TIME-CONSCIOUSNESS AND FORM

IN NONLINEAR MUSIC

and

FLUX

for large chamber ensemble

by

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ABSTRACT

This study comprises two components: a theoretical dissertation and an original musical composition. The dissertation, "Time-Consciousness and Form in Nonlinear Music," expounds an approach to analyzing certain music from the perspective of subjective time-consciousness. Specifically, it employs phenomenological constructs to examine the structure of nonlinear musical experience. Key concepts are demonstrated through analysis of the composition, entitled *Flux*, and several other works: Helmut Lachenmann's *Dal Niente (Interieur III)* and *Pression*, György Ligeti's *Fragment*, Salvatore Sciarrino's Fifth Piano Sonata, and John Zorn's *Road Runner*. Chapter 1 investigates the relationship between music and subjective time-consciousness, asserting that certain musical passages evoke a unified act of consciousness in which perceived events remain simultaneously available for syntactic and semantic revision. This phenomenon, known as the "specious present," yields a sensation of indeterminacy and, in some cases, an enduring sense of present awareness. In Chapter 2 the latter sensation is defined as a Φ-state (phi-state). Conditions under which the present can be made to endure are examined, and four factors contributing to the likelihood of Φ-state emergence are established. Chapter 3 reconciles certain cognitive-scientific concepts with philosophical accounts of perception in order to devise a method for classifying Φ-states, and Chapter 4 examines a variety of local-level temporal relationships among Φ-states. Based on the assertion that each Φ-state possesses its own temporality, it is determined that Φ-states can emerge not only successively but also concurrently. Chapter 5 addresses large-scale relationships among Φ-states through the concept of stratification, according to which perceived events are streamed into separate time strata. Finally, in Chapter 6, the theories and procedures postulated throughout Chapters 1–5 are applied in a structural analysis of the opening thirty-three measures of the original composition *Flux*. The entire score for *Flux* is included at the end of the document.

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Chapter 1

TIME, PHENOMENOLOGY, AND MUSIC

1.1 Introduction

Time is commonly conceived as endlessly and immutably flowing. Heraclitus suggested it is a river into which we can never step in the same place twice[1]—a metaphor that conveys the idea of time flowing constantly and unidirectionally.[2] Indeed such a notion of temporal linearity was posited by Isaac Newton: "Absolute, true, and mathematical time, in and of itself and of its own nature, without reference to anything external, flows uniformly."[3] While acknowledging that there may be no reliable uniform motion by which time can be precisely measured—not even celestial motion—Newton maintained that the flow of "absolute" time is invariable.

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[1] See Aristotle, *Metaphysics* [350 B.C.E.], Books 4–6, trans. Christopher Kirwan (Oxford: Clarendon Press, 1993), 1010ª10–15 (Book 4, Part 5).

[2] The conductor and music theorist David Epstein implies such an interpretation in *Shaping Time: Music, the Brain, and Performance* (New York: Schirmer Books, 1995), p. 6.

[3] Isaac Newton, *The Principia: Mathematical Principles of Natural Philosophy* [1687], trans. I. Bernard Cohen and Anne Whitman (Berkeley: University of California Press, 1999), p. 408.

Around the turn of the twentieth century, different conceptions of time began to emerge. Einstein's groundbreaking special theory of relativity, for example, which shows that time flows differently for observers in relative motion, was crucially important from the standpoint of theoretical physics. Various other theories, however, challenged the idea of uniformly flowing time in different ways. Instead of approaching time from a physical perspective, certain philosophers and psychologists, including Henri Bergson, William James, and Edmund Husserl, began to explore time from an experiential perspective. Each of these progressive thinkers—particularly Husserl, in his examinations of the structure of consciousness—developed the idea of a *subjective time-consciousness* that is distinct from objective time.

The concept of subjective time-consciousness is by no means a new or radical one. Documented investigations of experiential time date back to Augustine.[4] Modern philosophers, however, made a critical association between the experience of time and the stimulus of that experience. One of the things they discovered was that different stimuli cause time to be experienced differently. The Austrian-American philosopher and social scientist Alfred Schutz was among the first to apply the concept to music. Schutz specialist Christine Skarda expresses his position as follows:

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[4] Husserl recommends Chapters 13–18, Book XI of Augustine's *Confessions.* See Edmund Husserl, *The Phenomenology of Internal Time-Consciousness* [1928], ed. Martin Heidegger, trans. James Churchill (Bloomington: Indiana University Press, 1964), p. 21.

> ... although the clock upon the wall may measure the passage of a similar amount of time in the case in which we wait anxiously to receive the outcome of major surgery upon someone we love and in the case where we eagerly discuss and issue of vital importance with a friend, we do not *experience* these time intervals as equivalent. In the first example we say that time "dragged on" and in the second that time "flew by."[5]

Schutz's two contrasting examples (as related by Skarda) illustrate that experiential time, unlike absolute time, is flexible.

A flexible notion of temporality is critical to the understanding of musical experience. This flexibility arises in part from the polythetic manner in which musical meaning is derived. The meaning of a simple visual stimulus such as a stop sign, for instance, can be grasped immediately through a single act of consciousness, or *monothetically*. Musical meaning, on the other hand, due to the temporal nature of its communication, can be grasped only through multiple acts of consciousness, or *polythetically*. In other words, it is through the synthesizing of multiple acts that the conceptual content of a musical experience is constituted. Skarda asserts that experiential time is not only the basis of meaning in music but also the very structure of the phenomenon of music.

> It is in inner [experiential] time that the musical meaning is constituted, and since musical meaning is such that it can only be polythetically grasped, inner [experiential] time must be understood as the very form of existence of music.[6]

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[5] Christine A. Skarda, "Alfred Schutz's Phenomenology of Music," in *Understanding the Musical Experience*, ed. F. Joseph Smith (New York: Gordon and Breach, 1989), p. 64.
[6] Ibid., p. 94.

If experiential time is in fact "the very form of existence of music," then any analysis of music involves an examination of experiential time. Let us therefore explore musical experience.

The flow of experiential time is subject to influence by factors specific to each moment. That is, changes in sensory stimuli can evoke changes in one's experience of time-flow.[7] Since different pieces of music present different sets of stimuli, the experience of time is different for each piece. David Epstein writes

> [Experiential time] ... denotes the unique organizations of time intrinsic to an individual piece—time enriched and qualified by the particular experience in which is it is framed. The musical mechanisms by which this temporal organization is established [in the consciousness of a listener] are likewise unique to a given work, and must be studied anew in each case.[8]

Indeed musical experience encompasses a vast range of temporal possibilities. Some passages may elicit an experience in which time passes quickly and others an experience in which time passes slowly. Revisiting Heraclitus's river metaphor from the perspective of experiential time, it becomes apparent that a different interpretation is possible. Although the metaphor is sometimes cited as a depiction of absolute time's linear nature, it in fact better illustrates the nonlinearity of experiential time. Just as experiential time can move at varying rates, so too can rivers involve eddies, standing waves, vertical

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[7] Imagination—in addition to audition, vision, and the other senses—is a common such stimulus.

[8] Epstein, p. 23.

currents, and so on. Only recently, however, have composers chosen to explore these waters.

Prior to 1945 musical time was understood as a primarily linear phenomenon.[9] This understanding stems from the teleological nature of much of the music. Works evoking a highly linear conception of time are typically structured according to the basic elements of a traditional dramatic arc—an identifiable beginning, followed by a development and, ultimately, a conclusive ending. The arc is often embodied in a recognizable form—such as a sonata, a rondo, etc.—with predictable thematic and harmonic processes. At any point in a musical experience thus structured, a listener is aware of the general direction that future events will take.

The directionality inherent in such a trajectory tends, not coincidentally, to emphasize the linear aspect of experiential time. In particular, it allows the listener to predict, with sufficient consistency, the path of future events. Musical linearity therefore refers to a temporal experience in which expectations are frequently fulfilled and, as a result, later events are understood as consequences of earlier events. Bob Snyder characterizes musical linearity as "a metaphor of physical causation, ... an attempt to make musical

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[9] In his book *The Time of Music: New Meanings, New Temporalities, New Listening Strategies* (New York: Schirmer Books, 1988), Jonathan D. Kramer discusses a number of important ways in which certain pre-1945 works may be seen as forward-looking exceptions to the prevailing linear conception of musical time. These include the first movement of Beethoven's String Quartet in F Major, Opus 135, Schoenberg's Opus 19, No. 1, the first movement of Webern's Opus 29, and Stravinsky's *Symphonies of Wind Instruments.*

events seem to cause each other."[10] Nonlinearity, conversely, refers to a temporal experience in which the directionality of events defies meaningful expectation. Music evoking such an experience tends to explore the extremities of temporal possibility, thereby challenging more conventional conceptions of musical time.

In his book *The Time of Music*, Jonathan Kramer addresses various unconventional conceptions of musical time.[11] These include nonlinear time, moment time, vertical time, and a host of other temporal conceptions—each of which he carefully distinguishes. It is important to recognize, however, that all of these possibilities derive from a basic opposition between linearity and nonlinearity. As implied in the analogy of physical causation, the qualities of linearity and nonlinearity are products of listener expectation—linearity arising from the frequent fulfillment of expectation, and nonlinearity from either the frequent denial of expectation or simply the absence of significant expectation altogether. Linearity is therefore associated with predictability and nonlinearity with unpredictability.

Pierre Boulez asserts that it is precisely with respect to the predictability or unpredictability of future events that certain post-war music most differs from earlier music. Although he conflates compositional intent with listener experience, his characterization is nonetheless astute.

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[10] Bob Snyder, *Music and Memory* (Cambridge, Massachusetts: The MIT Press, 2000), p. 230.

[11] Of particular relevance are pp. 20–65 (Chapter 2) and pp. 201–220 (Chapter 8).

> A composition is no longer a consciously directed construction moving from a "beginning" to an "end" and passing from one to another. Frontiers have been deliberately "anesthetized." Listening time is no longer directional but time-bubbles, as it were.[12]

The bubble metaphor is a strangely appropriate one. The image suggests a temporary cessation of causality within a container that appears free of the directing forces of gravity. Events contained in a bubble, no matter how disparate, integrate to form a perceptual unit by virtue of being surrounded by the bubble's boundary, which separates them from events in the external environment. Within the bubble, no new beginnings are perceived. Instead each succeeding event contributes to its becoming (i.e., its expanding). When a listener experiences a present awareness as being *within* such a perceptual unit, the present may seem directionless.

This study endeavours to investigate how and why, during the experience of listening to certain recent music, these perceptual units arise in a listener's consciousness. Why do certain perceived events integrate to form a unified and distinct musical object?[13] How do object boundaries arise? Within these boundaries, what sorts of event-sequences evoke sensations of directionlessness? What are the implications of a multiplicity of such objects on a listener's perception of musical form? In order to answer such questions, it will be necessary to examine these temporally distinct perceptual units—these time-bubbles—from the perspective of subjective time-consciousness. What is needed is an

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[12] Pierre Boulez, *Orientations*, ed. Jean-Jacques Nattiez, trans. Martin Cooper (Cambridge: Harvard University Press, 1986), p. 178. "Frontiers" is a translation of the original French "frontières," which carries a more direct connotation of "boundaries."

[13] The term "musical object" denotes an object of temporal consciousness that is the cognitive correlate of a physical stimulus, as opposed to the stimulus itself.

investigation of music *as experienced.* A good approach to such an enterprise is through the philosophy of experience known as *phenomenology.*

1.2 Present Awareness

The phenomenon of present awareness is often approached by way of the *specious present.* John Michon synthesizes the salient aspects of the concept as follows:

> The specious present is understood ... as the time interval ... in which we experience the flow of events as being simultaneously available to perceptual or cognitive analysis. ... The information contained in a present is a discrete segment ... [the contents of which] are simultaneously available and are as such continually open for restructuring; that is, the information contained in it is open to revision under different cognitive (or at least higher-order) interpretative hypotheses.[14]

Various writers have espoused different versions of the specious present. In each case, the defining aspect of the concept is the *simultaneous availability* of perceived events. That is, all perceived events within a present awareness remain open for interpretation. Perceived events may enter a listener's consciousness in a sequential manner, but persist in the present in a more loosely ordered fashion. To assess how the specious present bears on the experience of musical time, it must be addressed within the larger context of experiential time.

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[14] John Michon, "The Making of the Present: A Tutorial Review," *Attention and Performance* 7 (1978): 90-92. Michon draws on the work of Husserl, William James, and psychologist Paul Fraisse in his description of the specious present. (Kramer reproduces a similar passage from Michon's article on pages 371-372 of *The Time of Music.*)

The notion of a specious present features prominently in Husserl's analysis of inner time-consciousness. Given a "temporally extended content of consciousness," he explains, "a unitary apprehension takes place which is spread out over a temporal interval."[15] Such an apprehension can only occur, however, if the parts of the whole are simultaneously held in the listener's consciousness. He asserts that in order to achieve a "temporal comprehension" of a sequence of perceived events,

> ... it is necessary that they be the absolutely simultaneous Objects of a referential cognition which embraces them completely and indivisibly in a single unifying act ... [16]

Husserl's idea of absolutely simultaneous objects embraced by a single unifying cognitive act clearly stems from the idea of simultaneously available perceived events in a specious present. The concept of the present is greatly expanded, however, in his account of temporal awareness.

The centrepiece of Husserl's analysis of inner time-consciousness is the *temporal span.* An analysis of one's window of temporal awareness, the temporal span comprises three main parts: *primal impression*, *retention*, and *protention.* These three parts are inseparable from one another, and bounded by a *horizon.* At one horizonal extreme is the *leading edge* and at the other is the *running off.* Sound (for example) enters consciousness as a primal impression at the leading edge. Husserl describes this coming-

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[15] Husserl, *The Phenomenology of Internal Time-Consciousness*, p. 41.
[16] Ibid., p. 40. The "Objects" of such a cognitive act are "absolutely simultaneous" but the events that provide them for cognition are not.

into-being of a temporal experience as a "welling up" in consciousness. As further sound enters consciousness at the leading edge, the initial primal impression passes over to retention, where it remains until it passes the running off point. Husserl likens retentions to reverberations or echoes that sink into the "just-past." "The retentional sound is not actually present," he explains, "but 'primarily remembered' precisely in the now."[17] Retention is therefore distinct from recollection. Whereas a recollection is a "re-presentation" of an object, primal impression and retention are inextricably linked in the perception of a "now."[18]

Husserl describes protention, the third aspect of the temporal span, as "predelineated potentialities"[19] that point (indeterminately) toward potentially upcoming events. Don Ihde, following Husserl, characterizes these intentions as "attentional structurings which may be futurally oriented."[20] Some of these "attentional structurings" will find fulfillment; others, called "empty intentions," will not. It is important to note that protention is far more elementary than anticipation, and retention far more elementary than remembering. Both phenomena— retention and protention—occur "within the initial

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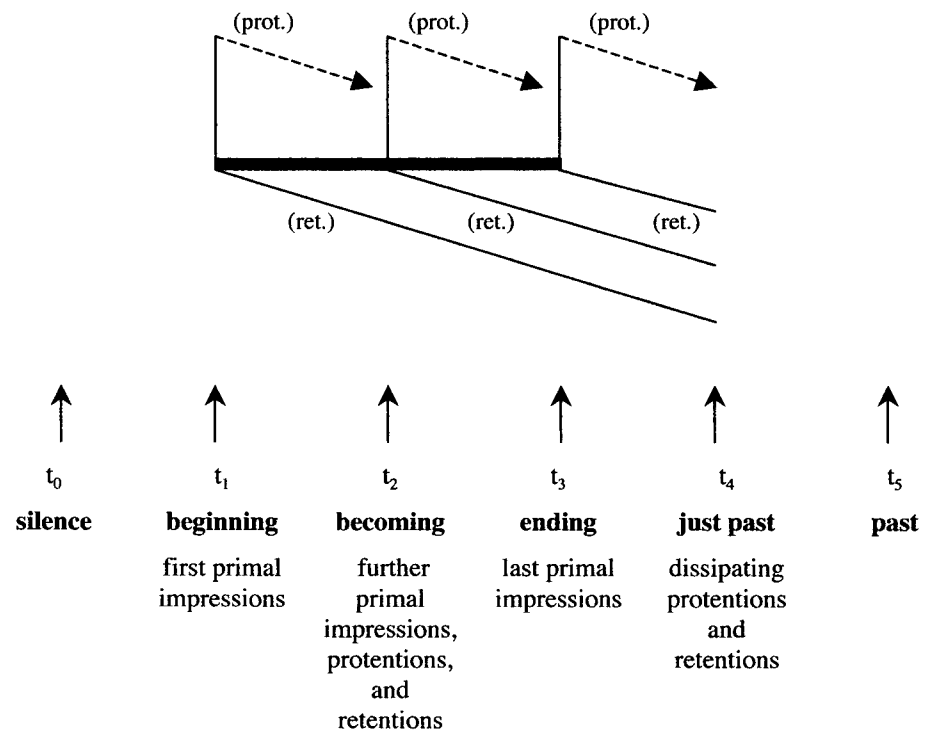
[17] Ibid., p. 53.
[18] Don Ihde notes that, at the extreme point of retention, "there is a horizon which transforms primary retention into genuine recollection which is the first genuine appearance of memory." See Don Ihde, *Listening and Voice: A Phenomenology of Sound* (Athens: Ohio University Press, 1976), p. 91.
[19] Edmund Husserl, *Cartesian Meditations: An Introduction to Phenomenology* [1931], trans. Dorion Cairns (The Hague: M. Nijhoff, 1973).
[20] Ihde, p. 91.

establishment of temporal duration."[21] The following diagram depicts the basic structure of a temporal span.



Example 1.01. Basic aspects of a temporal span.

The horizontal line shown above represents a sound. Below the line are a series of time points, marked t_0–t_5. Each time point represents the leading edge of a listener's temporal awareness at a particular moment in time. At t_0 the sound has not yet begun, and silence continues to be perceived. At t_1 the sound begins and the first primal impressions begin to enter the listener's consciousness. These primal impressions, however, immediately

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[21] Robert Sokolowski, *Introduction to Phenomenology* (Cambridge: Cambridge University Press, 2000), p. 137.

recede into retention. Diagonal lines positioned below the horizontal line represent retentional modification. At the same time primal impressions are receding into retention, they are also triggering protentions about potentially imminent impressions. Dotted diagonal lines positioned above the horizontal line represent protentions.

Primal impressions, retentions and protentions occur not only at the initial perception of a sound but also throughout its continuation. For instance, at t_2 the listener not only continues to receive new primal impressions (the vertical segment), but also retains past impressions (the portion of any lower diagonals aligned vertically with t_2) and protends future impressions (the portion of any upper dotted diagonals vertically aligned with t_2). When the sound ends, only the primal impressions cease—retentions and protentions persist momentarily in the "just past." This phenomenon is illustrated in the above diagram by the continuation of the diagonal lines beyond t_3 toward t_4. By the time the listener has reached t_5, these sensations have dissipated and silence is perceived. This basic structure of primal impressions, retentions and protentions is inherent to every temporal span.

Husserl's characterization of temporal experience as a "welling up" in consciousness implies a strong sensation of indeterminacy. Specifically, it implies that events perceived to be within the expanding horizon of a temporal span remain simultaneously available for interpretation. Moreover it implies that a temporal span will always encompass the entirety of a present experience, extending from a beginning through all subsequent now-points to an ultimate end. Recalling Boulez's characterization of certain indeterminate

time spans as time-bubbles, we can now better understand why the metaphor's implication of internal integration and contextual distinctness speaks so directly to a directionless present.

This notion of directionlessness relates to what Ihde calls "surroundability." The concept refers to an enveloping sensation or "auditory aura" that emanates an "ambiguous richness of sound."[22] From the perspective of temporal experience, surroundability constitutes the opposite of directionality. Whereas directionality refers to a perception of predictable change along a particular dimension, surroundability refers to an experience devoid of predictable change. Within such a perception, the onset of each event is "enriched by the depth of those [perceived events] which have just preceded it *'equally' present.*"[23] Thus, for the purposes of this study, the term surroundability will refer to the extreme case of the specious present.

Neither extreme, however—surroundability or directionality—can exist without the other. As Ihde asserts, the sensations of surroundability and directionality are "constantly co-present" in any temporal span.[24] A significant imbalance between the two yields either a linear or nonlinear temporal experience. For example, music characterized by long, continuous trajectories of events elicits a substantial sensation of directionality and only a marginal sensation of surroundability, so we consider it to be linear. Music comprising

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[22] Ihde, p. 78.
[23] Ibid., p. 94 [my emphasis].
[24] Ibid., p. 76.

shorter, highly disparate groups of events elicits a marginal sensation of directionality but a substantial sensation of surroundability, so we consider it to be nonlinear. The terms linear and nonlinear are therefore relative terms born of sensations experienced within the temporal span of a present awareness. The next section addresses the problem of how a sequence of events that is nondirectional can nonetheless be heard as unified.

1.3 The Constitution of Unity in Present Awareness

Husserl provides two important illustrations of how unity is constituted across a temporal span. The first involves a sustained tone and the second a melody. In the first illustration, the experience of hearing a sustained tone is analyzed in order to illustrate the phenomenon of an *enduring* act. He describes the experience as follows:

> The sound is given, that is, I am conscious of it as now, and I am so conscious of it "as long as" I am conscious of any of its phases as now. But if any temporal phase (corresponding to a temporal point of the duration of the sound) is an actual now (with the exception of the beginning point), then I am conscious of a continuity of phases as "before," and I am conscious of the whole interval of the temporal duration from the beginning-point to the now-point as an expired duration. I am not yet conscious, however, of the remaining interval of the duration. At the end-point, I am conscious of this point itself as a now-point and of the whole duration as expired (in other words, the end-point is the beginning point of a new interval of time which is no longer an interval of sound). "During" this whole flux of consciousness, I am conscious of *one and the same* sound as enduring, as enduring now.[25]

Husserl determines that a listener constitutes a sustained tone as a unified object by identifying a continuity of "phases" between the beginning-point and the end-point as "expired duration." "Now" is more than simply the sense of duration between a beginning-point and an end-point. At any now-point prior to the end-point, the listener is unaware of the remaining duration though aware of duration. In other words, at such now points the listener senses no protentions of closure.

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[25] Husserl, *The Phenomenology of Internal Time-Consciousness*, pp. 44–45 [my emphasis].

Christopher Hasty's treatment of present awareness elucidates Husserl's assertions regarding the constitution of unity in a sustained tone. He characterizes "now" as a sensation of growth, "a feeling of potential for becoming."[26] For Hasty, "being present involves both the determinacy of having begun and the indeterminacy of being as yet incomplete."[27] These two components are inseparable aspects of being present. "Now" must embody the idea of the "present awareness of [an] event in its process of becoming—an awareness of what the event has thus far become, an awareness of its continual becoming, and, when it has ended, an awareness of what it has at last become."[28] As regards the case of a sustained tone, the concept of becoming involves a continuous awareness of what Izchak Miller calls a "temporally extended *part* of that tone."[29] The simultaneous availability of all such "parts" in a listener's awareness ensures an awareness of succession rather than a succession of awarenesses. In short, a *composite object* obtains from an enduring act of consciousness. But an enduring object is not the only type of composite object.

Whereas an enduring object sustains uniformly through time, a *processive* object comprises serially apprehended constituent events. Husserl cites a melody as an example of a process. Processes and enduring objects share many features, including the embodiment of becoming. In other words, events perceived within a temporal span

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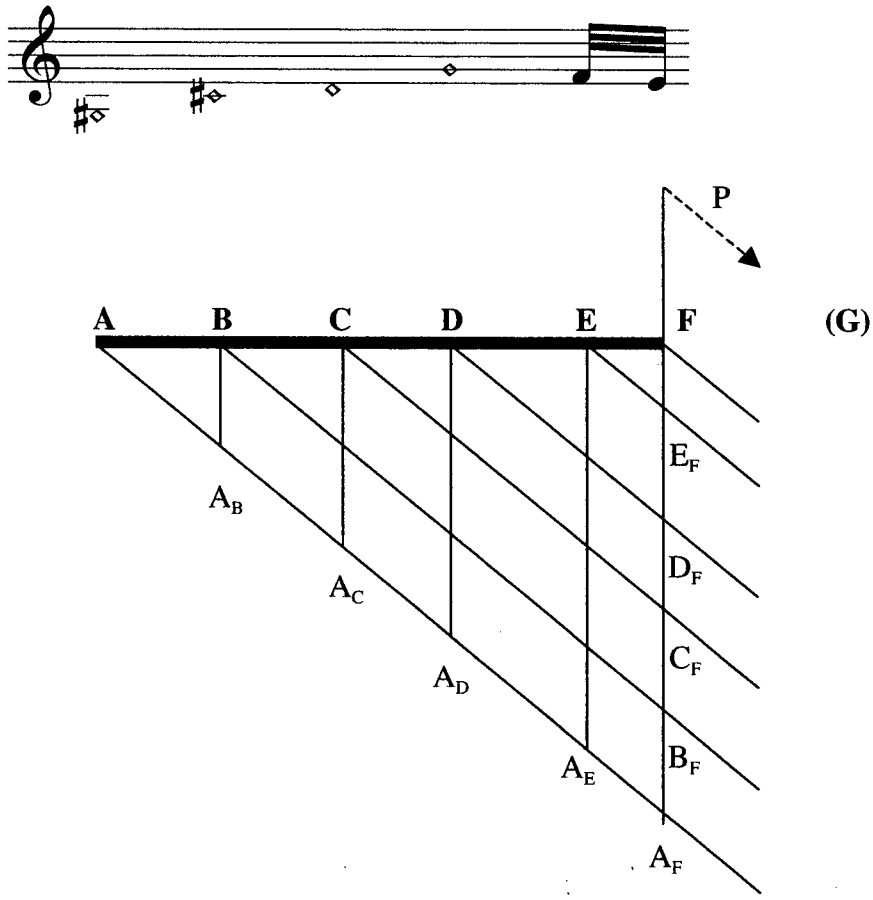
[26] Christopher F. Hasty, *Meter as Rhythm* (New York: Oxford University Press, 1997), p. 72.
[27] Ibid.
[28] Ibid.
[29] Izchak Miller, *Husserl, Perception, and Temporal Awareness* (Cambridge, MA: The MIT Press, 1984), p. 109.

remain simultaneously available for "restructuring." "The whole melody," Husserl asserts, "appears as present so long as it still sounds, so long as the notes *belonging to it*, intended in *one* nexus of apprehensions, still sound." [30] Adopting Douglas Bartholomew's Husserlian model for diagramming musical experience, the temporal span of a perceived melody can be represented as follows:



Example 1.02. Temporal span of a melody; Lachenmann's *Dal Niente*, system 1.[31]

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[30] Husserl, *The Phenomenology of Internal Time-Consciousness*, p. 61.

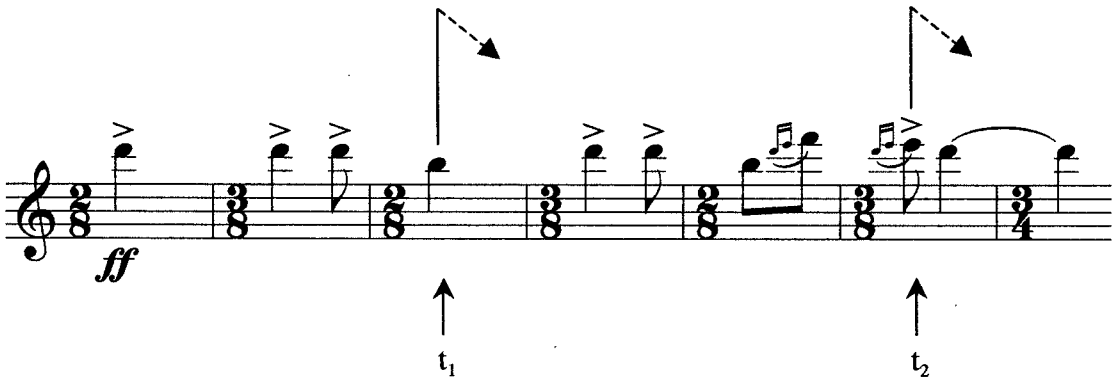
[31] This diagram is adapted from illustrations in Husserl, *The Phenomenology of Internal Time-Consciousness*, pp. 49 and 121, as well as adaptations of the Husserlian model in Miller, p. 122 and Douglas Bartholomew, "Preamble to a Phenomenology of Music," in *Understanding the Musical Experience*, ed. F. Joseph Smith (New York: Gordon & Breach, 1989), p. 35.

Example 1.02 may be seen as a more specific version of the generic temporal span shown in Example 1.01. It shows the basic temporal structure of a processive musical object. As in the earlier diagram, the horizontal axis in Example 1.02 represents time and the vertical lines represent now-points along that axis. Each now-point, marked with a letter from A–F, corresponds to the onset of a primal impression associated with a specific musical event—namely, the onset of a new pitch. Diagonal lines positioned below the horizontal line represent the receding of primal impressions into retentive modification. The intersections of vertical and diagonal lines therefore represent the retention of a given primal impression at a subsequent now-point. Point A_B, for example, represents the retention of primal impression A at the moment primal impression B enters consciousness. Each succeeding primal impression modifies the retention of other primal impressions already present.

The diagonal dotted line marked P represents a listener's set of protentions at now-point F. These protentions are anticipations of primal impressions that may occur at some imminent point along the horizontal axis. Some may be fulfilled while others may remain emptily intended. Like retentions, protentions change with each new primal impression, thereby modifying our temporal experience. Thus the protentions depicted by dotted line P represent only those present at a particular instant in time.

All experiences elicit protentions of either closure or of continuance. The former requires a significant element of predictability with respect to the direction of future events and

the latter a significant element of unpredictability. Consider the following melodic fragment from the opening of Stravinsky's *Symphonies of Wind Instruments*:



Example 1.03. Protentions of closure;

Stravinsky's *Symphonies of Wind Instruments*, mm. 1–7, clarinet 1.

Several aspects of the melodic sequence contribute to protentions of closure. Repetition of the central pitch D6, for example, privileges it above all others. Within the pitch-centric tradition of Western art-music, each departure from a note evokes protentions of its return. The more times this intention is fulfilled, the stronger it becomes. For this reason, protentions of a return to D6 at t_2 are stronger than protentions of its return at t_1. (Protentions are represented in Example 1.03 by diagonal dotted lines above the music.) Predictability with respect to the direction of future events is further heightened by an octatonic pitch scheme that governs the entire passage. The implementation of a consistent system of pitch class organization such as this has the effect of prescribing a unique function to each pitch class. As one becomes more familiar with the system and its usage in a given piece, one is better able to predict musical direction.

In addition to pitch-based factors, a consistent duple subdivision of the quarter note provides a certain element of rhythmic predictability, both in general and as regards the placement of returns to the central pitch D6. Although one does not know precisely when a return will occur, or if a given pitch class will behave according to its established tendency, aspects of melodic construction such as these serve to direct one's attention toward goals. This directedness fosters a sense of determinacy that diminishes a listener's focus on the present. Thus the temporal experience of this melodic sequence is best characterized not as a becoming but as an ontological trajectory toward closure.

Returning now to the six-note melodic sequence shown in Example 1.02, we can easily see that no such elements of predictability exist. No pitch is privileged above any other. No identifiable pitch scheme or pulse is established. In short, perceived events do not direct a listener's attention toward a particular (protended) goal. Instead they simply accumulate in a listener's consciousness—as if contained in a directionless time-bubble. Moreover, since no strong sense of directionality is permitted to develop, no protentions of closure arise. The resulting sensation of indeterminacy, described earlier as surroundability, intensifies a listener's focus on the present. Thus, although nondirectional, present events form a unified object of consciousness by virtue of their constitution in a single act.

The idea that an event-sequence capable of evoking surroundability may also be constituted as a unified object of consciousness speaks directly to the elegance of Boulez's notion of time-bubbles. One can now conceive of a time-bubble as the extreme case of the specious present—a unified aura of becoming in which all perceived events remain simultaneously available. Devoid of substantial directionality, a nonlinear temporal experience permits no protentions of closure, only nondirectional protentions of continuance. Unlike linear music, which features readily apparent and often predictable temporal trajectories, nonlinear music curtails a listener's ability to anticipate conclusion. The effect is one of enduring present awareness. The next step is to determine the conditions under which the present can be made to endure.

Chapter 2

Φ-STATES

(Phi-States)

Chapter 1 addressed the relationship between music and subjective time-consciousness. It described a unified act of consciousness, known as the specious present, in which perceived events remain simultaneously available for interpretation. Associated with this act is a sensation of indeterminacy, in the sense that the listener is unable to protend an end to the present awareness. This sensation was defined as "surroundability." In this study, acts of consciousness characterized by a significant quality of surroundability will be called *Φ-states* (phi-states), and the series of events that (potentially) evoke them will be called *Φ-spans* (phi-spans).[32] A composer wishing to evoke a Φ-state would compose a Φ-span: a distinct series of events that fosters primal impressions, retentions, and protentions of continuance, while minimizing protentions of closure. Although characterized by sensations of surroundability, the events comprising such a span are nonetheless unified, forming a single object of consciousness. Within the bounds of this temporal object—described earlier as a "time-bubble"—the present appears to endure.

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[32] The Greek letter Φ (phi) is intended as a symbol for the term "phenomenological," as it pertains to the objects of consciousness referred to herein.

Thus the term Φ-state refers to a phenomenological state of consciousness in which the present endures.

This chapter describes four factors that contribute to the emergence of a Φ-state. They are: (1) sequential integration; (2) contextual distinctness; (3) non-goal-directedness; and (4) collective nonlinearity. The first two factors, sequential integration and contextual distinctness, address the idea that a Φ-span must be a group; that is, its events must cohere to form a distinct perceptual unit. The last two factors, non-goal-directedness and collective nonlinearity, address the idea that a Φ-span must evoke an enduring sense of presence. All four factors are necessary to Φ-state emergence, though they need not contribute equally. The relatively weak impact of one factor, for instance, may be compensated for by the relatively strong impact of another. Following a discussion of the four factors, their impact on the emergence of Φ-states will be demonstrated through an analysis of the opening of John Zorn's *Road Runner*.

2.1 Sequential Integration

In order for a time span to be perceived as a Φ-state, its events must group together to form an internally cohesive perceptual unit.

Husserl's analysis of a melody was cited in the previous chapter to illustrate how unity can be constituted in a present awareness comprising distinct events. The analysis describes how the perceived events of an unfolding melody remain simultaneously available in a listener's consciousness, "so long as the notes belonging to it ... still sound."[33] Husserl does not provide any details as to how one knows which events belong to the melody and which do not, except to say that all must be "intended" in a single nexus of apprehensions. In order for a time span to evoke such an act of consciousness, its temporally disparate events must be grouped as a perceptual unit. The best way to address this issue is through an examination of auditory streaming and the Gestalt principles of grouping on which it is based, notably belongingness, proximity and similarity, good continuation, and common fate.

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[33] Husserl, *The Phenomenology of Internal Time-Consciousness*, p. 61.

Belongingness

In audition we are often confronted with a multifarious mixture of stimuli. One of the ways our perceptual mechanisms organize incoming data is by grouping sequentially presented events into perceptual representations known as auditory streams. Albert Bregman calls the cognitive process of perceiving streams "sequential integration," defining it as "our perceptual grouping of the parts of the neural spectrogram that go together."[34] Note how Bregman's notion of "going together" resonates with the notion of "belongingness" in Husserl's description of constituted unity. A stream is not necessarily equivalent to a Φ-state but it accounts for protentions of continuance during a Φ-state. Let us examine how this concept drives a listener's integration of sequentially apprehended events.

The principle of belongingness states that all mentally represented properties *belong* to something. For example, the parts of a particular tree (its leaves, branches, bark, and so on) belong together because they contribute to its constitution as an object of consciousness. Similarly, the notes of a particular melody belong to together because they contribute to the constitution of the melody. In both cases, it is the quality of belongingness to an object that binds properties together.

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[34] Albert Bregman, *Auditory Scene Analysis: The Perceptual Organization of Sound* (Cambridge, MA: MIT Press, 1990), p. 9.

Belongingness is not an independent or absolute quality, however—it is a relative one. The strength of a perceived association may vary depending on context. Ultimately, components that *most strongly* belong together will be grouped. Bregman describes the competitive nature of grouping as follows: "two components that, in the absence of any other components, might have been placed into the same stream can be captured into different streams by other components with which they better fit."[35] This basic principle applies to all the different ways in which belongingness manifests itself. Some of these ways are addressed below.

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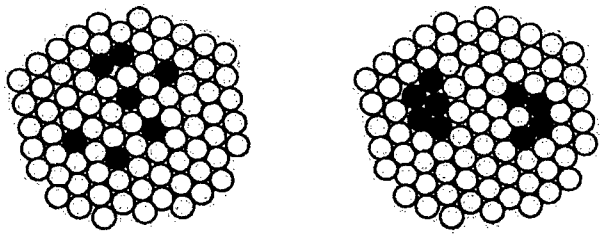
[35] Ibid., p. 32.

Proximity and Similarity

In the Gestalt theory of vision, belongingness is addressed primarily through the concepts of similarity and proximity. These concepts are illustrated in the drawings shown below.



Similarity Proximity

Example 2.01. Visual representations of similarity and proximity.[36]

Each drawing shows a cluster of equal-sized circles, either black or white. Certain circles in the left cluster distinguish themselves on the basis of similarity of colour. Certain circles in the right cluster, already distinguished on the basis of colour, form two distinct subgroups on the basis of relative proximity. Implicit in these drawings is the idea that that the principles of similarity and proximity can affect grouping either separately or together. In fact, if one chooses to recognize proximity as positional similarity, the difference between the two is moot. Bregman finesses the semantic problem of distinguishing between proximity and positional similarity by positing an axiom that combines them. He writes: "Things that are either more similar to one another than to

[36] This diagram is from Bregman, p. 20.

their neighbors, or nearer to one another, will tend to be grouped together perceptually."[37] Certain types of musical groupings, however, seem to be better described by one principle or the other.

Certainly temporal sequence is best addressed through the concept of proximity. This interpretation of the Gestalt principle of proximity reflects Bob Snyder's definition: "events close together in time will tend to be grouped together."[38] In addition to grouping based on nearness in time, proximity also describes groupings based on nearness of pitch. "Small steps," Bregman asserts, "favor sequential integration."[39] The principle of proximity may therefore be taken to mean the grouping of auditory events perceived to be close together in time or pitch, or both. Excerpts from Salvatore Sciarrino's Fifth Piano Sonata, shown below in Example 2.02a and Example 2.02b, illustrate both manifestations of the principle.

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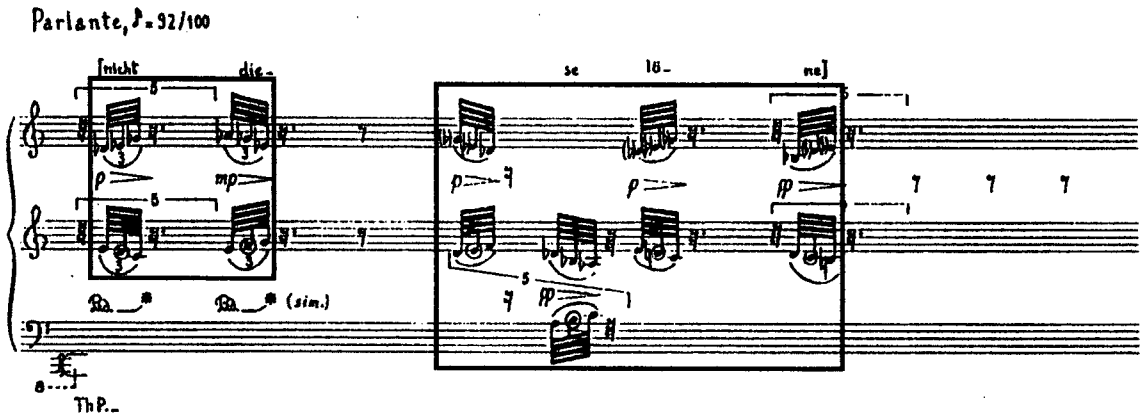
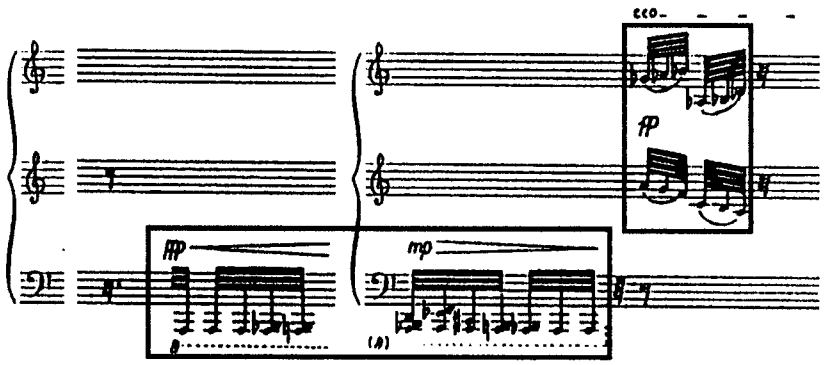
[37] Ibid., p. 198.
[38] Snyder, p. 39.
[39] Bregman, p. 681.



Example 2.02a. Grouping based on temporal proximity

in Sciarrino's Fifth Piano Sonata, system 1.



Example 2.02b. Grouping based on registral proximity

in Sciarrino's Fifth Piano Sonata, systems 26–27.

The opening system of the sonata, shown in Example 2.02a, contains six brief gestures. All are similar with respect to rhythm and register but, due to their temporal proximity, are perceived as two groups. The first group involves two gestures and the second group involves four.[40] Example 2.02b shows grouping based not upon temporal proximity but upon registral proximity.[41] All events in this passage occur in close temporal proximity to one another. A sudden and substantial change of register on the fifth beat, however, divides the excerpt into two separate groups—one characterized by a relatively high register and one by a relatively low register. Within each group, events share a strong sense of belongingness due to their temporal and registral proximity to one another.

While the grouping together of events on the basis of temporal and registral nearness is best understood as a function of the Gestalt principle of proximity, the grouping together of events on the basis of loudness and timbre is best understood as a function of similarity. Similarity of loudness is a straightforward basis for grouping, which Bregman describes as follows:

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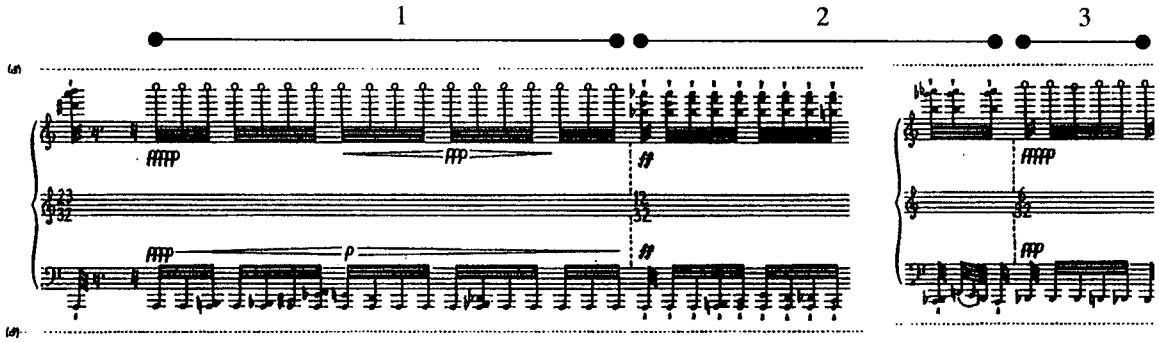
[40] In this case, proximity-based grouping is strong enough to suppress minor variations within each group, such as the registral disparity of the second group's second gesture. Moreover, this rhythmic pattern of [two gestures + six gestures] is immediately repeated in the following system, thereby itself forming a group.

[41] Bregman makes a connection between the law of proximity and the auditory concept of stream segregation, noting that a collection of high pitches will tend to be grouped together and a collection of low pitches will tend to be grouped together, even if high and low are temporally integrated. A commonly cited example is the perception of two streams of sound in compound melodies, such as those in Baroque music. The two most important factors in the strength of multiple auditory streams are the rate of events and the frequency separation between registral subsets.

> Loud sounds will tend to group with other loud ones and soft ones with soft ... [However] Tones that differ only in loudness may not have a tendency to segregate from one another, but when there are also other differences between the sounds, the loudness differences may strengthen the segregation.[42]

The excerpt shown below in Example 2.03 illustrates this simple concept.



Example 2.03. Grouping by similarity of loudness

in Sciarrino's Fifth Piano Sonata, systems 74–75.

The events comprising time span 2 in Example 2.03 are not only integrated on the basis of similar loudness levels but also segregated from preceding and succeeding music on the basis of dissimilar loudness levels. Given that the attack density and registral breadth of time span 2 are so similar to those of flanking time spans 1 and 3, the entire passage (time spans 1–3) may have been united as a single perceptual unit had time span 2 not featured a contrasting dynamic marking. As Bregman notes, however, a difference in loudness is rarely the sole segregating factor in a perceptual grouping. In this case,

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[42] Bregman, p. 648.

increased registral density and a contrasting articulation also contribute to the establishment of time span 2 as a perceptual group.

Sometimes pulse can also contribute to similarity-based grouping.[43] In the example shown above, the pulse remains consistent across sudden loudness changes. As a result, discontinuities of loudness level are mitigated. If pulse were to change in conjunction with one or more other musical property, however, the change would contribute both to the resulting discontinuity at these points and to the integration of events occurring within the points.[44]

Timbre is a very important factor in similarity-based grouping. Consider our ability to identify the lines of individual instruments in an ensemble. Even when different instruments are playing in the same register, we can often distinguish them. This is possible largely because sounds of similar timbre tend to be grouped together. In fact, timbral similarity is such a strongly cohesive agent that it often determines the degree to which sequential events cohere.

> Often ... timbre is used as a sequential glue for musical phrases ... On the other hand, if timbre is made to change repeatedly and rapidly within a phrase, the sequence becomes fragmented.[45]

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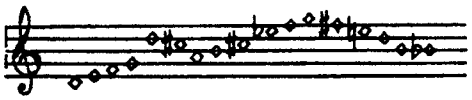
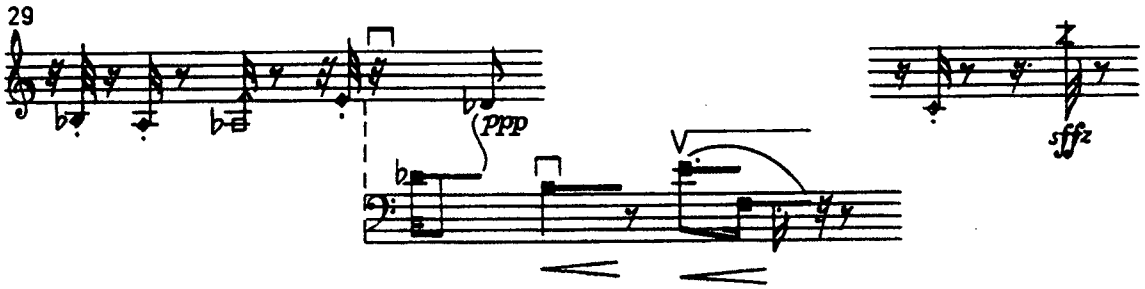
[43] For more on pulse-based integration see John Roeder, "Pulse Streams and Problems of Grouping and Metrical Dissonance in Bartók's 'With Drums and Pipes'," *Music Theory Online* 7.1 (2001).
[44] Further aspects of pulse are addressed in section 2.2 of this study.
[45] Bregman, p. 678.

In other words, a consistent timbre tends to promote belongingness, and inconsistent timbre does not. Timbre certainly contributes to group determination in Example 2.03, though it is less of a factor in a solo piano work such as this than it might be in a work featuring a broader timbral palette. Helmut Lachenmann's clarinet solo *Dal Niente (Interieur III)*, for example, is such a work. Consider the effect of timbre in grouping events in the following examples:



Example 2.04a. Timbral consistency resulting in auditory streaming;

Lachenmann's *Dal Niente*, system 68.



Example 2.04b. Timbral inconsistency resulting in fragmentation;

Lachenmann's *Dal Niente*, system 29.

Example 2.04a shows a series of stemless, diamond-shaped noteheads, indicating extreme prestissimo and pianissimo execution. The pitch sequence is highly unpredictable, conveying no readily apparent melodic pattern or sense of scalar affinity.

Due to a highly consistent and striking timbre, however, the series coheres to form an auditory stream. The excerpt in Example 2.04b also features an unpredictable series of events. However, unlike the first, this excerpt entails numerous timbral changes. Over the span of just one system, five timbrally distinct modes of sound production are indicated: tongue rams, a kiss/smacking sound, air only sounds, normal tone, and a sharp whistling sound. Timbral inconsistency causes the passage to become highly fragmented and precludes its events from cohering to form a single auditory stream.[46] Whereas the events of Example 2.04a are likely to integrate and lead to the emergence of a Φ-state, the events of Example 2.04b are not.

