture is one in which there is no clear dominance of one instrument over the others. A relatively homogenous sound field spreads across all instruments. By contrast, a texture can have an *individual focus,* in which one instrument exerts its prominence above the others. An individual focus is not as simple as a melody with accompaniment, although that would certainly be one type of individual focus. In much of Carter's music, there might simply be a *prominent* voice, which may not be especially melodic in nature. In many of his pieces, Carter explicitly marks principal and secondary voices, or adds score direction to "bring to the fore."

Example 2.22 demonstrates the difference between uniform and individually focused textures from Carter's String Quartet No. 5. In measure 89–92, shown in Example 2.22a, all instruments create a texture of sustained simultaneous streams. Some shift between singular or compound streams, but all are generally treated equally, creating a uniform aural texture. Later in the piece, as shown in Example 22.2b, all instruments instead create a rapid simultaneous streams texture, though, again, the texture is more or less uniform. Example 2.22c shows an even later moment in the quartet, where the harmonic accents and simultaneous streams are uniform across the ensemble *except* for violin 2. The melodic differentiation from the other instruments shifts the aural focus, either to or away from violin 2. In Carter's chamber pieces, the distinction between one dominant voice and a more uniform texture is often aurally clear and explicit.

2.2.7 Composite and Layered Textures

One final consideration of textures will conclude our examination of aural components. While many of the examples throughout this Chapter present clear instances of the concept at hand, this is not always the case. Some passages in Carter's music may be so sparse or dense that not one clear texture or specific set of aural cues emerges. This results when textures are *composite*, or *layered* on top of each other. One type of composite texture involves a constant ebb and flow of two or more different types of texture. For a brief period, one texture may dominate the piece, but it soon evolves into a different type of texture. Example 2.23 shows this in a movement from *Epigrams*.

In measures 4–5 of *Epigrams VIII*, we might hear the back and forth interaction between interlocking streams and simultaneous streams. For brief moments the instruments are clearly interlocking melodic fragments, while at other brief moments they are playing at the same time, even at the same speed. This is typical of much of Carter's music. Thus it shows how the texture of interlocking and simultaneous speeds fades in and out of focus.

In some of Carter's larger chamber pieces, a composite texture can also occur through the collective textural aggregate of all instruments. Although the texture of a passage in *Mosaic* (shown in Example 2.24a) sonically resembles something like *Klangfarbenmelodie,* it is, in essence, a composite interlocking streams texture. Even though melodic fragments are spread out over numerous wind and string instruments, there exist only two speeds of pulse-streams: the sixteenth-note and triplet eighth-note. These two pulse-streams run simultaneously in all instruments leading into measure 39. At this point, the instruments fragment, yet the two pulse streams remain constant. The triplet eighth-note stream interlocks between all seven of the sounding instruments: string bass—viola—bass clarinet—flute—oboe—cello—violin. The sixteenth-note stream does not traverse all of these instruments, but instead is limited to oboe, violin, viola, and bass clarinet. A listener might hear the passing of each stream fragment from one instrument to the next; the interlocking texture still remains an interchange between only two pulse rates. Example 2.24b re-composes the pulses onto only two staves, showing how the composite streams still interlock by filling in the silent spaces between each melodic fragment.

The excerpt from the piece *Nine by Five* (2009) in Example 2.25 shows an interlocking structure similar to that in the *Mosaic* excerpt. Here, there are three different pulse rates spread out across the five instruments. Each melodic fragment picks up from the previous fragment. Below the full score is a rhythmic reduction highlighting the interlocking nature of the "three streams by five."

"Reduced" composite textures, such as those shown in Examples 2.24 and 2.25, compile all of the sonic events into only one type of texture. Rapidly changing composite textures, such as that shown in Example 2.23, may deal with multiple textures, but are still successive, rather than simultaneous. *Layered* textures refer to the simultaneity of one or more types of textures. Carter's development of layering effects dates back to layered ensembles (*A Symphony of Three Orchestras* [1976]), layered formal movements (String Quartet No. 3 [1971]), and other layered devices prior to this. In his later chamber pieces, however, layered textures are often readily discernable. When encountering layered textures a focused listener might attend to an individual texture or concentrate on the interactions between these textures.

Example 2.26 demonstrates the layering of a sustained streams texture in the strings (single streams with uniform spread) with a rapid streams texture of the winds and harp (single streams in the winds, with uniform spread). A focus on only strings, or winds/harp would yield two different types of texture. The combined aural effect of the interaction between the two layers, however, is that of a larger interlocking texture: the rapid streams only progress during sustained moments of the strings, while the strings only shift their pitches when the rapid streams are silent. The concepts of meta-texture types (such as this large scale interlocking texture), or complex aural cues (are the

strings interjecting into the winds/harp sonic field, or *vice versa*?) are essential tools for aurally navigating Carter's music.

2.3 Combining Components into Aural Analysis

The previous typology of aural cues and textures is not exhaustive—many additional cues and textures could be formulated in the pieces surveyed in this chapter, and across a wider swath of Carter's output. Additionally, these phenomena can extend beyond Carter's late pieces to his earlier music and that of other composers. Enough component pieces are now in place for us to consider how they might function in a larger analytical framework. Before doing so, we can summarize some of the important aurally dependent facets of cues and textures:

1.) Cues and textures are aurally salient.

2.) They can be created by one instrument or many.

3.) Cues can serve more than one function within a given texture. A characteristic cue might aurally identify an instrument in the context of a piece, be gestural in nature, indexical of something extra-musical, and serve as a local interruption and extrinsic event.

4.) Carter's manipulations of ratios and pulse-streams give rise to many of the cues and textures.

5.) Textures can be layered. That is, one or more instruments might have a strict homophonic texture, while another set of instruments may be involved in a contrapuntal style. The possibility for multiple layers of textures often increases with the number of instruments.

6.) In a given context, cues and textures can establish themselves as a musical norm (intrinsic), or represent new aural ideas (extrinsic).

7.) Some textures can be described through the melodic-harmonic relationships of a passage. This can involve homophonic, chordal textures, or linear, contrapuntal textures, or some combination of both.

8.) Descriptive names can be used in conjunction with cues and textures, dependent on musical parameters. Thus a contrapuntal texture could be "forceful" or "playful."

9.) The number of instruments, or the number of pitches an instrument can play, can simplify or complicate the nature of a cue or texture.

Based purely on these observations of cues and textures, we can begin to combine and link these ideas together into a more comprehensive aural analysis. The last example will examine a longer section of a single chamber piece, with an added analysis derived from combining the categories defined above. Many foundational aural cues and textures are often introduced in the first main section of Carter's pieces. Example 2.27 provides an annotated score analysis of the first 26 measures of the String Trio. Beneath the score, cues and textures are identified, with added time markers for the first minute of the piece.[20]

In the context of characteristic cues, we have already identified the "sustained *pizzicato*" as the defining characteristic cue of the viola, introduced in its opening

20 These timings are based on the performance of Rolfe Schulte, Richard O'Neil, and Fred Sherry at the 103rd Birthday Concert for Elliott Carter, held in New York City on December 8, 2011.

phrase.[21] Measures 1–12 reveal a texture that is primarily an unaccompanied viola solo melody. The exception is an "aggregate interjection" in measure 6, comprised of two separate aural cues. One cue is the cello's *pizzicato* figure, while the violin plays a directional gestural cue, rising up and then falling back down. The two cues combine to form the aggregate, or a tetrachord/octachord complement pair.[22] Measure 12 again interrupts the unaccompanied viola melody, once more as two separate interjecting aural cues. The cello uses an *arco* quadruple-stop while the violin trills between two pitches. Collectively, they form a kind of offset cue. This also serves as a bridge to the next type of texture, which is a prominent sustained melody with sustained pitch accompaniment in the other instruments. Thus we can hear this as sustained simultaneous streams, although the viola is still privileged as the dominant instrument. There is only a brief passage of this type of texture, from measures 13–16. During measures 17–20 the violin and cello continue hold sustained pitches, mostly fading to the background as a static field. This is made more prominent by the viola's *martellato* gesture and interjections. The double-stop interjections, extrinsic to the static field, begin to assert their dominance due to repetition, dynamic differentiation, and stark contrast to the static field. Ultimately, however, all three instruments take up streams of double-stops in measure 21, solidifying the viola's initial interjection as an intrinsic part the texture. The simultaneous streams, this time more rapid, continue into measure 23, where a brief pause in each instrument isolates a culminating rhythmic offset cue.

21 Depending upon the performance, the initial attack of the "sustained *pizzicato*" may be more or less aurally salient. Added visual cues, such as watching a performer perform this articulation, could add to the "identity" of the cue.

22 Details of pitch combinations are explored in more detail in Chapter 4.

An account of these cues and textures in the opening measures of Carter's String Trio is more than merely descriptive. Analysis makes the relationships of key sonic events become more apparent, and an increasingly broader view of a listener's potential musical *experience* comes to the fore. What we have not accomplished yet is to 1) examine how these phenomena might influence aurally defined *formal* divisions of a composition; and 2) scrutinize the compositional details behind these events. The following two chapters achieve both of these goals.

Chapter 3
Form, Ambiguities, and Shifts

"…what is so valuable about it musically…"

Of Elliott Carter's concertos, David Schiff reflects that, "If we add…the more obvious observation that Carter's concertos lack the thematic structures and lyrical melodies that distinguish the concertos of the concert repertory, it is clear that Carter approaches the form with a quixotic disregard for its conventions" (1998, 234). Carter's formal innovations and designs extend beyond the concerto, however. Although he uses the basic frameworks of many traditional forms, Carter does not necessarily adhere to their specific features. He voiced his desire to reconsider form around the time of his first quartet in the early 1950's, turning "his interest from rhythm and harmony to the larger questions of continuity and form: 'Musical discourse needed as thorough a rethinking as harmony had had at the beginning of the century'" (Schiff 1998, 22–23). And while Carter did carefully manipulate traditional form, he also thought about the *aural* facets of form. For example, Schiff explains the connection of sounds and form in The Double Concerto for Harpsichord and Piano (1961): "From the first, sounds and structure were to be one; the work would 'get down to the physical origins of musical sound and…take off from there'" (1998, 244). Recognition of clear aural formal procedures continues into Carter's recent pieces as well. In her chapter on Carter's *ASKO* concertos, Marguerite Boland also notes that "for Carter, form conceived as a process linked to musical content has been a long-held aesthetic principle of his composition" (Boland 2012, 80), with "musical content" being the salient aural

experiences of a listener. Furthermore, in his later music, Carter's continued manipulations of forms and musical materials have "emphatically *originated their own forms*" (2012, 80; emphasis original).

Carter's melodic devices are no less important than form, and their aurally recognizable interactions are no less influential on phenomenological accounts of his music. Stephen Heinemann says of Carter, "While he embraced athematicism as enthusiastically as any other modernist, he nevertheless found that the melodic line was conceptually appropriate to his musical goals, and he has used melody, often in quite expansive forms, to represent the instrumental characters, and by extension the scenarios of conflict, that permeate his compositions" (2012, 190). Heinemann does not solely concentrate on aurally similar motivic events (such as the aural cues outlined in Chapter 2), or the construction of what might be construed as a "traditional" or "singable" melody. His definition is broader than this, in which a passage of music is melodic as long as a "temporal progression/succession of pitches in rhythms is *perceived* as a connected event."[1] I will adopt the same, broad definition when discussing melodic ideas in Carter's music.

With the potential connections between formal and melodic procedures and a listener's experience in mind, the current chapter continues the strategy of Chapter 2, building a framework once again from a *sonic* ground. As before, the primary analytic focus is a listener's experience of music, not a precompositional perspective. The chapter is divided into two main sections, dealing with form (3.1) and melody (3.2), respectively. Two primary topics are discussed within each of these main sections. 3.1.1, "Aural

1 Heinemann 2012. See note on 190, emphasis is mine.

Boundaries," builds from the concepts of cues and textures in Chapter 2, and shows how they can create salient barriers, effecting continuity and change. 3.1.2, "Metric Modulations and Section Divisions," presents a new account of Carter's metric modulations, and how they can be categorized as aurally "constant" or "inconstant." After an introduction to the section on melody (3.2.1) highlights some trends in Carter's melodies, section 3.2.2, "Aural Ambiguity," discusses how some melodic interactions create passages in which instruments blend in and out of perspicuity. 3.2.3, "Aural Shifts," demonstrates a common melodic procedure in Carter's music: an exchange of melodies and textures from one set of instruments to another. In addition to several small examples, three brief analyses elucidate the four main concepts of the chapter. The first analysis examines aural boundaries in *Trije Glasbeniki* (2011); the second examines the metric modulations in the String Trio (2011); and the third considers some of the aural interactions of melodies in *Mosaic* (2004).

3.1 Form

3.1.1 Introduction

Chapter 2 demonstrates that many cues and textures provide opportunities to examine Carter's music with a special attention to similarity and difference. For instance, rhythmic offsets and wedge cues group together aurally according to similar gestural behaviors. Additionally, comparisons of musical elements group events according to sameness and expectation (intrinsic events), or mark them as unexpected and different (extrinsic events). Many of the previous music examples considered thus far show that aural comparisons of musical materials elucidate common features in

Carter's music, but they can *also* elucidate larger, structural features. The idea that different, audible musical parameters can serve as formal boundaries resonates with Wallace Berry's (1976) concepts of texture and form. Horizontal and vertical boundaries of textural components create what Berry calls "texture-space." The shape of such a space can change depending on what textural components are included, and can be independent of harmonic or rhythmic components.[2] If textural boundaries can help define formal aspects of music, then other conspicuous aural events—such as aural cues—can also serve as formal markers. Any type of aural division in music, whether by texture, motivic cue, or some other means, will hereafter be referred to as an *aural boundary*.[3] Similar to Berry, Robert Hopkins (1990) also pays close attention to musical elements other than pitch and tonal function to discuss "closure" in Mahler's music. Hopkins's demonstration of how non-tonal parameters provide a sense of finality or closure reinforces the notion of aural boundaries. Hopkins even evokes Carter's music as an example of how "intensifying" and "abating" dynamics can provide closure to a passage of music.[4]

Perhaps more relevant studies are by Christopher Hasty (1981), Dora Hanninen (2012), and Patricia Howland (2015). Hasty characterizes different musical domains "by the range of different values which we hear in a particular quality of sound. The definition of each domain is largely a stylistic matter. Also the relative importance of certain domains is not universally fixed" (58). Hasty goes on to suggest that the interaction of these musical domains can produce aural divisions throughout a piece,

2 See especially Chapter 2, "Texture" of Berry 1976.
3 Patricia Howland similarly defines an *articulation* as "an event that forms a perceptual boundary" (2015, 71).
4 See especially Hopkins's Chapter 2 "Closure," and Chapter 3 "Secondary Parameters and Closure."

and that "segmentation may be regarded as the formation of *boundaries of continuity and discontinuity* that result from the structures of various domains."[5] The *Hiyoku* discussion in Chapter 1 highlights the relationships between sameness and difference, and corresponds with several of Hasty's ideas about the formation of boundaries.

Related to the idea of aurally defined formal divisions is the question of whether similar musical events continue or discontinue over time. Dora Hanninen offers refined definitions of continuity and discontinuity as different types of *orientations*. For Hanninen, an orientation "is a perceptual or cognitive strategy, a mode of attending or conceptualizing music, a 'general or lasting direction of thought, inclination, or interest'" (2012, 19). A *disjunctive* orientation "identifies perceptual salience with difference…[S]ignificant disjunctions in sonic dimensions such as pitch, duration, loudness, and timbre (acting individually or in tandem) mark *boundaries* between sound objects."[6] An *associative* orientation "focuses on relational properties, such as those supported by repetition, equivalence, or similarity. The potential for association between groupings of notes transforms predictable properties into relational ones and motivates the mutual formation and recognition of specific groupings as analytical objects" (19–20).[7] Hanninen's orientations allow for both the formation of aural boundaries in Carter's music, as well as a method for establishing the intrinsic and extrinsic events in a potentially unique syntactic compositional environment.

5 Hasty 1981, 59. Emphasis is mine. For an expanded view of segmentation and continuity in post-tonal music, see Hasty 1984 and 1986, Lefkowitz and Taavola 2000, and Hanninen 2001.

6 Emphasis is mine.

7 Hanninen's disjunctive and associative orientations are part of a larger theory that includes three types of orientations (disjunctive, associative, and theoretical) across three types of domains (sonic, structural, and contextual). It should also be noted that Hanninen and Hasty use "domain" to mean different things.

Taking Hanninen's orientations into account, aural boundaries a have a dual function to keep *different* things separate as well as keep *similar* things bound together. In this study, aural boundaries serve as sonic markers that function in both of these manners. That is, they are dividing lines between aurally different sections of Carter's music, as well as boarders at the edges of grouped aural similarities. This notion coincides with Patricia Howland's concepts of an "integrated parametric structure," or IPS, which "is defined as a succession of elements in which the whole exhibits coherence and articulation."[8] Not only do aural boundaries help elucidate these "successions of elements," but also articulate important relationships between these successions, or when one transforms into another. The examination of aural boundaries (3.1.2) builds from Howland's (and others') ideas, but expands them to include the specific aural events found in Carter's music.[9]

A particular formal device that cannot be overlooked in much of Carter's music is the *metric modulation,* also commonly called tempo modulations.[10] There has been some analytic work regarding metric modulations (Tingley 1981), including recent attempts to isolate their perceptual characteristics within a larger context of polyrhythms (Poudrier 2013). Carter himself notes that metric modulations are important markers for compositional boundaries, saying that they are used "as a mode of proceeding smoothly or abruptly from one speed to another and as a formal device to

8 Howland 2015, 71. Howland's article, built largely from Christopher Hasty's (1981) and James Tenney's (1988) work defines five IPS types that are determined primarily by parametric similarities. Howland also discusses the important of dissimilarities to determine beginnings and endings of IPSs.

9 In addition to Howland's consideration of Carter's String Quartet No. 2, other scholars examine phenomenological accounts of form specifically in Carter's music (Coulembier 2015; Theisen 2010). Michael Klein provides another account of form articulating aural events specific to a single composer, in this case Witold Lutosłowski (1999).

10 See Schiff 1998, 41–43, for an overview of metric modulation in Carter's music.

isolate one section from another" (Carter 1997, 273). Yet compositionally preconceived divisions and aurally perceived divisions are not necessarily synonymous. That is, while metric modulations serve as visual markers for a performer or score analyst, they do not necessarily equate to salient aural phenomena. Similarly, notated meter and tempo markings are not as important to a listener as aural relationships between sections. On this, Andrew Mead points out that "[i]f we concentrate on the *ratios* as opposed to tempo *rates*, we can much more readily track like changes between different pairs of tempi, and in turn develop an ear for recognizing the replicated experience of a particular ratio in various contexts" (2012, 139). An aural account for how metric modulations function is therefore the subject of section 3.1.3.

3.1.2 Aural Boundaries

3.1.2.1 Triple Duo of Aural Boundaries

Considering the number of possible aural cues and texture types, it follows that there are multiple possibilities for how boundaries surrounding these musical events behave. Throughout Carter's later pieces, there is a high frequency of six boundary types, grouped together in three pairs: *immediate—extended; chronologic—stratified;* and *soft—hard*. The analysis of the String Trio, which concludes Chapter 2 (Example 2.27), provides ample musical space to examine all three types of aural boundaries. A quick summary of this analysis can serve as a point of departure for our discussion of form: The opening measures of the String Trio involve three primary aural textures. The first is a solo melodic line that is completely interrupted by the other two instruments. The second texture involves a sustained static field, which is altered in two ways:

initially with a continued solo melody, and subsequently with interjections by the same instrument that began the privileged melody. The third texture involves all instruments with repeated pitches, though at different pulse rates.

Figure 3.1 redraws this analysis of the String Trio, but without the score. Added to the analysis are prominent boundary types. The opening 27 seconds (Figure 3.1(a)) divide into two halves of roughly equal length, each with a solo melody in the viola and ending with interjecting cues in the other two instruments. The violin and cello interjections create two kinds of aural boundaries. On a large scale, the interjections create dividing pillars between the two melodic phrases, but also bind these phrases together as musical similarities. The second phrase begins approximately halfway (both in measure numbers and in timing) through the opening 27 seconds, serving as a kind of consequent phrase to the initial viola phrase. While the discrete interjections at 0:12 and 0:25 function similarly as boundaries, they are comparatively dissimilar on their musical surface—the first interjections at 0:12 are more melodic than their more rhythmic boundary partners at 0:25. The durations of both interjections each serve as boundaries, but the precise moments of change between the lyric melodies and interjections create even smaller boundaries. In other words, there is a "front" and "back" end of both interjections, each as a local boundary between the beginnings and endings of the cues and melodies. This results in a total of four immediate moments of significant aural difference. Figure 3.1(a) includes this dual function of the aural cues as boundaries, demonstrating the first of three important characteristics: aural boundaries can create formal divisions between sections both as *immediate* moments of changing parameters as well as *extended* durations. An abrupt silence can serve as an instant

aural boundary, while an interjecting gestural cue, such as the one at 0:12, can last several seconds, and serve as an extended boundary between subsequent sections.

From 0:28 to approximately 0:46 there are moment-to-moment aural boundaries (between the viola's melody and its new, extrinsic interjections) as well as boundaries determined within the texture. Even though the texture of simultaneous streams involves all three instruments, the privileged viola—due to prominent parameters such as dynamics, articulation, and frequency of pitch changes—is set apart from the other two instruments. An aural boundary therefore divides one part of the texture from another. The viola stops its lyric melody in favor of short interjections around 0:37, which forms an aural boundary with itself—its musical parameters change at a particular moment in time. While this is a new immediate boundary in the viola, the ongoing aural boundary between the viola and the other two instruments remains. The nature of the texture changes slightly, but the behavior of the aural boundary between instruments does not. The second pair of aural boundary types discriminates between *chronologic* boundaries (which could be immediate or extended), and *stratified* aural boundaries (which, due to their necessity to aurally separate layers of texture over time, can only be extended). Figure 3.1 (b) displays the second section of the String Trio excerpt (from 0:28–0:46), and shows that the stratified aural boundary between the viola and the other two instruments lasts throughout the section. Additionally, one primary chronologic aural boundary divides this section in half, between the third overall melodic viola strand (0:28–0:37), and its individual interjections (0:37–0:46).

Figure 3.1(c) recounts the third, texturally different section of the opening sixty seconds of the piece. The viola's extrinsic interjections become increasingly familiar in

the previous section, launching the rapid simultaneous streams around 0:47. This new texture continues for several seconds until around 0:50, when several rests in each instrument precede a climactic rhythmic offset. This cue comes to an abrupt halt—a clear aural boundary of silence. Immediately following the offset cue, a harmonic accent at 0:54 provides another boundary marker, which is succeeded by a new solo melodic line in the viola. Several chronologic boundaries exist during these ten seconds, yet they can further divide into two binary oppositions. The gradual assimilation of the extrinsic viola cue around 0:47, and the staggered rests around 0:50, create gradual and overlapping changes in musical parameters. They are not immediate boundaries, and are not quite extended boundaries, as the boundaries' precise beginnings and ends are not entirely clear. Instead, these are instances of *soft* aural boundaries, meaning that the beginning and end of the boundary overlaps with previous or successive musical materials. Soft aural boundaries blend from one section to another, yet there are enough parametric alterations such that a listener can determine that there is a relatively prominent shift in texture. The opposite of this—a *hard* aural boundary—occurs surrounding the harmonic accent at 0:54. The offset cue increases in dynamic tension until it abruptly stops. There is no doubt when the exact moment of change occurs. A specialized case of hard and soft boundaries is considered with specific regards to metric modulations in Section 3.2.2 below.

Although these three sets of dual types of aural boundaries are similar in many ways, their nuanced differences allow for a great variety of possibilities. For instance, hard and immediate boundaries might seem synonymous, but a gestural cue could serve as hard aural boundary and last for a significant amount of time, and thus also be an

extended boundary. Chronologic boundaries can be immediate, extended, soft, or hard, while stratified boundaries are never immediate. A stratified boundary between textural components might also become blurred, thus also serving as a soft aural boundary. Many of these nuanced boundaries exist throughout Carter's repertoire—some are immediately aurally apparent, while others become apparent only in retrospect. Boundary types depend on relating the events in their musical contexts.[11] The previous discussion of aural boundaries does not necessitate a musical score, yet we must remind ourselves that our ultimate goal is to marry phenomenological accounts and score extracted analyses. We will do this in the next extended analytical vignette of the chapter, which examines a section from one of Carter's recent trios, *Trije Glasbeniki* (2011).

3.1.2.2 *Trije Glasbeniki* Analysis: Aural Boundaries

Carter's *Trije Glasbeniki*, or "Three Musicians," was "composed as a gift to the Slovenian musicians that [had] organized a large festival of [Carter's] music in November, 2011 in Ljubljana" (Carter 2011b). The short piece for flute, bass clarinet, and harp offers contrasting timbral sounds unique to the piece, while at the same time providing textures representative of Carter's late chamber works. The following analytic vignette examines some of the aural aspects of the piece with particular attention to aural boundaries. The piece itself is less than three minutes in length, and we will look at

11 For a foundational study on phenomenal events in musical contexts, refer to Lewin 1986, especially pages 335–343.

a central portion of it, shown in Example 3.1, with overall timings of approximately 1:17–2:02.[12]

At 1:17, a prominent harp melody creates both chronologic and stratified aural boundaries. Chronologically, the *espressivo* melody offers a new texture, aurally extrinsic from the previous passage of subdued simultaneous streams. Stratified from this (and isolated in Example 3.1), all three instruments fade into long sustained pitches, creating a background static field. Aside from the soft articulations within this static field, there is one possible aural cue that isolates itself at 1:26. At this moment, the flute's brief interjection barely disrupts the static field, but a keen listener can establish local boundaries on either side. Isolated by immediate boundaries, the flute's gesture has motivic connections with material earlier in the piece (not shown in the example). Additionally, this interjection potentially draws attention to the harp melody's repeated pitch B♭6.[13] Aside from this brief interjection, the texture persists for the duration of around twelve seconds, at which point a series of events creates new aural boundaries.

At 1:39, the harp's static field component breaks from its consistent low sustained pitches and suddenly rises. Both the bass clarinet and flute absorb this new melodic outburst over a period of several seconds, ending with the flute's G♭5 at 1:45. This aural phenomenon functions in two ways. First, the instruments work together to form a salient aural cue: a collective, gestural melodic rise. Second, a five-second extended aural boundary effectively ends the static field stratum of the overall texture. The three musicians, originally bound by long sustained pitches, cease their collective textural

12 These timings are based on the performance of Marie Tachouet, Virgil Blackwell, and Bridget Kibbey at the 103rd Birthday Concert for Elliott Carter, held in New York City on December 8, 2011.

13 Repetition of a single pitch is also a salient motivic feature of the entire piece, but plays less of a role in this analysis.

involvement. Furthermore, this extended, stratified boundary coincides with a more immediate chronologic boundary in the harp's melodic line. At 1:40, the harp's lyric melody suddenly hastens into a more rapid stream. At 1:45, just as the gestural rise ends in the flute, the rapid melodic stream immediately drops in register, creating a second immediate aural boundary in the harp. Listening retrospectively, the harp's melodic addition of rapid pitches serves as an extended boundary between the lyric melody from 1:17–1:39, and the rapid stream in a lower register beginning at 1:44. The span from 1:40–1:45 emphasizes both an upper melodic line in the harp and rapid intervening pitches. Thus, just as the end of the static field is marked by an extended boundary, the harp's melodic line switches between different textural sections by way of a different extended aural boundary. The blending of old and new materials also creates a soft boundary, until the sudden drop in register clarifies the new melodic process.[14] Once the new rapid texture is clearly set at 1:44, there is no longer a stratified boundary between textural components; there is only a rapid melodic stream in the harp.

After several seconds of uninterrupted material from harp, entrances by the bass clarinet and flute mark the beginning of a new stratified boundary, again between a melodic line and static field. From 1:48–2:01, the bass clarinet and flute's static field comes more to the fore, perhaps in response to the harp's faster melodic line. Within this new section, several other aural boundaries stand out. The first occurs at 1:51, shortly after the beginning of the new woodwind static field. The consistency of the harp's rapid stream changes and offers instead a stepwise descent, which creates a subtle and local chronologic boundary. A similar gestural cue at 1:53 counteracts this

14 Additional issues of blending and clarity are refined in the following sections on melody (Section 3.2).

descent with a clear upward directed *glissando*. With the continuation of the locally intrinsic harp stream, the *glissando* acts as an extended boundary between two like sections of the rapid melodic stream. The stratified texture with the woodwinds continues through this harp boundary until 1:59 (Example 3.1(c)), at which point another soft boundary blends intrinsically established musical material in the harp with new sonic events. For a brief time, the single, rapid stream adds an accented tetrachord, which ultimately yields a new emphasis on harmonic accents, rather than melodic streams. The exact instant when the old texture becomes the new is aurally blurred, hence another extended, soft boundary. Only moments later another clear and immediate boundary occurs with a sudden change in the woodwinds at 2:01. Both instruments begin their own individual melodic strands, beginning a new texture of two simultaneous streams.

Although this account of aural boundaries only considers about 45 seconds of *Trije Glasbeniki*, it exemplifies a very common type of progression through Carter's chamber music: Immediate changes combine with extended and blended sectional boundaries in constant waves of evolving textures. Small local boundaries such as the individual cues at 1:26 or 1:53 coexist with large, form defining boundaries, such as the textural divisions from 1:39–1:44, or from 1:59–2:01. With careful scrutiny, the listener-analyst can detect the precise nature of these types of boundaries, and articulate their differences into a meaningful aural analysis of the piece at large.

3.1.3 Metric Modulations and Section Divisions

3.1.3.1 Aural Constancy and Inconstancy

Carter's recent chamber works frequently include movements that are played *attacca*, although this practice dates back to some of his formally innovative pieces such as his second and third string quartets. Many of Carter's works—early and late—are also often described as "episodic" rather than having detached movements or sections, with either a sudden or gradual shift in texture.[15] Throughout these pieces, *metric modulations* typically delineate these episodes, movements, and sections. Ève Poudrier points out that, "although the musical surface exhibits a high degree of irregularity, there is a sense in which discontinuous events relate to one another, a feature that is emphasized by the composer's reliance on 'metric modulations' for the seamless juxtaposition of contrasting materials" (Poudrier 2009, 208). In terms of aural boundaries, this aligns closely with the idea of a "soft" boundary, during which "discontinuous events" can blend seamlessly together. Yet not all of Carter's metric modulations behave exactly this way—as Jonathan Bernard states, "one speed (or tempo) lead[s], *gradually or abruptly*, to another by assertion of a specific proportional relationship."[16] The gradual and abrupt behaviors of boundaries from one section to another are evident in the passage from *Trije Glasbeniki* discussed above, and are typical throughout Carter's chamber works. While the aforementioned analysis depicts aural boundaries at beginnings and endings of textural changes, most of them do *not* precisely coincide with the written metric modulations indicated in the score. Does this mean that metric modulations have no place in aural analysis? Certainly they do.

15 Examples of scholarship on recent pieces includes discussions of *What Next* (Capuzzo 2012a), *Shard* (Capuzzo 2003), *Boston Concerto* (Theisen 2010), and numerous others (Schiff 1998).

16 Bernard 2012, 15. Emphasis is mine.

Although metric modulations are primarily visual components in the score, they also yield important aural effects in the overall process of the piece. We can account for them as special cases of *soft* and *hard* aural boundaries. An additional component is necessary, however, which divides metric modulations of two different aural types. In one type, the metric modulation reinforces an aural *constant*—usually in the form of a steady pulse. For example, a steady pulse prior to a metric modulation remains constant to the listener after the indicated metric modulation. A*ural constancy* does not merely refer to "the presence of sound" on either side of the metric modulation, but rather that an aurally discernable pulse remains unchanged. Furthermore, aural constancy is autonomous from notation. The functions of written devices is independent from how these devices might function aurally, or as Andrew Mead observes, "the relationship between the notated meter and what we may hear in Carter's music can be in flux" (2012, 145).

Example 3.2 shows two contrasting instances of aural constancy in Carter's music. Example 3.2(a) isolates one of these moments from the *Trije Glasbeniki* analysis above, in which the pulse of the sixteenth-note sextuplet remains aurally constant as sixteenth-note quintuplets. The listener is likely unaware of the exact moment of this metric modulation. Although the pulse and speed of the sounding pitches remain constant, the actual placement of the metric modulation is arbitrary. It is possible that this metric modulation could occur at any time during measures 29–30, although the meter signatures would have to be rewritten to reflect this. Because there is no distinction between the end of one section and the beginning of the next, it can also be defined as a *soft* division, similar to the soft aural boundaries depicted above. The two

sides of the metric modulation are aurally indistinguishable, and the listener might only realize he or she is in a new section in retrospect. Example 3.2(b) also has a constant pulse in the percussion before and after the marked modulation, but the textural divide that overlaps this modulation is rather stark. The rapid streams of the cello and piano abruptly stop after a melodic rise, giving way to an immediate change in texture, comprised of sustained double-stops in the two string instruments. Thus the aurally constant stream is juxtaposed with a *hard* sectional division.

Easily discernable, constant pulses do not always coincide with the precise moment of metric modulations, however. Therefore there also exist metric modulations that are aurally *inconstant*. An example of an inconstant modulation is when a steady pulse prior to the modulation does not continue to the next section at all. Other possibilities of inconstancy arise when pulses are broken into smaller pulse units, or small pulse units combine into a longer pulse.[17] Example 3.3 provides two aurally inconstant metric modulations. In *Double Trio* (see Example 3.3(a)) the initial texture of the excerpt includes five of six instruments in rapid simultaneous streams. Although a sudden *tutti* rest in measure 77 sets up a repeated harmonic accent based on these streams, the metric modulation itself is based on only two interjected piano pulses. Once the new notationally defined section begins, this pulse is not aurally present at all. There is no constant pulse on both sides of the modulation, which happens at a particularly hard aural boundary. Another inconstant modulation occurs in the String Trio (see Example 3.3(b)). Between measures 24–25, the metric modulation uses the violin's

17 Ève Poudrier defines Elementary Pulse Streams and Elementary Pulse Units (EPU) in relation to larger pulse streams and their subdivisions. While this works when there is a consistent pulse of interval onsets, or when there are smaller and unequal melodic fragments, this is not always the case in Carter's music. For an expanded view of the interaction of pulses and their unit subdivisions, see Poudrier 2009, especially pages 211 ff.

accented pulse of five sixteenth-notes. The single sixteenth-note pulse is undeniably aurally present, but does not continue into the downbeat of measure 25. Contained within the complex offset cue, the individual pulse of the sixteenth-note does not easily commute to the new section, but rather has an additive effect to the larger pulse. The pulses do not consistently blend between the sections.

It is worth noting that the two aurally inconstant excerpts in Example 3.3 are also both hard sectional divisions, while as the two aurally constant excerpts in Example 3.2 have either a soft or hard division. These two notions—aural constancy/inconstancy and soft/hard aural boundaries—are *not* equal to each other. Previous examples already show instances of soft and hard aural boundaries that are *not* metric modulations, whereas aural constancy specifically deals with salient pulses before and after notated metric modulations. It is important to keep separate the two distinct forces at play, both of which involve saliency: the aural constancy (or lack thereof) of a pulse (or instrument-character "speed"), and the hard or soft aural boundaries. Distinctions between different types of metric modulation *can* lead the listener to aurally conspicuous moments regarding formal boundaries. Figure 3.2 provides a semiotic square highlighting the four possible relationships between these two binaries. Type 1 pairs soft boundaries and constant metric modulations, while Type 2 combines hard boundaries and aurally inconstant modulations. *These two relationships account for the two types of formal boundaries that are the most prominent in Carter's late chamber music.* Types 3 and 4 are certainly possible and warrant inclusion in the theoretical discussion at large, even if they are not as readily present in Carter's music. An example of Type 3 might involve a metric modulation in which there is no discernable pulse on

either side of the metric modulation, with very similar textures on either side of the metric modulation. This scenario seems counterintuitive to the very utility of metric modulations, however, and is therefore unlikely. An example of Type 4 might involve a metric modulation that has an abrupt change in textures, but also involves an instrument with a constant audible pulse on either side of the modulation, such as the *Double Trio* modulation shown above (Example 3.2(b)). Whether or not a section division or metric modulation is aurally discernable will vary, depending on the listener. Regardless, this model does give a nuanced understanding for aurally discriminating metric modulations as formal boundaries in Carter's music.

3.1.3.2 String Trio Analysis: Metric Modulations and Section Divisions

A brief analysis of large sectional divisions in a single piece of music will provide a test case for the discussion above. There are four notated metric modulations throughout the String Trio, thus suggesting the piece divides into five main sections. Example 3.4 places all four metric modulations in close proximity to each other. One of these boundaries—at measures 24–25—is illustrated above in Example 3.3(b) as an inconstant modulation at a hard sectional division (or relationship Type 2). The others occur successively at measures 43–44, 73–74, and 104–105.

The section division at measure 43 is fairly soft, as the textures are highly similar on either side of the modulation. The privileged viola melody stands apart from the other two strings, and even though its modulating pulse is brief, it is consistent across the notated modulation. The aural effect of this boundary is thus soft and consistent, or a metric modulation of Type 1. The third metric modulation, at measures 73–74 has an

identical ratio to the first modulation. They are also similar in that they are both hard section divisions, and have an inconstant pulse on either side of the modulation. Although the aural relationship Type 1 is the same, the latter has a reciprocal effect to the former. In measures 24–25, the sixteenth-note pulse (as part of a rhythmic offset) is additive, and leads to the inconstant, longer pulse rate. In the latter section division, the longer pulse breaks apart into smaller units, and becomes part of a rhythmic offset. The fourth and final modulation at measures 104–105 similarly links to the second modulation from 43–44. The viola's steady quintuplet eighth-note pulse remains constant as an eighth-note after a metric modulation. Once again, an aural constant pairs with a blended or soft border.

It would appear that a brief analysis of sectional divisions creates symmetric pairs across the entire piece, with sectional boundaries of only Types 1 and 2. While this is certainly true by only considering the metric modulations, a listener/analyst should not betray what he or she perceives as formal divisions of the piece. Indeed, an astute listener could, either within a listening experience or as a retrospective reflection, *hear* these moments as formal divisions. Hard divisions are likely easier to pinpoint than soft divisions, but in either case he or she might say, "Ah, I very well could have *experienced* one of Carter's metric modulations at these moments, even though I do not know the precise relationships." A return to the score could verify that each of the moments do indeed contain a metric modulation. However, this same listener could likely also aurally identify the passage shown in Example 3.5 as a striking formal division. Prior to this moment, rapid pulses permeate all three instruments, which eventually culminate in a rhythmic offset. The prominent silence that follows marks a hard aural boundary.

What follows is an entirely different section, which begins with a sustained harmonic accent, followed by a new texture of sustained simultaneous streams. One could argue, however, that in addition to this hard aural boundary, an inconstant pulse modulation exists in which the rapid pulse stream (either sixteenth-note or triplet eighth-note) simply ceases to exist, similar to the *Double Trio* boundary in Example 3.3(a). Performers have no need for a metric modulation indicator at this point, but the moment still adheres to the defining qualities of Type 2—a sort of "unnotated" metric modulation. In addition to the four sectional boundaries listed above, this fifth division is aurally important to the formal divisions of the piece. Figure 3.3 shows that the four sectional divisions—as defined by metric modulations—alternate between Types 1 and 2, while the inclusion of the "unnotated" metric modulation favors Type 2. The String Trio provides an important realization regarding metric modulations and sectional divisions. Working in conjunction with the various types of boundaries outlined above, the types of combined divisions in Figure 3.2 help aurally define metric modulations as well as other salient formal boundaries. Relationship Types 1 and 2 occur most frequently at large formal divisions in Carter's pieces, and can happen *even when a written metric modulation is not present*.

Aural boundaries, whether they are brief, fleeting moments, or conspicuous formal divisions, are crucial components in our endeavor to establish a framework for a listener-sensitive analytical approach to Carter's music. Many of these aural boundaries grow out of the numerous cues and textures presented so far. But before we consider how Carter's compositional harmonic designs influence these aural phenomena, there is one additional component of Carter's chamber music that requires attention: melody.

3.2 Ambiguities and Shifts

3.2.1 Introduction

Melodic events already appear amid discussions throughout Chapters 2 and 3. For instance, many melodic fragments and imitative musical gestures exist in the previous examinations of aural cues, especially *motivic* cues. This falls under the consideration of melodic aspects of Carter's music, as it is often these fragmentary moments that pass through an ensemble and become the subject of instrument/character interaction or "human cooperation" (Roeder 2012). A passage from the Oboe Quartet (Example 3.6) shows how these brief melodic motives often behave within an ensemble. Carter typically marks the "primary" voice in a piece, or *hauptstimme*, even though it can be brief (as it is here). Some of the primary melodic fragments in measures 21–22 repeat a contour pattern of leaping up, repeating a pitch, and leaping back down (primarily in the violin and viola). And while the overall texture is of rapid streams among three instruments, the primary melodic fragments interlock with one another, creating a continuous melodic thread between the oboe, violin, and viola. An astute listener can follow this motivically related melodic thread, even though individual fragments spread across the ensemble. Individually, the "like-sounding" instances relate as motivically connected, but collectively they create one primary melodic stream.

Extended, lyric melodies make appearances in nearly all of Carter's chamber pieces, some instances of which are examined above (consider Example 2.27). Example 3.7 shows a brief passage from "Godimento," the fifth song from *Tempo e Tempi*. During much of the song, a single lyric melody appears in the soprano while the apparent

accompaniment in all of the instruments consists of four separate, rapid simultaneous streams. In Carter's chamber pieces that include voice the lyric melody is often contained in the vocal line, as is the case here. As soprano Tony Arnold notes: "Rarely virtuosic, Carter's vocal lines are often slowly unfolding arches that stand in contrast to concurrently bubbling instrumental lines" (2014, 164). But it is not only the vocal line that is melodic in the case of "Godimento." All five instruments, including the voice, progress melodically, yet the differences in rate of speed, dynamics, vocal presence, and text, create a stratified boundary between the voice and instruments. Interactions of these melodic lines give rise to the overall texture, which is why an aural study of texture and melody is closely interrelated. We will therefore employ a broad sense of melody in the sense that Steven Heinemann does in his melodic analyses of concertos (2012). That is, when continuous strands of pitches through time can be perceived as connected, they are regarded as *melodic*.

The remainder of this chapter examines two common melodic phenomena in Carter's chamber works. They do not necessarily relate to primary-line melodies but do affect how continuous lines aurally interact with each other. These melodic interactions may also impact the overall texture, encompass various cues, and serve as driving forces for aural boundaries. The first set of examples deal with melodic lines that, due to the compilation of musical elements, create a sonic field in which instruments sound very similar. A high degree of similarity increases the probability that these instruments are aurally indistinguishable from each other. The second phenomenon passes or *shifts* melodic lines from one instrument to another.

3.2.2 Aural Ambiguity

Prominent in Carter's chamber works are passages in which it is difficult to aurally distinguish one instrument from another. This often results due to the instruments playing in very similar fashion and with nearly identical musical domains.[18] A musical event is *aurally ambiguous* if comparable musical domains contain a high degree of similarity. A*ural clarity* is the opposite, in which domains under comparison contain a low degree of similarity. The more musical domains there are under consideration, the higher the potential degree of ambiguity or clarity. Consider two instruments of the same kind playing the exact same pitches at the same dynamic level. Attempting to differentiate the two may be difficult if they blend together well—something that is often the goal in ensembles. The uniqueness of each instrument is ambiguous. Yet if one instrument is a clarinet while the other is a trumpet, there is a timbral mismatch. The timbres of the two instruments help mark them as distinct from each other, even if everything else (pitches, rhythms, dynamics, articulations) is essentially equal. Relatively speaking, they would still be more ambiguous than a clarinet and trumpet playing completely different pitches, rhythms, etc. The interplay between ambiguity (a highly blended sound) and clarity (uniqueness of sound) fuels many of the gestures found in Carter's chamber music. Although this relationship between ambiguity and clarity happens in numerous musical contexts, it often takes place during passages with melodic lines.

Example 3.8 illustrates this phenomenon in a passage from Carter's *Duettone* (2009), a piece we will use to illustrate both ambiguity and melodic *shifts* (section

18 In this case, "domains" refers to Christopher Hasty's definition, and not Dora Hanninen's, as discussed in section 3.1.1 (the introduction to form) above.

3.2.3). In this excerpt, two string instruments become aurally entangled.[19] Three primary musical domains play a factor in creating instrumental ambiguity during this passage: register, timbre, and melodic note density. Prior to measure 67, both the violin and cello play *pizzicato* over an expansive register. In measure 67, just before an aurally constant/soft metric modulation, the violin changes its technique to play *arco*. The violin's constant stream of bowed pitches is in stark contrast to the suddenly slower, lower, and *pizzicato* pitches of the cello. Each instrument is clearly distinct due to its timbre and melodic line. Furthermore, the register of each instrument throughout measure 67 helps a listener distinguish which instrument *must* be the cello and which one *must* be the violin.[20] The high register of the violin is difficult (though not impossible) for the cello to play, and any pitch lower than G3 cannot be played on the violin without re-tuning the instrument. None of the three primary musical domains match.

Immediately after the metric modulation in measures 68–69, however, the register of the violin is lower and is less than an octave in range (between B♭3 and G♯4). The cello similarly begins to play *arco* and at a faster pulse rate, nearly equal to that of the violin. Thus the texture changes from a single rapid stream to two rapid simultaneous streams. The cello's range is nearly identical to the violin, spanning C♯4 to A♭4. During this brief passage, the similar timbre (stringed instruments playing *arco*),

19 It is important to note that aural ambiguity is not the same as a visual ambiguity. During a performance, it might be very clear which instrument is playing which part, either from a performer or an observer's point of view. Once again, an idealized listening must be assumed as is the case in the *Hiyoku* discussion in Chapter 1. The goal is once again to generalize the types of aural phenomena that may occur separate from visual, tactile, or other sensory feedback.

20 We must accept some degree of musical expertise at this point. To some listeners, this may sound like general "string sounds." Some knowledge of string instruments would cue the listener toward the lower and higher register as being "probably-not-cello" or "impossible-to-be-violin." For perspectives on listener expertise, see Straus 2011 and also Adorno 1988.

note density (continuous sixteenth-notes), and range (neither too high nor too low for either instrument) make it potentially very difficult to aurally distinguish the instruments. Passages with aural ambiguity create a "muddled" sound space, as though each entity is vying for control of disputed territory, while an impartial observer is unclear who has the upper hand. It is not until the outward wedge that the ambiguity dissolves; both instruments retreat in measure 70, leaving the disputed territory. Through this brief example, the progression of clarity:ambiguity:clarity is aurally conspicuous—a phenomenon frequent in Carter's works. Although the ambiguous space of both lines lasts for several seconds between measures 68–70, there are passages of ambiguity throughout Carter's music that are either shorter or longer.

The number of musical domains under investigation changes from passage to passage and from piece to piece, depending on an analyst's or listener's interests or a listener's musical focus. Figure 3.4 displays the passage from measures 67–70 along a continuum, comparing an expanded account of musical domains and their degree of compatibility. The moment when the instruments once again become distinct is during the outward wedge cue, when two domains (contour and register) change. Measure 70 (the lowest box) has only these two domain differences from measures 68–69 (the middle box), yet this is the moment that aurally distinguishes the two instruments from each other. Even though measures 67 and 70 have a different number of non-matching domains, both provide instrument clarity. The prominent change of contour and register—which are defining factors of the outward wedge cue—enables the listener to distinguish the two instruments. This reveals an important determining factor for the extent of ambiguity or clarity: it is not simply a matter of calculating the total number of

domains that match to determine whether or not something is aurally ambiguous or clear. Additionally, the musical context, and *progression* of matching domains will impact a listener's determination of aural ambiguity at any given moment.

For comparison, Example 3.9 offers another account of similar and contrasting domains, also from *Duettone*. There is a very similar progression of ambiguity and clarity. Comparing this score excerpt to Figure 3.4, the lower two boxes of ambiguity and clarity from can substitute exactly for the corresponding measures in Example 3.9, including the final outward wedge cue. Melodically and texturally, these brief excerpts function in the same way regarding aural ambiguity or clarity. Additionally, the moments that shift from clarity to ambiguity, or *vice versa*, can always be marked as an aural boundary. The sudden divergence in both measures 70 and 85 separate themselves from the previous musical materials, and establish a fairly immediate aural boundary. The consideration of instrumental ambiguity extends the aural analytical consideration of form to include melodic and textural spaces between both local and global boundaries. Are measures 68–69 and 83–84 prominent textural spaces? Are they some sort of extended boundary between formal divisions? Or do they represent a transition of some kind? Answers to these questions depend on the overall context of the analysis, but are all worthy for consideration. The next section on a specific melodic trait engages with these and other questions. The concept of aural *shifts* examines the exchange of melodic and textural components between instruments, and while related to aural ambiguity, it is not necessarily dependent on it.

3.2.3 Aural Shifts

In addition to changes in one or more musical domains resulting in aural boundaries, there are also *shifts* in domains from one instrument to another. Sometimes this creates further aural ambiguities in Carter's music, but can also distinguish instruments from each other. Often, these shifts in register, timbre, or some other domain occur concomitantly with aural boundaries and create another type of blended space. Rather than comparing musical domains simultaneously, however, a listener can also compare identical domains successively, and notice that one instrument sounds very similar to (or different from) to an instrument that is no longer playing, or that is playing contrasting material. *Aural shifts* are those moments or events that serve as a catalyst or pivot of domains from one instrument to another. Carter often blends instruments together in an aurally similar manner during a shift, either briefly or for an extended time, and then separates the instruments once again. Only after the shift happens might the listener realize that it has taken place, thus these events are most likely to be understood as a past phenomenological event.

Continuing to use *Duettone* as a test case, Example 3.10 shows an extended shift of melodic material from the cello to the violin in measures 28–33. During this passage, Carter reverses the "sounding role" of each instrument by a musical shift involving a sustained simultaneous streams texture. Prior to measure 28, the violin plays *arco* double-stops in a sustained stream while the cello plays a single *pizzicato* melodic line. Even though the timbre and articulation between instruments are clearly different, both play in a similar range. At measure 28, the cello's playing technique changes in two significant ways: First, the cello joins the violin in playing *arco* double-stops at a longer

pulse-rate, creating a more uniform (and thus ambiguous) timbre; Second, the cello also immediately drops to a low register, keeping its independence (that is, clarity) from the violin, despite the similarities in timbre. The cello continues to play double-stops into measure 33, while the violin picks up the *pizzicato* melody from earlier. Not only are the timbres differentiated once again, but so too is the register, which is not the case prior to measure 28. While measures 28–33 display compound sustained simultaneous streams, they also provides a "shift-space" for the migration of domains from on locale to another.

Shifting timbres and registers create two clear aural boundaries at measures 28 and 33, and divide the excerpt into "before, during, and after" segments. Aural shifts typically have these three formal parts, akin to a contrapuntal suspension. Rather than being dependent on only pitches, however, aural shifts rely on multiple musical domains. Not shown in Example 3.10 are the entirety of measures 21–28 and 33–40. These are eight-bar phrases that constitute "before" and "after" segments of this larger section of the piece. Measures 28–33 provide the space in which the shift of *pizzicato* and *arco* timbres takes place. Had this shift-space not existed, a more immediate exchange of domains would take place. Example 3.11 offers a recomposition of these measures without the transitional shift-space between two aural boundaries. The recomposition makes clear that the melodic continuity of the *pizzicato* line emphasizes the equivalence of musical domains, thus there is potentially a high degree of instrumental ambiguity. By only focusing on the pizzicato line, a listener may not realize that there is a shift from cello to violin, and conclude that the same instrument is resuming the *pizzicato* melody. The primary differentiating factor is the low sustained

stream in a low register, clarifying that the upper melodic line *must* be the violin and not the cello.

The recomposition also suggests that immediate shifts of musical domains are possible, and these certainly do occur in Carter's music. More often than not, however, the musical cooperation between instrument/characters creates a brief shift-space like that in *Duettone*. Example 3.12 offers one final aural shift in *Duettone,* and shows how interlocking streams might shift from one instrument to another. This excerpt happens just after the passage of ambiguity and clarity initially discussed above (see Example 3.8). Once again, the violin and cello have rapid melodic streams, but are now interlocking rather than simultaneous. Singleton pitches combine with a set of two or three rapid pitches to form the overall interlocking texture. The base-note value for the cello is a sixteenth-note, while the violin is a quintuplet sixteenth-note. These values remain throughout the remainder of the piece. Carter clearly marks that the single note stream is the "primary" melodic stream, and should stand out aurally due to the relative dynamic difference. In measures 72–73, the cello plays the single-note stream on harmonics, floating above the softer sets of notes. This melodic line, however, picks up directly from the preceding violin line, and immediately shifts the focus of the primary melodic line.

The downward gesture of the violin in measures 73–74 acts as a shift during which the two instruments exchange their interlocking streams. Formally, this shift is an extended aural boundary, composed of a gestural cue (fall and rise) in the violin, coupled with a static field (single sustained pitch) in the cello. Carter does not mark either instrument as a primary voice, further emphasizing that this extended boundary

serves as the melodic shift; it is specifically a brief period of time with no primary melody. On the other side of this shift, the violin now has the higher single-note stream, while the cello takes up the interlocking sets (in this case pairs) of notes. They each retain their base-note value. The overall texture itself has not changed, as the relative register and effective timbre remain constant. Aurally, there is a continuous melodic texture divided by an extended gestural boundary, although a focused ear may perceive the slight variations of the relative speeds of the single-note stream or interlocking multi-note stream.

Measures 75 and 76 both have another immediate and direct shift from one instrument to the other, similar to measure 72. There is no intervening shift space until measure 77, which behaves like the one in measures 73–74. Here, however, the static field and gestural cues are reversed, with an added change in domains. The cello's gesture is largely descending, bringing the singleton stream into a register that can no longer be replicated by the violin. Not only does the shift-space in measure 77 switch domains, but it also provides additional aural clarity between the instruments—something that is potentially lacking up to this point.

Aural ambiguities and aural shifts are more than just melodic interactions. While the excerpts from *Duettone* provide paradigmatic instances of how ambiguities and shifts behave, we must continue to take account of factors such as texture, boundaries, and cues. And although interactions of only two instruments clearly demonstrate these two concepts, there are many chamber pieces that include much more than two instruments, thus compounding the ways that ambiguities and shifts interact throughout a piece. The final section of this chapter therefore examines another

chamber piece, with an extended account of how the melodic devices outlined above behave over a longer period of time.

3.2.4 *Mosaic* Analysis: Melodic Interactions

Nuanced exchanges and interactions of melodic ideas provide much of the charm of Carter's smaller pieces. Naturally, not every moment in his music can best be aurally described as melodic. Some passages defy the nature of melodic exchanges or progressions altogether, while others are highly melodic. The final analytic vignette of Chapter 3 examines *Mosaic* in more detail and demonstrates some of the melodic and formal ideas covered throughout the chapter, with particular attention to the melodic concepts presented above. The excerpt from *Mosaic* (shown in Example 3.13) aurally behaves very similarly to the Oboe Quartet (see Example 3.6), as the melodic voices move between multiple instruments, creating an extended melodic focus. Whereas the Oboe Quartet excerpt highlights short motivic fragments, some of the melodic ideas in *Mosaic* are longer, lyrical lines, and interchange with each other on a larger durational scale. Beneath the score in Example 3.13, horizontal bars represent different *qualities* of melody in each instrument, and vertical bars account for harmonic accents.

The excerpt begins just after a Grand Pause—a significant aural boundary in the piece. The harp's harmonic accent launches the next "tessera" of the overall sound mosaic.[21] The viola begins a new lyric melody at timing 4:34, but quickly shortens its extended line into short and succinct pulses, perhaps reacting to the double bass's

21 Carter describes this piece as, "formed be many short mosaic-like tessera that I hope make one coordinated impression" Carter 2004.

immediate interjections.[22] The viola's lyric melody-turned-pulse sets up the metric modulation at measure 99—in this case an aurally constant pulse coupled with a *soft* boundary (another instance of metric modulation Type 1). Although the melodic line is still clearly dominant in the viola, the lyric quality morphs into a rapid stream, marked by occasional multi-stops that echo the double bass and harp interjections. These two melodic ideas in the viola—a lyric melody and a fragmented rapid stream—provide most of the material for the upcoming section.

As the rapid stream's dynamics subside around 4:46, the clarinet picks up the primary lyric melody, and the alto flute soon follows with an additional rapid stream. Perhaps since the rapid stream is now carried by a new instrument, the viola's rapid stream stops abruptly around 4:49, after a swift melodic rise. At this same moment, the clarinet, after a parallel rise with the viola, fades into the background just as the oboe enters, which picks up the primary lyric line. As this third woodwind enters, so too does a third melodic strand (labelled "lyric counterpoint" in Example 3.13(b)), which sits subdued underneath the more prominent melody. For the next several seconds, the clarinet and oboe trade the two lyric melodic strands, while the flute continues the subtle, rapid stream.

At timing 5:07 (see Example 3.13(c)), the dominant lyric melody abates once again in the clarinet, but this time there is no simultaneous shift of the lyric line to the oboe. Instead, a series of soft motivic gestures creates a different type of texture for several seconds, labeled "interlocking motives." Before long, the oboe *does* finally pick up the dominant lyric line yet again at 5:13. A lyric contrapuntal line no longer supports

22 Timing is based off of the performance of the Swiss Chamber Soloists on *Carter: Happy Birthday, Elliott Carter!*

the renewed lyric melody. Additionally, the subtle rapid stream slowly fades even further in the alto flute, until a significant aural marker (the harp's "thunder" interjection) disrupts the entire melodic process. For the next several seconds, from 5:16 to 5:38, a series of exchanges between instruments again ensues. The subtle rapid stream becomes a rapid trill and passes from the flute to both other wind instruments. The lyric melody passes through all three instruments as well, finally arriving in the oboe once again at 5:35 (though now marked *cantabile*). Soon thereafter not one but two subtle rapid streams proceed in tandem with the more dominant oboe melody.

Figure 3.5(a) presents the melodic analysis of each instrument in a more succinct fashion than Example 3.13. Throughout this passage of the piece, the three primary instruments (alto flute/flute, oboe, and clarinet) use, at one time or another, the two melodic strands initially presented by the viola ("lyric" and "subtle rapid stream"). From 4:49 to 5:02, the oboe and clarinet exchange the foreground and background lyric themes, and it is relatively easy to see the *shift* of musical materials from one instrument to the other. The harmonic accent interjections further both isolate and bind the changes in the melodic makeup of passage. On a local level, the harmonic accents between 4:30 and 4:49 mark the beginning and ending of the viola's introductory material; they also isolate the initial presentations of the woodwind instruments. The prominent (and noisy) harp accents at 4:44 and 5:15 establish two large formal sections for the passage. The first section primarily features interplay between the oboe and clarinet, while the flute holds the steady rapid stream underneath. The latter section exchanges two melodic ideas between all three instruments, before settling on two rapid simultaneous streams and a single lyric melody. While Figure 3.5(a) elucidates the

overall melodic and formal makeup of this passage, it does not as easily display other important melodic relationships. Figure 3.5(b) redraws the analysis to focus solely on the melodic and textural types, and highlights several important moments of *ambiguity/clarity* and *shifts*.

After the initial presentation of melodic materials by the viola, three instruments play three different melodic strands as shown in Figure 3.5(a). However, one could argue that there are only two different melodic textures, not three, as displayed in Figure 3.5(b). The "lyric melody" and "lyric counterpoint" melodic lines from 4:49–5:07 divide primarily by only one primary musical domain: dynamics. Even though the instrumental timbres between the oboe and clarinet are dissimilar, they are more similar than clarinet and harp. Most of the other musical domains (rhythm, contour, register, articulation, etc.) are close together, producing a fairly high degree of ambiguity between the two "lyric" instruments. Among these two stratified layers of the texture are several shifts between the instruments, as their dynamics and registers blend together. The close proximity of a high number of musical domains creates sufficient ambiguity to allow Carter to seamlessly shift between the two instruments. Thus the shifts between 4:49 and 5:02 are within the same overall melodic texture, with a high degree of ambiguity during the brief moments of shifting from one instrument to another. Additionally, there are shifts between the two primary melody types. The most aurally salient is the initial presentation by the viola which presents the lyric melody first, and morphs into the rapid streams amid the harmonic accents.

The other prominent noteworthy aspect of Figure 3.5(b) is the density of these melodic lines. The shifting lyric melodies from approximately 4:49–5:04 represent two

stratified layers of the same texture type, though they have been separated in Figure 3.5 and Example 3.13 to emphasize the shifting domain of dynamics and instrumental timbre. There are other moments in which two instruments overlap their respective melodic strands. From 4:47–4:49, for instance, both alto flute and viola have, although briefly, a shared rapid stream, creating some aural ambiguity and shifting of musical domains. After the "thunder" cue at 5:15, several brief moments of lyric melody overlap in the instruments, and it is in these moments that Carter's manipulation of musical domains creates aural blending of the continuous melodic process. After 5:38, two rapid simultaneous streams provide a balance in melodic density to the earlier double lyric melody passage. Especially prominent is the brief, aurally bound (with rests) rapid fragment at 5:44. The high degree of similarity helps bring this moment to the fore, even against the prominent oboe line.

This account of a single passage from *Mosaic* focuses only on melodic interactions between the instruments. It certainly could expand to include the other aural considerations, such as additional aural cues, boundary types, the interplay of intrinsic and extrinsic events, and larger formal considerations of the overall piece. Such an undertaking presents a formidable task, yet even without an extended aural analysis we can inquire as to whether any of these salient events support or undermine Carter's compositional designs. For instance, the intervallic makeup of each instrument is often an essential part of Carter's design. Do any of the ambiguities and shifts coincide with close proximity of intervallic content? A closer examination of the score (possibly aided by the ear) reveals that the rhythmic design of the flute's rapid pulse is based on a sixteenth-note quintuplet, which is absent after the "thunder," only to reappear in a

different instrument at 5:38. Thus a different type of domain shift occurs over a longer period of time. Do the details of the rhythmic space between 5:15–5:38 offer any clue as to how exactly this shift happens? And while we might recognize prominent harmonic accents as formal boundaries and markers, what precisely are these harmonies? Does their aural presence matter in relation to their pitch content? Armed with the vocabulary and typology of aural events of Chapters 2 and 3, we can now proceed to investigating what specific devices contribute to these experiences.

Chapter 4
Aurally Defined Analytic Models

"...and then show what it is that contributes to this experience."

The previous two chapters explore both specific and general aural phenomena in Carter's music, providing practical tools for listening audiences. One of my objectives is to use these accounts as avenues into analytical and theoretical issues that may not be aurally apparent. Do Carter's calculated compositional procedures give rise to aural phenomena, or do initial aural analyses inevitably lead toward a deeper theoretical understanding of the musical materials? It may not even be an issue of one or the other, as both may be true. From the outset of this dissertation, however, it is clearly the latter that is the primary focus. I am interested in where a listener's ears might lead when experiencing Carter's music. The analyses that follow are driven because of aural experiences, and not in spite of them.

This chapter thus serves two purposes. First, I show how various aural analytical tools in the previous chapters lead toward underlying compositional procedures. I accomplish this by reexamining musical excerpts from Chapters 1, 2, and 3, as well as additional excerpts from Carter's recent chamber music. The chapter's second purpose is to use and expand theoretical tools that can better explain the pitch, rhythmic, or other musical relationships during a musical passage. Abstractions that have little or no bearing on the listener have limited interest, thus I only engage with the specific abstract considerations that further develop our musical experiences. There are four main sections to this chapter: 4.1 reexamines common aural cues to include their

harmonic makeup; 4.2 expands current harmonic approaches to Carter's combinatorial processes and the All-Trichord Hexachord; 4.3 continues to expand the notion of post-tonal harmonic progressions, and examines combinatorial processes of the All-Interval Tetrachords; and 4.4 expands the initial hypothetical listening of *Hiyoku*, showing how audible musical elements *other than* pitch or rhythmic components can enhance an analysis.

4.1 Aural Cues: Harmonic Implications

4.1.1 Carter's Signature Sets and Aural Cues

As noted in Chapter 1, after 1990 Carter uses only a few primary set-class (SC) types in his compositional process. When encountering aural cues, it is often possible to predict the harmonies involved, due to Carter's consistent harmonic construction. This might be obvious: If Carter always uses these sets as a basis for his late music, would it not it make sense to expect these SCs as inevitable? Perhaps so, but there are moments where aural cues prominently emerge from the music, and in so doing promote structural harmonic articulations.

It will be useful to quickly take stock of these primary SCs before proceeding. Guy Capuzzo dubs three SCs as Carter's *signature sets*, and I will adopt the same terminology. The primary hexachord signature set is 6-z17 [012478], or hexachord 35 in Carter's numbering.[1] As this hexachord abstractly contains all twelve trichord SCs as subsets, it is most commonly referred to as the All-Trichord Hexachord (ATH). Its abstract complement, 6-z43 [012568], is not considered a signature set by Capuzzo, but

1 Carter developed his own numbering system independently from the Forte numbering system. For a side-by-side comparison of Forte's and Carter's numbering systems, refer to Carter (2002, 23–26).

does appear in Carter's music. I will adopt Capuzzo's label of *ATH* for this SC. The two other signature sets are known as the All-Interval Tetrachords, or AITs. I again adopt Capuzzo's designations for these two tetrachords and their abstract complements, the latter of which are not considered signature sets. Tetrachord 4-z15 [0146] is AIT1, and 4-z29 [0137] is AIT2. The relationship between ATH and *ATH* also exists with either AIT's abstract complement. As Capuzzo labels them, the two All-Tetrachord Octachords (ATOs) also relate accordingly: ATO1 [0123468] is the abstract complement of AIT1; and ATO2 [01235679] is the abstract complement of AIT2. Certainly other logical SC partitions exist in Carter's music, but these three signature sets and their abstract complements drive many musical passages.[2] For clarity, I will always use square brackets [ ] for SCs, parentheses ( ) for ordered sets (pc sets or otherwise), and curly braces { } for unordered sets (pc sets or otherwise).

4.1.2 Rhythmic Offset: Harmonic Implications

An investigation of several aural cues will demonstrate how these signatures sets translate to the musical surface. Example 4.1 reinvestigates two rhythmic offset cues from Chapter 2. As a relatively isolated aural cue, the rhythmic offset almost always emphasizes a signature set. In measures 76–77 of *Duettino*, the violin and cello each play separate triple-stops to create the rhythmic offset, yet their combined trichords [016] and [048] together form the ATH. In measure 24 of the *String Trio*, the ATH similarly forms through the combined dyad pitch content of all three instruments. Based on just these two instances of 3+3 or 2+2+2 combinations, it is certainly possible to

2 Capuzzo refers to all six of these sets as "core sets," and also includes "combination sets." See Capuzzo 2012a, especially pp. 28–33.

hypothetically create multiple possible combinations for a rhythmic offset cue. The ATH could also be created as a 4+2 offset cue, or even as six individual instruments (1+1+1+1+1+1)! Furthermore, an offset cue might contain one or both AITs through various combinations. Although Carter tends to favor the ATH offset cue, particularly in his string ensembles, numerous combinations are possible for this single cue.

Although, as shown in Example 4.1, rhythmic offset cues typically form a signature set. These primary SCs also occur in many places throughout a piece that might *not* be identified as a salient aural cue. For example, the triple-stops following the rhythmic offset in Example 4.1a *also* combine to form another ATH. Whether or not we hear this as an extension of the rhythmic offset or as its own cue (or not a cue at all) is up to the analyst. The rhythmic offset in 4.1b is a culmination of a longer simultaneous streams texture, in which many ATH instances occur. Thus the rhythmic offset cue is not a special case when a signature set is present. Rather, its aural prominence can lead the listener to infer that he or she is *likely* hearing an ATH at a particular culmination of pitches.

4.1.3 Gestural Cues: Harmonic Implications

Like the rhythmic offset, various aural wedges and directional cues can also articulate a signature set. Example 4.2 reproduces Example 3.8, which shows a rapid, simultaneous stream texture in *Duettone* that ends with an outward wedge cue. The instrumental ambiguity during measures 68–70 becomes more relevant when the analyst observes that this passage does not easily parse into any signature set. Therefore, there is both aural *and* harmonic ambiguity in these measures. The wedge in

measure 70 not only separates the *aural* instrumental ambiguity, but also clarifies the phrase's *harmonic* content. The outward wedge "unzips" the tight-knit simultaneous streams into two discrete AITs, one for each instrument.

Even though Carter's signature sets permeate his latter music, they are especially prominent at certain moments, such as the rhythmic offsets in Example 4.1 or the wedge shown in Example 4.2. However, it would be dangerous to infer that a listener always "hears" these sets at any given moment. The *Duettone* example shows exactly the opposite. Most of this passage does *not* easily parse into an AIT or ATH until the aural clarity provided by the outward wedge. As shown in Chapters 2 and 3, this particular aural cue typically marks the end of a passage and creates an aural boundary. It is also safe to assume that at least one signature set is likely present in this cue. Similar to the rhythmic offset, a listener can *expect* that the ATH or an AIT is present. Just as various hypothetic combinations might create the offset cue, the wedge cue can also express Carter's signature sets in several possible ways, as suggested in Figure 4.1.

Figures 4.1(a)–(c) show three possible horizontal (or melodic) realizations of the wedge cue. Each diverging line uses a different signature set, or as is the case in 4.3(c), only one melodic line uses a signature set. There could be many possibilities for a signature set's harmonic articulation in the wedge cadence, including vertical realizations (4.3(d) and (e)), or a combination of vertical and horizontal components (4.3(f)). While the vertical or horizontal alignments may change, the wedge retains its aural identity. The *Duettone* example in 4.2, which is a manifestation of 4.3(a), marking a moment of repose at the melodic phrase's completion. Other gestural cues may behave similarly to the wedge possibilities shown here, especially as *cadential* resting points of

the music. This suggests that cues like the outward wedge, especially when linked to signature sets, aurally and harmonically behave as a specific type of *post-tonal harmonic cadence*.

4.1.4 Cadence Points: Harmonic Articulations

Broadly defined, a post-tonal harmonic cadence is the *coincidence of compositionally determined primary sonorities and aurally salient factors that suggest musical closure.*[3] The aurally salient outward wedge in Carter's music typically coincides with a return to a harmonically "stable" signature set. As a formal boundary marker—typically as an end to a phrase or section—it is therefore reasonable to ascribe a cadential function to it. Due to Carter's prominent harmonic language based on both AITs and the ATH, a return to these sets at a particular moment of closure marks a similar cadential function. Thus a post-tonal harmonic cadence in Carter's late music contains a cue such as the outward wedge and at least one signature set.

The second piece from *Two Diversions* (Example 4.3) provides an example in which an outward wedge occurs with two simultaneous streams progressing at two different speeds. The streams separate by register with increasing intensity, and harmonically form two signature sets. The higher stream, which primarily uses interval-classes (ic) 1, 4, and 5 in measures 80 and 81, creates the upper half of the wedge, breaking free from the rapid stream's lower pitches. The final upward gesture articulates

3 I primarily use the term post-tonal harmonic cadence in Carter's music to refer to the joining of aural and harmonic factors that conspicuously coincide at moments of closure. Although there is not yet an abundance of literature on post-tonal harmonic cadences, several pertinent studies include Corrêa 2012, Hasty 1984, Hasty 1986, Howland 2015, Barash 2002, Hopkins 1990, Kurth 2000, and Pelligrino 2002.

AIT1, while the long, sustained stream of the left hand ends its downward descent by forming an ATH. The piece's aesthetic "contrasts two musical lines one of which, on the whole, grows slower and slower while the other grows faster and faster" (Carter 1999). Even here, within Carter's own precompositional constraints, a harmonic cadential wedge signals the section's end.

4.1.5 Other Cues and Their Implications for Analysis

Specific cues such as the "rhythmic offset" and "wedge" often have a clear harmonic construction. Yet many other types of aural cues exist. Motivic cues, for instance, can establish themselves as intrinsic components of the piece, yet undergo several musical transformations. These transformations may alter the motive's harmonic makeup, or may not consistently have a clear harmonic structure at all. Mimetic and referential cues such as those in *Am Klavier* evoke a certain sonic salience due to their sudden extrinsic nature when compared to their musical surroundings, but an isolated examination of such a cue may do little to inform a larger understanding of the piece. One should therefore not overgeneralize the degree to which specific cues have specific harmonic manifestations. Consider the harmonic accent in measure 59 of *Nine by Five* (2009) (see Example 4.4), which forms AIT1. Many harmonic accents might similarly create a signature set, yet the broken harmonic accents in measures 57–58 do not. In the same piece, motivic connections (shown in Example 4.5) form AIT1 in the flute and oboe in measure 6. The next motivic similarities in the clarinet and horn are clearly aural continuations of oscillating pitches, but do not combine with preceding or succeeding motivic partners to form any other signature set. Instead, the clarinet,

horn, and contrabassoon dyads create pivot harmonies that lead to the culminating [01367] pentachord in measure 7.[4] Examples 4.4 and 4.5 show that cues and textures, though unified by aural salience, remain as individualized as the pieces that contain them. Their analytical implications must therefore be considered carefully in each context.

This leads to two important considerations: First, the analyst should continually strive for a meaningful consideration of isolated cues within an ever-expanding context. Second, analysis should never completely discount Carter's aesthetic goals for any given piece, or ignore his compositional procedures. Crucial to Carter's latter compositions is the cultivation of expanded sonorities through various combinations of his preferred set types. Timbrally, these combinations depend on the type of ensemble, which ultimately dictates *how* the various harmonic combinations occur. In order to move forward, it will be necessary to consider how these combinations exist in Carter's music and find ways to engage with these combinations in light of the listener-sensitive approach outlined in Chapters 2 and 3.

Carter's interest in combining sets in various ways is well documented in his harmony book and sketches. With the reduction to only a few characteristic sets in his later music, however, the particular types of combinations become more limited. However, it is still possible to see (and hear) numerous ways in which these combinations become manifest. This is partly what Capuzzo refers to as *variety within unity* (1999). Integrating the numerous aural facets of Carter's music as part of this variety is the next task.

4 Pentachord [01367] is another common SC used by Carter, formed by overlapping AIT1 and AIT2 with three common pcs. There is an explicit example of this in the analysis of Carter's Clarinet Quintet in Chapter 5.

4.2 Expansion of Set Combinations I: CUP and ATH

4.2.1 Set Combinations

Carter's *Harmony Book* contains two volumes, titled *Catalogue/Synthesis* and *Analysis*. For Carter, synthesis refers to the combination of different SCs, to make new, resultant SCs. Analysis is the opposite of this, breaking down a single SC into all possible set combinations. Both volumes demonstrate precise examination of Carter's interest in different types of SC combinations. Over time, he came to favor the ATH and AITs due to their compact, yet abundant possibilities of subsets. As Capuzzo notes, "[e]ach signature set contains all of a particular subset at the smallest possible cardinality. The AITs contain all six two-note sets (interval classes) at the smallest possible cardinality—four. The ATH contains all twelve three-note sets (trichords) at the smallest possible cardinality—six" (Capuzzo 2012a, 29). The previous exploration of aural cues demonstrates some of these combinations, but a more detailed account of these combinations will be necessary to further unpack Carter's compositional designs and their impact on the musical surface. This requires examination of several intricate properties of the ATH and AITs. The following two sections, 4.2 and 4.3, provide a theoretical aside that differs from the exploration of Carter's music thus far. This is warranted, however, as it will enrich our understanding of set complementation, which will allow more flexibility in analyzing actual surface partitions that figure prominently in aural cues, textures, and melodies. Two analytic vignettes (4.2.4 and 4.3.3) bring the upcoming theoretical discussions into dialogue with the listener-sensitive approaches of the previous chapters.

4.2.2 Complement Union Property and Pairs

Robert Morris theorizes one particular property of SCs, particularly the ATH and AITs. Morris defines SCs as having the "complement union property" (CUP) if the following is true: "Given pc-sets V, S, and T, such that S ∈ SC(X), T ∈ SC(Y), and V ∈ SC(Z), if S ∩ T = { }, and S ∪ T = V, for all V, S, and T, then SC(Z) has the complement-union property" (Morris 1990, 182). In other words, an SC has CUP when two other, disjoint SCs combine, and the union of these two disjoint SCs will *always* produce the initial SC. The ATH is one of only two hexachords that have CUP in two different ways: with a tetrachord/dyad pairing [0167] and [04], or by pairing two distinct trichords [016] and [048].[5]

The AITs also have a type of partitioning related to CUP, which Morris calls the "complement union pair" (CUP2).[6] Based on the definition of CUP above, this means that the union of any non-intersecting members of SC(X) and SC(Y) will form one of two values for SC(Z). Put differently, the union of two non-intersecting pc-sets will result in one of two possible SCs. For the two AITs, any combination of disjoint pc-sets of SCs [03] and [06] will *always* form either AIT1 or AIT2. No disjoint pc-sets of a SC [03]+[06] combination can yield anything other than an AIT. There has been some interest in examining CUP and CUP2, particularly in Carter's music; thus any harmonic account of various combinations should consider these analytical tools.[7]

Although aforementioned analyses of Carter's demonstrate the utility of CUP and CUP2, there are many passages that do *not* use these specific combinations. The aural

5 The other hexachord that has a CUP in a similar pairing is [013569], with partitions of [0369]+[04] and [048]+[036]. For a more detailed account of CUP, see Morris 1990.

6 See Morris, 1990, 193–196.

7 See especially Childs 2006; Capuzzo 1999; Capuzzo 2004; Capuzzo 2012a; Roeder 2009; and Jenkins 2010

cue of Example 4.1(a) *does* use the [016]+[048] partitioning of the ATH, yet the triple-stops that immediately follow this cue do not. These two trichords also combine to form an ATH, but with a different partitioning: [036]+[026]. The passage therefore manifests only one CUP combination, not two. Both AITs help form the wedge cue in Example 4.2, yet it would be difficult to argue a [03]+[06] partitioning in either case, especially if a listener attempts to "hear" these dyad pairs. Rather than dismissing these passages as unrelated to a CUP partitioning, an extension of the current understanding of CUP may hold unifying factors.

4.2.3 Secondary CUP Set Combinations

Treating the CUP combinations as part of a larger family of SC combinations can expand an understanding of combinatorial passages in Carter's music. In order to do this, a more general method can look at SC combinations that allow for CUP combinations *as well as* combinations that don't exhibit CUP. This is possible by adopting and expanding Morris's method of defining CUP:

> Define pc-sets J, K, L, and M, such that $J \in SC(W)$, $K \in SC(X)$, $L \in SC(Y)$, and $M \in SC(Z)$.
> Let $K \cap L = \{\}$, $J \cap K = \{\}$, and $J \cap L = \{\}$ for all J, K, and L.

In other words, the intersections of pc-sets K and L, J and K, J and L result in an empty set. No element is the same in any combination—they are disjoint.

> Now let $\{SC(Z): K \cup L = M\}$ be the set of all values of SC(Z) such that the union of pc-sets K and L yields pc-set M.

This refers to all of the possibilities of SC(Z) when K is joined with L to form M, which is a member of SC(Z). For example, if K is a member of SC [015] and L is a member of SC [06], the union of K and L will yield M, but M can be of three possible values of SC(Z), which are SCs [01457], [01258], and [02458].[8] These combinations are reproduced in Table 4.1(a). The second column offers values for SCs X, Y, and all possibilities of Z, while the third column provides both the Forte number and Carter sigla for each SC.

When there is only *one* possibility for Z for all X and Y, then Z exhibits the Complement Union Property. Table 4.1(b) provides a different 3+2 combination, of which there is only one possible outcome. The second column is now highlighted in bold to indicate that this combination exhibits CUP. Any member of SC [048] combined with a non-intersecting member of SC [01] will result in a pc-set of only one possible SC: [01248]. This approach recreates the *synthesis* method of Carter's *Harmony Book*, but also allows isolation of combinations that exhibit CUP. Isolating the CUP combinations is relatively easy to do given Morris's account of all pentachords and hexachords with CUP (Morris 1990, 184). Of the 38 pentachords, only 5 exhibit CUP, and are shown in Table 4.2. The combination of these specific values of SCs X and Y create only one possible value for SC Z.

Rather than concentrating on these precise partitions for Z, an expansion of combinations will instead focus on the CUP subsets of SCs X and Y. The primary question is this: Are there any *additional* pc-sets J of SC W that can combine with pc-sets that are members of SCs X or Y, and that *also* create a pc-set M of SC Z? In other

8 The reader can likely confirm this in a number of different ways. He or she could, for example, combine appropriate pc-sets at the piano, or refer to Carter's *synthesis* combinations in his *Harmony Book*. See Carter 2002, 103.

words, if a *primary* combination of X and Y yield Z and exhibits CUP, is there a *secondary* combination of X+W, or Y+W that *could* create Z*?* I define an *alpha* combination as the union of pc-sets K and L (as defined above) to result in pc-set M (as defined above). Pc-set M is of SC type Z, and has CUP.

$$\alpha = (K \cup L = M), \text{ and } \alpha \text{ always exhibits CUP.}$$

A *beta* combination can exist when the union of a new pc-set J (as defined above) with either K or L and also yields a pc-set M. of SC Z that results in the union of *X* and *Y*:

$$\beta = (J \cup L = M) \text{ or } \beta = (J \cup K = M), \text{ and } \beta \text{ never exhibits CUP.}$$

The values for pc-set M can be different in the K and L, J and L, and J and K unions, but M will still be the same resulting SC Z. The primary difference between α and β combinations is that an α combination yields an SC exhibiting CUP, whereas a β combination yields the same SC as α, but the secondary partition of the SC does *not* result in CUP. Are there values for J, K, L, and M such that $J \cup (K \vee L) = M_1$ and $K \cup L = M_2$, where M_1 and M_2 are both members of SC Z? The set of values for W are either {SC(W): J ∪ L = M} or {SC(W): J ∪ K = M}. Table 4.3 reexamines the pentachord [01248], first by removing the Forte and Carter designations, and second by examining potential values for SC W. Table 4.3(a) shows that no other dyad can combine with a member of SC X [048] to form a member of SC Z [01248], thus there is no β combination of X and W. However, a member of SC Y [01] can combine with a different trichord of SC [026] to result in a member of SC Z [01248]. The union of pc-sets of SCs Y and W does not *inevitably* yield a member of SC Z as per CUP, but is merely one

possibility. I will refer to the secondary combinations of sets that yield one of the possible sets exhibiting CUP as CUP$^{\beta}$ combinations. CUP$^{\alpha}$ combinations will refer specifically to the combinations of those specific SCs that yield a set with CUP.[9]

Table 4.4 shows all five pentachords that can exhibit CUP$^{\alpha}$ as well as their CUP$^{\beta}$ combinations. Three interesting aspects of CUP$^{\beta}$ are evident in these five pentachords. First, it is possible that that there are no CUP$^{\beta}$ combinations, as in Table 4.4(b). Thus neither subset of the CUP$^{\alpha}$ partitioning can combine with any other SC to also yield [01478]. I define this distinction as an *impermeable* set. I define *permeable* sets, by contrast, as an SC with at least one CUP$^{\beta}$. The second aspect of these sets is that no pentachord has CUP$^{\beta}$ with both SC X *and* SC Y. In other words, there can only be one set of CUP$^{\beta}$ for each value of SC Z. Third, it is possible that the CUP$^{\beta}$ combinations yield more than one possibility, as in Table 4.4(c).

The same process can be done for sets of larger cardinality, although as Morris points out, "CUP becomes a less distinctive feature of larger sets" (1990, 183). Of the 50 hexachords, 22 can exhibit CUP, either as 2+4 or 3+3 partitions. The number of SCs that can exhibit CUP increases greatly for each of cardinalities seven, eight, and nine: 97, 472, and 798 respectively. Table 4.5 shows the CUP$^{\alpha}$ and CUP$^{\beta}$ combinations for all 22 hexachords. There are 24 total combinations of hexachords, but two of these hexachords—[013569] and the ATH [012478]—have combinations of both 2+4 and 3+3, and are marked with the dagger (†) symbol. As with the pentachords, there are both permeable and impermeable sets, and there is only one set of CUP$^{\beta}$ for each hexachord.

9 Morris confirms the number pentachords and hexachords exhibiting CUP, and their individual partitions (1990, 184). The reader can confirm all of the α and β combinatorial possibilities in Tables 4.3, 4.4, and 4.5 by cross referencing the relevant SCs in both Carter's *Synthesis* and *Analysis* volumes of his *Harmony Book* (2002).

4.2.4 String Trio Analysis

Now that both aural and expanded theoretical frameworks are in place, the next step is to expand a musical context for analysis. Rather than considering isolated cues or formal boundaries, what follows is an analysis of a larger portion of Carter's String Trio. As before, I will present a proposed hearing of the piece, interspersed with analytical insights. Example 4.6 provides the entire second section of the String Trio, beginning and ending with the *hard* and *soft* metric modulations defined in Chapter 3. The primary aural texture for the main body of the section extending from measures 29–38 consists of interlocking streams. After the hard sectional division at measure 25, a downward melodic gesture through all three instruments initiates the main body of the section with. After an initial AIT1 multi-stop in the violin, the melodic line gradually descends in register, highlighting the interval-class (ic) 2. In measure 27, the viola acts as a catalyst to transform the prominent ic2 into ic1, by means of a melodic succession of AIT1. Although either AIT can highlight any interval melodically, the viola's presentation specifically emphasizes ic2 at first, connecting with the previous violin pitches, and then proceeds forward with ic1, looking ahead to the cello's preponderance of semitones. The viola holds on to a sustained D, yet fades into the background texture as a static field behind the cello's melodic stream. Once the violin restarts its own melodic stream we can, in hindsight, aurally determine that the transitional passage is complete, and that a new texture is beginning.

The interlocking streams texture is now prominent until measure 38, at which point the violin and cello have a composite texture relationship, combining interlocking and simultaneous streams. The viola is mostly silent throughout this section. At first

(measures 28–31), we could hear the viola as part of a static background, behind the interlocking exchanges of the other two instruments. The viola's double-stop interjection in measure 37 is its only conspicuous cue throughout the interlocking streams. Yet this important cue seems to signal an impending change. Both an increase in dynamics and an ascending register in the violin and cello lead to an apparent cadential climax. The gestural rise in measure 38 confirms harmonic closure as well, as two ATHs form the end of a complete aggregate collection.

By measure 39–40, the interlocking streams now become a fuzz of repeated pitches, ultimately culminating in two different dyad trills in the violin and cello. A succession of dyad trills in measures 39–41 (notably forming a succession of AITs) hearken back to the opening section and a distinct violin trill cue at measure 12 (not shown in this example). The viola interrupts and stops the dyad trills with its own multi-stop AIT2 in measure 41. Aurally, the viola again signals an impending change, progressing toward a different type of texture and into a new section. The fast successive notes break down in favor of longer sustained pitches in measures 41–43. The metric modulation at measure 44 marks a soft section break, where a new texture takes over, and the viola reemerges as a dominant character. The viola's regular pulse creates the aurally constant metric modulation between measures 43–44, using its characteristic "sustained pizzicato" aural cue for emphasis.

In general, this section demonstrates some of the harmonic characteristics discussed above, which are common at aural cues and cadence points. A closer look at the interlocking streams during measures 29–38 reveals a more nuanced account of motivic cues, aural boundaries, and SC combinations. For the most part, each

instrument throughout this interlocking texture adheres to a small set of intervals. The violin mostly highlights ordered pc intervals 2 and 5, although also uses pc intervals 4, 6, and 9. The cello, on the other hand, highlights ordered pc intervals 1, 3, 7, 6, and at times 8. This is fairly consistent throughout the entire section. Although the aural texture of interlocking streams involves both high and low registers for each instrument, there are never more than four successive pitches in one instrument before the other instrument picks up the next rapid fragment. This holds true until their streams are more integrated in measure 37. In the middle of this passage a specific motivic cue is prominent, as shown in Example 4.13, which further elucidates Carter's SC combinations in the passage.

Aside from their registral differentiation, the rapid pitch exchanges make it difficult to distinguish between the violin and cello. It may be possible to pick up on the characteristic intervals for each instrument on a focused hearing, but even this could be difficult. At measure 34, however, an aurally striking passage begins: see Example 4.7. The three-pitch cello motive (5,E,6) likely does not stand out compared to any of the previous short cello motives.[10] At the next interlocking interchange, however, the cello repeates these three pitches in the same register, only in a different order. After twice hearing the similar cello motive, the listener may still not pay particular attention to this. Yet this happens a third time, again with the same three pitches in the same register, and again in a different order. By the third repetition, the listener may realize that there has not been a change in register and pitch content, as there has been up to this point. The interlocking violin motives continue to change pitch content and register

10 At this point I adopt the standard mod-12 integer notation for pcs.

as before, but couple with an “aural anchor” in the cello. This aural anchor motive repeats two more times before finally changing pitches. The fourth iteration once again changes the order of the pitches, while the fifth and final iteration keeps the same pitch ordering as the fourth iteration. The {5,6,E} aural anchor motive is extrinsic in the sense that a repetition of pitches is not a recently established musical norm. Thus with a retropsective listening—or a guided, focused listening—one can say that there are new aural boundaries bound by the repetitive aural anchors, as shown in Example 4.7

As with the other aural boundaries, there is a break in an established process, creating an aurally salient moment. In the case of the String Trio section, the continued repetition of a motive is at first an extrinsic cue, until it repeats enough to become an *intrinsic* established norm, albeit for only a brief passage. It is globally extrinsic in the larger context of the interlocking streams section, but locally intrinsic after several repetitions. Once this aural anchor is lifted from the interlocking musical seabed, the previously established interlocking streams texture returns to fragments with changing pitch content. A closer investigation of this musical space beneath the score in Example 4.7 pairs each instance of the aural anchor motive with its successive interlocking pitches in the violin. With each of the first four pairings, the aural anchor combines with different pcs, and each of a different trichord SC. The {5,6,E} aural anchor combines in four different ways to form an instance of the ATH. The extension of CUP combinations from above now comes to the analytical fore.

Table 4.6 isolates the CUP^{α} and CUP^{β} combinations of the ATH, taken from Table 4.5, showing all five possible combinations with [016] to form the ATH. With five instances of the [016] aural anchor in measures 34–36, one might expect the presence of

all five combinations to form the ATH. However, only the first four combinations do so. After the fourth combination of (E,6,5)+(T,4,2), the cello repeats the aural anchor exactly, yet now interlocks with the following (3,7,9) in the violin. Although the violin uses another instance of SC [026] as before, it does *not* form the ATH. Not only has the sequence of ATH combinations been broken, but so has the reordering of the aural anchor motive, emphasized even further with a different rhythm. In measure 36, the changing pitch content, register, and rhythm of the cello signal another change and potential aural boundary. The four ATH combinations significantly *exclude* the one possibility that would exemplify CUP, thus only the CUP$^{\beta}$ are present. Although there are numerous skillful applications of CUP-spaces in Carter's music (Capuzzo 2004; Roeder 2009; Jenkins 2010; Koivisto 2004), this brief analysis of the *String Trio* shows that the CUP$^{\beta}$ combinations also play an important role in formal divisions, and are particularly reinforced by aural boundaries and cues.

4.3 Expansion of Set Combinations II: CUP2 and AIT

4.3.1 Post-Tonal Harmonic Progressions

The sequence of ATH combinations in the *String Trio* constitutes a type *progression* through all possibilities of CUP$^{\beta}$ combinations. Such a progression, however, is not the same as a culturally accepted syntax of hierarchically related sonorities. Rather, it progresses through a number of combinatorial permutations that, given its post-tonal context, reaches a type of harmonically related fulfillment. Within its localized context in this specific piece of Carter's, why should we not call this a harmonic progression?

Scholars continue to explore issues of progression and prolongation in post-tonal music. Edward Pearsall points out that "[i]t is possible to imagine a universe of post-tonal compositions where each composition defines its own harmonic structures and pitch hierarchy" (1991, 347). This aligns with Carter's own idea that every piece can have its own "language." The defining line between harmonic structures, hierarchy, and *progressions* can be difficult to articulate, however, especially in post-tonal music. Centuries of convention have defined tonal hierarchies and progressions. While a piece that primarily uses SCs such as the ATH or AITs is using a certain harmonic *structure,* this does not necessarily dictate the pitch hierarchy, or how chord structures might logically proceed within the piece.

As theorists find ways to define post-tonal progressions that parallel standard conventions of most tonal music, they also develop a wide array of analytical methods tailored to individual musical situations. Some, most notably Joseph Straus, provide methods for tracking voice-leading between sets in various atonal settings (2003, 2005, 2014). Others seek to find a basis for atonal harmony with historical and philosophical trends, or derived from individual composers (Cramer 2002; Deliège 2008, 2010). Lewin's seminal work (2007a) offers a transformational method for both tonal and atonal repertoire. Rather than developing a standard to define post-tonal harmonic progressions, the present goal is to specifically use aural phenomena in Carter's music as a guide for potential harmonic procedures. Thus any harmonic progressions in Carter's music do not arise from a generalized post-tonal harmonic law, but rather as a product of the aural realizations of his compositional process. The analysis of the *String Trio* demonstrates just this, by facilitating an aural experience to serve as a guide for

moments of harmonic progression. We will now turn to another example to further explore the ways in which the present analytical approach illuminates the concept of progression.

4.3.2 Secondary AIT Combinations

A further extension CUP allows continuation of this type of analytical investigation, although now with regards to AITs and their property as a CUP2. Although the [03]+[06] is the CUP2 partitioning of the AITs, other dyad combinations exist that also yield an AIT. There is an important difference between formulating α and β combinations, however, and additional dyad partitions of either AIT. Table 4.7 shows that there are no *beta* combinations for either AIT. I label these combinations as CUP2$^{\alpha}$, and are *impermeable*.

Carter has no specific interest in CUP2 *per se*, but rather in a broad use of combinations. Thus there is no reason that analysts should necessarily only seek out the specific AIT CUP2 combinations in Carter's music. Rather, a more exhaustive view of AIT combinations will help expand analytic views of CUP2. Table 4.8 shows all of the dyad pairs that can generate both AITs. AIT1 can be divided into three different non-intersecting pairs of dyads: [01]+[02]; [05]+[04]; and [03]+[06]. AIT2 can also be divided into three non-intersecting pairs of dyads: [01]+[04]; [05]+[02]; and [03]+[06].[11] Although the CUP2$^{\alpha}$ property of the [03]+[06] combinations *must* yield one of the two AITs, the other combination types could not be considered CUP2$^{\beta}$

11 Carter also shows these types of combinations in his *Harmony Book* (2002). Theisen (2010) uses similar divisions as well. For comparison, also refer to Morris's graphical method of combinations (1990), and Child's alternate labeling for AITs (2006). For some analytical applications and similar combinatorial examples in Carter's recent work, see Buchler and Theisen 2009 and Mailman 2009.

because they are not using an additional dyad type to combine with either [03] or [06]. In order to clarify this distinction, I refer to the CUP2$^{\alpha}$ of the AITs as "Type I." Two other types exist for each AIT. "Type II" uses the combination that includes dyad [01], while "Type III" uses the combination that includes dyad [05]. Types II and III do not necessarily combine to form an AIT. That is, [01]+[02] could combine to create AIT1 [0146], but could also form a different tetrachord—such as [0124]—which does not have the properties of CUP2. For the analysis that follows, I adopt the convention of linearly writing AIT type followed with its dyad combination type. For example, AIT2 with a [01]+[04] partitioning is "AIT2.II."[12]

4.3.3 *Duettone* Analysis

We will now once again return to a familiar musical example and enhance the initial aural analysis with a harmonic analysis. Example 4.8 revisits the *Duettone* example from Chapter 3, which examines aural boundaries, the sustained, simultaneous streams texture, instrumental ambiguities, and timbral shifts between instruments. Aural boundaries are once again shown in the excerpt, with added instances of AITs. Both AITs permeate the entire passage, both as melodic successions and harmonic combinations.

Figure 4.2 redraws these measures graphically and isolates only the Type I, or CUP2$^{\alpha}$ dyad pairings of the AITs. This passage *could* be analyzed as a CUP-space within which intervening harmonies, to use Marguerite Boland's terms, "link" the primary AIT

12 Theisen 2010 also demonstrates similar partitions of both AITs, though he does not label them as I do. For a larger context of partitions in post-tonal music, particularly in 12-tone literature, see Morris and Alegant 1988; Mead 1995; and Morris 2003.

harmonic combination (Boland 2006). A particular reinforcement of the CUP2$^{\alpha}$ partitioning of the AITs occurs in measures 33–34, in which a common pitch dyad {A, C} "pivots" the pairings from AIT2.I to AIT1.I. A search for these and other harmonic procedures may be valuable on some level, but it is difficult to understand how these relationships might enhance the aural realizations discussed in Chapter 3. It is imperative to remember that a quest for harmonic validation based on inherent set properties may not elucidate a passage's musical value. For instance, the CUP2 combinations in no way coincide with the aural boundaries or timbral shifts of this passage. This excerpt contains a harmonic procedure that goes beyond a CUP-space with intermediate "connector" harmonies.

An alternate view, if one adopts the aural perspectives developed in this dissertation, is to observe an aurally driven harmonic progression, shown in Figure 4.3. Measures 25–34 are again graphically redrawn, only this time showing all dyad pairings, not only AITs of Type I. Instead of specifying each instrument, the Figure 4.3 displays distinctive timbres and approximate register. The distinction of *arco* vs. *pizzicato*, and high vs. low register are the same aural phenomena that help determine the aural boundaries. Prior to measure 28, melodic successions in the same instrument form each AIT. The final two *pizzicato* pitches in the cello in measure 28 (A, D) do not form an AIT with the previous cello pitches, but rather combine with {Ab, Gb} of the violin to form AIT2.II, marking the first harmonic combination between both instruments. Immediately after this pairing, the cello changes to *arco* and drops to a low register. From this point, harmonic combinations dominate the simultaneous streams texture until the instrumental shift at measure 33. When the violin picks up the *pizzicato*

melody, the harmonic combinations between instruments cease and return to purely melodic successions. A listener can recognize this boundary, but may not be aware of the shift in dyad pairings. Beginning with aural boundary at measure 28, each AIT occurs three times, and are each of the three combination types outlined in Figure 3.8. The aural boundary at measure 33 articulates the exact moment of the final harmonic combination of these three combination types.

Similar to the String Trio passage, a combinatorial harmonic progression is articulated by aural boundaries. In the String Trio progression, the CUP^{α} combination of the ATH was significantly omitted. In the *Duettone* progression between measures 28–33, the AIT $CUP2^{\alpha}$ combinations (that is, AIT1.I and AIT2.I), *are* present, but are not saliently articulated. A comparison of Example 4.8 and Figure 4.3 shows that combination types of both AITs are equally favored due to the musical context. In this case, a harmonic progression of AIT1 types I–II–III would mean that SC [0146] forms with three different dyad combinations. The same would be true for a harmonic progression of AIT2 types I–II–III. A harmonic progression for *both* AITs would involve six total pairings of dyads, which is precisely what happens in measures 28–33 of *Duettone*, beginning just prior to the first aural boundary. Each instrument provides one dyad in successive combinations, thus the harmonic progression is dependent on both instruments.

Figure 4.4 simplifies the progression, focusing only on the three types of each AIT. Figure 4.4(a) presents the progression linearly, with diagonal lines representing the chronology of each dyad pair. For each AIT2, the violin dyad occurs before the cello, while the cello dyad occurs before the violin for each AIT1. The progression begins just

at the first aural boundary, switching from AIT2.III to AIT1.III. After progressing through AIT1 types III–I–II, a common dyad shift {B, Bb} acts as a pivot harmony, and helps facilitate the return to AIT2 combinations, completing the progression through AIT2.II and AIT2.I. Once the sixth and final combination occurs, the progression is complete, and coincides exactly with the second aural boundary. Figure 4.4(b) shows a circular representation of the cycle; the dotted arrow between AIT2.II and AIT2.I is where the cycle is "broken" with regard to the combination of both instruments collectively forming one of the two AITs. The "breaking" of the cycle occurs at the aural boundary of measure 33. CUP2 appears in these examples, but now plays a diminished role in comparison to the prioritized aural boundaries. One possible reading of this as a CUP-space is that the final AIT2.I completes the entire progression, serving as a cadence point.

The expanded analysis of *Duettone* functions similarly to the expanded String Trio analysis. Both analyses show that the various devices in Chapters 2 and 3 provide an aperture through which we can observe the detailed compositional process that gives rise to the music's salient events. Even though many of the listening devices presented thus far may appear to be a simple catalog of various phenomena on the musical surface, the analyst may actually use them as initial tools for a deeper investigation of Carter's harmonic techniques. The various musical parameters that articulate cues, textures, and aural boundaries can also direct our ears to harmonic techniques such as the progression in the String Trio and *Duettone*. The final analytical expansion below explores how to further incorporate additional musical parameters into an aural analysis.

4.4 Combined Aural Analysis

4.4.1 Multiple Musical Elements

The previous two analyses carefully combine aural accounts of the musical surface and explorations of underlying harmonic structures. While Carter carefully constructs much of this repertoire in terms of harmonic content, many other musical domains contribute to the musical surface. Domains such as rhythm help shape rhythmic offset cues; contour and register define wedge and directional cues; and timbral similarities can create aural ambiguities. We will now turn to another example that further explores how multiple, diverse musical parameters interact in the formation of aural cues, textures, and boundaries, as well as the illumination of harmonic structure. We will return to the initial example from Chapter 1. Although this exploration began with a hypothetical listener-account of the opening measures of *Hiyoku*, we will complete our examination of these measures with a deeper, listener-informed analysis.

4.4.2 *Hiyoku*: Expanded Analysis

The "listener-first" exercise of the opening measures of *Hiyoku* in Chapter 1 reveal that many factors—other than the pitches themselves—can contribute to a listener's meaningful interpretation of the music. Having formulated a framework for a listener-sensitive analysis and explored how this framework can enhance existing analytical models of Carter's harmonic practice, we can once again return to the opening measures of the clarinet duet and examine whether any other factors might contribute to an overall experience of the piece. The combination of salient aural events and

compositional frameworks can lead the listener to establish what Leonard Meyer calls *implicative* relationships. These inferences "are like hypotheses which experienced listeners entertain (perhaps unconsciously) about the connections between music events—past and present, present and future ones—on several levels of hierarchical organization in a particular movement or work" (Meyer 1973, 113). Even though Meyer talks specifically about tonal melodies, it is possible to imagine a similar treatment of Carter's melodies, "instrument/characters," and perceptual relationships. Whether or not there are particular hierarchies that are aurally evident in a piece, there are cumulative levels of musical parameters working together.[13]

Example 4.9 provides the opening measures of *Hiyoku* with added cues, textures, and boundaries to accommodate the initial imagined-listener's account of the piece. The aural boundaries are at first delineated by melodic differences. After the motivic aural cue links the ends of two melodic phrases (measures 4–5), the next aural boundary begins with a new texture of simultaneous streams and ambiguous aural distinction between instruments. The final outward wedge cue brings both aural clarity between the instruments and a cadential musical gesture. This surface-level aural analysis provides enough salient cures to help with the harmonic level of analysis.

Example 4.10 again shows the opening measures of *Hiyoku*, this time highlighting prominent intervallic and harmonic relationships. This example simplifies

13 Seth Monahan offers another approach that considers several hierarchical levels of analysis. Monahan has two primary goals, to determine "the various types of agents we encounter in analytic prose, along with their essential characteristics, and the relational logic that allows authors to transfer agency from one locus to another without forfeiting coherence or bewildering their readers." Monahan's ideas of transferring ideas of agency from an "avatar" to other levels of analysis fits well with the idea of different analytical levels, and how we as analysts and listeners can might move from one level to another. See Monahan 2013.

the intervallic and range of each clarinet across each phrase.[14] As Elizabeth West Marvin and other scholars have shown, listeners can more easily distinguish the upper and lower limits of a musical shape, which can allow clear aural associations.[15] The outer boundary of clarinet 1 in the opening phrase (shown in Example 4.10) spans 13 semitones.[16] The opening phrase of clarinet 2 is broken into two sub-phrases. The first sub-phrase, in measures 2–3, mimics the 13 semitones of clarinet 1, although it is slightly higher in overall register and reverses the order of presentation (and thus the contour). The second sub-phrase of clarinet 2, in measures 3–4, keeps the boundary contour, but *changes* the range to 10 semitones. Intervallic "discussion" continues through the opening measures, resulting in a palindromic progression in each instrument. Clarinet 1's semitone range for each phrase progresses from 13 to 11, 7, 11, and back to 13. Clarinet 2 takes up the initial 13 semitones of clarinet 1, and although persistently opts for a change to 10 semitones, it ultimately abandons this and returns to 13 semitones. In the final musical gesture of measure 7, both clarinets simultaneously agree on the same intervallic range of a 25 semitones (13 semitones plus an octave). The diverging ranges suggest conflict, yet the instruments agree in the absolute distance of each interval. Intervallic interplay between instruments portrays the cooperation and integration of instrument/characters so common in Carter's later style.

Example 4.11(a) shows that the harmonic makeup of the passage begins and ends with two overarching ATHs and a series of several AIT2s. Example 4.11(b) simplifies the

14 As in Chapter 1, the reader should take note of the clarinet as a transposing instrument. Thus, the clarinet's notated pitches are two semitones higher than actual concert pitch. The current analytical examples use the clarinet's notated pitch-space, and not sounding pitch.

15 For scholarship on contour theories, and perceptions of musical contour, see Marvin 1991; Marvin and Laprade 1987; and Prince 2014.

16 Expanded literature on intervals and intervallic content in post-tonal music can be found in Bernard, 1987; Susanni and Antokoletz 2012; and Straus 2014.

score into a transformational network, explicitly highlighting relationships between the initial ATH and its AIT subset.[17] The harmonic progression mirrors a similar trope in Example 4.10 of "ending up where we started" with the intervallic progressions. Clarinet 1 owns both initial and final ATHs at either end of the opening phrase, sharing tetrachords {B C F F♯} in measures 0–2, and 7. Theoretically, this sets up a framing [0167]/[04] CUP space, but such a partition is not readily aurally salient. On a smaller scale—and potentially with more aural perspicuity—the opening melodic lines of both clarinets sets up a harmonic progression of AIT2s. The (B D C F♯) linearly proximate subset of the initial ATH (measures 1–2) is transforms and shifts from clarinet 1 to a new AIT2 in clarinet 2. After an inversional flip of this set, remaining in clarinet 2, the AIT2 melodic transformations return to clarinet 1 with the same initial pcs from measures 1–2 (albeit in a different order and range). The AIT2 progression is a microcosm for the entire 7-measure passage, as the encompassing ATH is broken apart, undergoes changes, and ultimately returns in the final six pitches of clarinet 1 in measure 7. The two progressions are further related by transpositional invariance and symmetrical axis. The pitches of the T_6 [0167] invariance between the first and last ATHs, {B C F F♯}, serve as the axis of inversional symmetry of the AIT2 while in the hands of clarinet 2. Just as the ATH breaks down into a subset AIT, so too does the AIT break apart into "linking" gestures before coalescing again at the end of the overall phrase.

Example 4.12 takes into account an additional musical parameter. The example displays a dynamics graph, extracted from the musical score, offering an alternative

17 The seminal study for transformational networks is Lewin, 2007a. For a more recent study examining intersections of transformational analysis in tonality, see Rings 2011.

glimpse of the opening musical gestures. Dynamics are relative measurements, and the graph can only give estimates based on Carter's marking, thus this analysis is essentially heuristic. Nevertheless, the opening seven measures contain five different dynamic levels, as well as crescendos and decrescendos. Example 4.12(b) shows that there is a triple division of the gestures through time: initial entrances, interaction, and resolution. This dramatic interaction parallels the previous discussion of boundaries-of-difference. The opening gestures are in stark contrast. Clarinet 1 starts loud, but is gentle and fades away. By contrast, clarinet 2 starts loudly and quickly and sporadically changes its dynamic direction, ending with a crescendo. In the middle third of Example 4.12(b), clarinet 2 mimics, but does not exactly replicate, clarinet 1's dynamic shape. Finally, each clarinet's gestures are more closely related, thus blurring any clear boundaries. In the end, the clarinets come together in a "dynamic unison." One might interpret that the final up and down gestures of the clarinets are not opposing forces. Rather, they are acting cooperatively toward the same aural punctuation of the passage.

Example 4.13 places examples 4.9–12 in close proximity to each other, relating analytic accounts across several levels. The top of the example overlays the unfolding relative dynamics with the harmonic progressions, while the bottom of the example overlays the salient perceptual phenomena with the intervallic content. This conflation of various analytical accounts can help justify some of the less aurally perspicuous claims with ones that are more salient. The combined analyses produce several observations:

1. A trajectory of "conflict-to-resolution" or "difference-to-sameness" is supported by each type of analysis.

2. The opening harmonic AIT2 progression connects both instruments, although the AIT2 pitch content between the clarinet *dolce* melodies is invariant, which differs from the AIT2 pitch content of the *marcato* melody.
3. A conspicuous *x* motive connects the ends of the two sub-phrases of the *dolce* and *marcato* melodies.
4. Differing dynamic shapes help give rise to the initial aural boundaries in conjunction with the differing melodies, but do not necessarily inform the harmonic transformations.
5. Harmonic (ATH) and intervallic (13 (25) semitone) pillars mark the beginning and end of the opening 7 measures.
6. Moments of aural and harmonic clarity bookend passages of aural and harmonic ambiguity.

4.5 Conclusion

Does the *Hiyoku* analysis suggest that on some level a listener can envision two character-personas engaging in a struggle of conflict and cooperation, while on another level there can be a different narrative of transformations and changes of a single entity? How much of this is evident in our actual experience of listening to Carter's music? If we allow an analytical, removed reflection of this music, does our "in-time" experience of Carter's music change? Just as Carter's late chamber works each have their own individual charm, so too should the nuances of analysis be tailored to individual instances. By now it should be clear that several aural unifying factors exist across many pieces, while at the same time playing into the uniqueness of each piece. In addition,

detailed analyses based on these aural phenomena may help explain how these sounds rise from Carter's precompositional methods. The opening of *Hiyoku* has come full circle, beginning with a listener's account of the piece and ending with a deep examination of what contributes to this account. Yet even this example, as with many of the other examples throughout the previous three chapters, only explores a relatively brief passage of music. In order to put this method more fully to the test, I now turn to an analysis within the context of a complete piece: Carter's Clarinet Quintet.

Chapter 5
Analytical Essay: Clarinet Quintet

5.1 Carter's Clarinet Quintet (2007)

5.1.1 Overview

During the premier of Elliott Carter's Clarinet Quintet on April 29, 2008, the composer answered questions during a mid-concert interview. With added wit, Carter discussed his relationships with the performers, specific moments of the piece, and technical, compositional procedures. During the interview, according to blogger Dick Strawser, Carter pointed out that "the opening notes of the first clarinet solo—or rather the intervals they formed—are the basis for much of the piece's language" (2008). Violinist Joel Smirnoff then demonstrated a separate passage of the piece that inverts the intervallic structure of the clarinet's opening solo. Strawser continues to recall this part of the interview, and that "this chain of intervals, in one form or another, permeates much of the language that defines the individual roles within the ensemble. Then [Carter] added, 'though this is not something most listeners are going to hear—I don't think anybody would actually hear that—*I* certainly can't…'"[1] Carter's self-admittance of a detachment between the sound surface and the compositional design again pinpoints the struggles of music analysis to connect with immediate aural feedback. Additionally, even a *New York Time* music review of the premier suggested that the immediate sound surface is perplexing: "No question Mr. Carter's intricate rhythms and bristling textures can be hard to follow, even with the score" (Smith 2008). Yet the previous chapters show that we *can* find meaningful connections between elaborate sound clusters and

1 Strawser 2008. Emphasis in original.

textures in Carter's music, and that an analytic approach to compositional design *can* enhance an understanding of the surface phenomena. The intricacies of Carter's compositional method remains secondary to the sonic surface, and "as complex as his music is, it is still the *sound* that is the determining factor—not the system, not the rules we associate with this presumably strict style" (Strawser 2008).

The following analysis of Carter's Clarinet Quintet therefore serves as a case study for the listener-sensitive analytic approach to Carter's music developed in the previous chapter. It does not abandon the many technical analytical methods common to post-tonal music, but begins with the salient aural features that might be prominent during a listener's experience of the piece. As before, "a listener's experience" can be multifaceted, thus the following analysis is certainly an analytic interpretation of the piece. The first part of the chapter provides an overview of specific aural features of the piece, including prominent aural cues, textures, and formal boundaries. The remainder of the chapter examines each of the piece's five movements individually, first with a general "aural map," and second with a close analytical account of a single passage within the movement.

5.1.2 Preliminary Aural Features

Within the span of fourteen minutes, the Clarinet Quintet's soundscape shifts and evolves immensely through five movements. In addition to common textures explored in the previous chapters, there are unifying aural events that pervade the piece, either within a single movement or across the entirety of the work. To assist with the analysis of the piece as a whole, a preface of several prominent aural cues will serve as a sonic

guide, which includes specifically defined motivic, characteristic, and gestural cues. While many common gestural cues—such as directional cues, wedges, and rhythmic offsets—permeate the piece, some are more salient than others. An account of all instances of such cues is both redundant and unnecessary, although some of the more prominent occurrences play important roles in several analytic vignettes below. Similarly, t*utti* string harmonic accents play important roles throughout the piece, but a compilation of every instance is not necessary.

More specific aural connections, typical of Carter's late music, are the numerous quick and fleeting local interactions among motives throughout his pieces. These are abundant in the quintet, and may come to the fore at different times for the listener, depending on his or her focus. For instance, melodic repetitions of a single pitch, or oscillations of two pitches, are frequent occurrences, both in rapid and extended fashion. With a focused ear, these repetitions can easily take priority over other local events. Underneath the aural surface, these repetitions often serve to connect harmonic materials between successive sections of music, or to blend instruments together. Example 5.1 shows two such instances. In the first, a rapid clarinet stream suddenly stops, only to proceed with a new, deliberate melodic line with percussive attacks and large, angular leaps. The clarinet ends its rapid stream with the notated pitches (C♯, C), and begins the following melodic line with an exact repetition of these pitches. The last six pitches of the rapid stream, and the first six pitches of the new melody, form a set of complementary ATH and *ATH*, with (C♯, C) serving as the aural pivot between the two hexachords. Example 5.1(b) shows two instruments sharing repetitive pitches. In measures 44–45, the rapid stream of the clarinet slowly interlocks with a new, slightly

slower stream in the viola. At the initial moment of integration, the sounding pitches {C, F♯} occur three times in succession, in precisely the same register. Carter achieves many of the charming "cooperation" moments in his pieces with this type of subtle but effective shifting of musical domains from one instrument to another, creating a brief moment of aural ambiguity.

Repeated pitches in close proximity are but one type of motivic connection throughout the piece, but again, an exhaustive account of every nuanced moment is far beyond the scope of this analysis. More helpful will be to define overarching motivic cues that serve as aural progenitors of the many motivic interactions throughout the piece. Examples 5.2–5.4 outline three such primary motives. These motivic cues serve as aural anchors for the entire piece. Two of the three motives launch the piece in the string quartet and clarinet, respectively. Charles Neidich (the clarinetist for whom the piece was composed) explains the first motive simply as "a rhythmic figure in the strings, which returns in various guises throughout the piece, almost a leitmotif, *à la* Wagner" (Neidich 2008). I call this rhythmic gesture "Motive 1," which consists of three repeated notes, followed by a different note that is repeated and then sustained. It is difficult not to evoke the sonic specter of Beethoven's fifth symphony here, as similar "three-repeated-notes—change-to-something-else" motives so often do. Rather than a repeat of the motive, however, the second primary motive (which I call Motive 2) enters in the clarinet. Its "murmur" includes a fairly compact succession of melodic notes at a fairly rapid speed. The first several seconds of the clarinet's rapid stream consists of only four notated pitches {C5, D♭5, F5, G5}, and explores key intervallic relationships (alluded to in Carter's interview above). Even though these two primary motives return

throughout the piece, they do not always take the same form. Example 5.3 shows several variants of Motives 1 and 2, either altering the rhythm, intervallic content, or other musical domain.