It is apparent from the preceding examples that similarity- and proximity-based sequential integration obtain primarily from parametric consistency.[47] That is, the sequential events of a given time span are likely to integrate perceptually if at least one prominent parameter remains consistent throughout.[48] The various preceding examples featured consistency in parameters such as register, loudness and timbre. Other possibilities include attack density, registral density, pitch schemes, and so on. Sequential integration is typically the result of consistency in several such parameters. In the excerpt from Sciarrino's Fifth Piano Sonata shown earlier in Example 2.03, for instance, the soft events are integrated primarily due to minimal changes in timbre, loudness, rhythm, and process. The events comprising each loud interruption, similarly, are integrated due to

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[46] Intermittent silences also contribute to fragmentation.

[47] The term "parameter" refers to any musical property such as rhythm, pitch, timbre, loudness, and so on.

[48] The "prominent" parameters of a given time span are simply those that are immediately apparent and identifiable, and contribute most to its character. (The concept of Φ-state identity is examined extensively in Chapter 3.)

consistent parametric values, in this case minimal changes of timbre, loudness, rhythm, and register. Thus parametric consistency does not necessarily denote absolute consistency—that is, an absence of change—but to a sufficiently narrow *range* of perceived level changes in one or more of the prominent parameters of a time span.

Time spans that are *extremely* consistent tend to evoke the strongest Φ-states. Thomas Clifton refers to the experience of extreme parametric consistency as "static succession."

> Static succession may be regarded as the limit case of continuity, for here we encounter the maximum motionlessness of which music is capable ... The term "succession" is descriptive of the way in which ... unchanging process is ... heard as "sameness succeeding itself."[49]

In short, a group of events featuring extreme parametric consistency can evoke an extreme temporal experience, which Clifton calls a static succession. György Ligeti's *Fragment* includes a passage that may elicit such an evocation. Consider the following excerpt in which the strings sustain a single sonority for a remarkably long time:

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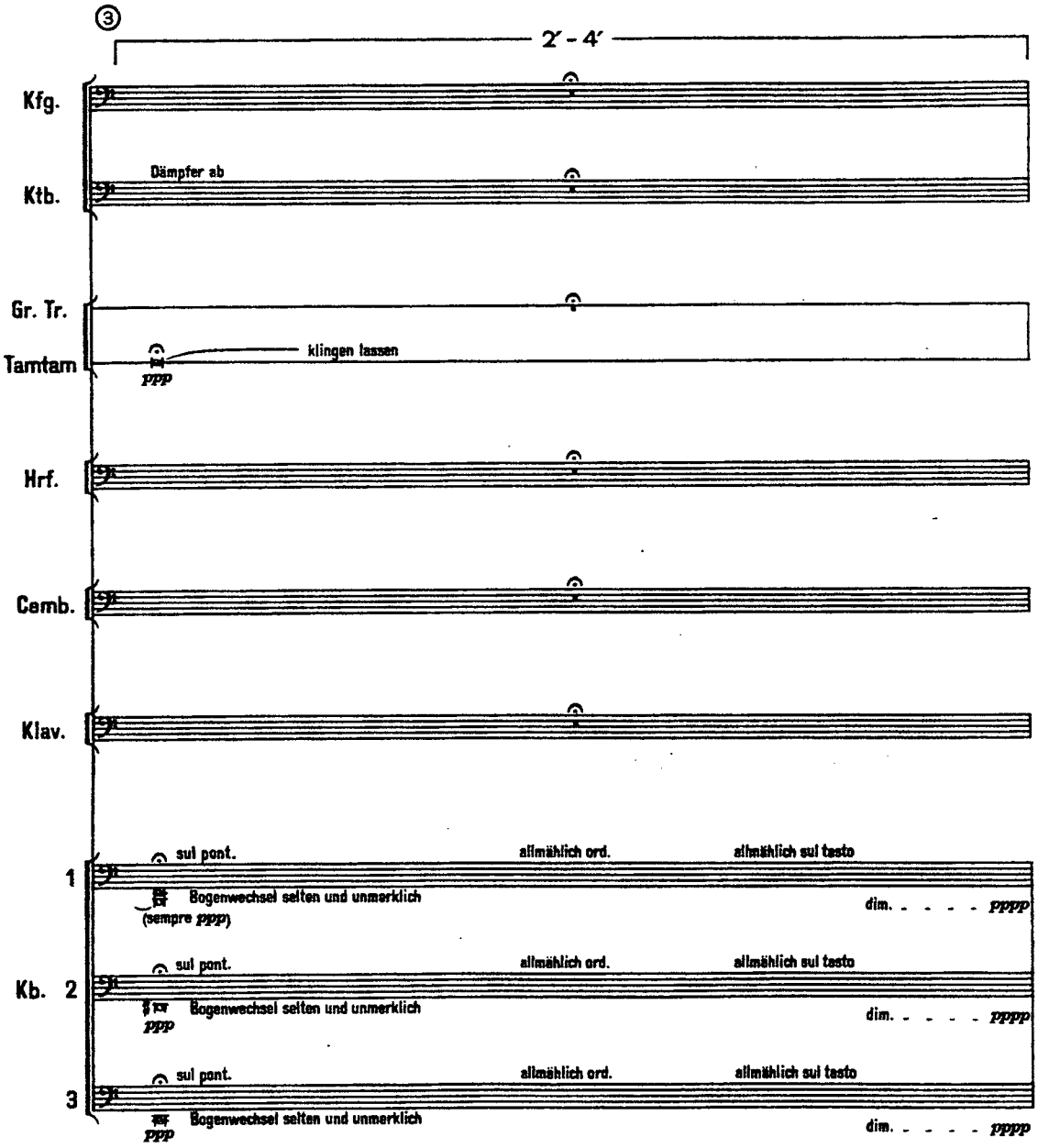
[49] Thomas Clifton, *Music as Heard: A Study in Applied Phenomenology* (New Haven: Yale University Press, 1983), pp. 104–5. Clifton cites Ligeti's *Volumina* as an example of "static succession."



Example 2.05. Static succession in Ligeti's *Fragment*, m. 3.

The above passage is remarkable not only for the extreme consistency of pitch, timbre and loudness that it features but also for the extremely long span of time throughout which it maintains the consistency. The result is an intense experience of static succession.

Although the above passage of music is simple in many ways, the temporal experience it elicits is highly complex. Indeed the array of perceptual elements comprising most time spans precludes any simple quantitative evaluation. Thus the assessment of factors leading to sequential integration—specifically parametric consistency—must remain in the realm of the qualitative. It is not simply a matter of computing the sum of all contributing parameters, since not all parameters exert the same integrational and segmentational strength. Several writers have posited systems for weighting parametric values.

Tenney and Polansky weight intervals of pitch and duration, explaining that the values are chosen to produce the segmentations they intuit.[50] Hasty, however, shows that many other parameters in addition to interval and duration affect segmentation.[51] Lefkowitz and Taavola, in an attempt to reflect the inherent inequity among the defining parameters of any given segmentation, provide a detailed account of their logarithmic weighting system.[52] Although each approach has its merits, the prospect of weighting parametric

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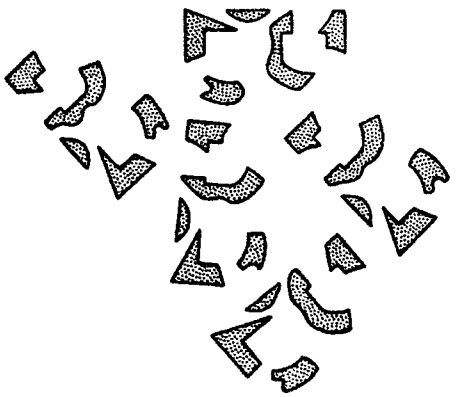
[50] James Tenney and Larry Polansky, "Temporal Gestalt Perception in Music," *Journal of Music Theory* 24/2 (1980): 205–241.
[51] Christopher F. Hasty, "Segmentation and Process in Post-Tonal Music," *Music Theory Spectrum* 3 (1981): 54–73.
[52] David S. Lefkowitz and Kristin Taavola, "Segmentation in Music: Generalizing a Piece-Sensitive Approach," *Journal of Music Theory*, 44/1 (2000): 171–229.

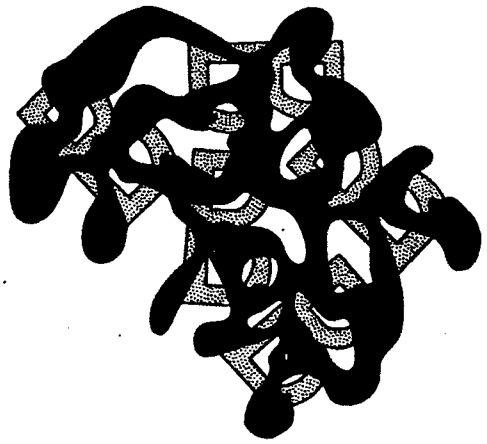
values cannot escape certain difficulties. Most notably, the principles for assigning weighting numbers are not self-evident. If not arbitrary, such assignments inevitably reflect a significant element of subjectivity. The problem of parametric weighting is further complicated by the inter-connectedness of the parameters. Timbre, in particular, constitutes the collective effect of various other parameters. At the very least, parametric consistency, as a measure of similarity- and proximity-based sequential integration, can only be assessed relative to context; that is, in a piece-specific manner. But parametric consistency alone is not always sufficient in gauging sequential integration. Other factors must also be considered.

Good Continuation, Masking, and the Continuity Illusion

The principles of similarity and proximity also give rise to other Gestalt principles governing sequential integration. Of particular relevance to the emergence of Φ-states is the principle of good continuation. This principle refers to the phenomenon whereby a perception of the whole occurs despite an absence of certain parts of the whole. That is, it describes our ability to complete evidence with gaps in it. Perceptual completion tends to occur when the contour of a given object is strong (i.e., "good") on either side of an interruption.[53] Bregman cites the following drawings as evidence of the principle of continuity in vision:[54]



Example 2.06a. Unorganized fragments, due to absence of occlusion information.



Example 2.06b. Fragments organized by occlusion information.

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[53] The term "perceptual completion" is used in place of the more common psychological term "perceptual closure" in order to avoid the word "closure," which has a different meaning in music.

[54] Bregman, pp. 26-27.

Example 2.06a shows an array of visual fragments that are not easily grouped. Example 2.06b shows the same array of fragments but, due to the presence of information about an occlusion, the fragments are grouped. An occlusion such as this is known as a *mask.*

Without a mask, as in Example 2.06a, one does not know where (or if) the evidence is incomplete. With a mask, as in Example 2.06b, one knows two important things. We know (1) which contours have been produced by the shape of the fragments as opposed to which contours have been produced by the mask's covering of the fragments, and (2) which spaces between fragments were already present (in the letters themselves) as opposed to which spaces were produced by mask's occlusion of the fragments. Bregman explains the concept as follows: "[Perceptual completion] is really a way of dealing with missing evidence. But before our perceptual systems are willing to employ it, they first have to be shown that some evidence is missing."[55]

The phenomenon of masking is as relevant to audition as it is to vision. Bregman describes an experiment that illustrates how auditory masking can promote good continuation.[56] In this experiment an alternately rising and falling pure-tone glide is periodically interrupted by brief bursts of loud broad-band noise. Examples 2.07a and 2.07b provide a graphical representation of the two-part experiment.

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[55] Ibid., p. 27.

[56] The experiment (Dannenbring, 1976) is described in Bregman, p. 28.

Example 2.07a.

A series of glides are perceived.

Example 2.07b.

A continuous gliding tone is perceived.

When the glide is broken but the mask is absent, as in Example 2.07a, one hears a series of glides (with intervening silences) but does not perceive them as a single stream of information. When corresponding blocks of noise replace the silences, however, as in Example 2.07b, one perceives the glide as one continuous rising and falling sound. In Gestalt psychology, this phenomenon is known as the "continuity illusion."[57] While the auditory experiment shown in Examples 2.07a and 2.07b is not a direct analogue of the visual illustration shown in Examples 2.06a and 2.06b, both demonstrate how masking can promote (illusory) continuity.

This phenomenon—wherein good continuation obtains despite gaps in the evidence—sometimes occurs in music. Consider the following excerpt from Sciarrino's Fifth Piano Sonata in which an alternation of two types of sonic activity is evident.

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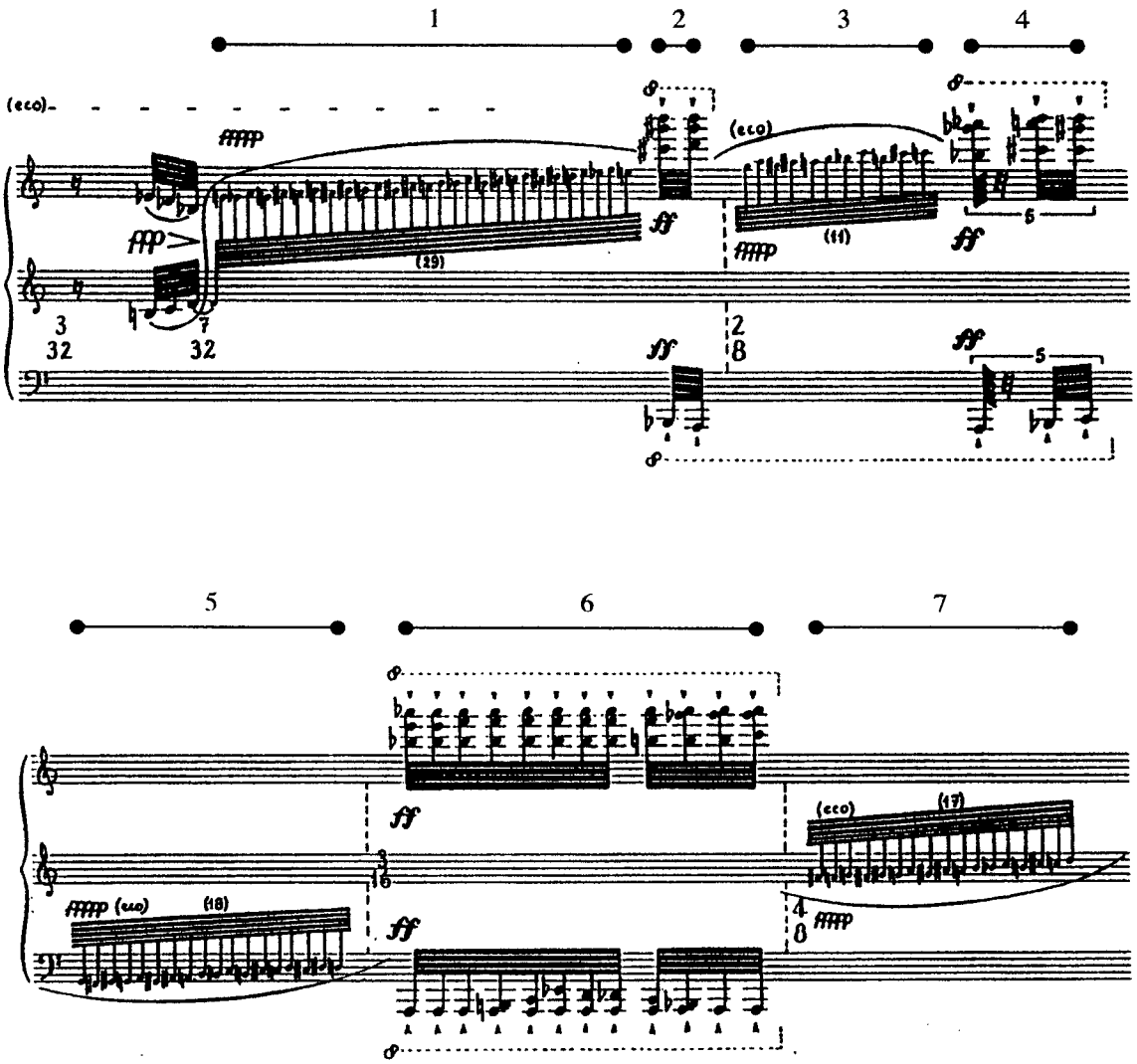
[57] There are numerous rules governing the probability of continuity illusion. A concise overview of these rules is available in Bregman, pp. 662-664.



Example 2.08. Masking in Sciarrino's Fifth Piano Sonata, systems 104–105.

One type of sonic activity involves soft, rapid, gradually ascending single notes. The other involves loud, dense static blocks of repeated chords, which intermittently interrupt the ascending soft notes. Through the principle of good continuation, the gradual ascent of soft notes across system 104 is completed perceptually—despite having sizeable

gaps—as is the interrupted ascent of soft notes across system 105.[58] In each case, the soft notes integrate to form a single auditory stream.

Several factors contribute to a perception of the soft, rapid notes extending across each system as single streams. Notable among these factors is the starkness of the contrast between the two types of sonic activities. One is loud, the other soft; one is registrally dense, the other sparse. This contrast between occlusion and broken stream is necessary to the phenomenon of masking because it ensures minimal contextual integration. The perception of masking is further strengthened by the processive nature of each ascent. In fact, each chromatic ascent forms such a strong trajectory that the following detailed and rather specific perceptual completion occurs: If time span 1 were to continue through time span 2 according to the established melodic pattern, it would arrive precisely where time span 3 begins; similarly, if time span 5 were to continue through time span 6, it would arrive precisely where time span 7 begins. Example 2.09 makes manifest the details of each perceptual completion by continuing the established melodic pattern through the time span of each static block using hollow noteheads.

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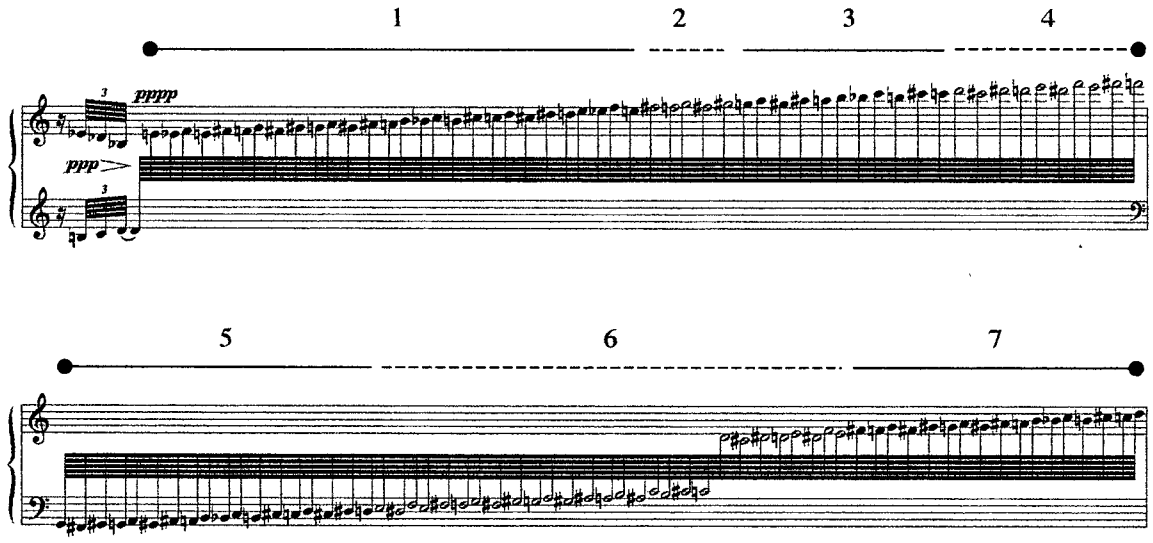
[58] The excerpt shown in Example 2.07 subdivides into two parts as a result of a substantial registral shift at the beginning of segment 5.

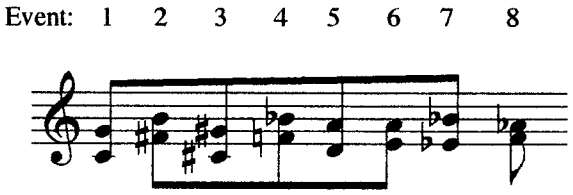


Example 2.09. Perceptual completion in Sciarrino's Fifth Piano Sonata, systems 104–105.

The above example suggests not only that the ascending lines are perceptually completed but also that this completion may involve considerable detail. That is, the masks provided by the loud static blocks (which have been removed in the above example) permit a continuity illusion not merely with respect to the general contour of each line but also with respect to a specific melodic pattern. As such, the seamless continuation of each completed stream illustrates the principle of good continuation.

Common Fate

Integration in the above example is further strengthened by a phenomenon known as common fate grouping. This principle states that "when different parts of the perceptual field [are] changing in the same way at the same time, they [tend] to be grouped together and [are] seen to be changing as a group because of their common fate."[59] As a visual example, imagine two clusters of dots, each on a separate transparent sheet. If one image is placed upon the other, we simply see one denser cluster. If one of the transparencies is slowly shifted, however, a trend is recognized and two clusters are perceived. An analogous musical example might involve the recognition of two concurrent trends, such as is evident in the example shown below.



Example 2.10. Common fate grouping in music.

Events 1, 3, 5 and 7 depict a pattern of chromatically ascending perfect fifths. Events 2, 4 and 6 depict a contrasting pattern of chromatically descending perfect fourths. Despite

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[59] Bregman, p. 657.

occupying not only the same perceptual field but also the very same register, events 1–7 are streamed into two distinct groups, as indicated above by the use of separate beams.

Trends such as these are sometimes expressed as the second derivative; that is, as a measure of change in the rate of change. In the case of events 1, 3, 5 and 7, the rate of change is a consistent pattern of <both-pitches-up-a-semitone>. In the case of events 2, 4 and 6, the rate of change is a consistent pattern of <both-pitches-down-a-semitone>. When a significant change in the rate of change occurs, a boundary or transition point is formed.[60] In this case, an intervallic departure from the interlacing scheme at event 8 marks such a transition point.

Common fate grouping is also at work in the passage from Sciarrino's Fifth Piano Sonata shown above in Example 2.10. As noted above, the soft events of time spans 1 and 3 are grouped together, primarily because they are similar to one another. The group is further strengthened, however, by the consistent melodic trend its events collectively form. Like the shifted cluster of dots in the visual example, the soft events are governed by a consistent trend. Clearly this musical passage is not a direct analogue of the visual example, particularly since the sound events are also distinguishable by other factors.

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[60] Typically, boundaries are formed not simply when the rate of change changes, but when change in the rate of change exceeds an established average range. Lefkowitz and Taavola use change-in-the-rate-of-change as the principal criterion for determining discontinuities in the algorithmic approach to auditory segmentation described in their article "Segmentation in Music: Generalizing a Piece-Sensitive Approach" (2000). See also Tenney and Polansky, "Temporal Gestalt Perception in Music" (1980) and Hasty, "Segmentation and Process in Post-Tonal Music" (1981).

Nonetheless, it adequately illustrates that affiliation to an established trend strengthens group allegiance.[61]

In much the same way that common fate grouping in Example 2.10 ceases with the introduction of event 8, a sudden and substantial change of register at the outset of time span 5 in Examples 2.09 and 2.10 marks the end of one stream and the beginning of another. This change breaks the repeating melodic pattern, thus constituting a significant change in the rate of change. As a result, a transition point is formed between the two streams of soft, ascending events. Within each stream, however, common fate increases integration among constituent events, and thereby the likelihood of its being perceived as a Φ-state.

The most important principles governing the integration of sequential events have now been addressed. These include the principles of belongingness, proximity and similarity, good continuation (including the related concepts of masking, perceptual completion and the continuity illusion), and common fate. The continuity arising from sequential integration is critical to Φ-state emergence, but it alone will not yield such a perception. Discontinuity is also required.

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[61] Masking, as discussed above, increases the strength of this trend even further.

2.2 Contextual Distinctness

In order for a time span to be perceived as a Φ-state, it must be contextually distinct—that is, independent with respect to all proximate time spans. Its events must form a perceptual unit that is not only "internally cohesive" but also "externally segregated from comparable time-spans immediately preceding and following it."[62]

The qualities of "internal cohesiveness" and "external segregation" are essential to the establishment of Φ-spans as groups. According to Christopher Hasty, it is precisely the quality of being "simultaneously differentiated and undifferentiated" that creates structure:

> ... a structure has two aspects. First, it must have unitary value in some domain, that is, there must be no change of value in this domain which would cause it to be broken up into subcomponents. Secondly, it must be distinguished as an object of our attention by possessing a difference of value in the same domain compared with another object. [63]

In other words, structure requires relative consistency within a time span and relative inconsistency at its boundaries. A Φ-span represents the case limit of this structural phenomenon: extreme parametric consistency throughout its duration and extreme parametric inconsistency at its initial and terminative transitions. The former has already

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[62] Tenney and Polansky, p. 205. They call such a time span a "temporal gestalt-unit."
[63] Hasty, "Segmentation and Process in Post-Tonal Music," p. 58.

been addressed by way of sequential integration. The latter will now be addressed through the concept of contextual distinctness.

Contextual distinctness, as noted above, refers to the sense of perceptual autonomy that certain time spans evoke. This notion of autonomy with respect to neighbouring time spans is integral to the idea of distinct perceptual units. Boulez's metaphor of a time-bubble, for instance, embodies this notion. Karlheinz Stockhausen's concept of a "moment" also speaks to this point: "Each moment ... is individual and self-regulated, and able to sustain an independent existence."[64] The same sense of perceptual autonomy applies to Φ-states. Such a perception is only possible however if the events comprising a particular time span do not integrate with those comprising proximate time spans.

In order for a time span to be perceived as contextually distinct, the discontinuities leading to its segmentation must be extreme. Its transitions must feature sudden and substantial parametric change. Whereas vague or gradual transitions promote the integration of a given time span into a larger context, sharp transitions promote contextual distinctness. The sharpest transitions are often those delineated by silence.[65] It

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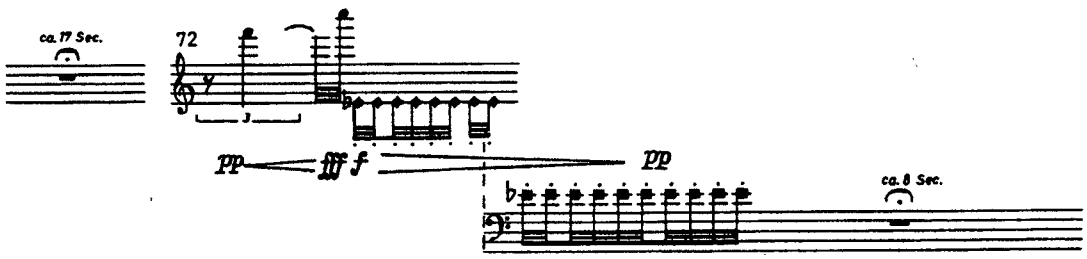
[64] This description pertains specifically to Stockhausen's notes on *Kontakte*, reproduced in Karl H. Wörner, *Stockhausen: Life and Work*, trans. Dill Hopkins (London: Faber, 1973), p. 46.

[65] Judy Lochhead makes a similar assertion in "Temporal Structure in Recent Music," in *Understanding the Musical Experience*, ed. F. Joseph Smith (New York: Gordon and Breach, 1989), p. 145.

therefore follows that the articulation of a time span's initial and terminative transition points by silence contributes most strongly to its perception as a Φ-state.

William James noted that in consciousness there are periods of activity separated by periods of rest. These periods of rest are critical in articulating the periods of activity. According to Alfred Schutz, musical units are perceived in precisely the same manner.[66] An extended silence tends to form a definitive transition point because it not only constitutes the termination of sound but also causes the termination of a conscious act.[67] Although Schutz's assertions were made in reference to phrases and themes from tonal music, the principle applies equally well—if not better—to more distinct musical units, such as Φ-spans. Consider the following excerpt from Lachenmann's *Dal Niente*:



Example 2.11. Musical unit articulated by flanking silences;

Lachenmann's *Dal Niente*, systems 71–72.

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[66] For further discussion of correlations between James and Schutz, see Skarda, p. 77.
[67] This why short silences can be bridged by the cohesive effect of trends but long silences cannot.

Despite the fact that system 72 contains three highly disparate modes of sound production and twenty separate events, its events are unified largely because they are presented in a series that is directly preceded and followed by long silences. It therefore appears that the flanking of a series of events by periods of rest serves not only to integrate the events as a group but also to segregate that group from context.

Although transition points are often delineated most clearly by silence, change in any musical parameter can form a strong unit boundary. Snyder asserts that since sound is inherently temporal, the "boundaries of auditory events are defined by various degrees of *change*."[68] Indeed every parametric change of value represents some level of discontinuity. Segmentation, however, is typically determined on the basis of *sharp* transitions, which are marked by sudden and substantial change. Tenney and Polansky, for example, base the delineation of group boundaries not merely upon change but upon the *magnitude* of change preceding and following a given time span.[69] Lefkowitz and Taavola, similarly, advocate *significant* change-in-the-rate-of-change as the principal criterion in determining group boundaries.[70] In this way, substantial reductions of activity in various parameters can—like silence—constitute (relative) periods of rest, and thus mark transition points between Φ-spans.

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[68] Snyder, p. 32.
[69] Tenney and Polansky, p. 209.
[70] Lefkowitz and Taavola, p. 177.

As noted earlier, contextual distinctness and sequential integration are grouping factors. They are necessary to the designation of a time span as a Φ-span. However, while all Φ-spans are groups, not all groups are Φ-spans. In order for a time span to be perceived as a Φ-state, it must evoke not merely a sense of internal continuity and external discontinuity but also a sense of enduring presence. The next two sections address important factors leading to such an evocation.

2.3 Non-goal-directedness

Non-goal-directed event-sequences evoke a sensation of indeterminacy characterized earlier as surroundability. A time span capable of evoking this sensation is more likely to be perceived as a Φ-state.

A Φ-state was defined earlier as a present awareness that persists without prospect of ending. This not to say that a Φ-state is endless or even that it appears thus, only that the events upon which its evocation depend do not project a teleological trajectory. While events constituting certain time spans may seem to be directed toward predictable goals, events constituting Φ-spans do not. Non-goal-directedness is often the defining quality of such a span. It is the impetus for the sensations of indeterminacy that preclude a listener from protending an end within the span.[71]

The distinction between goal-directedness and non-goal-directedness is one of degree. In particular, it is determined by relative sensations of determinacy and indeterminacy. Time spans evoking a strong sensation of determinacy are recognized as goal-directed, and time spans evoking a strong sensation of indeterminacy are recognized as non-goal-directed. Employing the terminology established in Chapter 1, we can say that while goal-directed time spans evoke a sensation of directionality, non-goal-directed time spans—such as Φ-spans—evoke a sensation of surroundability.

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[71] The broader concept of collective nonlinearity is discussed in the next section.

The quality of non-goal-directedness (and the corresponding sensation of surroundability) began to emerge as a characteristic of art music in the twentieth century. The fragmentary sections of Debussy's *Jeux* (1913), for instance, do not direct a listener toward easily predictable goals. In this way, the work anticipates the non-goal-directed "block form" approach to composition prevalent in the latter half of the century. Other early examples include the second movement of Webern's *Symphony* (1928), which features distinct constellations of closely related material, and Messiaen's *L'Ascension* (1931–35) and *Quatuor pour la fin du temps* (1941), whose movements feature a quality of self-containment that diminishes protentions of closure. Although none of these examples evokes surroundability—nor therefore a Φ-state—all represent a move away from goal-directedness.

These baby steps toward harnessing the phenomenon of surroundability led to bounding leaps for Stockhausen and his Darmstadt contemporaries during the 1950s and 60s. Although several eminent composers of the Darmstadt school arrived at a similar aesthetic position at roughly the same time, it is Stockhausen—owing in large part to his numerous writings on the subject—who is hailed as the father of non-goal-directed music. In his seminal 1963 article "Momentform" he describes the nonnarrative forms adopted by certain recent works.

> Musical forms have been composed in recent years which are remote from the scheme of the finalistic dramatic forms. These forms do not aim toward a climax, do not prepare the listener to expect a climax, and their structures do not contain the usual stages found in the development curve of the whole duration of a normal composition: the introductory, rising, transitional and fading stages. On the contrary, these new forms are immediately intensive and the main point which is made at once remains present at an equal level to the very conclusion.[72]

Stockhausen describes how non-adherence to the conventional dramatic arc creates an immediate and continuous intensity. This intensity—which "remains present at an equal level to the very conclusion"—precludes many formulas of closure. That is, when events are presented in such a manner as to defy the perception of any predictable formal model, they are likely to evoke sensations of surroundability.

It follows that a composer must be able to create a sensation of surroundability by ensuring that a given event-sequence does not convey patterns of closure. For example, events unfolding in a fashion contrary to the usual harmonic and metric processes of tonal music tend to diminish a listener's ability to predict musical goals.[73] Certain musical formulas are particularly associated with closure. These include dominant to tonic harmonic motion, stepwise melodic motion to a metrically accented tonic centre, melodic descent after a climax, reprise after a contrast, and so on. By avoiding formulas such as these, a composer can minimize a listener's sensations of goal-directedness and maximize sensations of non-goal-directedness, or surroundability.

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[72] Karlheinz Stockhausen, "Momentform," *Text zur elektronischen und instrumentalen Musik* 1 (1963): 189–210. Quoted in Seppo Heikinheimo, *The Electronic Music of Karlheinz Stockhausen*, trans. Brad Absetz (Helsinki: Acta Musicologica Fennica, 1972), pp. 120–121.

[73] Not all agents of predictability are necessarily antithetical to Φ-state formation. Pulse, for example, does not typically affect non-goal-directedness. This is because although the durations projected by a pulse are indeed realized, the *way* in which they are realized is unpredictable.

Sometimes the duration of a time span can affect its capacity to evoke surroundability, and therefore Φ-states. Duration cannot *cause* surroundability, of course, since surroundability is a moment-to-moment sensation and duration is unknowable until a time span has ended. Duration can, however, impact a listener's ability to detect teleological patterns and models. A brief time span, for instance, is less likely than a longer one to permit the detection of familiar patterns and models, and therefore more likely to be perceived as a Φ-state. Longer time spans, on the other hand, are more apt to convey such regularities. If a longer time span is to be perceived as a Φ-state, it must thwart a listener's attempts to detect teleological patterns. Hence Φ-spans are usually brief.[74]

Indeed Φ-spans often last for no more than a few seconds. Others can last for much longer. It is very difficult to say what the perceptual limits are on Φ-spans. Certainly some time spans are too short to evoke any sense of an enduring present, even if sequentially integrated, contextually distinct, and non-goal-directed. An event or event-sequence such as this—one that is too short to be a Φ-span yet too distinct to integrate with its context—may be referred to as a *protostate*.[75] Conversely, there may be some time spans too long to permit the continuance of an enduring present, despite being sequentially integrated and contextually distinct. In either case, however—a short time span or a long one—the likelihood of Φ-state evocation ultimately depends not on the

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[74] Shorter time spans make good candidates for Φ-spans also because they are usually easier to constitute as unified acts of consciousness than longer time spans.
[75] Examples of a "protostate" are shown in Examples 5.02 and 5.03.

duration of a time span but on the degree to which it is non-goal-directed; that is, the degree to which the detection of teleological patterns is thwarted.

A correlation between non-goal-directedness and duration is evident in a number of the musical excerpts cited earlier. Example 2.05, for example, shows an extended yet non-goal-directed time span from Ligeti's *Fragment*. This very long time span constitutes (a portion of) a Φ-span in part because its events avoid projecting an overall shape that might direct a listener's focus toward a goal. By way of contrast, consider the stream of soft events from Sciarrino's Fifth Piano Sonata shown earlier in Example 2.09. Although more processive in design, the soft events nonetheless constitute a Φ-span, in part because its duration is too short for the listener to develop significant expectations of directionality.

If expectations *are* permitted to develop—that is, if perceived events do direct a listener's attention toward a goal—then Φ-states are unlikely to arise. To choose an improbable example, let us consider one of Stockhausen's moment-form works. The 1972 "Europa Version" of Stockhausen's large chamber work *Momente* is generally regarded as the quintessential moment-form work, the practical embodiment of the concept. In order to fully understand the work, one must understand Stockhausen's conception of moment form. It is important to recognize, however, that his writings sometimes overstate certain aspects of his compositions. He speaks, for example, of a "timeless" and "eternal" present.[76] While his music made considerable strides in this direction, the impossibility

[76] Stockhausen, "Momentform," p. 189.

of thwarting expectation *completely* relegates many of his intentions to a theoretical (if not hypothetical) realm.

Only certain of the moments in *Momente* seem to possess the quality of non-goal-directedness to any significant degree. Typically the shorter moments are more successful in this regard. Others, such as the opening Moment i(k), serve only to negate the possibility of any such quality. With a duration of over 25 minutes and a sectional construction, Moment i(k) stands in direct opposition to Stockhausen's stated ideals of evoking an "eternal" present.[77] Moreover Moment i(k) does not constitute a Φ-span—not because of its considerable duration but because it permits goal-detection. As noted above, duration is only a consideration in determining Φ-spans in so far as it affects the perceived presence or absence of goal-directedness.

Non-goal-directedness has been shown to elicit sensations of surroundability, a quality necessary to the emergence of Φ-states. The next section examines why larger-scale indeterminacy is also necessary.

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[77] Stockhausen's subsequent comments further distance his music from his originally stated ideals. During a conversation with Jerome Kohl more than a decade after the completion of *Momente*, Stockhausen noted that "moment-forming" does not refer to a process of complete discontinuity wherein successive time spans share no connection. "It simply means," he explains, "that there *can* be moments which have no common elements ... and there are other moments which have a lot in common." (Karlheinz Stockhausen in conversation with Jerome Kohl, "Stockhausen on Opera," *Perspectives of New Music* 23/2 [1985]: 25.) As regards a work such as *Momente*, Stockhausen's observation is accurate. But this means that only a select few of the moments in the work are in fact the types of independent entities originally described by the composer. Ultimately, Stockhausen's addendum to his definition of a moment undermines an already dubious notion.

2.4 Collective Nonlinearity

A collectively nonlinear temporal experience is one in which a listener senses minimal directionality across multiple time spans. Such an experience is conducive to the emergence of Φ-states.

Collective nonlinearity refers to a temporal experience in which protentions of large-scale directionality are either very minimal or consistently unfulfilled (i.e., "emptily intended"). Each Φ-state is understood as being non-consequential with respect to earlier Φ-states. Whereas non-goal-directedness refers to a sense of indeterminacy arising from structures manifest *within* a given time span, collective nonlinearity refers to a sense of indeterminacy arising from structures manifest cumulatively across multiple (earlier) time spans. Although both sensations contribute to the emergence of Φ-states, the distinction is critical because a passage of music may contain time spans that, despite being individually non-goal-directed, collectively present certain predictable patterns.

Examples of large-scale teleological patterns include anything from basic processive schemes, such as a gradual progression from disorder to order, to conventional models, such as a set of successively presented variations. To the extent that these large-scale patterns are predictable, they elevate a listener's expectation of directionality, thereby diminishing the likelihood of Φ-state emergence. Collective linearity affects Φ-state emergence as follows: If a time span that fulfills all other conditions of a Φ-span is part

of a series of time spans that are *collectively* predictable in some way, then its intra-span nondirectionality (non-goal-directedness) is overridden by accumulated inter-span directionality (collective nonlinearity), and the span does *not* constitute a Φ-span. While the initial time spans in such a series may be perceived as Φ-states, similar time spans later in the series will not, due to the linearity inherent in the large-scale patterns that they collectively form.

Music devoid of large-scale teleological patterns, on the other hand, tends to diminish a listener's sense of directionality, thereby promoting a nonlinear experience of time. Whereas the seemingly consequential nature of events in linear music often permits the listener to form relatively accurate expectations about future events, the events comprising nonlinear music yield an experience that is all but bereft of such directionality. This is not to say, however, that the rate of experiential time is consistent.

A nonlinear temporal experience involves frequent variations in the rate of experiential time. In fact, according to Snyder, there is a direct correlation between the rate of experiential time a span elicits and the amount of information it contains.[78] He asserts that

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[78] The mathematical discipline known as *information theory* defines "information" as the amount of novelty a message contains and "redundancy" as the amount of non-informative repetition a message contains. Despite its name, redundancy is a very important component of a message. Without it we would not know what to expect next, and a maximally informative message would soon overload our short-term memory. Thus a meaningful message must contain both redundancy and information. That is, it must strike a balance between sustaining interest and allowing the recognition of familiar constructs.

> "boring" time periods with little information are experienced as being long ... Conversely, because our attention is actively engaged in the events themselves, time periods filled with unusual, informative sequences of events, can seem to flow very rapidly."[79]

This phenomenon, Snyder argues, derives from the frequent "violations of our expectations" that occur in a novel environment—violations that stimulate the processing of much new information. In a familiar environment, our expectations are frequently fulfilled, leading to little processing of new information, or redundancy. In other words, time passes most quickly when a listener is confronted with unfamiliar events, and slowest when a listener is presented with more familiar events.[80]

It is important to recognize that redundancy does not necessarily equate to parametric consistency. Parametric consistency promotes sequential integration, and is therefore conducive to the emergence of Φ-states. Redundancy, on the other hand, refers simply to non-informative repetition. Sometimes this repetition is superfluous, but other times it establishes syntax or other systems of rule. The former conveys no directionality and is conducive to the emergence of Φ-states. The latter, however—systems of rule—can constitute familiar musical models, such as teleological patterns. As established earlier, such patterns convey directionality, which discourages the emergence of Φ-states. Thus a Φ-span may contain both information and redundancy to widely varying degrees, so long as the redundancy does not convey directionality.

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[79] Snyder, p. 214.

[80] The novelty of musical stimuli diminishes, of course, with repeated listenings.

The effect of information and redundancy on the rate of experiential time can only be measured across multiple time spans since the perceived information and redundancy content of each subsequent span depends on its relationship to all previous spans. The first instance of a particular event type, for example, is often informative, and subsequent instances increasingly redundant. This relationship between familiar and unfamiliar events dictates the rate of experiential time. A highly nonlinear temporal experience involves an unpredictable array of familiar and unfamiliar events, and therefore an unpredictable and frequently changing rate of experiential time.

Stockhausen approaches the association between experiential time flux and information flux from the perspective of "surprise," arriving at an understanding of experiential time very similar to Snyder's.[81] According to Stockhausen, "the more surprising events [that] take place, the 'quicker' time passes [whereas] the more repetitions there are, the 'slower' time passes."[82] But too great a density of potentially surprising events quickly becomes just as predictable as repetition (i.e., familiarity). Thus the level of surprise does not necessarily increase with an increased density of discontinuities. "We stop expecting anything specific," Stockhausen explains, "and cannot be surprised."[83] Ultimately, the degree of information is greatest when "at every moment of a musical flow the *momentum of surprise* ... is the greatest ... But this means that the experiential time is in a state of flux, constantly and unexpectedly altering."[84]

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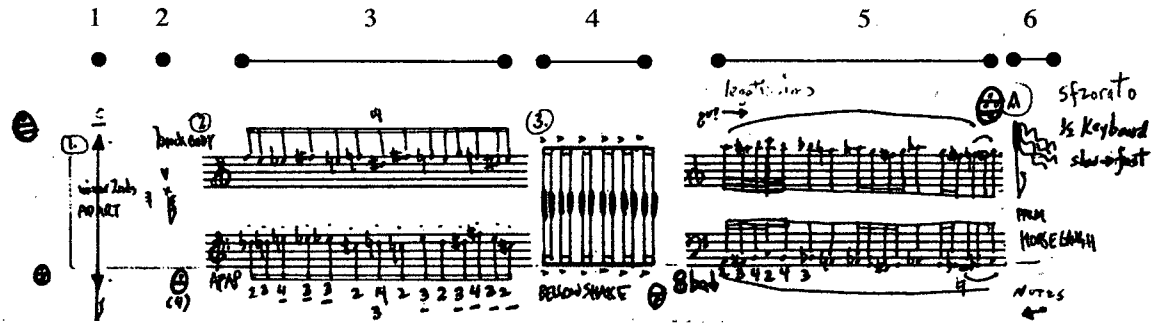
[81] The term "surprise" may be defined as a listener's reaction to unexpected discontinuity.
[82] Karlheinz Stockhausen, "Structure and Experiential Time," trans. Leo Black, *Die Reihe* 2 (1959): 64.
[83] Ibid.
[84] Ibid.

Collective nonlinearity was defined earlier as a temporal experience in which protentions of large-scale directionality are either very minimal or consistently unfulfilled. The above discussion of how perceived information and redundancy content affect the rate of experiential time allows us to better appreciate *why* it is that no protentions of large-scale directionality occur during such an experience: Experiential time is always in a state of flux.

2.5 An Analysis of Φ-spans in John Zorn's *Road Runner*

To illustrate all four factors leading to the emergence of Φ-states, let us analyze the opening system of Zorn's solo accordion work *Road Runner*, shown below.



Example 2.12. Opening system of Zorn's *Road Runner*, renumbered.[85]

In order to identify Φ-spans, we must first identify candidate time spans. Each span should be distinct from preceding, following, and, if applicable, concurrent spans, due to sudden parametric change. Once such time spans have been identified, we can determine which (if any) of them are Φ-spans by evaluating them according to the four factors described above. In order for a time span to be perceived as a Φ-state, the following should be true: its sequential events integrate through the perceptual mechanisms responsible for auditory streaming; it is distinct with respect to context; its event-succession does not suggest any goal; and it does not create any large-scale patterns with

[85] The oval symbols refer to various voices or reed combinations.

other time spans. To the extent that a time span satisfies these conditions, we can say that it lends itself to perception by a single act of consciousness in which the present endures.

The numbered points and line segments shown on the score are not Zorn's, but have been added to identify distinct time spans.[86] Let us now determine which of these spans is likely to be perceived as a Φ-state.

Sequential Integration in Road Runner

All time spans shown above feature short events. Whereas most contain many such events, time spans 1 and 2 contain but one attack apiece—time span 1 a widely voiced simultaneity dyad, and time span 2 a percussive strike to the body of the instrument. Sequential integration therefore does not apply to them, neither individually nor collectively. Time span 3 features a series of fourteen simultaneity dyads.[87] Horizontal belongingness among the events of each hand is very strong due in part to limited intervallic motion. Each stream moves primarily by step and never by more than four

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[86] Zorn's original rehearsal numbers seem to indicate a highly personal and inconsistent method. Sometimes the numbers correspond with group boundaries and other times they appear to be arbitrarily assigned, often including several groups within a singly numbered segment. For the purposes of this study, the segments have been renumbered according to distinct time spans, as demarcated by significant parametric changes.

[87] The bottom clef indication (superimposed treble and bass clefs) is ambiguous. One possible interpretation is that the bass clef may have been sketched in out of habit and later corrected to a treble clef. This assumption is consistent with Guy Klucevsek's performance of the piece on the recording *Guy Klucevsek: Manhattan Cascade*, Composers Recordings Inc. (CRI), CD 626, 1992.

semitones. The perception of these two streams as separate Φ-states is highly unlikely, however, due to the vertical belongingness afforded each pair of simultaneous events by the span's homorhythmic texture. The fourteen dyads also cohere as a result of a narrow and consistent register. (No simultaneity dyad extends beyond an intervallic span of six semitones.) Sequential integration in time span 3 is further strengthened by a consistency of loudness and timbre,[88] as well as by a synchrony of events both throughout the time span and at its initial and terminative time points.

Although time span 4 employs noise rather than pitch, its events are easily integrated by the consistency of their unusual timbre and rhythm. The simultaneity dyads comprising the following time span, time span 5, integrate for many of the same reasons that those of time span 3 integrate. These include limited intervallic motion, a homorhythmic texture, synchronous initial and terminative time points, and consistency of loudness and consistency of register. Although the dyads feature a five-octave span, they are nonetheless bound by the consistency of this span.

Each of time spans 3, 4, and 5 conveys a rhythmic pulse. Spans 3 and 4 feature regular attack points and durations, while time span 5 establishes subdivisions of interonset intervals and of durational values. In each case, the presence of a perceived pulse increases the level of sequential integration. Such is not the case for time span 6. However, its events do achieve cohesion in other ways.

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[88] Dynamic markings are used inconsistently in *Road Runner*. The assertion of dynamic consistency is based on the absence of any indication of change.

The events of time span 6 are integrated by a number of parametric consistencies, notably consistencies of loudness and, to a lesser degree, timbre. The primary integrating factor, however, is not a particular parameter but a principle: the principle of common fate. The events comprising time span 6 are unified by a readily apparent trend that their unfolding conveys. The score indications "palm" and "horse laugh," together with the accompanying musical notation, imply a generally descending series of tone clusters. Zorn indicates the range and shape of the gesture with the words, "1/2 keyboard" and "slow→fast." Although a gesture thus indicated lacks the specificity of a more traditional process of transformation, it nonetheless constitutes a processive change. As such, different parts of the perceptual field are perceived to be changing according to a single identifiable idea, and are integrated.