Example 5.4 shows the final two measures of the introductory section of the piece. Motive 3 is aurally conspicuous primarily due to its registral extremes. Growing out of the clarinet's rapid stream, Motive 3 involves large leaps, often with a single punctuated pitch in either a very high or low register. The registral contrast and wide contour are particularly striking, and often stand out of any given texture. Mostly relegated to the clarinet's melodies, Motive 3's sonic fingerprint also involves variety, as shown in Example 5.4(b). Measures 73–74 behave similarly to the initial instance of Motive 3 in measures 6–7. Although the instance in measures 97–98 does not highlight registral extremes, its isolation can aurally connect it with measures 6–7 as its motivic ancestor.

Two other conspicuous aural events are worth mentioning. The first is an important characteristic aural cue with which we are already familiar, thanks to previous analyses: the snap *pizzicato*. In conversations with the composer prior to the premier of the Clarinet Quintet, Fred Neidich writes that Carter "has put in 'snap' pizzicato (*à la* Bartok)—as he explained to me, 'like a little splash of brightly colored paint found sometimes in abstract paintings'" (Neidich 2008). While Neidich explains these events as "unexpected moments," they may be more relevant to the listener than Neidich gives credit. Just as splashes of paint offer a visual stimulus, so too do these splashes give an auditory stimulus. But they also add meaning to the overall experience

of the piece, and an awareness of them often provides aural markers for upcoming changes in texture.

The second additional aural event completes an initial account of overarching cues. Common in Carter's pieces—not just in the Clarinet Quintet—are moments that create an acute awareness of time. It is nearly impossible to aurally determine precise metric placements of events in Carter's music, or solidify any notion of abstract or notated "beats." Yet some moments can make the listener aware of chronologic time. I will call these moments of temporal awareness "time motives," and they can take a number of shapes and forms.[2] For example, an awareness of the process of time often occurs at Carter's metric modulations, during which a steady pulse serves to modulate tempos across sections. However, time motives are not merely the presence of a steady pulse-stream. They are typically brief passages of only several seconds or less, and can have the effect of *decelerando*, *accelerando*, *rubato*, or other standard performance fluctuations of time. Of paramount importance is that time motives often focus the attention of the listener toward, or away from, a particular aural texture. Example 5.5 shows one such instance in which rapid streams steadily slow their overall rate of speed and come to a stop, as if the gears of a massive clock slowly grind to a halt. Throughout the quintet, several time motives create particularly striking contrasts to the passages which precede or follow, drawing acute awareness to the process of chronologic time.

2 Michael Cherlin concept of a *time shard* in Schoenberg's music resonates with my concept of time motives. For Cherlin, time shards are correlate of an uncanny sense of time, particularly in Shoenberg's later works. See Cherlin 2007, especially Chapter 5.

5.1.3 Form

Table 5.1 provides a breakdown of the piece's overall formal structure.[3] Though divided into five interlocking movements, the first two movements comprise nearly half of the piece. Measure numbers make reference to the moment at which notated metric modulations separate each movement, but this does not necessarily mark the exact moment that one movement begins and another ends. As shown in Example 2.1, intrinsic events of the first movement overlap with new, extrinsic events of the second movement, thus the transition involves integrated sounds. Each formal division either behaves in this way, or creates a transitional passage to assist with the notated metric modulation. Example 5.6 highlights the primary aural events surrounding each formal division.

The first transition (Example 5.6(a)), introduces new sustained pitches in the clarinet and cello. Although precedents for sustained pitches and short, lyric melodic fragments exist in the first movement, the absence of short gestural cues marks a noticeable change in the overall aural texture. The conspicuous characteristic snap *pizzicato* also serves as a sonic event that creates an impetus for change. The clarinet's rapid stream slows down, and provides the inconstant pulse rate that bridges the soft boundary of the metric modulation. The leaping clarinet attacks, stating instances of Motive 3, intrinsically hold on to their previous materials, while the melodic materials and new string attacks slowly take over the listener's attention. The second transition (Example 5.6(b)), bridges the gap between movements 2 and 3, but does not overlap

3 The timings are based on the first commercial recording of the piece (Carter, 2010), which is performed by Charles Neidich and the Juliard String Quartet. These same timings will be used throughout the analysis. Other recordings or live performances will certainly have different timing markers.

material as conspicuously as the first transition does. The metric modulation at measures 129–130 again uses an inconstant pulse in the clarinet, with a soft aural boundary in the strings. The extended durations of all pitches rend this metric modulation practically inaudible. A more prominent, hard boundary exists earlier with the clarinet's sudden upward directional cue in measure 127. This effectively ends the second movement, and is the approximate temporal halfway marker of the entire piece. Thus the sustained pitches that follow this immediate, chronologic boundary serve as the transitional measures into the third movement. The sudden, expansive harmonic accent in measure 132 breaks the mold. This interjection, at present an extrinsic event, eventually establishes itself as a primary defining sound of the upcoming movement.

The third and fourth transitions, unlike the first two, involve harder metric modulations accompanied by constant aural pulses. Example 5.6(c) shows transitional measures, in which rapid simultaneous streams (extrinsic to movement 3), slowly build intensity. The cello's constant pulse bridges across the hard aural boundary of the suddenly silent pulse streams. A characteristic snap *pizzicato* lies hidden within a final expansive harmonic accent—the last holdover from the previous movement. The texture shifts immediately to the hurried interlocking streams that set the precedent for the fourth movement. Both this transition and the final transition, shown in Example 5.6(d), offer two more time motives. The constancies of the pulses link one movement to the next, but the sudden regularity of pulses—compared to their surrounding textures—draws aural attention to the pulses. A sudden flourish in the clarinet creates a hard boundary in the final transition between movements, while the strings' *tutti* accents are largely extrinsic to both the fourth and fifth movements. Nevertheless, their regular

pulses create a suspension of time between the two movements, until the immediate switch to *pizzicato* streams confirms to the listener that a new section and new texture will proceed.

Having surveyed the primary aural cues and provided an overall sense of the Clarinet Quintet's form, the analysis now turns to individual movements. I provide an "aural map" for each movement, which provides an overall interpretation of the movement's sonic landscape, primarily taking into account the analytic strategies of Chapters 2 and 3. Following this, a brief analytic "figment" looks at a single passage in close analytic detail. The reader should take care to note that the Clarinet is a transposing instrument, thus it sounds two semitones lower than notated.

5.2 First Movement: Motivic Evolution

5.2.1 Aural Map: *Allegro Non Troppo*

For each movement, an "aural map" provides an overview of salient features, offering a starting point for further analytic investigations. Each map includes a number of topographical categories from chapters 2 and 3 in addition to the preliminary features mentioned above. Common to all aural maps are: descriptive texts for each passage, timing and measure numbers; multiple layers, as needed, grouping together similar textures; and aural cues. Of the latter, the three primary motivic cues described above are labelled M1, M2, and M3; an asterisk (*) denotes instances of the characteristic snap *pizzicato*; while vertical and angled bars depict various harmonic and gestural cues.

Figure 5.1 shows the aural map for the first movement, which lasts approximately two minutes and thirty seconds. The opening measures set the stage for the entire

movement by setting the initial texture quickly as a clarinet melody, with the strings providing an accompanying role. The opening measure unifies the string quartet in rhythmic unison, creating the first instance of M1. The strings quickly fade into the background, once the clarinet embarks on its initial flurry of notes. The opening pitch material (refer again to Example 5.2) is also telling. The initial string repeated notes create SC [0126], although the following sustained pitches form AIT1 [0146]. Together these initial eight pitches are literally complemented by the first four notes of the clarinet, thus completing the aggregate.[4]

Strings slowly emerge from their static background, and over the next several seconds move closer to the musical foreground through slowly changing and sustained simultaneous streams. The first major break for either stratum of the texture comes at measure 7 with an emphatic harmonic accent in the strings on AIT1, breaking free from the static field. Not only does the clarinet break its subtle rapid stream, it also expands its intervallic content and register with the first instance of Motive 3. The strings follow with a significant return to instances of Motive 1. Up to this point all musical materials are essentially new, but after the harmonic accent at measure 7, aurally familiar material happens for the second time. The continued presence of Motive 1 eventually establishes itself as an integral and intrinsic part of the piece. The strings again pick up the simultaneous streams in uniform fashion, seemingly from where they left off earlier. They are more to the fore, however, both due to increased dynamics and the absence of the clarinet. Their *espressivo* marking and lyric quality serve as aural precursors for the numerous lyric melodies in the remainder of the piece.

4 For more on Carter's procedures with aggregate completion, see Mead 1995.

A new, extrinsic cue occurs at 0:19: the snap *pizzicato*. Although this is the first time this cue presents itself, like Motive 1 it continually returns throughout the piece. Due to its infrequent and isolated nature, however, this cue does not ultimately establish itself as localized intrinsic cue, but rather as a characteristic cue across the entire piece. As noted earlier, it functions as a "splash of paint" at unexpected times. On a global scale throughout the piece, the listener may wonder when the next "splash" will occur, shifting its function to a global intrinsic cue at locally extrinsic moments.

The remainder of the movement involves similar short phrases by both the clarinet and quartet. Short phrases cluster together between several primary aural boundaries, creating sections from 9–27, 27–32, 32–37, 37–43, and 43–50. The first of these sections is the longest, giving much of the heft of the movement. As the clarinet exchanges rapid fragments with variants of Motives 2 and 3, the accompanying quartet interlocks with various sound projections, including Motive 1 fragments, background static fields, harmonic accents, and fragmented lyric streams. The remaining four subsections last only between fifteen and twenty seconds, although offer contrasting aesthetic soundscapes. During measures 27–32, a listener might attend to the various repetitions created by the ensemble. This section serves as the first analytical vignette in Section 5.2.2 below. Measures 32–37 return to the rapid clarinet streams and accompanying quartet Motive 1 alterations, while measures 37–43 return to the lyric, simultaneous streams akin to measures 7–8. The final section, measures 43–50, begins to integrate the sounds of the mostly autonomous quartet and clarinet by creating similar, interlocking streams. It is in this section the conspicuous aural pitch repetitions occur (refer again to Example 5.1(b)).

Aside from the general trajectories of these phrases, the listener might attend to several other subtle aural phenomena. For instance, Motive 1 is continuously transformed throughout the strings. One way is by altering the timbral components of *pizzicato* or *arco*. Between approximately 0:29–0:39, Motive 1 is infused with harmonic accents, providing patterns of *pizzicato-pizzicato-arco/pizzicato* or *arco-arco-arco/pizzicato*. Multiple characteristic snap *pizzicati* also seem to disrupt ongoing musical processes, or provide a signal for an impending aural boundary. Motive 2 "murmurs" and Motive 3 leaps move in and out of the sonic foreground, while short hints of lyric melodies slowly percolate, waiting for further realization. Although any of these interactions are worthy of deep analysis, we will now turn our attention to one particularly aurally striking passage.

5.2.2 Analysis Figment I: Repetition and Time

Example 5.7 shows measures 27–32, a particular striking passage. The clarinet is the determining factor for aural boundaries of this passage due to the change from rapid streams (prior to measure 27), and again after measure 32. Rather than a rapid stream, the clarinet instead has intermittent pitches, although an additional chronologic boundary divides the clarinet's line in measure 30, essentially splitting the passage in half. In the first half, a new feature of the clarinet appears, which serves as an aural anchor for measures 27–30. The clarinet repeats a single pitch, notated C♯6. The first instance of this C♯ breaks free from the rapid stream with an accented leap up of 28 semitones, evoking Motive 3. The C♯ repeats subtly at first, yet with each repetition three aurally significant things happen. First, the mere repetition of a single pitch brings

it to the sonic foreground. Up to this point repetition in the clarinet is an extrinsic occurrence. The second noticeable progression is the dynamic contrast. The first accented C♯ in measure 27 stands out due to its registral difference from the previous rapid steam, the silence that follows, and the increased dynamic tension. The first repetition of the C♯ immediately drops in dynamics, yet with each subsequent reiteration, the dynamic tension again increases. Third, the space between each C♯ gradually becomes smaller. The equivalent of ten sixteenth-rests divides the first and second C♯s, but quickly diminishes in the following pattern of sixteenth-rest durations: 10–7–5–4–3–3–2. Collectively, the clarinet's aural effect is that of increased urgency due to diminishing time, as if a lingering thought continually heightens the anxiety of the listener.

The tension finally breaks in measure 30 by a change in all three of these domains (dynamics, repetition, and intervening rest). The change in pitch is immediate, and further reinforced by the new, non-repeating pitch E5. The dynamics also begin to subside after the final C♯. The new, hurried pace of the clarinet remains, however, until the space slowly begins to lengthen in measure 31. Beginning with the E5, the rest-space progression is now the following: 2–2–2–2–2–3–4–4–4–4. This has the opposite effect from earlier, now as a relaxation or expansion of time.

Because of the interlocking nature of the instruments throughout this passage, the quartet mirrors the contraction and expansion of durational time of the clarinet. Example 5.7 also demonstrates how the intervening quartet attacks interact with the space between each clarinet attack. In the first half of the passage, the total number of onset attacks by the quartet diminishes as the space between the clarinet's attacks also

decreases. The snap *pizzicato* and return to Motive 1 fragments marks the halfway point of the phrase, and provides an important shift of a musical domain between the clarinet and quartet. Prior to this, the clarinet prioritizes repetition, while the strings' harmonic accents primarily shift pitch content. After this mark, the clarinet does not repeat a single pitch, while each subsequent attack of the strings increasingly repeats individual pitches. Furthermore, the number of intervening repetitions of string attacks coincides with the expansion of durational space in between each clarinet attack. Beginning with the unified *pizzicato* harmonic accent in measure 31, the onset attacks of the strings increases to two, three, and finally five.

A close examination all five instruments reveals additional pitch relationships. In the clarinet, the pitch content in measures 30–32 is constructed to further divide the second phrase into two parts. After the C♯ in measure 30, the non-repetitive pitches complete the aggregate *without* any pitch repetitions. A C♯ also ends the string of individual pitches, framing the other twelve. A closer examination reveals the division of pitch content into two hexachords: The C♯ in measure 32, which creates the second aural boundary in conjunction with a return to the rapid stream, completes the ATH with successive pitches in measures 31–32. Its complement ATH—both literal and abstract—begins after the repetitive C♯ ends in measure 30, coinciding with the short two-sixteenth rest duration between each successive pitch.

Within this span, the accompanying string quartet acts as unified single entity, and also divides the passage into two main aural halves. The dividing point does not, however, coincide with the clarinet's aural boundaries. For the quartet, there are short melodic fragments of one or two pitches, which collectively create shifting chords

interlocking with the clarinet's repetitive C♯. The prominent snap *pizzicato* in measure 29 not only portends the change of the quartet's texture but also the upcoming change in the clarinet. After this characteristic cue, the quartet switches to fragmented instances of Motive 1, using both *arco* and *pizzicato* versions, and lasts until measure 32.

The short melodic phrases and Motive 1 fragment are mostly harmonic simultaneities, and it therefore might make sense to organize certain harmonies accordingly. While this is true to some extent, there are a number of possibilities. Figure 5.2 shows one possible harmonic interpretation of the quartet, from measures 27–30.[5] Most of the passage uses both AITs as its harmonic basis, with occasional linking sets between the verticalities. The initial individual pitches of the quartet {3, 4, 7, 9} form AIT1—a pc-set that occurs several times throughout the passage, as shown in Figure 5.2.

While the simultaneity of the strings strongly supports vertical realization of harmonies, the parsing of additional tetrachords reinforce very subtle aural phenomena. Violin 1 purposefully stands out with an *espressivo* indication in the score, thus melodically prioritizing its aural presence, if only for a short time. Violin 2, viola, and cello do not replicate the linear AIT1 realization of violin 1. Other connecting clusters of AITs do exist, however, such as with the middle two strings with pitches {2, 4, 7, 8}, which is another recurring pc-set in this passage. Separated from violin 1's aurally prioritized line, the lower three strings now share a common aural bond with the clarinet in measure 28. With the first repetition of the clarinet's notated pitch 1, so too do the strings repeat the pitches {9, 8, 2}, thus aurally connecting the subsequent vertical instance of an AIT.

5 In this analytic discussion and the one surrounding Figure 5.4, the clarinet is transposed from the notated pitch to sounding pitch. I additionally shift to mod-twelve integer notation for analytic convenience.

Figure 5.2 proceeds in rough chronological order, and divides into two main parts at the cello's snap *pizzicato* pc 2. The primarily vertical harmonic realizations of AITs in the first half returns in the second half, although additional melodic connections exist as well. Pc-sets {3, 4, 7, 9} and {2, 4, 7, 8}, make prominent appearances again. In the first half of the passage, these two pc-sets combine to form a vertical and horizontal AIT cluster, yet in the second half they provide framing vertical AIT bookends. The vertical realizations of AITs provide an immediate aural connection, while the horizontal harmonic connections provide overall harmonic unity.

5.3 Second Movement: Melodic Continuities

5.3.1 Aural Map: *Meno Mosso*

The lyric fragments of the first movement provide the initial seeds for the long, independent melodies of the second movement. The total duration of the second movement is approximately five minutes in length, which is more than one-third the length of the entire piece. Figure 5.3 maps significant aural cues, changes in texture, and prominent aural boundaries in this movement. The overall texture of the movement is primarily in the form of melody and accompaniment, but not necessarily in the form of the quartet accompanying the clarinet. Although Carter remarks that "the clarinet follows its own musical character in contrast to that of the quartet," the second movement allows the quartet to finally express itself as four individual instruments, unlike the highly unified process of the first movement. Thus an aural consideration of the string instruments is split into two aural groups: the primary melodic string instrument and the non-melodic strings. With the addition of the independent clarinet

line, Figure 5.3 has three overall layers of texture. The listener can, however, direct his or her attention ways other than simply following three layers of texture, some of which include: toward the main lyric melody; how the main melody passes from one instrument to another, or if it is conspicuously absent; the changing nature of the accompaniment materials; coincidental interactions between different layers of texture; or a different, novel approach.

Overall, the second movement divides into four main sections: mm. 52–74; 75–92; 93–112; and 113–127. The first main section establishes the lyric melody as the primary driving force, beginning prominently in the cello before shifting to violin 1. Surrounding this lyric melody are a number of accompanying factors. The clarinet part is a mixture of elements from the first movement, especially Motives 2 and 3. This intermingles with long sustained pitches that act as a background static field. The remaining string accompaniment is similar to the clarinet, although it contains its own pulses and various interjections. Particularly striking in the first section is the time motive passage, in which rapid pulses slow down and dissipate into extended harmonic accents and rhythmic offsets (see Example 5.5). This leads into a transitional passage between sections, including a characteristic snap *pizzicato,* the end to the lyric melody, and a prominent rhythmic offset. The second main section provides a consequent counterpart to the first section. The strings combine once again for cooperative effort, although occasional fragments of the prime lyric melody engage with simultaneous streams, static fields, and harmonic accents. The clarinet is mostly relegated to a background static field, with occasional interjections that participate in the integrated

nature of the quartet. The second section ends with a prominent melodic rise that also marks the return of an extended lyric melody.

The third and fourth sections are similarly paired as the first and second are. In the third section, the lyric melody returns, and again begins in the cello. Rather than a fairly busy string accompaniment, the supporting material is now very subdued as a collective background static field. The extended cello melody, derived from its initial instantiation at the beginning of the movement, eventually passes to violin 1 as before. Violin 1 takes up the melody, although it is now infused with the clarinet's previous large angular leaps and gestural melodic interjections. An increasingly intruding static field mounts at measure 112 with a final down-up gestural cue in violin 1. This serves as an aural boundary between the third and fourth sections. The quartet's static field, formerly the background, now comes to the fore as sustained simultaneous streams. A decisive timbral aural boundary occurs at measures 117–118, as soaring non-vibrato strings reach ethereal heights. The clarinet reminds the listener of its presence with subdued points of interjection. A final upward gesture of the clarinet silences the strings, offering a sense of closure to the movement.

5.3.2 Analysis Figment II: Shared Melody, Shared Motive

The largely independent, lyric melody is one of the defining aural aspects of the movement. Therefore, the second analytical vignette of the chapter examines how this melody behaves at various points throughout the movement. Example 5.8 isolates the initial cello melody. The entrance of the cello in measure 52 on the pitch F4 does not necessarily sound like the start of a melody. Eventually, a series of downward leaps

reaches E2, an apparent melodic goal. The following B♭2, however, offers a sense of released tension after the low E2, suggesting the end of an initial musical phrase. The cello then leaps back into a higher register, going even higher than the initial pitch. An increase in register and dynamics leads the listener to a high A♭4 before relaxing down one step to G♭4, offering a closing complement to the initial downward phrase. Overall, the melodic phrase opens a wide range and contains only leaps, most of which are quite large. Not until the final two pitches is there a small stepwise interval, which is likely aurally prominent when compared to the preceding leaps. This twelve-note melody sets a precedent for how the lyric melody strand behaves for most of the movement.

Example 5.9 highlights similar melodic lines throughout the movement, showing several unifying factors. The lyric melodic line shifts from the cello to violin 1 in measure 58 (Example 5.9(a)). The lone stepwise motion that ends the cello's melody is the same stepwise motion—indeed, the same pitch dyad (A♭, G♭)—that starts the violin melody. Even with a slight difference in timbre, this motivic aural cue has a high degree of aural ambiguity due to relatively similar musical domains (similar to Example 5.1). The violin continues the upward trajectory of the cello's consequent phrase, and soars into a higher register with a series of leaps. The violin's lyric melody mirrors the cello's: Instead of starting with leaps and ending with a step, the violin melody does the opposite and ends with an emphatic and stressed leap in measure 61, emphasizing Motive 3. A further comparison reveals that the starting and ending pitches of the combined lyric melody in measures 52–61 are in very close proximity. The cello ends only a semitone higher than its initial pitch (F4 to G♭4), and a similar situation occurs with the violin (A♭4 to A4). In an isolated listening, one could identify them as highly related melodies. Their

structures are similar, even though some of their individual components are reversed or altered.

Additional aural similarities of the lyric melody exist elsewhere in the movement. The viola melody in Example 5.9(b) begins in a more stepwise fashion, and then cascades down through rapid, melodic flourishes. In a one-to-one aural comparison of this melody to the previous ones, there are still prominent similarities. The beginning of the viola melody is certainly lyrical in quality, reminiscent of the cello in mm. 57–58 or the violin in mm. 58–59. The second half of the viola melody, however, does not sound particularly similar to the preceding cello or violin 1 examples. One motivic aural cue in particular is striking, however, and marked as Motive 4 in Example 5.9(b). This motive serves as a springboard to the second half of the viola melody. Aurally, this motive behaves as an embellishing note prior to a leap. That is, the pitch C♯5 embellishes the sustained pitch G4, before leaping up to F♯5 in measure 83. This aural seed of Motive 4 could possibly link to the triplet turn in the cello in measure 54 (see Example 5.8), which launches the primary lyric line of the entire movement. Motive 4 emerges in many subsequent instances of the melody. In Example 5.9(c), violin 2's melody also contains a clear instance of Motive 4. Once again, as before in the viola, it serves to spring the listener toward a change, and indeed the end of a phrase. Harmonic support also exists for an embellishing-tone in Motive 4 when we consider the harmonic cadence of this melodic line. The final multi-stop of this phrase is an instance AIT2. The previous melodic pitches of violin 2 are the exact same pitches of the multi-stop in precisely the same register (F♯5, D6, B4, C4). The only pitch that is *not* a part of this AIT is the A5 in Motive 4.

The lyric melody eventually returns to the cello in measure 92, at the start of the second half of the movement. Example 5.9(d) provides the complete melodic line in the cello from measures 92–103. Perhaps the clearest and most deliberate instance of Motive 4 is in measure 101–102, once again just prior to the end of the extended melodic phrase. Several other instances of Motive 4 are not exactly the same as the instances in measures 101–102 or in the previous melodies, but can have a similar motivic aural connection to a listener.

5.4 Third Movement: Harmonic Pillars

5.4.1 Aural Map: *Adagio*

The majority of the third movement balances prominent harmonic accents with sinewy threads of melodic connectors. The "harmonic pillars," as I will call them, take a variety of shapes and sizes, from stacked twelve-note string multi-stops to weighted extensions of only a few compact pitches. Aurally mapped in Figure 5.4, this movement launches the second half of the piece and extends for just over three minutes. After the melodic rise that effectively ends the second movement, the ensemble's sustained pitches return. The definitive point of new material comes in measure 132, with an expansive twelve-note harmonic accent in the quartet. This type of unified quartet punctuation is largely absent in the second movement, thus it is a clear extrinsic sound to the surrounding sustained pitches, providing a solid chronologic, immediate aural boundary.

For the majority of the movement, all of the instruments engage in connecting these harmonic pillars in various ways—primarily using sustained pitches, with

staggered, paired, or otherwise coordinated attacks. Fleeting motivic connections between the instruments and continuous exchanges of static fields and interjections create the overall affect for the entire movement. The listener can hear a variety of interactions, such as repetitions of one or two pitches between one or more instruments. One might also attend to brief gestural contours cascading through the instruments, or registral matchings that create overlapping moments of ambiguity. Even though the texture of the movement is largely uniform, there are several larger formal divisions and cues that can help guide a listener through his or her aural experience.

Measures 132–166 contain three primary harmonic pillars. The outlining pillars at measures 132 and 166 frame the entire first half of the movement. A less expansive pillar at measure 150—just after a characteristic cue—further divides the movement into first and second quarters. Motivic connections between instruments permeate this entire section. From 166–170, sustained streams behave more like extended harmonic accents than continuously shifting melodic streams. More prominent accented harmonies further ingrain their presence as an intrinsic component of the movement, and soon the sustained connective material begin to break apart. Fragmentation of connecting melodic material continues after the harmonic pillar at 170, dissolving into rapid streams by measure 176. Rapid streams, so prominent earlier in the piece, now act as foreign interjections to the movement. Sustained harmonic accents return as well, but with fewer melodic connections in the strings than before. Instead, the clarinet's increasingly melodic presence spans the gaps between harmonic accents. A harmonic pillar and accented gestural cue at measure 183—reminiscent of some of the large, Motive 3 related leaps in the second movement—seem to mark an end of the collective

agitation. Subdued sustained pitches return, similar to the opening of the movement. Several more harmonic pillars with sustained connective materials appear throughout the remainder of the piece, from 187 and following. A clear aural boundary occurs at measures 205–206, as the clarinet breaks the sustained pitches again, followed by pizzicato rapid streams. These extrinsic gestures seem to portend an impeding change, and indeed signal transition into the fourth movement.

5.4.2 Analysis Figment III: Between the Pillars

A brief examination of the space between two harmonic pillars reveals some of the aural and harmonic interactions. Example 5.10 focuses on measures 188–198, which is about twenty seconds of music. This passage contains harmonic pillars that are connected by sustained melodic streams in the strings. The clarinet also partakes in the sustained pitches, cooperating with the strings more in this passage than in others. The contour of the first two pillars is largely falling, particularly in the upper three strings, as they leap a significant distance downward (between 8 and 13 semitones) from the first pillar to the second. As the following sustained lines progress, the clarinet slowly climbs in register with two upward leaps, perhaps most salient in measures 192–193. Just after this leap, the strings collectively stop their sustained pitches in measure 194, only to proceed in instrument pairs (violin 2/cello and violin 1/viola). The string pairs imitate the clarinet's previous upward trajectory. Once completed, however, the clarinet plummets -17 semitones to notated pc 1. What follows is another collective imitation of the clarinet by the strings. Both violins leap significantly down, although perhaps more aurally prominent is the cello's sounding pc 11 in measure 196. Even though the cello

rises from its previous pitch, the collective downward gesture of the strings mimics the falling gesture of the clarinet, and connects the clarinet and cello's shared sounding pc 11. An additional falling dyad in the clarinet in measures 196–197 imitates the clarinet's previous two pitches—nearly matching exact in register and semitone descent. An expansive harmonic pillar interjects within the clarinet's falling gesture marking an aural boundary that binds the preceding measures back to the pillars in measure 188.

Figure 5.5 reveals the integrated harmonic makeup of the passage, shifting between both AITs. Beginning with the sustained strings in measure 188, an initial AIT1 slowly shifts pitches into another instance of AIT1, retaining only pc 7 in the cello. The next two iterations of AITs, first to AIT2 and then back to AIT1, perform a common-dyad pivot from one tetrachord to the next. The {4, 7} dyad of the viola and cello sustains while the {3, 9} dyad of the violins slowly shifts to the pcs {0, 6}. The retention of SCs [03] and [06] ensures the formation of one of the two AITs, and the shift from AIT1 to AIT2 demonstrates an instance of the Complement Union Pair (CUP2).[6] The reverse happens immediately following this, as the violins sustain the {0, 6} dyad while the viola and cello slowly shift pitches from pcs {4, 7} to {2, 5}, retaining their SC [03] identity. Again, the [03]+[06] shift between AITs demonstrates a CUP2. While Figure 5.5 shows a close transformational relationship between both AITs, additional relationships demonstrate other combinatorial possibilities.

The first two harmonic accents of the passage yield pentachord [01367]. As noted above, these two harmonic accents produce a cumulative falling melodic gesture. The first five pitches of the clarinet *also* form pentachord [01367] and culminate in a falling

6 Refer to Chapter 4 regarding the Complement Union Property, Complement Union Pairs, and relevant scholarship regarding these topics.

melodic leap. By parsing the clarinet's pentachord into two overlapping tetrachords, however, both AITs emerge, with a common trichord. The outlying pcs {5, e} bookmark a highly symmetrical configuration of ics 3 and 6, which further support the [03]+[06] integration of the AITs. This parsing of the clarinet's [01367] helps support the makeup of the two initial harmonic accents within context of the passage. Both pentachords are a combination of overlapping AITs (as shown in Figure 5.5), with a common [026] trichord in each case.

The second wave of harmonic synthesis begins in measure 194, and continues for the remainder of the excerpt. Staggered string dyads group violin 2 with the cello, and violin 1 with the viola. After an initial AIT2 in measure 194, all four instruments shift pitches to create an AIT1 in measures 196. Following this, the violin 2/cello pair remains on their sustained [03] dyad while violin 1/viola shift their [06] dyad in measure 197, again creating a CUP2 pivot, similar to measures 191–192. As the shifting string combinations produce a collective falling gesture on the melodic surface, the clarinet also connects with its previous material. The clarinet's falling-dyad gesture in measures 196–197 essentially reiterates its previous falling dyad gesture in 194–195. These four pitches combine for a melodic succession of AIT1. Throughout the entire passage, combined [01367] pentachords create unifying harmonic pillars through all five instruments. These pillars connect back to the twin harmonic accents in measure 188, but are aurally "hidden" from the musical surface.

Finally, the dense harmonic pillar in measure 197 creates a decisive aural boundary, and contains a similar kind of harmonic combination of AITs. This reflects back on the preceding material and also launches the upcoming section. Only seven total

pcs create the eleven-note chord, as shown in Figure 5.5. The addition of the clarinet pitch in measure 198 adds an eighth pc, and aurally connects to the harmonic pillar as a culminating punctuation. These eight pcs form an instance of SC [0134578T], which behave similarly to the [01367] at the start of the passage. That is, there are overlapping AITs. In this case, rather than one AIT of each type, there are several overlapping AITs. Figure 5.5 also redraws the combined chord. Solid lines connect pcs to show two instances of AIT2, and a single instance of AIT1. Pcs {0, 5, 6, 8} appear twice in the musical surface, reinforcing the overlapping AITs. Some pitch duplications appear in the same register ({6, 5, 8}), while the duplication of pc {0} frames the high and low register of the chord.

The dotted lines in the combined chord (in Figure 5.5) represent a "missing" AIT1, which would complete the symmetric combination of the chord. The very pitches that are required to fulfill the "missing" AIT1 indeed *are* present, but are presented vertically in the clarinet, thus tying together the vertical and horizontal combination of AITs once again. Carter curiously ties the clarinet's accented pitch in measure 198 as two half-notes, unlike the clarinet's whole notes which follow. Perhaps this implies that the clarinet pitch {9} should be counted twice, thus ensuring that each pc of SC [0134578T] appears twice on the musical surface.

5.5 Fourth Movement: Hastened Cooperation

5.5.1 Aural Map: *Presto*

Compared to the slow, contemplative third movement, the *presto* of the fourth movement is sudden and brash, lasting just over one minute. As a whole, the movement

(shown in Figure 5.6) displays interlocking streams for the majority of the movement, although there are several differences in how Carter achieves this texture. After the interlocking transition between movements ends with a final harmonic pillar of the third movement, all five instruments immediately engage in an interlocking texture of short melodic fragments. Several fragments contain repeated pitches, which serve as manifestations of Motive 1. At measures 214–215, the second section of the movement begins as the strings' interlocking fragments quickly dissipate into single pitches. Three primary aural strata now emerge: the clarinet's rapid stream; a slower violin stream that contains occasional sustained pitches; and interjecting *pizzicato* harmonic accents in the remaining strings. An attentive aural comparison of the first two sections (mm. 209–214 and 215–223) reveals that these three main strata are present from the beginning. The rapid stream, slower stream, and *pizzicato* punctuations aurally separate themselves in measures 214–215 into a single timbral domain. The aural clarity of the second section is akin to carefully unknotting three entangled cables until they come free. Just at the end of this second section, the rapid stream shifts from the clarinet to the viola, before a final *pizzicato* harmonic accent bookmarks the section.

The third section, measures 223–232, returns to the interlocking fragments from the opening of the movement. Each fragment is clearly aurally delineated, with longer durational fragments than the opening. The durational distance between each fragment condenses, however, as if the clearly separated cables slowly become entangled again. By measure 230, the individual strands condense into a rhythmic offset cue before an extended gestural cue of three different rapid streams culminates in a climactic harmonic accent in measure 232. The separate strands now seem aurally fused together,

unable to separate themselves from each other. Three combined cues follow in measures 233–235, merging the three rapid pulse speeds. Measure 236 breaks the hastiness of combined tension and cooperation of the ensemble with a single sustained *sul tasto* pitch in the viola, followed by another characteristic snap *pizzicato*. Such extrinsic cues often mark an impending change in texture. Indeed, a clear rhythmic offset in the strings precedes one final rapid flurry of notes in the clarinet. The strings quickly join forces again in harmonic accents, serving as the transitional impetus between movements four and five. I aurally interpret these regular harmonic accents as a time motive, dubbing them transitional "clock-strikes" between movements.

5.5.2 Analysis Figment IV: Interlocking Diminution

Due to the rapidity of the fourth movement, the interlocking nature of the various streams can be difficult to discern. Example 5.11 shows the opening of measures of the movement, in which rapid melodic fragments interlock. Throughout this opening passage there is a continuous, collective melodic stream, yet the disparate registers, timbres, and rates of speed create separate aural fragments. Because the listener is thrust directly into the fray of rapid interlocking streams, he or she does not have time to gradually adjust to the change.

A more gradual process of aurally integrating the streams occurs in a later passage, shown in Example 5.12. During measures 223–232, the rapid fragments slowly compress together into compact interlocking streams until they are no longer successive, and become simultaneous streams. Three primary pulse speeds progress through the passage, as they do for most of the movement: a sixteenth-note quintuplet

pulse, a sixteenth-note pulse, and an eighth-note triplet pulse. This passage is further divided into three component subsections, as shown in Example 5.12. The first subsection offers a mirrored symmetry of pulse speeds, progressing from the faster pulse to the slower pulse, and then again in reverse, including harmonic instances of both AITs, the ATH, and aural cues including a melodic rise and an instance of Motive 1. The second subsection begins to integrate the fragments more closely together. Although the timbres and registers still clearly distinguish the instruments, their proximity in time makes them less easily separated by ear. The middle point of this subsection combines into a complete, interlocking aggregate before breaking apart again. The second subsection likely sounds similar to the opening measures of the movement (shown in Example 5.11). At the start of the third subsection from 230–232, the interlocking fragments fuse together. The quartet divides itself into pairs of sixteenth-note and eighth-note triplet pulses, leaving the clarinet the sole proprietor of the sixteenth-note quintuplet pulse. Not only are the spaces in between fragments eliminated, but so too is the registral discrimination. The result is a highly dense, aurally ambiguous rhythmic offset cue between all five instruments. After a brief pause, the rapid streams seek clarity, which they achieve in measure 232. The strings expand their registral space in a collective wedge cue, and break free from the rapid streams with a collective harmonic accent, which provides a final aural boundary for the subsection. An examination of Example 5.12 also reveals the combined aural degrees of ambiguity and density for the passage. As the overall density and register of each stream condense and the ambiguity of each instrument also increases. The final subsection of the passage is highly dense and aurally ambiguous. This type of gradual progression of aural

combinations is likely easier to assimilate for the listener, rather than the immediate and abrupt change at the start of the movement.

5.6 Fifth Movement: Mirrored Synthesis

5.6.1 Aural Map: *Meno Mosso*

The fifth and final movement combines many of the elements of the first four movements in an apotheosis of sounds. Compared to the opening bars of the piece, the closing movement reverses the initial sounding roles of the clarinet and quartet. Neidich observes that the Clarinet Quartet "begins with the clarinet moving at a furious pace and the strings fairly still, and ends with the strings playing virtuosic music while the clarinet plays an incredibly long, beautiful, slow line. I am not sure whether I have ever seen as long an unbroken lyrical line as Carter has written" (Neidich 2008). Indeed, the clarinet's lyric melody persists for over two minutes, nearly the entire length of the closing movement. The strings, meanwhile, engage in multiple layers of streams and integrated textures, often rapidly switching between playing techniques, register, dynamics, and cooperation with the other instruments. Figure 5.7 offers an approximate aural mapping of the six sections of the movement.

After the *tutti* "clock-strikes" that interlock movements four and five, the quartet engages in an episode of interlocking *pizzicato* fragments from measures 244–249, marked by two prominent rhythmic offset cues. The initial *pizzicato* streams interact similarly to the streams from the previous movement. By the second rhythmic offset, the lyric clarinet melody shows no sign of breaking its extended and sustained trajectory. The first section blends into the second primary section (measures 250–257) with a

continued *pizzicato* stream, primarily in the cello. This acts as a kind of "walking bass-line" throughout the section. Joined with this are *arco* melodic fragments, sustained pitches that create a background static field, and multi-stop interjections.

Sections three and four contain a common aural thread of rapid streams. From measures 257–266, several simultaneous streams persist, and as Section 5.6.2 explores below, the aural effect of this section arises from how these multiple streams interact. The fourth section, from measures 267–274 grows organically from the previous two sections. A rapid stream persists from section 3, but there is also a return of mixed textures and gestures, including harmonic accents, *pizzicato* interjections, a sustained-pitch interjection, and two prominent rhythmic gestures. The first of these combined rhythmic gestures is at measure 269, in which two sets of *pizzicato* harmonic accents interlock, though not quite a succinct rhythmic offset cue. A similar integrated rhythmic cue ends the section at measure 273, in which all four strings combine multi-stops with the clarinet's lyric line for a section-ending pitch aggregate. Aurally, the prominent rhythmic interactions serve as an extended aural boundary between successive sections. They also might bring an acute awareness of the forward progress of the piece, and are therefore labeled as a potential time motive.

The fifth section, from measures 274–281 recalls the slow, sustained pitches that bridge the second and third movements. Two melodic interjections offer the only moments of the entire movement in which the clarinet breaks from its sustained lyric melody. These two moments aurally recall Motive 4 from the second movement's lyric melodies. The closing, sixth section climactically combines nearly all of the component parts of the entire piece in rapid, overlapping bursts. The clarinet's sustained melody

reaches its registral limits, leaping from extreme lows to extreme highs, perhaps recalling the large leaps that comprise Motive 3. Stratified rapid streams interact with sustained pitches, harmonic-accent multi-stops, and an articulate cello bass-line in measures 282–285. The culminating five measures feature several conspicuous aural cues in succession: a clock-like harmonic pulse in the upper strings; a melodic gestural rise by a unified quartet; oscillating rapid fragments; a final, rhythmically integrated harmonic accent in the strings; and a final, fleeting melodic rise in the clarinet. The "cadential" melodic rise at the end of the piece parallels the end of the second movement, reinforcing John Link's point that "the quiet, understated ending has been a favorite device of Carter's," a feature that holds especially true in his later music.[7]

5.6.2 Analysis Figment V: Multi-Strata Melodies

Much of the fifth movement contains multiple ideas happening at the same time. This creates multi-stratified textures that often result in complex combinations of sounds. Example 5.13 interprets one such passage from measures 257–266 in which the combined aural effect comes from overlapping aural "waves" of varying textural strata. The overall texture is simultaneous streams with three independent strata. Throughout these twenty-five seconds, individual strata come to the fore at different moments. In addition to the ever-present extended lyric melody of the clarinet (labeled stratum 1 in the example), two rapid streams emerge in the strings. The speeds of each stream have a ratio of 1:2. One of these rapid streams (called stratum 2) uses an eight-note quintuplet

7 Link 2012, 51. See also Meyer and Schreffler 2008, p. 294.

as its pulse speed, while the faster stream (called stratum 3) uses a sixteenth-note quintuplet for its pulse speed.

The interlocking nature of the entire movement creates overlapping sections. In measures 256–257, the cello's melody and *pizzicato* harmonic accents mark the end of the previous section. Although the clarinet's lyric line is persistent throughout, the new rapid stratum 3 begins subtly in violin 1 as an oscillating derivation of Motive 2. Two other strings quickly join this stratum. Soon after this, the cello begins the rapid-stream stratum 2. Even though both strata shift through all four string instruments, each stratum is effectively continuous until the culminating gestural cue in measure 266. Underneath the score excerpt in Example 5.13, a textural interpretation shows the strata's consistency for the section. While a listener might attentively follow each of the three strands individually, additional factors create an ebb and flow to the overall affective characteristic of the passage.

A helpful metaphor might be an interpretation of multiple waves of varying intensities reaching a shore. Some waves wash up on the shore higher than others, and are the end result of combined wave frequencies, such as the moon's slow gravitational pull, a nearby underwater current, and the wake caused by a passing boat. The interpretation in Example 5.13 shows these different aural waves of each individual stratum, based on three primary musical domains: register, note density, and silence.[8]

Stratum 1 aurally divides into two primary overlapping waves, from approximately 257–262 and 260–266. After the clarinet reaches its pitch F5 in the first wave, the new rapid streams quickly overtake the sonic surface. The clarinet's lyric line

8 The metaphor of musical waves and relative strengths invokes musical-theoretical investigations of energetics, especially in the thought of Ernst Kurth. For an overview of musical energetics, see Rothfarb 2002.

descends, although an attentive listener can hear an important repetition in measures 261–262. This repetition, separated by a necessary breath-rest, launches a conspicuous rise to the upper register of the clarinet—the crest of the second wave. Harmonically, the repeated pitches link both waves of the clarinet's stratum. The second wave forms an ATH, with the clarinet's repeated pitches {B3, D♯4} serving as both beginning and end points for the hexachord. Furthermore the reiteration of this pitch dyad in measure 267 links with the following section, and also binds harmonically to the ATH as one of its AIT subsets.

Stream stratum 2 has four overall waves, again with register being a primary factor. To my ear, each main wave has two component parts: first a melodic rise from a low register, and second a culminating high register splash. Each of the four waves uses two instrument pairs. An immediate drop in register, often coupled with a brief silence, marks the end of one wave and the beginning of the next. The first long wave of stratum 2 rises up from the cello through violin 1. Waves 2 and 3 are slightly shorter, with a cello/violin 2 pairing followed by a viola/violin 2 pairing. The fourth and final wave returns to the cello/violin 1 pairing, and offers a significant amount of continuity from the low register to the high register with an exact shift on B♭3 in measure 265.

Stratum 3 also divides by register and brief rests, but a third domain—note-density—also plays a role in its aural effect. Because of its subtle dynamics, this stream may be difficult to distinguish in the midst of a rather busy context, yet it is possible to aurally interpret this stratum with three main waves. The murmuring of this stratum begins in measure 257, and quickly becomes dense with three strands. The uniform dynamics and register of three instruments create a high degree of ambiguity, and

instead likely sounds as a concentrated singularity. From 257–259, the note density fluctuates between one, two, and three strands, as shown in Example 5.13, yet collectively function as a subtle disturbance on the metaphorical waterfront. The next wave continues the subtle density shifts, but adds register, slowly rising from the cello up through violin 1. An additional extended registral cue occurs in the midst of this wave. Although stratum 3's speed is continuous, each brief fragment in measures 261–262 diverts away as a compound wedge cue, as if the ascending registral wave diffuses after hitting an obstacle. The only remnants of the singular wave are the soft ripples scattering across the highest register in measures 263–264. The final wave of stratum 3 begins as the initial wave did, with a single strand slowly building in density into a dissipating tumble, simultaneous to the descending crash of stratum 2.

5.7 Listening to Elliott Carter

Both Mozart and Brahms wrote their clarinet quintets relatively late in their careers, although Mozart was barely a third of Carter's age when he wrote his and Brahms was about two-thirds of Carter's age. Whether or not Carter created his soundscapes to purposefully evoke the past is unclear, although he most certainly had these—and likely other—clarinet quintets in his thoughts. According to Charles Neidich, early in Carter's process of writing the piece, "I found him studying the Mozart Quintet and looking over his other clarinet works" (Neidich 2008). This statement warrants aural and analytical comparisons between Carter and Mozart, although this is not a goal of the current analysis. Furthermore, Carter's careful attention to his own past provides opportunities for further analytical extension to his other clarinet works, especially of

his clarinet concerto.[9] Additionally, extension of Carter's clarinet works is fused with his extension of the string quartet. As Dorte Schmidt observes: "If one wants to find out how the idea of quartet composition continues in Carter's music, one needs to look at works like the Piano Quintet (1997)…at the Oboe Quartet (2001), and at the Clarinet Quintet (2007)" (2012, 189). The analysis above concentrates on aural aspects of the quintet, yet these and other logical connections and analytic expansions can only further enhance one's listening experience.

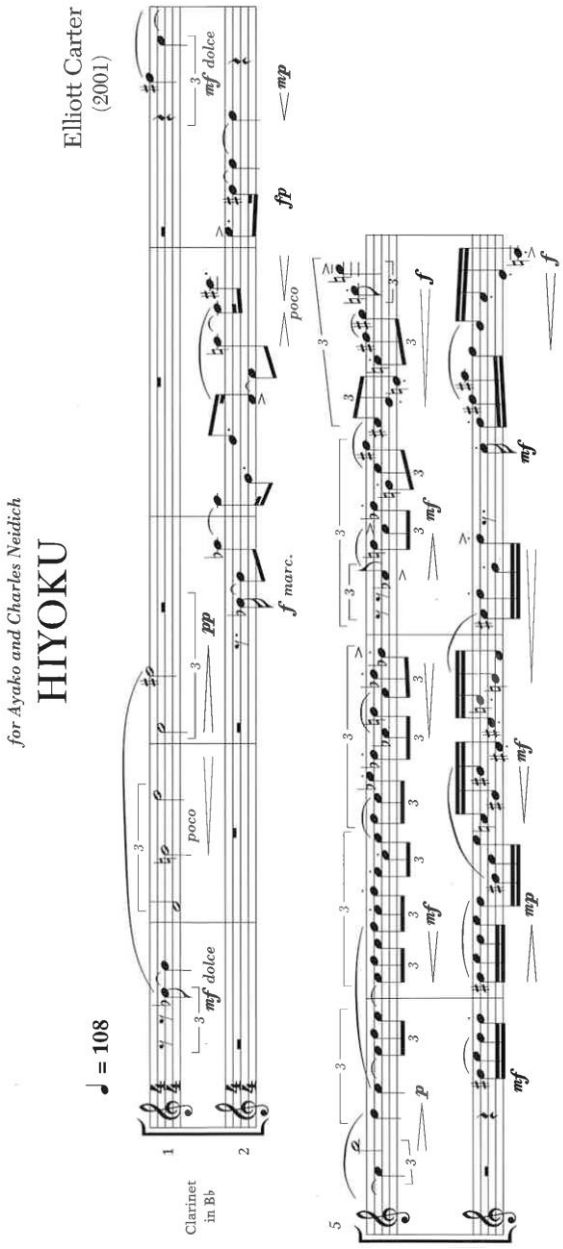
Once again considering Carter's thoughts from the opening of this dissertation, my goal is to provide *specific* ways to explore "what it is that makes the work so interesting to hear." Still, this project only offers the beginning of an analytic method for a listener-sensitive approach to post-tonal music. There are several logical extensions of this dissertation. My focus has been on Carter's late chamber works, as they represent a large portion of his later compositional output. Finding aural connections of these pieces to earlier works, and even works of his contemporaries will help expand the current analytic approach. My approach to Carter's music can apply to other late works not explored in this dissertation, such as several concerti, solo instrumental works, and vocal works. The method itself is not tied to the music of Elliott Carter, and could therefore extend to other post-tonal *and* tonal composers, and engage with other listener-sensitive approached to music. Finally, we must never lose sight—and sound—of whatever music we experience, and how to analytically engage with that music. We must listen to the music as well as listen to what any analysis can tell us about our

9 There has been some theoretical work done on Carter's clarinet works. See Heinemann 2001 and 2012.

experiences. As for Carter, his eighty-year compositional output has already provided—and will continue to provide—an abundance of listening experiences.

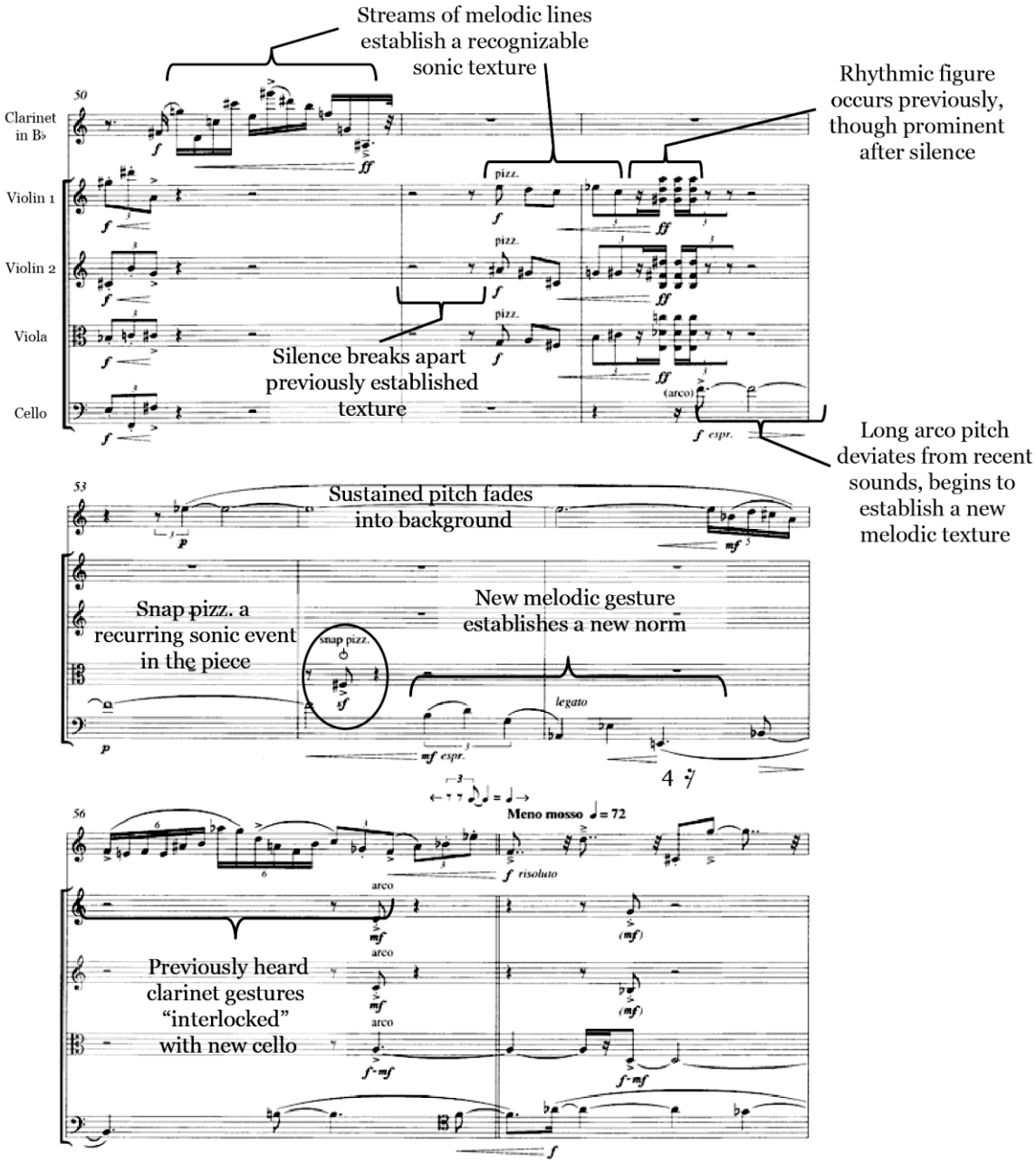
Appendix
Supplementary Material

A.1 Chapter 1

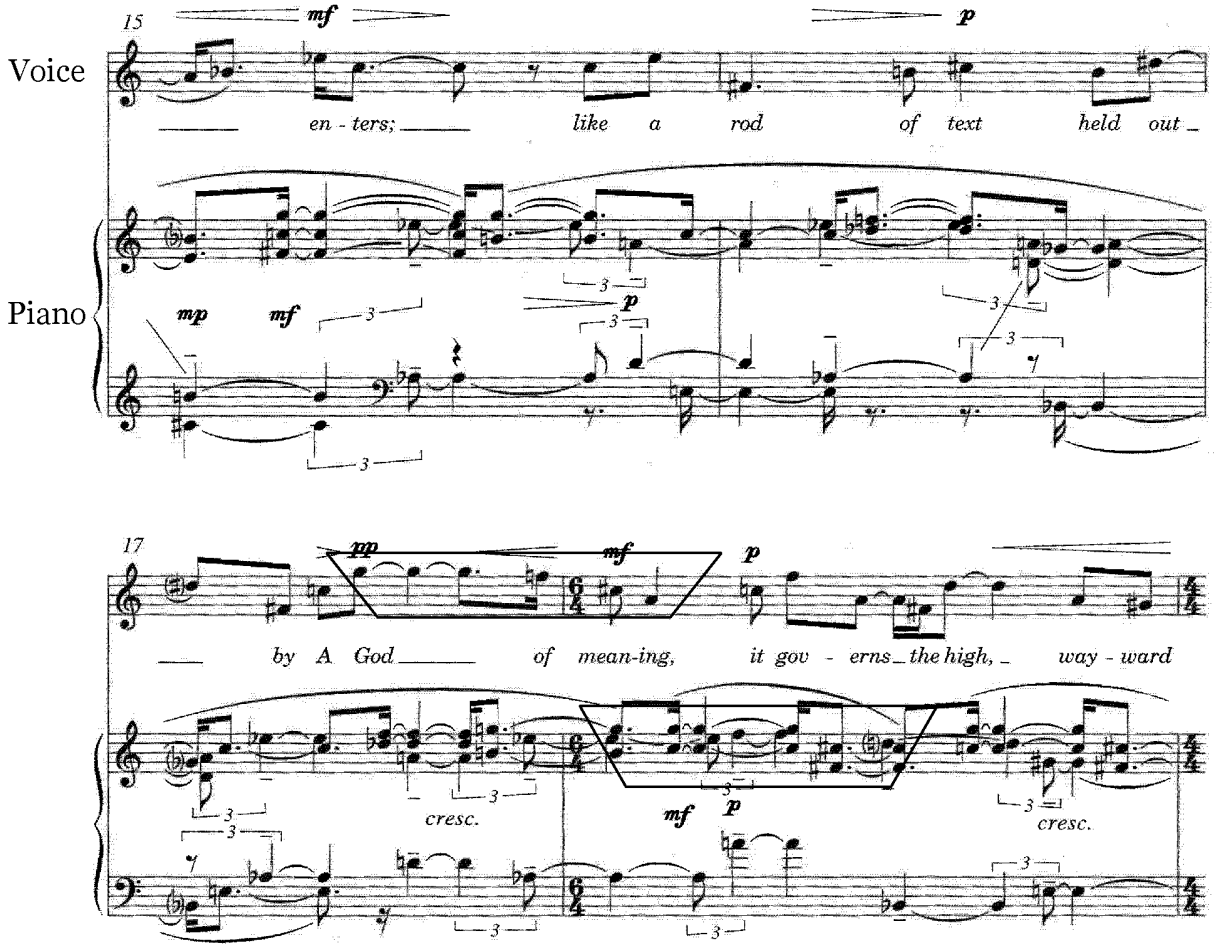


Example 1.1 *Hiyoku* (2001), mm 1–7

A.2 Chapter 2

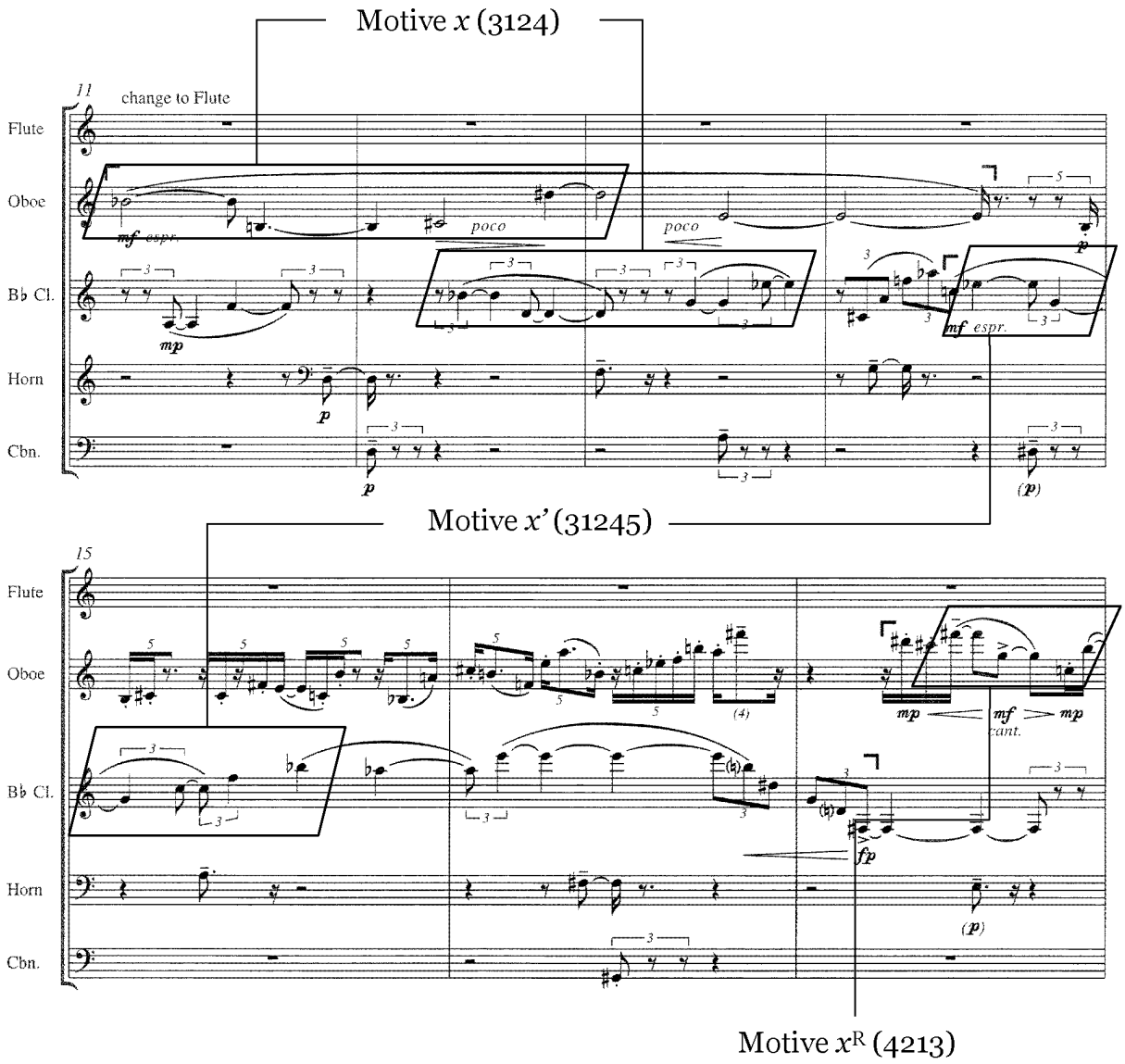


Example 2.1 Clarinet Quintet (2007), mm. 50–57, salient aural phenomena during the transition between movements 1 and 2