Contextual Distinctness in Road Runner

Time spans 1–6 all feature sharp initial and terminative transitions. Each is flanked by brief silence, and each silence is followed by a time span vastly different than the preceding span. Thus the singular respective events of time spans 1 and 2 constitute contextually distinct perceptual units, as do the sequentially integrated respective events of spans 3–6. The bellow shakes of time span 4, for example, garner contextual distinctness not only by virtue of their being flanked by silence but also by their being

preceded and followed by series of simultaneity dyads. In each case, no contextual linkage is evident between adjacent time spans.

Non-goal-directedness in Road Runner

Having established sequential integration and contextual distinctness for all six time spans (where applicable), we may consider them to be perceptual groups. In order to determine whether a particular group is likely to be perceived as a Φ-state, however, we must determine whether or not it is likely to evoke an enduring present. In other words, we must establish non-goal-directedness.

The highly disparate respective events constituting time spans 1 and 2 may be considered non-goal-directed, since they do not last long enough to permit a recognition of either goal-directedness or non-goal-directedness. In fact, time spans 1 and 2 do not last long enough to permit an evocation of enduring present. The two spans therefore constitute "protostates."[89]

The events of time span 3 also convey no sense of goal-directedness. They forecast no overall direction with respect to pitches, intervals, rhythms, contour, and so on. Time

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[89] A "protostate," as asserted earlier in this chapter, describes a perceptual unit that, while sequentially integrated (if applicable) and contextually distinct, is too brief to constitute a Φ-span.

span 4, similarly, projects no goal. It does, however, involve a pattern. But since this pattern in strictly repetitive, it permits no protentions of ending, only protentions of continuance. Time span 5 is much like span 3 in that it presents an unpredictable series of pitches, and may likewise be considered non-goal-directed.

Time span 6 is the only span that conveys a potentially linear process, namely, the so-called "horse laugh." This process, cited earlier as an integrating force, is the type of pattern that could permit sensations of goal-directedness, marginal though they may be. The downward contour and "slow→fast" attack pattern of such a process could allow a listener to predict general features of future events. In this case, however, the time span is so short that a listener does not have sufficient time to form any such predictions. Thus time span 6, as all previous spans, may be considered non-goal-directed.[90] More generally, we may conclude that, with the exception of time spans 1 and 2, which are protostates, each span is capable of evoking an enduring sense of the present.

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[90] Brevity, as noted earlier, generally contributes to the likelihood of a time span being perceived as a Φ-state. For time span 6, brevity is in fact necessary to thwart goal-directedness. Time spans 1–5, by comparison, need not be as brief as they are since they feature no internal teleological patterns. Indeed each could have been much longer without significantly diminishing non-goal-directedness.

Collective Nonlinearity in Road Runner

Each sequentially integrated, contextually distinct, and non-goal-directed time span of sufficient duration shown in Example 2.12 is likely to be perceived as a Φ-state, so long as its potential for evoking non-goal-directedness is not overridden by evocations of collective nonlinearity; that is, so long as the succession of preceding Φ-states does not convey a predictable large-scale pattern.

Certainly the bizarre, widely spaced simultaneity dyad constituting time span 1 does not cause a listener to expect the subsequent percussive knock constituting time span 2. Nor do these two events, individually or collectively, cause a listener to expect the subsequent series of fourteen narrowly spaced simultaneity dyads constituting time span 3. This series of pitched dyads, in turn, does not arouse an expectation of the bellow shakes constituting time span 4. In fact, no time span is understood as being consequential of the preceding span. Each new time span is a surprise. The opening time spans therefore evoke a highly nonlinear temporal experience. As such, the likelihood of Φ-state emergence is very high at the outset of the piece.

As each subsequent time span is experienced, however, a listener becomes progressively more aware of certain large-scale patterns. Most notable among these is a pattern of stylistic alternation. Beginning with time span 2, Zorn alternates less conventional time spans with more conventional ones. Unconventional time spans, such as spans 2, 4, and

6, tend to be represented in nontraditional, often graphical ways. More conventional time spans, such as the intervening time spans 3 and 5, favour staff notation and exhibit qualities such as pitch specificity and metric regularity. Although the details of the music remain highly unpredictable, this alternation between conventional and unconventional time spans elevates a listener's ability to predict certain aspects of future spans. (In this way, the structure of the passage reflects the structure of Road Runner cartoons, which are equally predictable.[91])

In addition to stylistic regularities, durational regularities also become evident early in the piece. While the durations of the opening time spans are initially unpredictable, a normative length is soon established, from which Zorn deviates very little. This normative length—a range of approximately one to four seconds—still permits unpredictability. However, a range this narrow ensures that the level of surprise due to durational variety remains relatively low. Together with the above-described pattern of stylistic alternation, consistency of time span duration elevates the level of perceived directionality. Despite the (potential) internal non-goal-directedness of the individual time spans, the temporal experience becomes progressively more linear.

The limited extent to which the opening system of *Road Runner* evokes nonlinearity stems from the nearly saturated capacity for surprise it evokes. As asserted earlier, surprising events yield a faster sense of experiential time and expected events a slower sense of experiential time; a nonlinear temporal experience entails many such

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[91] John Roeder has suggested to me that perhaps the even-numbered Φ-states represent the Road Runner and the odd-numbered Φ-states represent Wile E. Coyote.

fluctuations in the rate of experiential time. Yet the level of surprise does not always increase with an increased density of discontinuities. Too great a density of potentially surprising events eventually becomes predictable. By the end of the first system of *Road Runner*, the listener has learned what to expect: surprise. Soon very little temporal flux will be experienced and the momentum of surprise will effectively reach a plateau. Such a consistent, directional sense of time is not conducive to sensations of an enduring present, nor therefore to an evocation of Φ-states.

The above analysis suggests that not all sequentially integrated, contextually distinct, and non-goal-directed time spans are likely to evoke Φ-states. Sometimes a listener will perceive a given time span to be part of a larger-scale pattern. The recognition of such a pattern produces a sensation of directionality that can preclude Φ-state emergence. In *Road Runner*, time spans 3–6 were determined to be excellent candidates for Φ-spans. With each successive Φ-state, however, a listener becomes more aware of a large-scale pattern manifest in their succession. This pattern—which is readily apparent by the end of the opening system—yields a sense of linearity that will eventually override a listener's initial sense of nonlinearity, thus precluding the emergence of Φ-states. In short, time spans 3–6 are likely to be perceived as Φ-states but similarly distinct subsequent spans are not.

A collectively *nonlinear* experience, by comparison, produces no significant sensations of directionality.[92] Instead experiential time remains in a state of flux, and each present awareness can be made to endure. But such an experience requires the processing of a large amount of information. The next chapter examines in detail some of the ways the brain reduces the amount of information it must process by categorizing groups of events. In particular, the discussion focuses on how a perception of invariance across certain Φ-states causes them to be grouped together into a particular *class*.

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[92] A passage of highly nonlinear music is examined in Chapter 6.

Chapter 3

Φ-STATE CLASSES

The previous chapter outlined four factors contributing to the emergence of a Φ-state. These factors reflect phenomena occurring on various levels of contextual awareness. Sequential integration and non-goal-directedness refer to phenomena occurring primarily as a result of events contained within a Φ-span, while contextual distinctness refers to phenomena occurring primarily as a result of the relationship between a Φ-span and its immediate context. Collective nonlinearity extends the scope of contextual awareness even further, referring to a temporal sensation manifest across multiple Φ-spans. A listener will attempt to form associations on all of these perceptual levels.

At the level of primal impressions, certain events will associate or dissociate with one another to form groups. Local grouping effects such as these are responsible for sequential integration and contextual distinctness. At the level of multi-span awareness, these smaller groups will associate with one another to form larger (conceptual) groups. This chapter addresses the process by which these larger-scale grouping effects facilitate

associations among Φ-states: the process of Φ-state classification. Before examining this process, however, we must address the concept of identity on which it is based.

3.1 Identity

It is a familiar act of cognition to compare and contrast experiences. Indeed, as we have seen, our experience of the present is conditioned to some extent by our recollections. Our experience of Φ-states, for example, engages memories of past Φ-states. It is also a familiar cognitive act to classify our remembered experiences—that is, to *identify* them as belonging to categories.[93] An identity therefore refers to the abstract mental construct by which an object is categorized. We identify our daily activities, for example, as belonging to categories such as meals, work, dreams, and so on. Similarly, we cognize music categorically, assigning identities to our experiences by comparing and contrasting them. This applies to Φ-states as well as to more traditional musical experiences. The following discussion addresses the idea of identity by reconciling certain cognitive-scientific concepts with philosophical accounts of perception. In particular, the notion of *intentionality* will be used to link the psychological concept *schema* with the philosophical concepts *determinable-X* and *eidos*. These concepts are important because they describe the way we associate and dissociate the different Φ-states experienced in a piece of music based on abstract identities that I will call *Φ-state classes* (or simply *classes*).

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[93] The word "category" is used here in a general sense, not in a strictly phenomenological sense. (This distinction is important because "category" is also a phenomenological term referring to a syntactical articulation of an experienced object. For example: A tree is a simple object, but the fact that the tree is green is a categorical object.)

Schemas

A schema is a learned mental construct that represents a particular familiar situation. According to Albert Bregman, each schema "incorporates information about one particular regularity in our environment."[94] Examples of schemas in music include anything from "the sound of pizzicato strings" to "the structure of a double period." "Anything that is being 'listened for'," Bregman asserts, "is part of a schema."[95] A schema can be something quite specific such as the sound of a mezzo forte concert C on a trumpet, or something more vague and amorphous such as the sense of rubato playing. But schemas are not limited to musical constructs learned *before* listening to a given piece of music. Constructs learned *during* the experience of listening to a piece of music also constitute schemas. Bob Snyder, following Tenney (1988), outlines two types of learned groupings that reflect these two categories of schemas: objective sets and subjective sets.[96] An "objective" set is defined by

> ... grouping effects established in and unique to a particular piece of music, which are learned during the course of listening to a particular piece, and which have to do with expectations unique to and established *during that piece*, such as recognizing a musical theme and its transformations.[97]

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[94] Bregman, p. 666.
[95] Ibid., p. 667.
[96] The terms "objective set" and "subjective set" refer, respectively, to a reliance on short- and long-term memory. As such, the terms do not imply any ontological or phenomenological distinction.
[97] Snyder, p. 45. See also James Tenney, *Meta Hodos and Meta Meta Hodos: A Phenomenology of 20th Century Musical Materials* (Oakland, CA: Frog Peak Music, 1988), p. 44.

The recurring time spans of soft, rapid, scalar material in Lachenmann's *Dal Niente*, for example, such as the one shown earlier in Example 2.04a, result in the formation of an "objective" (i.e., piece-specific) set of schemas. A "subjective" set, on the other hand, is defined as

> ... grouping effects that are part of a *style*, which are learned during the course of listening to *many* pieces, and which involve expectations established across many pieces that are *similar* in some way.[98]

The basic structure of the opening system of Zorn's *Road Runner*—which entails an alternation between more conventional and less conventional musical passages—reflects an accessing of "subjective" (i.e., general) sets. The various time spans can only be designated "conventional" or "unconventional" if a listener has internalized enough music to form a variety of style-based schemas.[99]

Bregman likens the concept of a schema to Noam Chomsky's notion of the deep structure of a sentence. For Chomsky, the deep structure is "a description of a sentence that separately and explicitly describe[s] all the underlying syntactic forms and display[s] their interrelationships."[100] Bregman applies this definition to the attentional act of listening to music, asserting that a listener parses the sensory input in order to perceive its deeper structure. But a listener can only arrive at a deeper structure if he or she has built up "a description of the regularities in the world that [shape] the evidence of our

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[98] Ibid.

[99] As illustrated by the analysis of *Road Runner* presented in Chapter 2, wherein style-based schemas are shown to influence perception even after time spans cease to be perceived as Φ-states, the process of classification is not limited to Φ-states; it can apply to perceptual groups of any kind.

[100] Noam Chomsky, *Aspects of the Theory of Syntax* (Cambridge, Massachusetts: The MIT Press, 1965), pp. 16–18 and 136. See also Bregman, p. 34.

senses"[101]—that is, schemas. The listener then attends for those regularities while listening to a composition. "Selecting the correct schema to process a situation," Snyder asserts, "is the basis for the process of *understanding*."[102]

The selection of schemas is typically an unconscious act, though they can be summoned consciously as well. In either case, they serve to identify and classify perceptual units. Bregman explains the effects of schemas by describing them as cognitive agents:

> ... schemas become active when they detect, in the incoming sense data, the particular pattern that they deal with. Because many of the patterns that schemas look for ... extend over time, when part of the evidence is present and the schema is activated, it can prepare the perceptual process for the remainder of the pattern.[103]

In other words, when conformance to a pre-formed abstract pattern is detected in the incoming data, that pattern or schema is activated. During the act of listening to music, it is particular sonic events or sets of events that trigger schemas. These schemas then shape our expectations through what Bregman calls "schema-governed attention." Triggered schemas typically remain semi-active, thus forming the context for our conscious awareness.

Bregman's concept of schema-governed attention is closely related to Husserl's concept of protention. Protentions, as established earlier, point toward possible future events in

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[101] Ibid., p. 35.
[102] Snyder, p. 96.
[103] Bregman, p. 666.

the form of "empty intentions." Some of these intentions will be filled and others will be abandoned. In either case, consciousness is directed by intentionality.

Intentionality

Intentionality derives from a process of *individuation.* That which one perceives, at any given instant, depends on that which one intends at that instant as the object of one's conscious act. Thus all perceived objects are individuated. It is not necessary to exhaustively individuate all of an object's constituent parts, however, in order to perceive that object.[104] A melody, for example, is typically perceived without the listener having to individuate each note. Instead a listener intends groups of perceptually integrated events. (It is sometimes possible for a listener to intend each note successively as the object of a separate act of consciousness. Furthermore it is sometimes possible, while individuating each note in a melody, to also individuate the melody itself.)

All conscious experiences are characterized by "aboutness." Every act of seeing is a seeing *of* something, every act of hearing is a hearing *of* something—intentionality shapes all experience. For Husserl intentionality is nothing less than the fundamental structure of consciousness. Everything we experience is correlated in this structure. Don Ihde describes the importance of intentionality to Husserl's phenomenology as follows:

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[104] For a more detailed description of the concept of individuation see Miller, p. 137.

> For Husserl the center of attention and of all experience is "intentionality," that essence of experience to be directed towards, to be "aimed" at. And ... the concern is to take note of, to describe, and analyze the ways that directedness takes place in both language and perceptual and imaginative experience. The things which are intended and the acts by which their meanings are constituted occupy [Husserl's] phenomenology centrally.[105]

Ihde's comments reflect a crucial phenomenological distinction. In describing Husserl's concept of intentionality, he is careful to distinguish between "the things which are intended" and "the acts by which their meanings are constituted."[106] This relationship between the intentional structures of acts and their correlative objects is the centrepiece of Husserl's science of consciousness. This relationship is known as the noetic-noematic structure of consciousness.

Douglas Bartholomew defines intentionality as the "directedness of experience towards objects (whether real, dreamt, imagined, seen, or heard)."[107] This amending clause—*whether real, dreamt, imagined, seen, or heard*—accounts for the fact that one can imagine a tree, for example, without it actually being present or even actually existing. But regardless of whether or not the object of the act exists in the physical world, the act

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[105] Ihde, p. 18.

[106] This distinction is important for several reasons, including the avoidance of an existential polemic. For Husserl, intentionality was a way to revive Descartes' *cogito ergo sum* without delving into ontological questions regarding actual existence. Husserl describes his intentional structure as *ego-cogitatio-cogitatum*, or the self, its acts of consciousness, and its objective correlate. (See Dermot Moran, *Introduction to Phenomenology* [London: Routledge, 2000], p. 16.) Merleau-Ponty's subsequent view of intentionality, by comparison, was one in which consciousness and being are so intertwined in a symbiotic relationship that they cannot possibly be separately conceptualized. (See Maurice Merleau-Ponty, *Phenomenology of Perception* [1945], trans. Colin Smith [New York: Humanities Press, 1967].)

[107] Bartholomew, p. 3.

must have a meaningful correlate. Since the intentionality of a mental act does not necessarily require a physical stimulus, Husserl concludes that the act must be directed toward something more abstract than a stimulus. Husserl calls this "something"—the object-correlate of experience—the *noema.* Each act is associated with one noema that directs the act toward its perceived or imagined stimulus.

Ihde clarifies the distinction between the noema and its corresponding act of consciousness as follows:

> Within experience overall there is that which is experienc*ed*, that called the *object-correlate* or the *noematic* correlate [noema]. And, in strict correlation with the *noema*, there is the act of experience or the experienc*ing* which was the "subject-correlate" or the noetic act [noesis].[108]

The *noema*, therefore, is the object of experience, and the *noesis* the act of consciousness that apprehends that object.[109] As regards listening, the noema is the mental constitution of that which is experienced and the noesis is the act of experiencing this constitution.[110] Thus a Φ-state is a particular type of noema, and the act of consciousness—including all the perceptual processes we have discussed—is a noesis.

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[108] Ihde, p. 35.
[109] The terminology of Husserl's intentionality is difficult to define, in part because his position evolved over his lifetime. The precise nature and extent of these evolutions, furthermore, is an ongoing matter of debate. The position presented in this study relates most directly to Husserl's *Ideas I.*
[110] Bartholomew, p. 15.

The Determinable-X and Eidos

Apart from the elegant terminology it employs, what makes this phenomenological description so apt for describing Φ-states is its analysis of the *structure* of the noema. The noema of any object comprises a set of attributes and a determinable-X. Attributes, also called attribute-meanings, are the means by which the abstract properties of physical things present themselves to the consciousness. Common musical attributes include perceived qualities such as pitches, levels of loudness, and types of timbre—but not the physical correlates of these qualities. But just as an actual event is not merely a bundle of physical properties, the noema is not simply a collection of perceived attributes.[111] The object of an experience is determined separately from its specific attributes. The determinable-X is an abstract mental construct that carries the perceived properties of an object, thereby determining that object.[112] Husserl describes the determinable-X as the *bearer* of the noema's attribute-meanings.[113] The concept of a determinable-X thus

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[111] Miller, p. 60.

[112] The determinable-X is but one aspect of the complexly structured noema. For a more detailed account of the components comprising a noema see Miller, pp. 16–32 and 55–63.

[113] Husserl's use of the word "bearer" must not be confused with the ontological use of the same word wherein physical objects are distinguished from their properties. (See Miller, p. 61.)

makes a distinction between an intended object of consciousness—such as a Φ-state—and its attributes.[114]

Let us consider what it means to say that each determinable-X represents the identity of the object it determines. In vision, the identity of an object is established during an initial act of consciousness, and is refined by comparing different acts directed at that same object. By experiencing a single object from different perspectives, Husserl asserts, "the self-same intentional 'object' separates itself off self-evidently from the shifting and changing 'predicates'."[115] Schutz characterizes this process as a bringing into congruence of "the recollection of a past experience of the same object of thought ... with a renewed originary experience of the same."[116] In other words, the identity of the determined object—that is, its determinable-X—is established through the recognition of invariance across multiple acts of consciousness directed at that object.

Husserl refers to this invariant structure as the *eidos*, or essence, and the acts through which it is established as *eidetic variation.* According to Bartholomew, "the eidos is what remains invariant in all possible variations of a thing, imaginative or otherwise."[117] We

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[114] Miller uses the term "determinable-E" rather than "determinable-X" when referring to the noematic meaning of a perceptual act that is directed at an event or course of events. (See Miller, p. 118).

[115] Edmund Husserl, *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, First Book* [1913], trans. F. Kersten (The Hague: Martinus Nijhoff, 1982), pp. 365-366; Husserl uses the term "predicates" whereas Miller prefers "attributes." I have adopted the latter term.

[116] Alfred Schutz, "Fragments on the Phenomenology of Music," in *In Search of Musical Method*, ed. F.J. Smith (London: Gordon and Breach, 1976), p. 50.

[117] Bartholomew, p. 5.

know features are eidetically necessary to an object if we cannot remove them without destroying it.[118] Ihde distills Husserl's concept similarly, noting that eidetic structure is discerned in phenomena through what he calls Gestalt experience, a single experience that shows an essential structural feature.[119] Thus the search for identity involves the discerning of an invariant structure (eidos) through acts of consciousness (eidetic variation) directed at the invariant attributes of a single object.[120]

Although we have approached eidetic variation in the context of visual perception, it applies to any conscious experience. "There is an essence of motion, of sound, of the musical note, and so on," Husserl explains, "material essences belonging to the different regional ontologies."[121] Robert Sokolowski cites our ability to recognize a famous work such as Mozart's Haffner Symphony, despite the fact that all performances of it are different, as evidence that the principle of unity in a manifold applies also to temporally apprehended objects. "The identity," Sokolowski asserts, "transcends its manifold of presentations."[122] Miller conceives of eidetic variation in a similar way:

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[118] Sokolowski, p. 179.
[119] Ihde, p. 30.
[120] This notion of eidetic invariance is distinct, however, from the notion of the empirical universal in natural sciences. (See Miller, pp. 186-189.) Whereas science is an explanation of nature, phenomenology is a description of experience; the eidos exists only as an abstract mental construct.
[121] Husserl, *Ideas I*, p. 7.
[122] Sokolowski, p. 30.

> Eidetic variation, according to Husserl, is a *sui generis* human capacity whose manifestation is a *sui generis* species of act, and we "exercise" this capacity throughout the different contexts of our intellectual activity. It is our eidetic capacity which enables us, for example, to *taxonomize* [stimuli] and to *discern regularities* among [them], thus making the science of nature possible.[123]

In short, the process of establishing identity through multiple acts of consciousness applies to any cognitive activity.

Eidetic variation requires the setting aside of certain taken-for-granted beliefs—reducing, as it were, not experience itself but presuppositions about experience. Husserl employs the Pyrrhonic term *epoché* to describe the suspension of the "natural attitude" that is necessary in order to perform this phenomenological reduction.[124] This bracketing of our presuppositions is designed to reveal the transcendental structures of consciousness. In music, this might involve the setting aside of beliefs regarding the linearity of the listening experience, the goal-directedness of music, the directionality of music, and so on. Once a presuppositionless state of consciousness is achieved, eidetic variation can occur. The aim of the eidetic variation is the very aim of phenomenology, to provide universal knowledge about the intentional structure of acts of consciousness. Eidetic variation therefore refers to that aspect of consciousness that allows one to grasp the universal in the individual—the essence.

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[123] Miller, p. 187.

[124] Husserl postulated a number of versions of the phenomenological reduction, and later the transcendental reduction. Each version of the reduction involves a number of procedural steps. (See Miller, section 9.2 for further details about Husserl's concept of reduction.)

Eidos refers to the same phenomenon of identification as does the determinable-X. The comparative process whereby the determinable-X is established is none other than eidetic variation, and the determinable-X—the identity of an object—is none other than the eidos. Only a semantic difference distinguishes the two terms. This difference lies in the respective methodologies from which each arises. Husserl introduces the concept of the determinable-X specifically to illustrate the distinction between an intended object and its attributes, whereas the concept of the eidos directly addresses the phenomenon of structural invariance.

Husserl's concept of the determinable-X, as noted above, pertains to multiple acts of consciousness on a single, visual stimulus. The idea is that by experiencing a stimulus from multiple perspectives, one can gain a truer understanding of the essential structure of that experience. Bartholomew refers to this process as *unity in a manifold.*[125] Identity is established through the recognition of invariance (i.e., unity) across different acts directed at the same stimulus. In music, however, a given physical stimulus can be experienced only once, and from but one perspective—beginning to end.[126] One cannot examine it from various perspectives the way one might a visual stimulus. For this reason, temporal stimuli are conceived in a considerably more abstract way than spatial stimuli. A listener cannot walk around a melody in order to gain further understanding, as

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[125] Bartholomew, p. 25.

[126] Throughout this study, the act of listening refers to a single continuous experience, usually of an entire piece of music. The ceasing, altering, or replaying of the music, by any means, would change the phenomenological implications of this experience.

an observer might a sculpture. It is for this reason that Ihde describes eidetic variation as a Gestalt experience wherein essential structure is conveyed. This single, unified experience establishes the identity, or eidos, of musical objects.

If, however, other musical objects with very similar identities are subsequently detected—that is, if invariant structures are discovered—then the eidos becomes refined. As noted earlier, this is because the identity of a musical object is established not through multiple acts on a single stimulus but through comparisons of acts on temporally distinct stimuli. Miller provides a clear description of this reinterpretation of the Husserlian model:

> ... my experiencing the (purported) object at t_2 as being the same (purported) object I experienced at t_1 does *not* consist in an attributive "re-identification" of the (purported) object. Instead, it consists in a straightforward *identification* of the (purported) object of my present act with the (purported) object of my previous act by *prescribing an identity* to the presently experienced object with the earlier experienced one.[127]

We may therefore conclude that an identity association is made between a present object and a remembered object when structural invariance is recognized.

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[127] Miller, pp. 71-72.

The various phenomenological essences established throughout a listening experience function much like schemas.[128] Adopting Bregman's style of describing cognition, we can say that an eidos, once established, is "triggered" when our perceptual mechanisms detect structures congruent with those defining the eidos. Even when not "triggered," an established eidos remains semi-active, contributing to the context for conscious awareness and guiding our expectations by intentionality. Miller explicitly notes the connection between the concept of the determinable-X to that of a schema.

> Husserl's own discussion of the determinable-X ... seems to be motivated, in part, by a basic ... intuition that the attribution of cross-act identity to the (purported) objects of our perceptual acts is a *primitive* feature of our conscious activity, something like a "schema" in terms of which our empirical experiences are passively (involuntarily) organized.[129]

In short, the concept of intentionality links various accounts of perception—specifically, the psychological concept of the schema and the phenomenological notion of identification, as illustrated through the concepts of determinable-X and eidos. In the next section, this intentional process of identification forms the basis of Φ-state classification.

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[128] As such, essences imply no ontological status, no sense of a priori. They are revealed only as the music unfolds, and are therefore piece-specific. A piece of music may thus be seen as its own microcosmic world (though it may involve other associations—musical or non-musical—outside itself). Identity associations within such a world define its phenomenological structure.

[129] Ibid., p. 74. Miller's use of the word "primitive" does not reflect a distinction between preattentive and attentive mental processes to the same extent as does Bregman's use of the word. Both connotations do refer, however, to involuntary conscious activity.

3.2 Classification through Identity-linkage

In the previous section, it was established that each temporally apprehended object possesses an identity, which is immediately given to consciousness. Sometimes this identity is refined and generalized through a comparative process whereby an invariant structure (eidos) is recognized across multiple acts of consciousness. By identifying the attributes that multiple Φ-spans have in common—such as particular characteristics of loudness, timbre, register, registral density, attack density, instrumentation, and so on—a listener establishes an abstract mental construct, or schema. This schema helps us categorize Φ-spans according to invariant structures recognized in all highly similar Φ-spans. In other words, the schema is the construct through which we derive the identity essential to all such Φ-spans—the eidos. Eidetic associations among Φ-spans constitute what Miller calls an *identity-linkage* among determinable-X's. He describes the concept as follows:

> The determinable-X associated with the present act is congruent with the determinable-X associated with my earlier act provided that there is an identity-linkage between the determinable-X associated with the present act and the determinable-X associated with [the] earlier act.[130]

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[130] Miller, p. 101.

Each identity-linkage between Φ-spans signals an invariant aspect of their structure, thereby reinforcing a previously established eidos.[131]

The act of identity-linkage is an act of classification whereby two distinct determinable-Xs are understood to share a basic identity, despite their differences. Once established, this identity begins to direct intentionality. When listening to Φ-spans, for example, one attempts to classify each new Φ-span according to its identity-linkages (if any)—that is, according to its association or non-association with established identities. The term "class" may therefore be taken to mean the identity—the eidos—that every Φ-span evokes, and which two or more Φ-spans may share.

The process of classification proceeds as follows: The first Φ-span in a piece establishes an identity based on its most salient attributes. Upon completion (either by silence or by some other type of discontinuity), the Φ-span's salient characteristics pass into memory, and can be recollected. As the next Φ-span is perceived, its attributes are compared to those of the first. If a high degree of dissimilarity is detected, identity-linkage is unlikely; if a high degree of similarity is detected, an identity-linkage is likely. When an identity-linkage does not occur, a new identity may form, based on the attributes of the second Φ-span. Such a Φ-span would be understood as the sole member or instance of its class (so far). When an identity-linkage does occur, the previously established identity is revised to

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[131] Identity-linkage is an innate, passive act involving no element of choice. "They [the determinable-X's of separate acts of consciousness] either are so organized, or they are not." (Miller, p. 102.)

include only the attributes common to both Φ-spans. In other words, attributes common to both Φ-spans are considered essential to their shared identity, and contrasting attributes nonessential.

For example, in the passage from Sciarrino's Fifth Piano Sonata shown earlier in Examples 2.08 and 2.09, an identity-linkage is made between the stream of soft, ascending notes in the top system (time spans 1–4) and the stream of soft, ascending notes in the bottom system (time spans 5–7).[132] Although the two streams (time spans 1–4 and 5–7) are perceived as separate Φ-states due to a sudden drop in register at the beginning of time span 5, they nonetheless share several prominent attributes. These include a very low level of loudness, a similar contour, and a monophonic texture of rapid events. (The issue of adequate specificity in describing attributes is addressed in the following section.) An identity defined primarily by these attributes is established during time spans 1–4, and reinforced by the highly similar time span 5–7. Despite their differences (such as register) the two time spans will be seen to share a single identity. That is, they will be understood as instances of a single class.

Time spans 2, 4 and 6 from the same passage also form an identity-linkage. This identity is based primarily on the following shared attributes: a high level of loudness, a comparatively wide registral range, comparative registral stasis, and comparative registral density. Again, despite their differences—notably with respect to precise pitch

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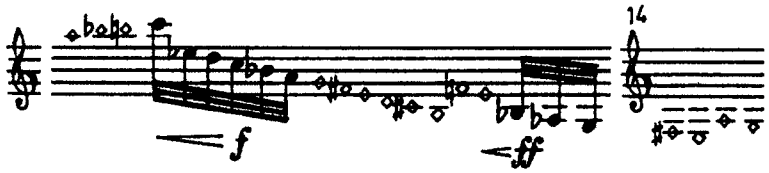
[132] It was asserted in Chapter 2 that, through a phenomenon known as the "continuity illusion," each stream of soft, ascending notes is understood to persist across the "masks" created by loud, static chords.

content—the three time spans will be seen to share a single identity, and a single class. The class to which time spans 2 and 4 belong, however, is clearly different from the class to which time spans 1 and 3 belong.

It is apparent from these examples that certain attributes are sometimes more important than others to identity-linkage, and therefore to class formation. However, this disparity is not fixed, it is dictated by context. In this case, register and level of loudness are the most important attributes in cultivating identity-linkage. In another passage it might be timbre and attack density, or perhaps pitch content. Regardless, it tends to be the attributes whose values change most significantly at Φ-state transitions that define classes. Consider the following example from Lachenmann's *Dal Niente*:

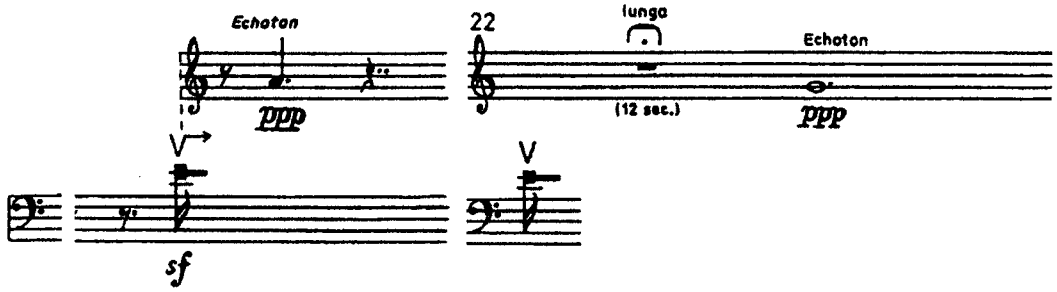


Example 3.01. Classes defined by significant parametric changes at Φ-state transitions; Lachenmann's *Dal Niente*, systems 13–14.

Two classes of Φ-spans are evident in this passage. One, represented by stemless diamond-shaped noteheads, associates all rapid, nearly inaudible pitched events. Another, represented by conventional notation, associates all rapid pitched events that are loud. Parameters such as register and rhythm do not distinguish the two classes. (Although one

class is rhythmically open and the other fixed, both feature such fast motion that no real distinction is apparent.) Instead, transitions between instances of the two classes are marked primarily by changes of loudness and timbre. Hence, these are the parameters that define the classes.

The presence of rests between Φ-spans does not impair a listener's ability to compare and contrast the parametric changes of earlier Φ-states with those of later ones. This fact is evident in the following passage, also from *Dal Niente*:



Example 3.02. Classes defined by significant parametric changes at Φ-span transitions, despite the presence of intervening rests; Lachenmann's *Dal Niente*, systems 21–22.

Example 3.02 presents two different classes of Φ-spans: breath-only sounds and traditional sounds. The former is represented by square noteheads and the latter by conventional notation. The transition from the first event to the second, although separated by an eighth rest, features significant changes of timbre and loudness. These parameters therefore define the respective classes of these two Φ-spans. The next two

transitions, although occurring across much longer periods of rest, maintain the same class definition. Although the pitched class of Φ-spans features a change of pitch from A4 to G4, this variation is understood to be relatively insignificant in light of the more significant changes of timbre and loudness. As such, the pitch variation is not a class-defining parametric change. Only significant parametric changes mark Φ-span transitions, and therefore class distinctions. In other words, classes are defined not simply by associations between contextually distinct Φ-spans, but by associations between Φ-spans that are contextually distinct *in the same way.*

The process of class formation, being an inherently temporal one, cannot be considered complete until the entire work in question has been experienced.[133] As a piece of music unfolds, a listener is constantly evaluating new information and re-evaluating previously (if tentatively) established associations. Invariably some expectations are confirmed and others denied; some associations are clearly drawn, others only vaguely. The effect of new information on established memories is well documented in psychological research. Snyder notes, for example, that "modifications to long-term memory can be made from short-term memory."[134] In short, Φ-state classes are always open to modification by subsequent instances. Conversely, subsequent instances can serve to strengthen a Φ-state

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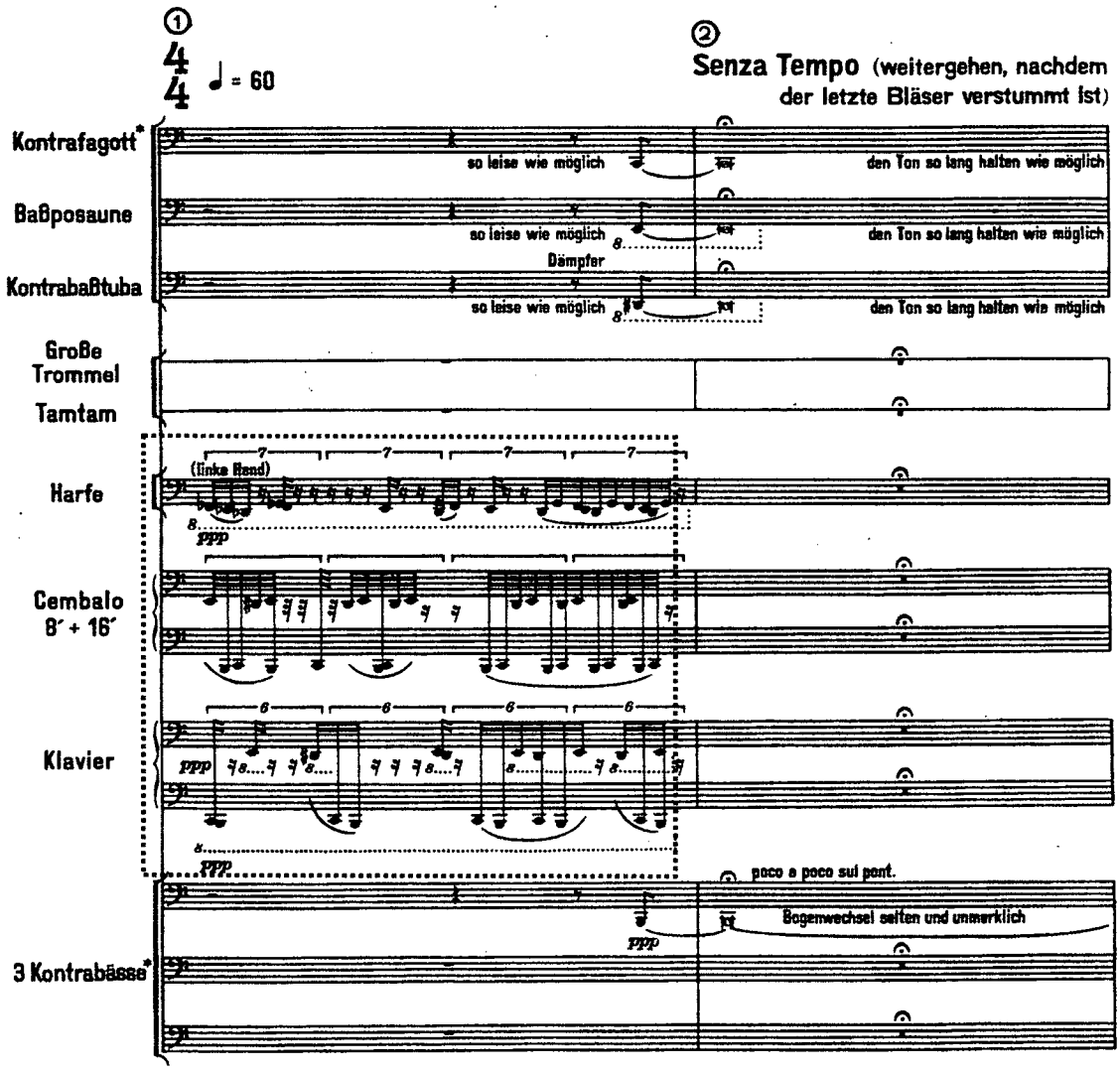
[133] Subsequent listenings tend to further refine the process of classification.
[134] Snyder, p. 10.

through repetition. These and other aspects of Φ-state classification are illustrated in the following analysis of Ligeti's 1974 chamber orchestra work, *Fragment.*

3.3 Classification in György Ligeti's *Fragment*

In order to address Φ-state classification in Ligeti's *Fragment*, we must first determine whether or not the candidate time spans manifest in the piece constitute Φ-spans. Let us therefore begin by quickly assessing the degree to which the opening time span, shown below, exhibits the qualities of sequential integration, contextual distinctness, non-goal-directedness, and collective nonlinearity.



Example 3.03. Time span 1; Ligeti's *Fragment*, m. 1.

The piece opens with a densely polyphonic texture. This texture, presented by the harp, harpsichord and piano, persists without interruption for four seconds. Just as it ceases, a long inert texture begins. Presented by an entirely new group of instruments—contrabassoon, bass trombone, contrabass tuba, and one double bass—this contrasting texture constitutes substantial parametric change. As such, it marks a

transition that closes the first segment. This opening segment will be called time span 1, as indicated in the above example.

Numerous factors point to the likelihood of time span 1 being perceived as a Φ-state. Perhaps most significant in this regard is its quality of contextual distinctness. Its initial transition is marked by silence, and its terminative transition by substantial changes in instrumentation and attack density. Thus time span 1 is perceived as a contextually distinct period of activity flanked by periods of relative repose—silence on one end and a single sustained sonority on the other.

In addition to contextual distinctness, sequential integration is also among the factors leading to its designation as a Φ-span. Belongingness among events results from a number of factors: a high attack density, a very low register, and a very low level of loudness. The events are further integrated by the synchronicity of onsets at the span's initiation and by the synchronicity of most releases at the span's termination. Finally, the absence of any established formal model ensures non-goal-directedness. The pitches, contours, and durations contained in time span 1 do not depict any familiar musical structures. A listener is therefore unable to predict musical goals. Surroundability ensues, and the present is made to endure. Time span 1 is therefore a Φ-span.

To reflect its new status, time span 1 will be renamed Φ-span A1. This designation indicates that its class, A, is the first to be established in the piece, and that this particular

Φ-span is the first instance of class A in the piece. Once experienced, Φ-span A1 forms a temporal Gestalt unit whose identity—and therefore class—is defined by a specific range of values in all of its primary attributes. I hear those attributes as follows:

Attributes of Φ-span A1 (time span 1)
Attack density: very high
registral density: high (micropolyphony[135])
register: very low
instrumentation: harp, harpsichord, piano
loudness level: very low

Example 3.04. Attributes of Φ-span A1 (time span 1) in Ligeti's *Fragment.*

The table lists only those attributes that are immediately apprehensible—those perceivable during listening. Thus any complex construct is an unlikely candidate. This approach reflects a general principle: The level of detail used to describe an attribute should reflect that which is reasonably perceivable during listening, not that which is conceivably derivable from a score. For example, the precise details of the micropolyphonic texture in A1 are probably not perceivable by anyone, and therefore are not included in the table. Even the pcset types 0145 and 0235—which might feature

[135] Ligeti coined the term "micropolyphony" to describe a compositional technique whereby numerous contrapuntal lines are layered and interwoven in order to produce a complex sound-mass whose individual parts are imperceptible. See György Ligeti, *Ligeti in Conversation* (London: Eulenburg Books, 1983), p. 128.

prominently in a score-based analysis—are excluded from the table because they are difficult to perceive at such an extremely low register. Moreover register and loudness level are described not as "B0–E2" and "ppp," respectively, but as "very low." (The level of specificity indicated by these descriptors is intended to reflect the perceptions of a moderately experienced listener. A highly experienced listener may perceive more specific attributes, and an inexperienced listener less specific attributes.)

In each case, these subjective descriptors are contextual. What might constitute "very loud" in one piece may be better described as "somewhat loud" in another. The idea is to characterize the essence of a temporal experience as accurately yet as succinctly as possible. It is important to recognize, however, that such a description defines the identity of a Φ-state *at the point of its cessation.* If a subsequent time span were to share certain attributes, an identity-linkage may occur, which may result in a revised understanding of the class.

As noted earlier, the end of Φ-span A1 elides with the beginning of a second passage at the upbeat to m. 2. This second passage, which we will call time span 2, contrasts greatly with time span 1. Most notably, time span 2 is inert whereas Φ-span A1 is highly active. From this information alone, it is readily apparent that an identity-linkage between Φ-

span A1 and time span 2 is impossible.[136] Let us therefore continue to the next significant time span in the piece, and compare it to Φ-span A1 and time span 2.

Example 3.05, below, shows a passage of music that we will call time span 3. It is densely polyphonic and at a very low register. This basic description would indicate that an identity-linkage with Φ-span A1 is possible but that an identity-linkage with time span 2 is impossible. That is, time span 3 shares several prominent attributes with Φ-span A1 and none with time span 2. Before engaging in further comparisons to Φ-span A1, however, we must determine whether or not time span 3 constitutes a Φ-span.

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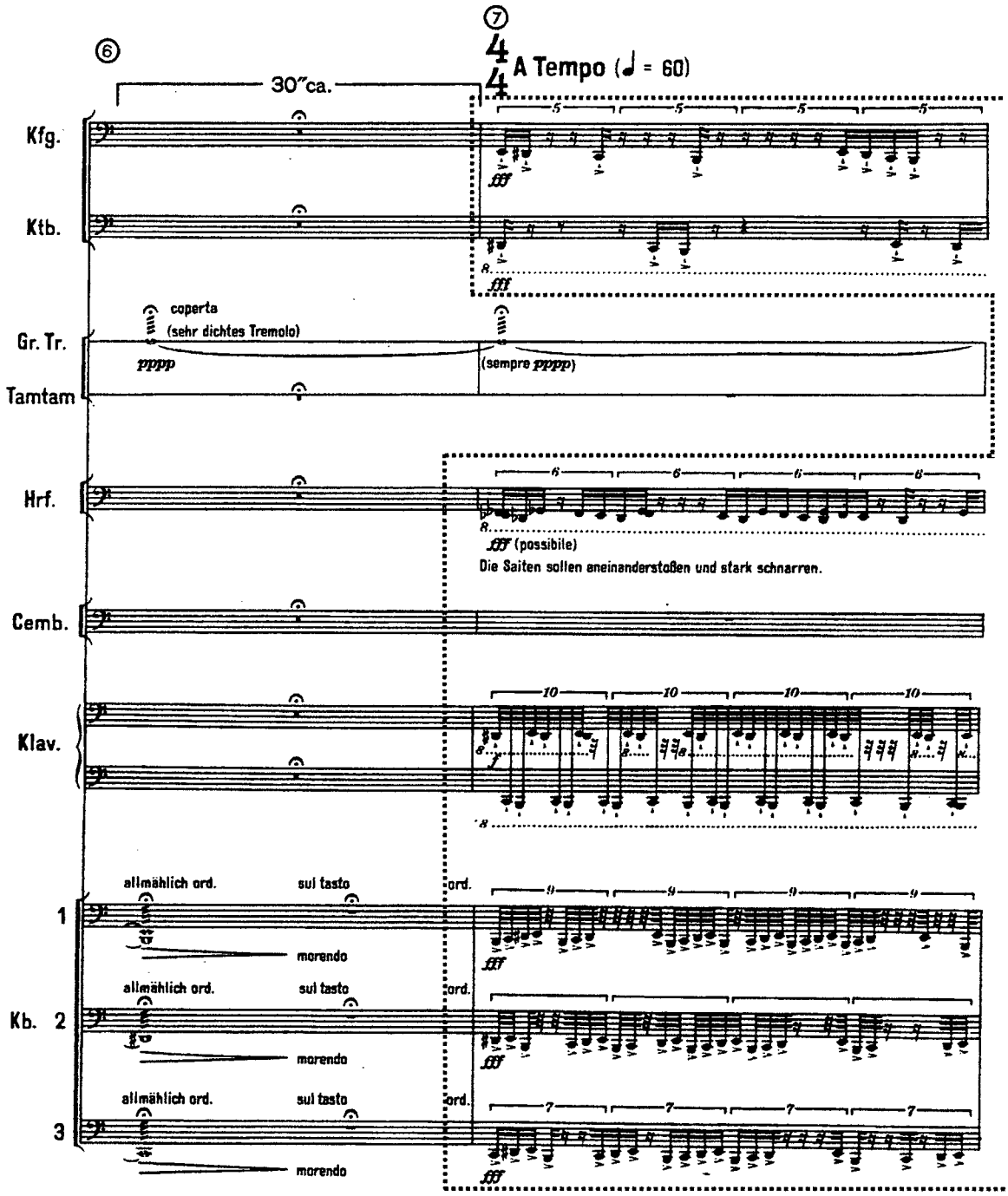
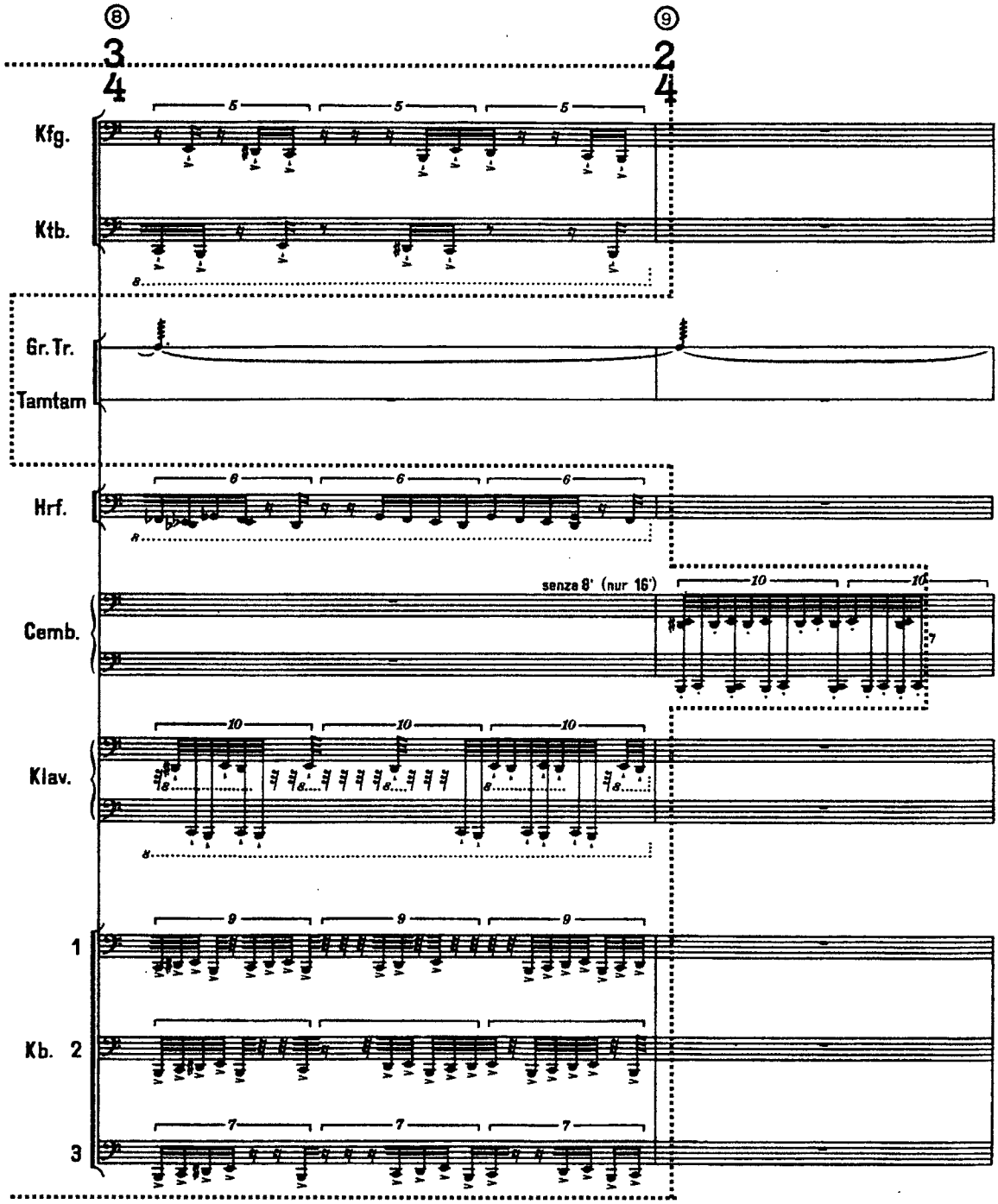
[136] Time span 2—the beginning and end of which are shown in Examples 3.01 and 3.03, respectively—cannot be fully examined in this section because it involves concepts not yet addressed. In Chapter 4, time span 2 will be shown to be a Φ-span in its own right, extending from the upbeat to m. 2 until the end of the piece.



Example 3.05 (beginning). Time span 3; Ligeti's *Fragment*, mm. 7–9.



Example 3.05 (continued).

The constituent events of time span 3 are bound by their collective achievement of a densely polyphonic texture. Each event is sequentially integrated into a repetitive and rhythmically active stream on the basis of a shared loudness level and a consistent registral range. In addition, time span 3 features a synchronous alignment of initial and terminative events, which, with the exception of the harpsichord tag in m. 9, form sharp transitions.[137] These transitions contribute to the time span's contextual distinctness. The time span also follows no established formal model, and therefore evokes no sensation of goal-directedness. Lastly, the temporal experience remains collectively nonlinear throughout the entire piece because the highly capricious nature of the piece conveys no large-scale teleological patterns. (Time span 3 may be *related* to Φ-span A1, but it is not understood to be a *consequent* of it.) As a result of all of these factors, the present is made to endure throughout the temporal experience of time span 3, and the likelihood of its being perceived as a Φ-state is very high. Before we can assign an analytical label to the Φ-span "time span 3," however, its association—if any—to other Φ-spans in the piece must be assessed more formally.

The aural similarity between the experience of time span 3 and that of Φ-span A1 is evident. In order to establish the presence or absence of an identity-linkage to the earlier Φ-span, however, the attributes of time span 3 must be made explicit for the sake of comparison. Example 3.06 lists the prominent attributes of time span 3.

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[137] The harpsichord "tag" in m. 9 is understood as an "echo" or "temporally misaligned" contingent of time span 3 rather than as a separate Φ-state. Although the harpsichord tag is not present during the main part of time span 3 (that being mm. 7–8), its association—particularly to the preceding piano part—is clear.

Attributes of time span 3
attack density: very high
registral density: high (micropolyphony)
register: very low
instrumentation: contrabassoon, contrabass tuba, harp, harpsichord, piano, double basses
loudness level: very high

Example 3.06. Attributes of time span 3 in Ligeti's *Fragment.*

If the attributes listed above are perceived as being highly dissimilar to those of Φ-span A1, then no identity-linkage will be made, and the identity of time span 3 would be defined by all its perceived attributes. If, however, an identity-linkage is made, then the single identity shared by the two Φ-spans is defined by the attributes common to both of them. In order to determine whether identity-linkage is warranted, one must distinguish shared from contrasting attributes for the Φ-spans, as exemplified in the table shown below.

Shared Attributes	Contrasting Attributes
attack density: very high	loudness level: very low (A1), very high (ts3)
registral density: high (micropolyphony)	instrumentation: contrabassoon, contrabass tuba, double basses
register: very low	
instrumentation: harp, harpsichord, piano	

Example 3.07. Shared and contrasting attributes

of Φ-span A1 and time span 3 in Ligeti's *Fragment.*

The above table tells us that Φ-span A1 and time span 3 share an identical or highly similar attack density, registral density, register, and subset of instruments, but differ with respect to loudness level and a separate subset of instruments.

As noted earlier, only immediately apprehensible attributes belong in a table of attributes. For example, the fact that the Φ-spans share a common pitch class collection is has little bearing on one's description of their respective temporal experiences. This is not to say that pitch schemes have no associative effect, simply that the details of such a

construction are not readily perceivable in this case. The same basic rule applies to instrumentation—list only that which is apprehensible through aural experience.[138]

In *Fragment*, the 10-person ensemble is just small enough that an experienced listener will be able to discern most or all of the instruments. It therefore seems appropriate, in this case, to separate the subset of shared instruments from contrasting instruments, since the shared instruments—harp, harpsichord and piano—are highly percussive and thus distinctive relative to the more homogenous subset comprising contrabassoon, contrabass tuba, and bowed double basses. For this reason, the first subset is easily recognizable as a shared attribute, despite its being only part of a larger group of instruments.

In order to determine whether the many shared attributes constitute an identity-linkage, however—that is, whether Φ-span A1 and time span 3 are members of the same class—we must examine the context in which the Φ-spans are presented. Commonality of attributes is necessary for an identity-linkage but not sufficient. When determining Φ-state classification, context of presentation must also be considered.

In *Fragment*, an association between Φ-span A1 and time span 3 is created not only by a commonality of attributes but also by a commonality of context. That is, not only are the Φ-spans similar to each other, they are also similarly distinct relative to their respective

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[138] The basses, for instance, are listed simply as "double basses" rather than "3 double basses."

contexts. Specifically, both Φ-spans, highly active in character, are flanked by periods of relative repose. Φ-span A1 is preceded by silence and followed by a single sustained sonority; time span 3 is both preceded and followed by the sound of a soft bass drum roll. More than any other single attribute, it is the high attack density relative to context that leads to the perception of time spans 1 and 3 as Φ-spans. Moreover, it is the similar nature of this separation from context that strengthens their bond as members of the same class.

Context also causes us to associate Φ-span A1 and time span 3 (retroactively) on the basis of durational similarity. Although the durations of the Φ-spans, measured chronometrically, are quite different—four seconds versus nine—they are nonetheless perceptually similar in this particular context. In another context, a five-second durational difference might dissociate rather than associate the two Φ-spans. In *Fragment*, however, their relative brevity proves to be an associative quality. It is specifically because the two Φ-spans are separated by such a long passage of contrasting of music that they are perceived as similar in duration. In fact, the intervening passage is so highly contrasting and so remarkably long (several minutes in length) that the durational difference between Φ-span A1 and time span 3 may be effectively indistinguishable.

Based on the above discussion, the following may be asserted: *The similarity of the ways in which two or more Φ-spans are distinguished from their respective contexts can affect their level of association, and therefore the likelihood of their belonging to the same*

class. In *Fragment*, for example, time span 3 forms an identity-linkage with Φ-span A1 in part because it is the first reminiscence of the densely polyphonic texture associated with class A. Had the intervening music involved such a texture in any way, the association between Φ-span A1 and time span 3 would be diminished. Thus it is due as much to context as to commonality of attributes that the shared attributes of the two Φ-spans—those listed earlier in Example 3.07—are considered essential to their shared identity, or class. Time span 3 may therefore be renamed Φ-span A2, indicating that it is the second instance of class A.

Context not only draws our attention *toward* similarities in strongly associated Φ-states, but also draws our attention *away* from dissimilarities in otherwise associated Φ-states. Consider the contrasting levels of loudness in Φ-spans A1 and A2. In another context, such a great loudness disparity might dissociate the two Φ-spans. In *Fragment*, however, this considerable dissociation is mitigated by the intentional structure of a class. That is, as a type of schema, a Φ-state class provides a governing structure for our experience. According to Snyder, "categorical structure tends to emphasize differences *between* categories (at category boundaries) and to suppress them *within* categories."[139] This phenomenon is characteristic of all intentional structures, including classes. It only applies, however, when a matching class (i.e., schema) has been triggered. As soon as a

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[139] Snyder, p. 85. See also Bregman, p. 650 for a description of an auditory experiment illustrating this phenomenon. For a broader discussion of category theory, see Laurence M. Zbikowski, *Conceptualizing Music: Cognitive Structure, Theory, and Analysis* (Oxford: Oxford University Press, 2002).

contrasting class is triggered, the intentional structure of the previous class ceases to exert primary control over perception—this is now the role of the new class.

Every Φ-state is an instance of its class, even if it is the only member. Classes are therefore always present in nonlinear music. As such, they are critical to the understanding of experiential time and therefore musical form. In order to explore the larger-scale implications of Φ-state classes, we must first examine the various temporal relationships manifest among Φ-states.

Chapter 4

TEMPORAL RELATIONSHIPS AMONG Φ-STATES

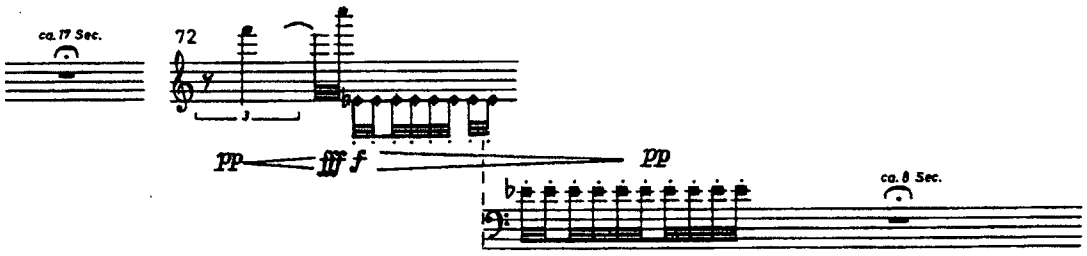
Chapters 1–3 have provided us with a better understanding of what Φ-states are, the circumstances under which they can arise, and how they can be grouped into contextually defined classes. To fully appreciate their impact on experiential time, however, one must examine the variety of temporal relationships that exist among them. An understanding of these relationships is critical because they affect our very perception of the Φ-spans themselves. Context entails not merely the temporal relationships that a Φ-span forms with proximate events but also the temporal relationships that it forms with other proximate Φ-spans. There are three general categories of temporal relationships among Φ-states: *isolation*, *overlap* and *polyphony*. The first may be considered a "uni-temporal" configuration, meaning temporalities are experienced one at a time; the second and third may be considered "multi-temporal" configurations, meaning two or more temporalities

are experienced simultaneously. As such, the three categories represent a continuum of increasing temporal complexity.[140]

[140] As in the previous chapter, the word "category" is used here in a general sense, not in a strictly phenomenological sense.

4.1 Φ-isolation

Φ-state isolation (or simply *Φ-isolation*) obtains during a time span if, at any given moment, all perceived sound manifests one and only one Φ-state. Only after an isolated Φ-state has ended might a listener begin to experience another Φ-state. Isolation yields the most contextually distinct Φ-states. Contextual distinctness is especially high when, as established in Chapter 2, a Φ-state is flanked by silent pauses.[141] Consider again the following excerpt from Lachenmann's *Dal Niente*:



Example 4.01. Φ-isolation in Lachenmann's *Dal Niente*, systems 71–72.

The unfolding of events shown above fulfills the requirements of a Φ-span. Firstly, it constitutes a group; that is, its events are sequentially integrated such that they form a contextually distinct perceptual unit. Sequential integration, in this case, is not extreme because the passage entails parametric inconsistency rather than consistency. Indeed several distinct modes of sound production are featured. Nonetheless, a unifying

[141] Intervening pauses need not constitute literal silence; relative inactivity can produce a similar effect.

envelope of loudness offers a certain degree of integration by way of common fate belongingness. Specifically, relatively gradual and uniform changes of loudness, from pianissimo to fortississimo and back to pianissimo, infuse the perceived events with a certain quality of continuity.

More important to the integration of these events, however, is the fact that they are collectively segmented from neighbouring events by virtue of their being flanked by extended silent pauses. These pauses serve not only distinguish the collection of events contextually but also to integrate its events perceptually. In another temporal configuration—one without flanking pauses—the time span may not be perceived as a group, let alone a Φ-state. In the configuration, however, extreme contextual distinctness serves to integrate the events such that they indeed form a group.

Having established that the above events constitute a group, we may now address the issue of non-goal-directedness. (Collective nonlinearity does not apply since no larger context for this passage is provided.) The pitches and rhythms of this highly angular series of events depict no familiar formal model. Yet its dynamic envelope is the type of contour that could invite meaningful predictions about the direction of future events. In this case, however, goal-directedness is mitigated by brevity. Much like time span 6 in Zorn's *Road Runner*, shown earlier in Example 2.12, this potentially predictable envelope occurs within a sufficiently short span of time that no substantial degree of goal-directedness is permitted to develop. Moreover, the envelope's capacity for evoking goal-directedness is severely diminished by the aforementioned timbral variations it contains.

We may therefore conclude that the group of events shown above is non-goal-directed and constitutes a Φ-span.

It is important to recognize that the passage was designated as a Φ-span in part *because* it was isolated as a perceptual unit by long silent pauses. As noted above, the passage may not have been thus designated without the pauses. Indeed such long pauses between Φ-spans are not always required for Φ-isolation. The category also includes adjacently presented Φ-spans—that is, Φ-spans presented consecutively, but without significant intervening pauses. Many of the time spans comprising *Road Runner* provide excellent examples of Φ-state adjacency. The first system contains Φ-spans separated by no more space on the page than the minimal amount required for graphical clarity. This would seem to indicate that the performer, upon the completion of one Φ-span, is to move directly on to the next.[142] If each succeeding span in such a series is sufficiently distinct, Φ-adjacency can produce perceptually isolated Φ-states.

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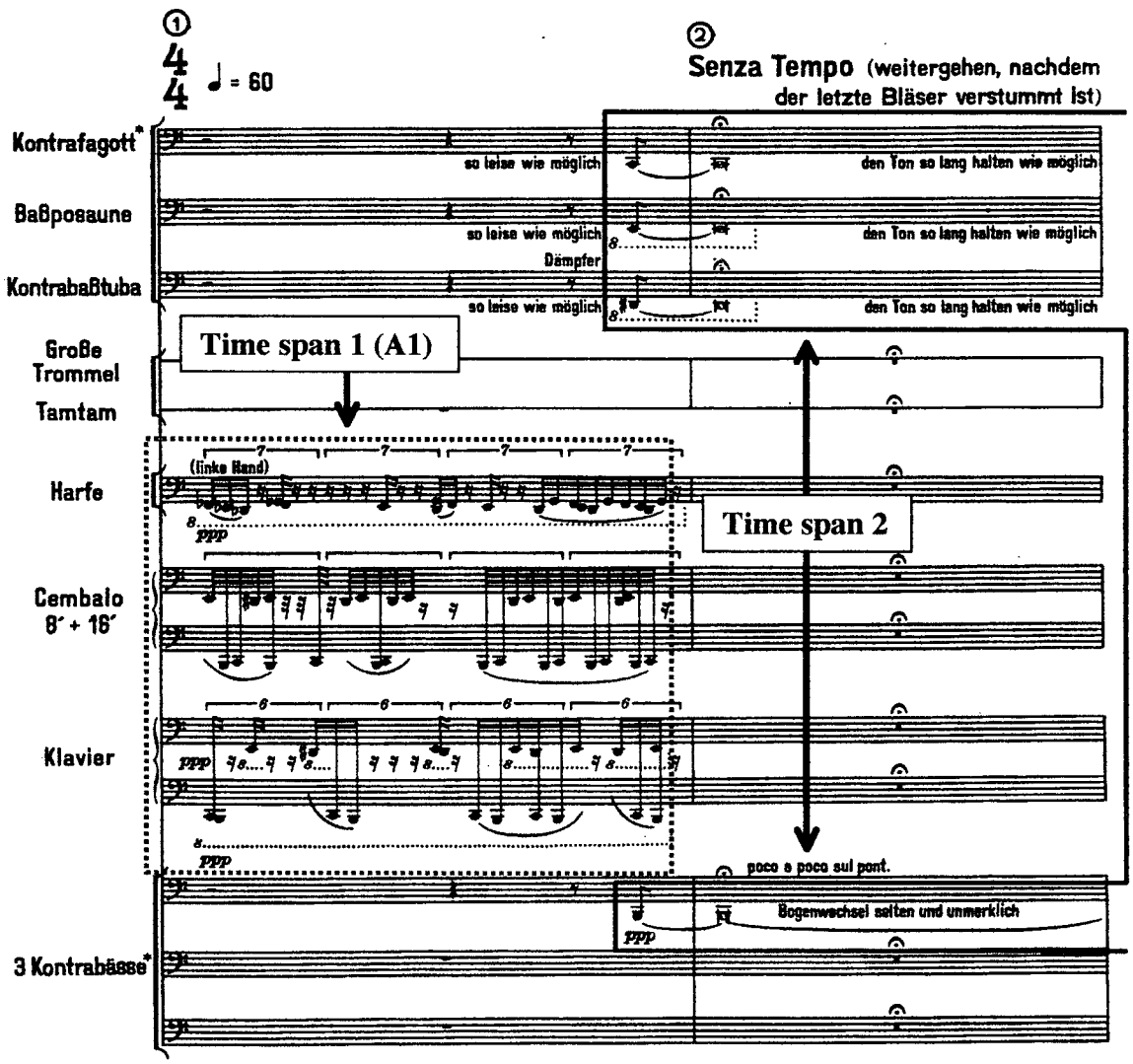
[142] This assumption is corroborated by Guy Klucevsek's performance of the piece on the recording *Guy Klucevsek: Manhattan Cascade*, Composers Recordings Inc. (CRI), CD 626, 1992.

4.2 Φ-overlap

Sometimes a listener, aware that preceding events have contributed to the establishment of a current and ongoing Φ-state, begins to experience a second Φ-state of a contrasting class amidst the continuation of the first. Since each Φ-state involves a distinct "temporality"—that is, a distinct way of perceiving time—it is sometimes possible that a listener may experience several simultaneously. Such an experience will be called *temporal multiplicity.*

The human mind has great capacities, many of which are not fully understood. One of these, I believe, is temporal multiplicity. The concept is analogous to the way a multi-processor computer functions. Just as computers can execute numerous sets of computations concurrently, we too can perform multiple simultaneous tasks. To choose a simple example, consider the common scenario of singing while driving a car. Each activity is highly distinct yet requires focus and attention to detail. If the concurrency of common tasks such as these seems relatively unremarkable, consider that one may also be engaging—simultaneously and at varying levels of consciousness—in other mental activity such as worrying about something, or anticipating something. Naturally the experience such as driving is not phenomenologically equivalent to the experience of actively listening to music. Nonetheless both activities represent distinct temporal experiences, and any concurrency of distinct experiences constitutes temporal multiplicity.

A brief instance of temporal multiplicity in which the first Φ-state ceases soon after the second begins will referred to here as *Φ-state overlap* (or simply *Φ-overlap*). In order to evoke separate Φ-states, overlapping time spans must constitute non-directional groups *despite* being presented in a partially concurrent configuration. In short, they must exhibit the same qualities that all Φ-spans exhibit: sequential integration, contextual distinctness, and non-goal-directedness. The opening measures of Ligeti's *Fragment* provide a good example of Φ-overlap.



Example 4.02. Φ-overlap in Ligeti's *Fragment*, mm. 1–2.

Time span 1 has already been determined to be a Φ-span (A1). For the purposes of this demonstration, let us quickly determine that time span 2 is also a Φ-span. Although not shown here in its entirety,[143] the long, sustained character evident in the above example is indicative of the general character of the time span. This inert character constitutes the

[143] Time span 2 extends from the upbeat to m. 2 through to the final measure of the piece. Examples 2.09 and 4.03 show other portions of time span 2. The multi-temporal aspects of time span 2 are treated in the following section.

defining aspect of its identity, or class. All factors leading to the designation of time span 2 as a Φ-span contribute to this unifying identity. While the events comprising time span 2 do not feature identical timbres and loudness levels, they nonetheless integrate on the basis of their similarity relative to context. (From the perspective of now-point m. 2, "context" comprises only the highly active time span 1.) Moreover, the inactive character of time span 2 yields a perception of extreme non-goal-directedness. So extreme is the level of inactivity contained within time span 2 that its long duration does not diminish its capacity for evoking (the potential beginning of) a Φ-state.

Time span 2 is sufficiently long that a listener is not aware of its terminative transition from the perspective of now-point m. 2. A listener is only aware of its sharp initial transition, which is marked by a substantial parametric change at the upbeat to m. 2. The initial (and potential) contextual distinctness of time span 2 is nonetheless very high. It may therefore tentatively be named Φ-span B1, the first instance of a contrasting class. If its terminative transition later proves to be less than sharp, this initial perception may be revised.

The brief overlap of Φ-span A1 and (tentative) Φ-span B1 does not affect their temporal independence because, from the perspective of m. 2, both spans exhibit the qualities of sequential integration, contextual distinctness, and non-goal-directedness to an exceedingly high degree.[144] Had the two Φ-spans been more internally varied, more contextually integrated, or had the duration of the temporal multiplicity had been longer,

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[144] The experiential implications of temporal overlap are addressed more explicitly in section 4.4 of this study, where a more extended instance of overlap is examined.

however, such a perception may not have occurred. In a hypothetical case such as this, contextual integration may indeed diminish the likelihood of Φ-span constitution for both time spans. The next section describes the circumstances under which more extended instances of temporal multiplicity can occur between Φ-spans.

4.3 Φ-polyphony

The term *Φ-state polyphony* (or simply *Φ-polyphony*) will refer here to an instance of temporal multiplicity that begins and ends during an ongoing Φ-state; that is, to a configuration wherein a second Φ-span occurs completely within the temporal bounds of a longer Φ-span. A listener, aware that preceding events have contributed to the establishment of a current and ongoing Φ-state, begins to experience a second and contrasting Φ-state amidst the continuation of the first. Each event perceived during this period of concurrency is understood as contributing to the manifestation of either the first Φ-state or the second. Having perceived the two Φ-states concurrently for some length of time, the listener then experiences the cessation of the second Φ-state during the continuation of the first.

The concept of temporal multiplicity—that is, of multiple concurrent temporal experiences—represents a reinterpretation of Husserl's phenomenological apparatus. The basic approach has nonetheless been recognized by a handful of phenomenology-oriented music theorists, though these treatments by no means exhaust the subject. In her analysis of Elliot Carter's Brass Quintet, Judy Lochhead observes a "co-existence" of two "types" of temporal objects.[145] While her conception of temporal manifestation is somewhat different than the one outlined herein, the concept of coexisting temporalities is

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[145] Lochhead, pp. 151–61.

nonetheless recognized.[146] The instances of coexistence that Lochhead cites, however, are all of the overlapping rather than the wholly concurrent (i.e., polyphonic) variety. For an investigation of the latter phenomenon, we must look elsewhere.

Thomas Clifton's idea of plural perceptions is suggestive of a type of temporal multiplicity similar to Φ-polyphony. Consider his description of temporal spans:

> It seems not unreasonable that we can have spans within spans, horizons within horizons, and that we can speak, with perfect intelligibility, about certain time spans interrupting others, or being interpolated between others, or of alternating with others.[147]

Given that Clifton elsewhere defines a horizon as "a singular event, in a single present,"[148] the idea of "spans within spans, horizons within horizons" speaks directly to the possibility of Φ-polyphony. Indeed he addresses the possibility of experiencing "distinct, different, but variously related temporal activities simultaneously."

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[146] Lochhead describes an "observational context" in which temporal objects can elicit dynamic as well as static temporalities. (See Lochhead, pp. 132–136.)
[147] Clifton, pp. 58–59. (Clifton's assertion is based on a connection between his conception of a horizon as constituting the object itself and Heidegger's concept of *Spanne*, referring to "acts of making-present.")
[148] Ibid., p. 58.

> Two events occurring within a single field of presence may unfold in some chronological order, while nevertheless being *about* a disjunct time experience, due to the manner in which the events keep their times from blending. The result tends to be an experience not merely of several kinds of events occurring simultaneously (most musical processes consist of this), but occurring within their own separate spatial fields.[149]

Clifton's description underscores the basic premise of Φ-polyphony—that concurrently perceived Φ-states are understood as possessing separate temporalities.[150] Metaphors used to describe this phenomenon are often spatial, due in part to their derivation from vision-based models. A "field of presence," for example, refers not to a physical space but to one's conscious awareness. Clifton extends the metaphor further, asserting that, within a field of presence, a listener may observe a "spatial field"—the temporal aspect of an aurally perceived object.

Applying Clifton's terms to the case of Φ-polyphony, we could say that a single field of presence would feature two or more concurrent spatial fields. Each spatial field would mark time in its own particular way, thus producing a plurality of perception. The simplest way to conceive of this phenomenon, however, may be to understand a

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[149] Ibid., p. 125. Clifton's musical examples, however, do not adequately illustrate his conclusions. In his analysis of the second movement of Beethoven's Piano Sonata op. 111, for instance, he equates the general idea of different rates of motion in a composition with the more specific and significant phenomenon of multiple concurrent temporalities. (See Clifton, pp. 126–128.) Were a more rigorous method for defining temporal objects employed, certain attributes of op. 111, particularly those pertaining to tonality and meter, would be recognized as factors responsible for binding all the different rates of motion into a single, if sectionalized, teleological process.

[150] Stephen Handel also treats what he calls "simultaneous analytical acts on multiple time scales" which can, at their extreme, be considered Φ-polyphony. See Stephen Handel, *Listening: An Introduction to the Perception of Auditory Events* (Cambridge: The MIT Press, 1989).

temporality not as a "spatial field" but as a *stratum*, and the concept of temporal multiplicity as a *layering* of strata.

According to Clifton, each "new or [sufficiently] different activity bears a new time within it."[151] Indeed the temporal exigencies of each present—the ways in which events mark time—are particular to each time stratum. Consider, for example, the two instances of class A from Ligeti's *Fragment* examined in the previous chapter. It was determined that the two instances shared the following attributes: a very high attack density, a high registral density, a very low register, and a particular subset of instruments. Although the two Φ-spans are separated by a long passage of contrasting music, a listener easily associates them. That is, as soon as the second instance begins, one recognizes that the temporality it is evoking is very similar to that which was evoked by the first instance. We may therefore conclude that the two Φ-spans share the same class—not simply because they exhibit a very similar set of features, but because that set of features evokes the same temporal essence, and therefore temporality.

Although prominent musical features are used to identify and describe a temporality, a temporality itself is an experience far richer and more complex than can be expressed by a mere list of such features.[152] For our purposes, however, it is sufficient to recognize that each Φ-state, while constituting a distinct present awareness, can elicit a temporal experience so similar to that of other Φ-states that they are understood to share the same

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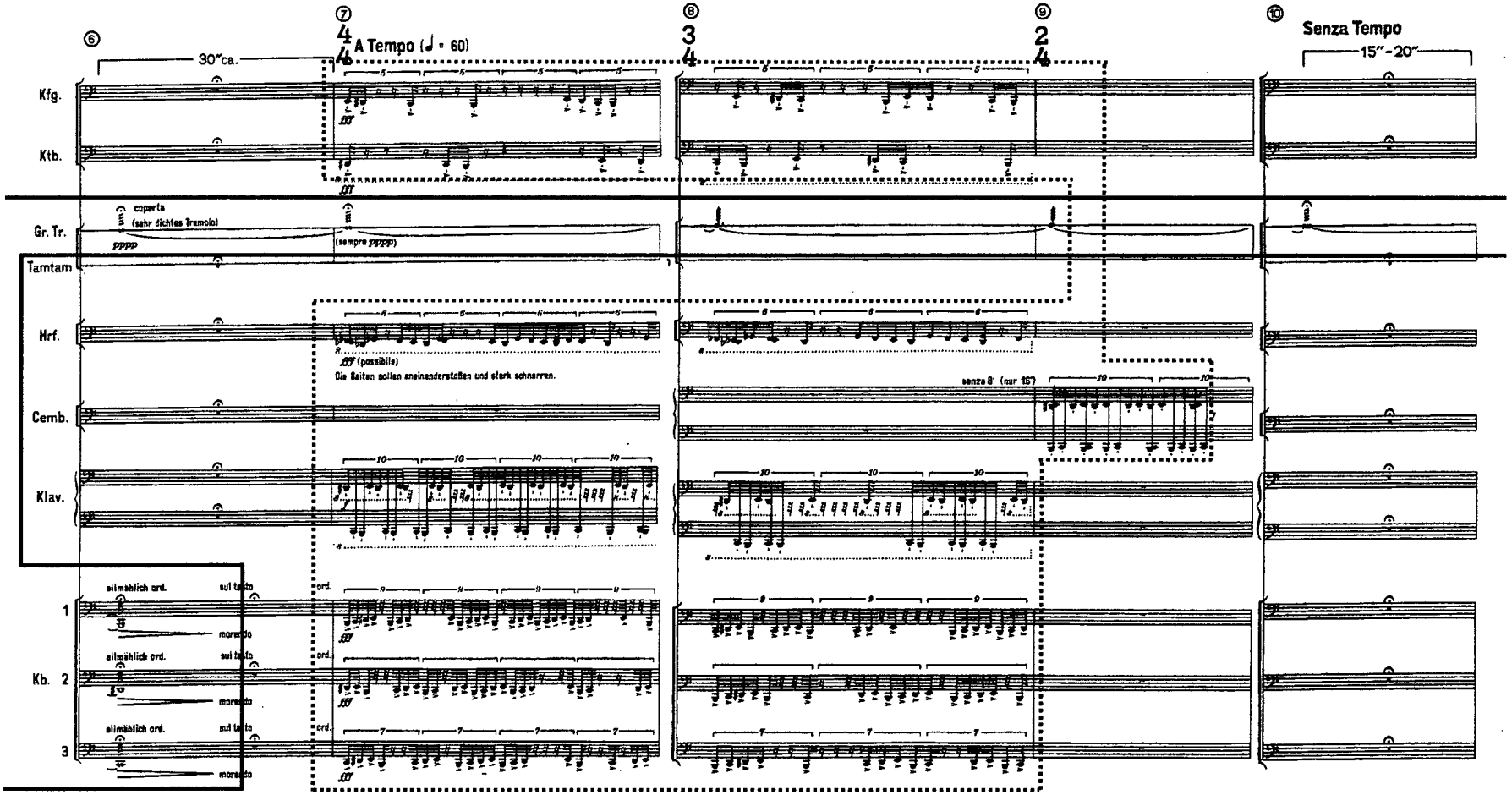
[151] Clifton, p. 114.

[152] The particular temporalities inherent in Ligeti's *Fragment* are described below. Unfortunately, a detailed investigation of temporalities as they pertain to musical experience lies outside the scope of this study.

temporality. The notion of a time stratum, invoked above, is intended to express this associative relationship that exists between the temporalities of all instantiations of a class.[153] By establishing a number of strata, one can categorize all Φ-states in a piece according to their temporal affinities.

The perception of distinct but *simultaneously occupied* time strata in music hinges on the perceptual independence of concurrent temporal objects. Since each object must constitute its own enduring present, a perception of simultaneous objects is only possible if—despite their concurrency—they constitute Φ-states. The following excerpt from Ligeti's *Fragment* features concurrent temporal objects that elicit a perception of Φ-polyphony:

[153] The alignment of Φ-spans along a stratum is intended to show only association; no sense of continuity is implied.



Example 4.03. Φ-polyphony in Ligeti's *Fragment*, mm. 6–10.

The above excerpt shows two disparate groups. One is a dense and varied group of events, and was defined in the previous chapter as Φ-span A2, the second instance of class A. This group occurs within the time span of what appears to be a second group—specifically, the continuation of what was tentatively determined to be (the beginning of) Φ-span B1. This second (purported) Φ-span features a gradual transition from a texture of low basses and bass drum to a solo bass drum texture, a portion of which is shown in the above example. While the parametric consistency exhibited by the slow-moving, sustained events of this second (purported) Φ-span is not extreme in and of itself, its consistency relative to A-class events is considerable. Consequently, the slow-moving, sustained events—B-class events—integrate to form a cohesive unit. (Perceptual integration occurs in part because class identities are so few and so strongly differentiated in *Fragment* that differences between instances of the same class are suppressed.[154] As such, each Φ-span in the piece is understood as a member of either class A or class B, and evokes the particular temporality associated with its class.)

The span of integrated B-class events, bounded by Φ-span A1 at its inception (the upbeat to m. 2; shown earlier in Example 3.04) and by silence at its termination (m. 11, the end of the piece; not shown), constitutes a contextually distinct group. Moreover, since the group's events unfold in a highly unpredictable manner, no sense of goal-directedness is

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[154] The notion of allowable and unallowable degrees of variance in a time stratum is common to phenomenological approaches to music. Clifton uses the terms "contrast" and "interruption" (Clifton, pp. 106-110); Lochhead uses the terms "disturbance" and "disruption" (Lochhead, p. 158).

conveyed. Thus the group's name, Φ-span B1, is confirmed, and its corresponding status need no longer be considered tentative.[155]

Having established that both groups of events shown in Example 4.03 are Φ-spans—despite their concurrent presentation—we may conclude that a perception of temporal multiplicity is likely. The evoked Φ-states will be perceived simultaneously, but understood to be occupying separate time strata. Moreover, since Φ-state A2 begins and ends during the time span of Φ-state B1, this plurality of perception constitutes Φ-polyphony.[156]

A correspondence between the amount of information perceived and the rate of experiential time was described in Chapter 2 in reference to inter-Φ-state awareness. This correspondence also applies to intra-Φ-state awareness. Each active and dense A-class instance in *Fragment*, for instance, contains a great deal of information. Experiential time therefore passes quickly. Moreover, the consistent and repetitive nature of A-class events ensures that this rapid rate of time remains even throughout. Φ-span B1, by comparison, contains far less information (for much of the span, minutes pass without substantial

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[155] In another context, this extended time span may not constitute a Φ-span. As Miller notes, "the horizon of [a] perceptual act is determined by the context of the activity within which the perceptual act occurs." (Miller, p. 93.)

[156] In this case, Φ-polyphony arises in part through continuity illusion. Since Φ-span B1 is only marginally audible during Φ-span A2, and since the portions of B1 immediately preceding and following the highly contrasting A2 are very similar, B1 forms a mask that leads to a perception of B1 as a single continuous Φ-state. As such, the likelihood that the temporal experience will be understood as Φ-polyphony is increased. An instance of Φ-polyphony in which both Φ-spans are readily apprehensible is discussed in section 4.4 of this study.

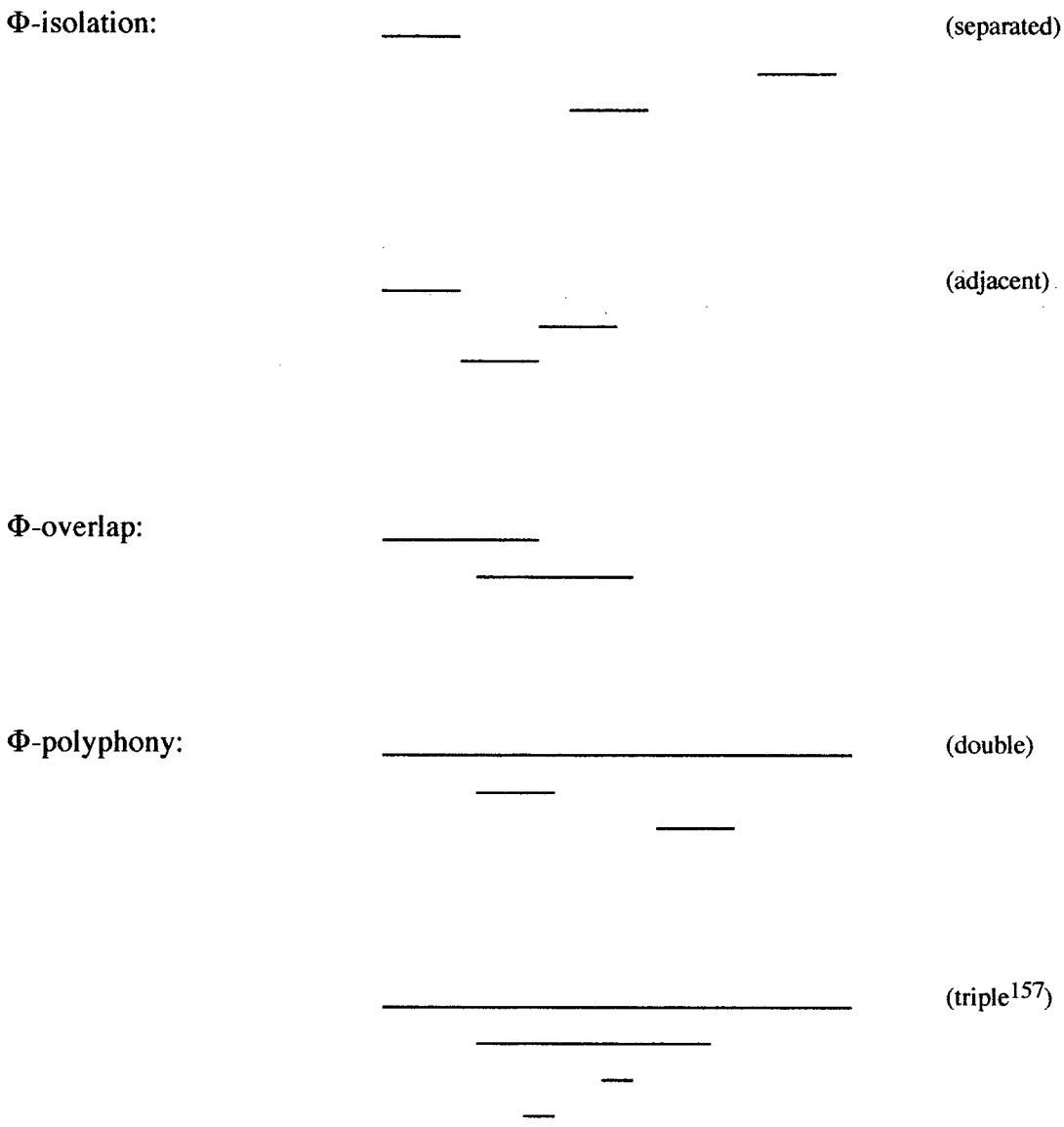
parametric change) yet a slightly more variegated texture. Experiential time therefore passes very slowly though somewhat less evenly.

Rate and consistency of experiential time are important facets of a Φ-state's temporality, though a temporality may also possess various other less tangible facets. These include evoked responses such as corresponding moods or feelings, physical reactions, extramusical associations, and visual images. In *Fragment*, for example, one might associate Φ-states A1 and A2 with a frenzied, anxious feeling. For some, this feeling may be linked to other more tangential concepts, such as the constant motion of machinery or perhaps societal conflict. The highly contrasting Φ-state B1, on the other hand, might be associated with a more tranquil sensation. Some may relate this sensation to familiar experiences such as meditation or viewing a placid lake. These subjective responses need not (and will not) be the same for all listeners. However, for a particular listener during a particular listening experience, responses are likely to be extremely similar for all instances of a class. Thus the structural relationships between Φ-states will be similar for most listeners. (For analytical purposes, however, Φ-spans are best identified by more objective attributes such as timbre, loudness, attack density, and so on.)

The idea of a temporality is integral to the conception of a Φ-state as an enduring present. As established in Chapter 1, the present is conceived not as an instant in time but as a "becoming" or a "welling up in consciousness." Present awareness was likened to an expanding "time-bubble." All events perceived as being contained in the bubble remain simultaneously available for restructuring. Yet within the bounds of the bubble, the

passage of time is nonetheless perceived. In fact, the rate of time's passage, as noted above, constitutes an important aspect of a temporal experience. The events contributing to an enduring sense of the present can, for instance, evoke a fast or slow perception of experiential time. Continuing the time-bubble metaphor, we could say that the rate of experiential time within an enduring present is reflected in the rate of the bubble's expansion. During an instance of temporal multiplicity, a listener experiences two or more such time-bubbles—each expanding at its own rate and in its own way.

The three temporal relationships discussed in this chapter—Φ-state isolation, overlap and polyphony—are depicted graphically below, along with some common variations. The horizontal axis represents the flow of time from left to right and the vertical axis represents separate time strata, or classes.



Example 4.04. Graphical representations of

the three basic temporal relationships between Φ-states,

including some common variations.[158]

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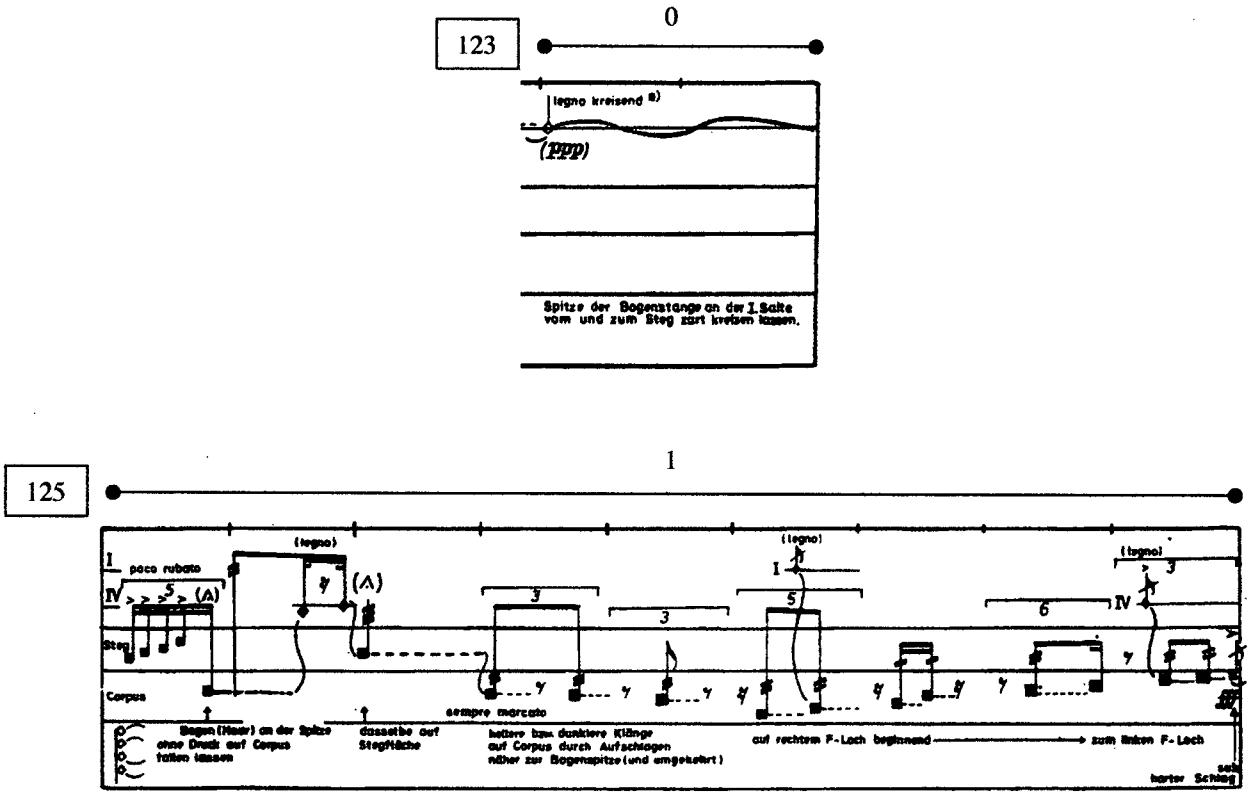
[157] An example of triple Φ-polyphony occurs between beats 87 and 91 of Lachenmann's *Pression*.

[158] Various other permutations are possible, notably Φ-overlap within an already temporally polyphonic experience.

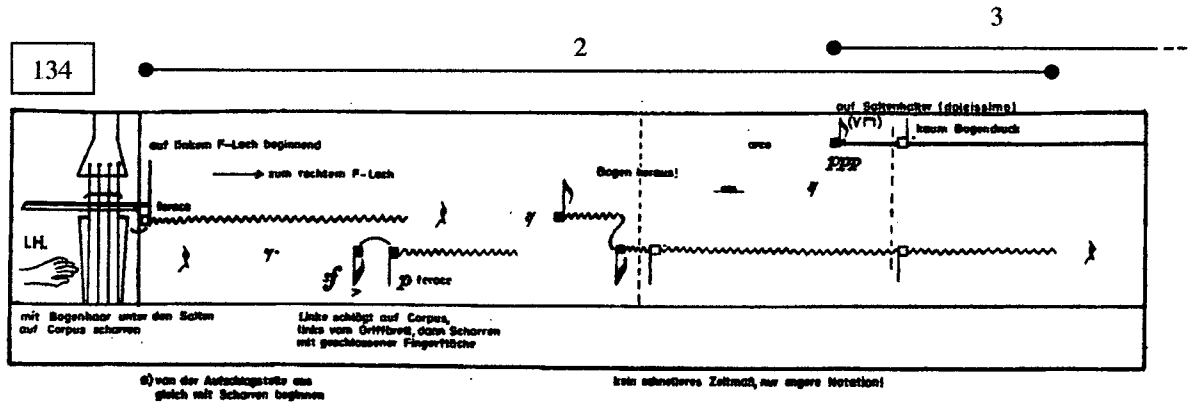
The above graphical representations help illustrate the various configurations in which time spans can evoke Φ-states. Time spans presented in an isolated configuration are most likely to be perceived as Φ-states, and time spans presented in a temporally overlapped or polyphonic configuration are least likely. Moreover the greater the depth of the polyphonic the configuration, the more internally integrated and contextually distinct each span must be in order to constitute a Φ-span. This basic relationship is evident in all of the above musical examples. The excerpt from Lachenmann's *Dal Niente* shown in Example 4.01, for instance, was determined to be a Φ-span despite a lack of parametric consistency. Such a perception is only possible because constituent events are presented in a temporally isolated manner. The respective sets of events constituting Φ-spans A2 and B1 in Ligeti's *Fragment* (shown in Example 4.03), on the other hand, were determined to be highly consistent and, as such, they are perceived as Φ-states despite their concurrent presentation. Thus, as with individual Φ-states, a perception of Φ-polyphony depends not only upon a span's content but also upon its context.

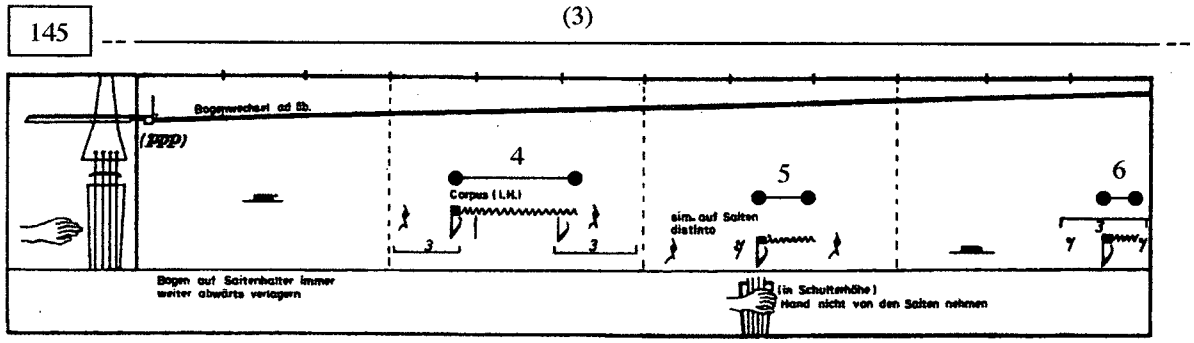
4.4 Temporal Configurations of Φ-spans in Helmut Lachenmann's *Pression*

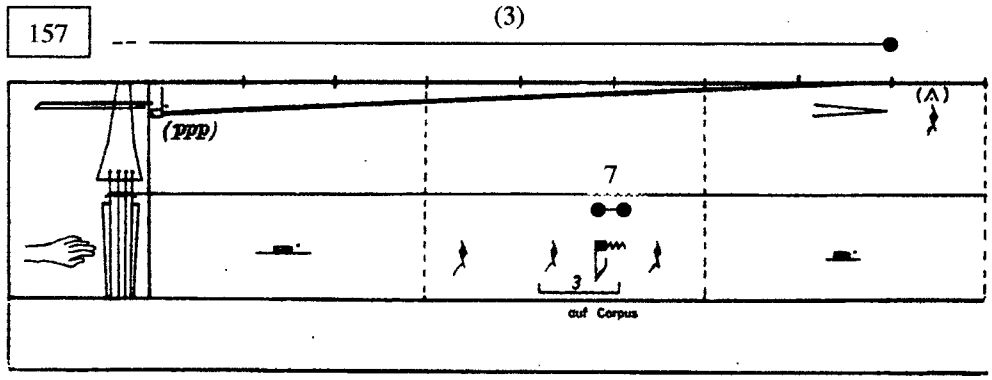
The examples shown above illustrate the basic configurations in which time spans can evoke an enduring sense of the present. In order to better understand the nature of these relationships, however—particularly the experience of temporal multiplicity—we must examine their manifestation in a more extended passage of music. Beats 123–165 of Lachenmann's cello solo *Pression*, shown below, evoke all three of the temporal configurations: Φ-state isolation, overlap, and polyphony.