Example 2.2 *Of Challenge and of Love* (1994), "Am Klavier," mm. 15–18, motivic connection between voice and piano

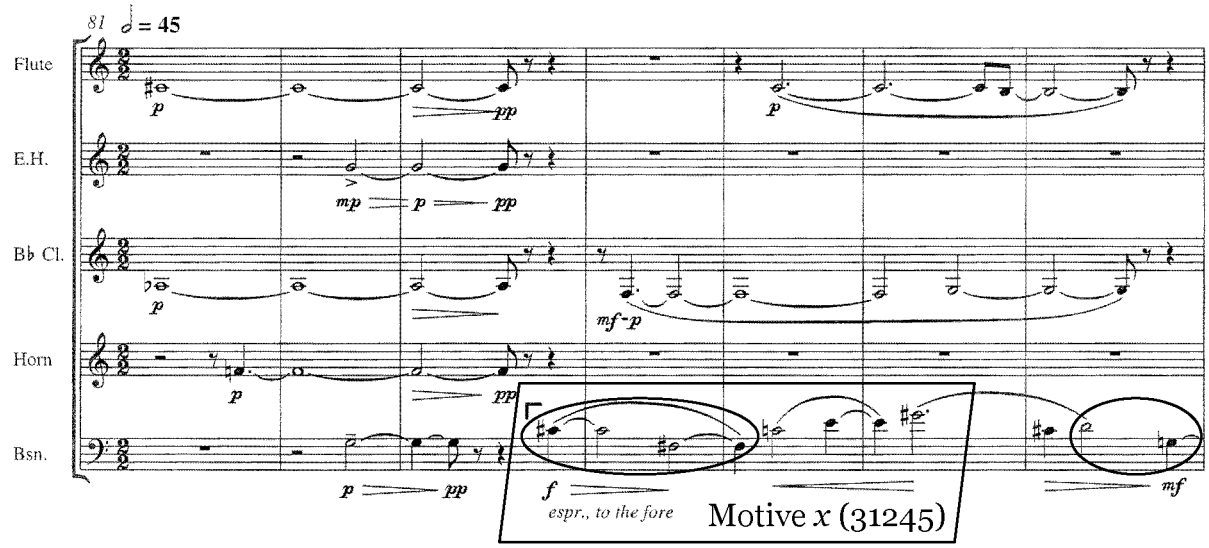
(a)

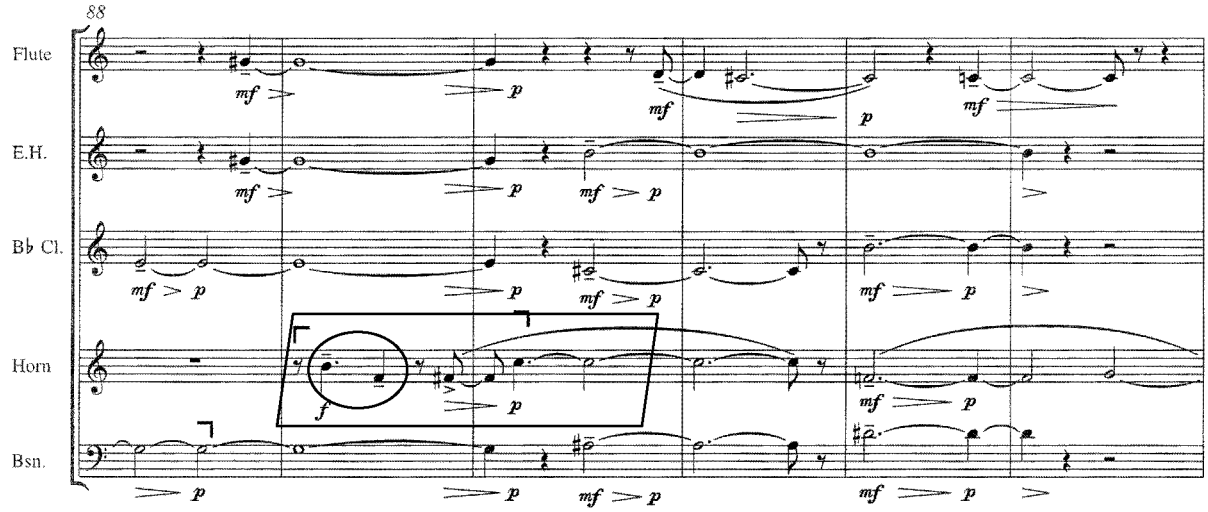


Example 2.3 *Nine by Five* (2009), Motivic Aural Cues: (a) mm. 11–15; (b) mm. 81–93

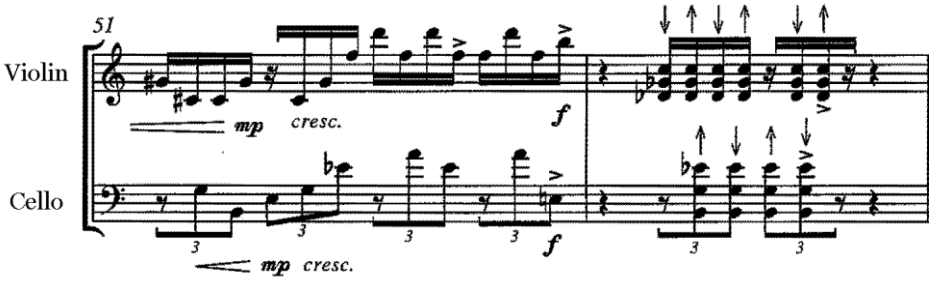
Example 2.3, *continued*

(b)

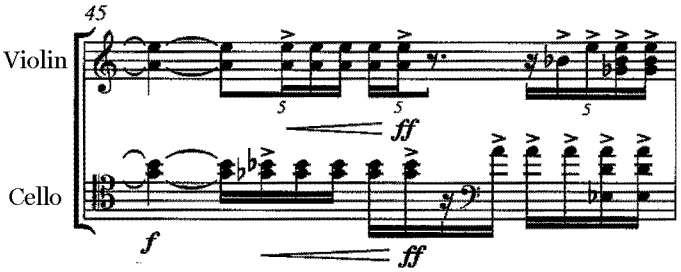




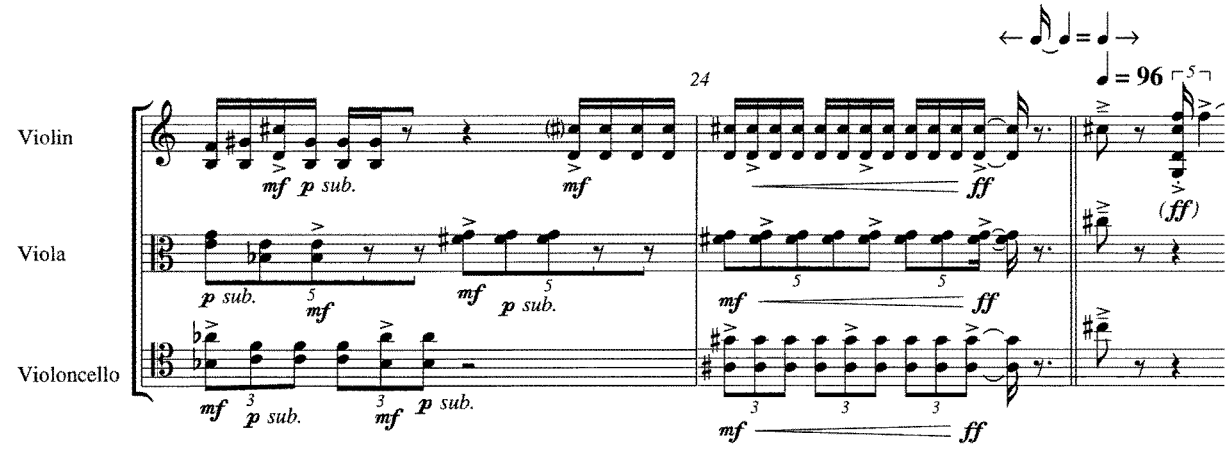
(a)



(b)



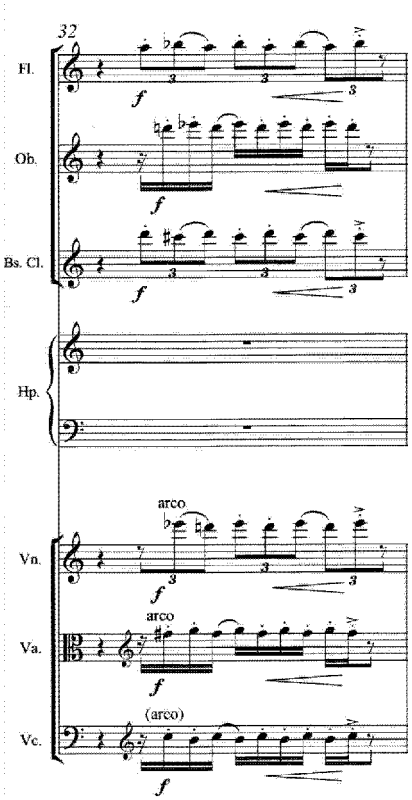
(c)



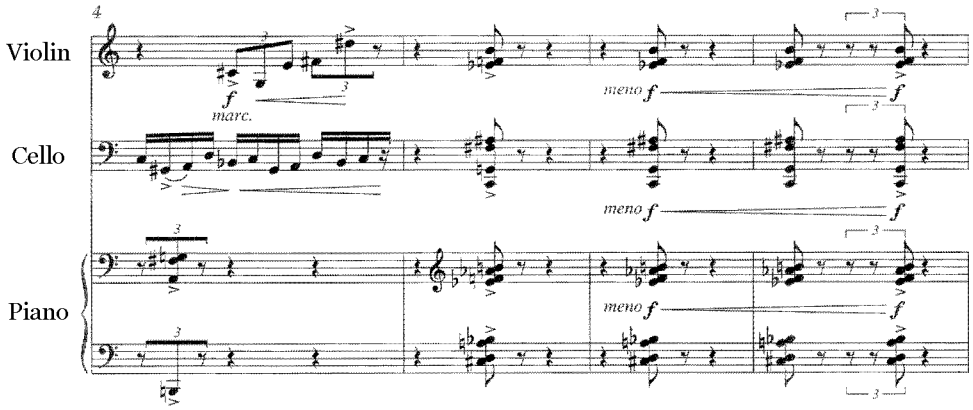
Example 2.4 aural cue, rhythmic offsets: (a) *Duettone* (2009), mm. 51–52; (b) *Duettino* (2008), m. 45; (c) String Trio (2011), mm. 23–25; (d) *Mosaic* (2004), m. 32

Example 2.4, *continued*

(d)



(a)



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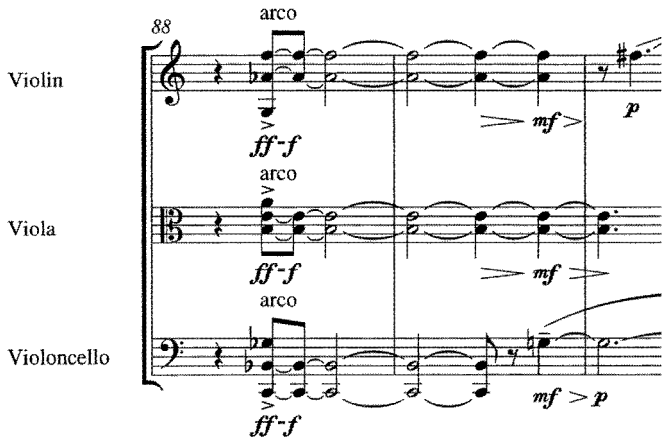
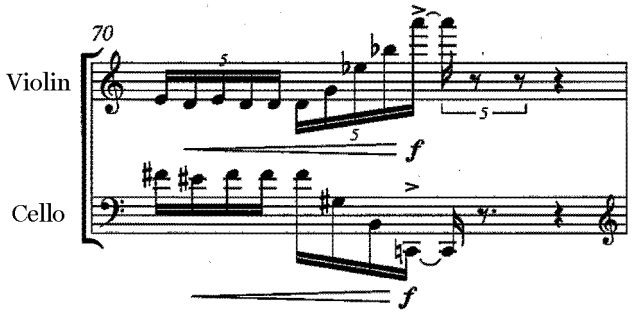


Example 2.5 aural cue, harmonic accents: (a) *Epigrams II* (2012), mm. 4–7; (b) String Trio (2011), mm. 88–91

(a)



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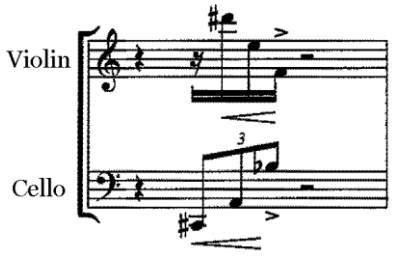

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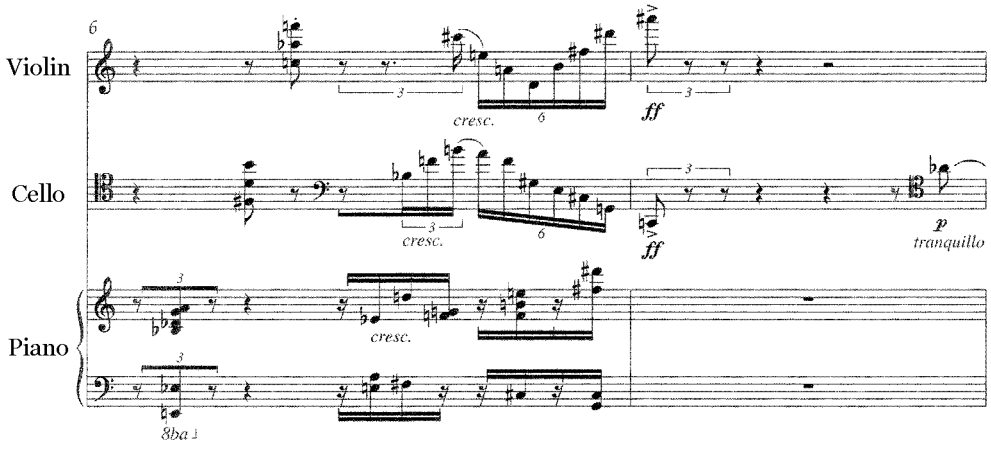
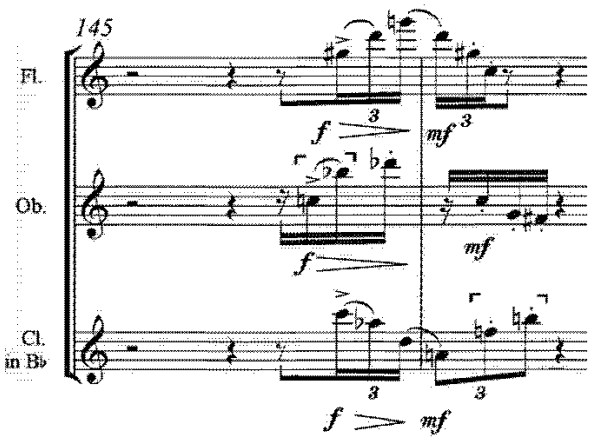


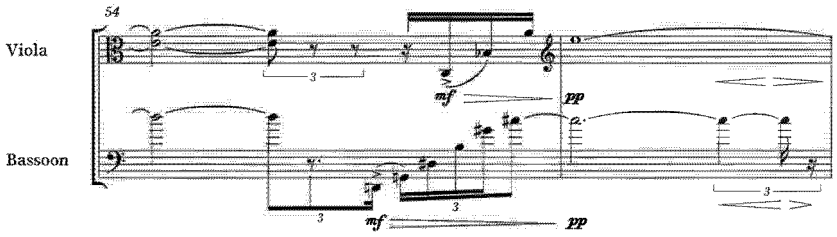
Example 2.6 aural cue, wedge: (a) *Duettone* (2009), m. 70; (b) *Duettone* (2009), mm. 51–53; (c) *Epigrams VIII* (2012), mm. 6–7; (d) *Mosaic* (2004), mm. 145–146

Example 2.6, *continued*

(d)



(a)



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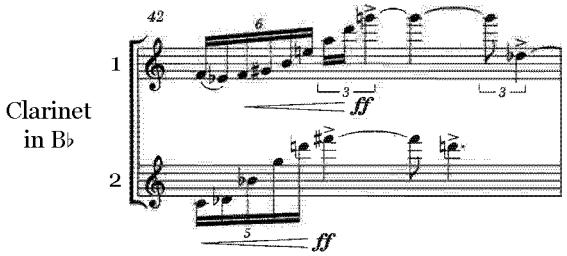
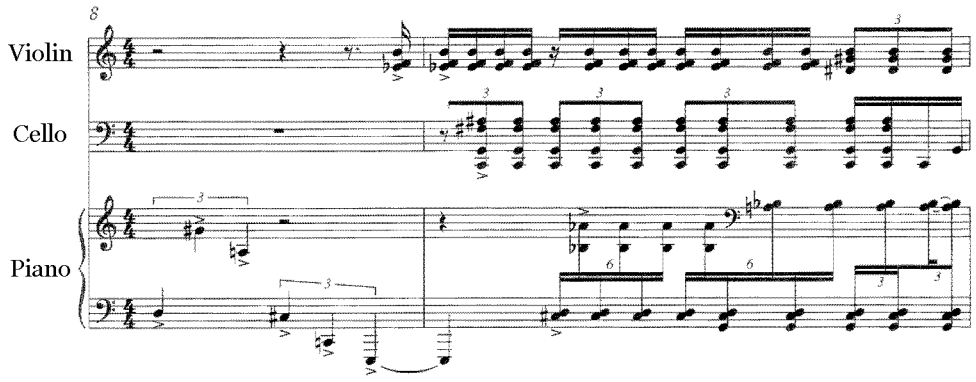


Example 2.7 aural cue, directional (melodic rise): (a) *Au Quai* (2002), mm. 54–55; (b) *Hiyoku* (2001), m. 42

(a)



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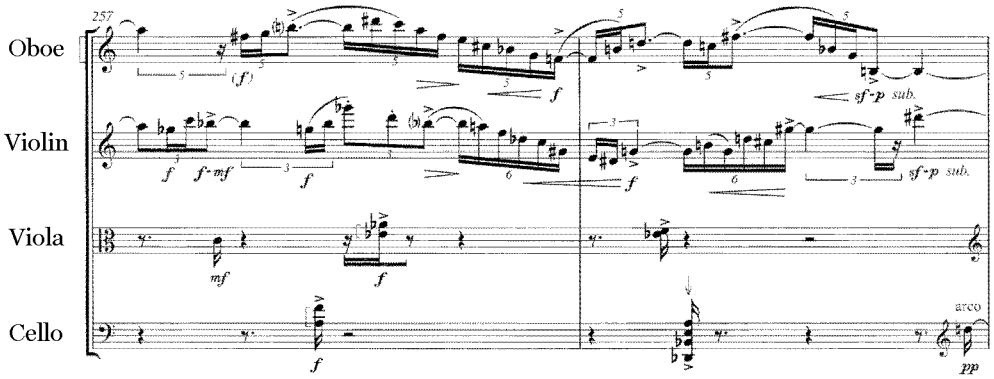
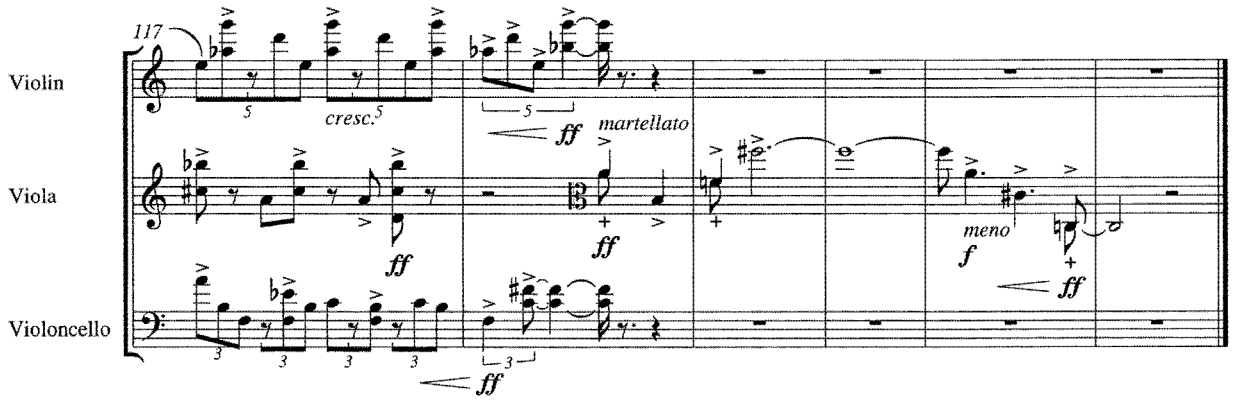


Example 2.8 aural cue, directional (melodic fall): (a) *Epigrams II* (2012), mm. 8–9; (b) Oboe Quartet (2001), mm. 257–258

(a)



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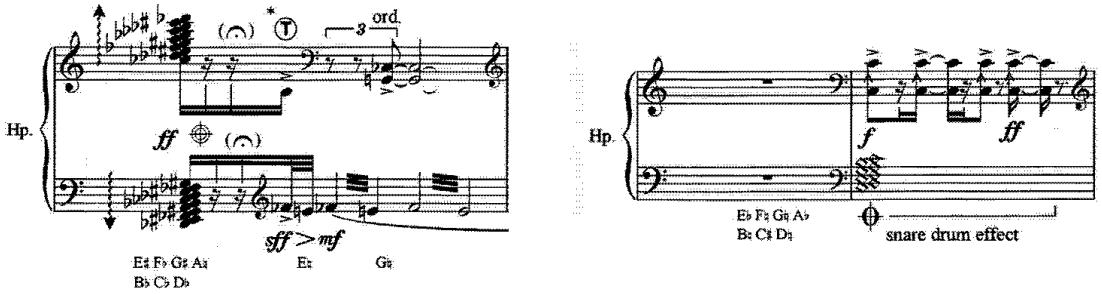
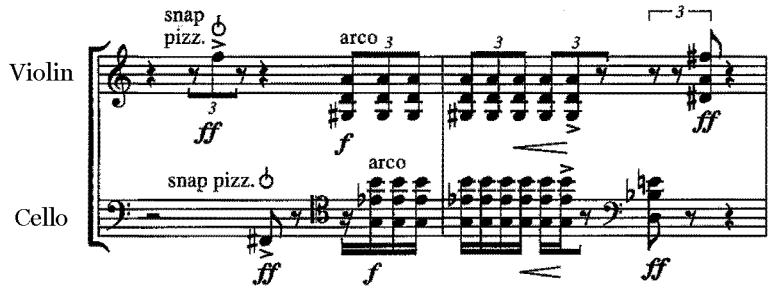
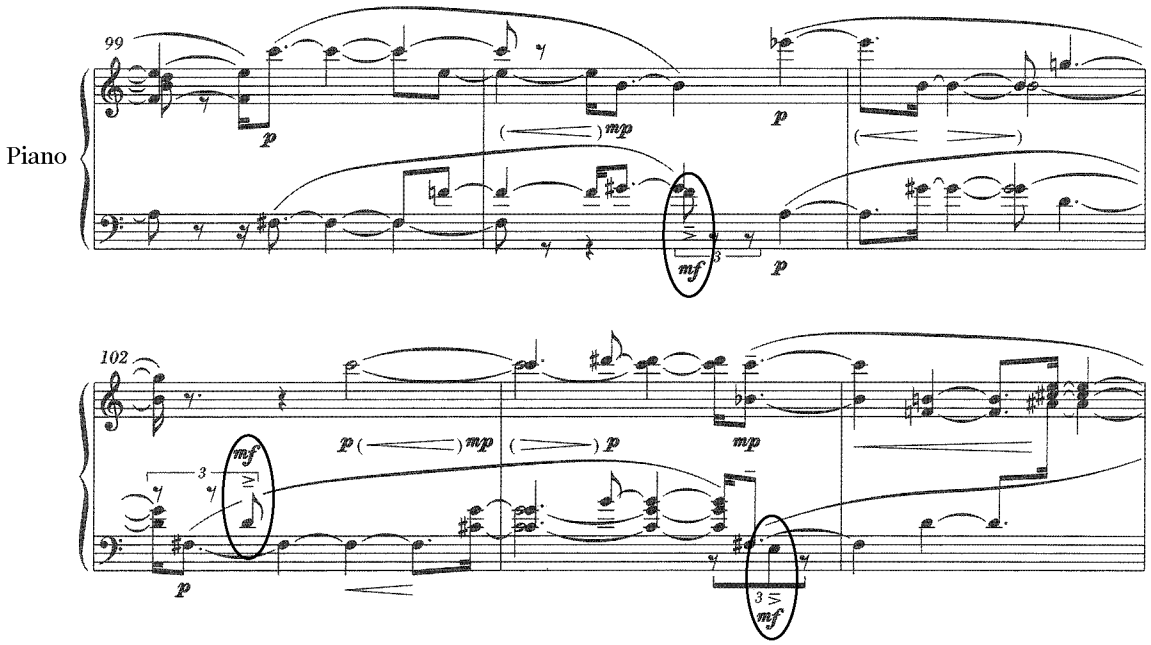


Example 2.9 characteristic cue, instrument identity: (a) String Trio (2011), mm. 117–122, "sustained" *pizzicato* identifying viola; (b) *Mosaic* (2004), mm. 20, 43, harp techniques as identity

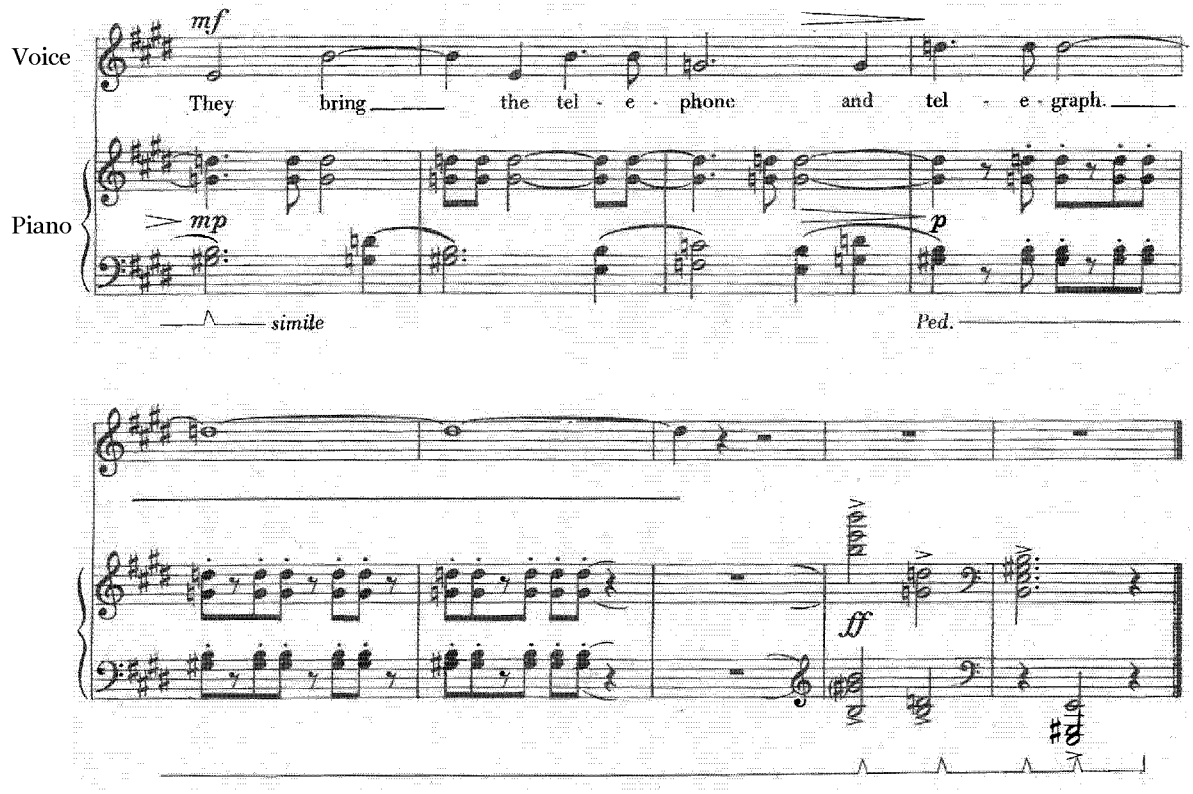
(a)



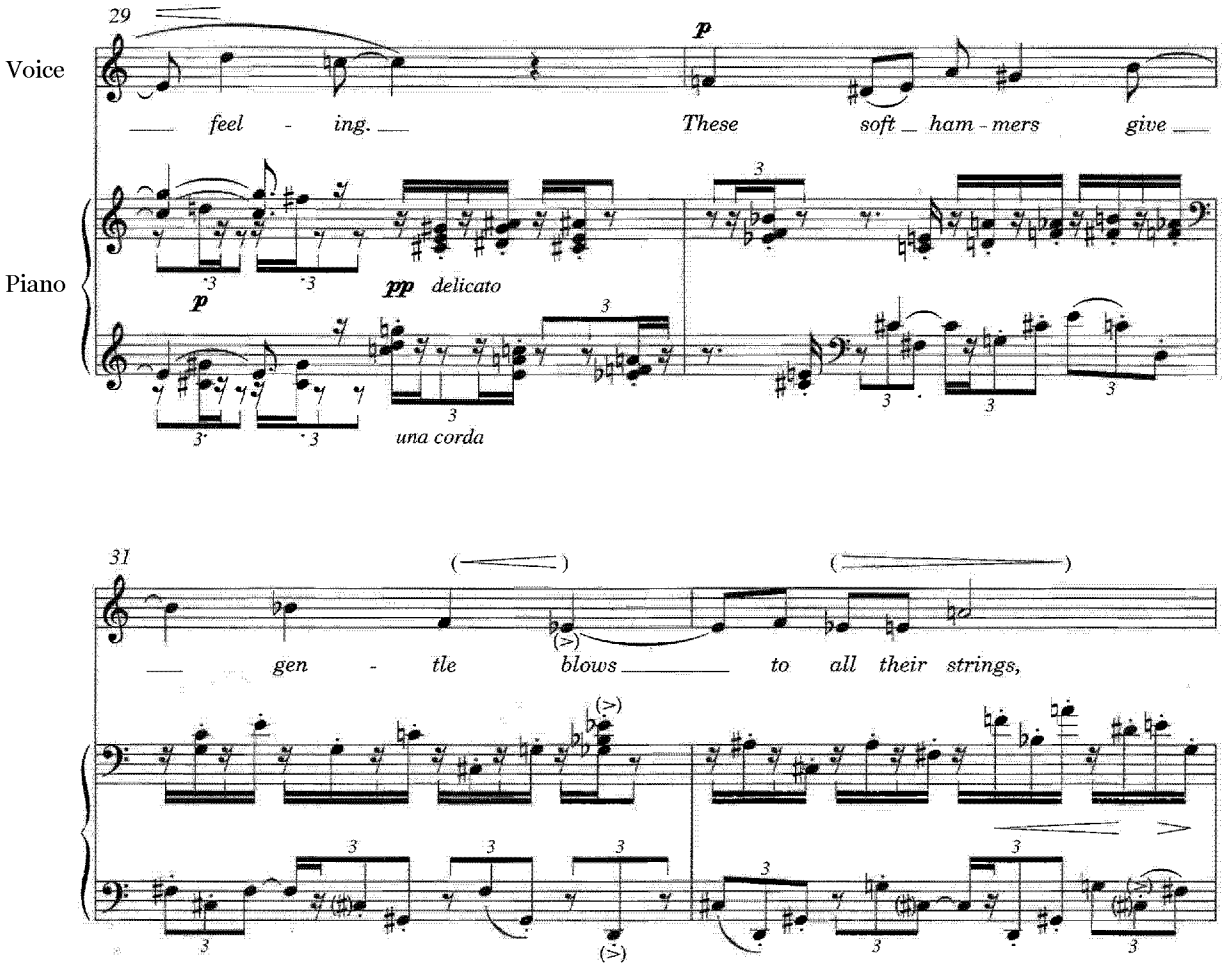
(b)



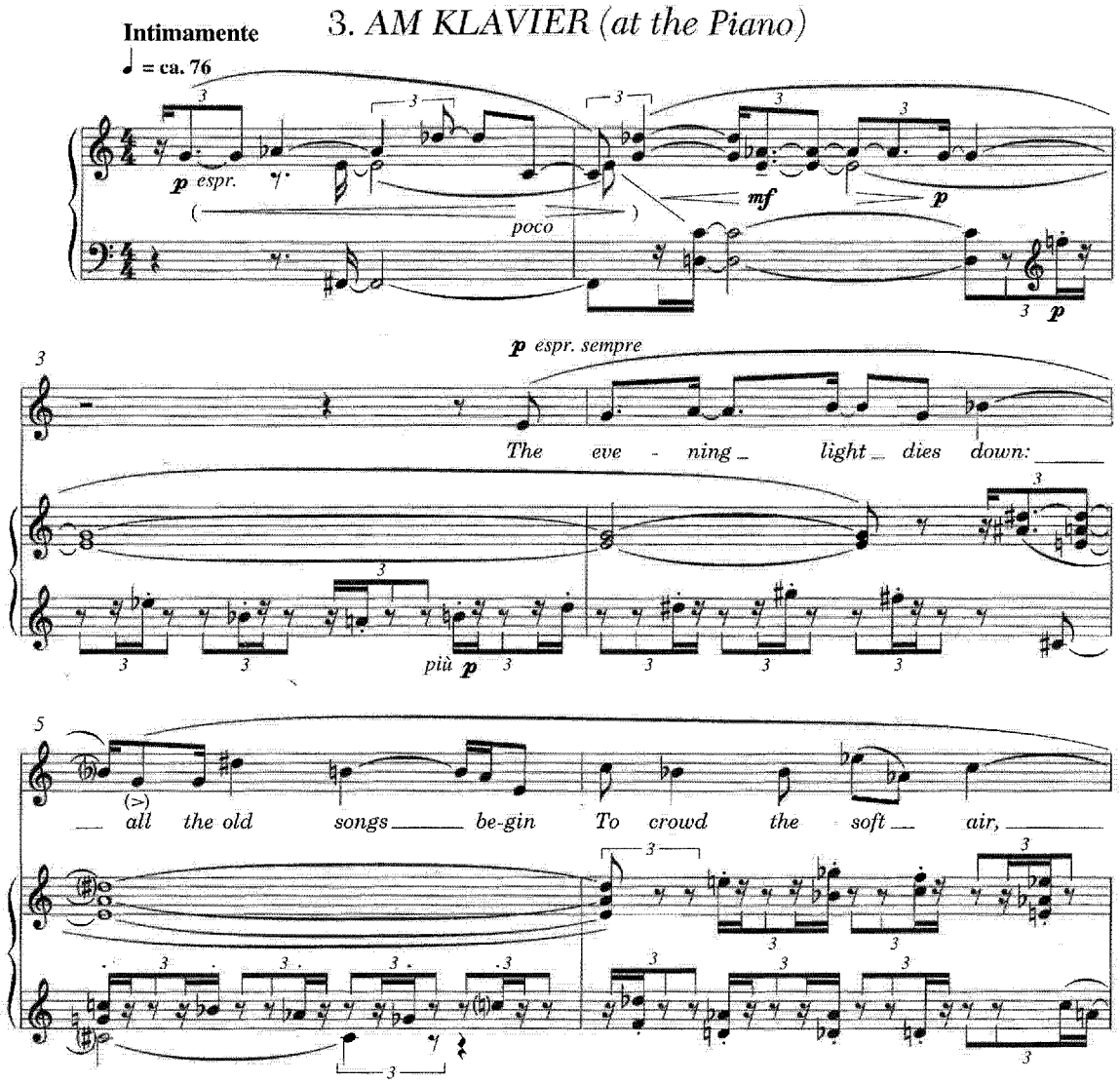
Example 2.10 characteristic cue, compositional marker: (a) *Duettino* (2008), mm. 76–77, snap *pizzicato* marks change; (b) *90+* (1994), mm. 99–104, characteristic "candle" cue



Example 2.11 *Three Poems of Robert Frost* (1942), "The Line Gang," mm. 63–71

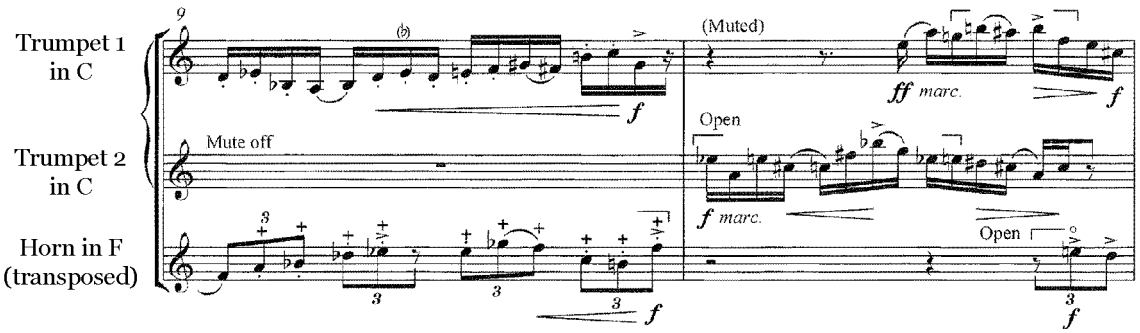


Example 2.12 *Of Challenge and of Love* (1994), "Am Klavier," mm. 29–32, "piano hammers" act as mimetic gesture and musical deviation

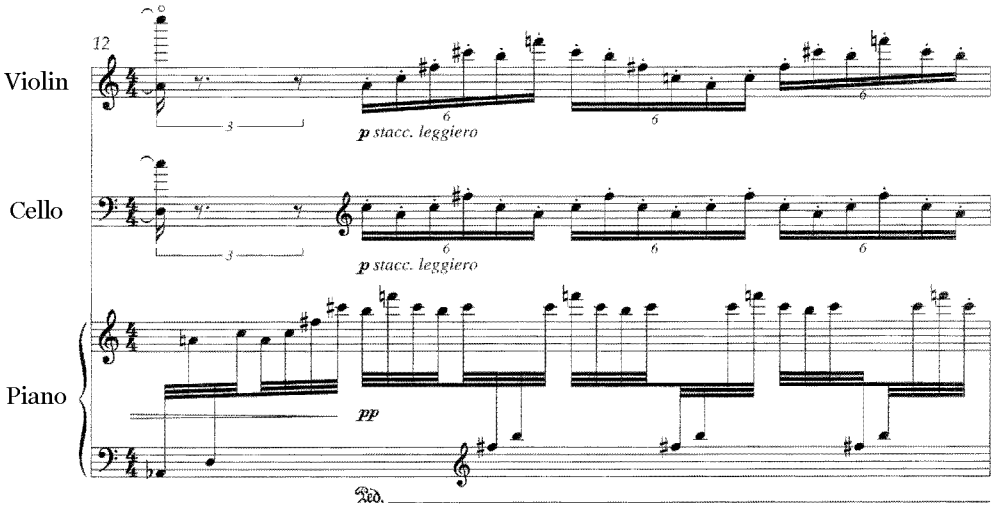


Example 2.13 *Of Challenge and of Love* (1994), "Am Klavier," mm. 1–6

(a)



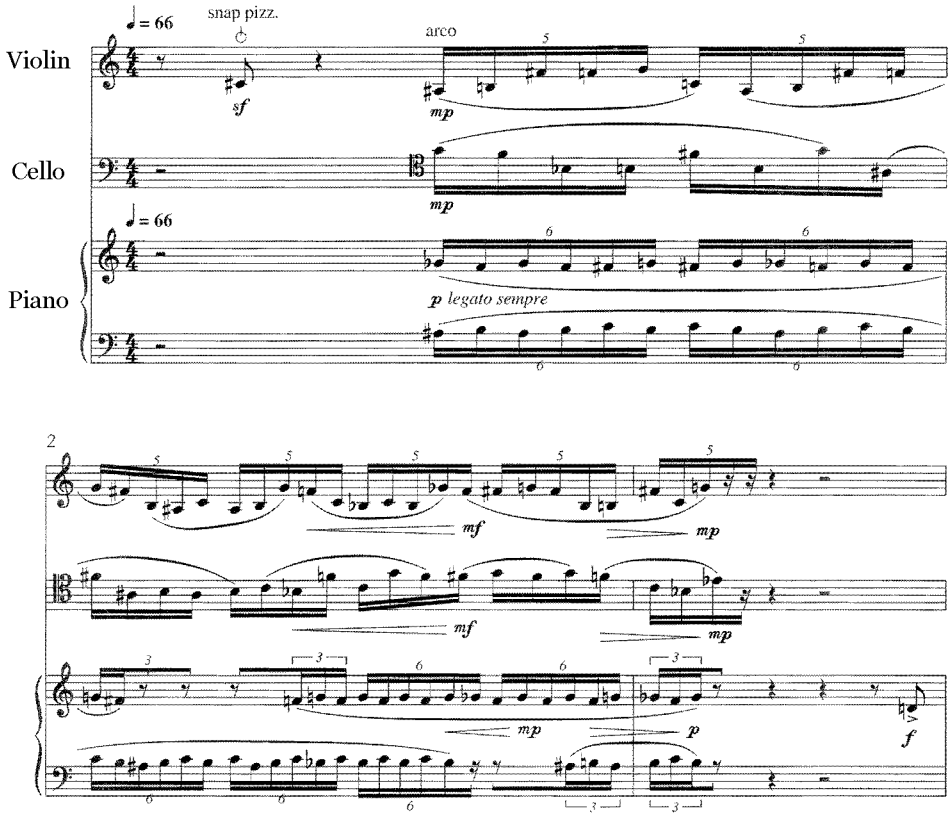
(b)



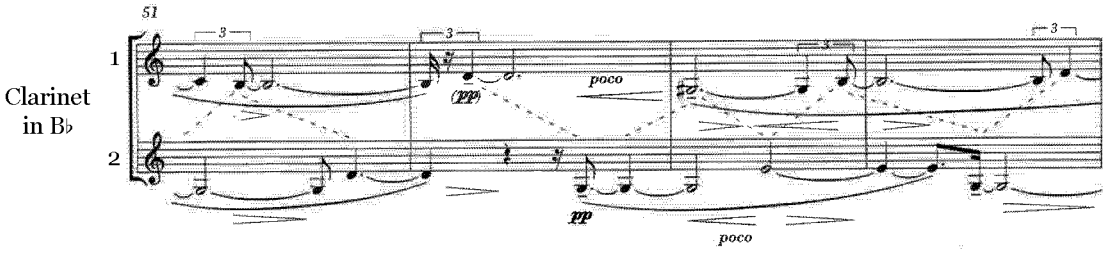
Example 2.14 simultaneous streams (rapid): (a) *Call* (2003), m. 9; (b) *Epigrams III* (2012), m. 12; (c) *Epigrams XII* (2012), mm. 1–3

Example 2.14, *continued*

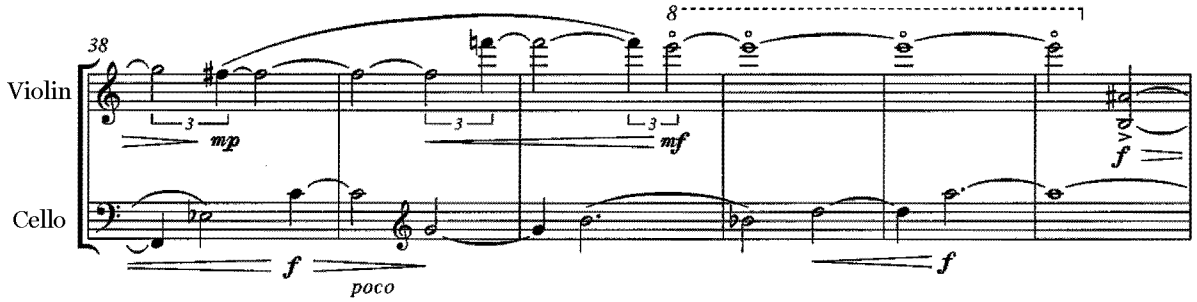
(c)



(a)

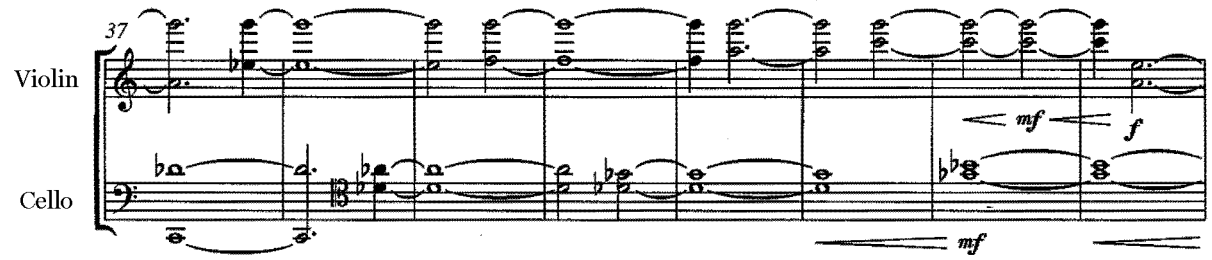


(b)

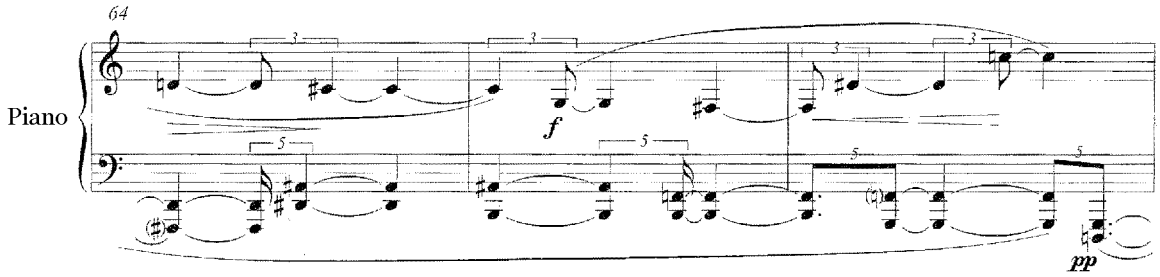


Example 2.15 simultaneous streams (sustained, single): (a) *Hiyoku* (2001), mm. 51–54; (b) *Adagio* (2009), mm. 38–43

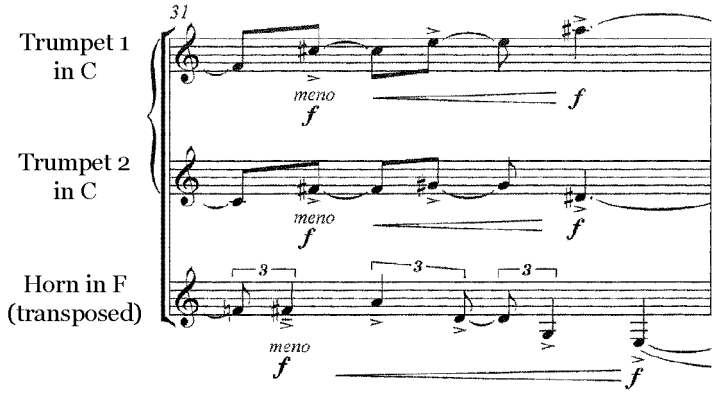
(a)



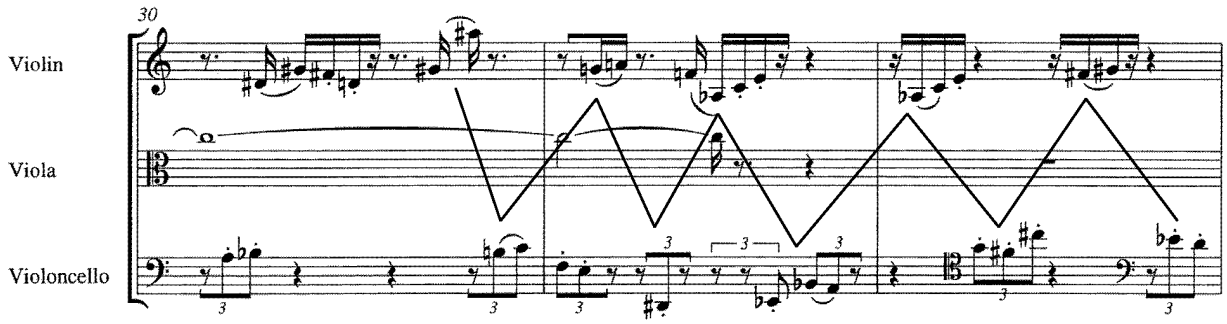
(b)



(c)

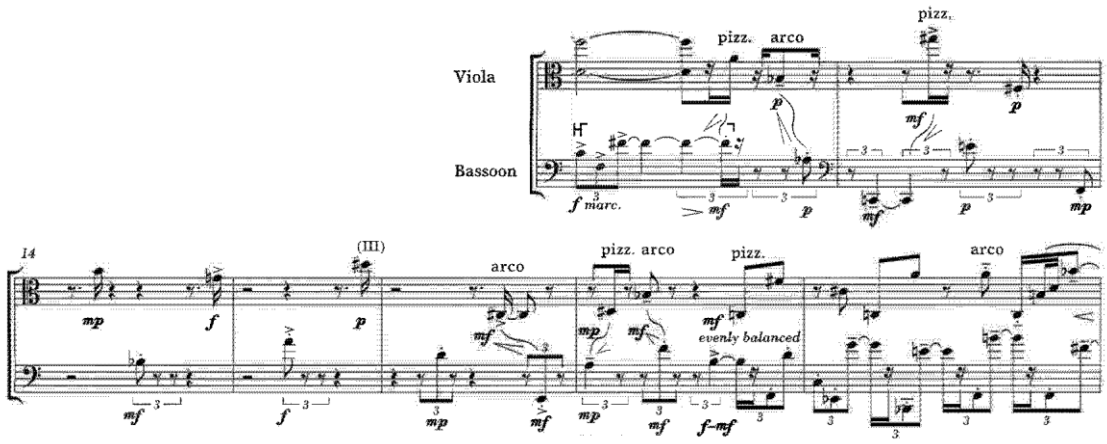


Example 2.16 simultaneous streams (sustained, compound): (a) *Duettino* (2008), mm. 37–44; (b) *Two Diversions* (1999), mm. 64–66; (c) *Call* (2003), m. 31

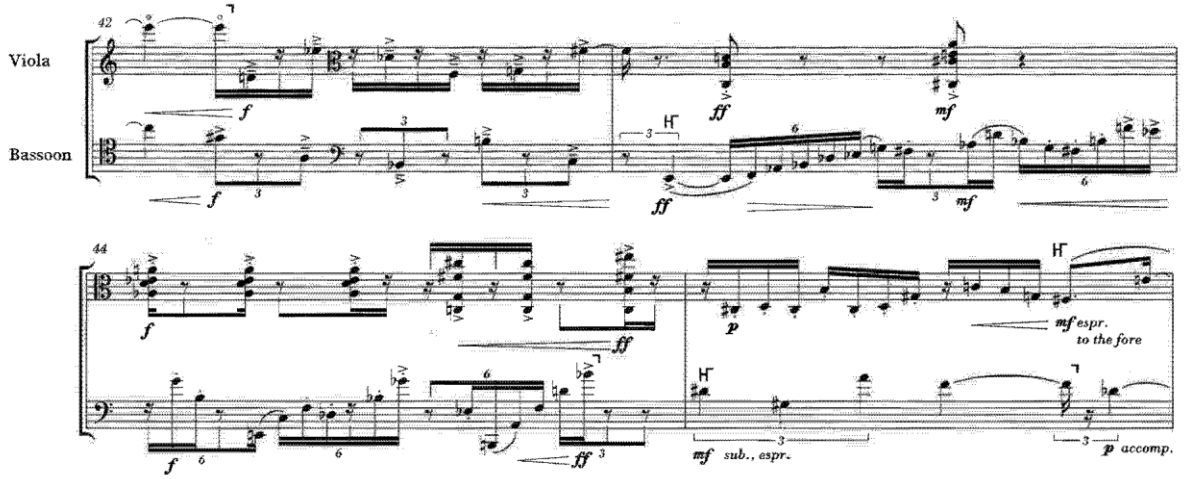


Example 2.17 interlocking streams, String Trio (2011), mm. 30–32

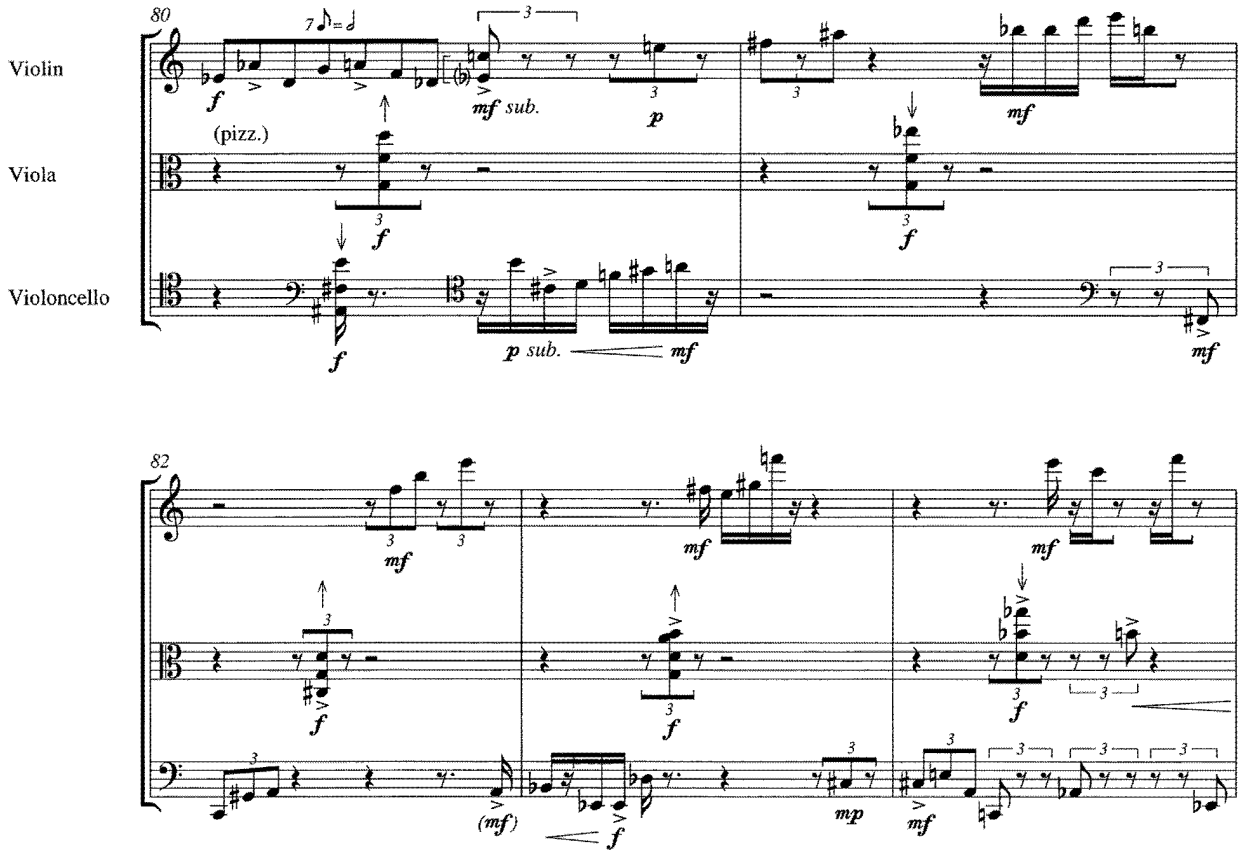
(a)



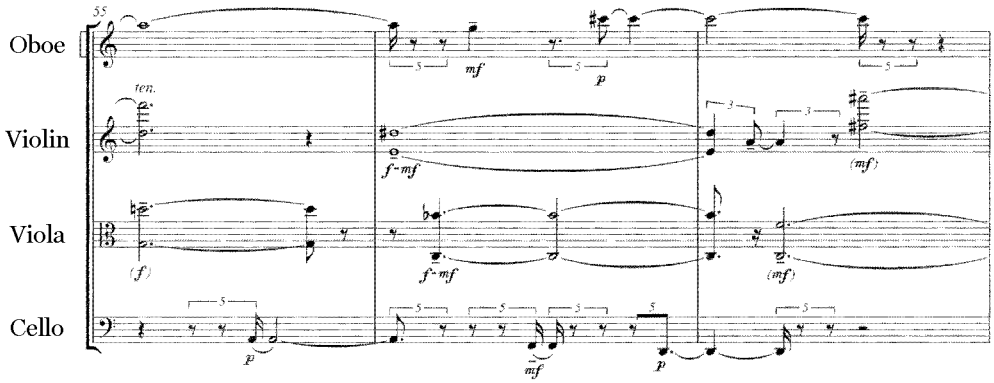
(b)



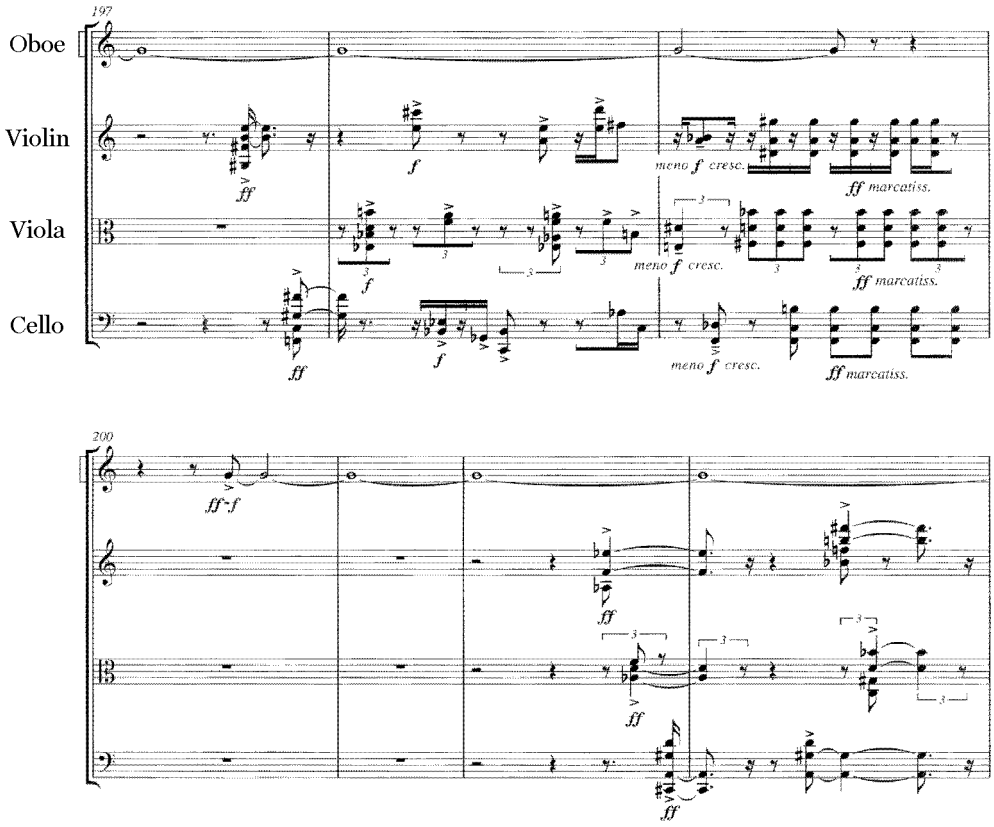
Example 2.18 interlocking streams, *Au Quai* (2002): (a) mm. 12–18; (b) mm. 42–45



Example 2.19 interlocking streams, String Trio (2011), mm. 80–84

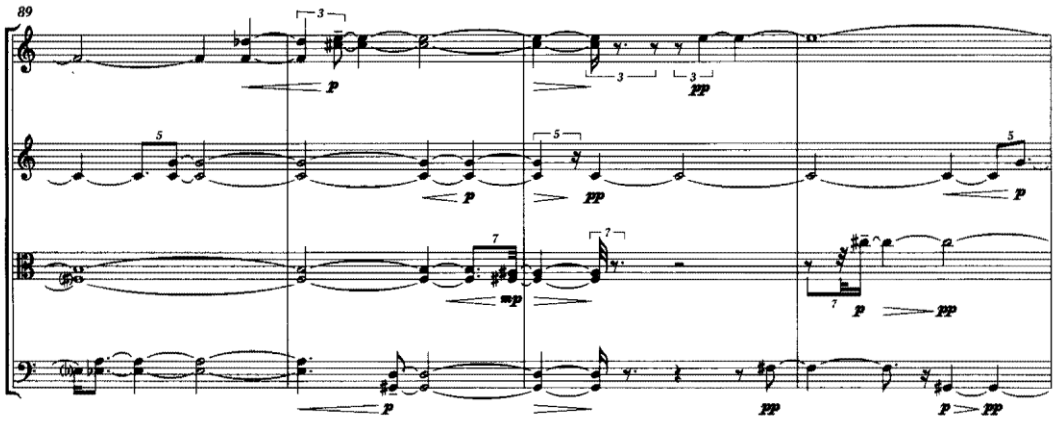


Example 2.20 interjections, Oboe Quartet (2001), mm. 55–57



Example 2.21 Oboe Quartet (2001), mm. 197–203, oboe static field

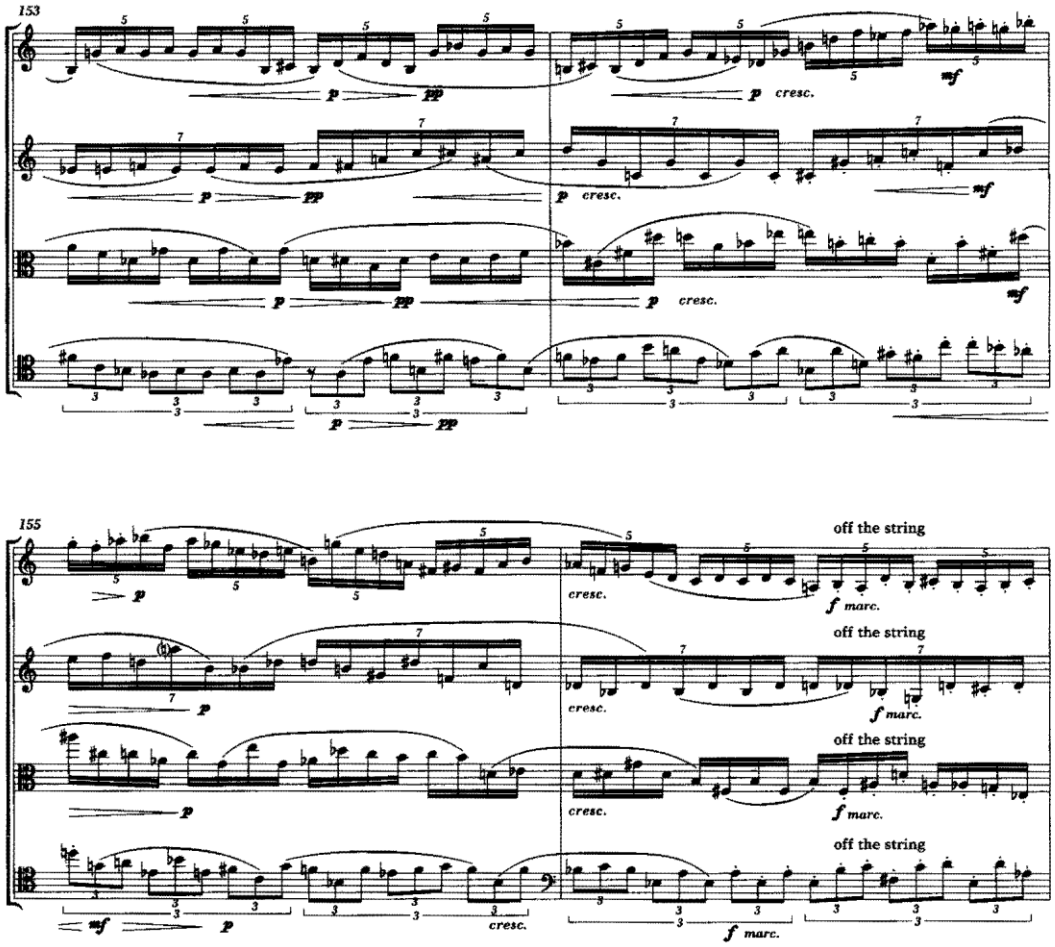
(a)



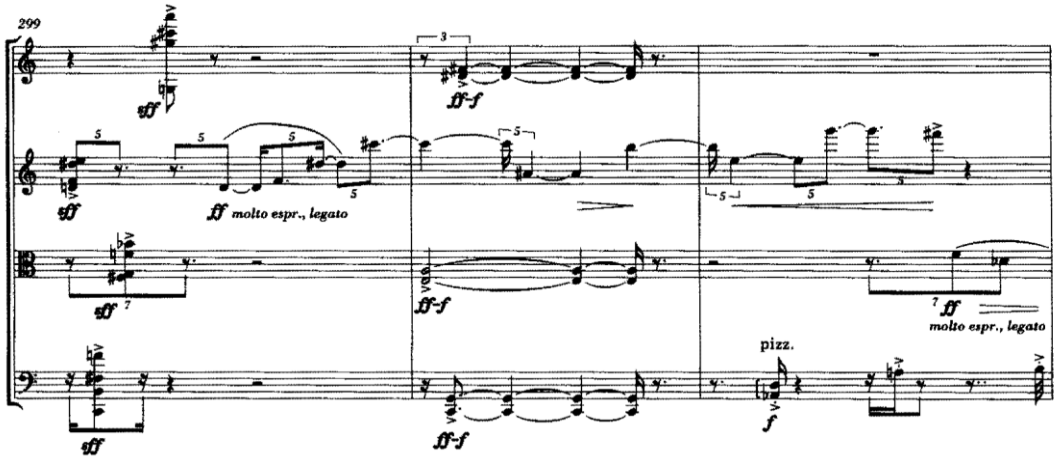
Example 2.22 uniform spread and individual focus, String Quartet No. 5 (1994): (a) mm. 89–92; (b) mm. 153–155; (c) mm. 299–301

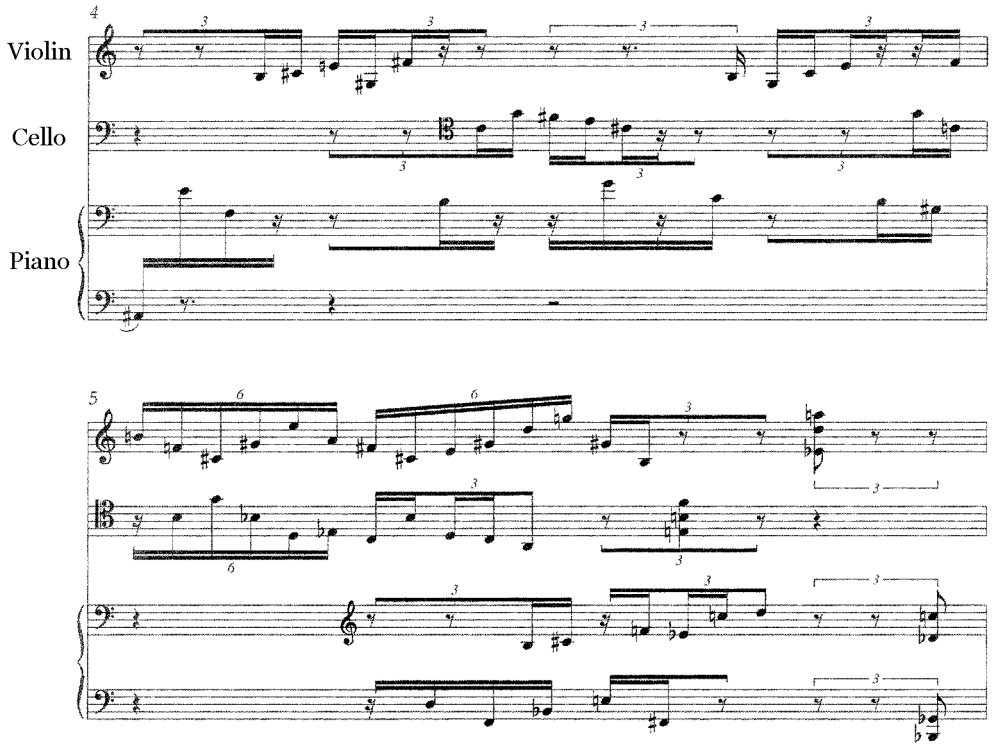
Example 2.22, *continued*

(b)



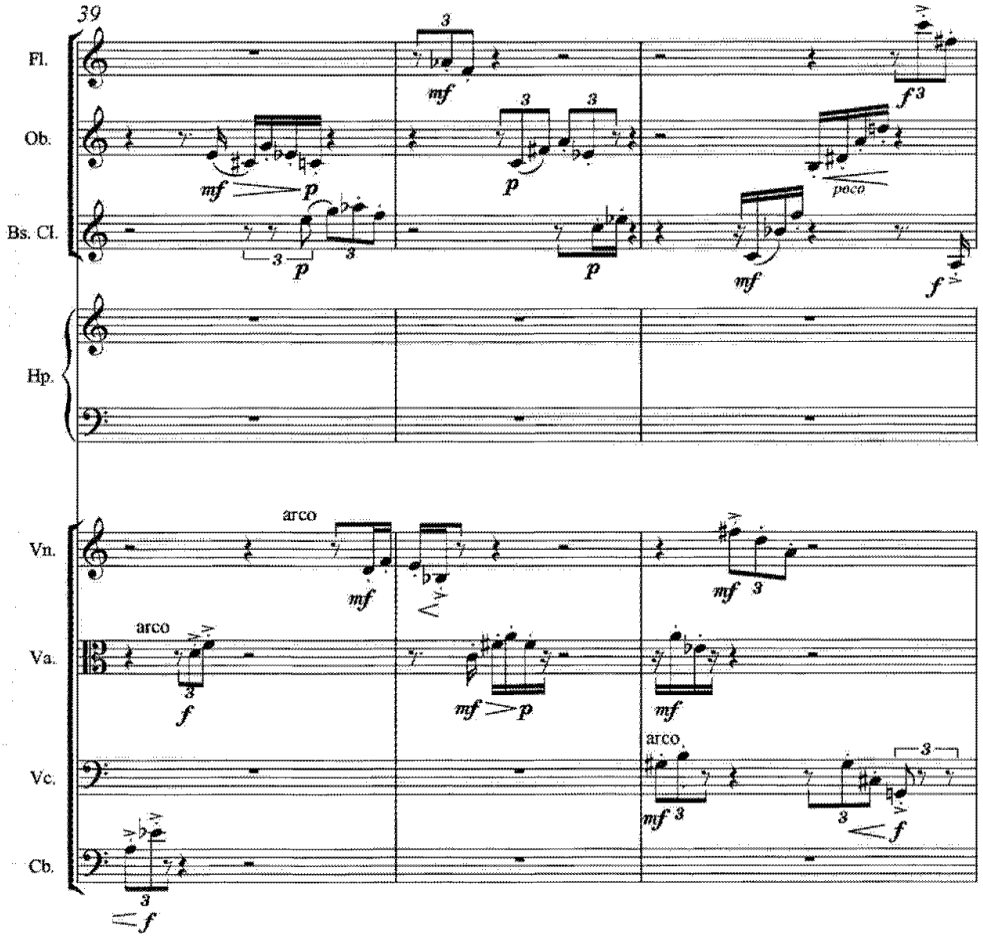
(c)



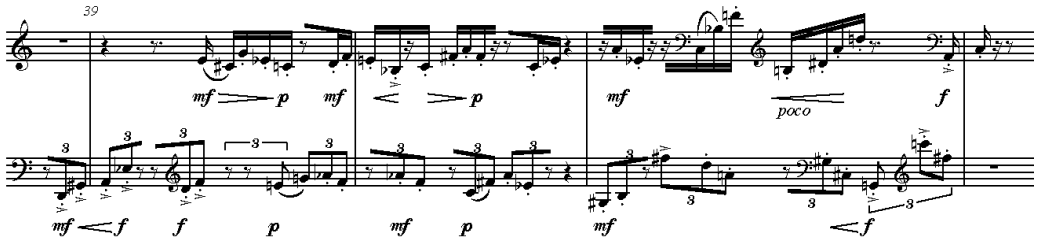


Example 2.23 *Epigrams VIII* (2012), mm. 4–5. composite texture: simultaneous /interlocking streams

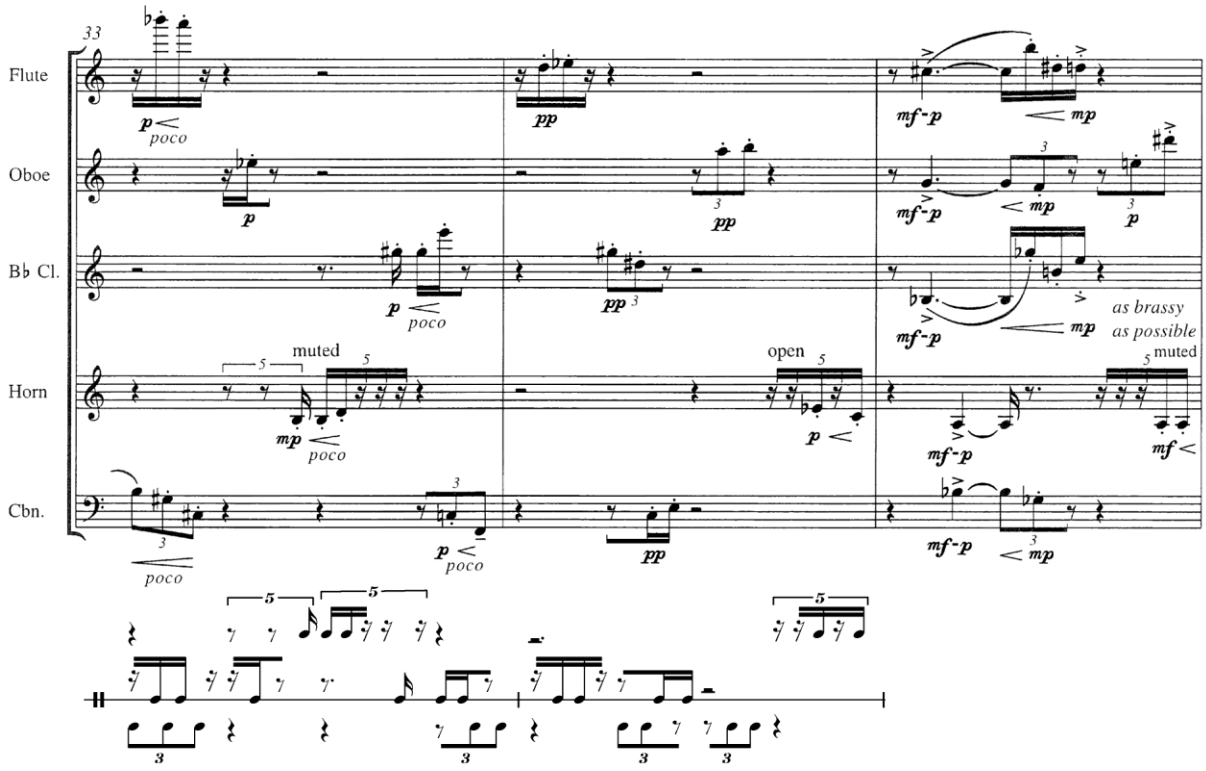
(a)



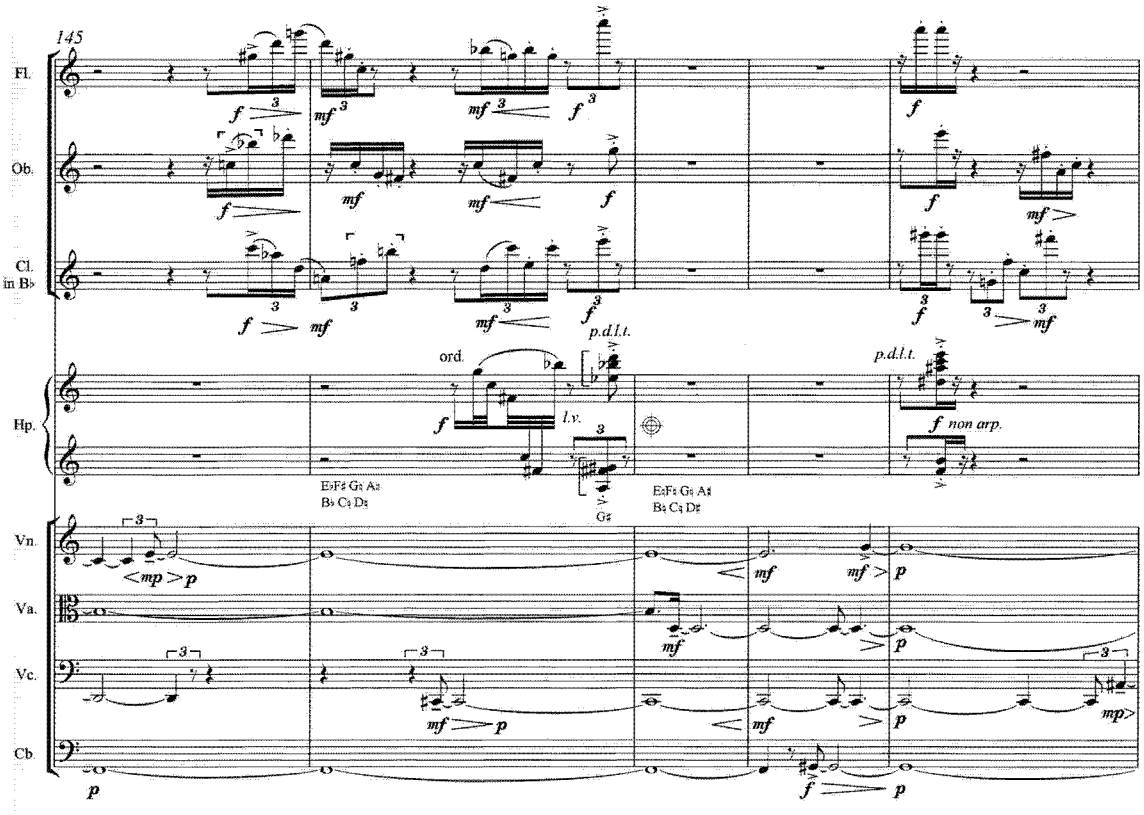
(b)



Example 2.24 composite interlocking streams: (a) *Mosaic* (2004), mm. 39–41; (b) composite streams recomposed

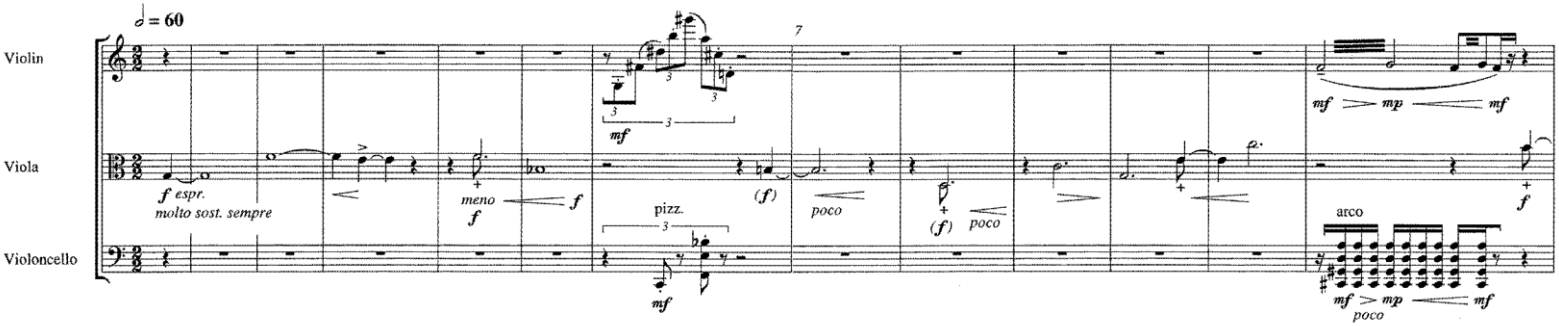


Example 2.25 composite interlocking streams, *Nine by Five* (2009), mm. 33–35

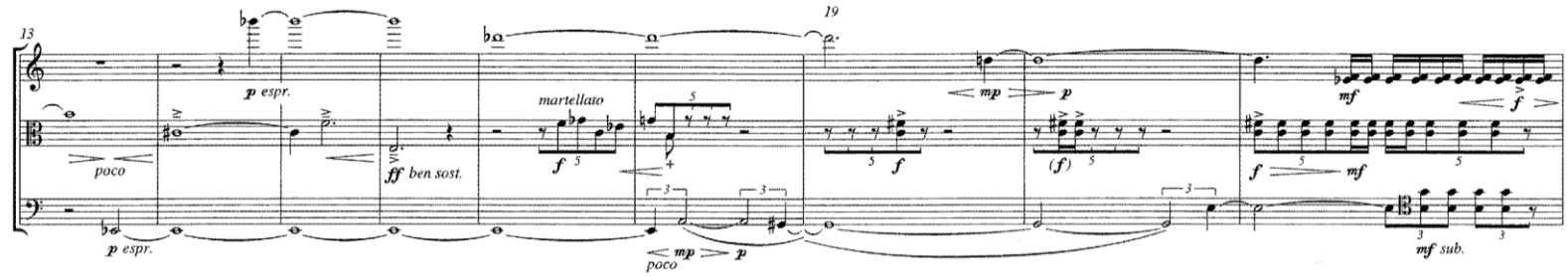


Example 2.26 *Mosaic* (2004), mm. 145–149, layered sustained and rapid simultaneous streams

Example 2.27 String Trio (2011), mm. 1–26, aural texture and cue analysis

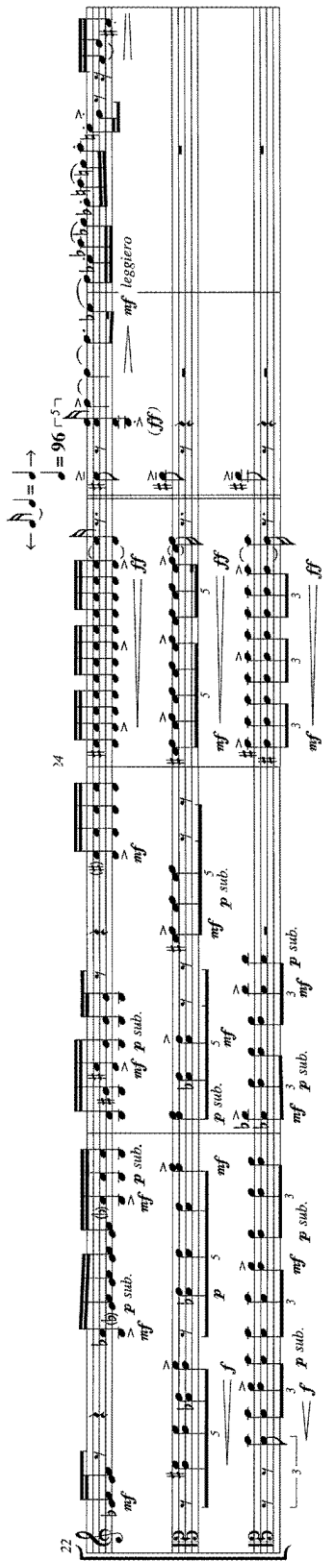


Cue:	cha. (vla.) l.h. *pizz.*	directional/harm. extrinsic (vl./vc.)		cha. (vla.)	cha. (vla.) intrinsic	offset extrinsic (vl./vc.)
Texture: Solo melody (*espr.*)		Interjection (vl./vc.)	Solo melody			Interjection (vl./vc.)
Timing: 0:00	0:09	0:12	0:14	0:16	0:22	0:25



Cue:	cha. (vla.)				
Texture: Simul. Streams (sus.)/ Static Field (vl./vc.) Priveleged Melody (vla.)	Interjection extrinsic (vla.)	Interjection (vla.) extrinsic, becomes intrinsic		Simul. Streams (rapid)	
Timing: 0:28	0:37	0:41	0:43	0:47	

Example 2.27, *continued*



Cue: offset (all inst.) harm. acc. (all inst.)

Texture: Simul. Streams (rapid) Solo melody, (rapid, leggiero)

Timing: 0:52 0:54

A.3 Chapter 3

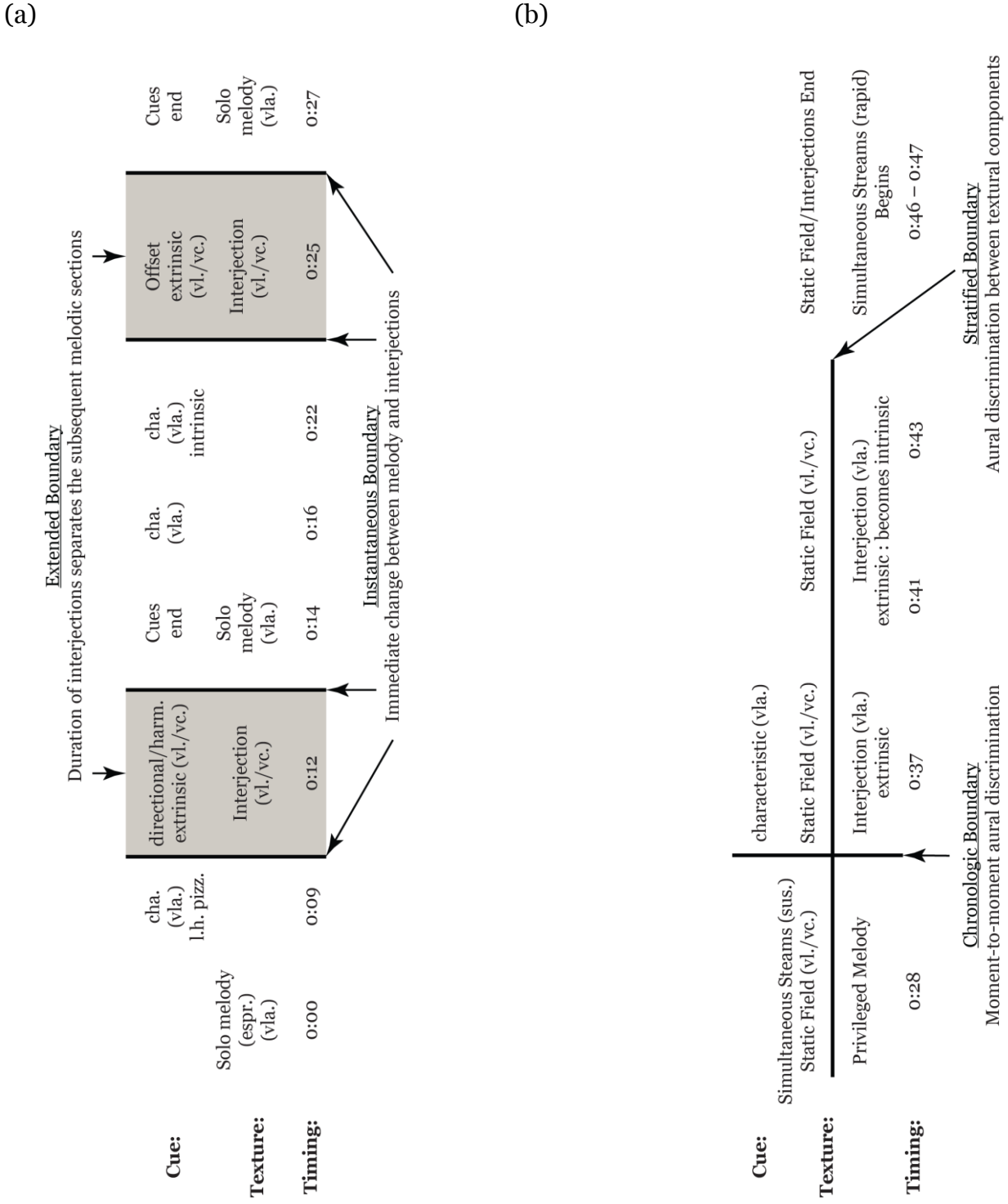
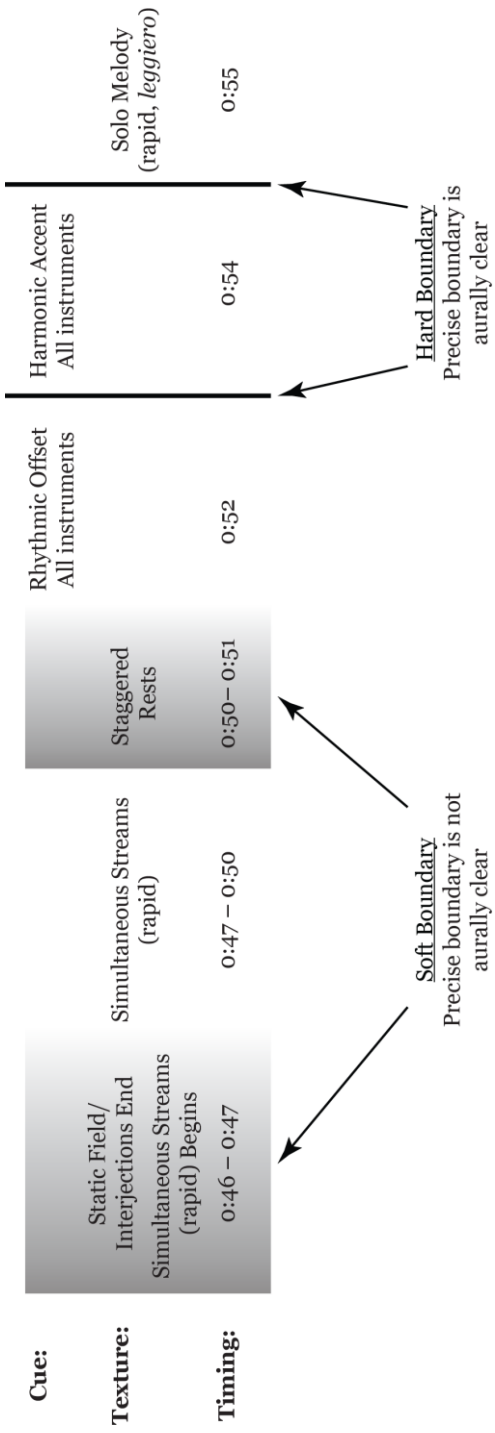


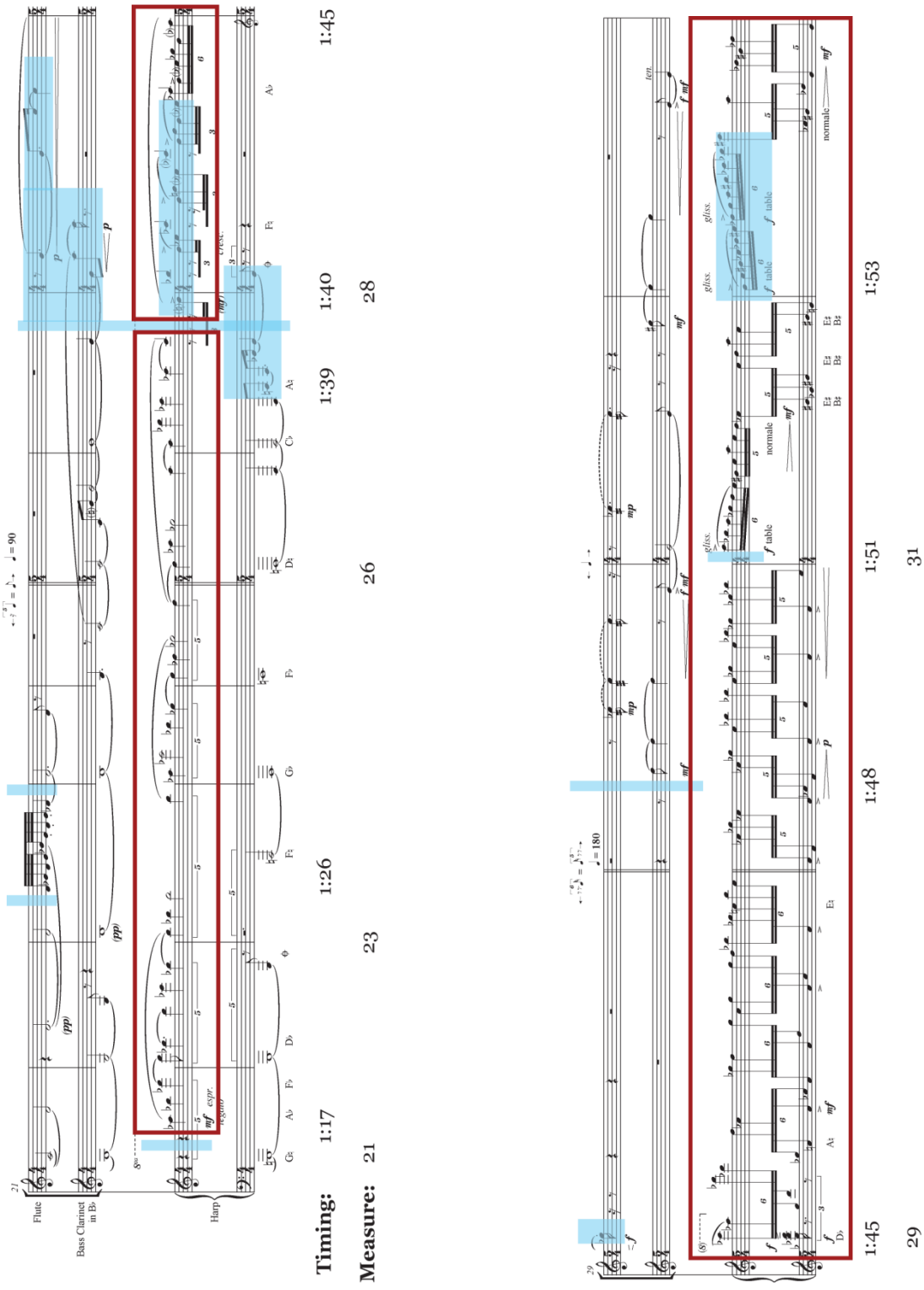
Figure 3.1 (a)–(c) aural boundaries in opening minute of String Trio, 0:00–0:55

Figure 3.1, *continued*
(c)



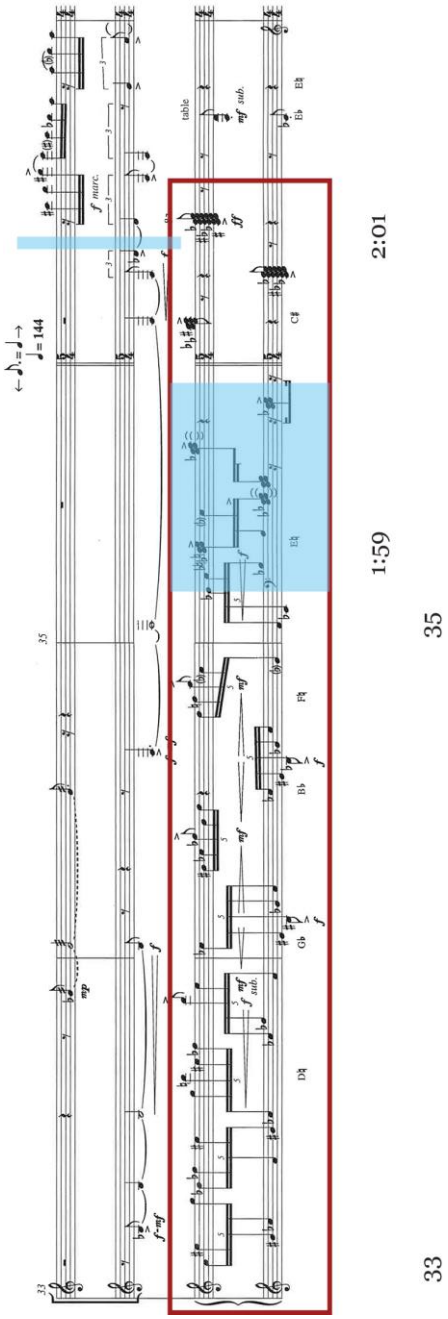
(a)

(b)

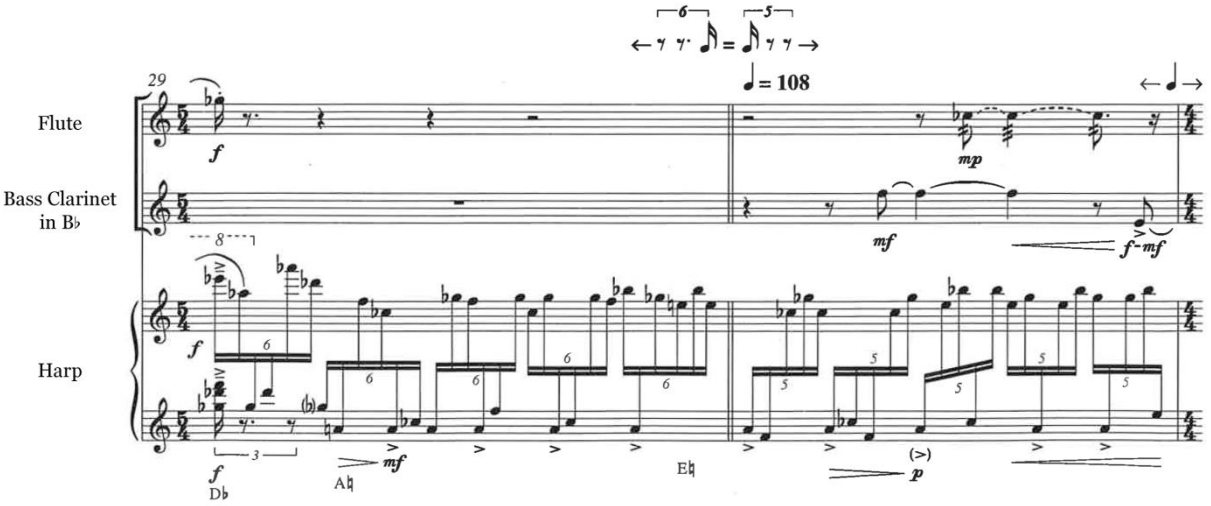


Example 3.1 *Trije Glasbeniki* (2011), (a)–(c), aural boundaries, mm. 21–36

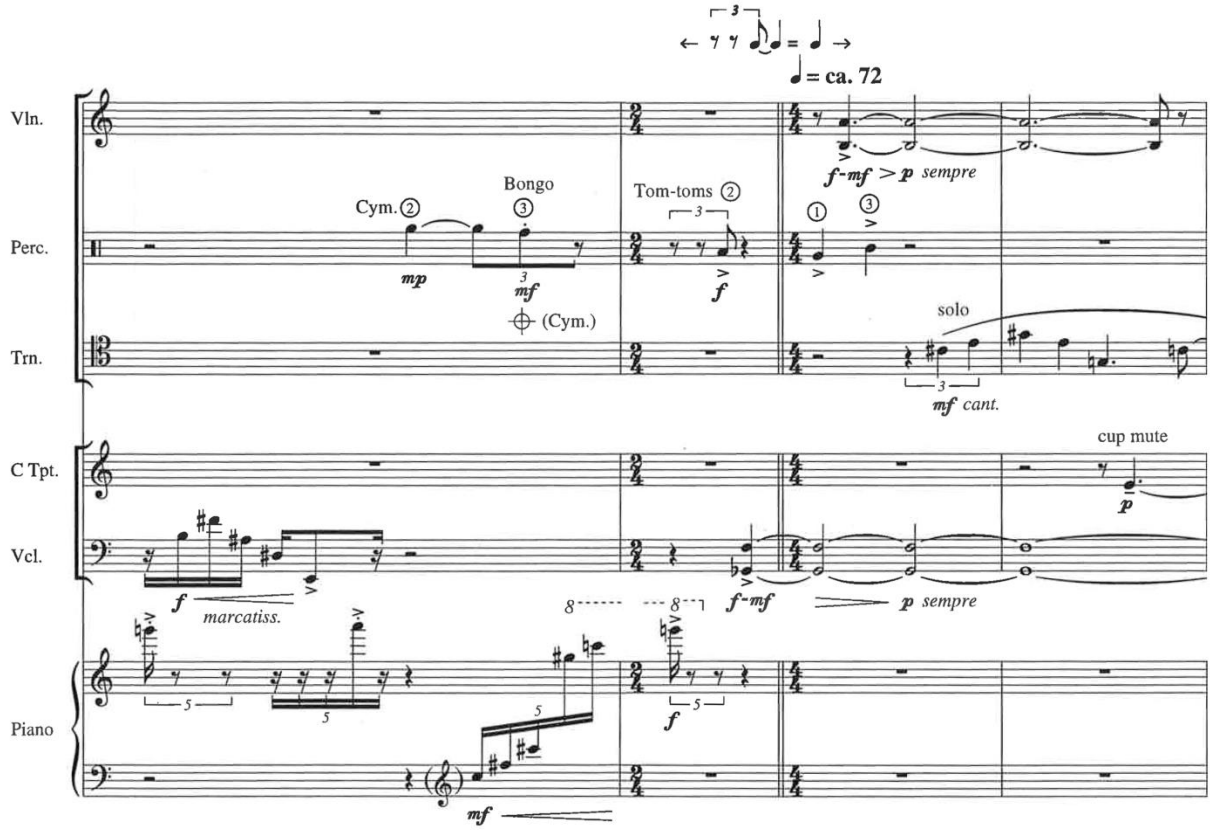
Example 3.1, *continued*
(c)



(a)

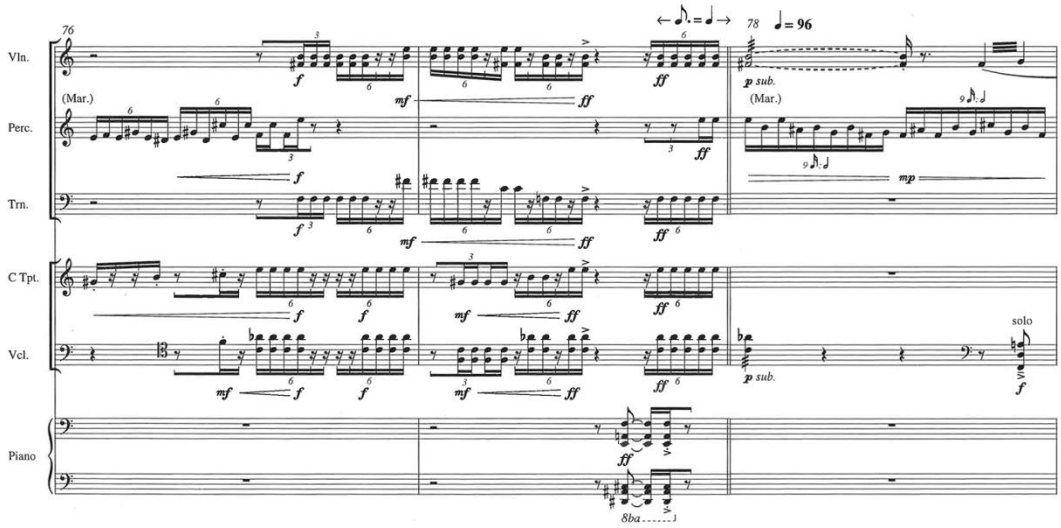


(b)

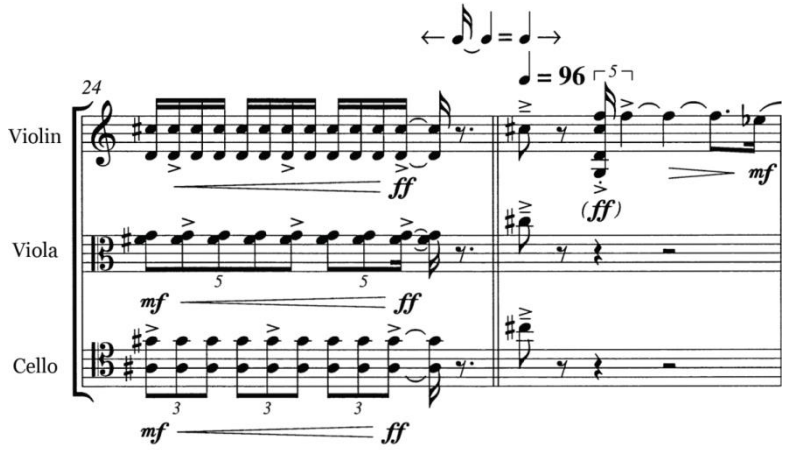


Example 3.2 aural constancy: (a) *Trije Glasbeniki* (2011), mm. 29–30, aurally constant pulse in harp, soft section division; (b) *Double Trio* (2010), mm. 125–128, aurally constant pulse in percussion, hard section division

(a)



(b)



Example 3.3 aural inconstancy: (a) *Double Trio* (2010), mm. 76–78, aurally inconstant modulation based on piano pulse, hard section division; (b) String Trio (2011), mm. 24–25, aurally inconstant modulation based on violin pulse, hard section division

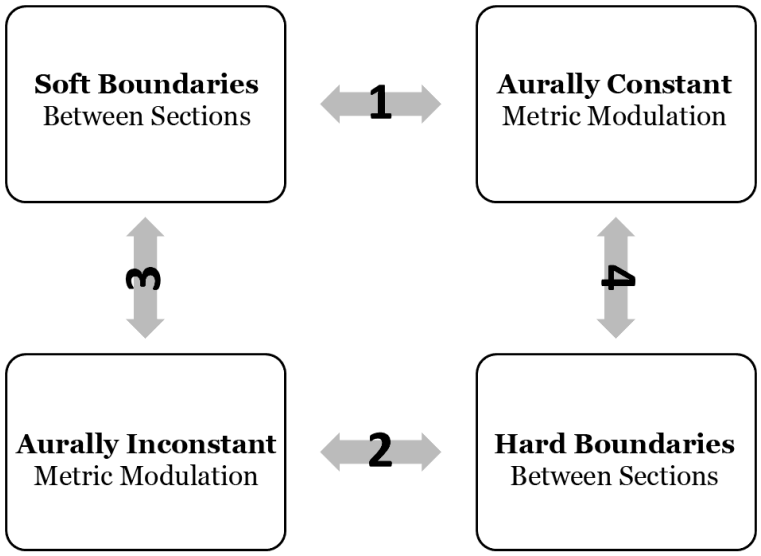
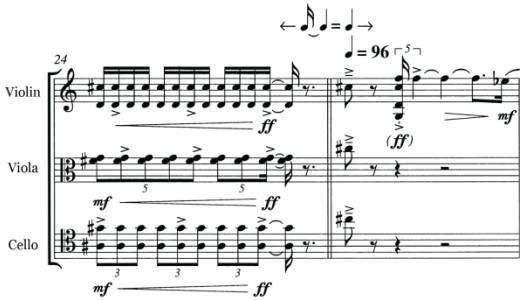
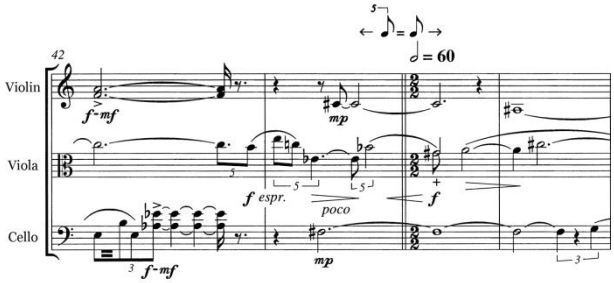


Figure 3.2 aural constancy and boundary hardness relationships

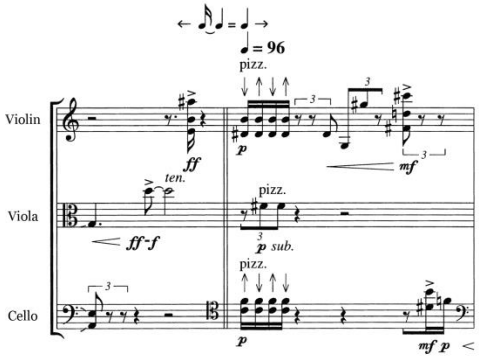
(a)



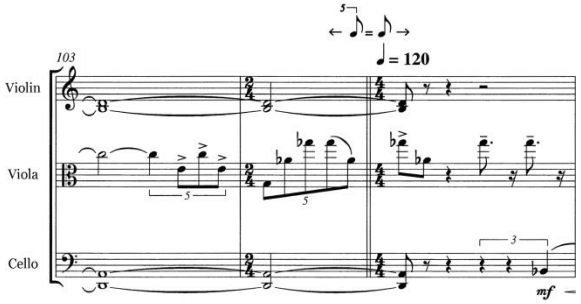
(b)



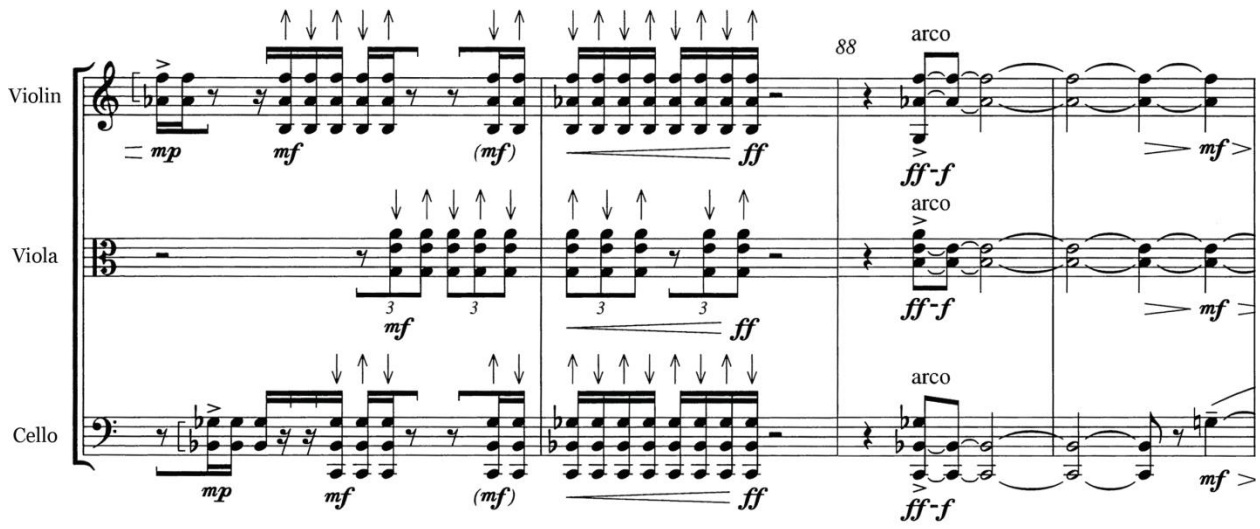
(c)



(d)



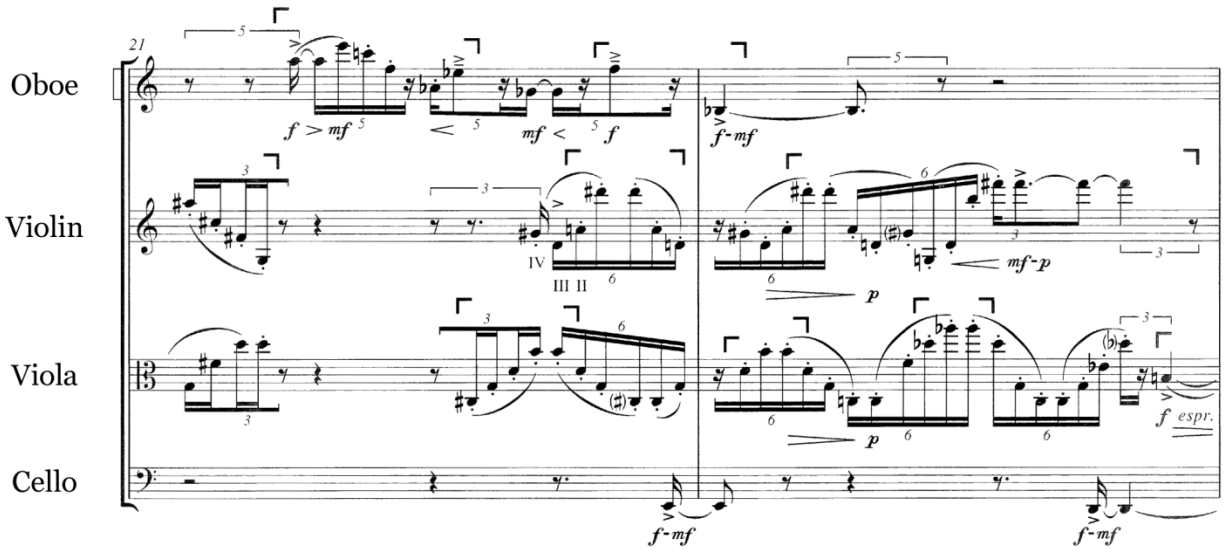
Example 3.4 String Trio (2011), sectional divisions (metric modulations): (a) mm. 24–25; (b) mm. 42–45; (c) mm. 73–74; (d) mm. 103–105