Example 4.05 (beginning). Lachenmann's *Pression*, beats 123–165.







Example 4.05 (continued).

Let us proceed chronologically through the passage. The single, continuous event extending across beats 123 and 124, marked time span "0," distinguishes itself as a distinct time span on the basis of being consistent between transitions and inconsistent at transitions. The highly contrasting group of events extending from beat 125 through beat 133, marked time span 1, distinguishes itself as a second time span for the same reason. Since the events preceding the gesture marked time span 0 are not shown, we cannot definitively say whether it constitutes a Φ-span. Our first opportunity to determine a Φ-span is therefore time span 1.

A sharp initial transition at beat 125 is immediately evident. The "*legno kreisend*" gesture of time span 0 suddenly ceases, giving way to strikes on the bridge of the instrument. Together with the similarly percussive strikes on the body of the instrument and on the strings ("*legno*") that follow, these strikes constitute time span 1. Although the method of sound production changes across span 1, all events are grouped on the basis of their percussive character. The events of span 1 are integrated largely because attack density within time span 1 is high compared to time span 0. Thus if the terminative transition at beat 134 proves to be as sharp as the initial transition at beat 125, time span 1 will be perceived as contextually distinct.

Examining beat 134, we see that sudden and significant changes of loudness, timbre and attack density indeed occur. The marked contrast between time span 1 and the preceding and succeeding time spans 0 and 2 ensures its contextual distinctness. This fact, together with the sequential integration of its events and its clearly non-goal-directed nature,

designates time span 1 as a Φ-span. As such, all events occurring within it contribute to its particular temporality. Only following its completion do events begin to establish a different temporality.

Time span 2 extends from beat 134–143, and comprises three highly similar gestures. All three gestures are characterized by long, continuous strokes. The first gesture, performed by the right hand, entails bowing the body of the instrument under the strings. The second requires the left hand to strike the instrument body, then immediately rub the wood. The third gesture begins as the first with right-handed bowing of the body, but moves seamlessly back to left-handed rubbing of the body.[159] With the exception of accented strikes at the outset of the first two gestures, the gestures are relatively quiet and highly consistent.[160] The events are therefore sequentially integrated. Brief and non-goal-directed, time span 2 is likely to be perceived as a Φ-state if contextual distinctness can be established.

The sharp initial transition of time span 2 has already been addressed, leaving only the terminative transition as the sole determining factor in its contextual distinctness. Time span 2 ends with the completion of the third gesture, followed by a pause. This pause, however, is not a silent one. Sudden parametric change nonetheless seems to mark a transition. Were time span 2 configured in a temporally isolated fashion, we would say that its contextual distinctness is extremely high. This is not the case, however, so the

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[159] Upward stems indicate the right hand and downward stems indicate the left hand.
[160] Although dynamic markings are not consistent throughout the time span, the nature of the gestures (bowing and rubbing the body of the instrument) ensures quiet sound production.

question of contextual distinctness—and therefore also the precise status of time span 2—must remain on hold until we can determine the nature of experiential time at its close.

In the middle of the third and final gesture of time span 2, a listener begins to detect a long, sustained event of a highly contrasting character. Instead of the wood sounds associated with time span 2, this new event involves the sound of bowing the instrument's tailpiece. This gesture, marked time span 3, does not contribute to the ongoing temporality of time span 2. Instead it begins to mark time in a different way. It differs considerably from time span 2 with respect to timbre, loudness level, and attack density (though attack density is not determinable until later in the course of the long gesture). As such, it marks the beginning of a new class.

Beyond these rather simple qualities, the new, overlapping temporality is characterized by a host of more complex qualities. Whereas, for some listeners, the bold gestures and wide dynamic range of time span 2 might evoke feelings of anxiousness, the unwavering consistency of time span 3 might evoke feelings of peacefulness. Other listeners may experience slightly different reactions. The inherent relationship between relative activity and relative inactivity, however, will ensure a generally predictable set of reactions. While the issue of emotion in music is beyond the scope of this study, it nonetheless represents an important facet of temporalities. More generally, one must recognize that temporalities refer to complexities of experience far richer than can be described by lists

of attributes.[161] A particular collection of attributes, in other words, has implications far beyond its constituent parts. Such is the case in *Pression*. As a result of all their distinguishing factors—both objective and subjective—the two concurrent temporalities constitute Φ-overlap during beats 140 though 142.

Let us now return to the question of time span 2's terminative transition, upon which the span's perception as a Φ-state depends. The contrasting characters of time spans 2 and 3 have already been addressed, as have their distinct temporalities. Since time spans 2 and 3 feature separate temporalities, neither will be affected by its concurrence with the other. As such, the final events of time span 2 mark a sharp terminative transition. Time span 2 is therefore likely to be perceived as a Φ-state.

Time span 3 contains but one long, slowly transforming gesture, extending from the second sixteenth of beat 140 through beat 163. Its sharp initial transition has already been established, and its terminative transition is clearly marked by a concluding silent pause at beat 164. The sharpness of its transitions, together with its extreme internal

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[161] For discussions of emotion in music see L. Apostel, H. Sabbe, and F. Vandamme, *Reason, Emotion and Music* (Ghent: Communication & Cognition, 1986); N. Carroll, *Beyond Aesthetics* (Cambridge: Cambridge University Press, 2001); N. Carroll, "Simulation, Emotion, and Morality," in *Emotion in Postmodernism*, ed. G. and A. Hoffman (Heidelberg: Winter, 1998); T. Clifton, "Music as Continued Object," in *In Search of Musical Method*, ed. F.J. Smith (London: Gordon and Breach Science Publishers, 1976), pp. 73–98; H. E. Fiske, *Music and Mind* (Lewiston, NY: E. Mellen Press, 1990); M. Hjort and S. Laver, eds., *Emotion and the Arts* (New York : Oxford University Press, 1997); D. Huron, "A Six-component Theory of Auditory-evoked Emotion," *Proceedings of the 7th International Conference on Music Perception and Cognition* (Sydney, Australia, 2002); D. Huron, "Emotional Consequences of Expectations: A Theoretical Model with Applications," presented at the Society for Music Perception and Cognition Conference (Las Vegas, Neveda, 2003; see <www.music-cog.ohio-state.edu/Huron/Huron.html>); E. Lippman, *Musical Aesthetics*, vols. 2 and 3 (New York: Pendragon Press, 1986); G. Madell, *Philosophy, Music and Emotion* (Edinburgh: Edinburgh University Press Ltd., 2002); and L. Meyer, *Emotion and Meaning in Music* (Chicago: The University of Chicago Press, 1956).

consistency, designates it as a group. According to its graphical representation in the score, time span 3 involves what appears to be a "glissando" or sorts; that is, a gradually ascending line. Since the vertical dimension refers not to pitch but to the physical position of the bow on the tailpiece, however, no significant directionality is conveyed. Time span 3 therefore constitutes a Φ-span.

Now that time span 3 has been established as a Φ-span, we may address time spans 4–7, which occur concurrently with it. Each of time spans 4–7 contains a single scraping gesture, performed either on the body of the instrument or on the strings. These scraping gestures stand in stark contrast to the smooth, continuous bowing of the tailpiece that comprises time span 3. In addition to timbral differences, time span 4–7 also feature a loudness level and durational range that are distinct from those of the concurrent time span 3. Consequently, the events contained in spans 4–7 do not integrate with the gesture constituting span 3. Moreover time spans 4–7 are sufficiently separated from one another that they do not themselves form a collective group. Instead each distinguishes itself as distinct time span on the basis of consistency within transitions and inconsistency at transitions. As such, each evokes a particular temporality, and is likely to be perceived as a Φ-state.

The brief, comparatively abrasive gestures of time spans 4–7 seem to share a temporality that is distinct from that of the long, smooth gesture constituting the concurrent time span 3. Much like the above-described transition from span 2 to span 3, the change in temporality—in whatever way it is interpreted by a given listener—is born of a change in

activity level. The transition from span 2 to span 3 involved a change from relative activity to relative inactivity. Each of spans 4–7, similarly, involves an experience of relative activity concurrent to the ongoing experience of relative inactivity. In other words, each constitutes an instance of temporal multiplicity: the perception of two distinct yet simultaneous temporalities. In this case, since each of time spans 4–7 begin and end within the initial and terminative transitions of the ongoing time span 3, Φ-polyphony is achieved.

As noted above, each temporality derives from a particular collection of perceived attributes but entails an experience far richer than can be expressed by merely describing those attributes. It was suggested, for instance, that the temporality associated with the continuous gesture constituting time span 3 might evoke feelings of peacefulness. The comparatively abrasive events of spans 4–7, on the other hand, might evoke feelings of anxiousness, or some sensation of comparative agitation. Other listeners may find the former boring and the latter exciting, or perhaps the former beautiful and the latter ugly. It is this very richness of temporal experience that permits the perception of time spans as Φ-states not only in temporally isolated configurations but also in concurrent configurations. The next chapter explores the large-scale implications of the various temporal relationships among Φ-states.

Chapter 5

Φ-STATE STRATIFICATION

Chapter 4 examined temporal relationships among successive, overlapping, and concurrent Φ-states. The first of these relationships yields a uni-temporal experience, and the next two multi-temporal experiences. The concept of temporal multiplicity—the idea that, given certain conditions, Φ-states may be constituted in a temporally polyphonic context—is possible because each Φ-span evokes a temporality particular to its class. In other words, all instances of a given class are understood to share not only a common identity but also a common corresponding temporality. As noted in the previous chapter, the attributes that give rise to a particular temporality serve well to identify it but do not speak to the full richness of its experience. This richness nonetheless constitutes an important facet of a temporality, and helps establish class distinctions.

For the sake of analysis, instances of a particular class may be conceived as perceptual units along a single time stratum. Instances of a contrasting class may be conceived as perceptual units along a different time stratum. In the case of two simultaneous states, perceived events are streamed into one or the other of two concurrent time strata. This

streaming of perceived events into separate time strata, whether concurrent or successive, will be referred to as *stratification.* Of particular interest are the large-scale relationships manifest among stratified Φ-states, and the effect they have on a listener's perception of musical form.

5.1 Intrastratum Associations

All Φ-states share some level of association. In even the most discontinuous, seemingly amorphous musical experience, regularities among temporally disparate Φ-states—however vague or insignificant—inevitably emerge over time. It therefore follows that the initial perception of certain time spans as separate Φ-states does not necessarily preclude their eventual association. Associations among objects along the same time stratum, or *intrastratum associations*, are of primary importance because they reflect the recognition of a common temporality. Associations among objects across different time strata, or *interstrata associations*, are less significant because no common bond of temporality exists.

Large-scale intrastratum associations between Φ-states—whether successively or non-successively experienced—are inherently nonlinear, since earlier Φ-states do not predict later ones. (A time span exhibiting this type of predictability is not a Φ-span.) The nonlinear nature of large-scale intrastratum associations among Φ-states is reflected in what Jonathan Kramer calls "cumulative listening."

> [Cumulative listening is] an all-encompassing, retrospective, atemporal understanding which lies beyond [a] piece's time frame. Cumulative listening is ... the mechanism by which we come to understand, in retrospect, the nonlinear principles of a composition or passage.[162]

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[162] Kramer, p. 43. The term "cumulative listening" is not exclusive to nonlinear music; Kramer is referring here to Mozart's Piano Sonata in E-flat Major, K. 282.

Construing Kramer's notions of linearity as referring to aspects of musical temporality, we can conclude from his description that atemporal aspects of a musical passage are inherent in its ultimately temporal presentation. It is through our perception of temporal aspects in the music that we gain a holistic comprehension of atemporal aspects. Implicit in the concept of cumulative listening is the notion that memory does not necessarily retain objects in the order they were received. "Long-term memories," Bob Snyder asserts, "are not necessarily organized in a time order."[163] Indeed connections are more typically made between memories of non-consecutively apprehended objects. According to Robin Maconie,

> ... recollected [objects] order themselves by association, not by temporal sequence, and the pattern of association, which may vary, derives its coherence from values attributed to them in isolation, not from a general pattern they may collectively reveal.[164]

In other words, long-term memory organizes objects more by association than by strict succession—that is, more by similarity than by temporal proximity.

The idea of cumulative listening reflects Henri Bergson's two aspects of the self, as outlined in *Time and Free Will.*[165] In his essay on the nature of consciousness he argues that we possess two levels of conscious thought. One pertains to surface-level conscious states, which are highly associative. The other pertains to deeper conscious states that interpenetrate and form an organic whole. That is, distinct terms are first "set out in line,"

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[163] Snyder, p. 216.
[164] Robin Maconie, *The Works of Karlheinz Stockhausen*, 1st edition (London: Oxford University Press, 1976), p. 164.
[165] Henri Bergson, *Time and Free Will: An Essay on the Immediate Data of Consciousness* [1889], trans., F. L. Pogson (London: George Allen & Unwin, Ltd., 1959), pp. 129–139 and xxvi.

then combined through a process of permeation and organization.[166] The self "perceives distinct states at first, and ... by afterwards concentrating its attention, [the self] will see these states melt into one another."[167]

Bergson asserts that although the perception of unity may appear cohesive, it typically comprises multifarious components: "the points have become lines, the divisions have been blotted out, the whole displays all the characteristics of continuity."[168] His approach is essentially one of intentionality. At first, distinct objects are perceived. As time passes, however, one becomes aware of certain large-scale associations. These associations, which tend to be nonlinear in nature, lead to the recognition of certain patterns, shapes, or organic wholes. In Bergson's parlance, these durational entities assume the continuity of space.

Bergson's description of the relationship between space and pure duration calls into question Kant's notion of space as an absolute reality. Specifically, he charges that Kant "confused duration with space." Bergson writes:

> Kant's great mistake was to take time as a homogeneous medium. He did not notice that real duration is made up of moments inside one another, and that when it seems to assume the form of a homogeneous whole, it is because it gets expressed in space.[169]

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[166] Bergson ultimately concludes that free will exists not in successive space but within a homogeneous inner process, embodying pure duration.
[167] Bergson, pp. 138–139.
[168] Ibid., p. 83.
[169] Ibid., p. 232.

Bergson cites as an example of this phenomenon—much as Husserl would do over a decade later—the experience of perceiving a melody not as a series of discrete pitches but as a "totality" or an "organic whole." The notes of a melody permeate and mutually penetrate one another, thereby forming an organized connection. Bergson argues that although duration is successive, space is homogeneous; together they permit the "contradictory idea of succession in simultaneity."[170]

Bergson's notion of the conscious state is general enough to pertain to all acts of consciousness, including the audition of nonlinear music. In particular, the conceptual space in which Φ-states of the same class interpenetrate is what I am calling a time stratum. It therefore follows that, in order to describe the perceived structure of a highly nonlinear piece of music, one must determine intrastratum associations at work in the piece. The following section discusses some of the fundamentals of Φ-state stratification.

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[170] Ibid., p. 228. Note the similarity between Bergson's notion of "succession in simultaneity" and Husserl's insistence that objects in a unitary apprehension remain "absolutely simultaneous." (The concept of simultaneously available percepts is addressed in section 1.2 of this study.)

5.2 Basic Aspects of Φ-state Stratification

The concept of class-based Φ-state stratification shares certain similarities with other theories of stratification, notably the method outlined by Edward Cone in his analysis of Stravinsky's *Symphonies*.[171] Cone defines strata by specific features that distinguish them from all other contrasting strata. Thus each stratum comprises multiple instances of a single class. The approach presented herein differs from Cone's approach to class-based stratification in a number of ways, however, most notably with respect to the phenomenological status of constituent groups. Although the analytical goal of stratification is similar—to reveal inherent aspects of large-scale structure—Cone's analysis is directed more generally toward the identification of groups and their inherent associations, rather than toward the more specific task of identifying Φ-states. For this latter task, a class is defined not simply by the attributes of its constituent members but by the particular temporality its attributes evoke. The class-based stratification of Φ-states therefore reflects the way we perceive large-scale structure in highly discontinuous musical experiences.

Before applying the principle of stratification, let us quickly review what we know about the concept. The notion of separate time strata was introduced in the previous chapter to help describe the phenomenon of Φ-polyphony. Based on Thomas Clifton's assertion that

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[171] Edward T. Cone, "Stravinsky: The Progress of a Method," in *Perspectives on Schoenberg and Stravinsky*, eds. Benjamin Boretz and Edward T. Cone (New York: Norton, 1972), pp. 155–164. Fundamentals of stratification in music are also addressed in Maury Yeston, *The Stratification of Musical Rhythm* (New Haven: Yale University Press, 1976).

each new activity bears a particular temporality, it was established that a perception of concurrent Φ-states must constitute a passing of perceived events into separate but simultaneous time strata. Moreover, it was established that sharing an identity (i.e., class membership) constitutes more than simply sharing a common collection of attributes. To share an identity is to present events in such as way as to mark time in the same way. The application of this principle to larger-scale structures is merely an extension of what Clifton describes as an interpolation of "spans within spans."[172] Of particular interest are associations among instances of the same class.

The role of stratification has been implicit since the outset of this study. Consider, for example, the earlier discussion of Zorn's *Road Runner*. At first the piece appears to defy meaningful stratification since the onset of each new Φ-state seems to constitute a new class. However, a relatively consistent alternation between Φ-states with a more conventional character and Φ-states with a more unconventional character soon leads to the establishment of two general classes. In other words, Φ-states are understood to occupy a position on one or the other of two time strata. The analytical benefit of stratification is not significant in this case, though, since the two classes are so broadly drawn.

By way of comparison, the classes established in Ligeti's *Fragment* are highly distinct. In fact, the classes are so distinct that the passing of perceived events into one time stratum or the other is sometimes understood to occur simultaneously, an experience

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[172] Clifton, pp. 58–59. (See section 4.3 of the present study for a more in-depth discussion of interpolated spans.)

characterized as temporal multiplicity. These well-formed classes are instantiated so infrequently, however, that beyond this purpose stratification is of only marginal analytical benefit. The phenomenon of stratification is most prevalent—and therefore most useful as an analytical tool—in works comprising several classes and numerous instances of each class in a variety of temporal arrangements. Lachenmann's *Dal Niente* matches this paradigm.

5.3 Large-scale Stratification

in Helmut Lachenmann's *Dal Niente (Interieur III)*

The following discussion outlines a basic two-step process for analyzing large-scale form in a work comprising Φ-spans—that is, nonlinear music. The first step is to identify all relevant classes manifest in the work. In a work featuring few classes, this may entail identifying all of them. In a more temporally complex work featuring many classes, this may require identifying only those that contribute significantly and directly to its large-scale form. These are the *governing* classes of a work.

The second step in analyzing large-scale form in nonlinear music is to identify and assess large-scale trends or processes. Although these processes are often relatively clear in a linear musical experience, they are not immediately apparent in a nonlinear musical experience. "Coherence and continuity [in nonlinear music]," Kramer asserts, "must be tucked away in the background ... so that their force is felt subliminally as a nonlinear phenomenon."[173] Kramer is referring here not to the intentional suppressing of continuity but to the indeterminacy of processes that may later prove to convey continuity. Although relegated to the "background," these processes can nonetheless be perceived in music involving frequently changing and (often) concurrent temporalities. For example, an experience comprising an array of distinct present awarenesses can communicate structure through proportions, patterns, and other devices. As the music unfolds, some

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[173] Kramer, p. 208.

processes may prove to be insignificant and others critical to the form of the work. Some may manifest themselves along a single stratum, others across multiple strata. By determining them from the perspective of perception, one can derive an understanding of a work's form that is consistent with its aural experience.

Step 1: Identify all relevant classes in the work

In order to identify the classes manifest in Lachenmann's 1970 solo clarinet work *Dal Niente (Interieur III)*, one must first address the unusual manner in which they are presented. The work features many tiny clusters of activity demarcated by unconventional timbre changes. Lachenmann characterizes the function of the solo clarinet in the work as "a filter for manipulating stylised and carefully controlled breath sounds."[174] Various alterations of grip, embouchure and air pressure form discrete layers of sound.

The composer likens the sudden juxtaposing of contrasting sounds to the turning on and off of a radio. This description is similar to an analogy by Thomas Day wherein moment form is compared to the experience of changing channels on a television.[175] The two analogies are similar in that they reflect Stockhausen's famous distinctions between

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[174] Helmut Lachenmann, *Musik als existentielle Erfahrung* (Weisbaden: Breitkopf & Härtel, 1996), p. 382.
[175] Thomas Day, *A Study of Moment Form* (M.A. thesis, Mills College, 1995), p. 2.

beginning and simply starting, and between ending and simply stopping. There is, however, one crucial difference: Whereas Day's channel-changing analogy implies a series of adjacent but largely disparate Φ-states (unless channels are limited to very few), Lachenmann's on/off analogy implies the recurrence of highly associative instances—i.e., Φ-states belonging to the same class. By recognizing class-based associations, one is better able to understand the structure of a musical experience. In *Dal Niente*, however, this task is made more difficult by the presence of multiple concurrent temporalities (that is, Φ-polyphony).

Clarinetist James Gillespie characterizes *Dal Niente* as a "quasi polyphonic" work.[176] This characterization, while seemingly paradoxical for a solo composition, is nonetheless apt. Sometimes polyphony is achieved literally, through the simultaneous production of two or more distinct sounds, as shown below in Example 5.01.

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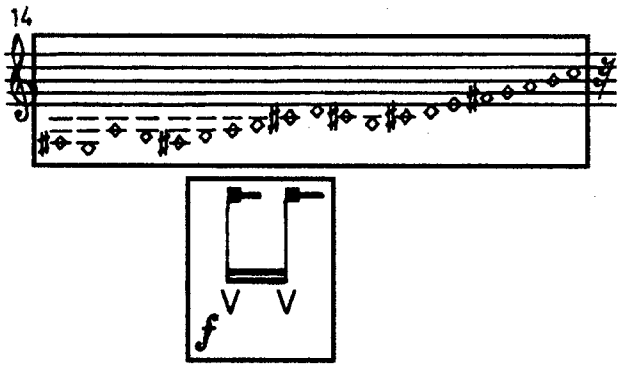
[176] James Gillespie, "*Dal Niente* [review]," *The Clarinet* 2/2 (1985): 14.



Example 5.01. Φ-polyphony resulting from simultaneous voices in Lachenmann's *Dal Niente*, system 14. [177]

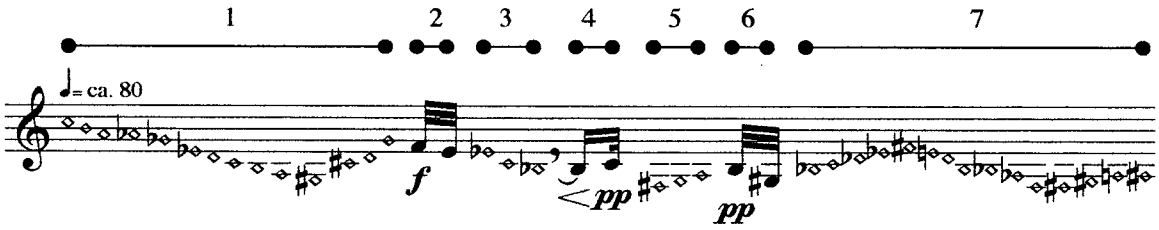
The diamond-shaped noteheads designate a rapid delivery of pitched events at the quietest possible dynamic level. The square noteheads designate a toneless air sound. By permitting air to escape on one side of the mouth, a clarinetist can produce both sounds simultaneously. The two types of gestures are distinguished from one another on the basis of contrast in various parameters including timbre, loudness level and attack density. Moreover each is consistent *within* its transitions and inconsistent *at* its transitions, and implies no internal goals. The two groups of events therefore constitute Φ-spans.

The above passage appears to produce Φ-polyphony in the conventional manner: by presenting two Φ-spans concurrently. As such, it is remarkable only for its production by a single player on a normally monophonic instrument. More important to the topic of

[177] Examples 5.01 and 5.02 omit a Q-shaped score indication referring to "loud key-noises." In the 5.01 the last sixteen pitched events would be affected; in 5.02 the first five pitched events of time span 1 and the last seven pitched events of time span 7 would be affected. The addition of this percussive element does not affect the perception of the time spans in question as Φ-states. It may, however, constitute its own Φ-span on the basis of its contrasting timbre.

stratification is the perception of Φ-polyphony arising from alternating instances of highly contrasting classes.

The "filtering effect" Lachenmann describes is evident in *Dal Niente* from the outset. The opening system, shown below in Example 5.02, quickly establishes two classes.



Example 5.02. Lachenmann's "filtering effect" in *Dal Niente*, system 1.

Class A is first instantiated by a long stream of rapid, barely audible pitched events represented by diamond-shaped noteheads. This quiet passage is interspersed with instances of class B—sudden bursts of conventionally executed and much louder groups of notes represented by regularly shaped noteheads. These conventionally produced sound events adhere to the marked tempo, and therefore feature a far lesser attack density. (The tempo marking applies only the beamed notes; the unbeamed notes are to be performed as rapidly as possible.[178]) Moreover, although instances of class B are not *equal* in loudness, their highly contrasting mode of production places them in a general range of loudness entirely apart from that of the barely audible instances of class A.[179] Class A is therefore defined by three primary attributes: an extremely low level of

[178] The entire system lasts for only a few seconds.

[179] As is often the case with loudness-based groupings, segregation involves the above-described phenomenon wherein listeners tend to suppress variances within categories (i.e., within classes).

loudness, an extremely high attack density, and a very pure clarinet timbre. Class B, on the other hand, is defined by three contrasting attributes: a higher level of loudness, a lower attack density, and a richer clarinet timbre.

A series of sudden and substantial changes to timbre and loudness divide the above passage into the seven time spans indicated above. These discontinuities mark transitions at the local level. Time span 1 has all the characteristics of a Φ-span. It features parametric consistency, ensuring that its events are sequentially integrated. It is non-goal-directed and brief. Moreover it features consistency between transitions and inconsistency at transitions, thereby ensuring contextually distinctness.

Following the completion of time span 1, the events of time span 2 begin to initiate a new Φ-span. Time span 2 is so brief however, that it does not evoke a strong sense of enduring present. Groups such as these were described in Chapter 2 as "protostates."[180] The same applies to time spans 3–6, which are of approximately the same duration. Although too short to be perceived as Φ-states, these event sequences nonetheless form associations with certain other event sequences. Specifically, they are classified on the basis of timbre, loudness level and attack density as either A- or B-class event sequences. Time span 7 constitutes a Φ-span in much the same way as does time span 1. The two spans thus form "bookends" in the passage shown above in Example 5.02.

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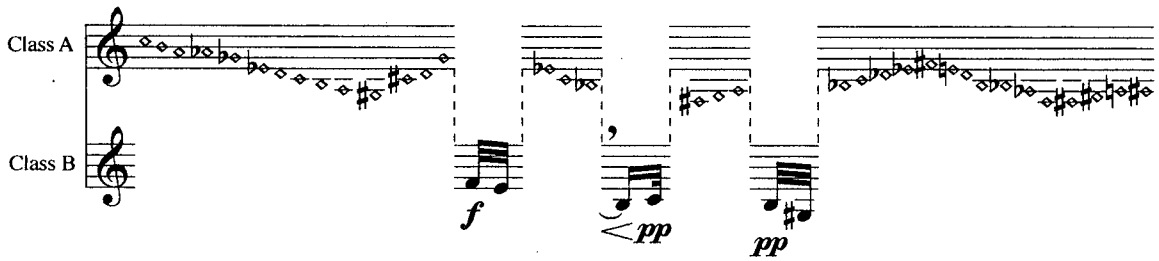
[180] A protostate refers to an event sequence too short to be a Φ-state but too independent to integrate with its context.

The alternation of brief A-class sequences with brief B-class sequences results in the phenomenon of masking. As described in Chapter 2, masking refers to the illusion of continuity that an occlusion can sometimes produce. In this case, instances of the much louder class B (spans 2, 4 and 6) constitute a mask that yields a perception of illusory continuity across all nearly inaudible instances of class A (spans 1, 3, 5 and 7). To a lesser extent, B-class events themselves possess an element of (illusory) continuity. B-class event sequences may be seen as islands in a vast sea of A-class events. Initially they appear to be mere interruptions in the surface of the water, but as time passes (and as more of the piece unfolds) they are revealed to be but the visible points in a much larger submarine formation. As more and more of the piece unfolds, the extent of stratification—and therefore the complexity of the work's temporal structure—becomes far greater.

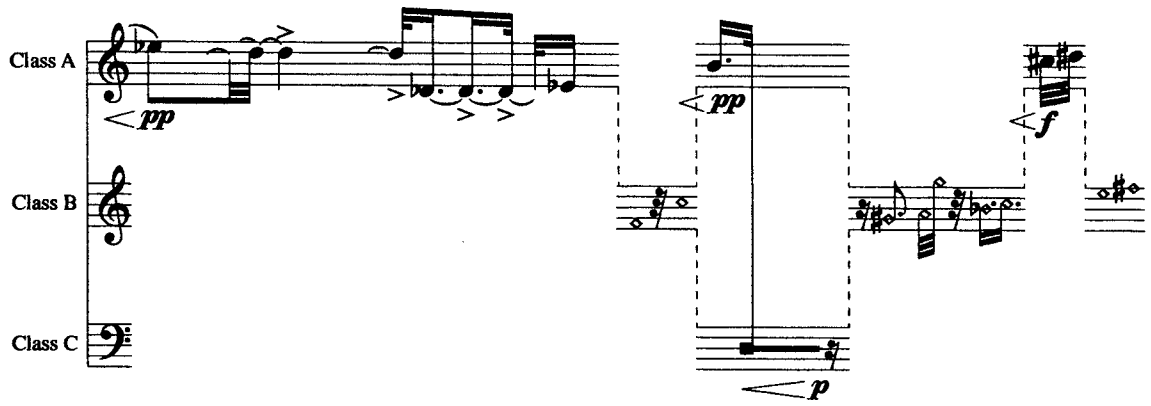
Despite comprising an alternating series of distinct event sequences, then, the passage nonetheless evokes a perception of two concurrent streams of continuity (i.e., Φ-polyphony). The component event sequences, Bergson might say, are invested with the continuity of space. Example 5.03 shows the two temporalities in parallel horizontal planes.



Example 5.03. Bipartite stratification and Φ-polyphony resulting from Lachenmann's "filtering effect" in *Dal Niente*, system 1.

At first, all perceived events stream into either A- or B-class Φ-states, primarily on the basis of differences in loudness, attack density, and timbre. Thus classes A and B are initially the only schemas guiding a listener's intentions. In system 5, however, an event with highly contrasting attributes initiates the formation of a new class: class C.

Class C represents a new temporality, one characterized by a collection of attributes distinct from those of both classes A and B. Most notably, class C is defined by toneless air sounds and a comparatively lower attack density. Example 5.04 illustrates the tripartite, class-based stratification of Φ-spans states during system 5.



Example 5.04. Tripartite stratification

in Lachenmann's *Dal Niente*, system 5.

As in the previous example, masking heightens a listener's sense of intrastratum associations, thus fostering an illusory sense of continuity.[181] In particular, a rising contour in stratum A (from Db4 through to D#5) promotes continuity across the passage. B-class events also form a stream, primarily on the basis of their low level of loudness and their pure timbre. During the passage shown above in Example 5.04, the temporalities associated with classes A, B and C are effectively perceived concurrently, though class C temporality is only hinted at by a single gesture. As the piece proceeds, however, more such events are perceived, thereby refining our understanding of the temporality.

The vast majority of all events in *Dal Niente* fall into one of classes A, B or C. These three categories are therefore the governing classes of the work—those primarily

[181] As illustrated in Chapter 4, a perception of illusory Φ-polyphony is only possible when masking occurs. (Actual Φ-polyphony may or may not involve some degree of masking.)

responsible for defining the work's large-scale structure. (In addition to classes A, B and C, there are four other infrequently instantiated classes in *Dal Niente*. They are characterized by, respectively, a slap-tongue sound, a smacking/kissing sound, a sharp whistling sound, and a multiphonic sound. Grace notes and various articulation markings further complicate the process of class-based stratification.)

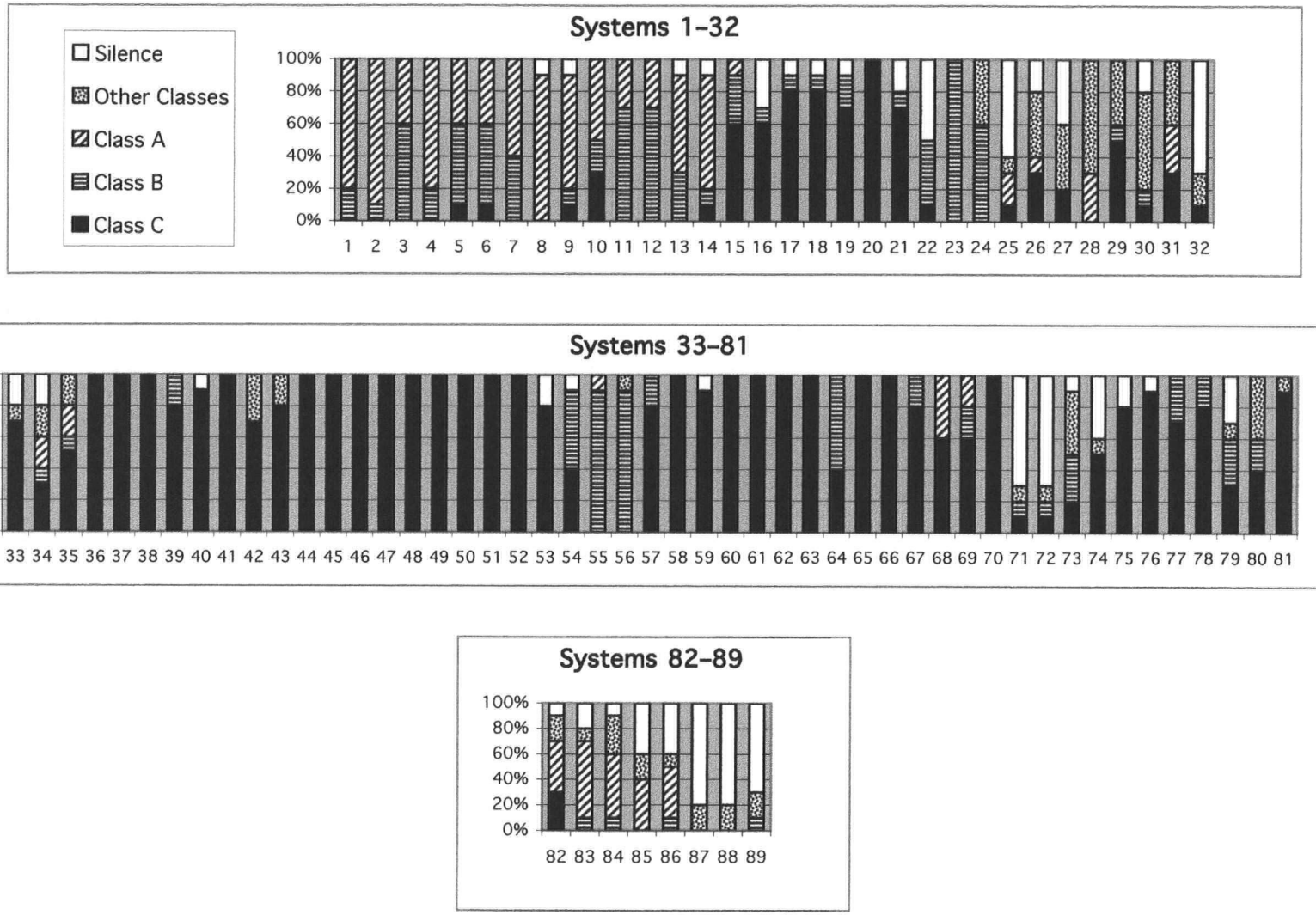
Instances of class C are particularly powerful determinants of musical form because they are exclusive in their employment of unpitched air sounds. That is, all events instantiating classes A and B, as well as those instantiating the four secondary classes described above, involve pitched rather than air sounds. Air-only sounds are thus the exclusive domain of class C, and therefore important factors in the establishment of musical form.

Step 2: Identify and assess large-scale trends or processes

As noted earlier, processes are not initially apparent to a listener in a predominantly nonlinear musical experience. The task of identifying such processes is particularly difficult in *Dal Niente* because it features not only frequent changes of temporality but also frequent changes in the number of simultaneous temporalities. This rich and varied array of perceived temporalities nonetheless conveys several large-scale processes, thereby contributing to a listener's understanding of the form of the piece.

Despite a seemingly amorphous quality at the outset of the work, several important processes eventually emerge across its three governing classes (A, B and C). The graph below displays these trends by indicating the proportional allotment of class instances for each system in *Dal Niente* using 100%-columns.[182] For example, 20% of the Φ-spans in system 1 are of class B and 80% are of class A; 10% of the Φ-spans in system 5 are of class C, 50% are of class B and 40% are of class A.

[182] Percentages of class instances in a system were derived from an analysis of durational proportions using a 10-increment scale. The results are therefore only approximate, but sufficient to illustrate generally perceived trends.



Example 5.05. Stratification showing large-scale processes in Lachenmann's *Dal Niente*.

Notable in the graph is the trend toward an increased presence of C-class instances. Following the first brief instance at system 5, the proportion of C-class instances gradually (albeit inconsistently) increases. Brief instances of class C occur in systems 6, 9, 10 and 14, before longer passages begin in system 15. By system 33, instances of class C begin to saturate the piece, becoming the unequivocal focus of attention. Amidst the continuing and dominating presence of class C, however, interjections of the contrasting classes A and B begin to reappear. These interjections soon become longer and more frequent. After system 82, class C is once again altogether absent and instances of classes A and B prevail, as at the outset of the piece.

Despite frequent discontinuity and fragmentation, the Φ-spans stratify in such a way as to depict an eventually discernible large-scale trajectory. The first and third sections, systems 1–32 and 82–89, respectively, are characterized by a predominance of A- and B-class Φ-spans. The middle section, systems 33–81, is nearly saturated by C-class Φ-spans. Thus a general ternary structure is depicted. In addition, a general progression in first section from exclusively A- and B-class Φ-spans toward an increased proportion of silence and instances of classes other than A and B is loosely mirrored in the last section. The latent linearity inherent in the quasi-ternary construction of the work is particularly remarkable given the degree to which nonlinearity initially dominates local-level experience.[183]

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[183] Thus Φ-states are closer to Lawrence Zbikowski's "categories" than Lerdahl and Jackendoff's "groups." "Musical categories," Zbikowski explains, "can absorb many of the functions of groups—specifically, the role of the group as the first level of organization for musical phenomena—but do not require absolute contiguity or strict hierarchy." See Zbikowski, pp. 59–60.

One of the implications of *Dal Niente*'s highly discontinuous, unpredictable local level is that precise boundaries for its three large sections are difficult to identify. While the overall trend is readily apparent, its sectional divisions are not. This aspect is represented in the above graphic depiction in that it reflects not only the strategic tripartite stratification of Φ-states but also the ambiguity of the work's two structural boundaries and the non-exclusivity of its three sections. The divisions at systems 33 and 82 indicate approximate boundaries, points that must therefore be understood as markers painted with a broad brush.

The plurality of temporalities in *Dal Niente* speaks directly to the beauty of the work. At first instances of the three governing classes are understood as discrete temporal objects. As large portions of the piece begin to unfold, however, these instances are seen as contributing, albeit in a seemingly capricious manner, to a large-scale trend. By observing where in the course of the piece particular timbral attributes of Φ-spans begin to contribute to a discernible trend, one can more easily and accurately determine the structure of the musical experience.

Chapter 6

FLUX:

AN ANALYSIS OF THE OPENING

THIRTY-THREE MEASURES

The theories and procedures postulated throughout Chapters 1–5 will now be applied in a structural analysis of the opening thirty-three measures of my large chamber ensemble work, *Flux* (2000). In particular, the factors established in Chapter 2 will be used to assess whether or not the various time spans comprising the passage constitute Φ-spans. The attributes of any Φ-spans will then be assessed and compared in order to determine their classification. The analysis will culminate with a class-based stratification of the passage. This approach will permit not only an examination of temporal relationships among Φ-states but also an assessment of large-scale structures inherent in the musical experience.

6.1 Preliminary Remarks

Flux was commissioned through the Canada Council for the Arts by the Ensemble contemporain de Montréal for their November 2000 cross-Canada tour. The 13-minute work is scored for an ensemble of nine musicians, configured as follows: flute (doubling on piccolo), clarinet (doubling on bass clarinet), bassoon, horn, trombone, piano (doubling on small percussion), violin, cello, and bass. The work embodies a number of the ideals outlined in this study, but was not designed to be a pedagogical instrument. In fact, the relationship between theory and practice is precisely the reverse—the theory arose from certain qualities I recognized in my music. Upon becoming more aware of these qualities, I began to explore their theoretical possibilities and further exploit them compositionally.

In writing *Flux* I was interested in cultivating an experience wherein time is continually expanding and compressing. It is to this experience of temporal instability that the title refers.[184] As noted in Chapter 2, the key to controlling the rate of experiential time lies in the control of surprise. Time passes most quickly when one is confronted with unfamiliar events, and slowest when one is confronted with familiar ones. In other words, surprise is generally caused by discontinuity. However, as noted in the earlier analysis of the opening system of Zorn's *Road Runner* (section 2.5 of this study), too many rapid

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[184] The Greek letter Φ, incidentally, was chosen as a symbol for the term "phenomenological" in part because it symbolizes the physical phenomenon of "magnetic flux."

discontinuities can saturate a listener's capacity for experiencing surprise, thereby becoming predictable. Only when discontinuities yield an inconsistent rate of experiential time is surprise maximized. This phenomenon is reflected in the following axiom, a portion of which was cited in Chapter 2:

> The *degree of information* is ... greatest when at every moment of a musical flow the *momentum of surprise* ... is the greatest. ... But this means that the experiential time is in a state of flux, constantly and unexpectedly altering.[185]

In *Flux*, interrelationships between continuities and discontinuities are designed such that the momentum of surprise—and therefore the degree of information—is maximized. As such, the work constitutes a complex temporal experience. Some time spans are paradigms of the phenomenological principles described herein while others relate less directly. This fact, together with the additional complexity arising from other aspects of the work, dictates that the best approach is an in-depth investigation of a particular extended passage rather than a cursory analysis of all conceivable candidate time spans. Hence, the following analysis attempts to describe the structure and significance of the opening thirty-three measures of *Flux* from the perspective of subjective time-consciousness.

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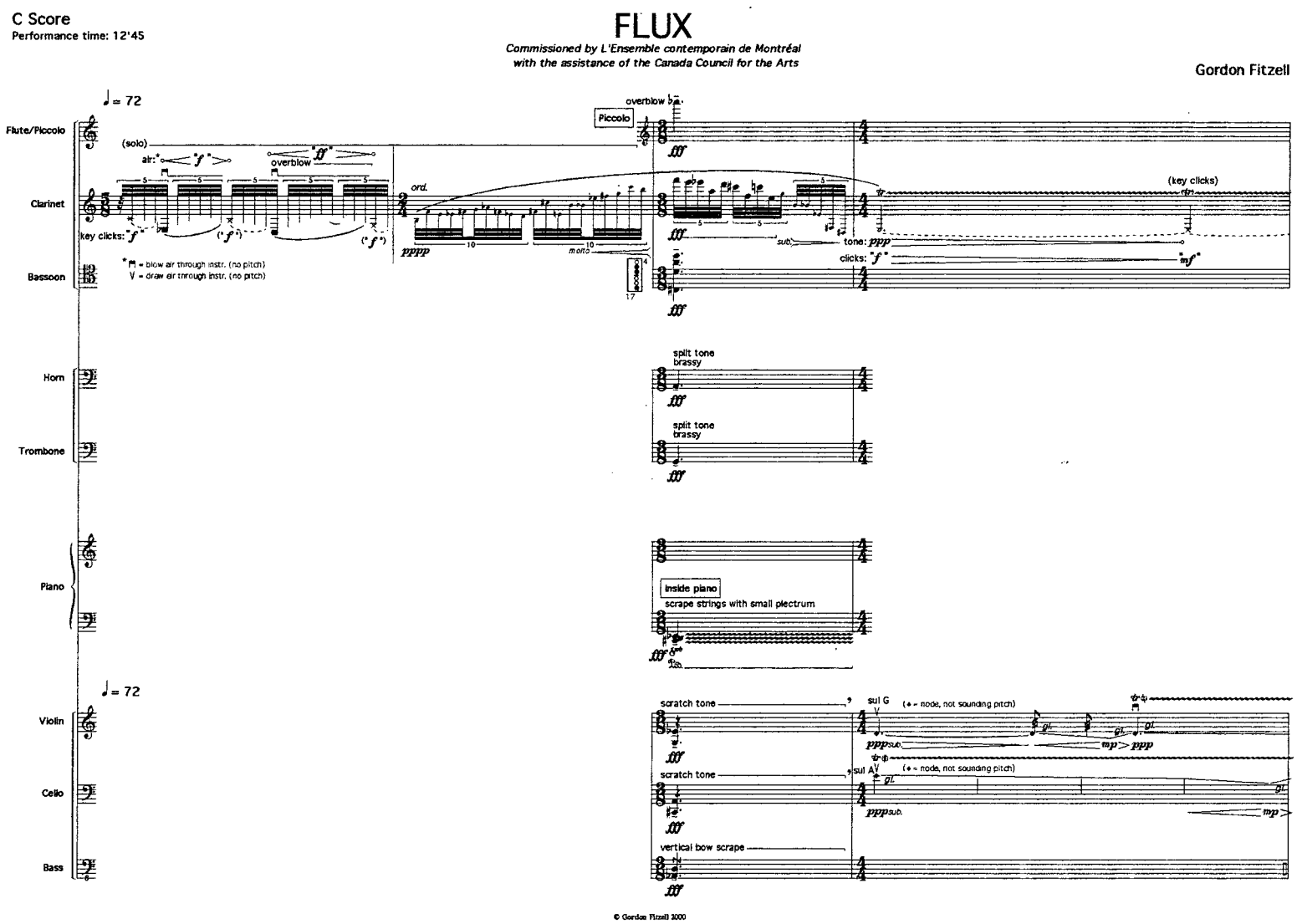
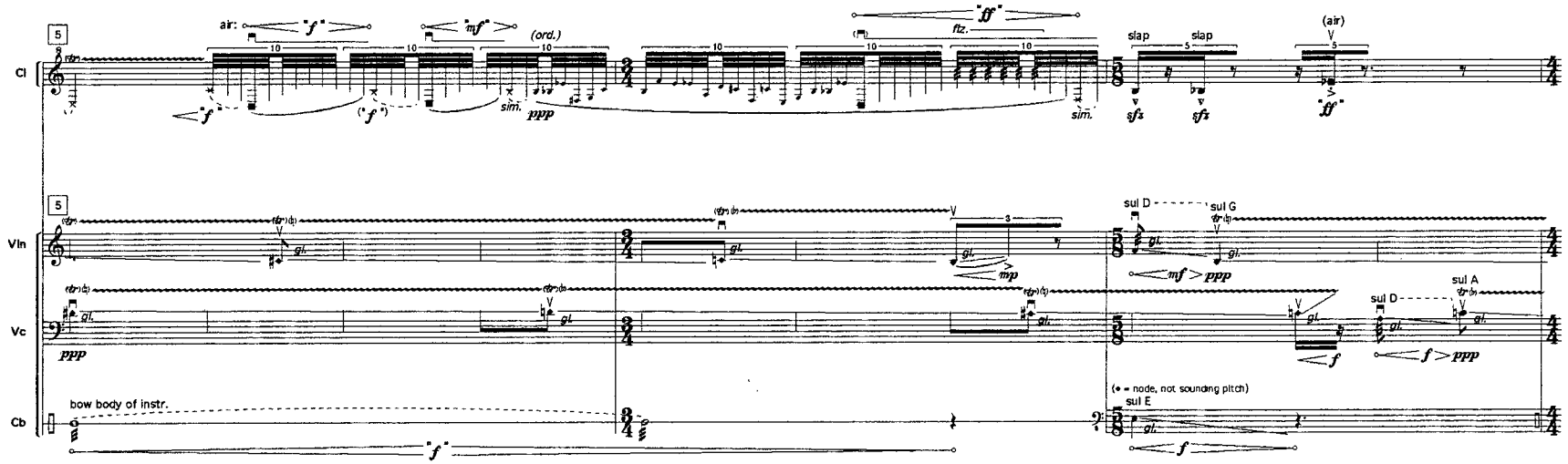
[185] Stockhausen, "Structure and Experiential Time," p. 64.