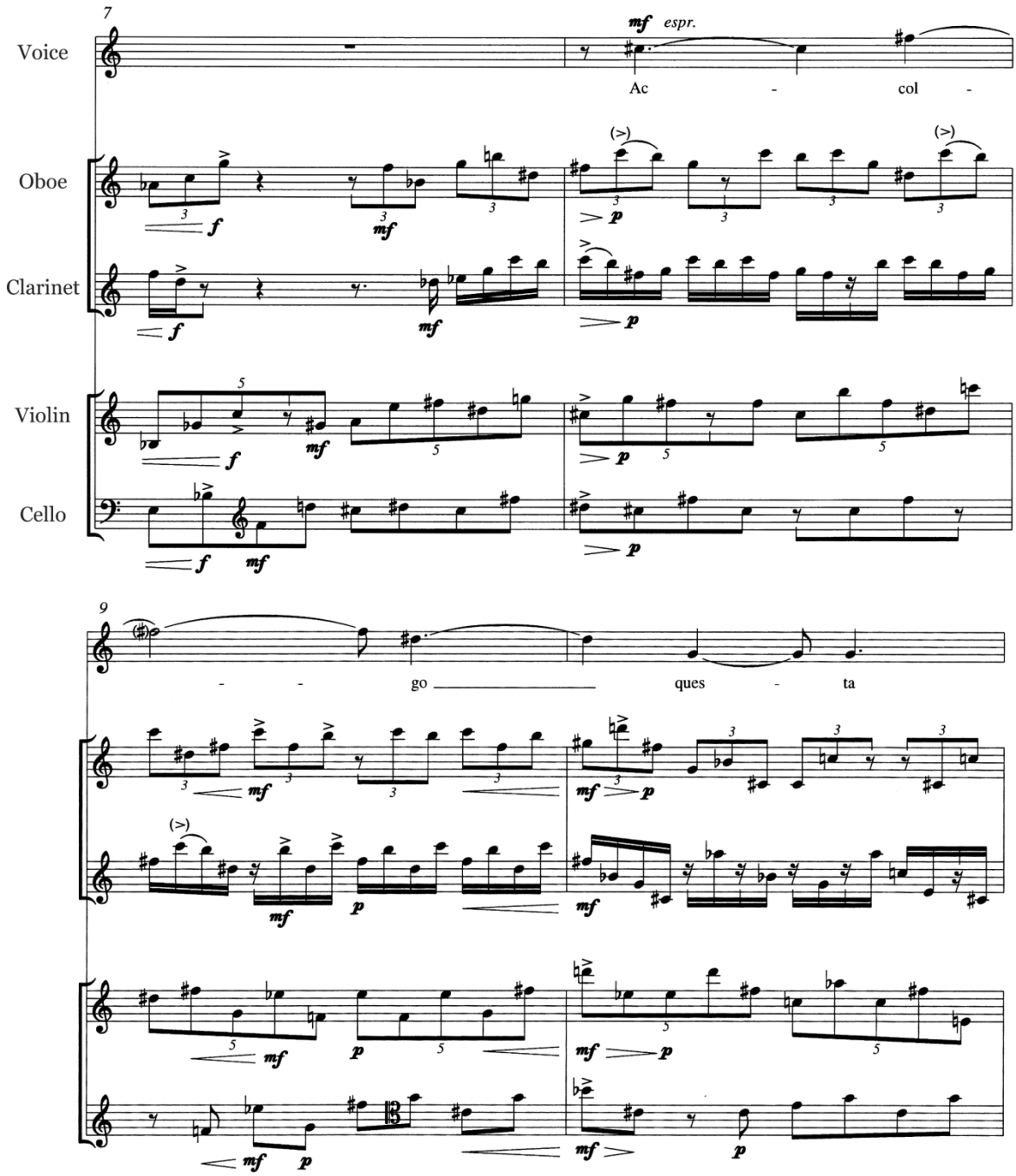
Example 3.5 String Trio (2011), mm. 86–89, sectional division, "unmarked" metric modulation

Relationship Type 2	Relationship Type 1
Hard Sectional Division **Inconstant** Metric Modulation	**Soft** Sectional Division **Constant** Metric Modulation
mm. 24–25	mm. 43–44
mm. 73–74 (mm. 87–88)	mm. 104–105

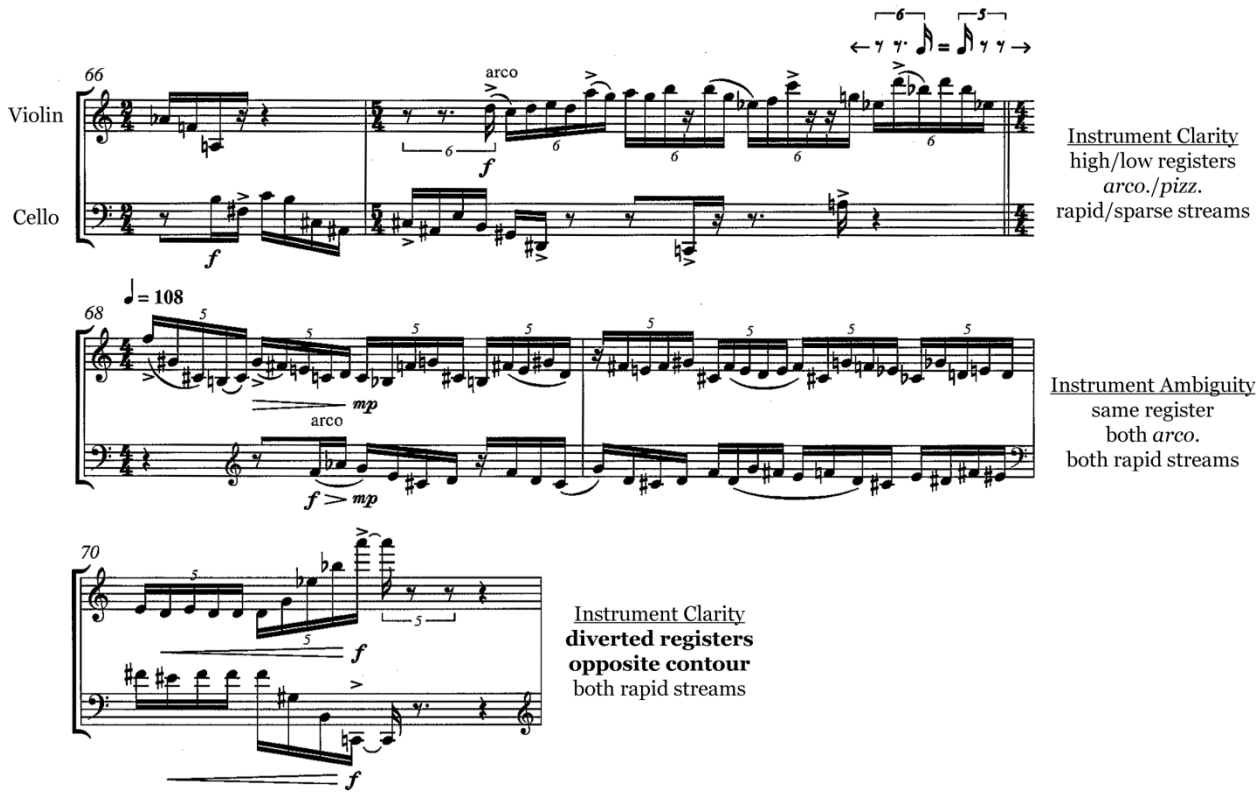
Figure 3.3 types of sectional divisions in the String Trio



Example 3.6 Oboe Quartet (2001), mm. 21–22, melodic fragments



Example 3.7 *Tempo e Tempi* (1999), "Godimento," mm 7–10, stratified melodic strands



Example 3.8 *Duettone* (2009), measures 66–71, instrument ambiguity and clarity

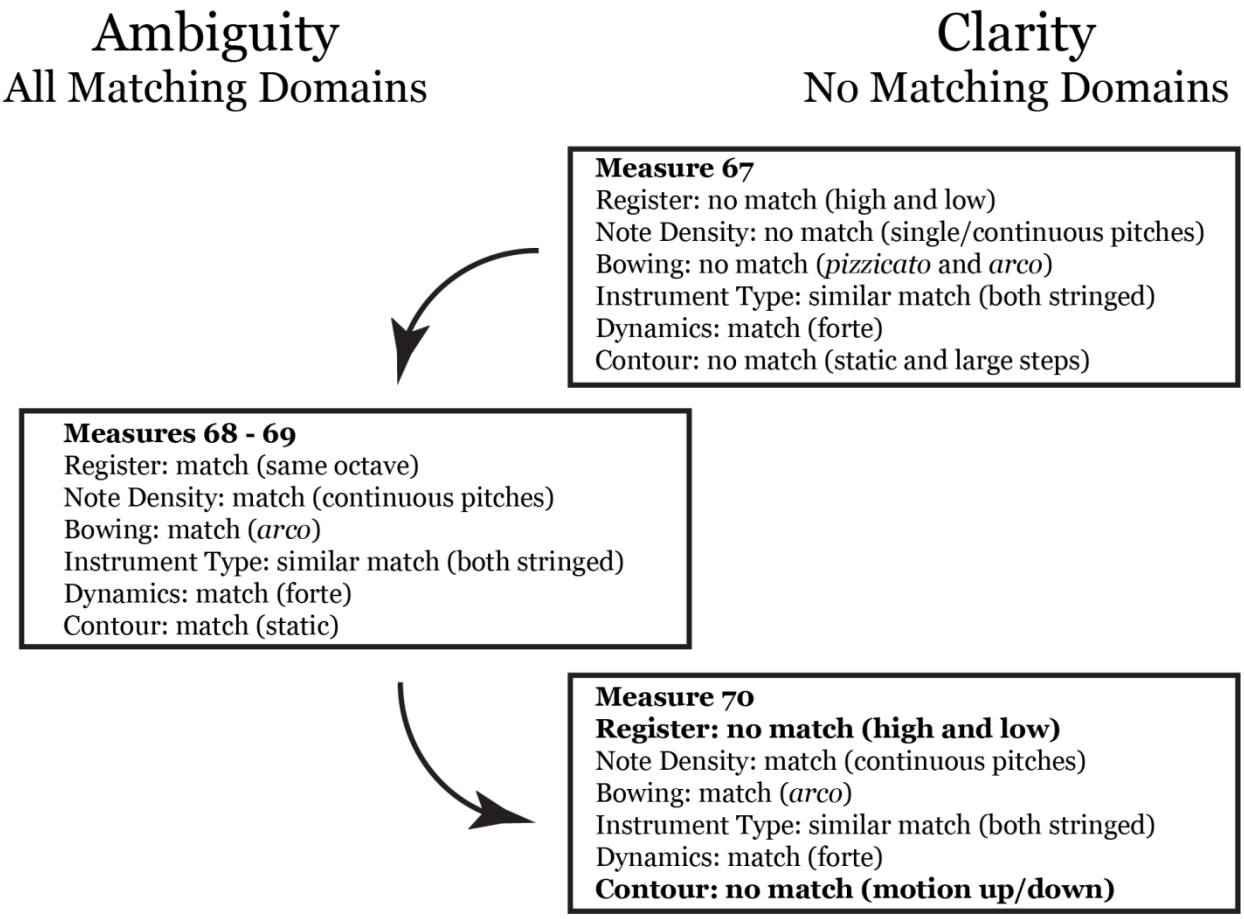
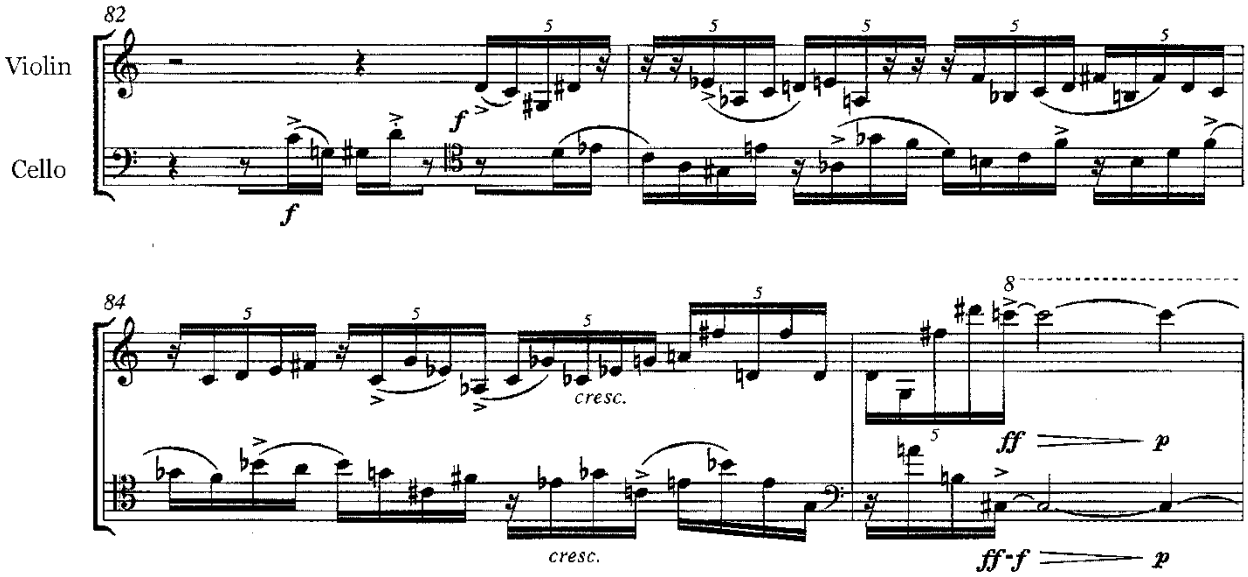
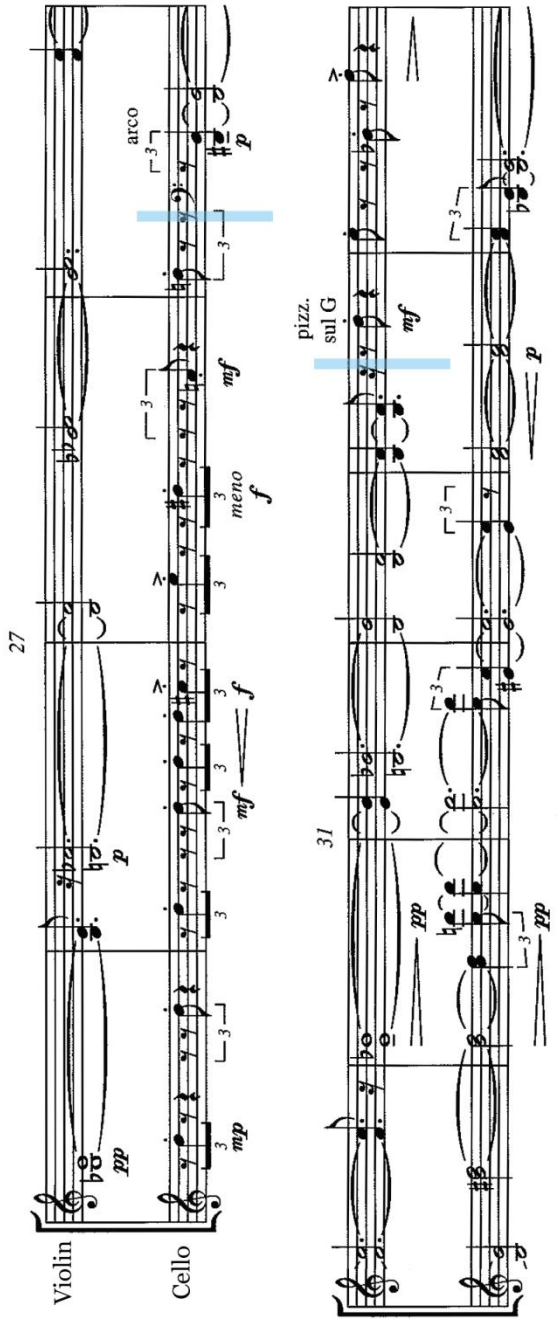


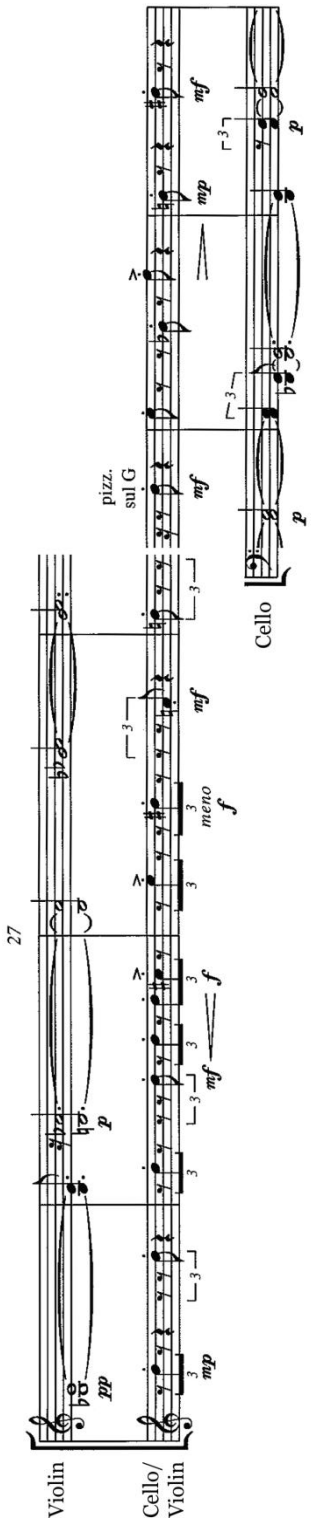
Figure 3.4 domains defining progression of ambiguity and clarity



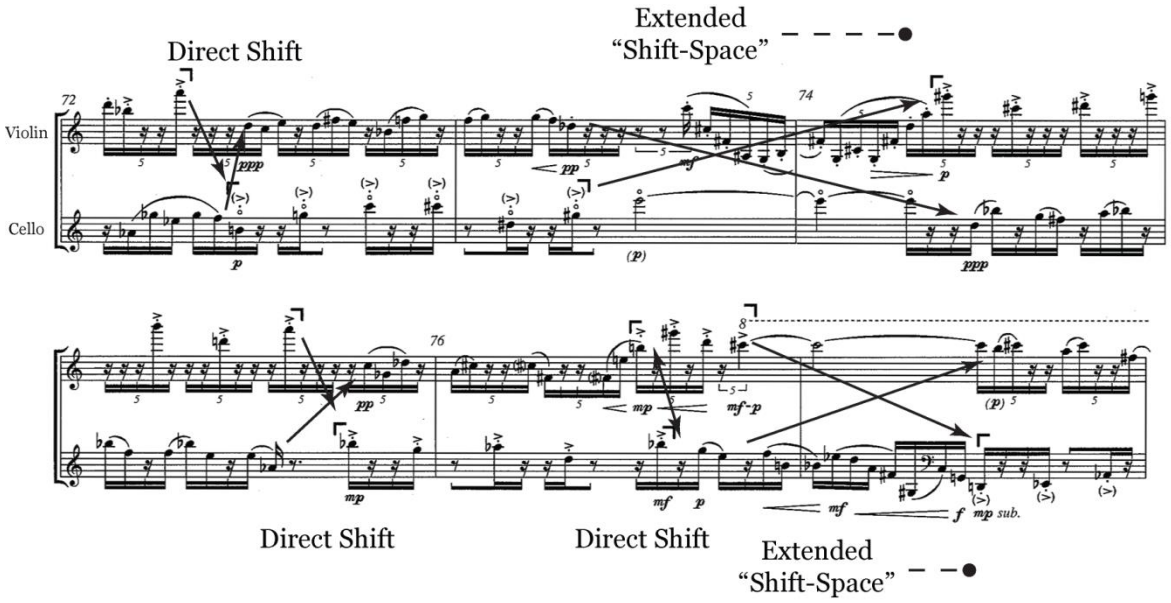
Example 3.9 *Duettone* (2009), measures 82–85



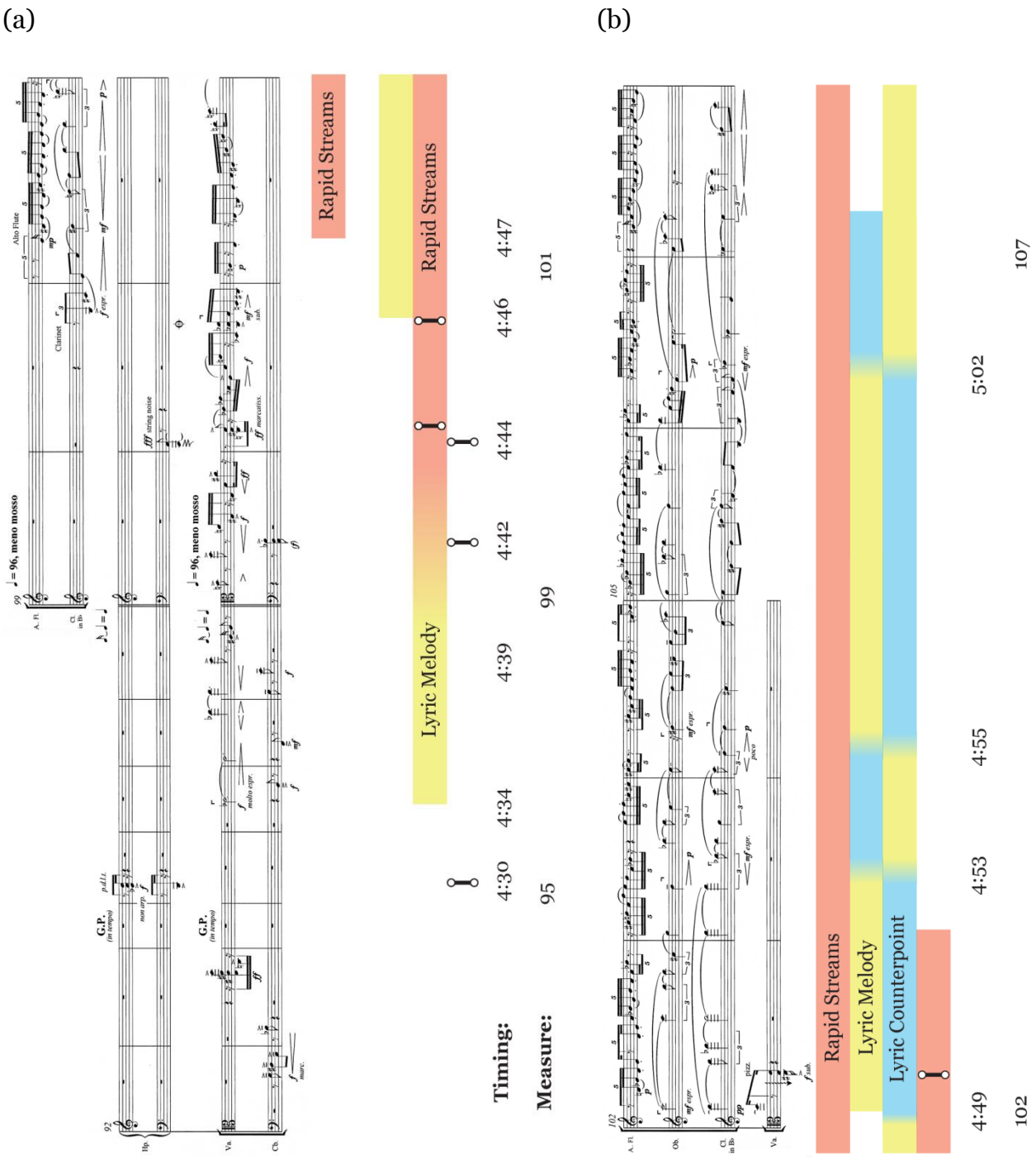
Example 3.10 *Duettone* (2009), measures 25–35, *arco*/*pizzicato* and register create aural boundaries



Example 3.11 *Duettone* (2009), mm. 25–35 recomposition, direct *pizzicato* shift from cello to violin



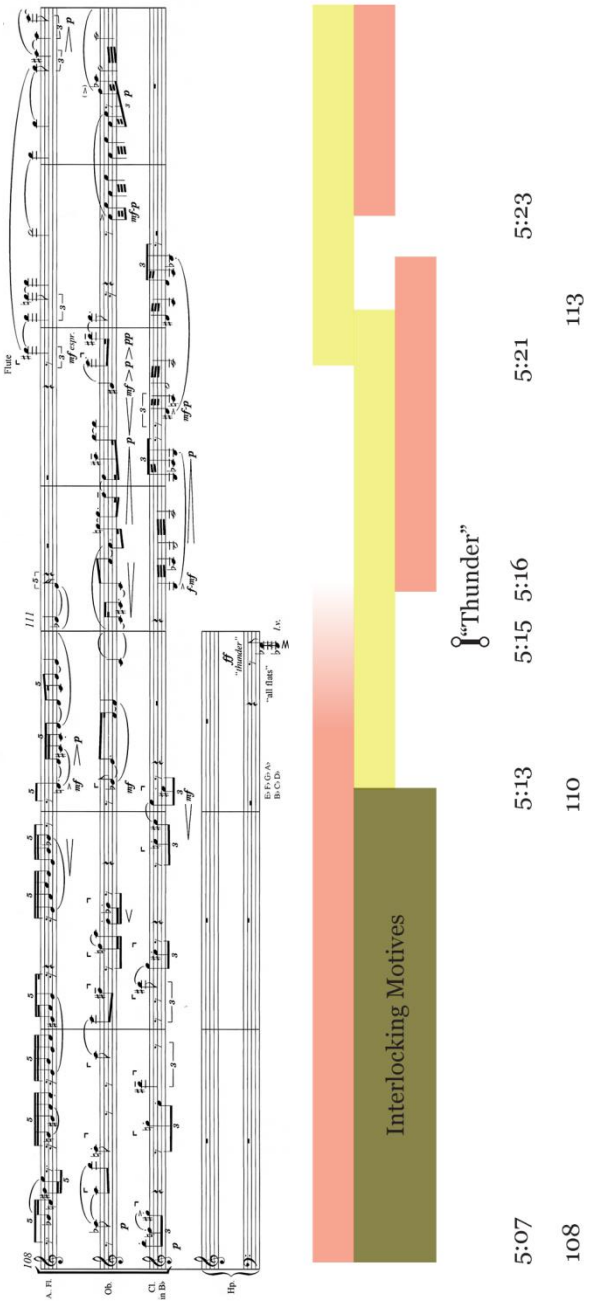
Example 3.12 *Duettone*, mm. 72–75, melodic shifts in interlocking streams texture



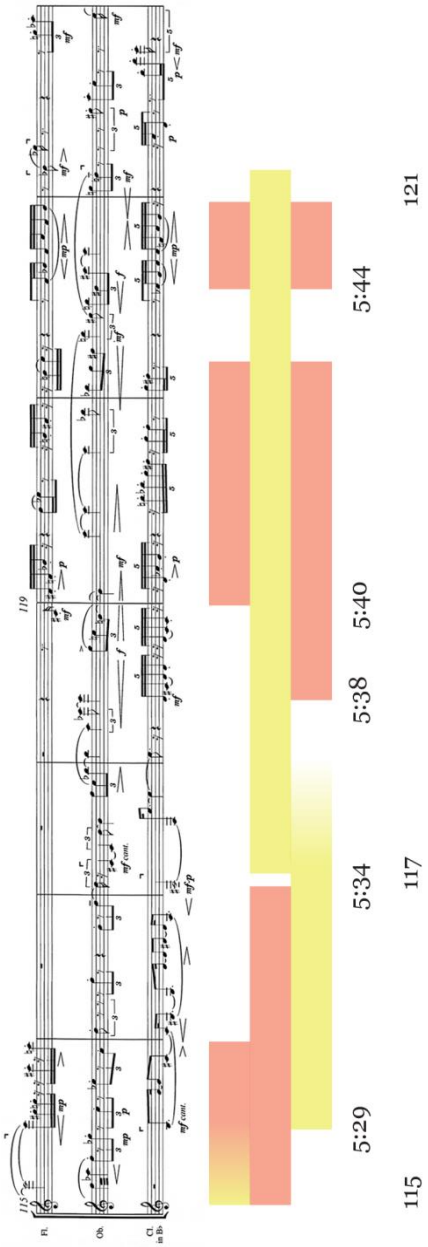
Example 3.13 (a)–(d) *Mosaic* (2004), mm. 92–104, melodic analysis

Example 3.13, *continued*

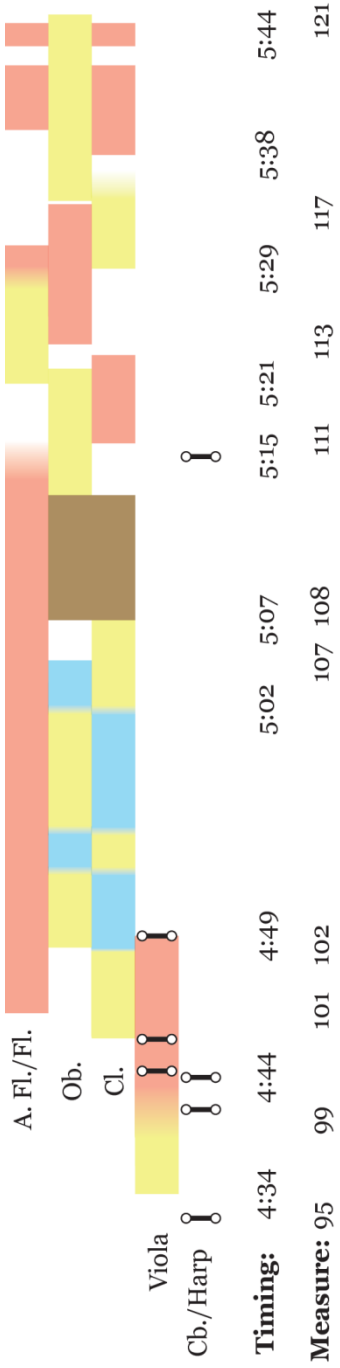
(c)



(d)



(a)



(b)

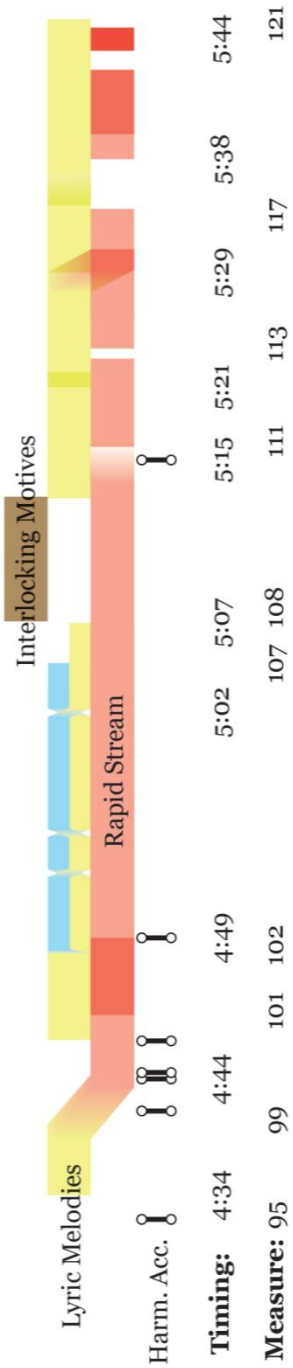
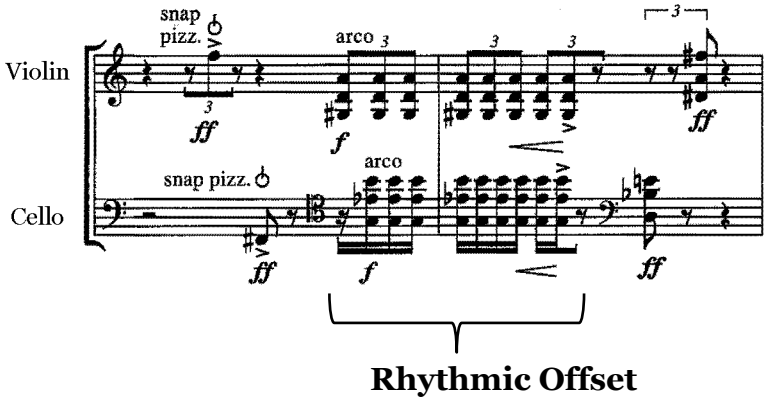


Figure 3.5 *Mosaic* (2004), mm. 92–114, melodic analysis reduction (a) by instrument; (b) by texture

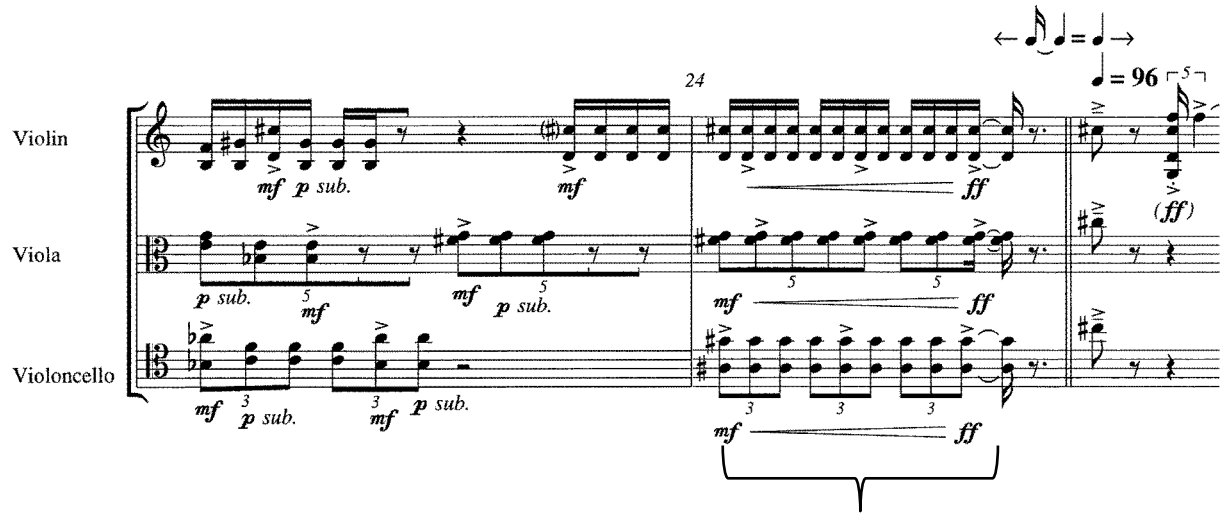
A.4 Chapter 4

(a)



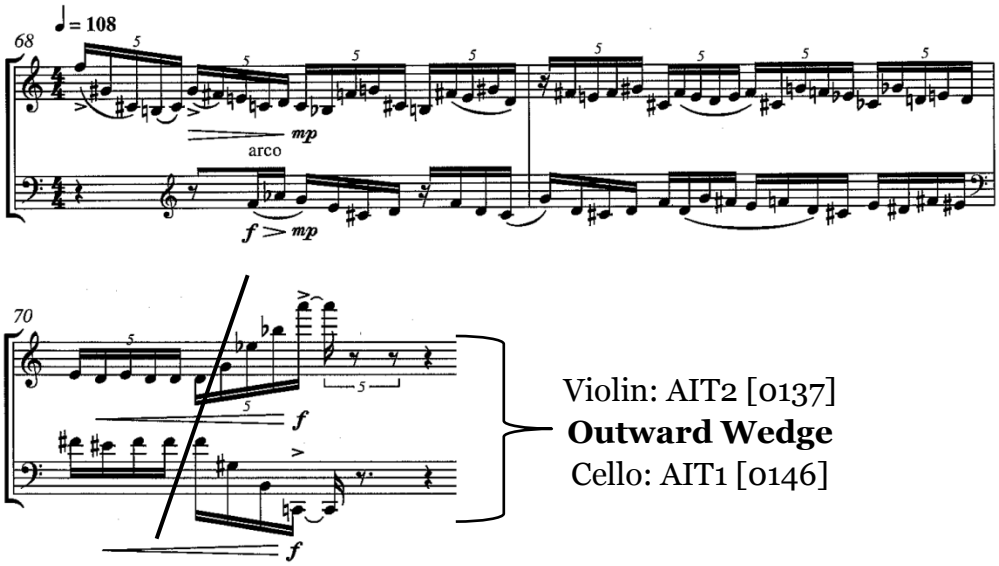
Harmonic Combination: 3+3 = ATH [012478]

(b)



Harmonic Combination: 2+2+2 =ATH

Example 4.1 signature sets in rhythmic offset cues: (a) *Duettino* (2008), mm. 76–77; (b) String Trio (2011), mm. 23–25



Example 4.2 *Duettone* (2009), mm. 66–71, aural cue as harmonic cadence

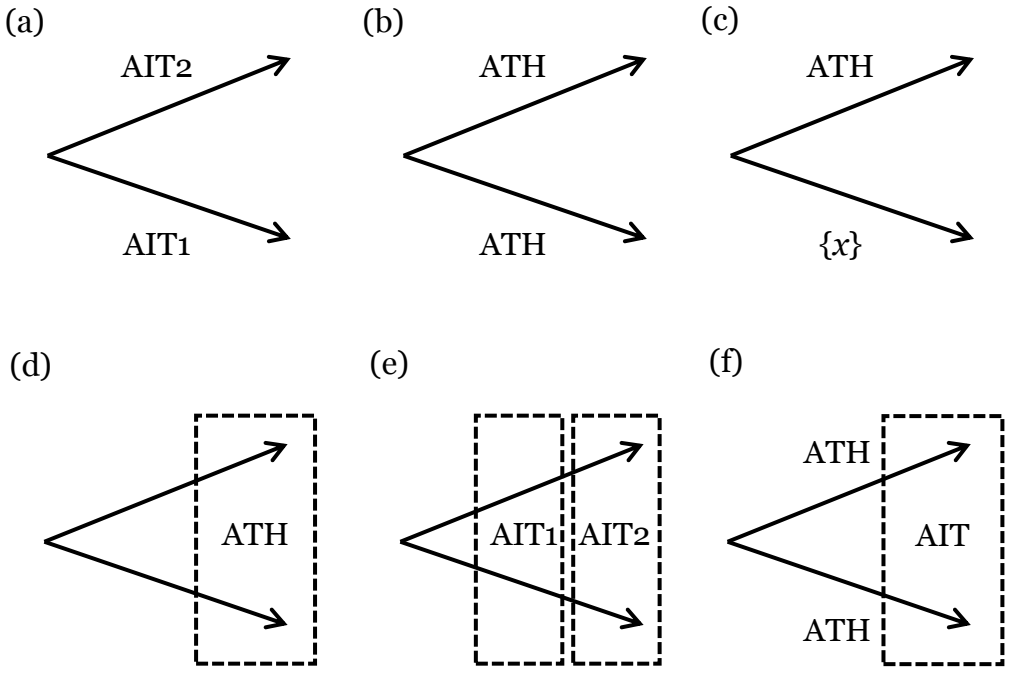
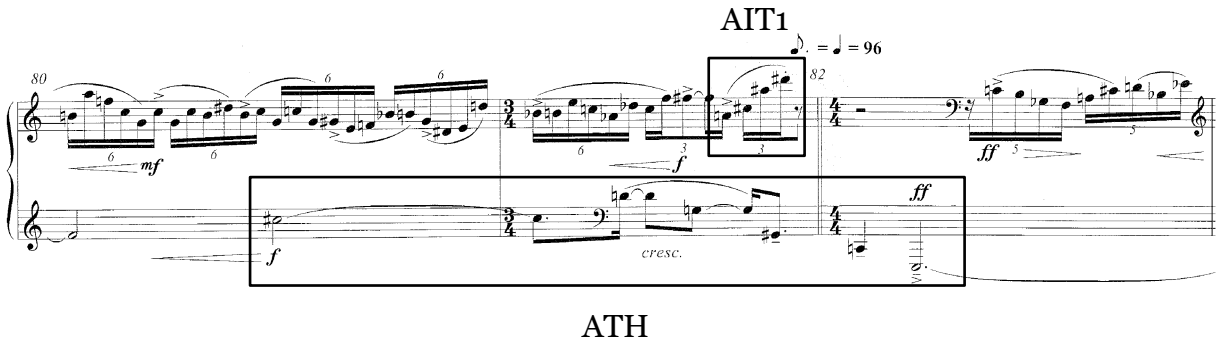
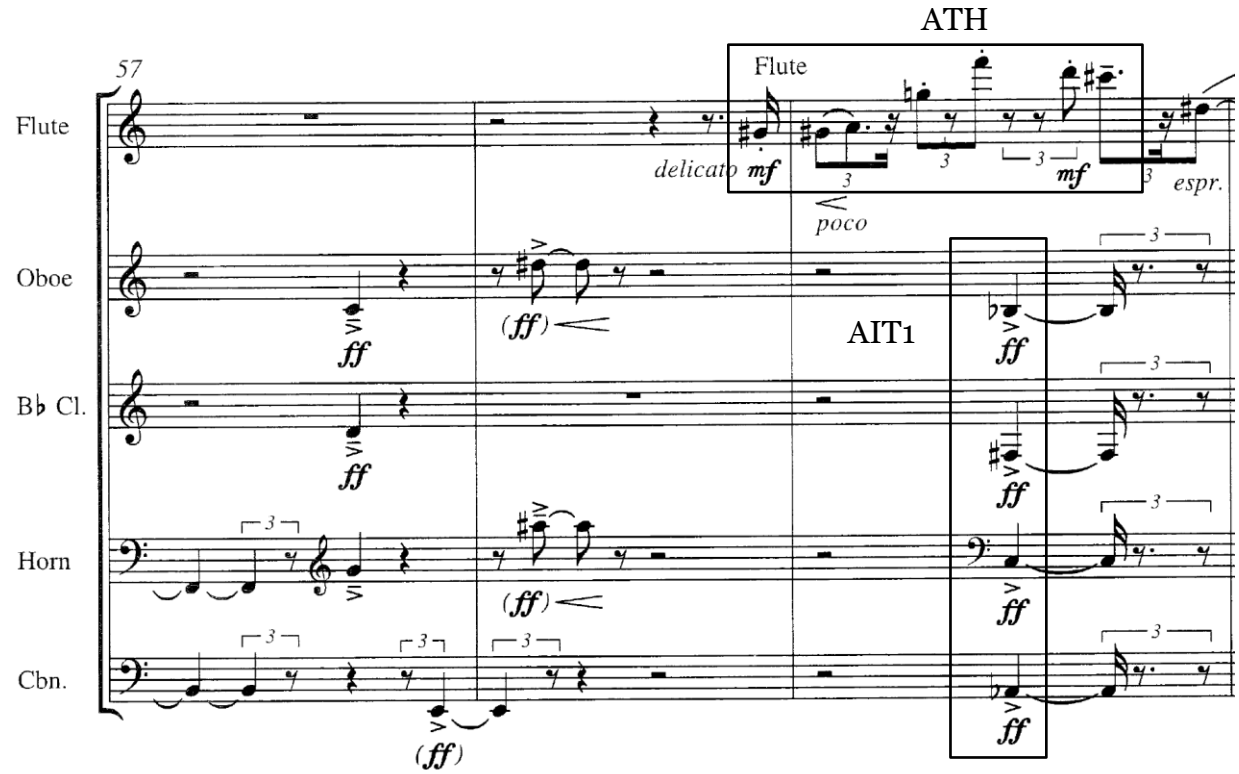


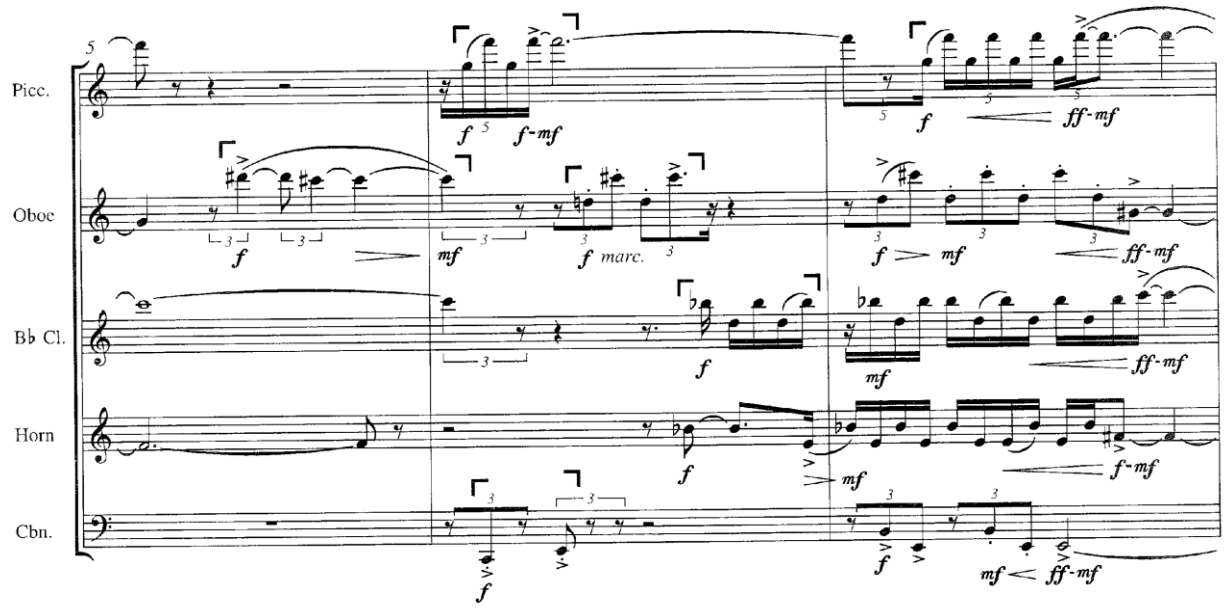
Figure 4.1 possible harmonic realizations of the wedge cue



Example 4.3 *Two Diversions*, II (1999), mm. 80–82, outward wedge cadence



Example 4.4 *Nine by Five* (2009), mm. 57–59, harmonic accent cue



Example 4.5 *Nine by Five* (2009), mm. 5–7, harmonic makeup of motivic cues

(a)

K ∈ SC(X)	[015]	3-4 
L ∈ SC(Y)	[06]	2-6 i6
{SC(Z): K ∪ L = M}	[01457] [01258] [02458]	5-Z18  5-Z38  5-26 

(b)

K ∈ SC(X)	**[048]**	3-12 
L ∈ SC(Y)	**[01]**	2-1 i1
{SC(Z): K ∪ L = M}	**[01248]**	5-13 

Table 4.1 set-class combinations: (a) 3+2 combination with multiple results; (b) 3+2 combination with only one result. Complement Union Property

(a)

K ∈ SC(X)	**[048]**	3-12	1
L ∈ SC(Y)	**[01]**	2-1	i1
{SC(Z): K ∪ L = M}	**[01248]**	5-13	17

(b)

K ∈ SC(X)	**[048]**	3-12	1
L ∈ SC(Y)	**[03]**	2-3	i3
{SC(Z): K ∪ L = M}	**[02458]**	5-26	26

(c)

K ∈ SC(X)	**[048]**	3-12	1
L ∈ SC(Y)	**[05]**	2-5	i5
{SC(Z): K ∪ L = M}	**[01468]**	5-30	37

(d)

K ∈ SC(X)	**[048]**	3-12	1
L ∈ SC(Y)	**[06]**	2-6	i6
{SC(Z): K ∪ L = M}	**[01478]**	5-22	8

(e)

K ∈ SC(X)	**[0369]**	4-28	5
L ∈ SC(Y)	**[0]**	1-1	N
{SC(Z): K ∪ L = M}	**[01369]**	5-31	5

Table 4.2 pentachords exhibiting CUP: (a)–(d) = 2+3; (e) = 1+4

(a)

	α	
β?	**[048]**	{SC(W): J ∪ K = M}= { }
	[01]	
	[01248]	

(b)

	α	
	[048]	
β?	**[01]**	{SC(W): J ∪ L = M} = [026]
	[01248]	

Table 4.3 (a)–(b): α and β combinations yielding [01248]

(a)

	α	
	[048]	{ }
β	**[01]**	[026]
	[01248]	

	α	
	[048]	{ }
β	**[03]**	[024]
	[02458]	

	α	
	[048]	{ }
β	**[05]**	[026]
	[01468]	

(b)

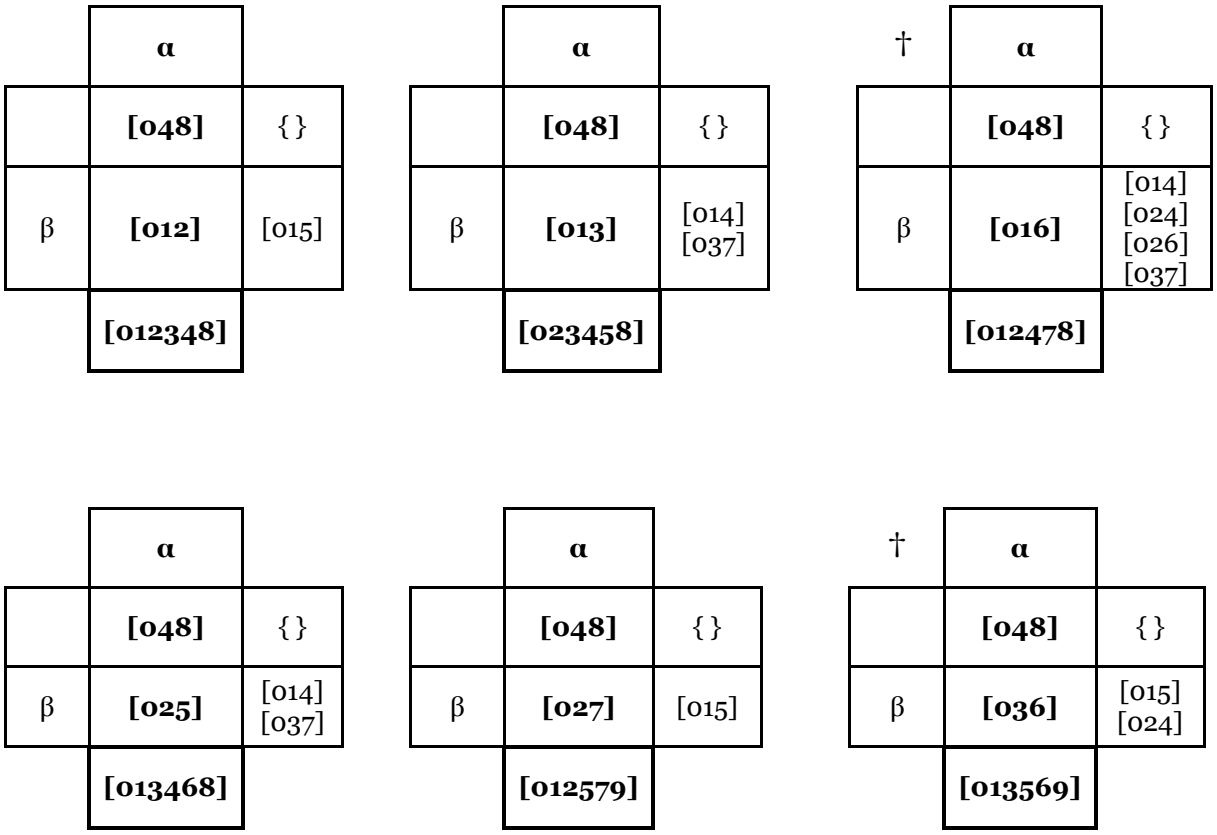
	α	
	[048]	{ }
	[06]	{ }
	[01478]	

(c)

	α	
	[0369]	{ }
β	**[0]**	[0136] [0147] [0236] [0258]
	[01369]	

Table 4.4 α and β combinations for all CUP pentachords: (a) 2+3 permeable sets; (b) 2+3 impermeable set; (c) 1+4 permeable set

(a)



(b)

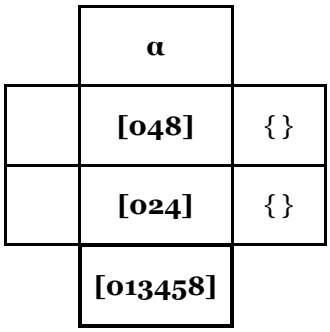
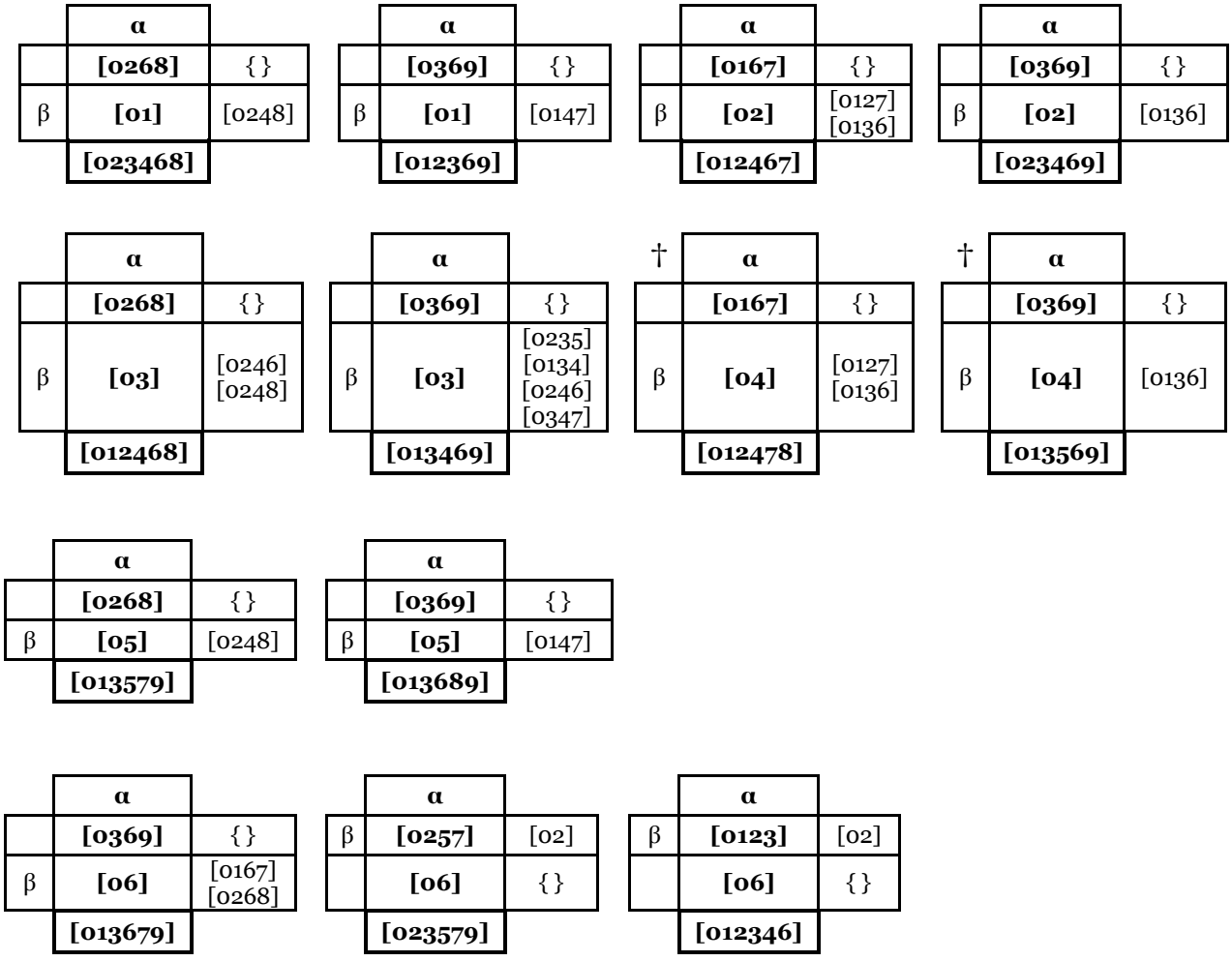


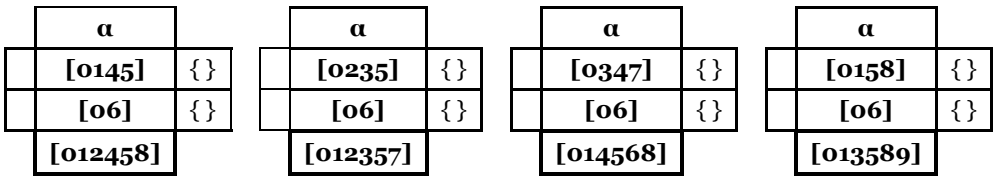
Table 4.5 α and β combinations for all CUP hexachords: (a) 3+3, permeable sets; (b) 3+3 impermeable set; (c) 2+4 permeable sets; (d) 2+4 impermeable sets

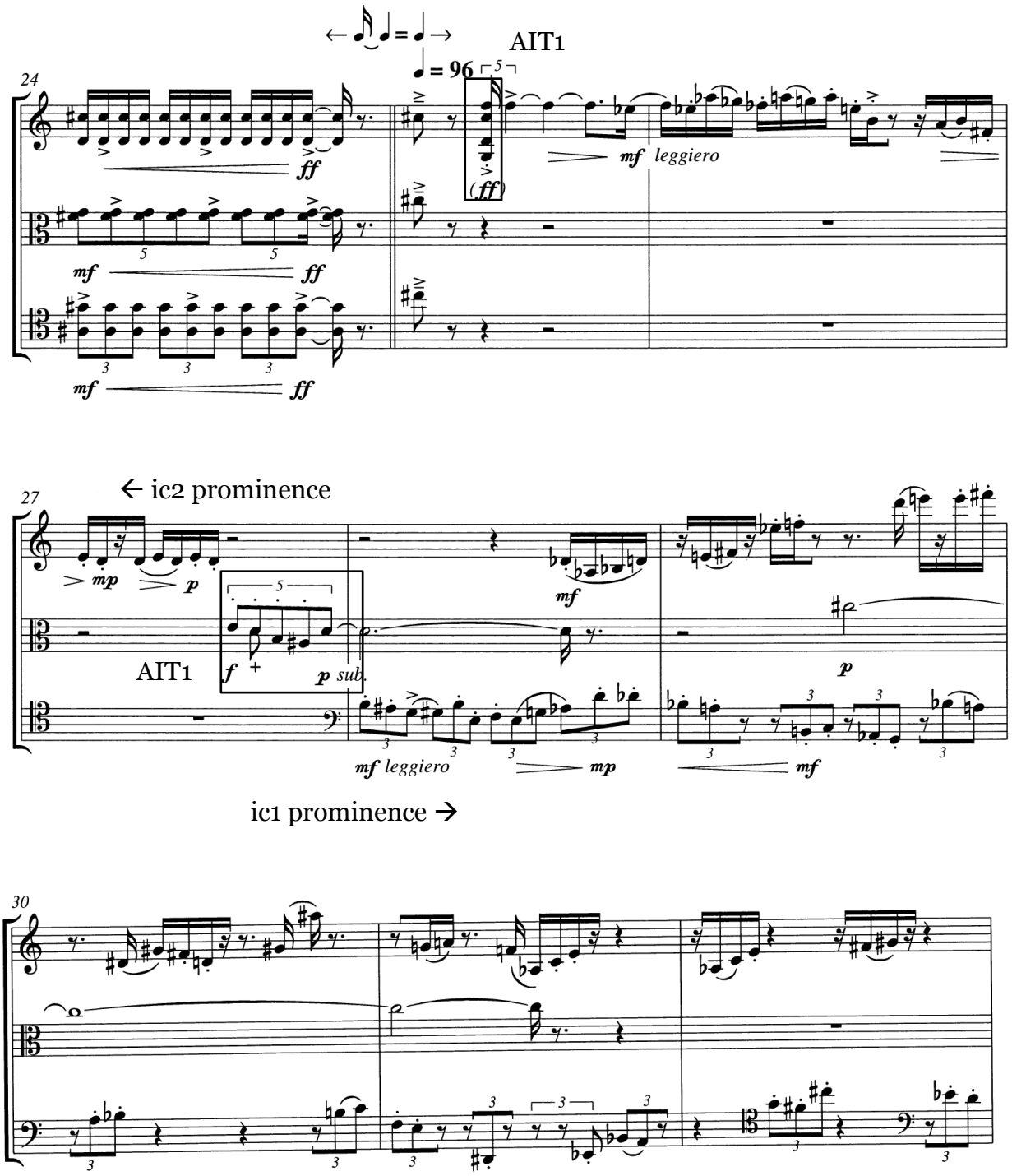
Table 4.5, *continued*

(c)



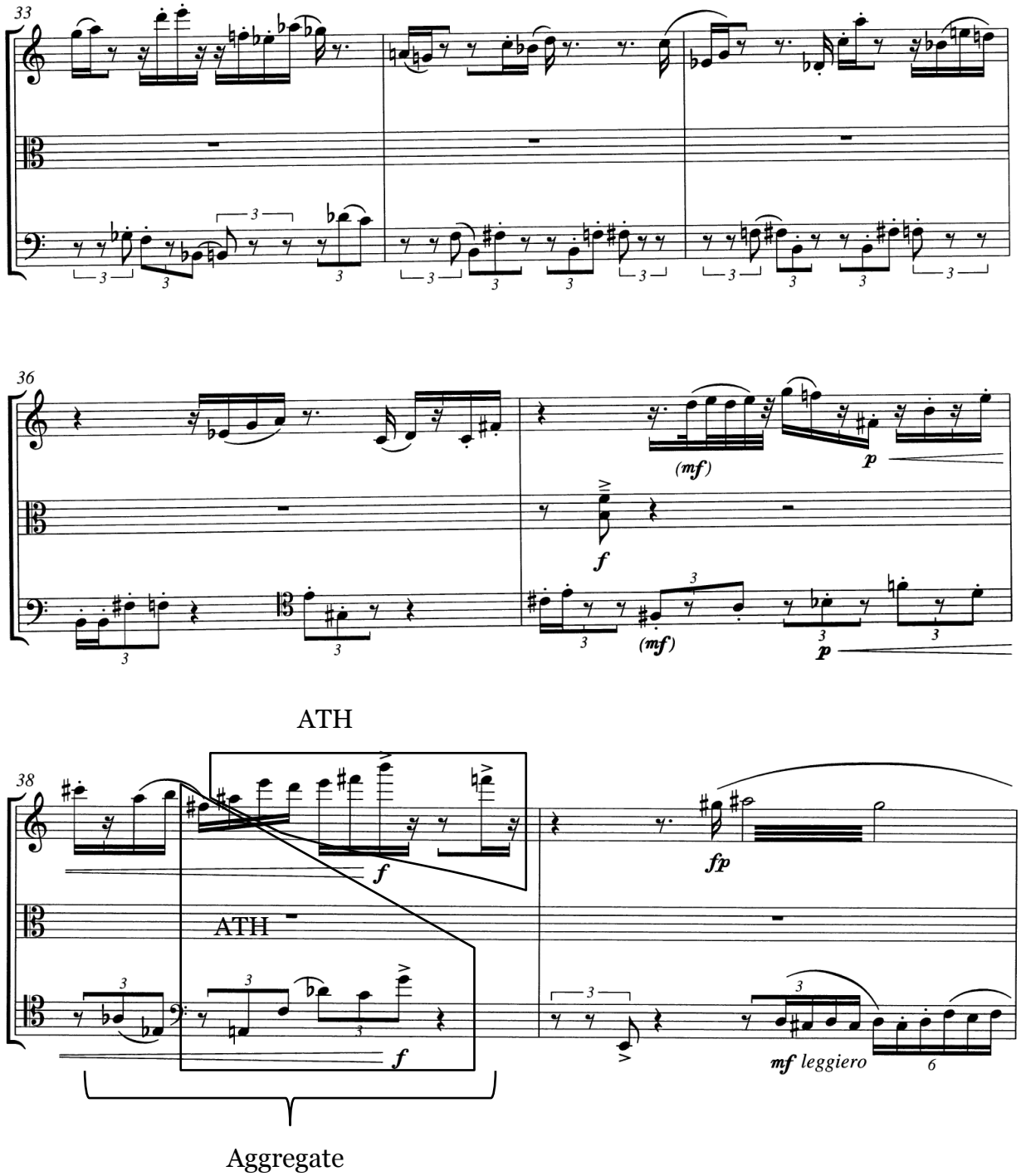
(d)



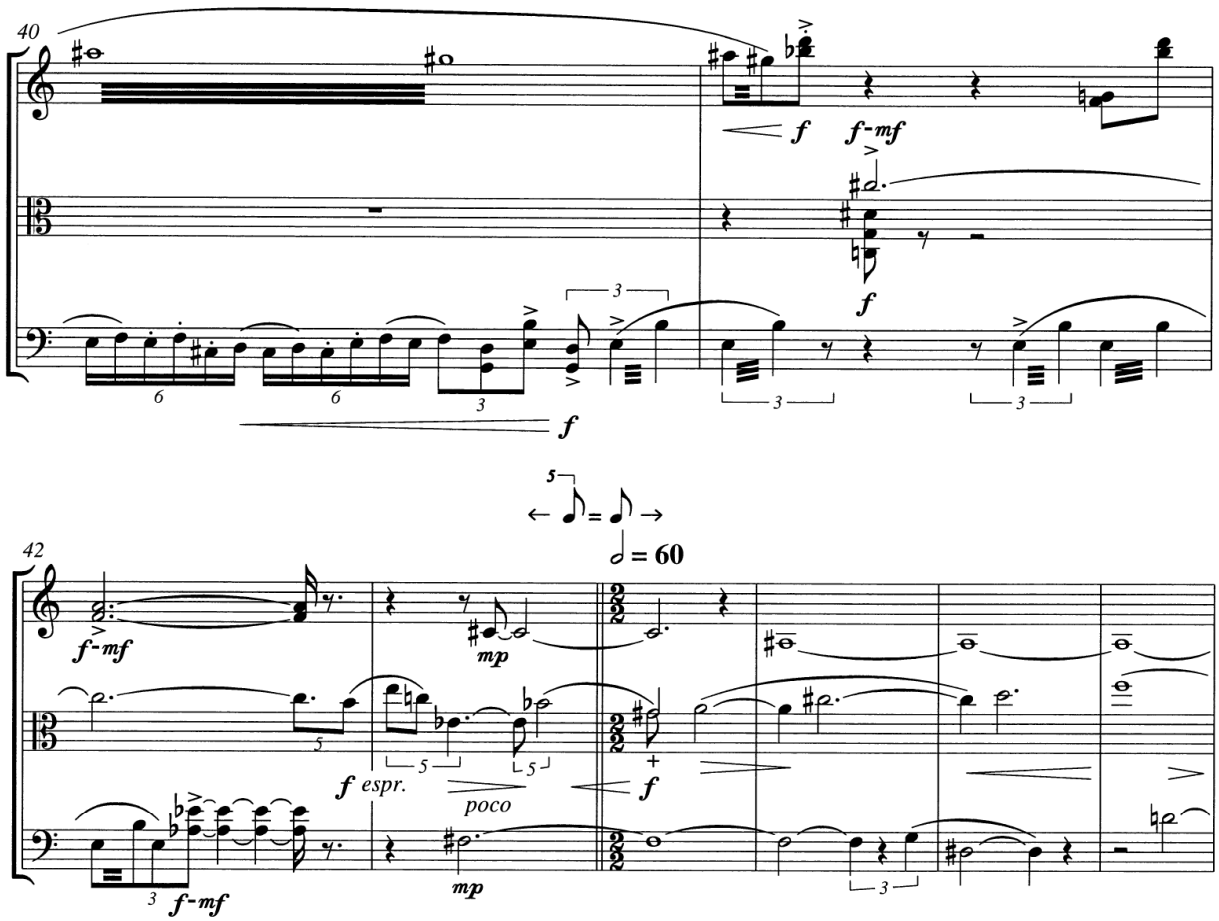


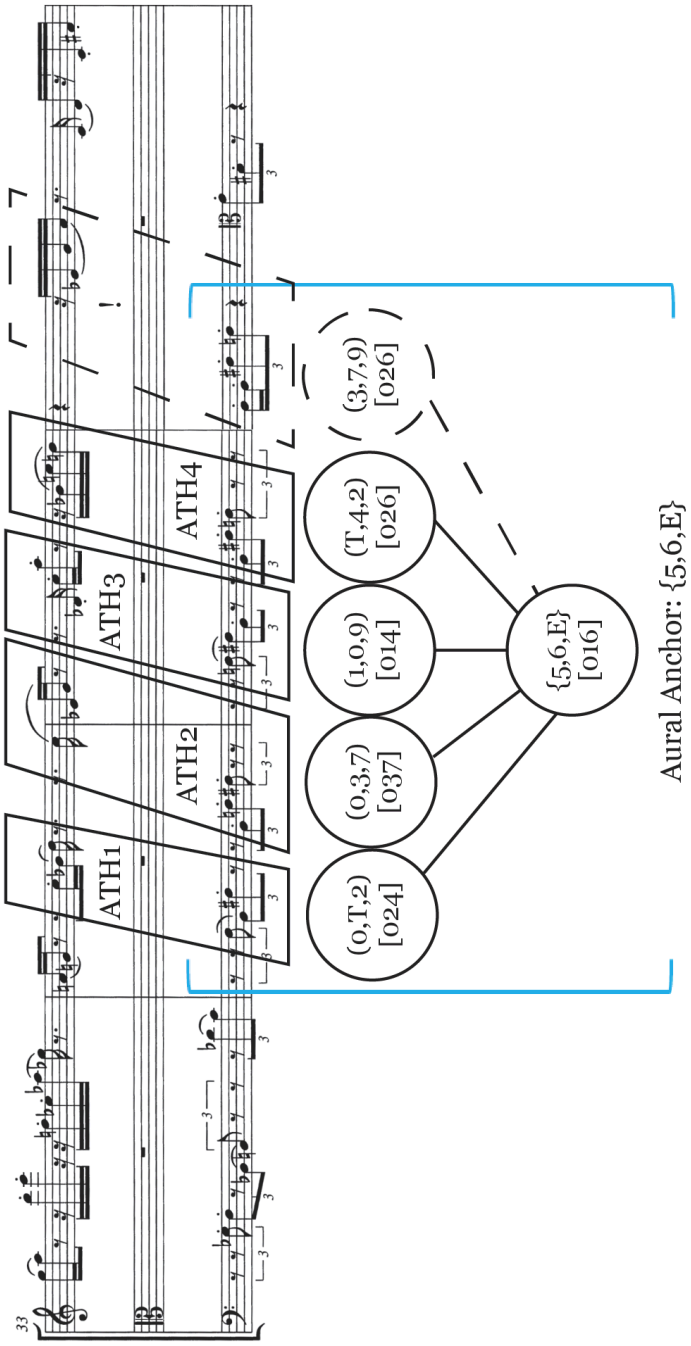
Example 4.6 String Trio, second section, mm. 24–47

Example 4.6, *continued*



Example 4.6, *continued*





Example 4.7 String Trio, mm. 33–36, [016] motivic aural cue, mm. 33–36

†	**α**	
	[048]	{ }
β	**[016]**	[014] [024] [026] [037]
	[012478]	

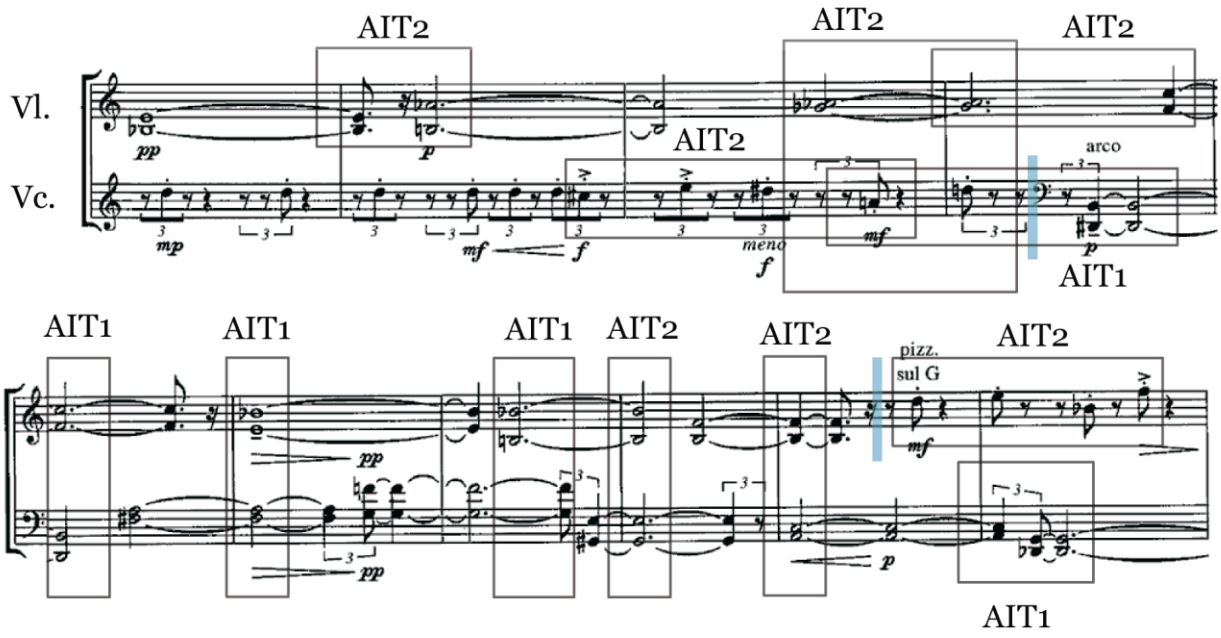
Table 4.6 *beta* combination of [016] to form ATH

	α	
	[03]	{ }
	[06]	{ }
	[0146] or [0137]	

Table 4.7 CUP2$^{\alpha}$ combinations for AITs

TYPE	AIT1 = 0146	AIT2 = 0137
I (CUP2$^{\alpha}$)	**03 + 06**	
II	01 + 02	01 + 04
III	05 + 04	05 + 02

Table 4.8 AIT Types by dyad pairings



Example 4.8 *Duettone*, mm. 25–34

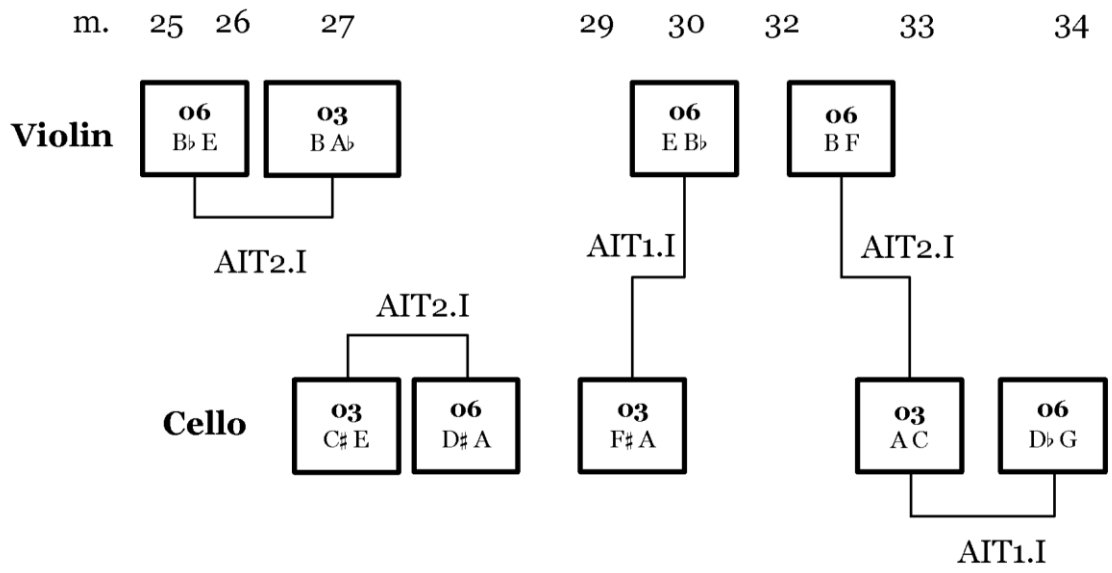


Figure 4.2 *Duettone* mm. 25–34, isolated CUP2$^{\alpha}$

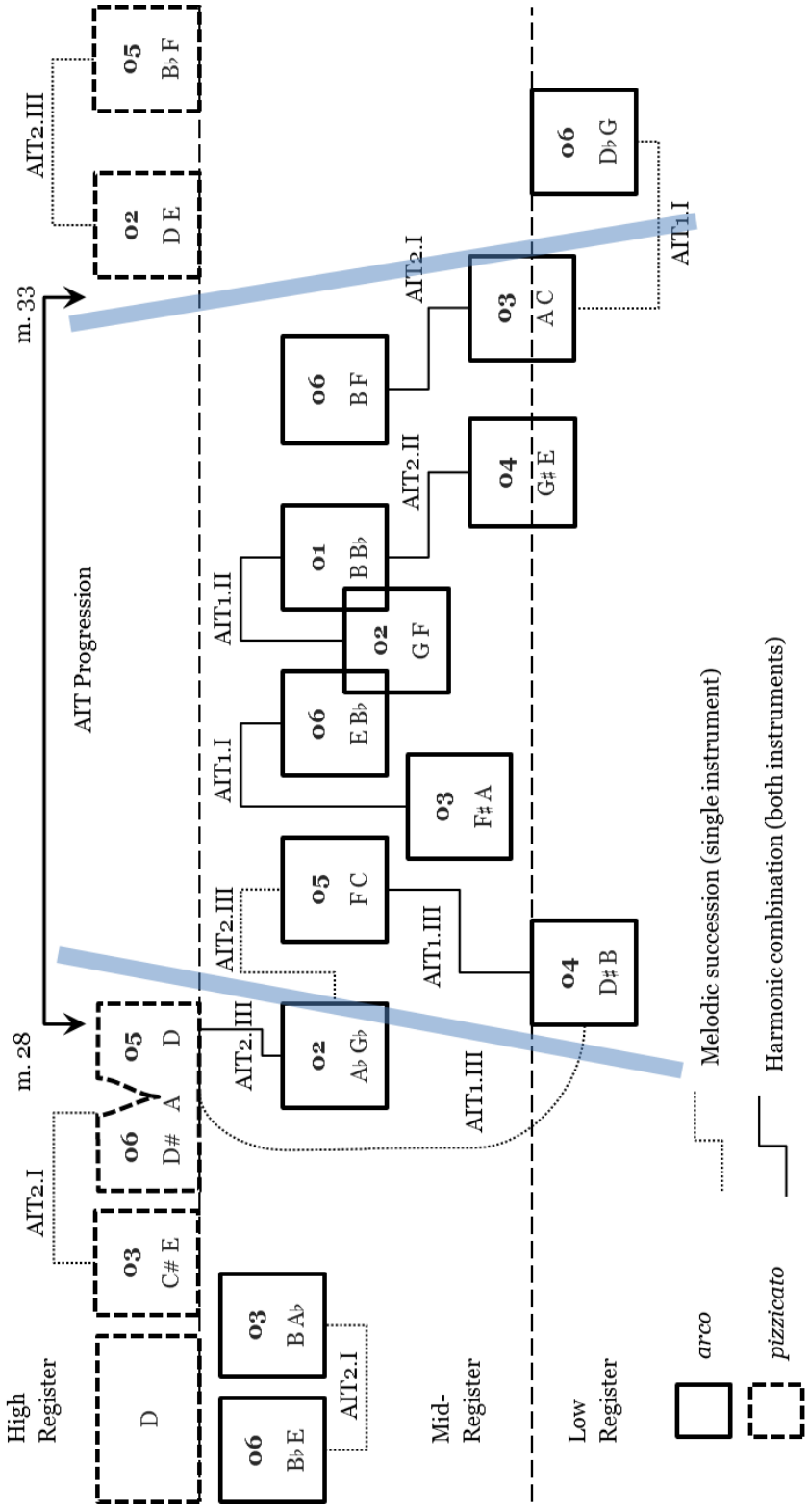
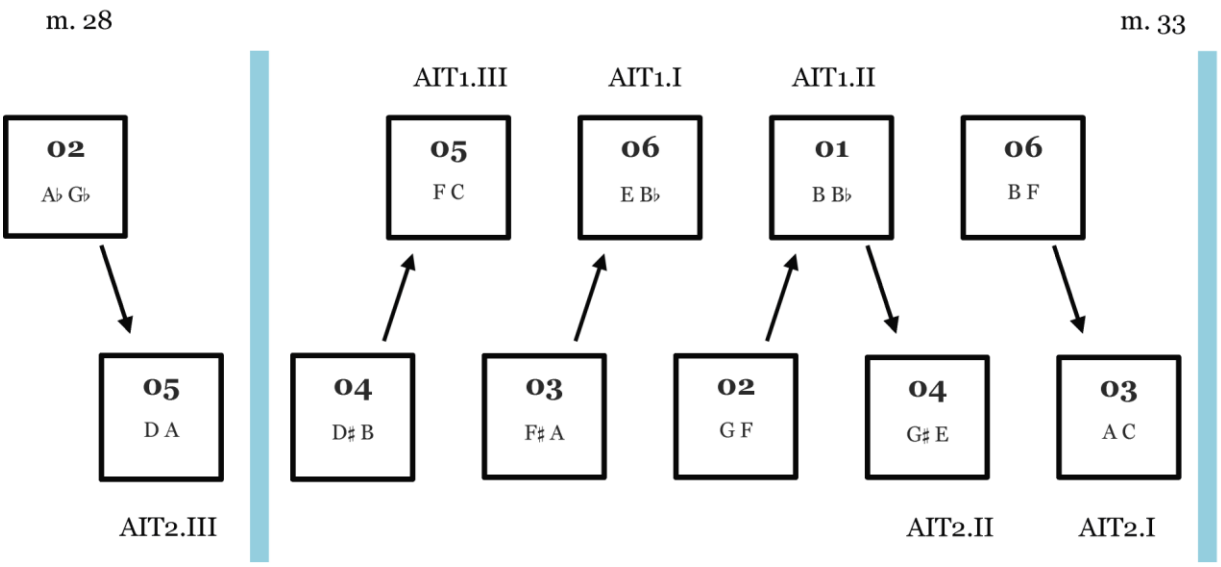


Figure 4.3 *Duettone*, mm. 25–34, AIT succession by dyad pairing

(a)



(b)

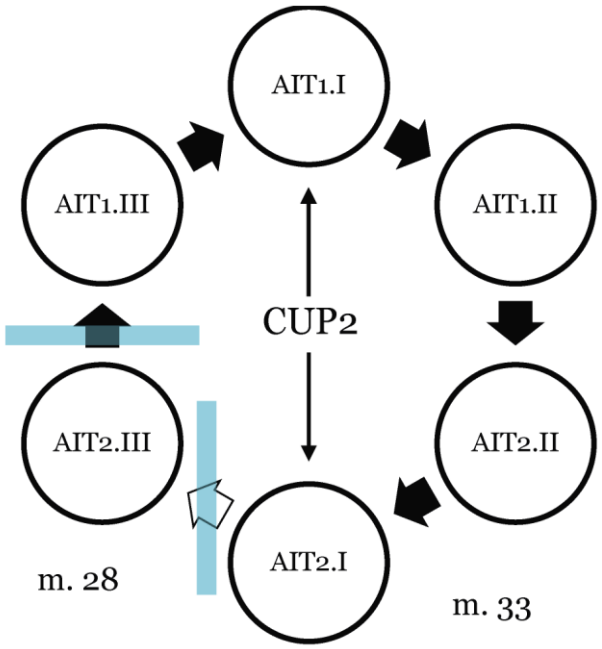
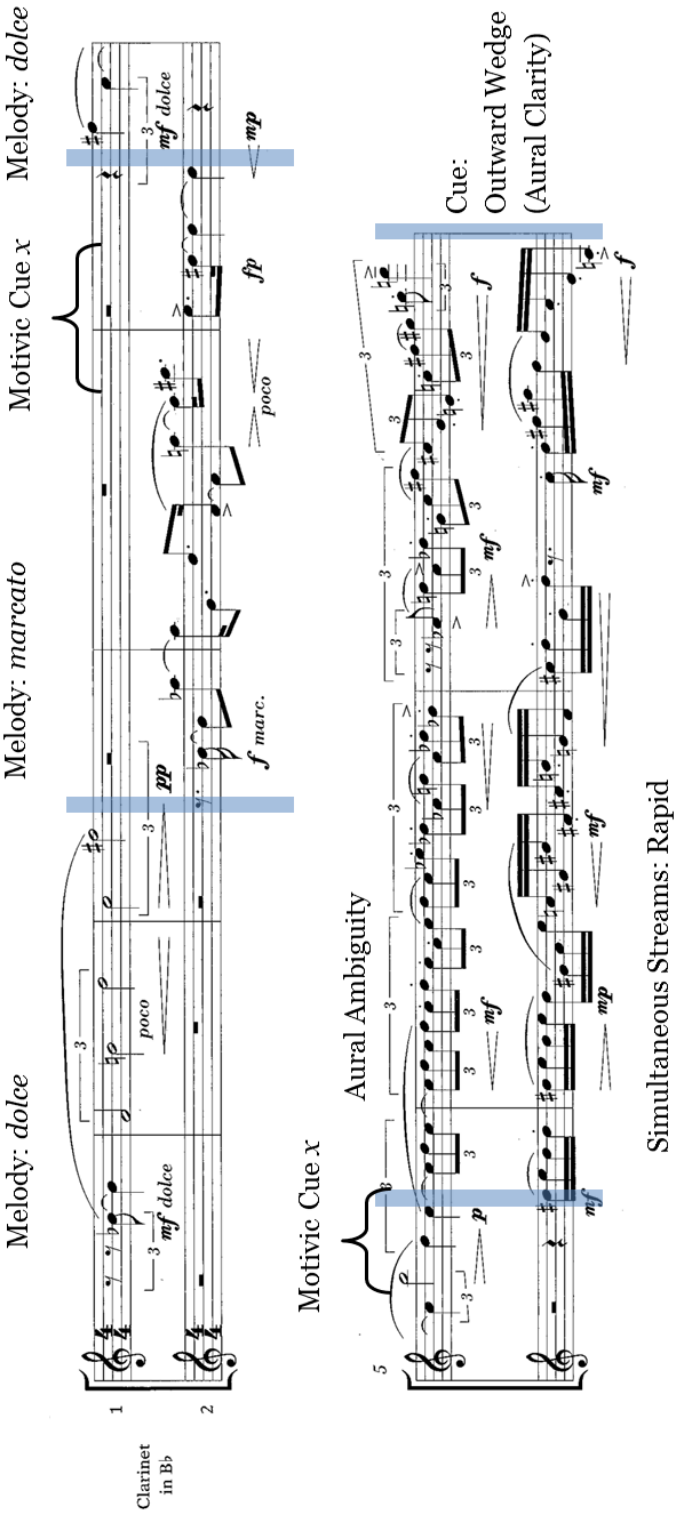
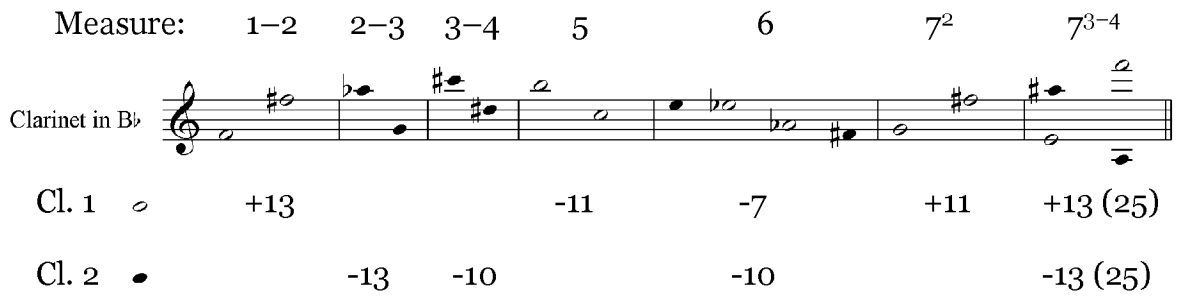


Figure 4.4 *Duettone*, mm. 28–33: (a) linear AIT Progression; (b) cyclic AIT progression

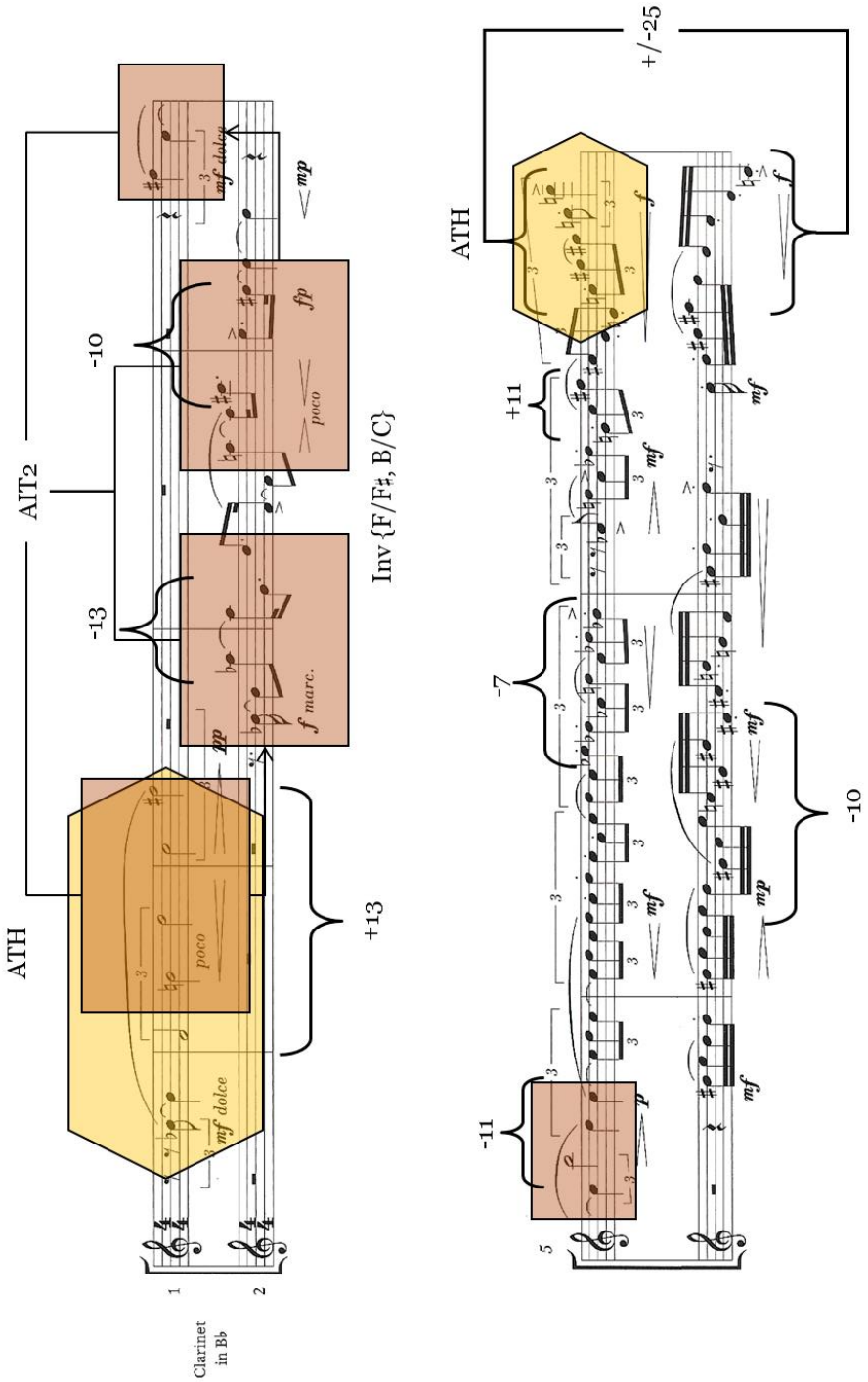


Example 4.9 *Hiyoku,* mm. 1–7, aural cues, textures, and boundaries



Example 4.10 *Hiyoku*, mm. 1–7, intervals and range

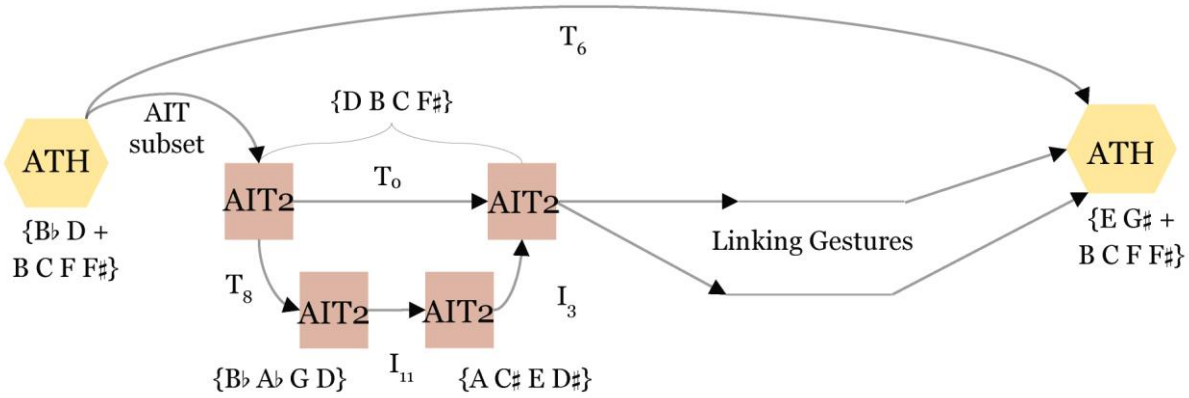
(a)



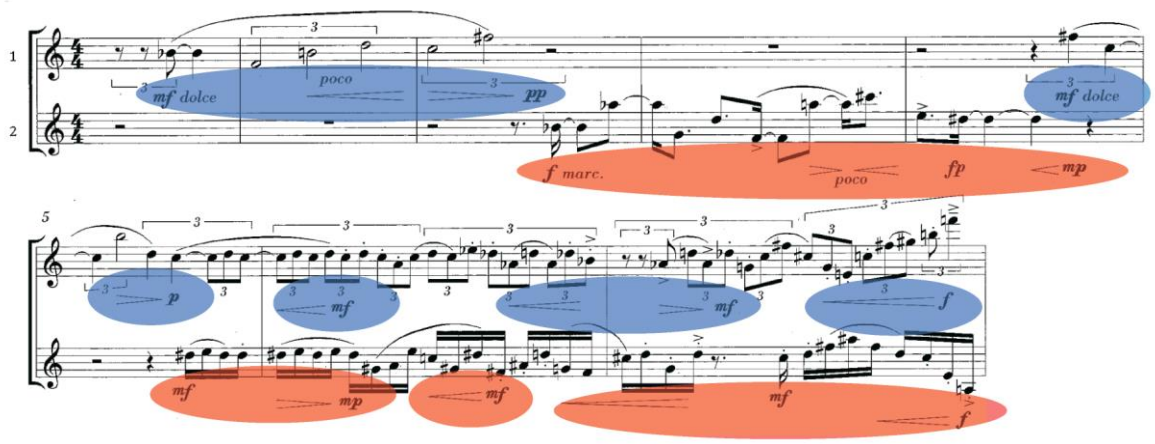
Example 4.11 *Hiyoku*, mm. 1–7: (a) harmonic and intervallic content; (b) transformational harmonic progression, [0167]/[04] CUP space

Example 4.11, *continued*

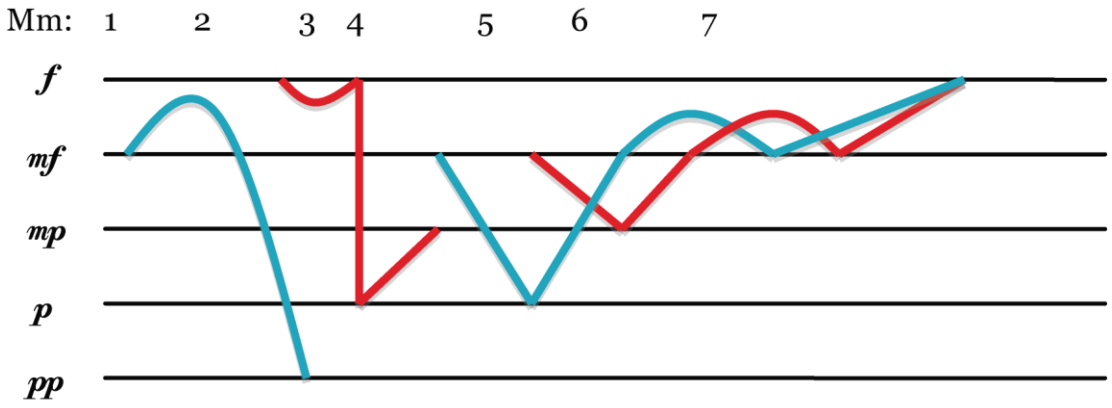
(b)



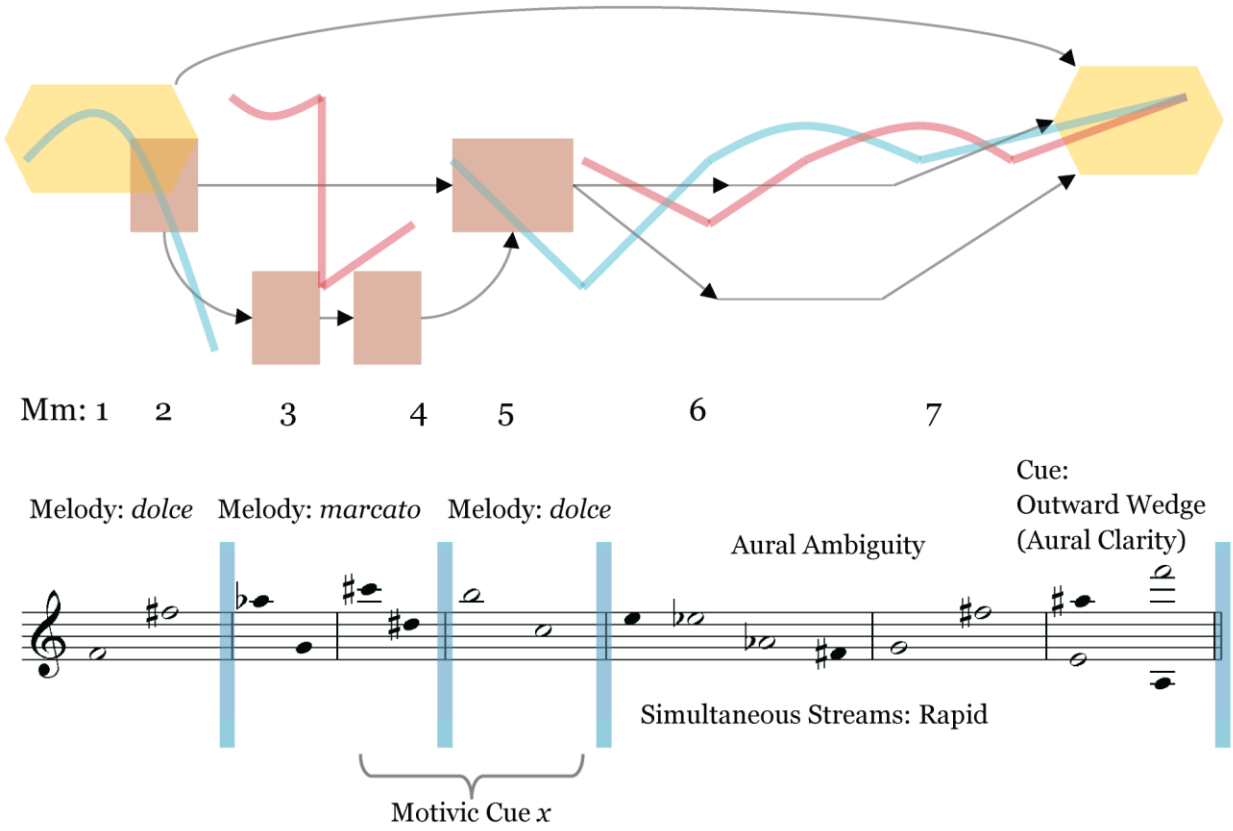
(a)



(b)



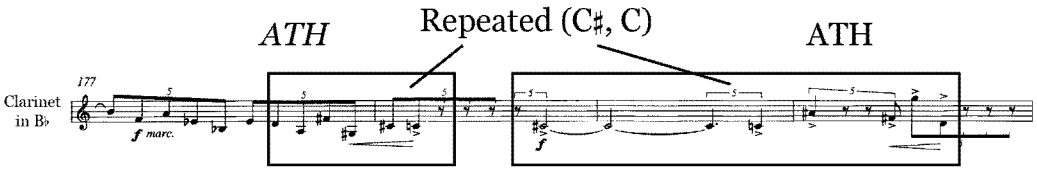
Example 4.12 *Hiyoku*, mm. 1–7: (a) dynamics by instrument; (b) relative dynamics graph



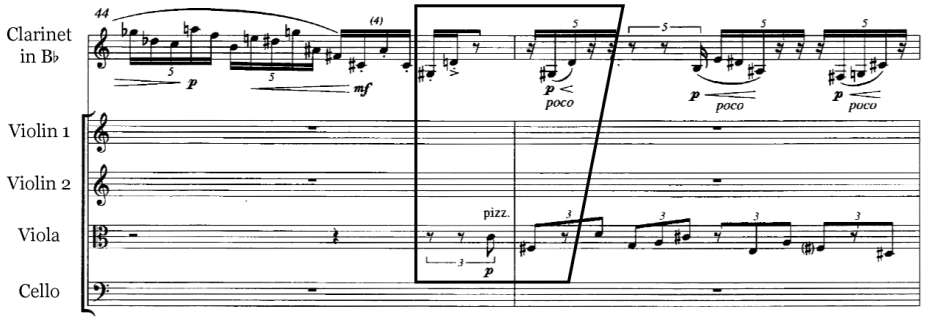
Example 4.13 *Hiyoku*, mm. 1–7, combined analyses

A.5 Chapter 5

(a)

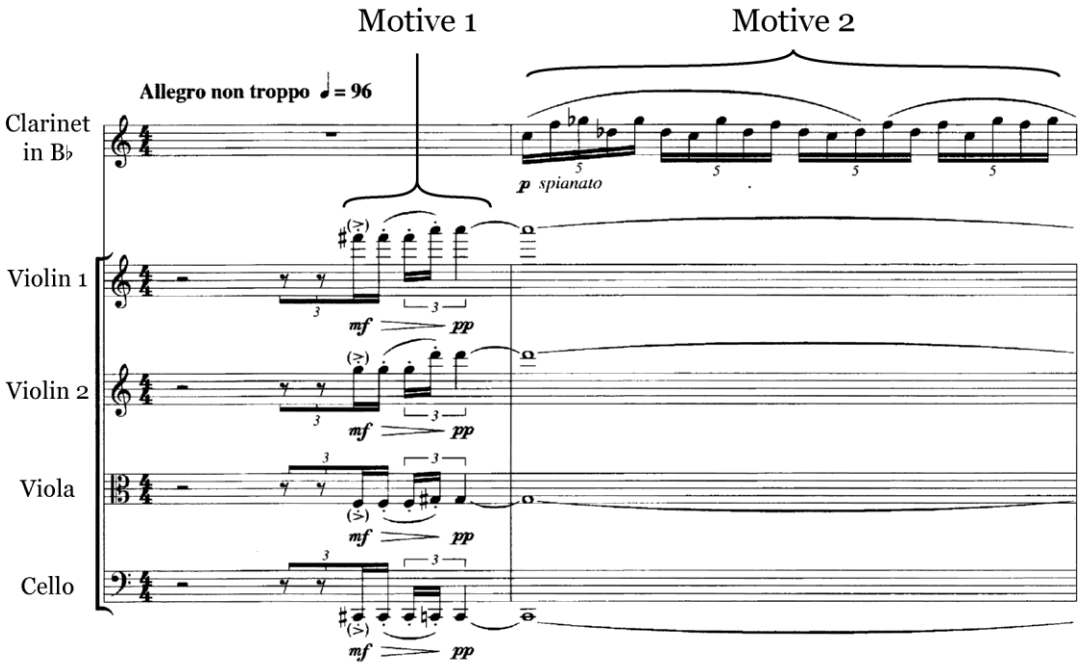


(b)



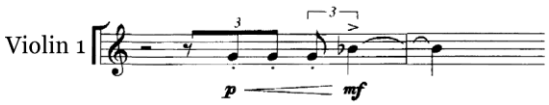
Repeated {F♯, C} creates shift of domains, and aural ambiguity

Example 5.1 motivic cue, repetition of pitches: (a) mm. 177–180; (b) mm. 44–45

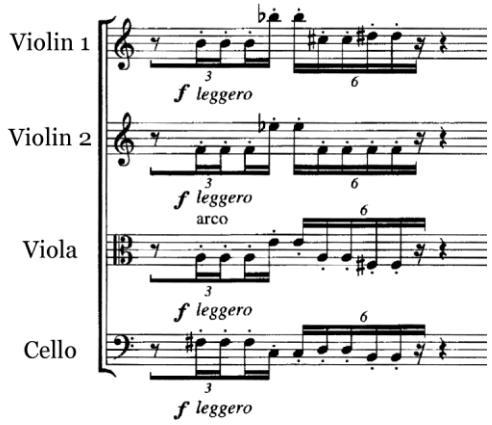


Example 5.2 primary Motives 1 and 2, mm. 1–2

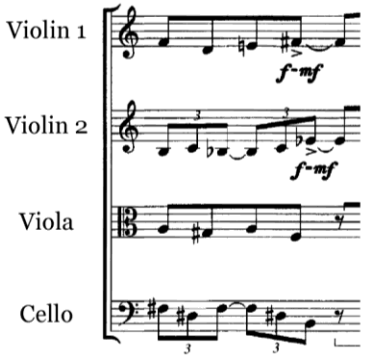
(a)



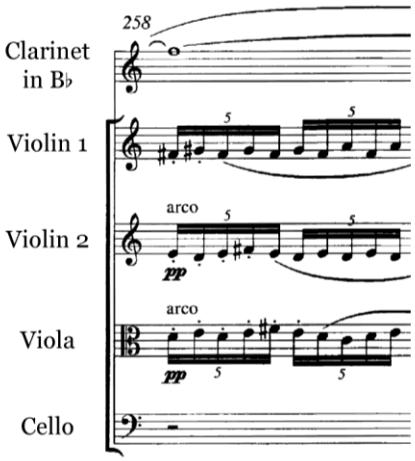
(b)



(c)

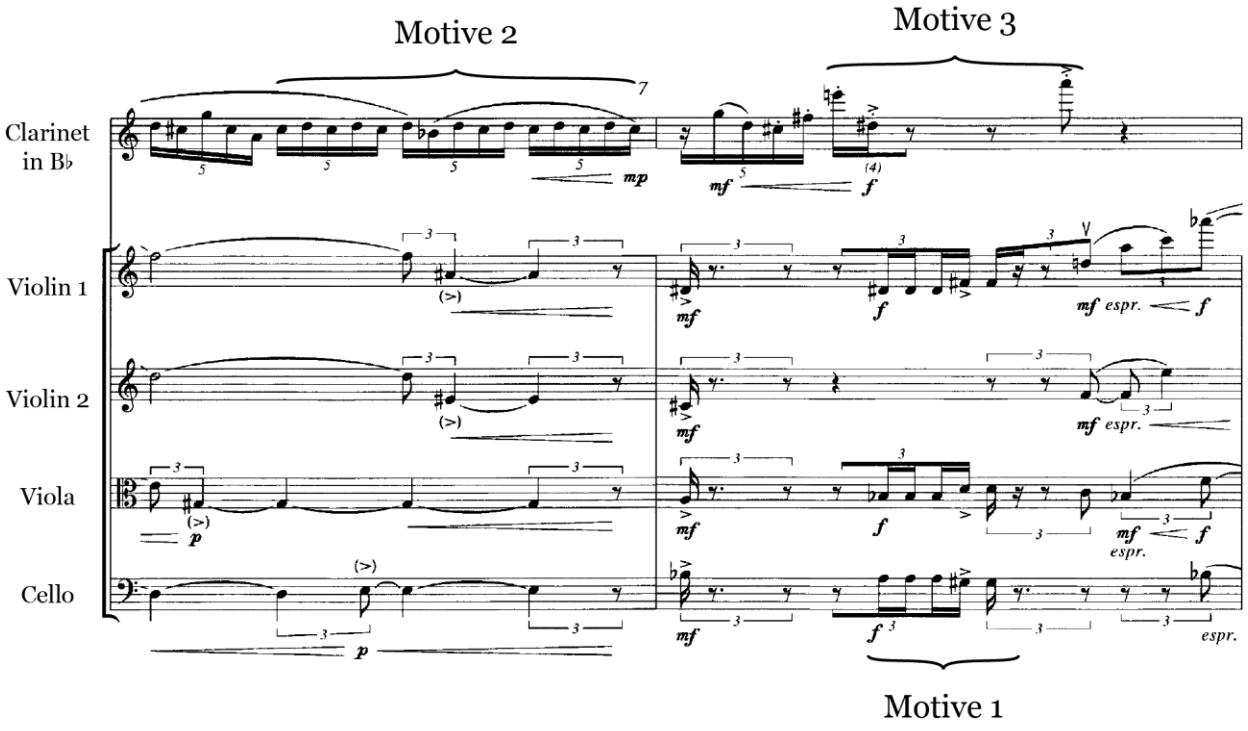


(d)

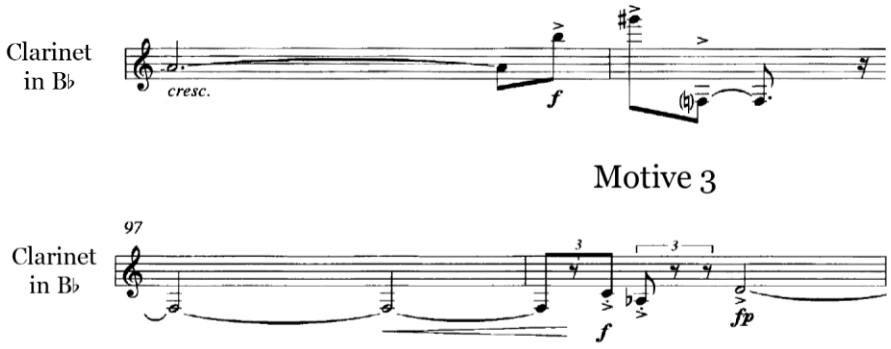


Example 5.3 variants of Motives 1 and 2: (a) Motive 1, mm. 213–214; (b) Motive 1, m. 35; (c) Motive 2, m. 176; (d) Motive 2, m. 258

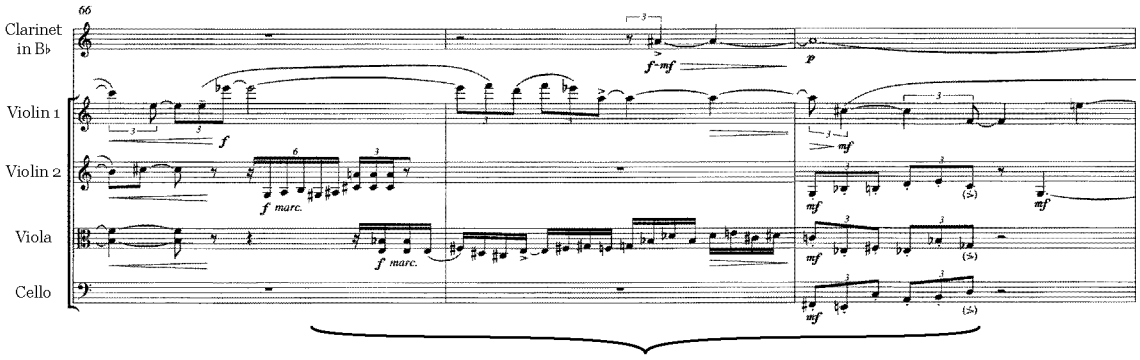
(a)



(b)



Example 5.4 primary Motive 3 and variants: (a) mm. 6–7; (b) mm. 73–74, 97–98



Gradual slowing of rapid stream creates "time motive"

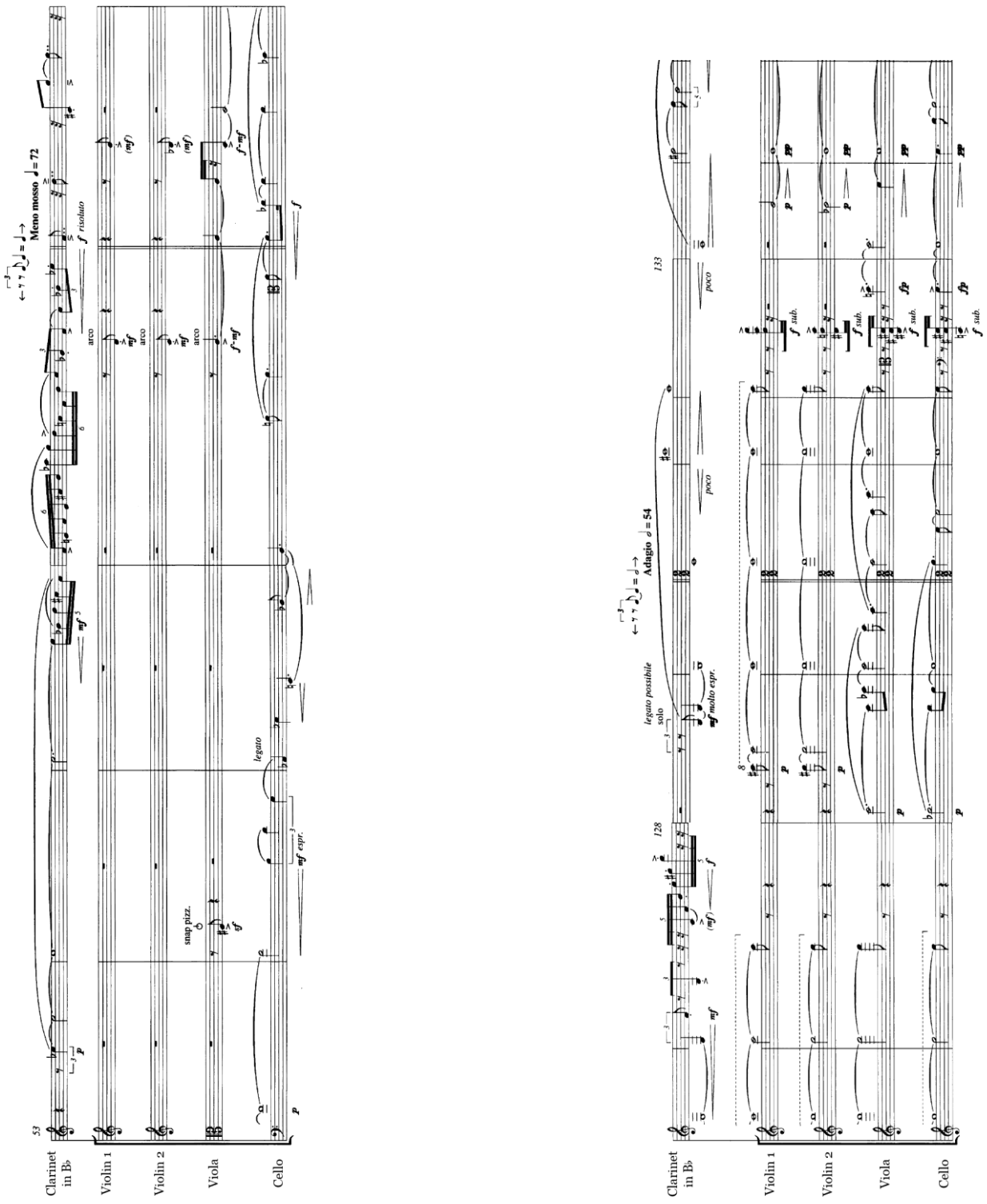
Example 5.5 time motive, mm. 66–68

Movement:	*Allegro non troppo*	*Meno mosso*	*Adagio*	*Presto*	*Meno mosso*
Measures:	1–56	57–129	130–207	208–241	242–290
Timing:	0:00–2:32	2:32–7:30	7:30–10:35	10:35–11:44	11:44–14:02

Table 5.1 overview of five movements in measures and approximate timing

(a)

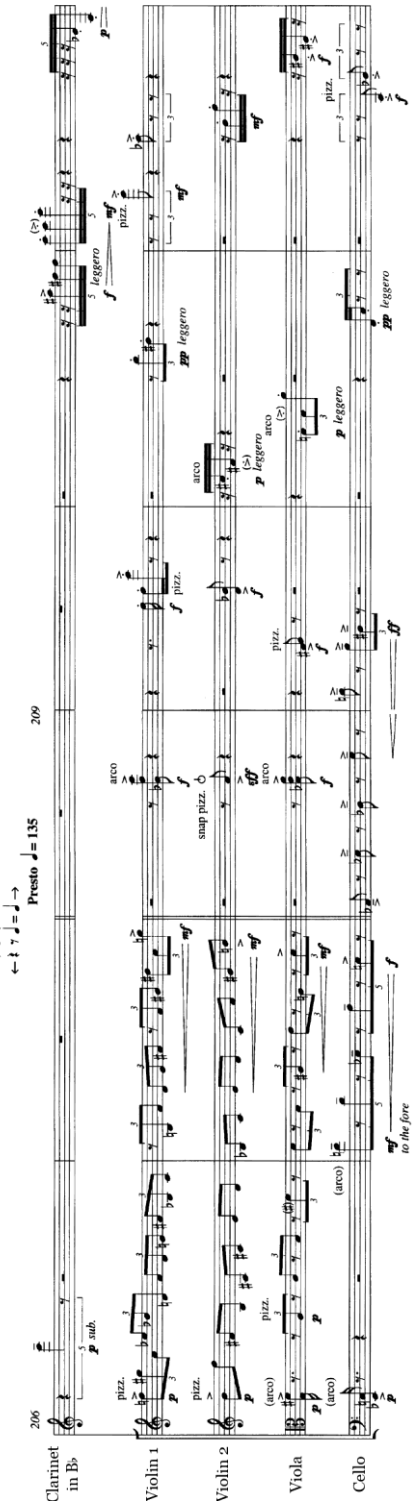
(b)