6.2 Describing the Phenomena

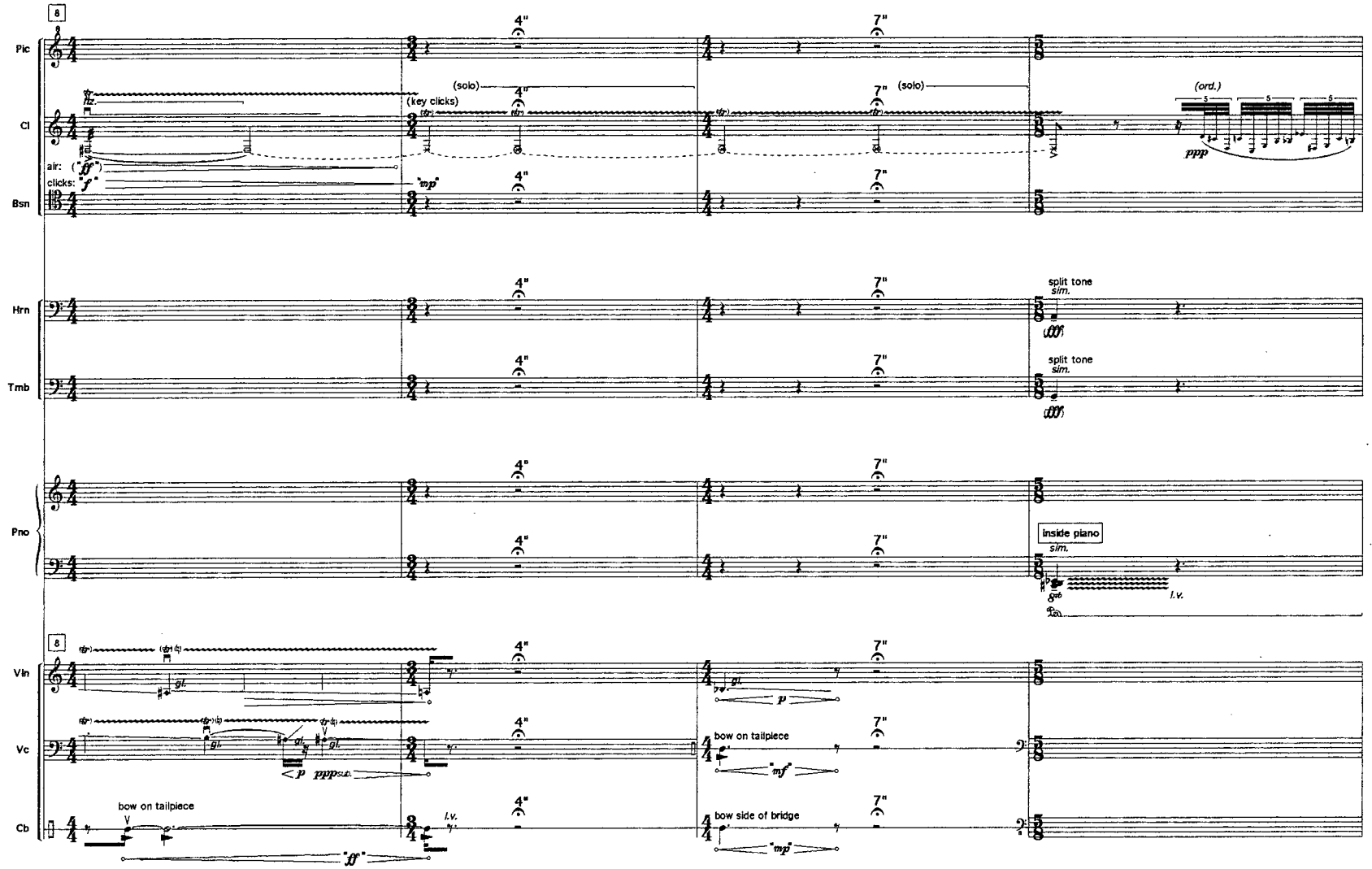
The opening events of *Flux* elicit a number of important perceptions that impact a listener's understanding of subsequent events. In particular, these include the perception of certain time spans as Φ-states and the establishment of corresponding classes. Before discussing these perceptions, however, it may be useful to describe the experience of perceiving these initial events. As a visual reference, the first eleven measures of the score are provided below.



Example 6.01 (beginning). *Flux*, mm. 1–11.



Example 6.01 (continued).



Example 6.01 (continued).

The experience of listening to the opening eleven measures of *Flux* begins with the perception of a stream of soft events presented by the clarinet. The events in this stream share a number of similar attributes. These include a very low level of loudness,[186] a consistently high attack density, and a gentle timbral character. Amidst the continuation of this stream, a sonic monolith suddenly dominates one's focus of attention at m. 3. This interruption is characterized by a number of contrasting attributes, including an extremely high level of loudness, a highly abrasive timbre, a lower attack density, a synchronous onset and release of events at initial and terminative points, a short duration, and a maximum textural density. The interruption therefore initiates a second time span.

No sooner has the contrasting time span begun, however, than it ceases. At this point (m. 4) focus returns to the stream of gentle events, which, in retrospect, appears to have been there all along. Now, however, gentle events in the clarinet are accompanied by similarly gentle events in the strings. Events of this character continue through to m. 11, where the listener's attention is once again suddenly dominated by another loud and abrasive monolith similar to the previous one.

Despite the dominating presence of the monolithic objects perceived at m. 3 and m. 11, the rapid stream of soft events is nonetheless perceived to continue throughout. In m. 3, this is in part because the clarinet temporarily elevates its level of loudness—effectively adopting an attribute of the dominating monolithic objects—but primarily because similar

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[186] The quotations-enclosed dynamic markings "ff" and "f" in the score refer not to absolute levels but to intensity levels for the "air" sounds; their resulting levels of loudness are quite low.

events are heard prior to and following what is a comparatively brief and highly contrasting interruption. The prominent attributes of the gentle event sequence—a low level of loudness, a high attack density, and a comparatively gentle timbre—serve to integrate its events. Its rising and falling contour, which reaches its peak on the downbeat of m. 3, further contributes to the integration of its constituent events.

The interrupting static block at m. 3 is characterized by an opposite set of attributes, as itemized above. Most prominent among these are a high level of loudness, a low attack density, and an abrasive timbre. The interruption forms a mask over the inaudible portion of the soft events produced by the clarinet, particularly the quintuplet on the third beat of m. 3. As a result, events in the clarinet during mm. 2–4 are integrated such that a single stream of events is perceived. In other words, good continuation is perceived across the stream despite a gap in its rising and falling contour. As we will discover, illusions of continuity can significantly impact a listener's understanding of Φ-states and their corresponding classes.

6.3 Determining Φ-states

Having described the experience of perceiving events in *Flux* up to m. 11, let us now assess the implications of our perceptions up to that point. In particular, we must determine whether—from the perspective of m. 11—any of the time spans discussed are likely to be perceived as Φ-states. At issue are the following three time spans: time span 1, which extends from the beginning of the piece through m. 11 (and perhaps beyond), and involves clarinet and strings; time span 2, which is contained within m. 3 and involves all the instruments of the ensemble except clarinet; and time span 3, which extends for the duration of one quarter note from the downbeat of m. 11, and involves brass and piano. In order to determine the likelihood of these time spans being perceived as Φ-states, we must examine them with respect to the following three factors: (1) sequential integration; (2) contextual distinctness; and (3) non-goal-directedness. A fourth factor, collective nonlinearity—which describes perceptions manifest only across larger spans of time—will be assessed later in the chapter.

Sequential Integration in Flux

Several factors leading to sequential integration in time span 1 have already been discussed. These include shared attributes such as a low level of loudness, a high attack density, and a gentle timbral character. These attributes unify the events of time span 1 despite variations in timbral colour. Timbral variations arise for a number of reasons, notably frequent changes of instrumentation. Time span 1 features the following instrumental combinations: solo clarinet, clarinet with violin and cello, clarinet with all three strings, and, briefly, violin and viola alone. A variety of modes of sound production also contribute to timbral variation across the span. These include air-only, traditionally produced, slap-tongued, and key-clicking clarinet sounds, as well as string harmonics, and bowing of the body and tailpiece. As wide as this array of timbral variations is, it does not affect the unity of time span 1.

Timbral variation is permitted within time span 1 because its events are so highly disparate with respect to those of time span 2 (those constituting the first interruption). The contrast in loudness and attack density between the two groups is so extreme that all quiet events with a high attack density are grouped on the basis of their exclusion from the interruption at m. 3. In other words, loudness level and attack density are such important factors in establishing the two groups that certain differences between them are suppressed.

Although not identical, the various sounds comprising time span 1 share a similar timbral *character*. This character was described earlier as "gentle." The strings, for example, feature soft, single harmonics during span 1, whereas they feature loud, double-stopped scratch tones during time span 2. We may therefore conclude that instrumentation is not an integrating factor for time span 1, whereas timbral character (in addition to loudness level and attack density) is.

For time spans 2 and 3, sequential integration is achieved primarily through the shared attributes of extreme loudness and a highly abrasive timbre. The two spans feature consistency in several other parameters as well, including attack density and register. In addition, the synchrony of onsets and releases for all contributing events at initial and terminative time points contribute to perceptions of the respective time spans as distinct objects of consciousness. For time span 2, this synchrony refers to every instrument in the ensemble except the clarinet, and, for time span 3, only brass and piano. While maximum textural density may have been considered an additional integrating attribute at any point prior to m. 11, a strong association between the groups of loud, abrasive events at measures 3 and 11 indicates to a listener that, as with time span 1, instrumentation is not a factor in determining sequential integration.

Contextual Distinctness in Flux

Defined earlier as perceptual independence relative to all proximate time spans, contextual distinctness requires sharp initial and terminative transitions. That is, it requires extreme consistency *within* transitions and extreme disparity *at* transitions. Time span 1, which begins the piece, emerges from silence, thereby forming a sharp initial transition. From the perspective of now-point m. 11, the terminative transition of time span 1 is not yet known. If subsequent events reveal that time span 1 does not feature a sharp terminative transition, then the likelihood of its perception as a Φ-state would be diminished. If subsequent events reveal that time span 1 *does* feature a sharp terminative transition, then the likelihood of its perception as a Φ-state is considerable.

The initial and terminative transitions of time spans 2 and 3, all of which are known by m. 11, reflect significant discontinuities. The synchronized beginnings and endings of their loud, abrasive constituent events demarcate sharp transitions against the contrasting context of the soft, gentle events comprising time span 1. Having established that both spans exhibit consistency with respect to parameters such as loudness level, timbre, register and attack density, we may conclude that time spans 2 and 3 are likely to be perceived as contextually distinct objects of consciousness. Moreover contextual distinctness serves to link them on the basis of their sharing a very *similar* context. In other words, time spans 2 and 3 are not only contextually distinct but also similarly so.

This similarity of context establishes a special association between the two time spans that will be explored in section 6.5 of this study.

Non-goal-directedness in Flux

The events comprising all three time spans unfold in such as way as to negate pattern detection. As such, they defy expectation. Time spans 2 and 3, which feature extreme parametric consistency throughout their brief durations, are particularly non-goal-directional. No formal model could possibly be conveyed by time spans 2 and 3 since neither features a sonic change of any kind. Time span 1, on the other hand, involves a comparatively large degree of variety—particularly timbral variety, as detailed above. But these changes of timbre are entirely unpredictable. Despite the fact that they transpire over a long period of time (relative to time spans 2 and 3), they do not imply any readily apparent teleological patterns. Hence, a listener senses no protentions of ending during time span 1, only protentions of general continuance. Surroundability ensues, and the present is made to endure.

Having determined that time spans 1, 2 and 3 possess—from the perspective of now-point m. 11—the qualities of sequential integration, contextual distinctness, and non-goal-directedness, we can assert that the likelihood of their being perceived as Φ-states is very high. (This assessment is tentative for time span 1, of course, since its continuation beyond m. 11—if any—is not yet known.[187]) The three Φ-spans cannot be labelled at this time, however, since their respective class affiliations have not been established.

[187] As noted earlier, all perceptual categories must be considered provisional until the entire work in question has been experienced. "The categories by which we make sense of music," Edward Pearsall asserts, "are not deterministic, but provisional." See Edward Pearsall, "Mind and Music: Intentionality, Music Theory, and Analysis," *Journal of Music Theory* 43/2 (1999): 231–255.

6.4 Establishing Classes

The events up to m. 11 elicit a perception of two highly similar "monolithic" Φ-states presented amidst a stream of comparatively gentle events that constitutes a contrasting Φ-state. Implicit in this perception is an identity-linkage between the determinable-X's of the monolithic Φ-states. This shared identity stands in stark contrast to the identity defined by the determinable-X of the ubiquitous stream of gentle events. Therefore it appears that Φ-states emerging during the opening eleven measures of *Flux* are affiliated with one or the other of two established classes—A and B.

Classes A and B will help us organize not only events perceived up to m. 11 but also future events. Classes constitute sonically defined schemas, thus forming the context for a listener's conscious awareness. Once established, classes remain semi-active—searching, as it were, for matching paradigms. In order to reflect these intentional processes analytically, we must express them as explicitly as possible. Example 6.02 lists the attributes—most of which have been discussed already—primarily responsible for defining the two classes established up to now-point m. 11. Class A refers to the identity associated with time span 1, and class B to the identity shared by time spans 2 and 3. Time spans 1, 2, and 3 may therefore be renamed Φ-spans A1, B1, and B2, respectively.

Class A	Class B
loudness level: very low	loudness level: very high
timbral character: gentle	timbral character: abrasive
attack density: very high	attack density: very low (a single attack)
synchrony of events at transitions: none[188]	synchrony of events at transitions: total

Example 6.02. Defining attributes of classes A and B,

as understood from the perspective of now-point m. 11 in *Flux*.

The four parameters listed for each class are those most responsible—from the perspective of now-point m. 11—for determining identity; that is, class membership.[189] As noted earlier, instrumentation certainly contributes to the *initial* distinction between Φ-spans A1 and B1 at m. 3, but subsequent events indicate to a listener that it is not a factor in Φ-span classification. Instead differences of loudness, timbre, attack density, and synchrony of initial and terminative points define each class. Several other factors

[188] The initial transition of A1 involves but a single monophonic instrument (the clarinet); the terminative transition of A1 is not known as of now-point m. 11. The transitions of B1 and B2, on the other hand, feature multiple instruments. The synchrony of their events at these transitions not only increases the strength of each resulting Φ-state, but is also a feature of their class.

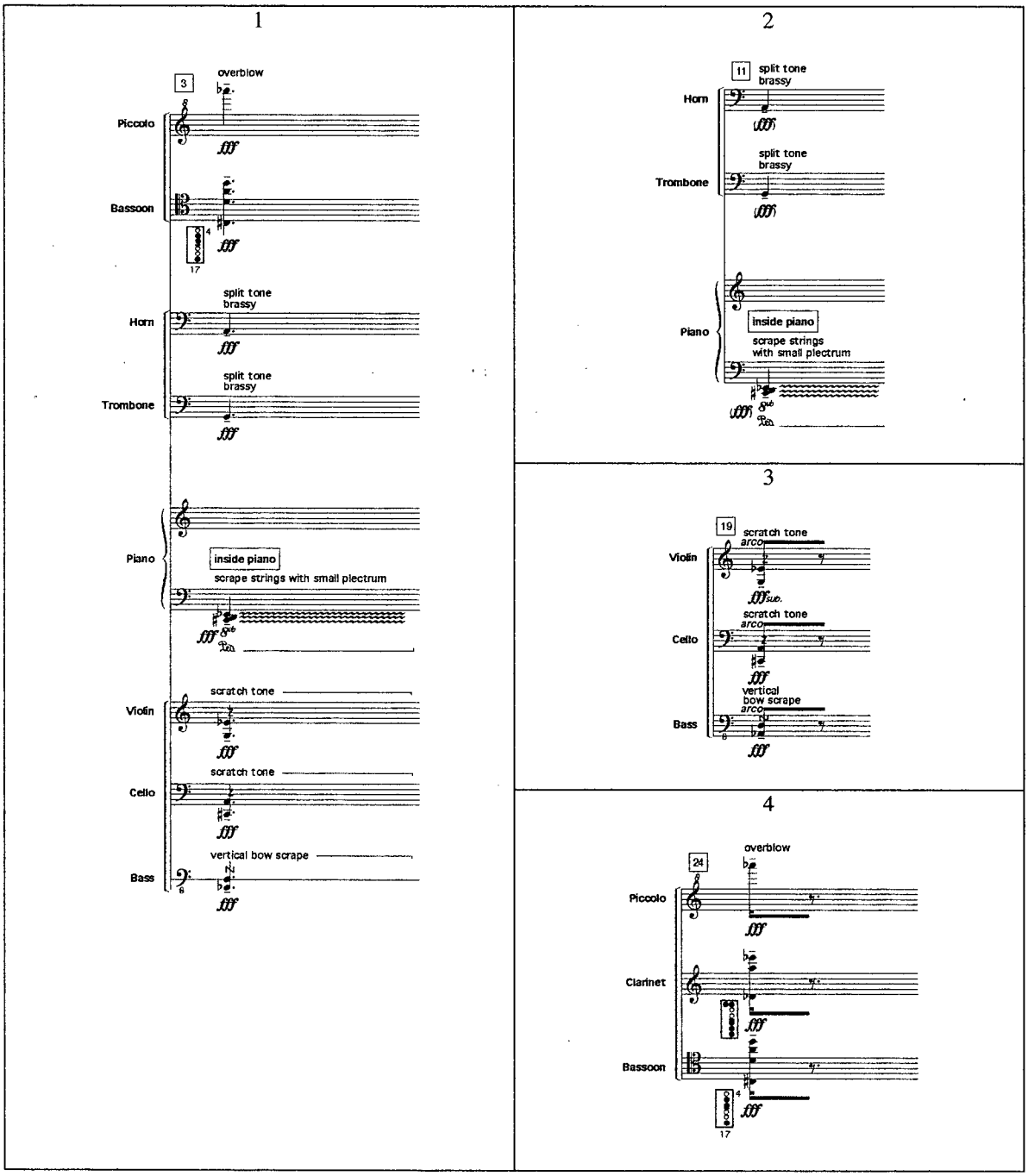
[189] As established in Chapter 3, however, the process of class formation cannot be considered complete until the entire piece in question has been experienced.

also contribute to the establishment of class A and B, though their perceptual effect is minimal.[190]

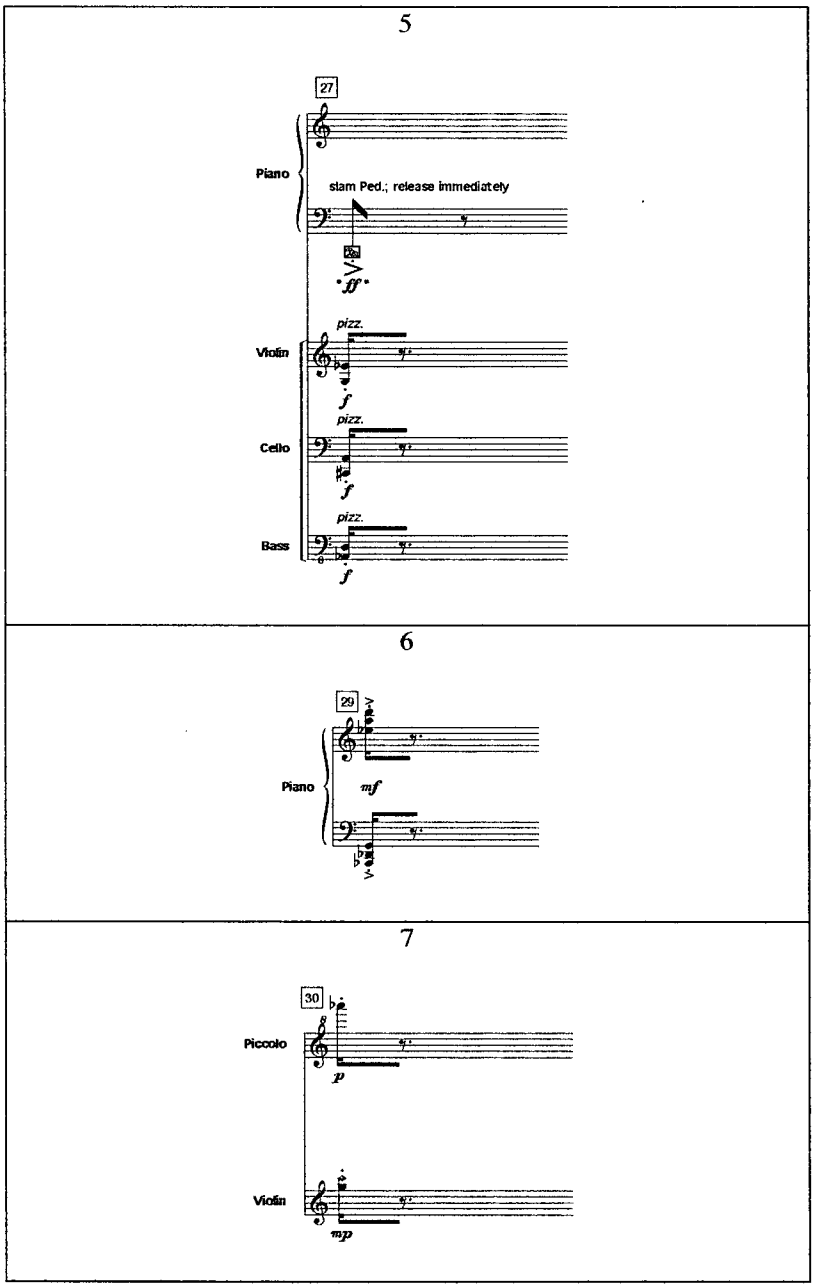
[190] Notable among these supporting factors is the following pitch class scheme: The pitch class content of B1 depicts the symmetrical, all-combinatorial hexachord [0,1,2,6,7,8], specifically [C#,D,Eb,G,Ab,A], which is the primary hexachord of the piece. This pitch class collection stands in contrast to that of the concurrent Φ-span A1, which presents the chromatic aggregate (including, of course, the complementary hexachord). All subsequent instances of class B throughout the opening thirty-three measures reflect this model in that they feature only pitches from the primary hexachord.

6.5 The Convergence of Classes A and B

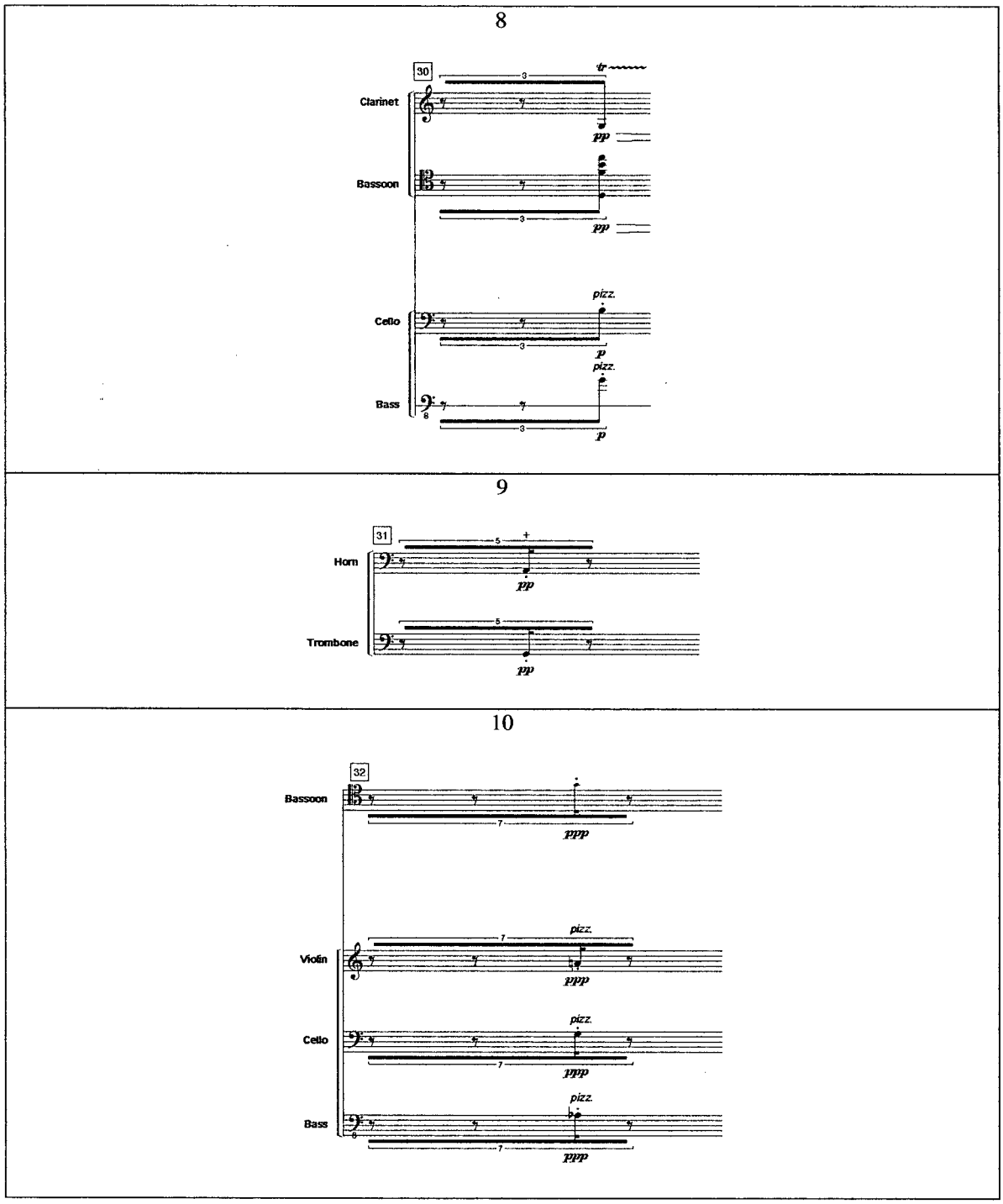
Classes A and B, as understood at now-point m. 11, are sufficient for organizing all Φ-spans arising from the unfolding of events beyond that point up to m. 33. However, temporal experience is also affected by a number of compositional processes. These processes, which manifest themselves primarily in the progression of B-class groupings that extends across the entire passage, yield a complex temporal experience. B1 and B2 have been addressed in detail, and have been dubbed "interruptions" because they suddenly dominate a listener's attention. As events continue to unfold beyond m. 11, the listener recognizes what (at first) appears to be a recurrence of similar interruptions. Within the opening thirty-two-measure segment there are ten such interruptions. In addition to those at m. 3 and m. 11, interruptions occur at mm. 19, 24, 27, 29, 30 (two), 31, and 32. All ten are reproduced below.



Example 6.03 (beginning). Ten "interruptive" event-groups occurring within the opening thirty-two measures of *Flux*.



Example 6.03 (continued).

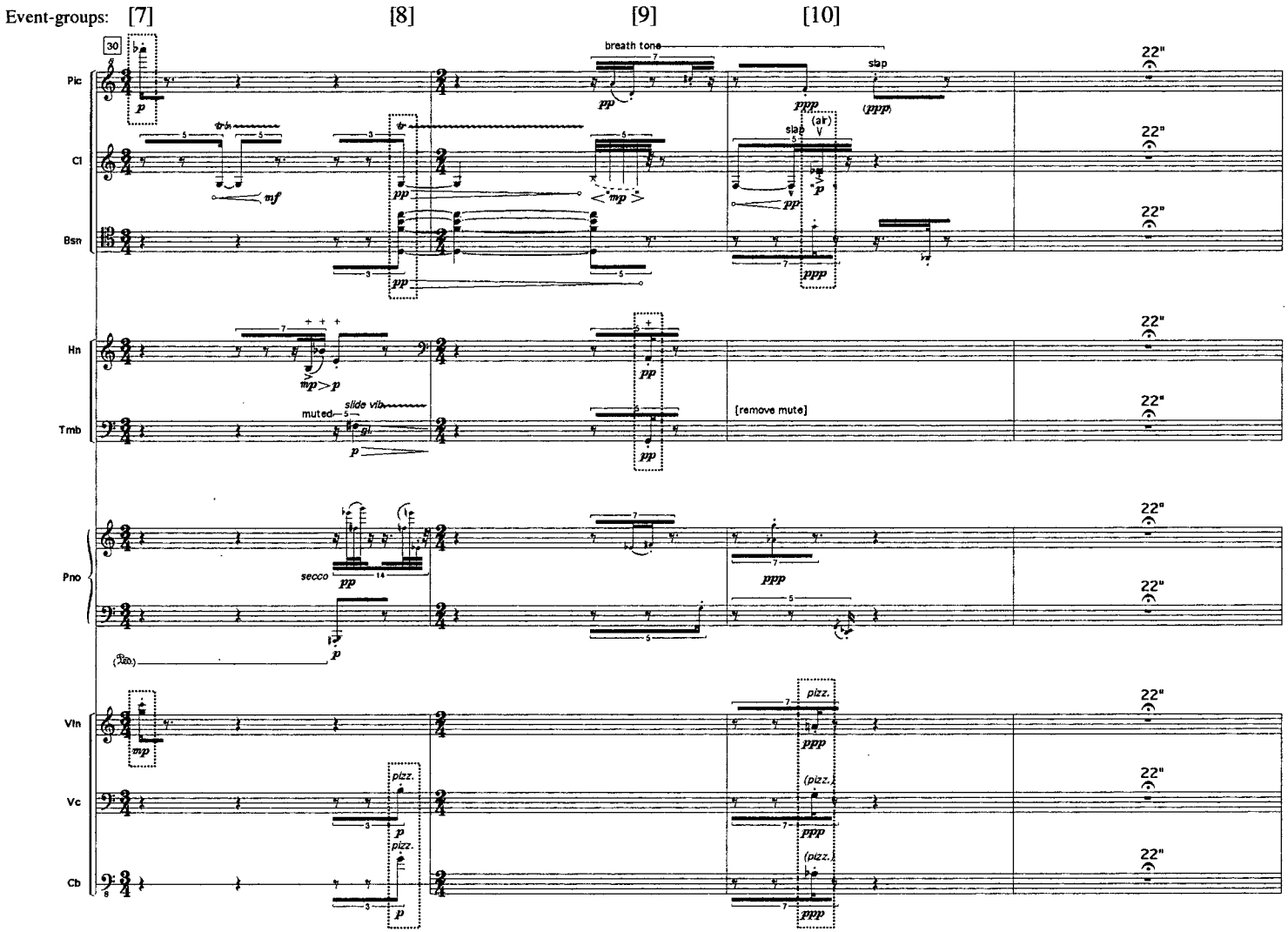


Example 6.03 (continued).

It is evident in the above progression of noncontiguous time spans that the first several interruptions resemble one another quite closely. That is, they form an intrastrata association. The similarities between B1 and B2—namely, an extremely high level of loudness, a highly abrasive timbral character, a minimally low attack density, and synchronous onsets and releases at initial and terminative points—have already been established. The third and fourth interruptions also possess these same qualities. The brief but powerful scratch tone chord presented by the strings in m. 19, for instance, rivals its two predecessors in intensity and contextual distinctness. The striking burst from the woodwinds at m. 24, involving multiphonics and overblowing, is equally incisive. Given the similarity of these two interruptions to Φ-states B1 and B2, as well as the fact that all four groups share the same context (that being the ongoing Φ-state A1), we may conclude that the third and fourth interruptions constitute Φ-states—specifically, B3 and B4. Inclusion of the fifth interruption in class B, however, requires a broadening of its class-defining parameters.

A somewhat quieter and considerably less abrasive pizzicato strike paired with a slamming down of the piano sustain pedal at m. 27 marks the first disparity between the attributes of a particular interruption and the established character of the perceptual category "class B." But the interruption is similar enough to earlier interruptions that, due to the intentional nature of classes, it is still likely to be recognized as a B-class instance. Nonetheless it is at this point that a listener may become aware of a trend toward quieter and less abrasive interruptions. Moreover, the listener will soon come to recognize that, in retrospect, the trend toward less contrasting interruptions is evident from the outset.

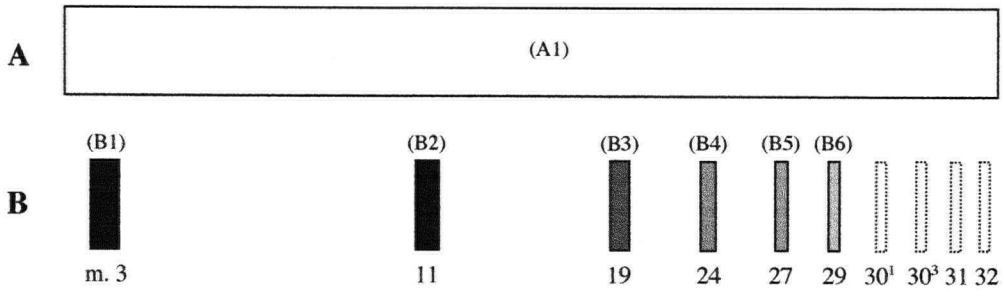
Although a dynamic marking of fortississimo is assigned to each of the first four interruptions, a general move toward quieter and less abrasive sounds is nonetheless apparent. The near-tutti instrumentation of Φ-span B1 yields a louder overall sound than the three instruments presenting the subsequent Φ-span B2; the scratch-tone strings of Φ-span B3, similarly, are more abrasive than multiphonic woodwinds of Φ-span B4, and so on. The fortissimo indication at m. 27 is merely the point at which the trend is most likely to become evident. From that point on, the trend is unmistakable. Subsequent such event-groups—by m. 30 they can no longer be called interruptions—involve timbres as delicate as string harmonics, stopped horn with muted trombone, and dynamic indications as quiet as pianississimo. As each such event-group is perceived, its inclusion in class B (as initially understood) becomes more dubious. The perception of each time span as a Φ-state also becomes increasingly less likely. Consider the level of contextual distinctness evoked by the event-groups represented below.



Example 6.04. Insufficient levels of contextual distinctness preclude the emergence of Φ-states; *Flux*, mm. 30–33.

It is difficult to say where, in the opening thirty-three measures of *Flux*, the line between Φ-span and event-group should be drawn; that is, where clusters of B-class events cease to evoke Φ-states, instead being perceived merely as groups. Certainly by m. 30, shown in the above example, the level of contextual distinctness is insufficient to support Φ-state constitution. Groups of otherwise cohesive events, indicated above by dotted-line groupings, are unable to garner sufficient contextual distinctness to constitute Φ-spans. Their proximity to other events very similar to them in prominent parameters such as loudness and timbral character precludes such a constitution. It seems reasonable therefore to assert that the first four event-groups unequivocally constitute Φ-spans and the last four unequivocally do not. Thus it is during the middle two event-groups (those occurring at m. 27 and m. 29) that perceptual categories—both class affiliation and Φ-state constitution—are most likely to be stretched to the limit.

This pushing of the perceptual envelope involves not only the defining parameters of class B but also those of class A. As quieter and gentler event-groups threaten to dissolve class B, their attributes more and more resemble those of A-type events. Thus, while intentionality expands a listener's class B schema to include the ever more dissimilar groups, intentionality also expands a listener's class A schema to include in its stream the ever more similar events. It is the latter scenario that ultimately defines a listener's perception of mm. 30–32. Just as the last events of the opening thirty-two measures are about to dissolve into what proves to be an extended silent pause, the defining parameters of class B finally dissolve into those of class A. The following chart illustrates this convergence of perceptual categories:



Example 6.05. Convergence of classes A and B in *Flux*, mm. 1–32.[191]

The above chart is intended to reflect a listener's perceptual organization at each point listed along the horizontal axis. Φ-span A1 is represented by a long white block, and the multiple instances of class B by shorter, darker blocks. Progressively lighter shadings of B-class groups indicate a weakening of intrastrata associations—specifically, an increasing similarity of B-class attributes to A-class attributes. (Vertical alignment of Φ-spans indicates a concurrency of Φ-states.)

Since class membership in this two-class passage is a binary mode of organization, a listener will try to retain a B-class affiliation for interruptions as long as possible, while nonetheless recognizing their affinity to A-class events. When it is no longer possible to retain this perceptual categorization, the listener begins including these event-groups—these would-be Φ-states—in the stream of A-class events. It is at this point in the above chart that boxes with solid perimeters give way to boxes with dotted-line perimeters. This graphic is intended to reflect that fact that these time spans no longer constitute Φ-spans, yet retain certain vestiges of B-class associations. All events

[191] The Fibonacci-like time intervals separating the B-class events are addressed in the next section.

(ostensibly) perceived to be within these white boxes are understood as constituents of Φ-state A1.

The convergence of classes A and B in the opening thirty-two measures of *Flux* ensures a complex temporal experience. Although only two temporalities are established, the definition of each temporality changes as one begins to merge with the other. The sensations initially associated with the active nature of class A must soon reconcile with those initially associated with the static nature of class B. Similarly, the manner in which quiet, gentle sounds define a temporality soon becomes cognitively entangled with the manner in which loud, abrasive sounds define a temporality. This perceptual structure will be the same for all listeners. In whatever particular way the characteristics of each time span are interpreted by a given listener, they will contribute to the initial establishment of two clearly defined temporalities that gradually dissolve into one. It is in this convergence of temporalities that the richness of the aural experience lies.

6.6 Structural Unity

Several factors contribute to the perception of mm. 1–32 as a unified whole. The most important may be its temporal isolation from other events. The final event of the opening thirty-two-measure section is followed by a twenty-two-second silent pause. This pause, shown earlier in Example 6.04, is critical to a listener's perception of the opening section of the piece for a number of reasons. Most importantly, it marks the terminative transition of the seemingly ubiquitous Φ-span A1. A strong transition heightens contextual distinctness, hence our tentative assessment of time span 1 as a Φ-span confirmed. Moreover, this strong terminative transition helps integrate *all* the events of mm. 1–32 by isolating it as a period of continuous activity. Together with the customary silent pause prior to the beginning of a performance, the silent pause at m. 33 completes a pair of perceptual bookends. As established earlier, the flanking of a period of activity with periods of rest contributes to a perception of the former as a contextually distinct object of consciousness. Thus, adopting Henri Bergson's phraseology, duration has been invested with the continuity of space.

The various components of mm. 1–32 are also unified by the presence of several large-scale processes. Although certain constituent time spans are initially recognized as being distinct and temporally independent (i.e., as Φ-spans), they can subsequently contribute to a perception of the entire passage as unified group. The convergence of loudness levels and timbral characters described in the previous section is perhaps the most important

factor in cultivating such a perception. However, several other temporal processes also contribute to the unification of the passage.

One such scheme is a Fibonacci-like subtractive process of time intervals between B-class instances, the so-called "interruptions." Beginning with the monolithic Φ-span B1 in m. 3, interruptions are presented in time intervals closely approximating a 3:2 ratio. The time interval between Φ-spans B1 and B2 is 29 seconds, or 15 beats at a tempo of 72 beats per minute plus 4- and 7-second pauses. The time interval from B2 to B3 is about 17 seconds, or approximately two-thirds of the previous duration. The time interval from B3 to B4 is roughly two-thirds of this duration, or 11 seconds.

The 3:2 ratio is most accurately reflected by the next three intervals, which are nine beats (10.8 seconds), six beats (7.2 seconds), and four beats (4.8 seconds), respectively. Using these precise whole number intervals as the measuring stick and calculating backward and forward in time accordingly, we discover that, of the nine time intervals between the ten interruptive event-groups, five intervals reflect the 3:2 ratio exactly, two are within 3%, and two are within about 15%. I believe this subtractive process is both simple enough and accurate enough to be recognized. However, because the process unfolds so slowly, and because it does so in conjunction with a complex convergence of temporalities, it is not evident until late in the passage. Nonetheless, when the process is

eventually recognized, it serves to unify the various components of the thirty-two-measure time span as a cohesive unit.[192]

Indeed proportions can be an important determinant of structure. "When ... ongoing structural linearity is either disguised or non-existent," Kramer asserts, "we may look to [a piece's] proportions for structural coherence."[193] In this case, linearity is disguised by a number of factors, including the presence of Φ-states, Φ-polyphony, and a variety of processes.

Parallel to the processes of proportional time intervals and converging classes is a subtractive process of durations. Rather than controlling the time intervals *between* interruptions, this process controls the durations of the interruptions themselves. After the first punctuation, values are cut by half each time, to the terminal brevity of a staccato sixteenth-note. B2 lasts for the duration of a quarter note, B3 for an eighth note, and so on. This simple 2:1 ratio of durations causes a listener to form associations among B-class groupings. These associations—together with those resulting from the 3:2 ratio of time intervals, the flanking of the entire passage by periods of rest, and the process of

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[192] Another instance in which a 3:2 ratio controls time intervals between strong punctuations occurs in mm. 111–117. In this case, a similar subtractive process integrates the events of a seven-measure time span.

[193] Kramer, p. 52. In Chapter 10 of *The Time of Music*, Kramer provides elegant analyses of proportional relationships in a number of works by Stravinsky.

loudness levels and timbral character—unify all the events comprising the opening thirty-two-measure section.[194]

As noted above, however, a listener does not become aware of these processes until the end of the thirty-two-measure time span. Temporal experience therefore remains highly nonlinear throughout most of the span. A listener, unable to protend an end, experiences sensations of surroundability rather than directionality. Any sense of linearity arising from an earlier recognition of these large-scale structures is diminished considerably—both by the ongoing dissolution of class B as a perceptual category and by the corresponding cessation of Φ-state constitution. If, on the other hand, the subtractive process of time intervals between interruptions had been articulated by strong instances of class B throughout the entire thirty-two-measure time span, a listener's temporal experience would undoubtedly have been imbued with a far greater sense of linearity. As it stands, the linearity inherent in the transformation of timbre and loudness is initially "disguised" by a complex array of other processes. Only upon reaching the end of the passage does a listener come to fully realize the various processes that ultimately unify it as a cohesive perceptual unit.

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[194] The proportions 3:2 and 2:1 are also reflected in other aspects of *Flux*. For instance, large segments of the piece are in part defined by tempo. The primary tempi 72 and 48 reflect a 3:2 ratio. A secondary tempo of 60 marks the mid-point between 72 and 48, reflecting a 2:1 ratio of the difference between the two primary tempi. That is: 72-(72-48)/2 = 48+(72-48)/2 = 60. There are four changes of tempo in the piece, occurring at mm. 64, 73, 76 and 126. Each tempo change contributes to the perception of a distinct transition point.

The opening thirty-three-measure passage of *Flux* is a useful and interesting case study for the phenomenological approach to musical form expounded herein. At its outset, the passage presents groups of events that evoke Φ-states. These Φ-states are stratified into two classes, each associated with a distinct temporality. Sometimes both temporalities are perceived simultaneously, constituting Φ-polyphony. Through the phenomenon of masking, one class is understood to be instantiated by a single, continuous stream of events, and the other (initially) by a series of monolithic interruptions. This understanding yields a nonlinear temporal experience. As events continue to unfold, however, a number of linear processes begin to reveal themselves. Notable among these is a convergence of the two classes, and therefore of their respective temporalities.

As these large-scale processes become evident, they unify—in part retroactively—the various components of the entire (primarily) nonlinear passage. Together with the above-described flanking periods of rest, this unification affords the passage a strong degree of contextual distinctness. Indeed its initial and terminative transitions (from and to extended silence, respectively) constitute boundaries even stronger than those found within the passage. Consequently, the entire time span is understood as an independent and ultimately cohesive perceptual unit.

The perception of mm. 1–32 as a unified group is not simply the result of conceptual nesting at a higher hierarchical level. The entire complex experience is bound perceptually by the myriad of processes described earlier. These processes begin early in the passage but, due to the complexity of the ensuing temporal experience, are not fully

comprehended until much later. Thus a listener, initially unaware of these processes that will ultimately bind the entire passage, experiences surroundability—that is, sensations of extreme indeterminacy, or directionlessness.

This notion of bounded directionlessness—of isolated becoming—was described earlier as a "time-bubble." It was asserted that all events contained in a time-bubble, no matter how disparate, integrate to form a perceptual unit by virtue of being surrounded by the bubble's boundary. Moreover, within its ever-expanding aura of ambiguity, all perceived events remain simultaneously available for (retroactive) reinterpretation. This model is useful in describing the aural experience of passages such as to the opening thirty-three measures of *Flux.*

The experience of listening to such a passage involves no significant protentions of ending until the end in fact arrives. Consciousness is dominated instead by protentions of nondirectional continuance (i.e., surroundability). Yet one ultimately restructures the collective meaning of all events according to information received late in the passage. In this way, experiential time ebbs and flows but seldom permits meaningful predictions about future events. The particular shape inherent in this complex temporal span—including all its primal impressions, retentions and protentions—constitutes the phenomenological structure of the musical experience.

BIBLIOGRAPHY

Aristotle. *Metaphysics* [350 B.C.E.], Books 4–6, trans. Christopher Kirwan. Oxford: Clarendon Press, 1993.

Bartholomew, Douglas. "Preamble to a Phenomenology of Music." In *Understanding the Musical Experience*, ed. F. Joseph Smith. New York: Gordon and Breach, 1989. Pages 1–42.

Bergson, Henri. *Time and Free Will: An Essay on the Immediate Data of Consciousness* [1889], trans. F. L. Pogson. London: George Allen & Unwin Ltd., 1959.

Boulez, Pierre. *Orientations*, ed. Jean-Jacques Nattiez, trans. Martin Cooper. Cambridge: Harvard University Press, 1986.

Bregman, Albert S. *Auditory Scene Analysis: The Perceptual Organization of Sound.* Cambridge, MA: MIT Press, 1990.

Butler, David. *The Musician's Guide to Perception and Cognition.* New York: Schirmer, 1992.

Childs, Barney. "Time and Music: A Composer's View." *Perspectives of New Music* 15/2 (1977): 194–219.

Chomsky, Noam. *Aspects of the Theory of Syntax.* Cambridge, Massachusetts: The MIT Press, 1965.

Clifton, Thomas. *Music as Heard: A Study in Applied Phenomenology.* New Haven: Yale University Press, 1983.

Cohn, Richard, and Douglas Dempster. "Hierarchical Unity, Plural Unities: Toward a Reconciliation." In *Disciplining Music: Musicology and Its Canons*, eds.

Katherine Bergeron and Philip Bohlman. Chicago: The University of Chicago Press, 1992. Pages 156–181.

Cone, Edward T. "Stravinsky: The Progress of a Method." In *Perspectives on Schoenberg and Stravinsky*, eds. Benjamin Boretz and Edward T. Cone. New York: Norton, 1972. Pages 155–164.

Cook, Nicholas. "Perception: A Perspective from Music Theory." In *Musical Perceptions*, eds. R. Aiello and J. Sloboda. New York: O.U.P., 1994. Pages 64–95.

Dahlhaus, Carl. *Esthetics of Music*, trans. William D. Austin. Cambridge, England: Cambridge University Press, 1982.

Day, Thomas. *A Study of Moment Form.* M.A. thesis, Mills College, 1995.

Desain, Peter. *Rhythm: Perception and Production.* The Netherlands: Swets & Zeitlinger B.V., Lisse, 2000.

Deutsche, Diana. "Grouping Mechanisms in Music." In *The Psychology of Music*, ed. Diana Deutsch. Orlando, FL: Academic Press, 1982. Pages 99–134.

Epstein, David. *Shaping Time: Music, the Brain, and Performance.* New York: Schirmer Books, 1995.

Fink, Robert. "Going Flat: Post-Hierarchical Music Theory and the Musical Surface." In *Rethinking Music*, eds. Nicholas Cook and Mark Everist. Oxford: Oxford University Press, 1999. Pages 102–137.

Fiske, Harold E. *Selected Theories of Music Perception.* Lewiston: The Edwin Mellen Press, 1996.

Gillespie, James. "*Dal Niente* [review]." In *The Clarinet* 2/2 (1975): 14.

Handel, Stephen. *Listening: An Introduction to the Perception of Auditory Events.* Cambridge: The MIT Press, 1989.

Harvey, Jonathan. *The Music of Stockhausen.* Berkeley: University of California Press, 1975.

Hasty, Christopher F. *Meter as Rhythm.* New York: Oxford University Press, 1997.

_____. "On the Problem of Succession and Continuity in Twentieth-Century Music." *Music Theory Spectrum* 8 (1986): 58–74.

_____. "Segmentation and Process in Post-Tonal Music." *Music Theory Spectrum* 3 (1981): 54–73.

Heidegger, Martin. *Being and Time* [1926], trans. John Macquarrie and Edward Robinson. London: SCM Press Ltd., 1962.

Heikinheimo, Seppo. *The Electronic Music of Karlheinz Stockhausen*, trans. Brad Absetz. Helsinki: Acta Musicologica Fennica, 1972.

Husserl, Edmund. *Cartesian Meditations: An Introduction to Phenomenology* [1931], trans. Dorion Cairns. The Hague: M. Nijhoff, 1973.

_____. *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, First Book: General Introduction to a Pure Phenomenology* [1913], trans. F. Kersten. The Hague: Martinus Nijhoff, 1982.

_____. *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, Second Book: Studies in the Phenomenology of Constitution* [1952], trans. Richard Rojcewicz and André Schuwer. Dordrecht, The Netherlands: Kluwer Academic Publishers, 1989.

_____. *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, Third Book: Phenomenology and Foundations of the Sciences* [1952], trans. Ted E. Klein and William E. Pohl. Dordrecht, The Netherlands: Kluwer Academic Publishers, 1980.

_____. *The Phenomenology of Internal Time-Consciousness* [1928], ed. Martin Heidegger, trans. James Churchill. Bloomington: Indiana University Press, 1964.

Ihde, Don. *Experimental Phenomenology: An Introduction.* New York: G.P. Putnam's Sons, 1977.

_____. *Listening and Voice: A Phenomenology of Sound.* Athens: Ohio University Press, 1976.

Jahn, Hans-Peter. "*Pression.*" In *Musik-konzepte* 61/62 (1988): 40–61.

Kierkegaard, Søren. *Either/Or*, trans. Howard V. Hong and Edna H. Hong. Princeton, New Jersey: Princeton University Press, 1987.

Klucevsek, Guy. *Guy Klucevsek: Manhattan Cascade.* Composers Recordings Inc. (CRI), CD 626, 1992.

Koffka, Kurt. *Principles of Gestalt Psychology.* New York: Harcourt, Brace & World, Inc., 1935.

Kohl, Jerome. "The Evolution of Macro- and Micro-time Relations in Stockhausen's Recent Music." *Perspectives of New Music* 22 (1983–84): 147–186.

Kramer, Jonathan D. *The Time of Music: New Meanings, New Temporalities, New Listening Strategies.* New York: Schirmer Books, 1988.

Lachenmann, Helmut. *Musik als existentielle Erfahrung.* Weisbaden: Breitkopf & Härtel, 1996.

Lefkowitz, David S., and Kristin Taavola. "Segmentation in Music: Generalizing a Piece-Sensitive Approach." *Journal of Music Theory* 44/1 (2000): 171–229.

Levinson, Jerrold. *Music in the Moment.* Ithaca: Cornell University Press, 1997.

Lewin, David. "Music Theory, Phenomenology, and Modes of Perception." *Music Perception* 3/4 (1986): 327-92.

Ligeti, György. *György Ligeti in Conversation.* London: Eulenburg Books, 1983.

_____. "Metamorphoses of Musical Form," trans. Cornelius Cardew. *Die Reihe* 7 (1965): 5–19.

Lochhead, Judy. "Temporal Structure in Recent Music." In *Understanding the Musical Experience*, ed. F. Joseph Smith. New York: Gordon and Breach, 1989. Pages 121–165.

Lora, Doris. "Musical Pattern Perception." *College Music Symposium* 19/1 (1979): 166–82.

Maconie, Robin. *The Works of Karlheinz Stockhausen*, 1st edition. London: Oxford University Press, 1976.

Merleau-Ponty, Maurice. *Phenomenology of Perception* [1945], trans. Colin Smith. New York: Humanities Press, 1967.

Michon, John. "The Making of the Present: A Tutorial Review." *Attention and Performance* 7 (1978): 90–92.

Miller, Izchak. *Husserl, Perception, and Temporal Awareness.* Cambridge, MA: The MIT Press/Bradford Books, 1984.

Moran, Dermot. *Introduction to Phenomenology.* London: Routledge, 2000.

Narmour, Eugene. *The Analysis and Cognition of Melodic Complexity: The Implication-Realization Model.* Chicago: University of Chicago Press, 1992.

Newton, Isaac. *The Principia: Mathematical Principles of Natural Philosophy* [1687], trans. I. Bernard Cohen and Anne Whitman. Berkeley: University of California Press, 1999.

Pace, Ian. "Positive or negative 1." *The Musical Times* (January 1998): 9–17.

_____. "Positive or negative 2." *The Musical Times* (February 1998): 4–15.

Pearsall, Edward. "Mind and Music: Intentionality, Music Theory, and Analysis." *Journal of Music Theory* 43/2 (1999): 231–255.

Reiner, Thomas. *Semiotics of Musical Time.* New York: Peter Lang Publishing, Inc., 2000.

Roeder, John. "Pulse Streams and Problems of Grouping and Metrical Dissonance in Bartók's 'With Drums and Pipes'." *Music Theory Online* 7/1 (2001).

_____. "Second Thoughts: Protention, Repetition and Form in Fauré's Prelude Op. 103, No. 9." Unpublished ms., presented at the School of Music Colloquium Series, University of British Columbia, 2002.

Schutz, Alfred. "Fragments on the Phenomenology of Music." In *In Search of Musical Method*, ed. F. J. Smith. London: Gordon and Breach Science Publishers, 1976. Pages 3–71.

Skarda, Christine A. "Alfred Schutz's Phenomenology of Music." In *Understanding the Musical Experience*, ed. F. Joseph Smith. New York: Gordon and Breach, 1989. Pages 43–100.

Smeyers, David. "The open-minded clarinettist (Helmut Lachenmann's clarinet)." *The Clarinet* 16 (1989): 15–18.

Snyder, Bob. *Music and Memory*. Cambridge, Massachusetts: The MIT Press, 2000.

Sokolowski, Robert. *Introduction to Phenomenology*. Cambridge: Cambridge University Press, 2000.

Spiegelberg, Herbert. *The Phenomenological Movement*, 3rd edition, vols. 1 and 2. The Hague: Martinus Nijhoff, 1982.

Stockhausen, Karlheinz. "How Time Passes," trans. Cornelius Cardew. *Die Reihe* 3 (1959): 10–40.

_____. "Momentform." *Texte zur elektronischen und instrumentalen Musik* 1 (1963): 189–210.

_____. "Structure and Experiential Time," trans. Leo Black. *Die Reihe* 2 (1959): 64–74.

Stockhausen, Karlheinz, in conversation with Jerome Kohl. "Stockhausen on Opera." *Perspectives of New Music* 23/2 (1985): 24–39.

Tenney, James. *Meta Hodos and Meta Meta Hodos: A Phenomenology of 20th Century Musical Materials*. Oakland, CA: Frog Peak Music, 1988.

Tenney, James, and Larry Polansky. "Temporal Gestalt Perception in Music." *Journal of Music Theory* 24/2 (1980): 205–241.

Williams, Alastair. "Music as Immanent Critique: Stasis and Development in the Music of Ligeti." In *Music and the Politics of Culture*, ed. Christopher Norris. London: Lawrence & Wishart, 1989. Pages 187–225.

Wörner, Karl H. *Stockhausen: Life and Work*, trans. Dill Hopkins. London: Faber, 1973.

Yeston, Maury. *The Stratification of Musical Rhythm.* New Haven: Yale University Press, 1976.

Zbikowski, Lawrence M. *Conceptualizing Music.* Oxford: Oxford University Press, 2002.

FLUX

for chamber ensemble

Commissioned through
The Canada Council for the Arts
by the Ensemble contemporain de Montréal

Flute, Piccolo
Clarinet
Bassoon

Horn
Trombone

Piano*

Violin
Cello
Bass

---

* Pianist requires the following auxiliary items:

- 2 plectrums for scraping piano strings (small: approx. 4cm; large: approx. 14cm)
- set of 2 bongos
- 2 crotales (written Ab and D, as in mm. 97–99)
- thin brass mallet for crotales
- large wooden wind chimes
- iron pipe (length: approx. 50cm; diameter: approx. 3cm)
- solid metal beater for iron pipe

The degree of information is ... greatest when at every moment of a musical flow the momentum of surprise ... is greatest. ... But this means that the experiential time is in a state of flux, constantly and unexpectedly changing.

* * *

Flux was commissioned through The Canada Council for the Arts by the *Ensemble contemporain de Montréal*. Its premiere at the Massey Hall New Music Festival in November 2000 kicked off a six-city Canadian tour.

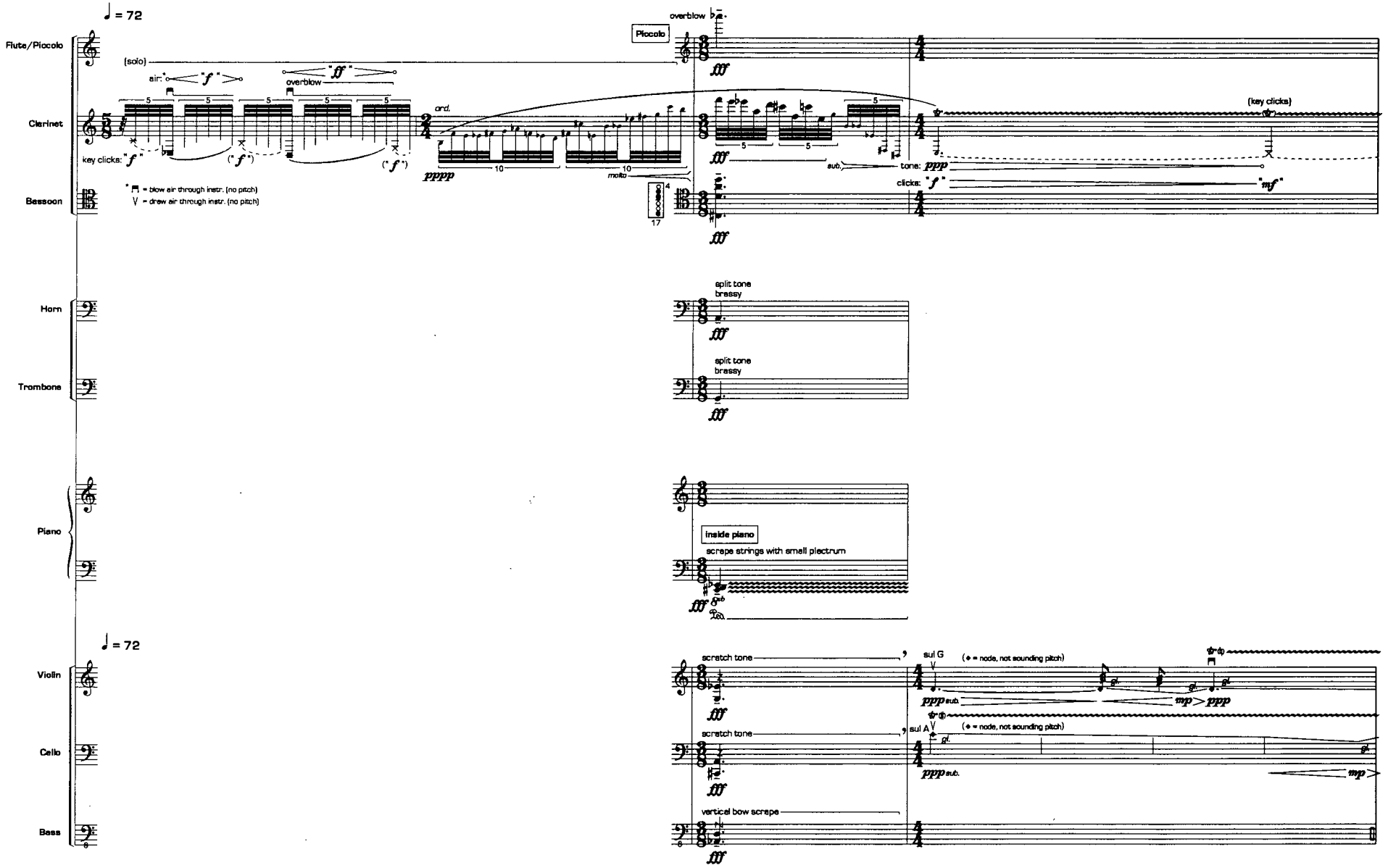
Gordon Fitzell

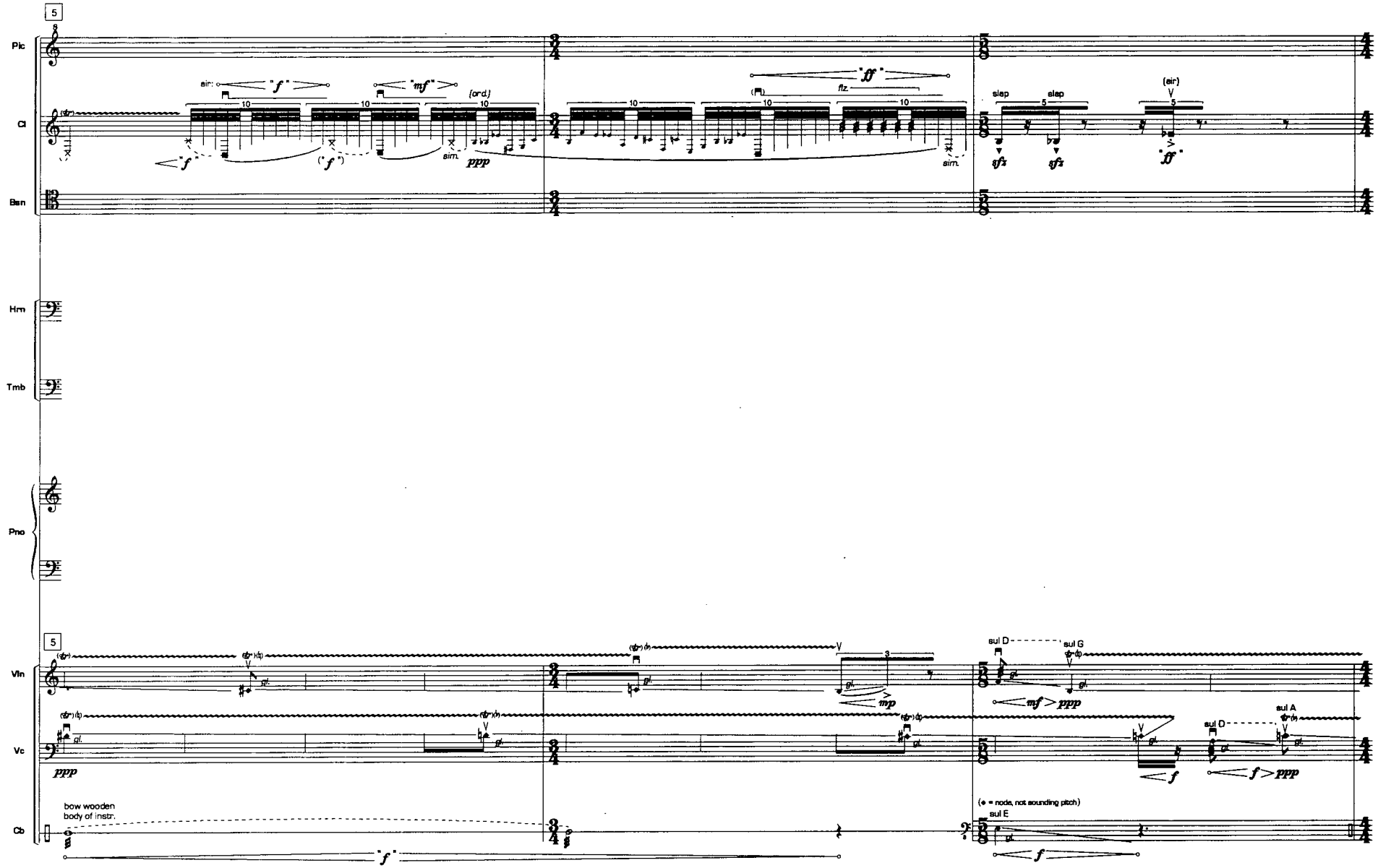
C Score
Performance time: 12'45

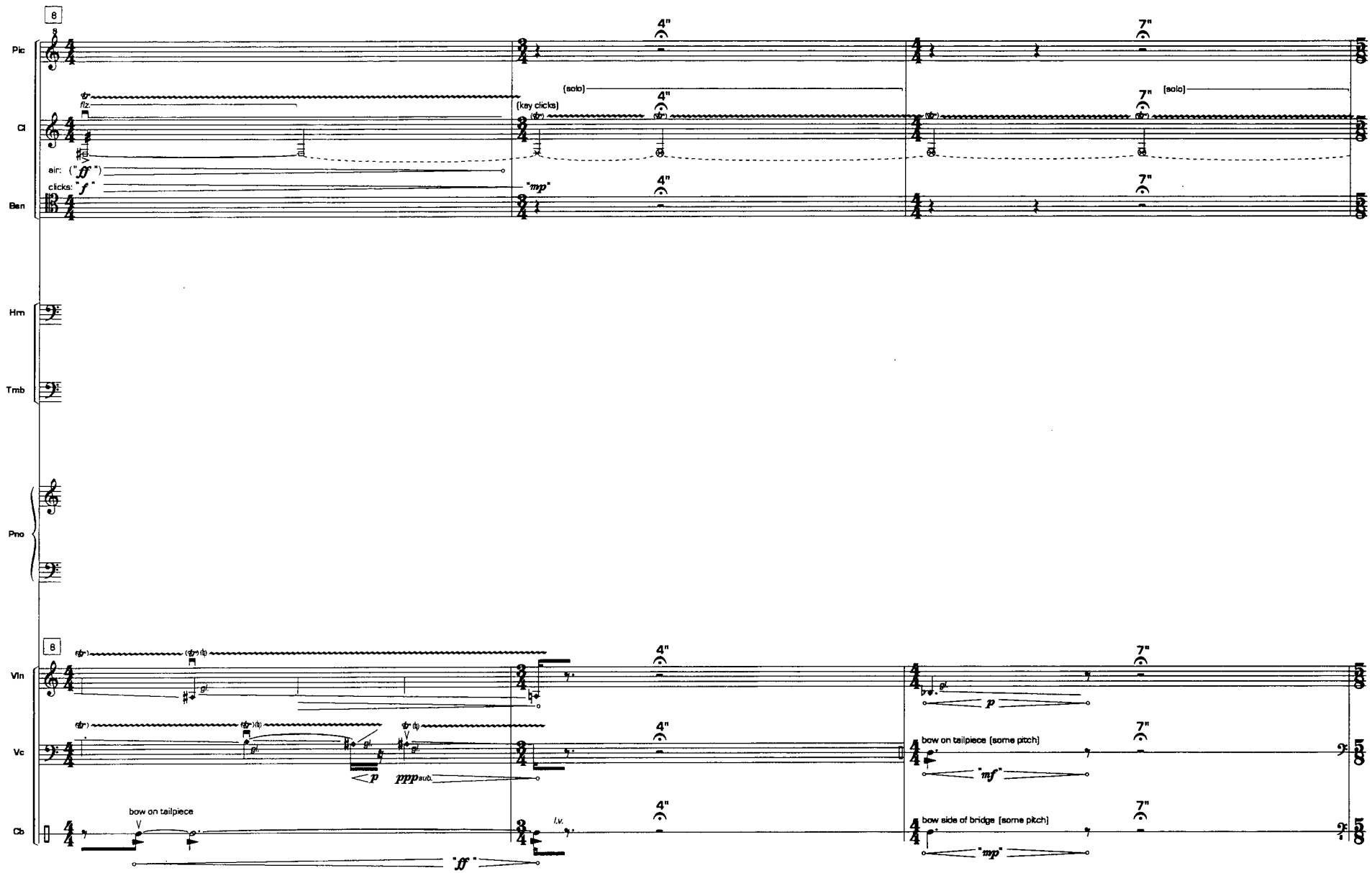
FLUX

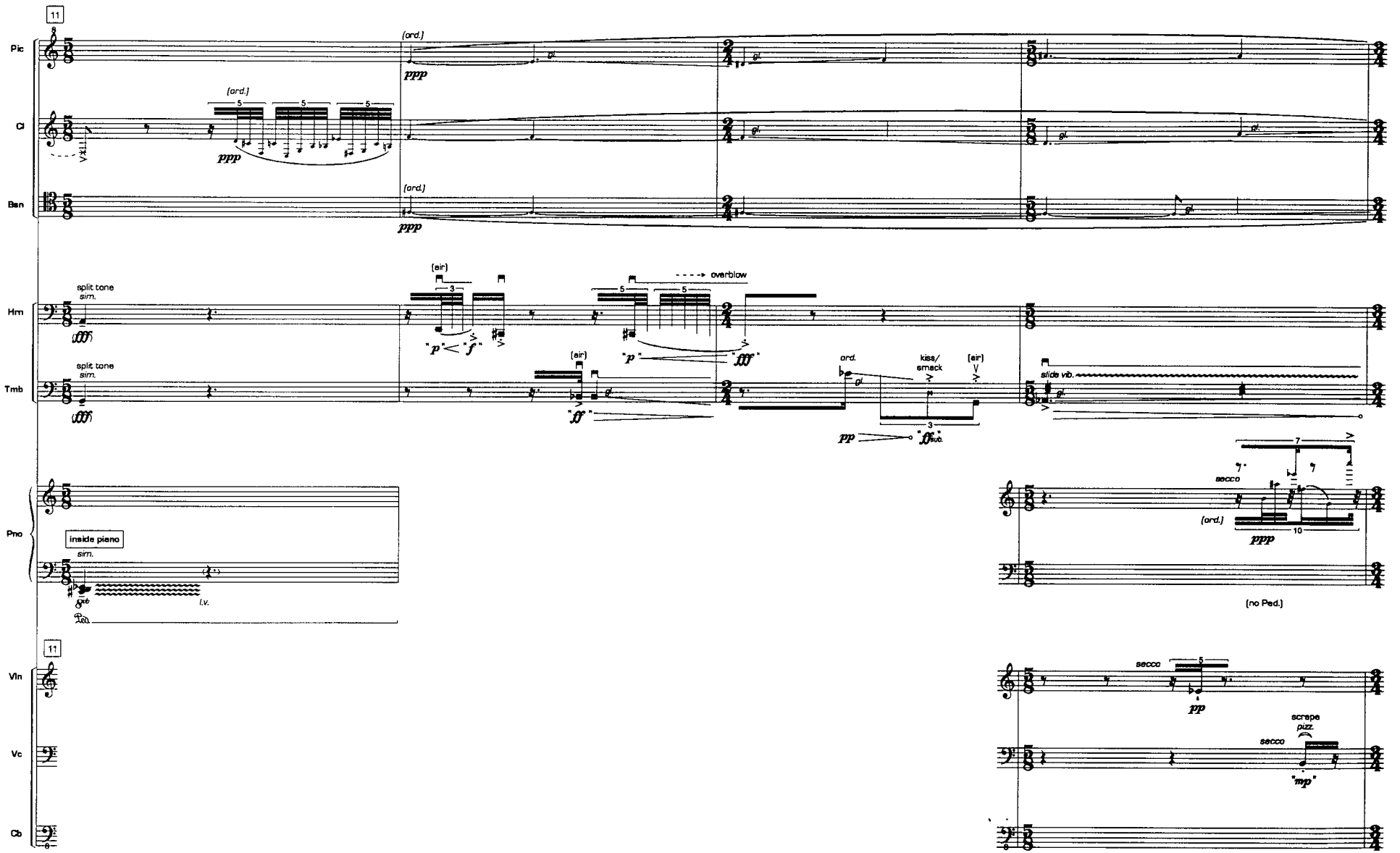
Commissioned by the Ensemble contemporain de Montréal
with the assistance of The Canada Council for the Arts

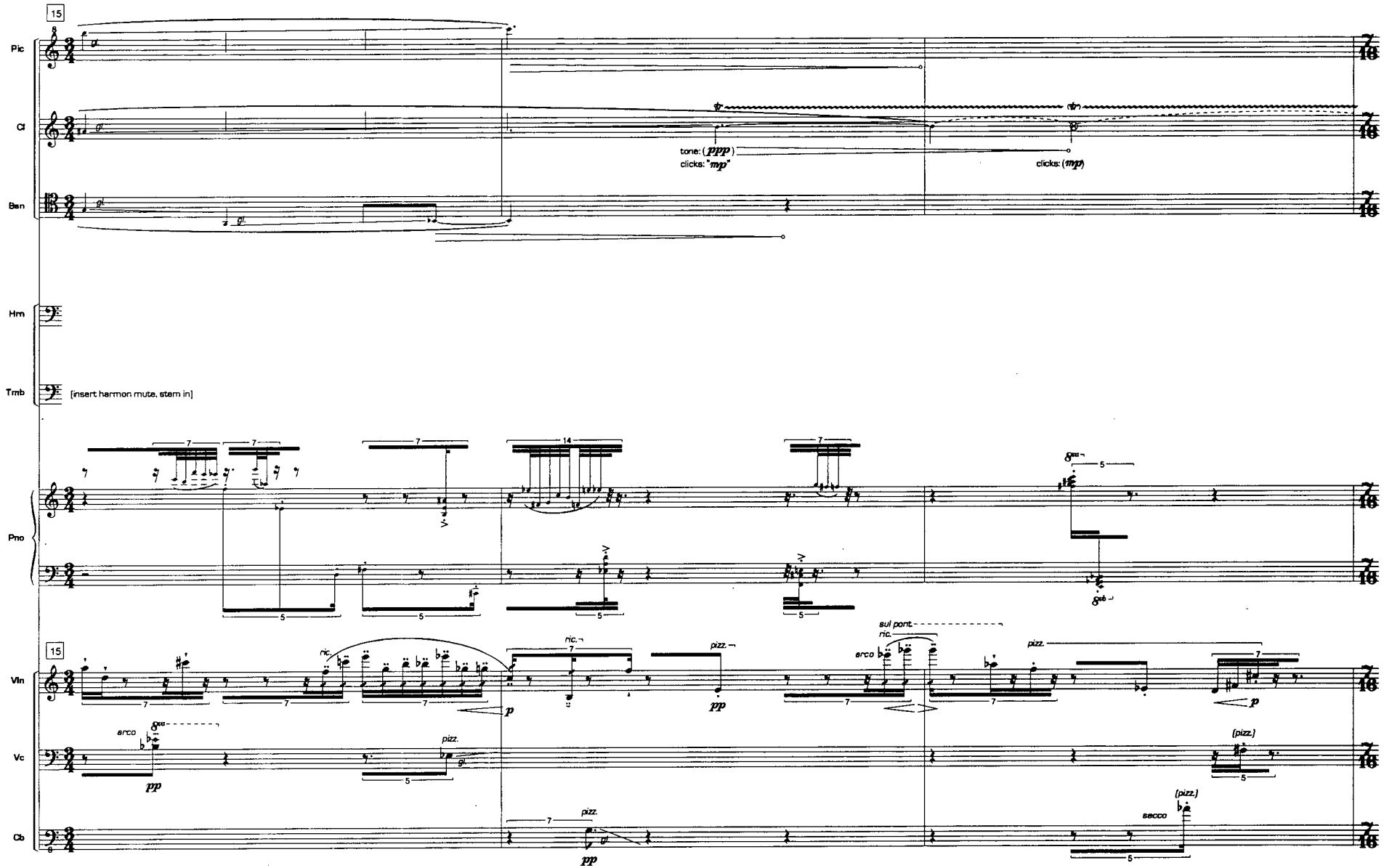
Gordon Fitzell

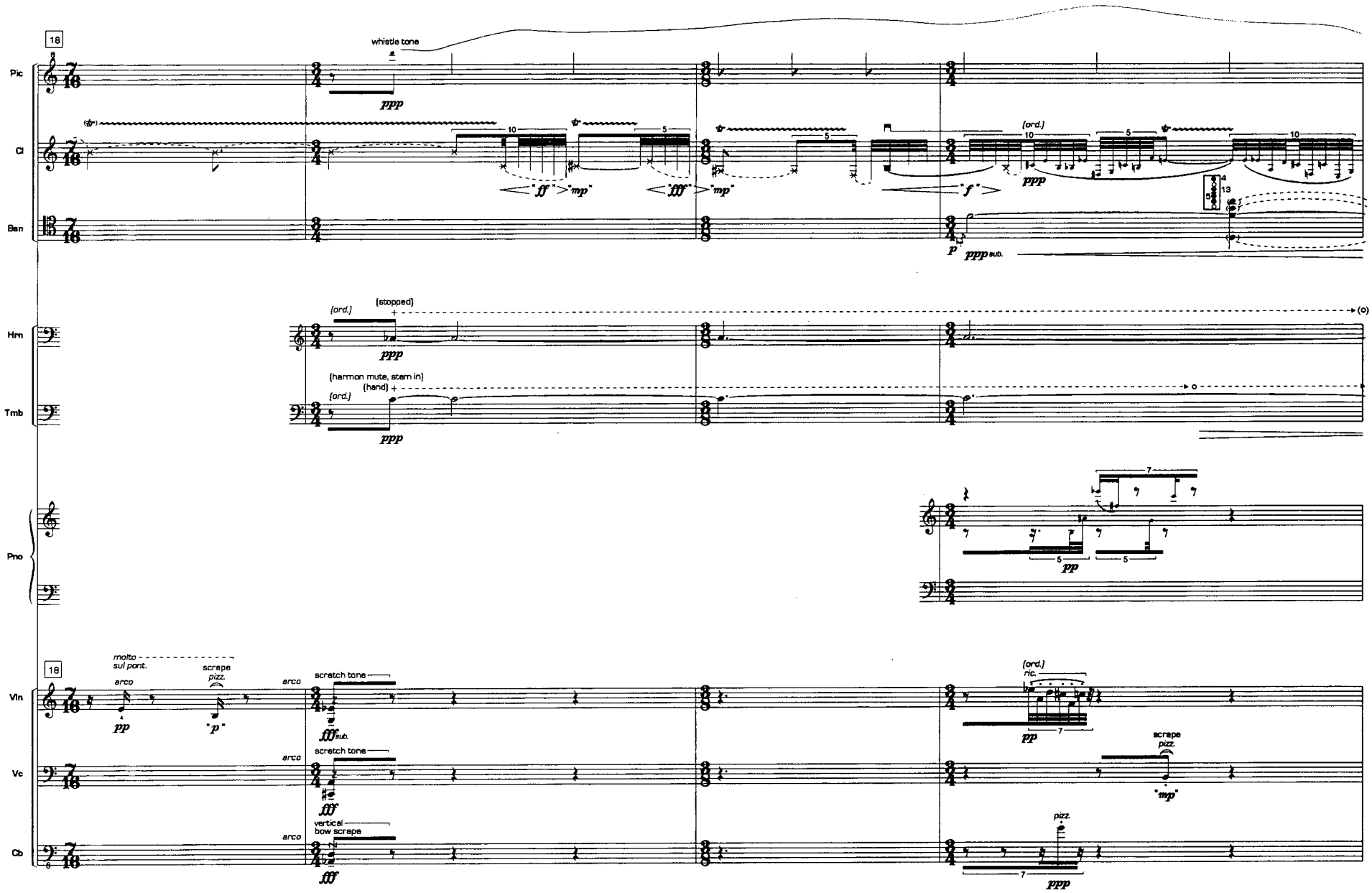


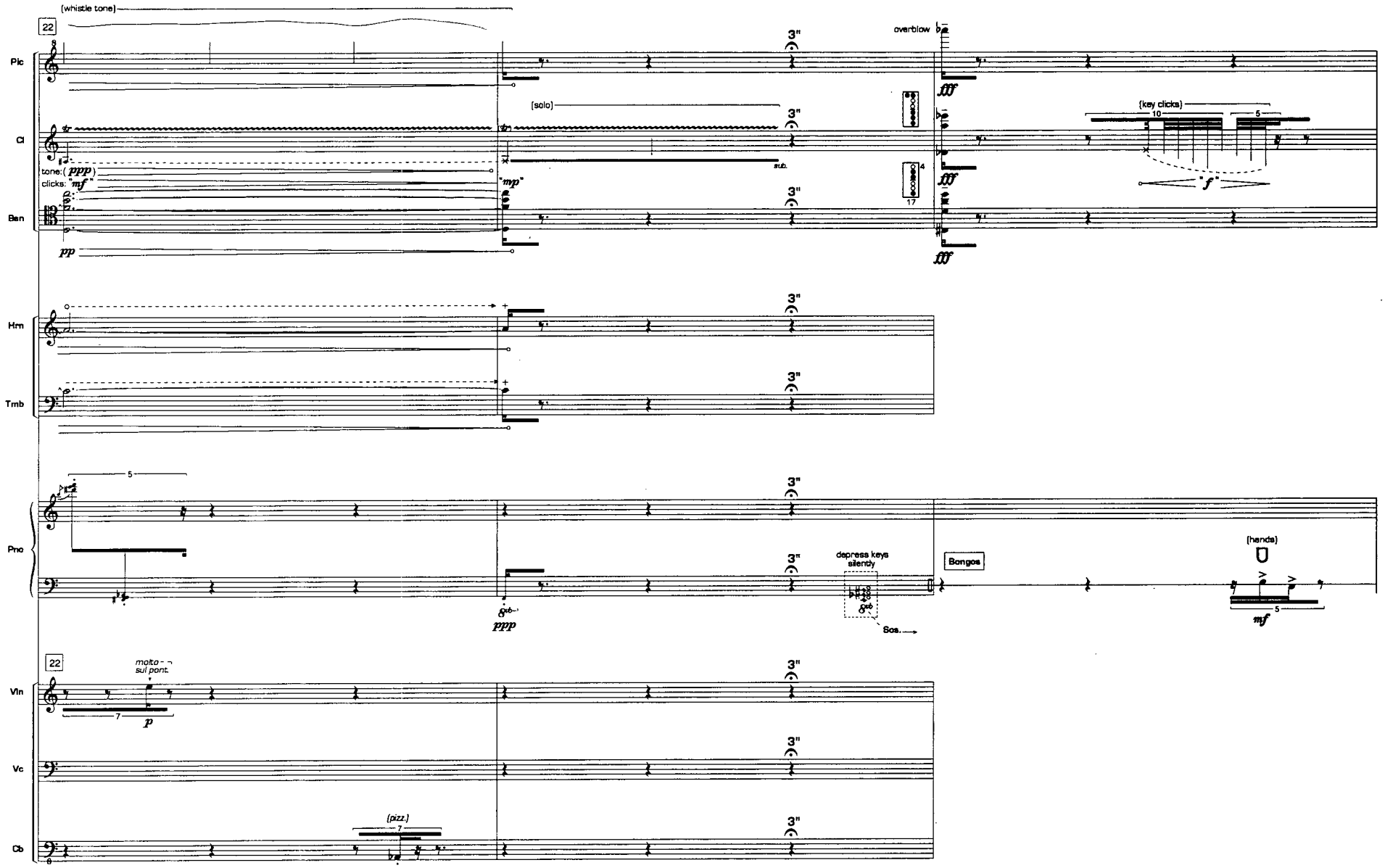

5
Pic
Cl
Bsn
Hrn
Tmb
Pno
5
Vln
Vc
Cb
bow wooden body of instr.
sul D
sul G
sul A
sul E
(◆ = node, not sounding pitch)

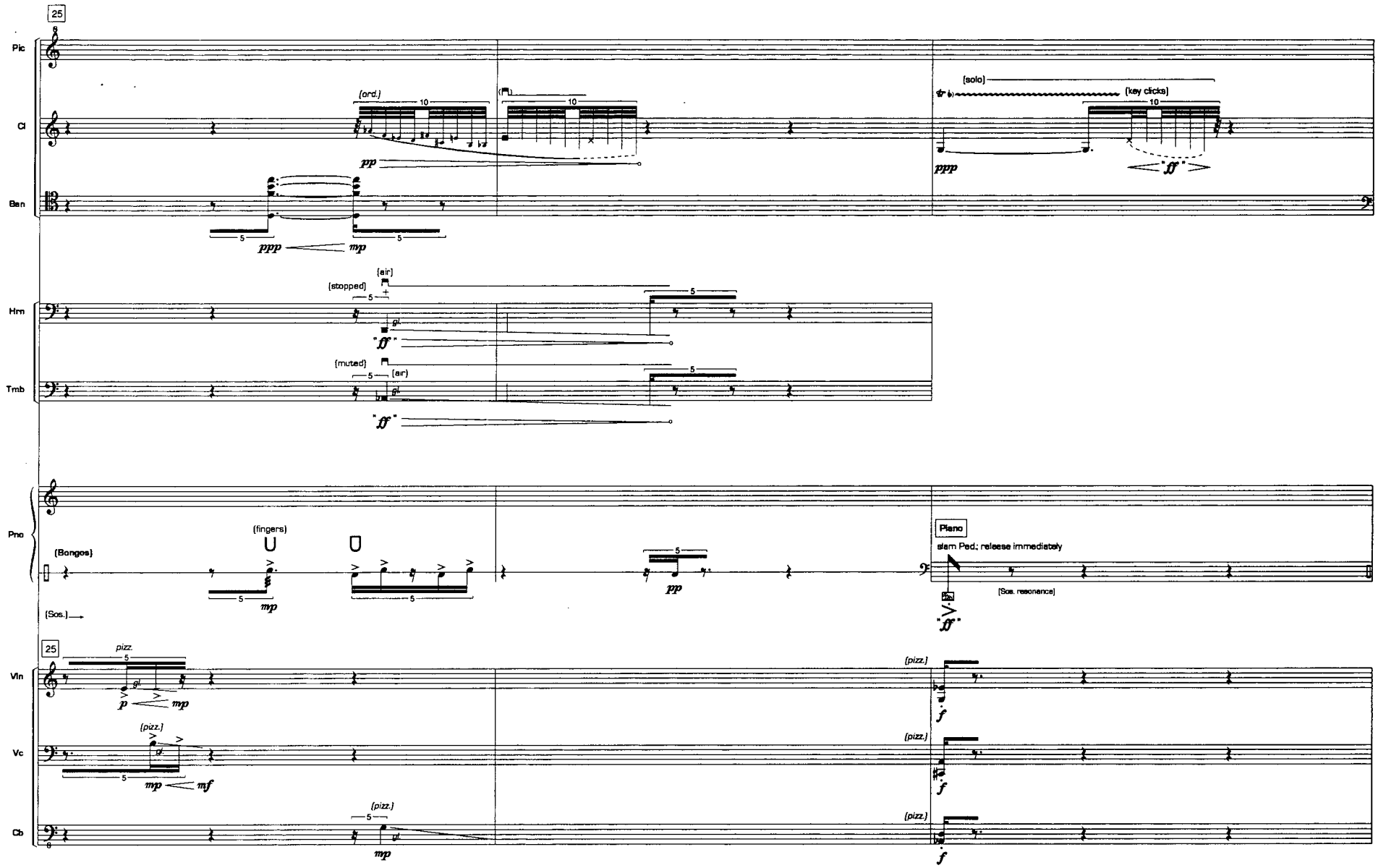

8
Pic
Cl
fltz.
air: ("ff")
clicks: "f"
Bsn
(key clicks)
(solo)
"mp"
4"
7"
(solo)
Hrn
Tmb
Pno
8
Vln
Vc
Cb
bow on tailpiece
p
ppp sub.
l.v.
ff
bow on tailpiece (some pitch)
"mf"
bow side of bridge (some pitch)
"mp"

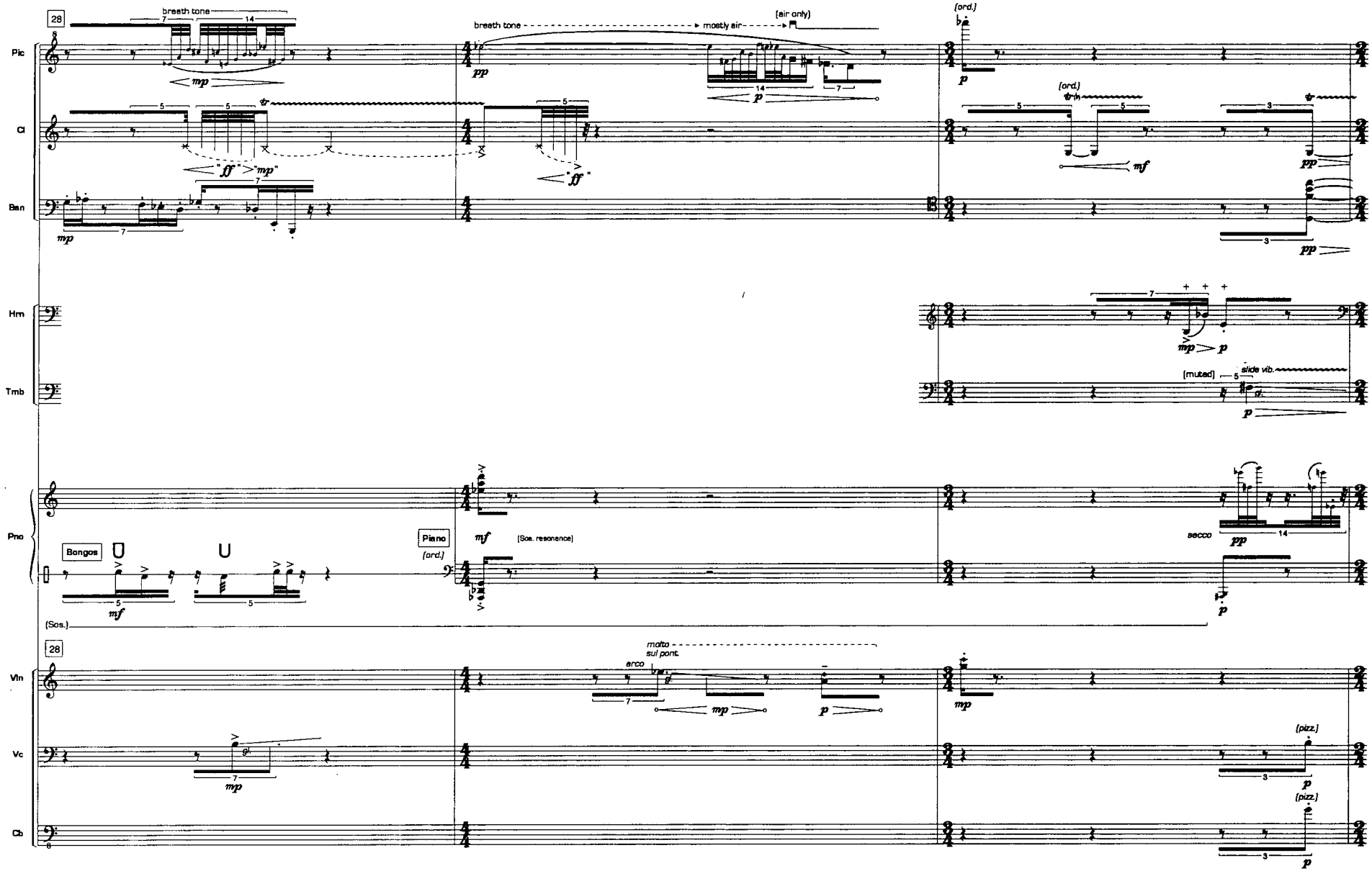

11
Pic
Cl
Bsn
(ord.)
ppp
Hrn
Tmb
split tone
sim.
(air)
overblow
"p" < "f"
"ff"
ord.
kiss/
smack
slide vib.
pp
"fp sub."
Pno
inside piano
sim.
l.v.
secco
7
10
(no Ped.)
Vln
Vc
Cb
scrape
pizz.
"mp"

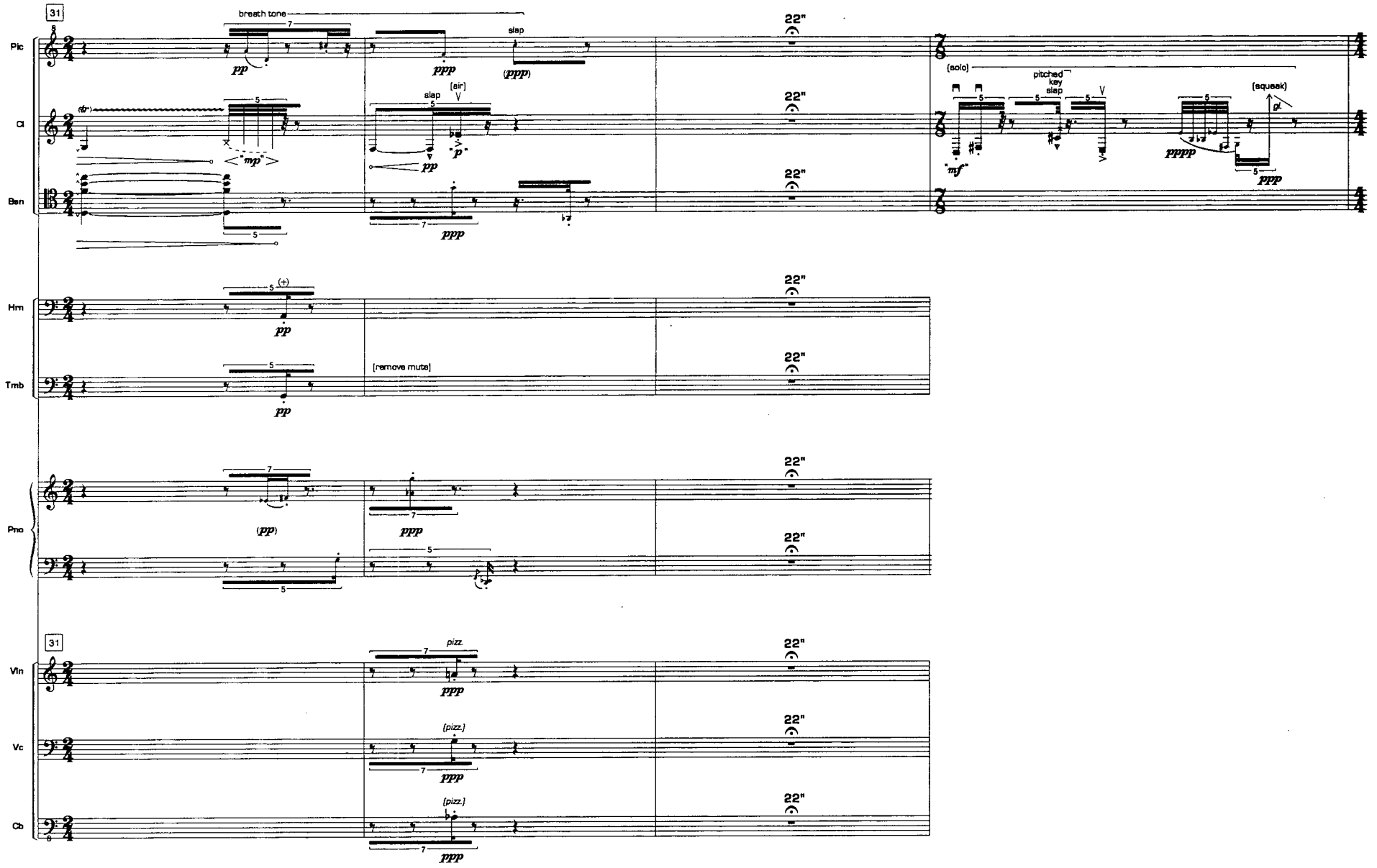

15
Pic
Cl
Bsn
Hrn
Tmb
[insert harmon mute, stem in]
Pno
15
Vln
Vc
Cb
tone: (ppp)
clicks: "mp"
clicks: (mp)
ric.
pizz.
arco
sul pont.
(pizz.)
secco
p
pp