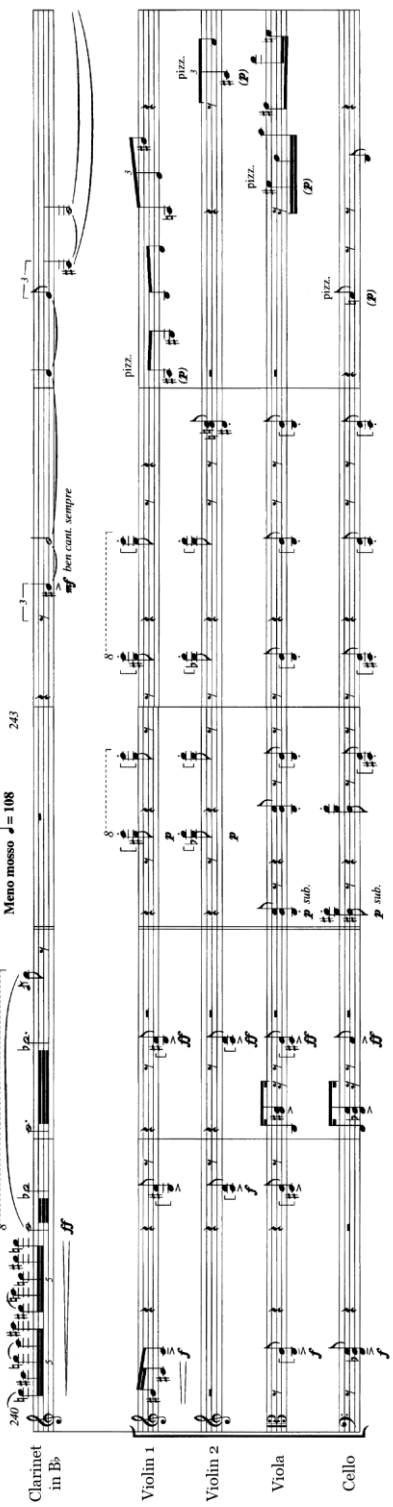
Example 5.6 transitions between movements: (a) mm. 53–57; (b) mm. 126–134; (c) mm. 206–211; (d) mm. 240–244

Example 5.6, *continued*

(c)



(d)



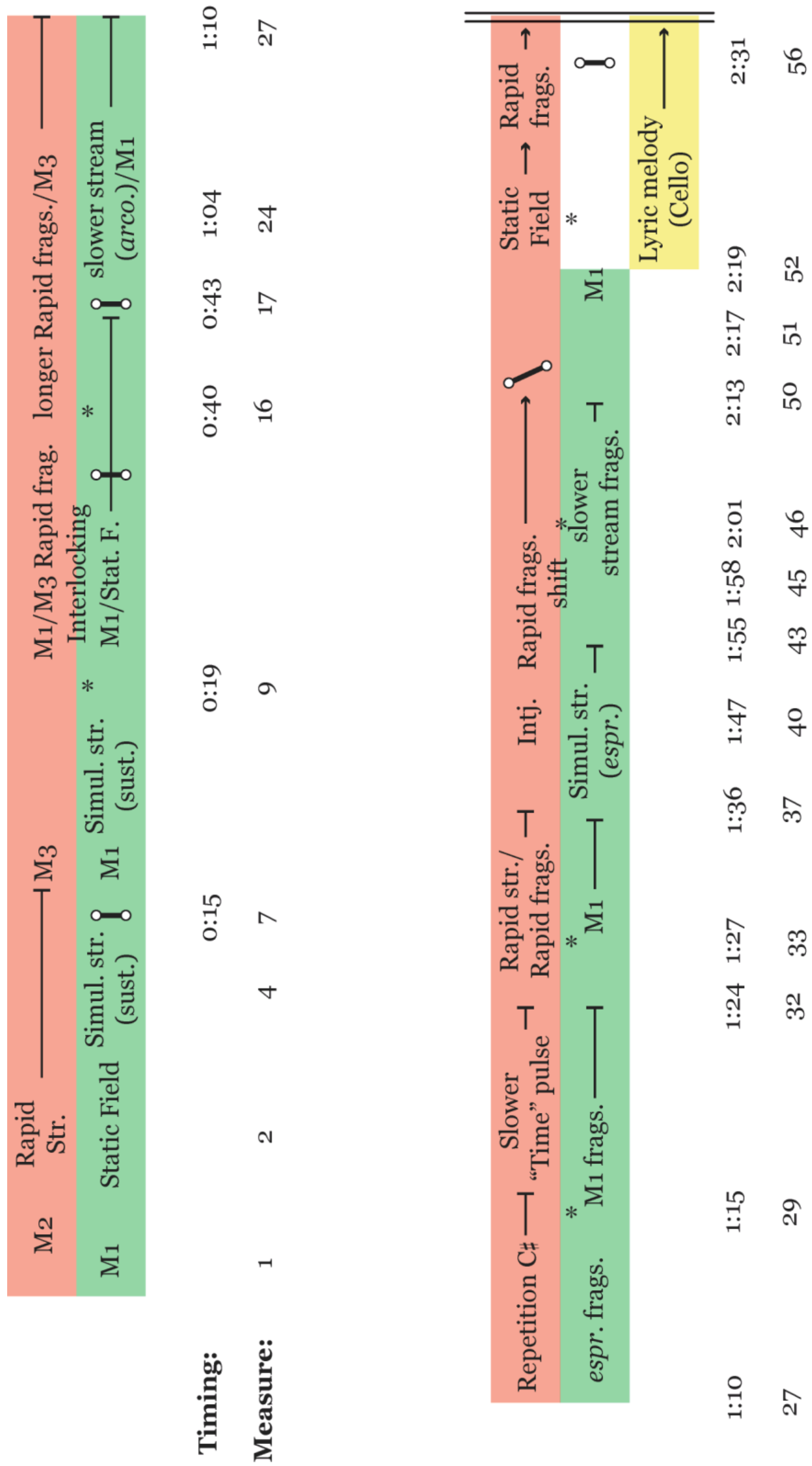
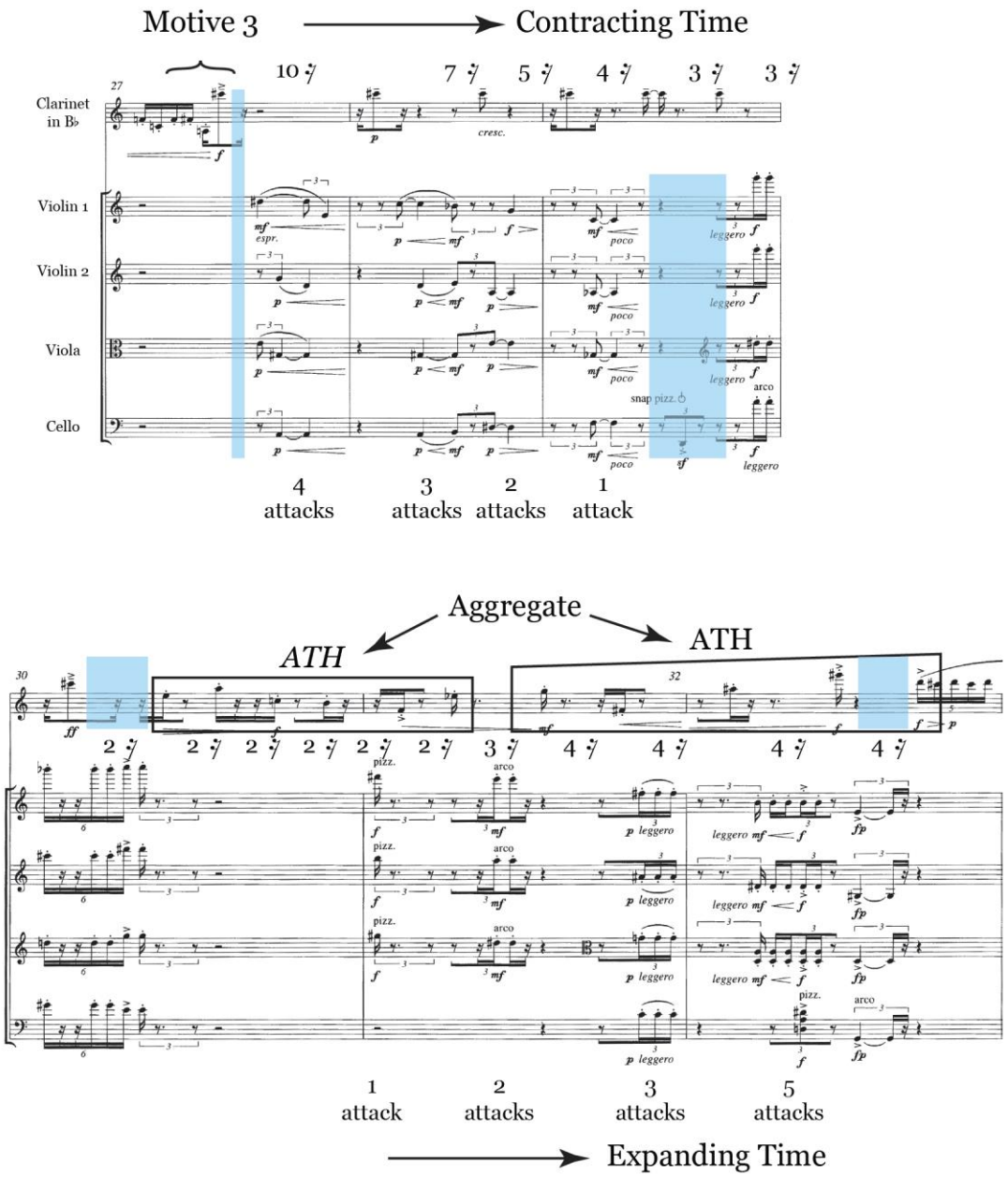


Figure 5.1 first movement, aural map, mm. 1–57



Example 5.7 mm. 27–32

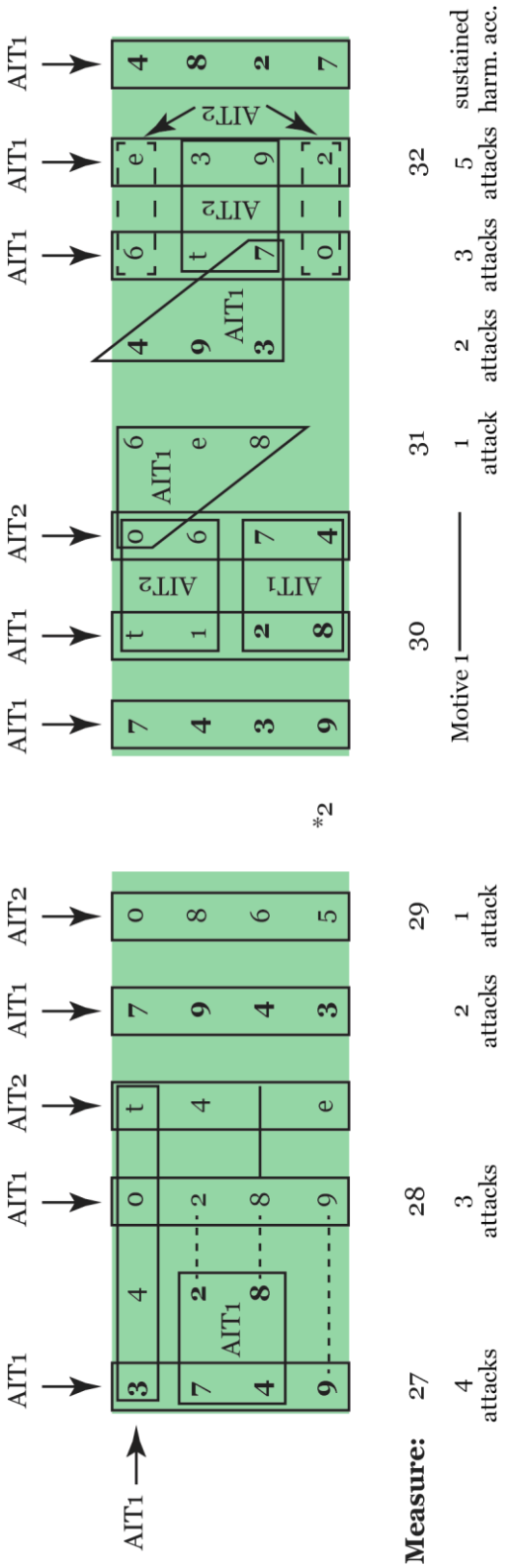


Figure 5.2 harmonic connections, mm. 27–32

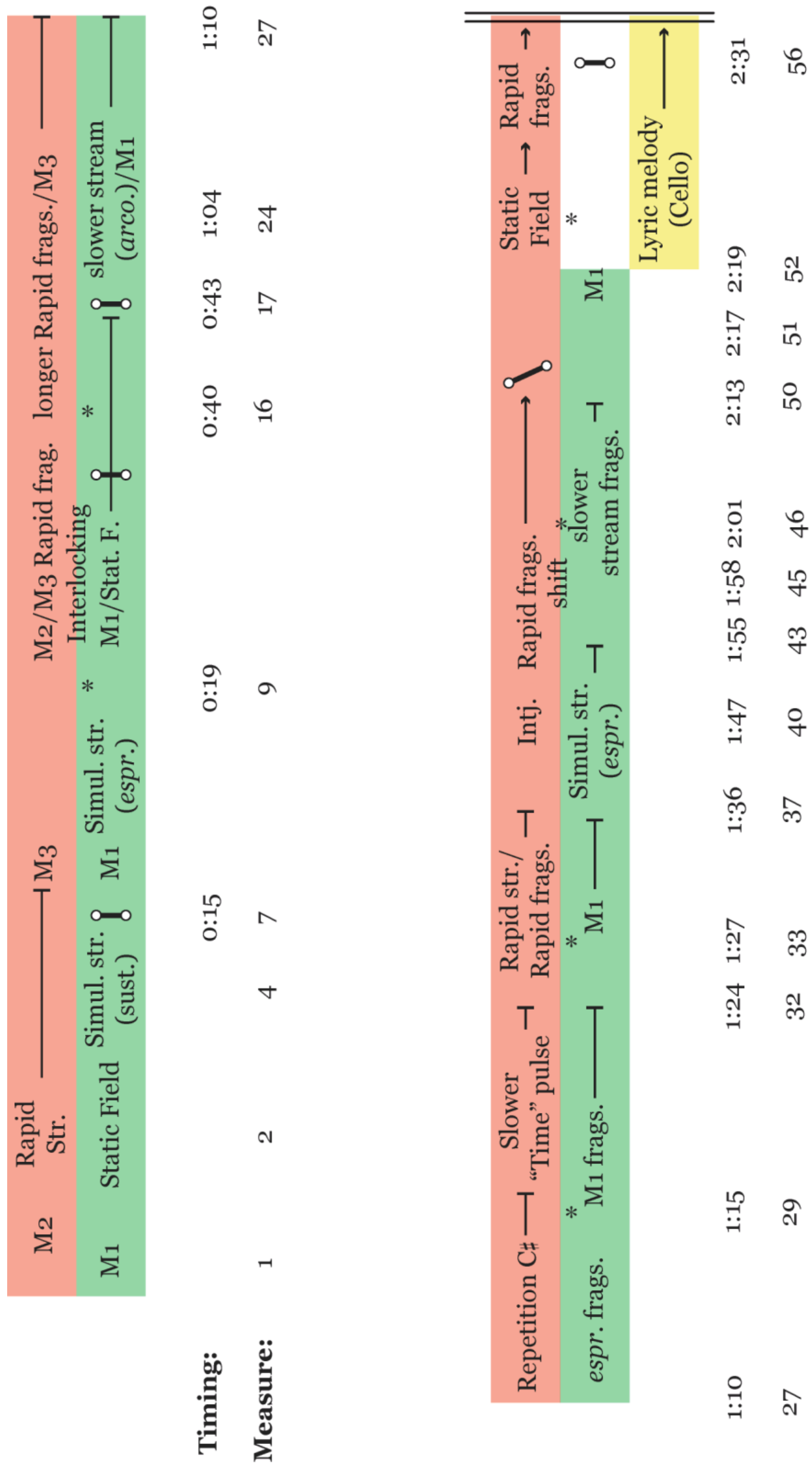
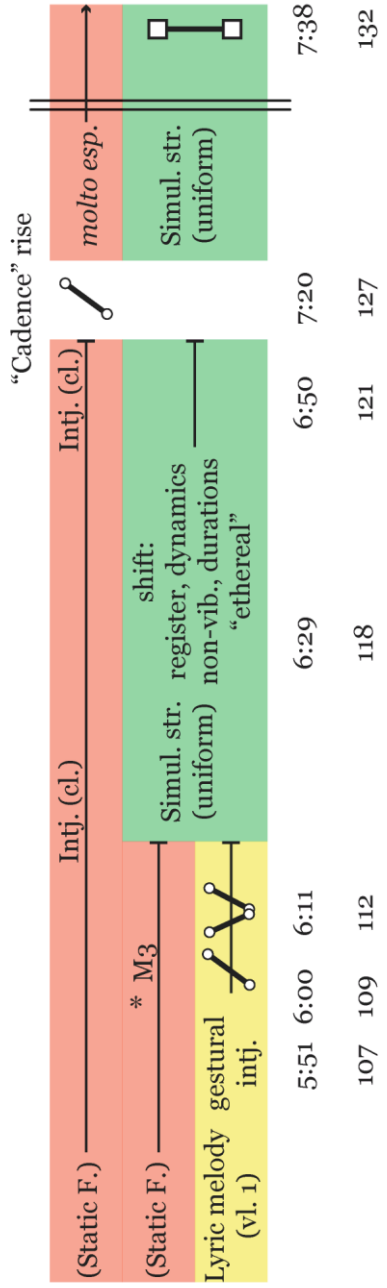
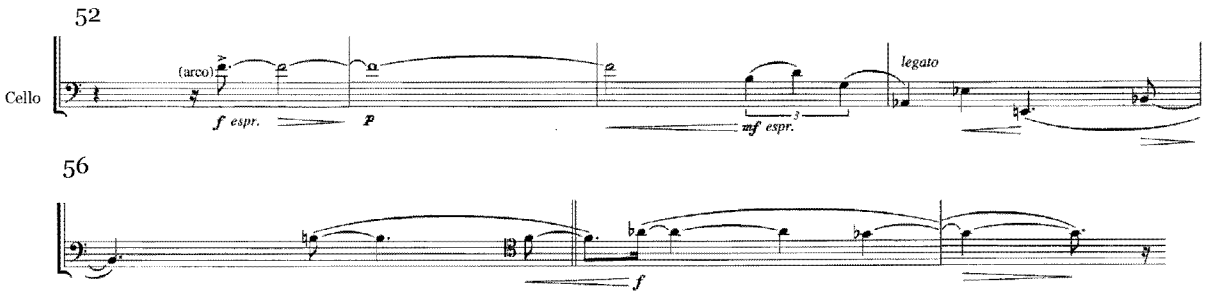


Figure 5.3 second movement, aural map, mm. 52–132

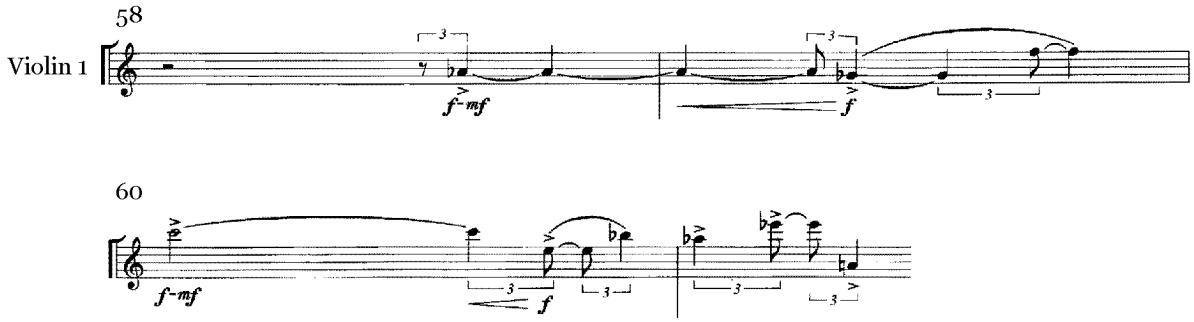
Figure 5.3, *continued*



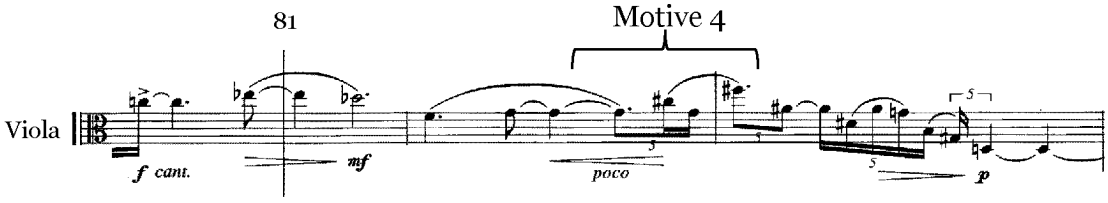


Example 5.8 *Clarinet Quintet* (2007), mm. 52-58, cello melody

(a)



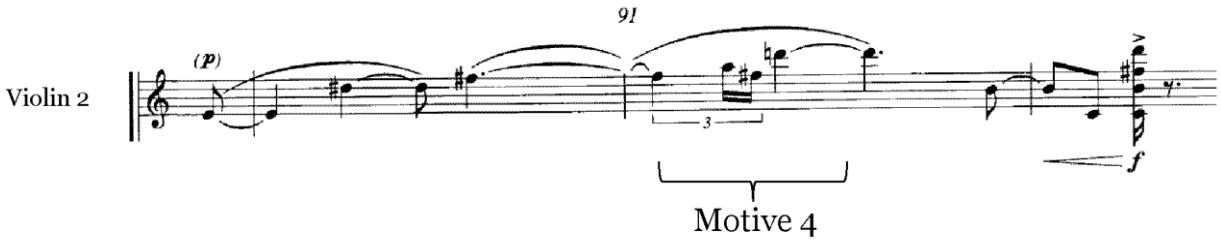
(b)



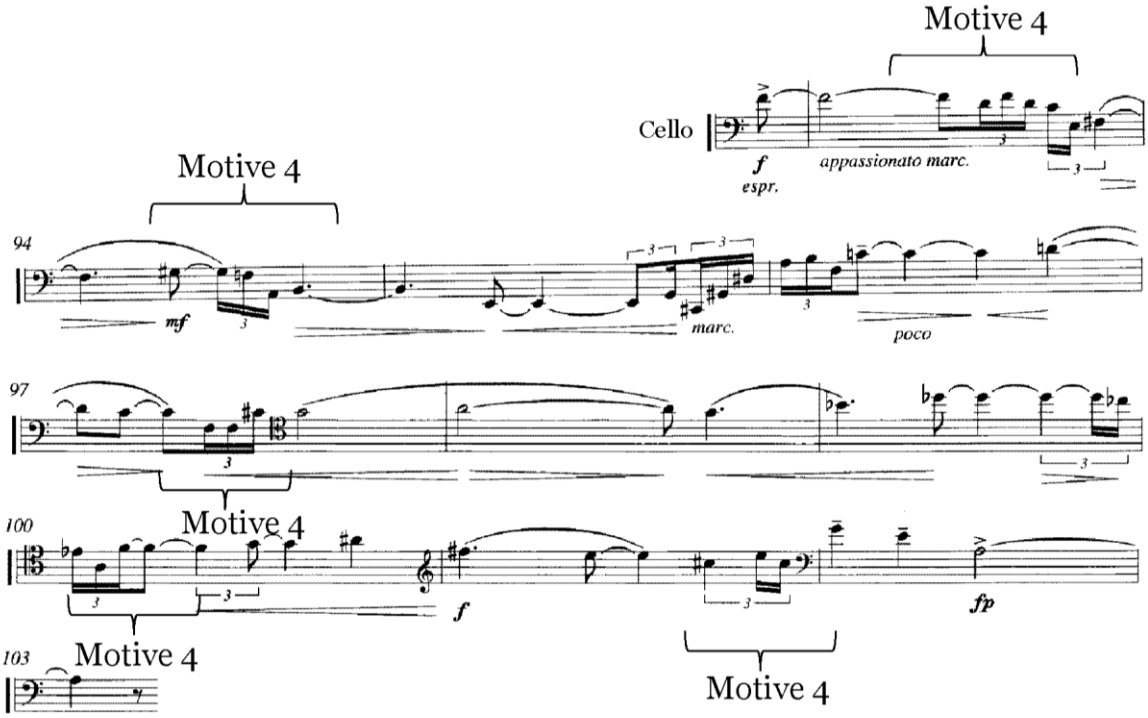
Example 5.9 comparison of melodic lines: (a) violin 1, mm. 58-61; (b) viola , mm. 80–84; (c) violin 2 , mm. 89–92; (d) cello, mm. 92–103

Example 5.9, *continued*

(c)



(d)



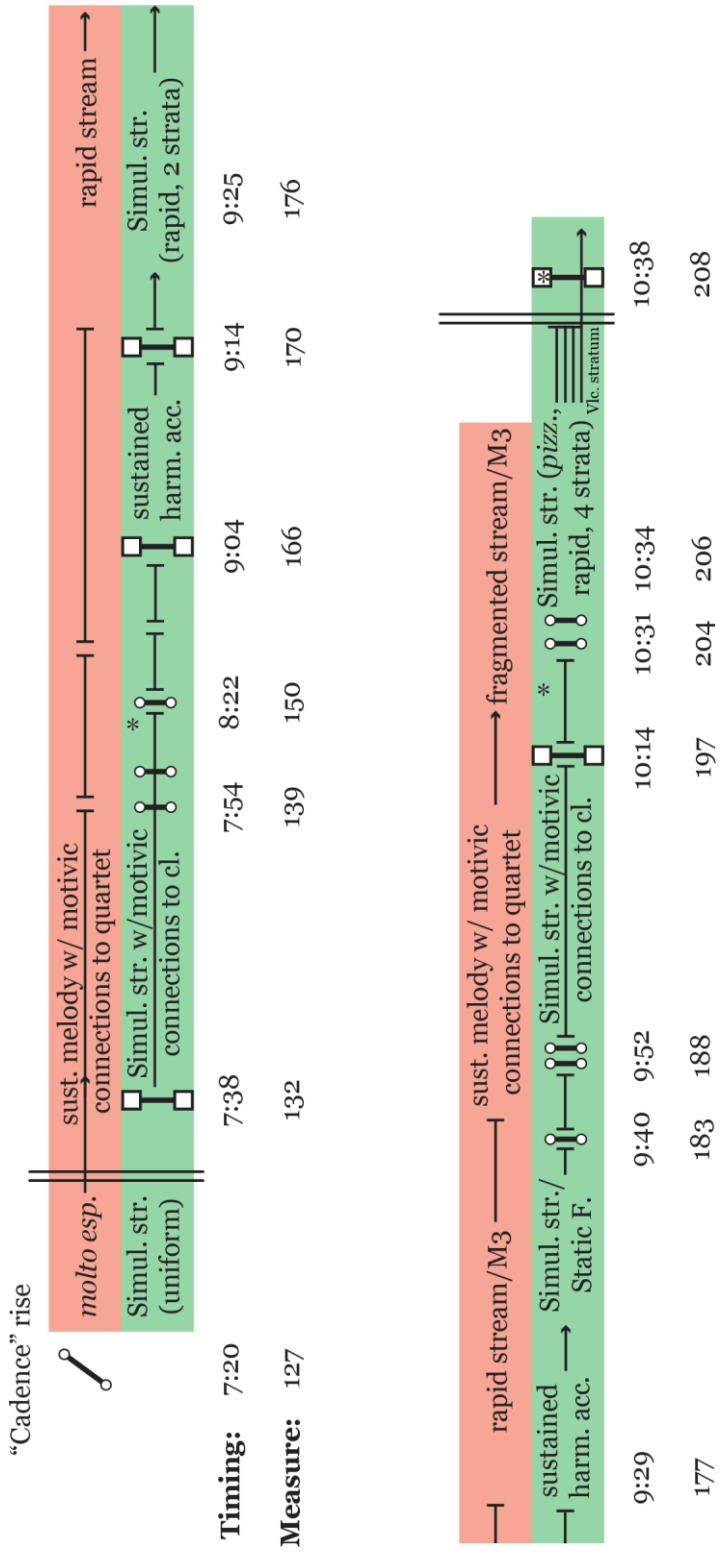
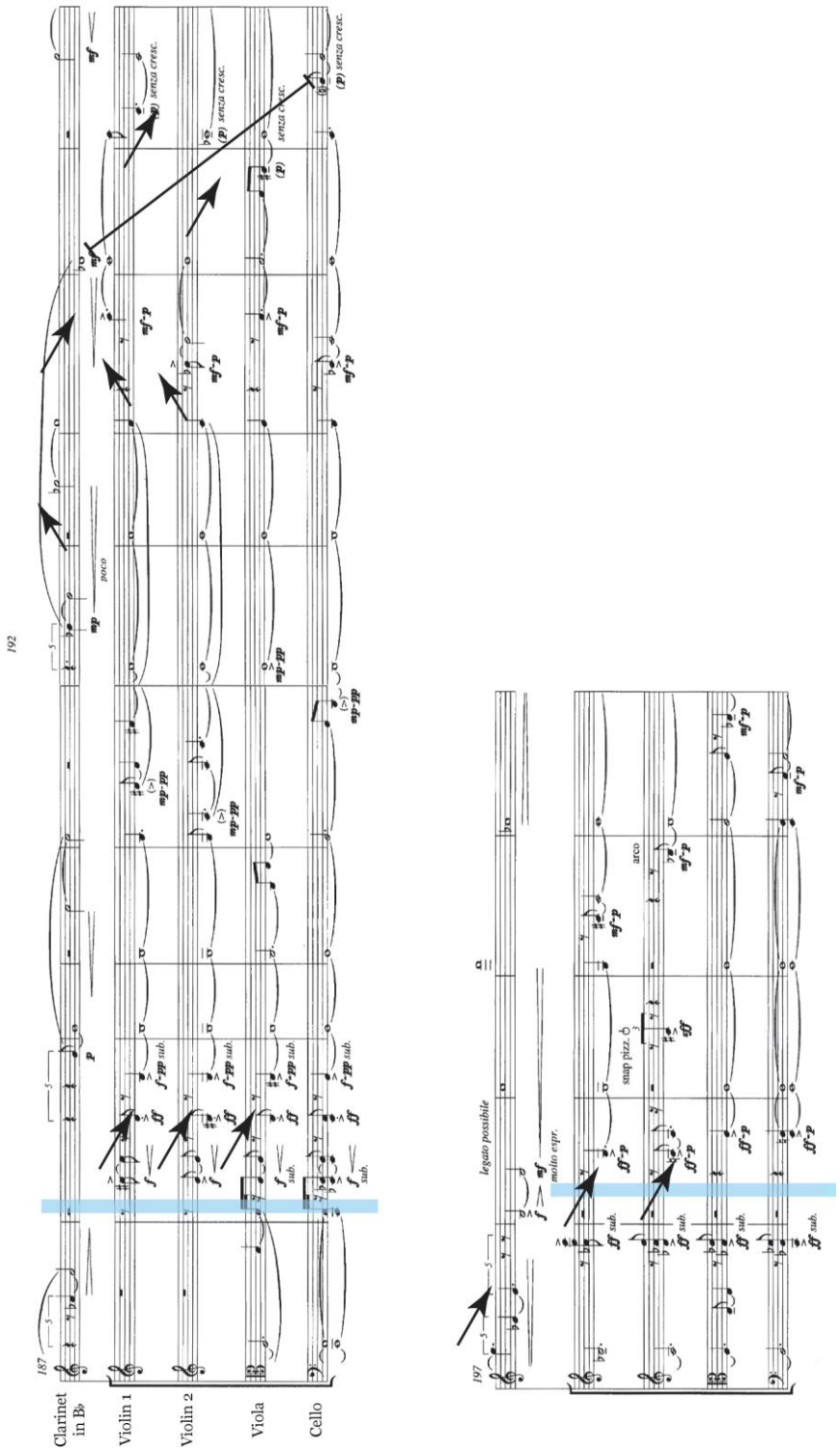


Figure 5.4 third movement, aural map, mm. 128–208



Example 5.10 mm. 188–198, motivic contour connections

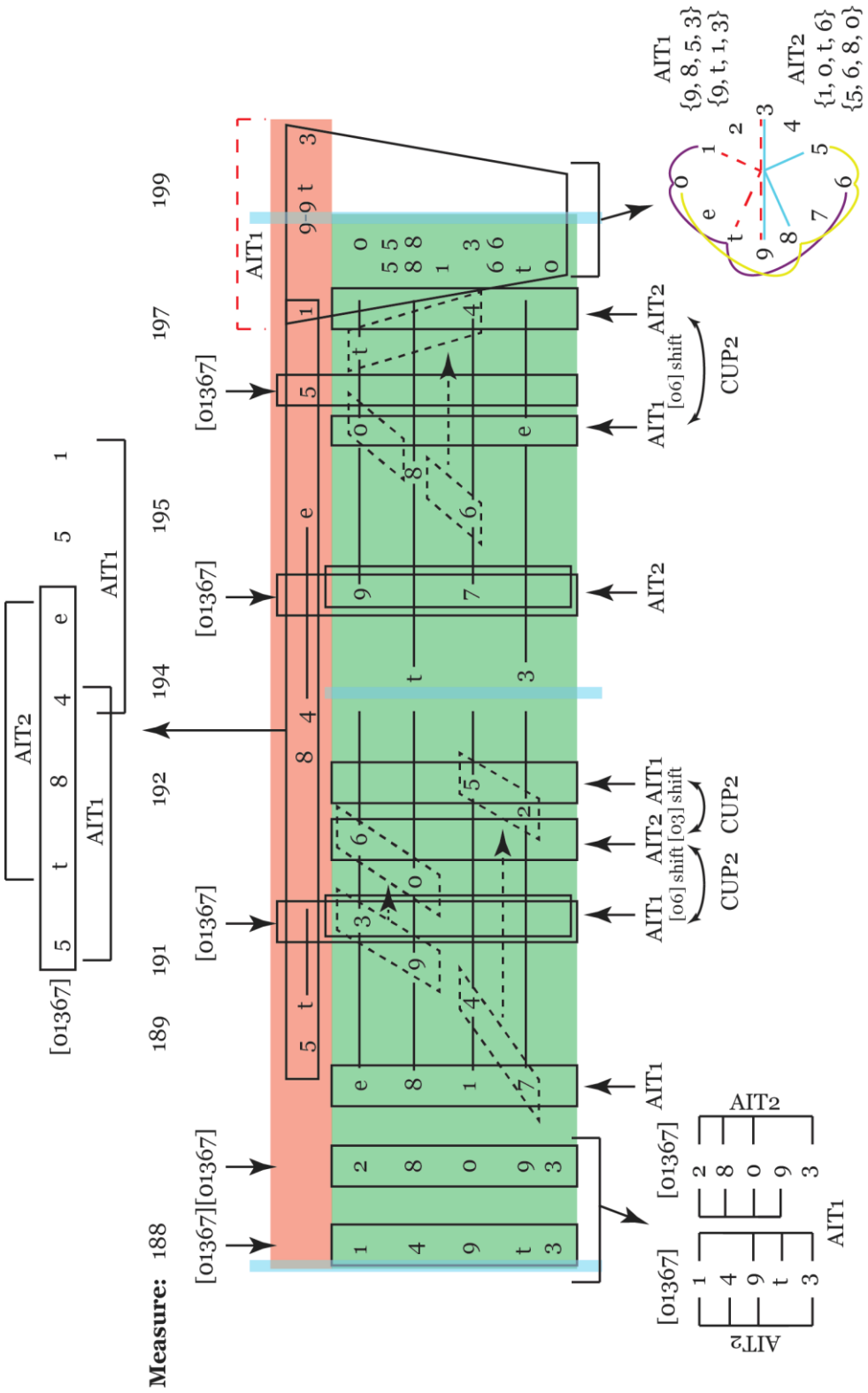


Figure 5.5 harmonic connections, mm. 188–198

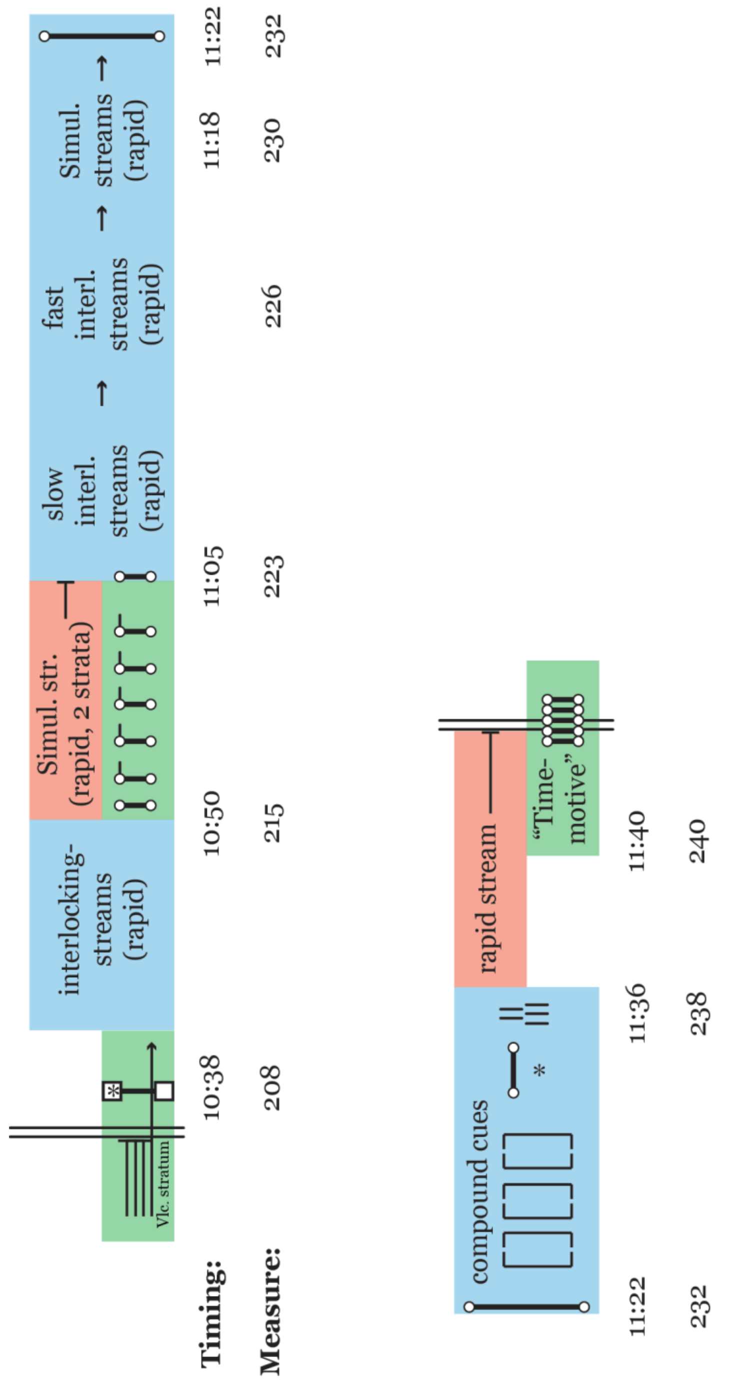
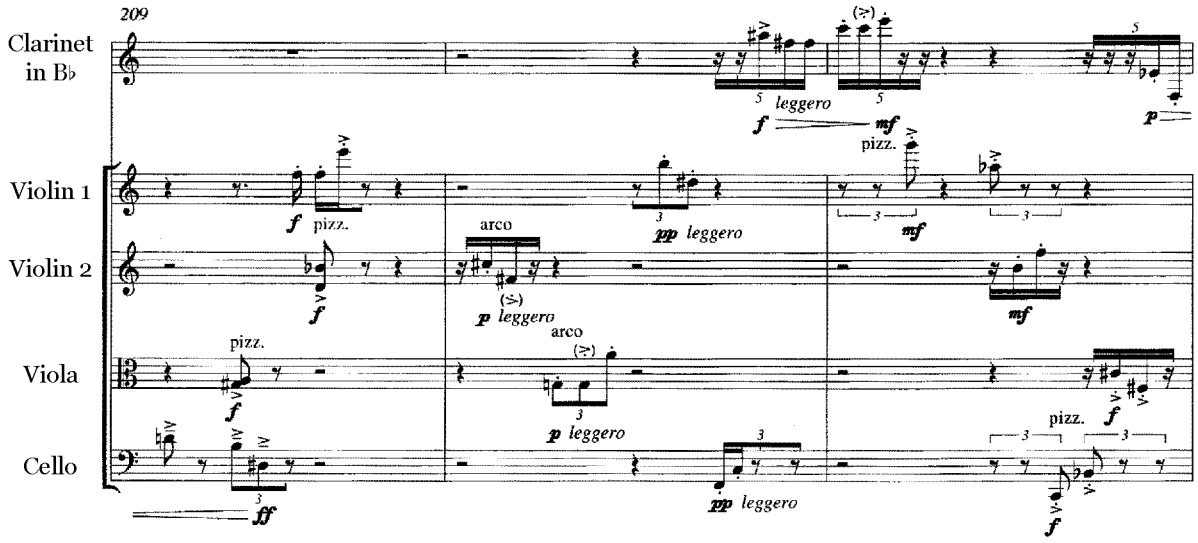
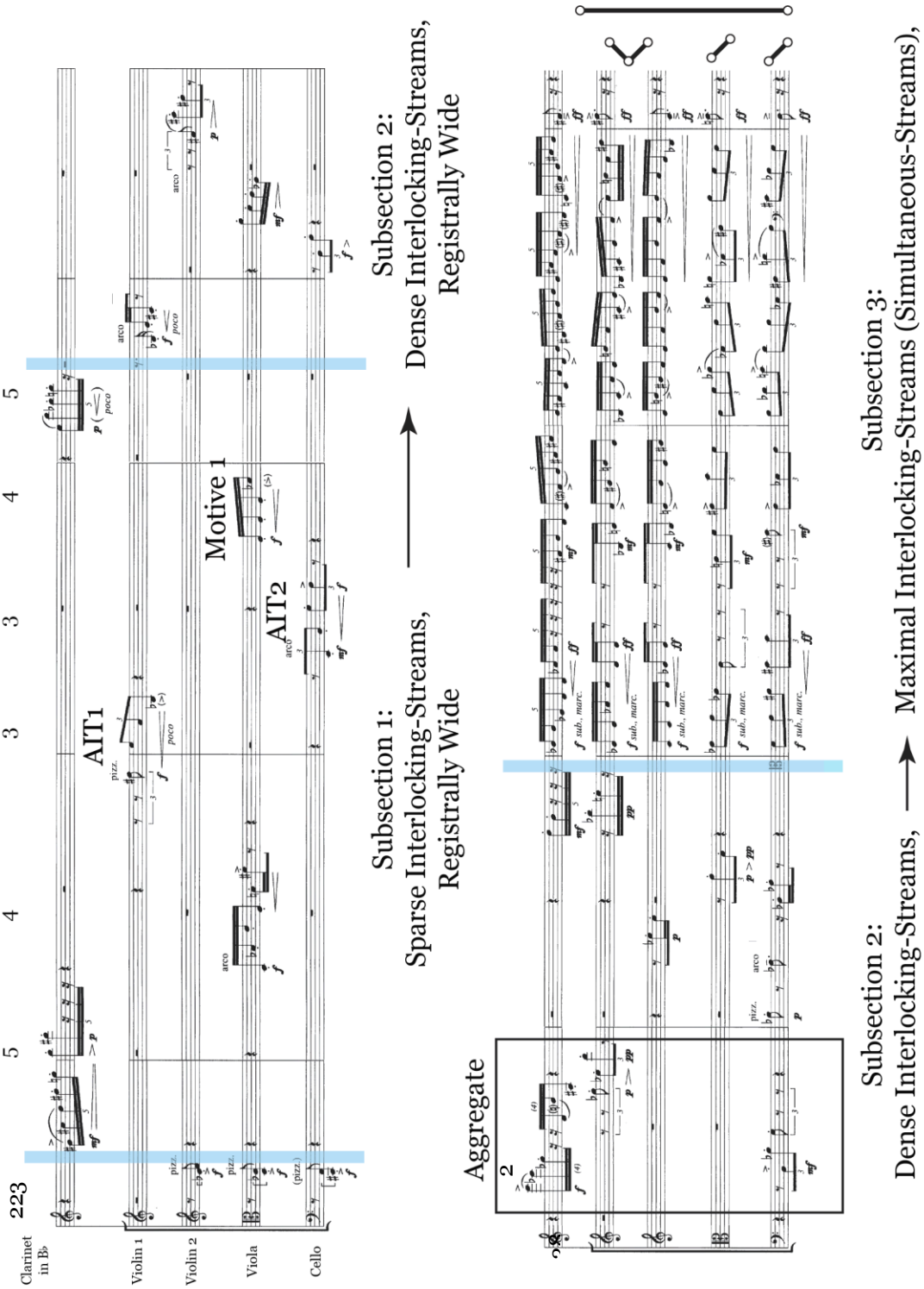


Figure 5.6 fourth movement, aural map, mm. 206–244



Example 5.11 mm. 209–211



Example 5.12 interlocking streams converge to simultaneous streams, mm. 223–232

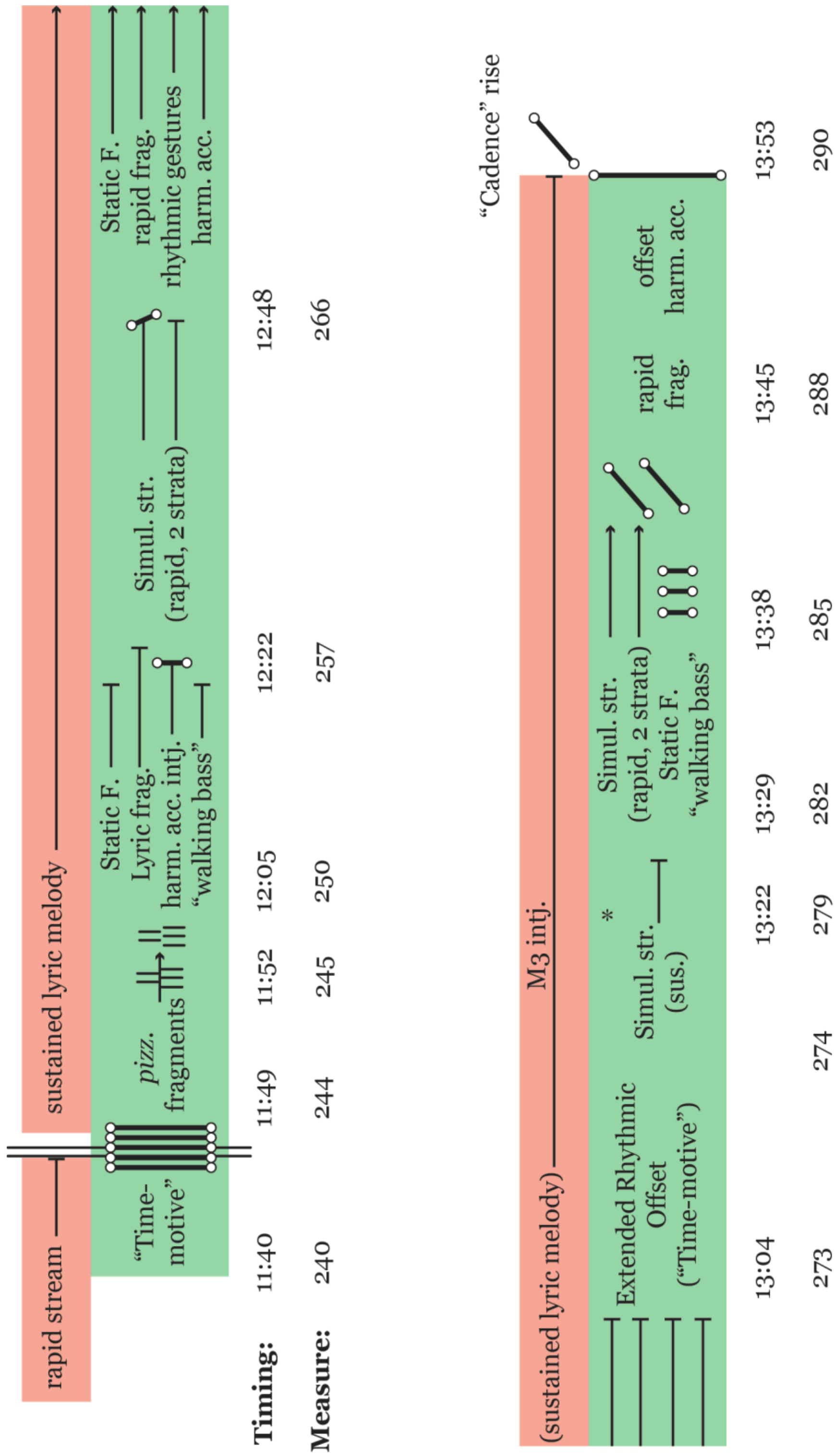
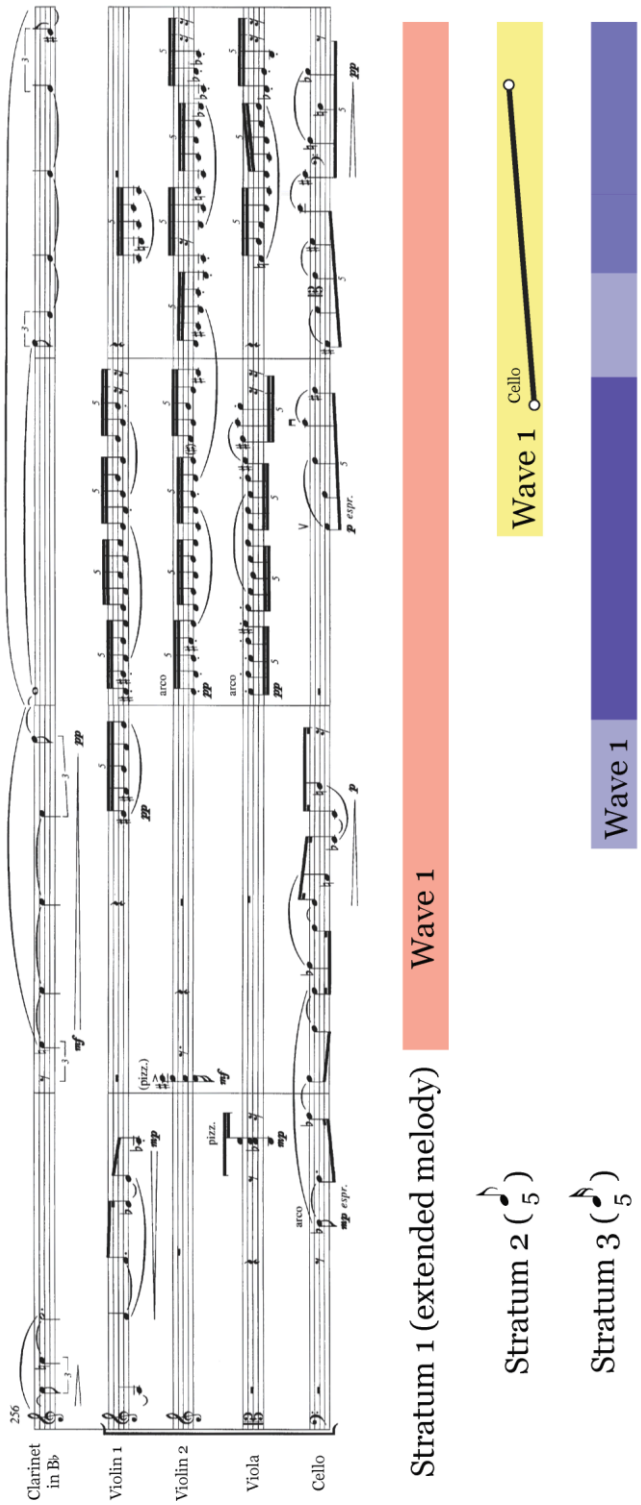
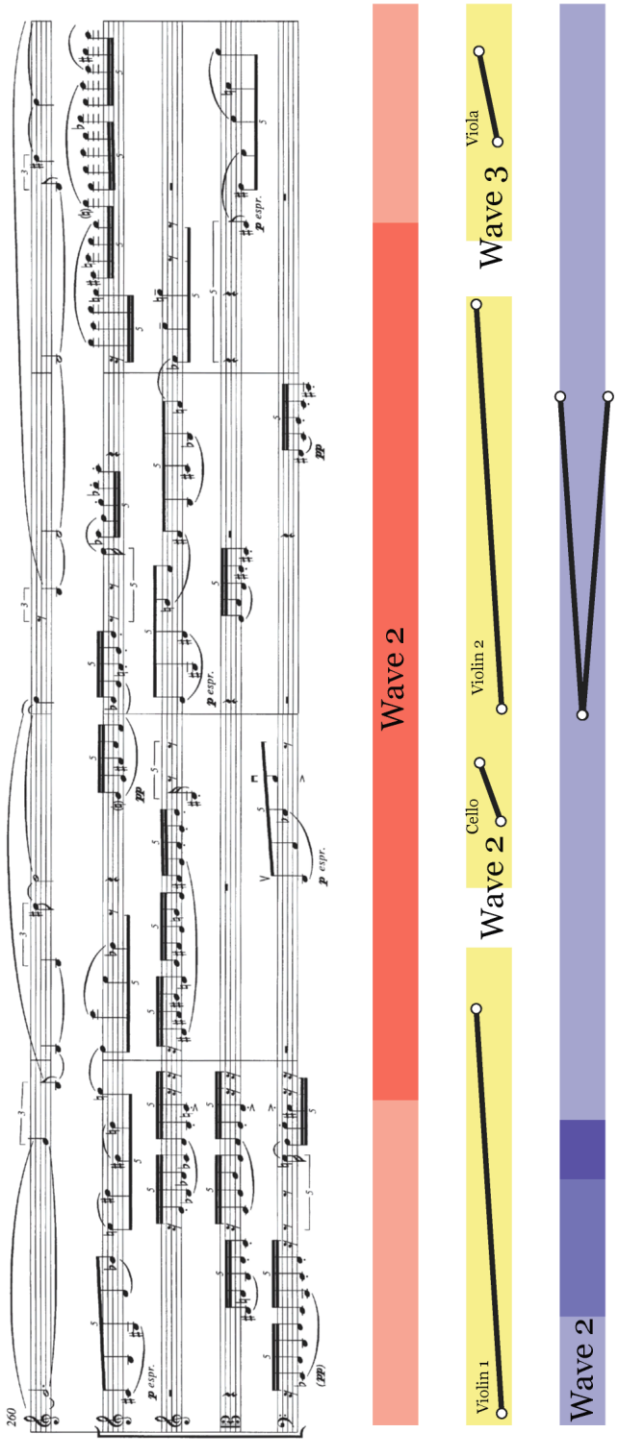


Figure 5.7 fifth movement, aural map, mm. 240–290

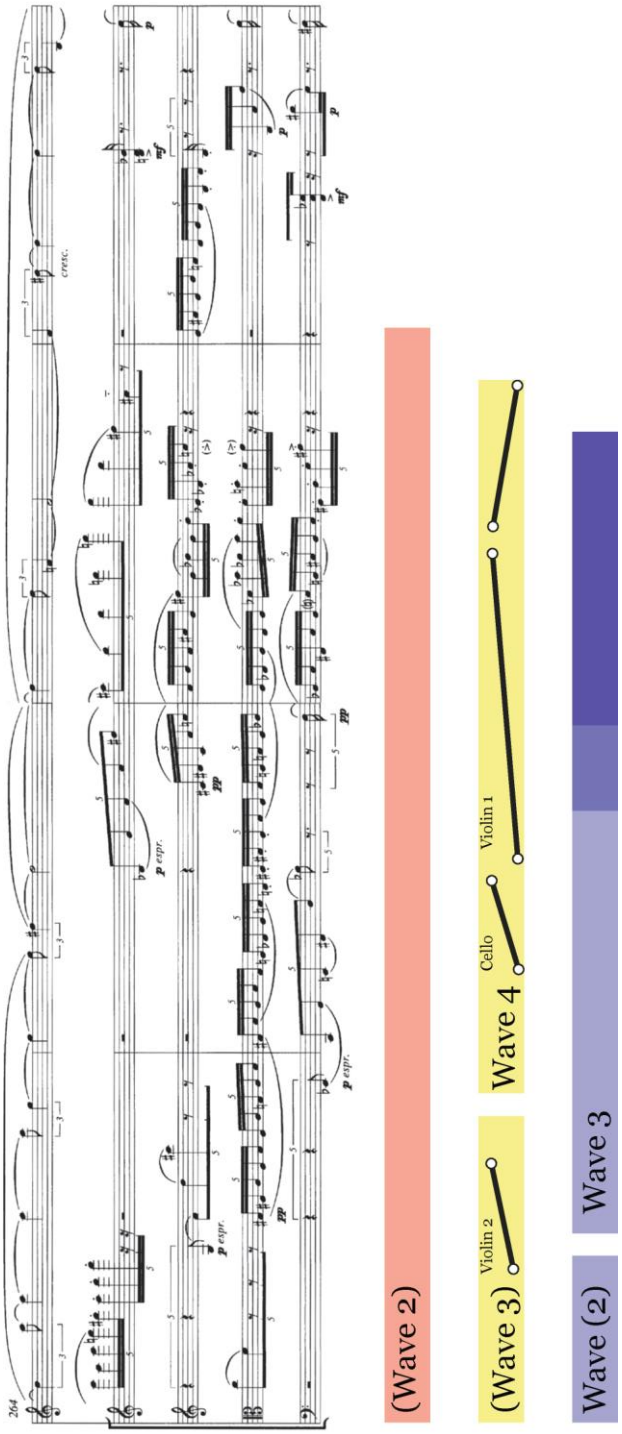


Example 5.13 mm. 257–266, aural waves in three strata

Example 5.13, *continued*



Example 5.13, *continued*



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