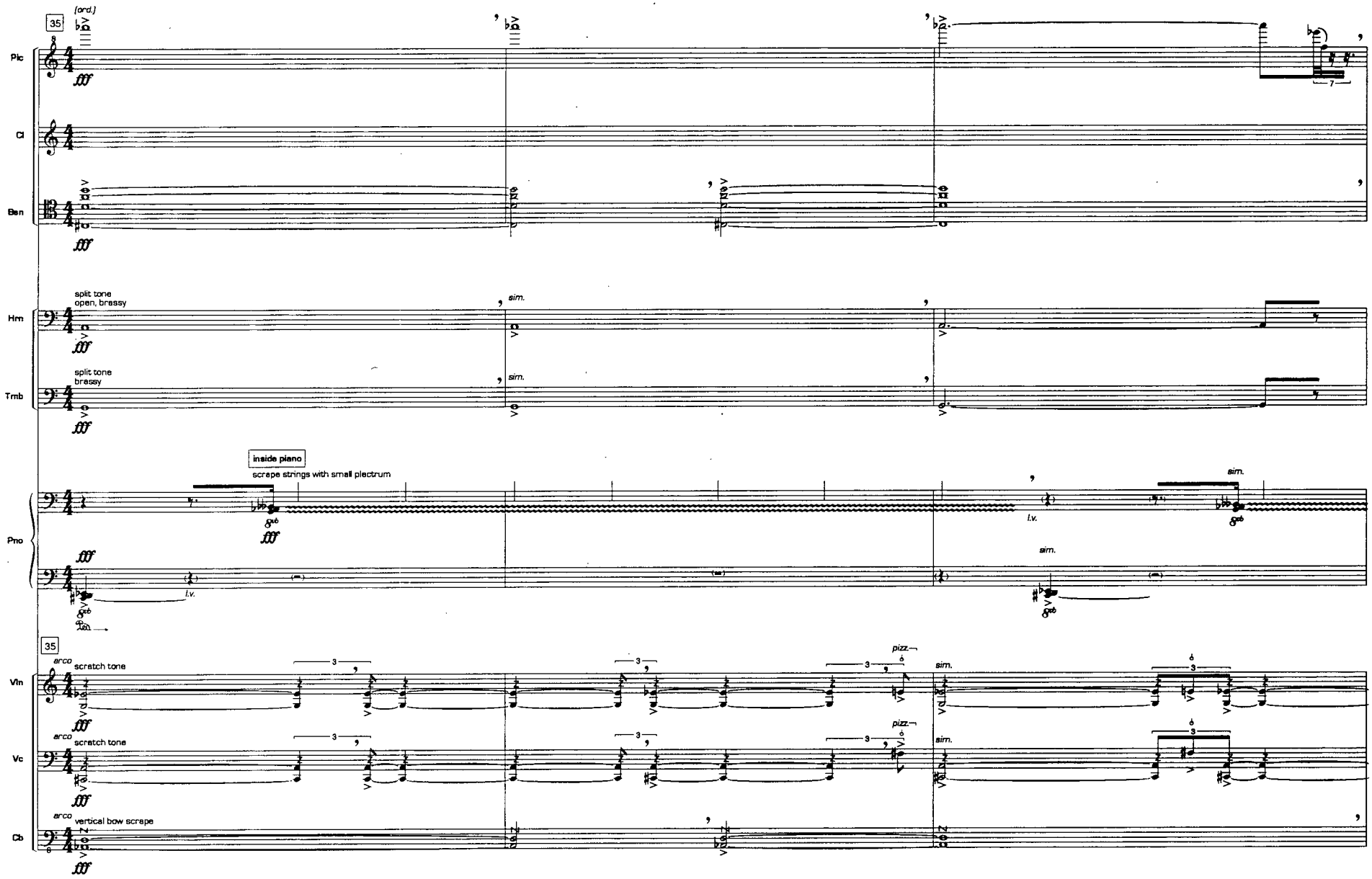

18
Pic
Cl
Bsn
whistle tone
ppp
ff
mp
fff
mp
(ord.)
ppp
f
p
ppp sub.
Hrn
Tmb
(ord.)
(stopped)
ppp
(harmon mute, stem in)
(hand)
(ord.)
ppp
(o)
Pno
pp
18
Vln
Vc
Cb
molto sul pont.
arco
pp
scrape
pizz.
"p"
arco
scratch tone
fff sub.
arco
scratch tone
fff
arco
vertical bow scrape
fff
(ord.)
ric.
pp
scrape
pizz.
"mp"
pizz.
ppp

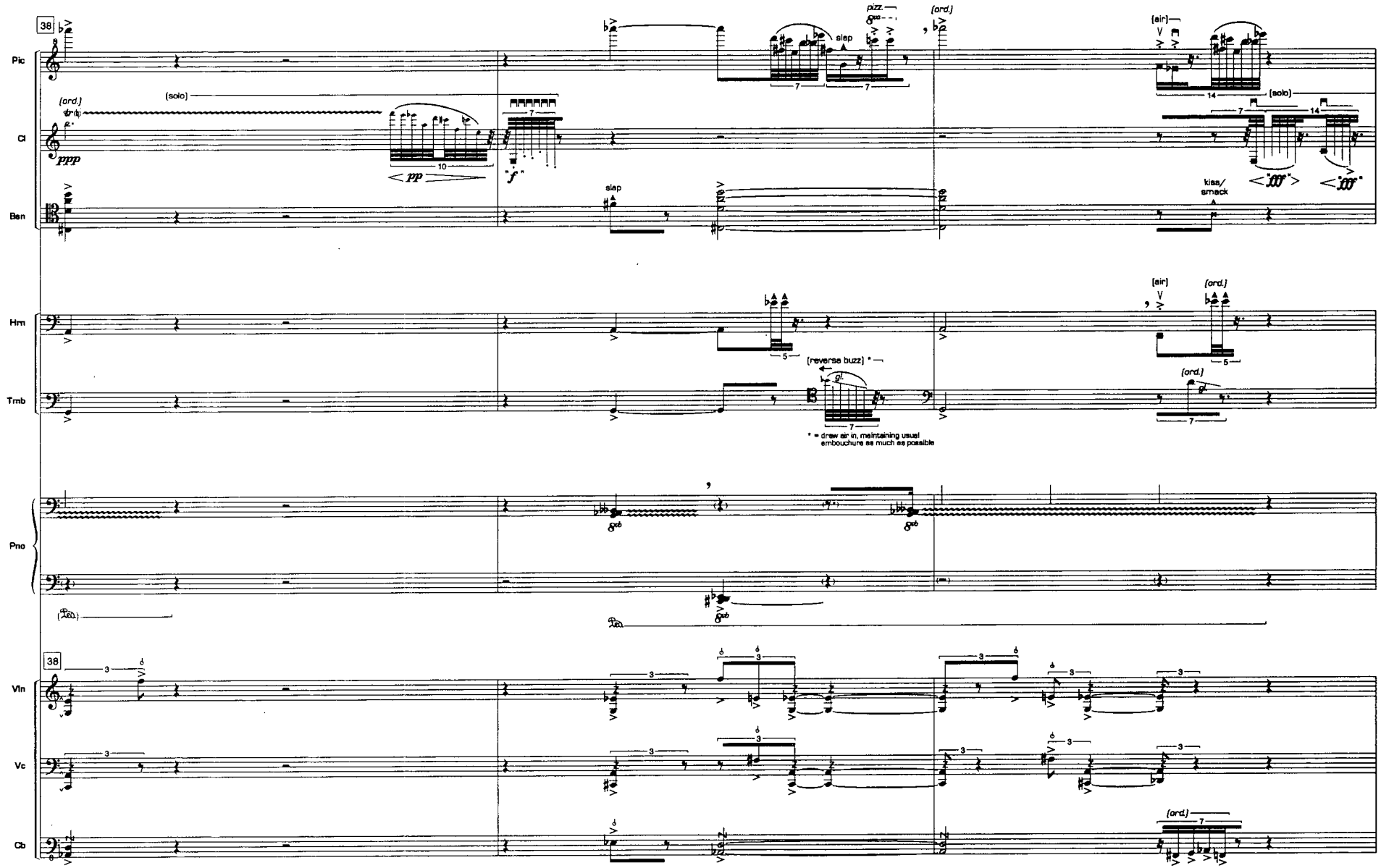

(whistle tone)
22
Pic
Cl
Bsn
tone: (ppp)
clicks: "mf"
pp
(solo)
"mp"
sub.
3"
overblow
fff
(key clicks)
10
5
"f"
17
Hrn
Tmb
Pno
ppp
depress keys silently
Sos.
Bongos
(hands)
mf
Vln
Vc
Cb
molto - sul pont.
p
(pizz.)

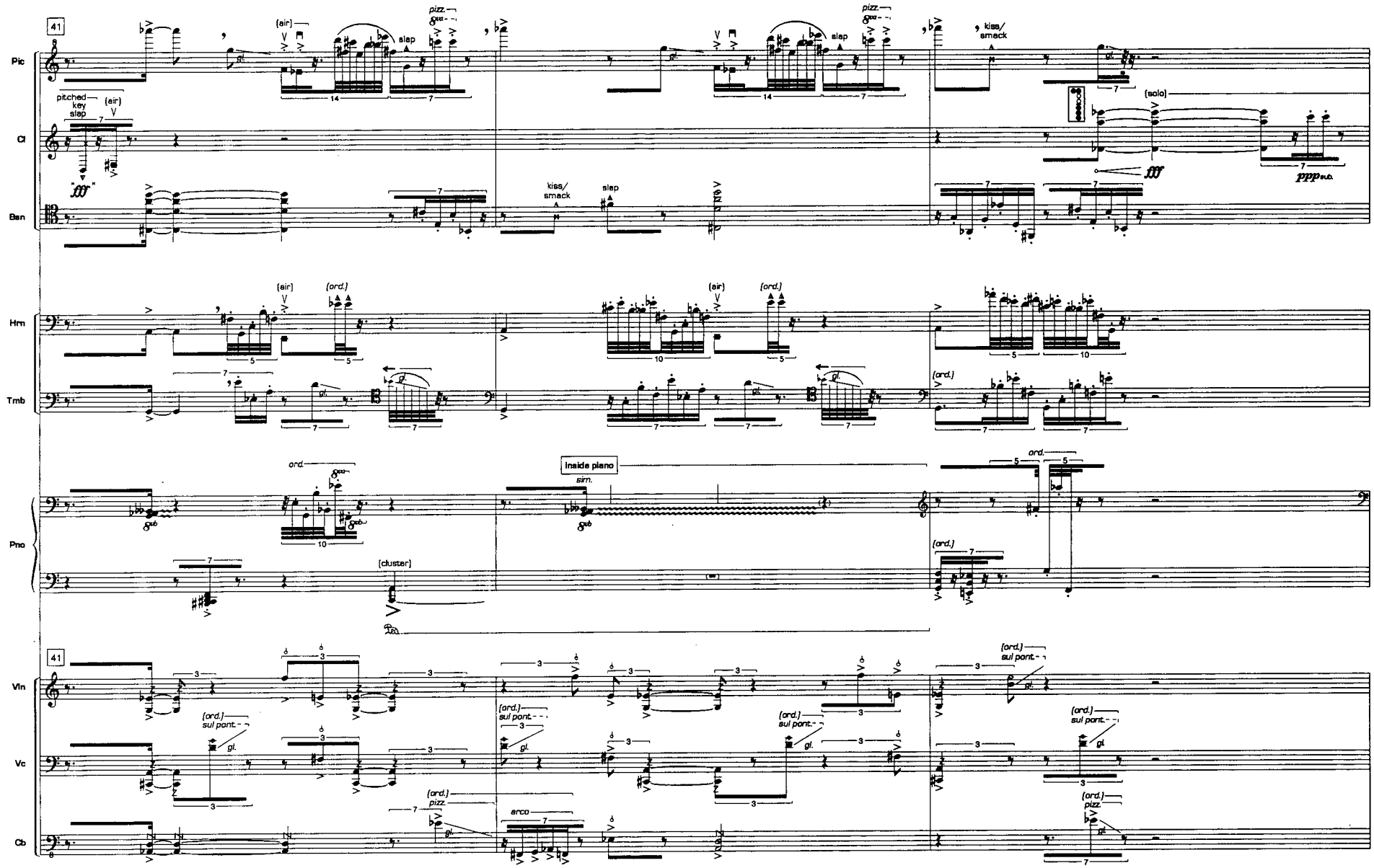

25
Pic
Cl
Bsn
{ord.}
{solo}
{key clicks}
Hrn
Tmb
{stopped}
{air}
{muted}
Pno
{Bongos}
{fingers}
{Sos.}
Piano
slam Ped.; release immediately
[Sos. resonance]
Vln
Vc
Cb
pizz.
{pizz.}

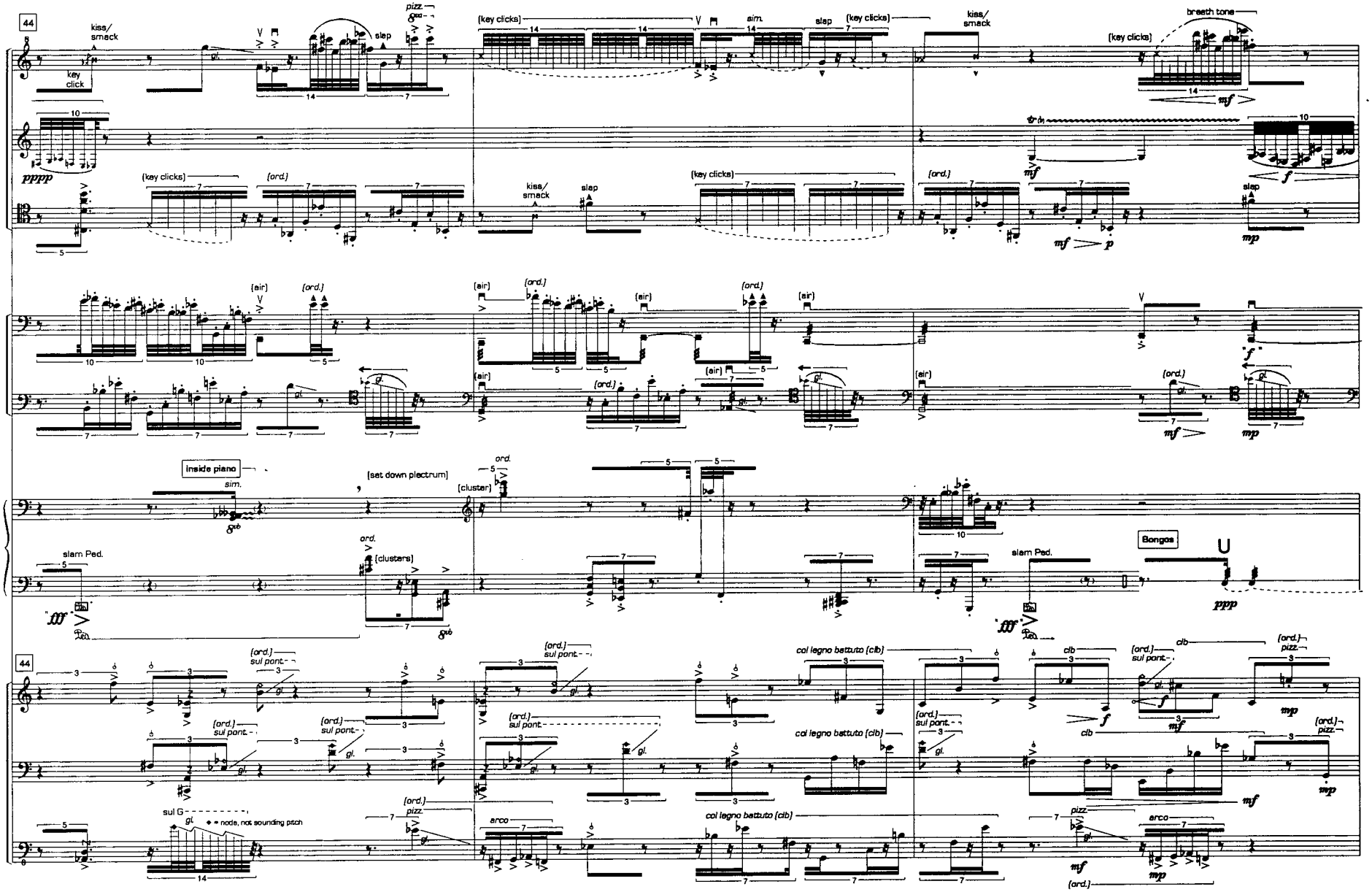

28
breath tone
breath tone
mostly air
[air only]
(ord.)
Pic
Cl
Bsn
Hrn
Tmb
[muted]
slide vib.
Pno
Bongos
Piano
(ord.)
[Sos. resonance]
secco
(Sos.)
28
Vln
Vc
Cb
arco
molto sul pont.
(pizz.)

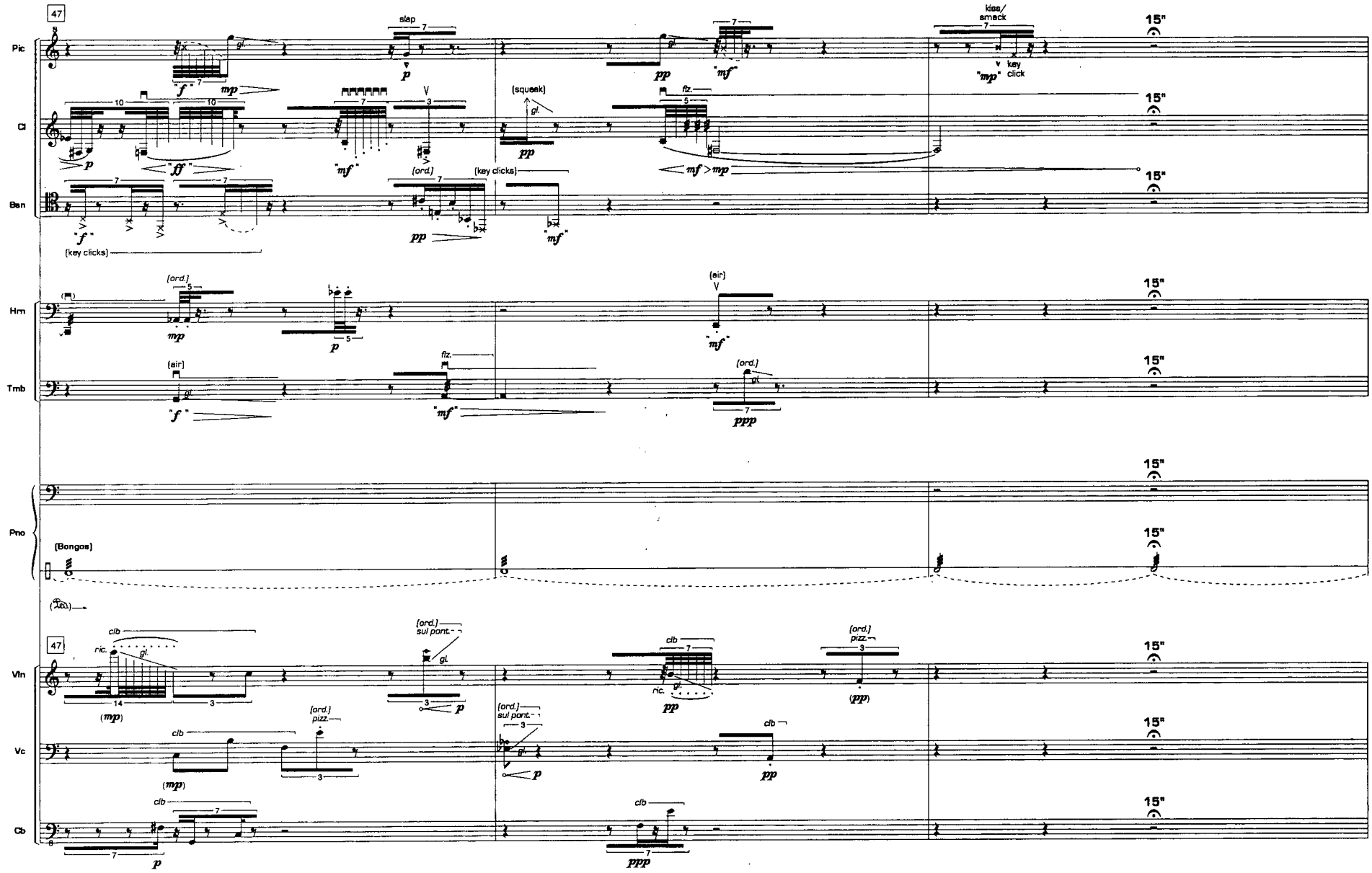

31
breath tone
slap
(air)
(solo)
pitched key slap
(squeak)
Pic
Cl
Bsn
Hrn
Tmb
[remove mute]
Pno
Vln
Vc
Cb
pizz.
22"

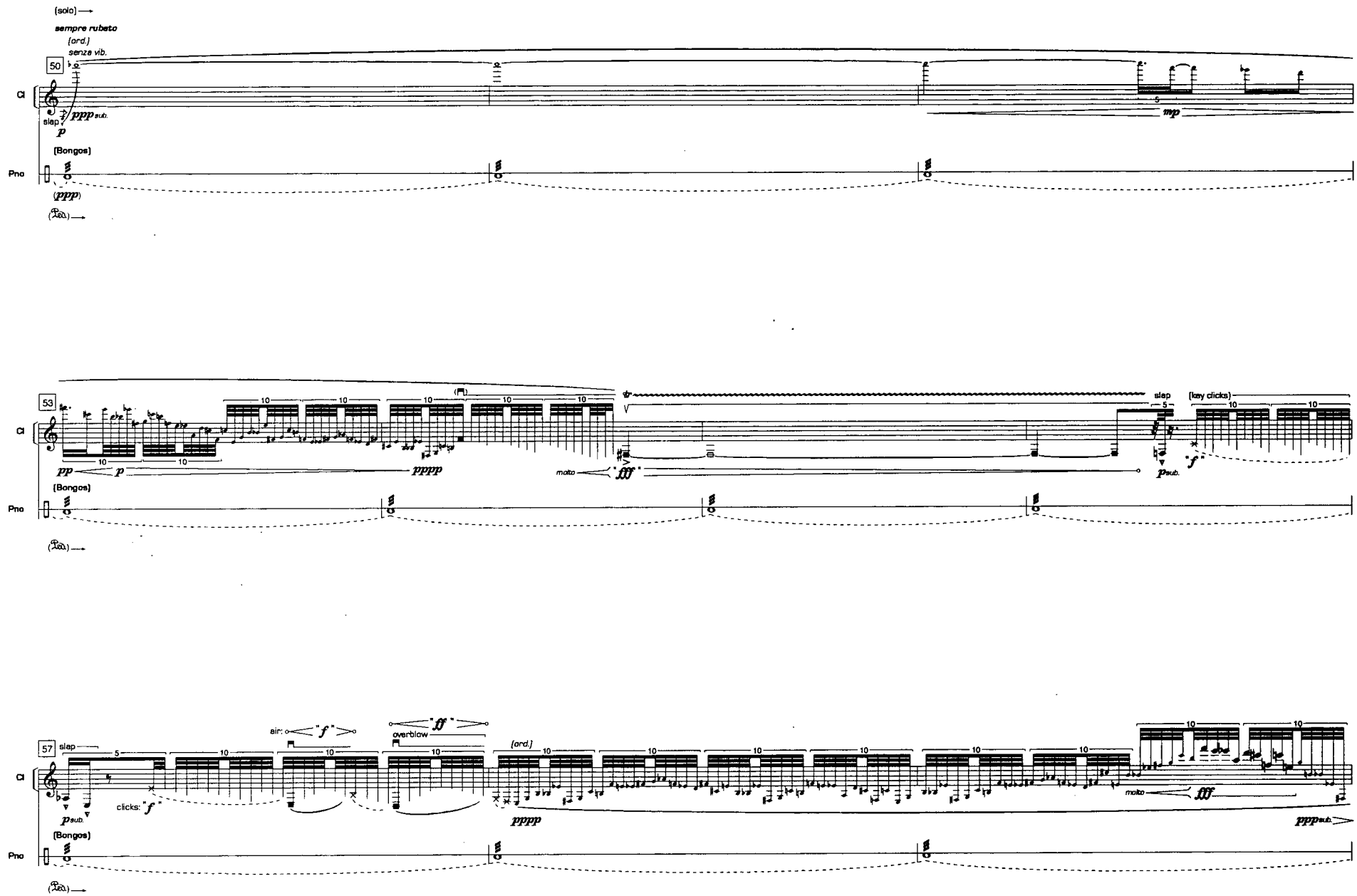

35
[ord.]
Flc
Cl
Bsn
fff
split tone
open, brassy
Hrn
sim.
split tone
brassy
Tmb
inside piano
scrape strings with small plectrum
l.v.
Pno
35
arco
scratch tone
pizz.
Vln
Vc
arco
vertical bow scrape
Cb

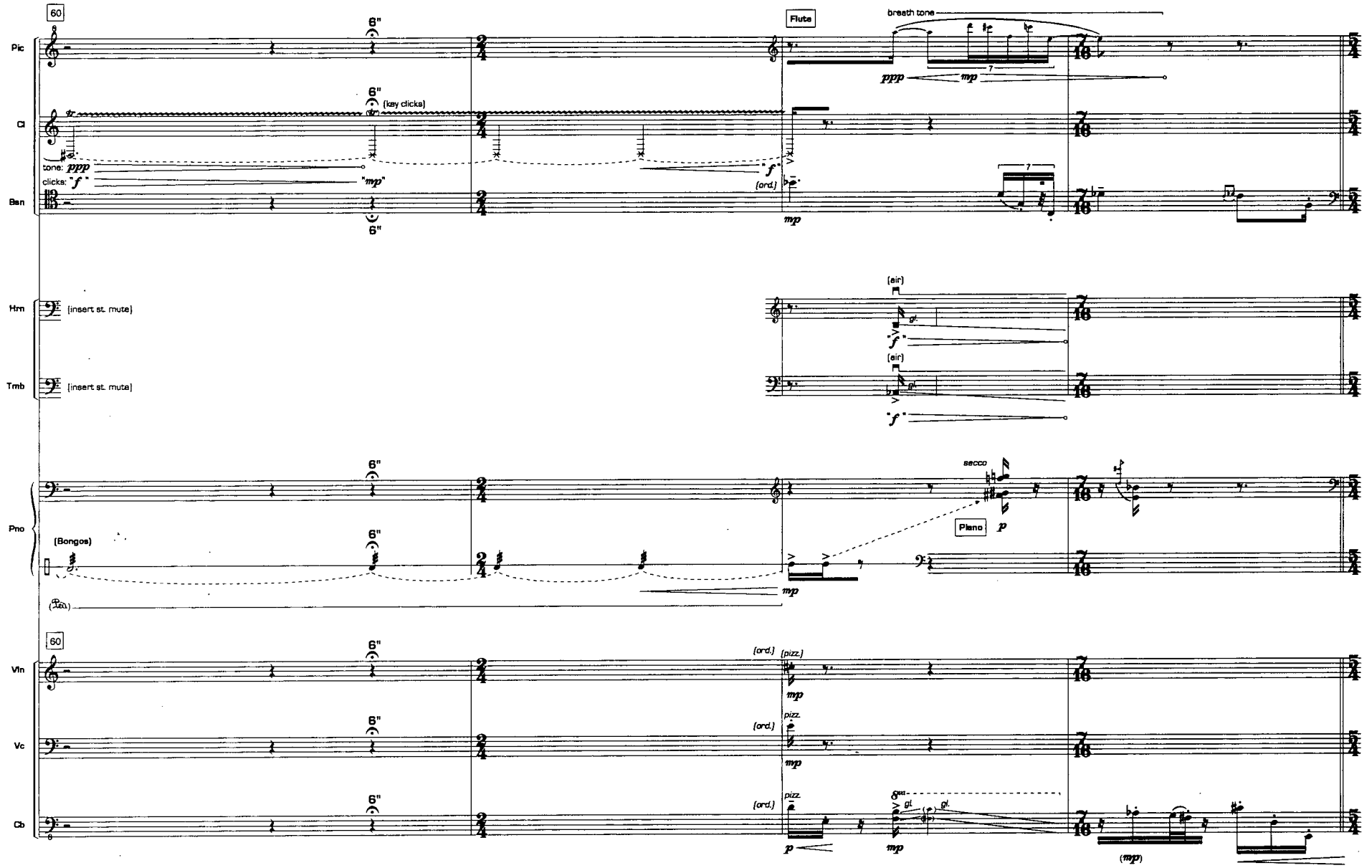

38
Pic
Cl
Ben
Hrn
Trmb
Pno
Vln
Vc
Cb
(ord.)
(solo)
ppp
pp
f
slap
pizz.
(air)
kiss/
smack
(reverse buzz) *
* = draw air in, maintaining usual embouchure as much as possible
tacet

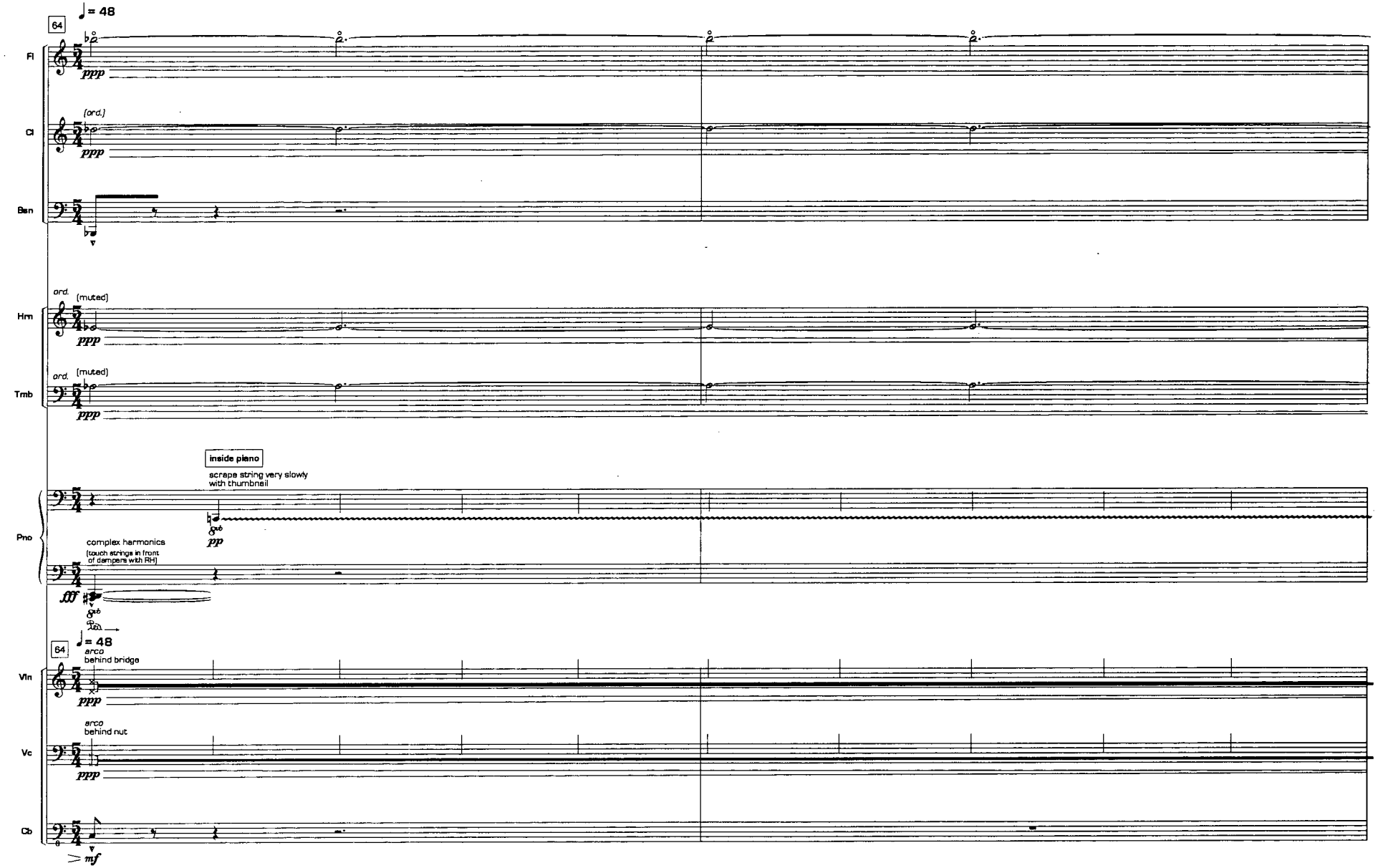

41
Pic
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
pitched key slap
(air)
slap
pizz.
kiss/ smack
(solo)
fff
pppsub.
(ord.)
ord.
Inside piano
sim.
(cluster)
sul pont.
gl.
arco

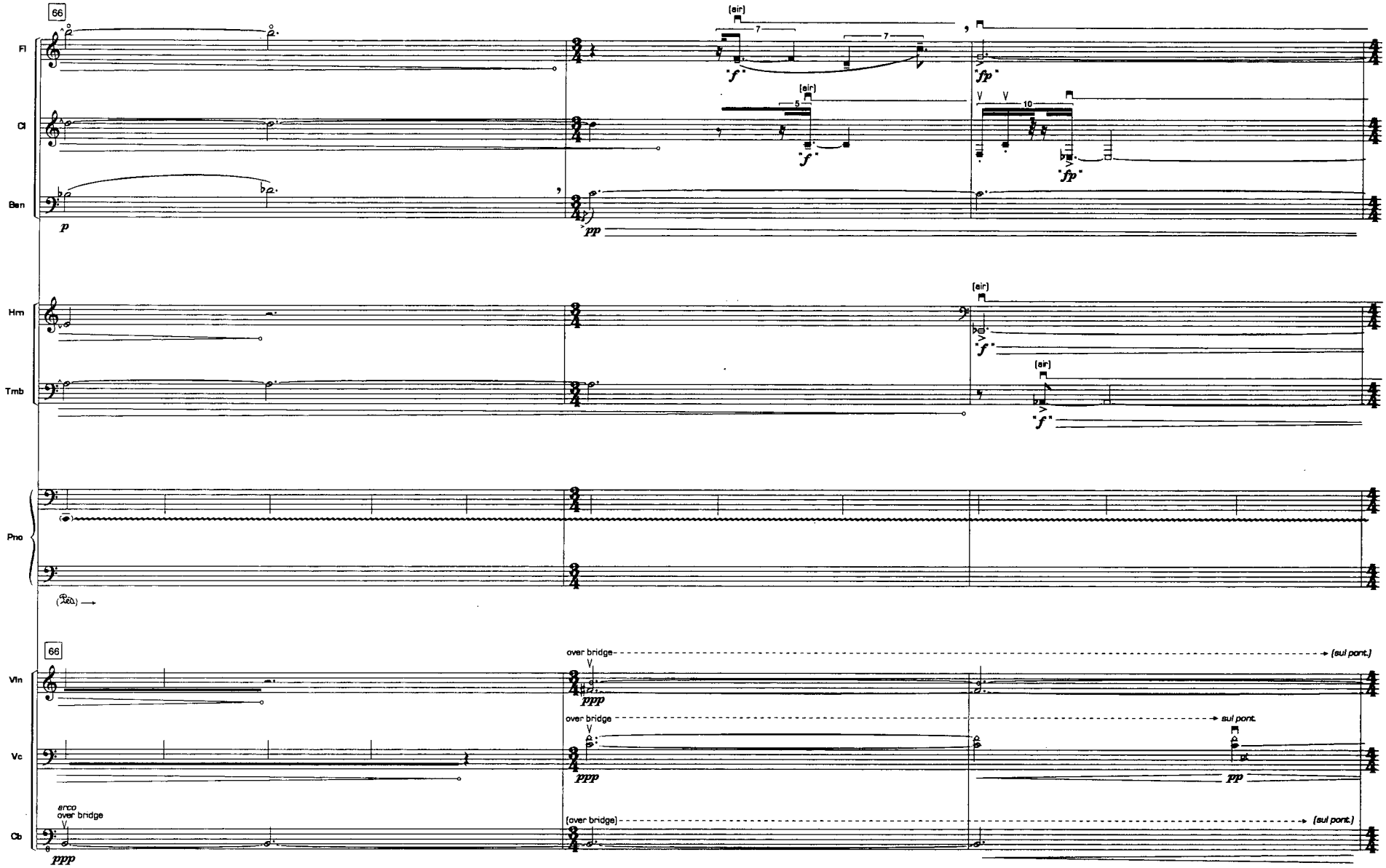

Pic
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
44
kiss/ smack
key click
slap
pizz.
(key clicks)
sim.
breath tone
pppp
(ord.)
(air)
Inside piano
[set down plectrum]
ord.
(cluster)
(clusters)
slam Ped.
Bongos
sul pont.
gl.
sul G
◆ = node, not sounding pitch
col legno battuto (clb)
clb
arco

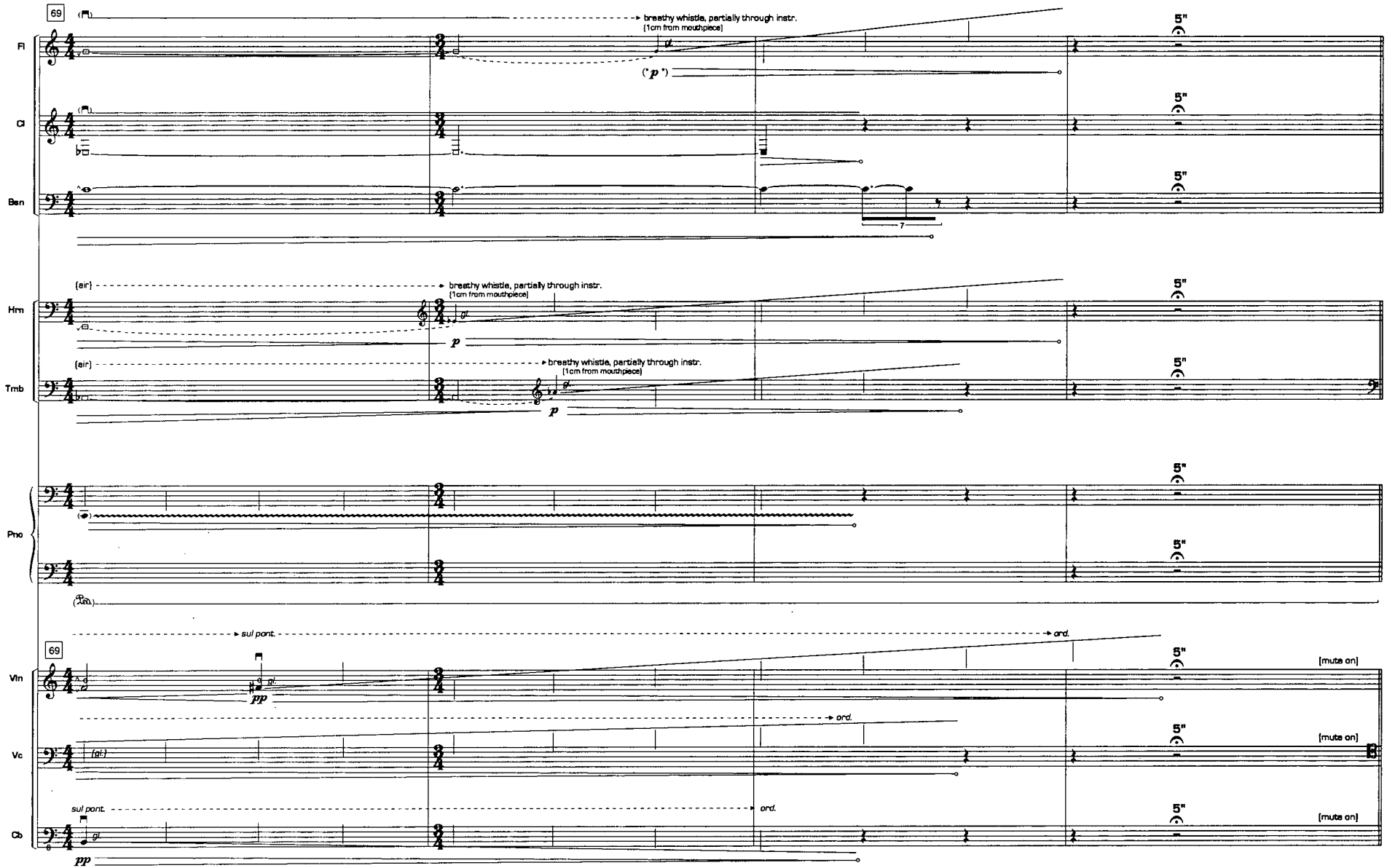

47
Pic
Cl
Bsn
Hrn
Tmb
Pno
(Bongos)
Vln
Vc
Cb
slap
kiss/
smack
key
click
(squeek)
(key clicks)
(air)
fiz.
clb
ric.
sul pont.
pizz.
15"

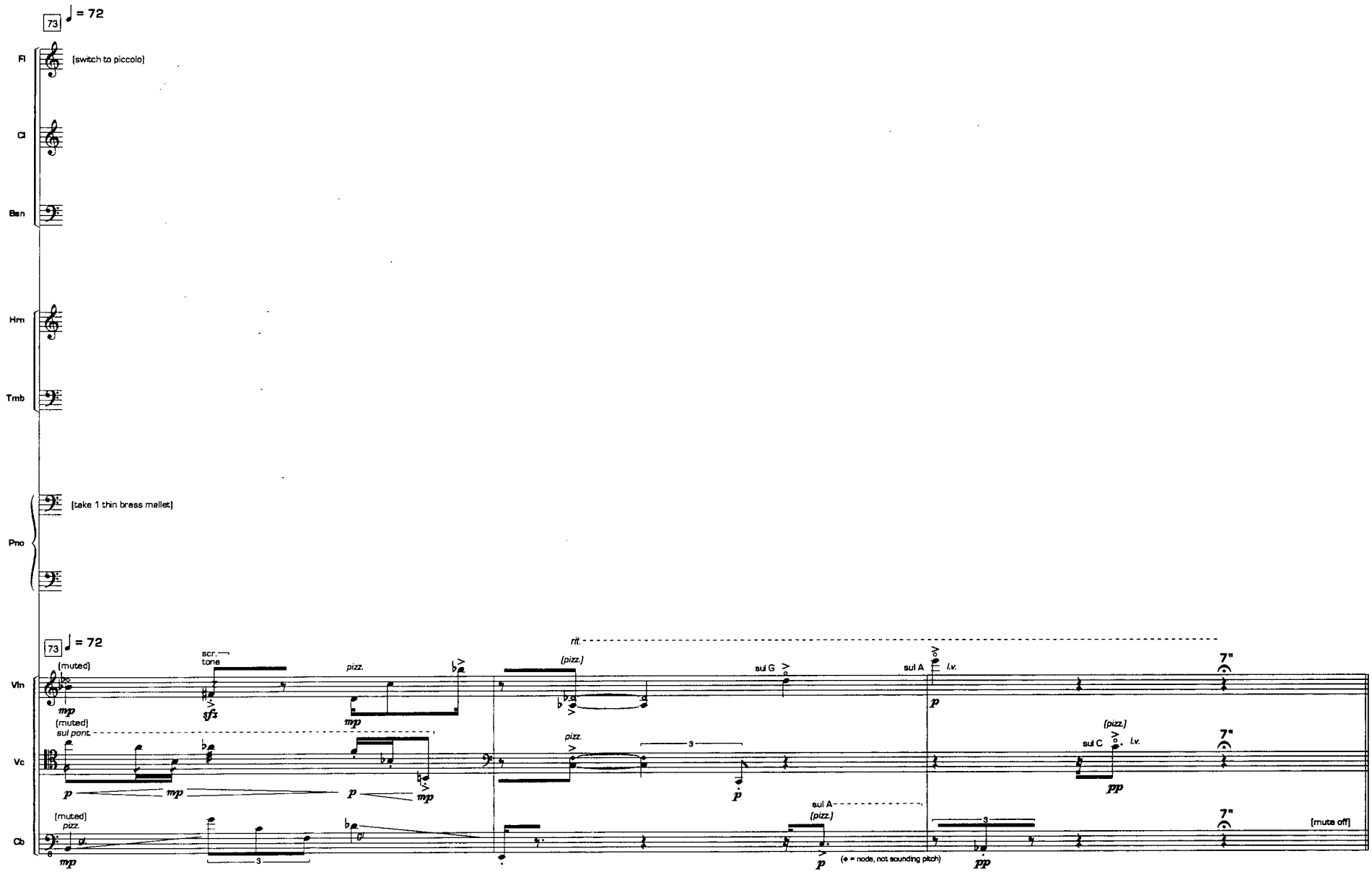

(solo)
sempre rubato
(ord.)
senza vib.
50
Cl
slap
ppp sub.
p
mp
(Bongos)
Pno
(ppp)
53
pp
p
pppp
molto
fff
slap
(key clicks)
f
p sub.
57
air:
f
ff
overblow
(ord.)
clicks:
f
pppp
molto
fff
ppp sub.

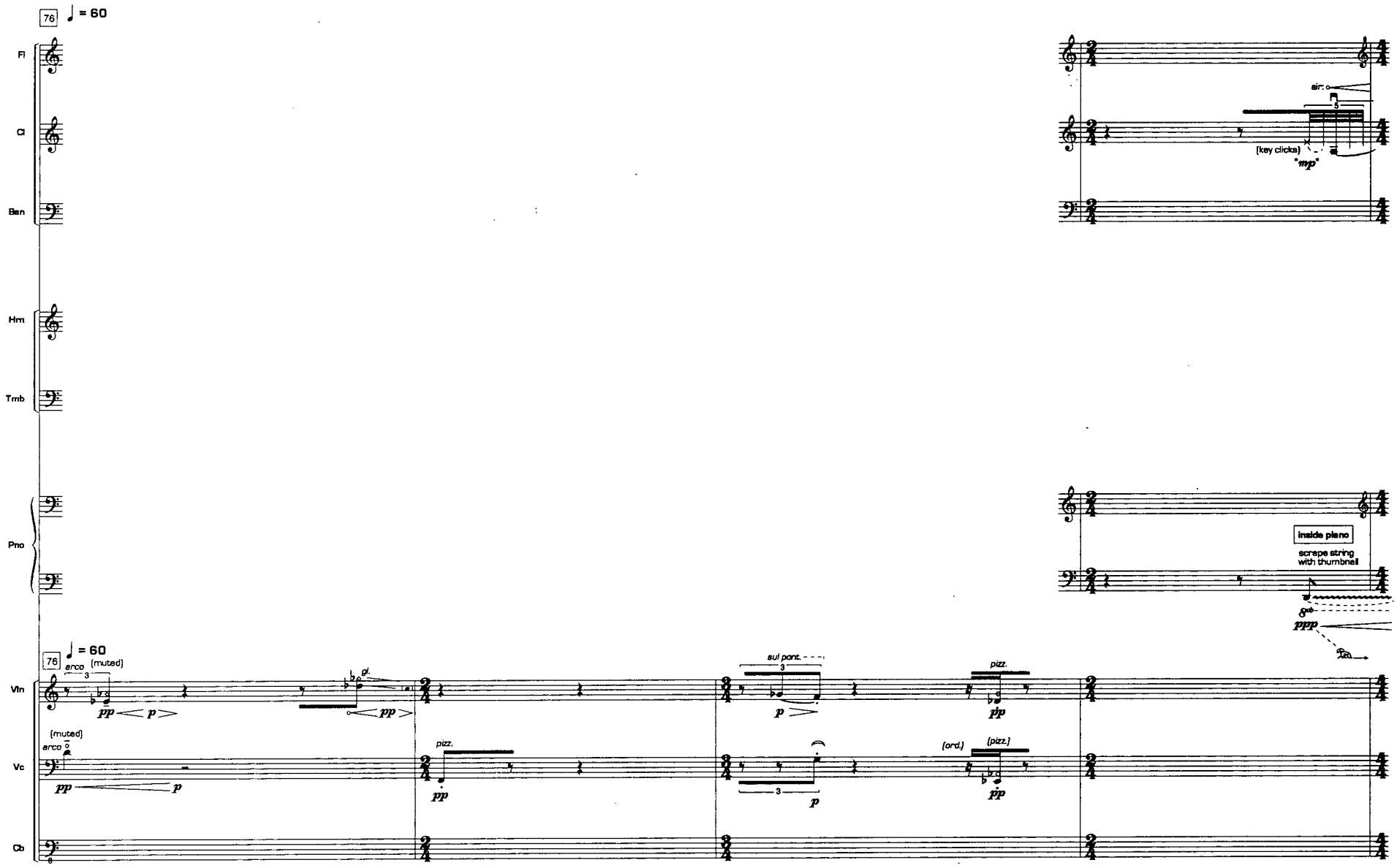

60
Pic
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
6"
(key clicks)
tone: ppp
clicks: "f"
"mp"
Flute
breath tone
ppp
mp
(ord.)
(air)
gl.
[insert st. mute]
(Bongos)
secco
Piano
p
(pizz.)
pizz.
(mp)

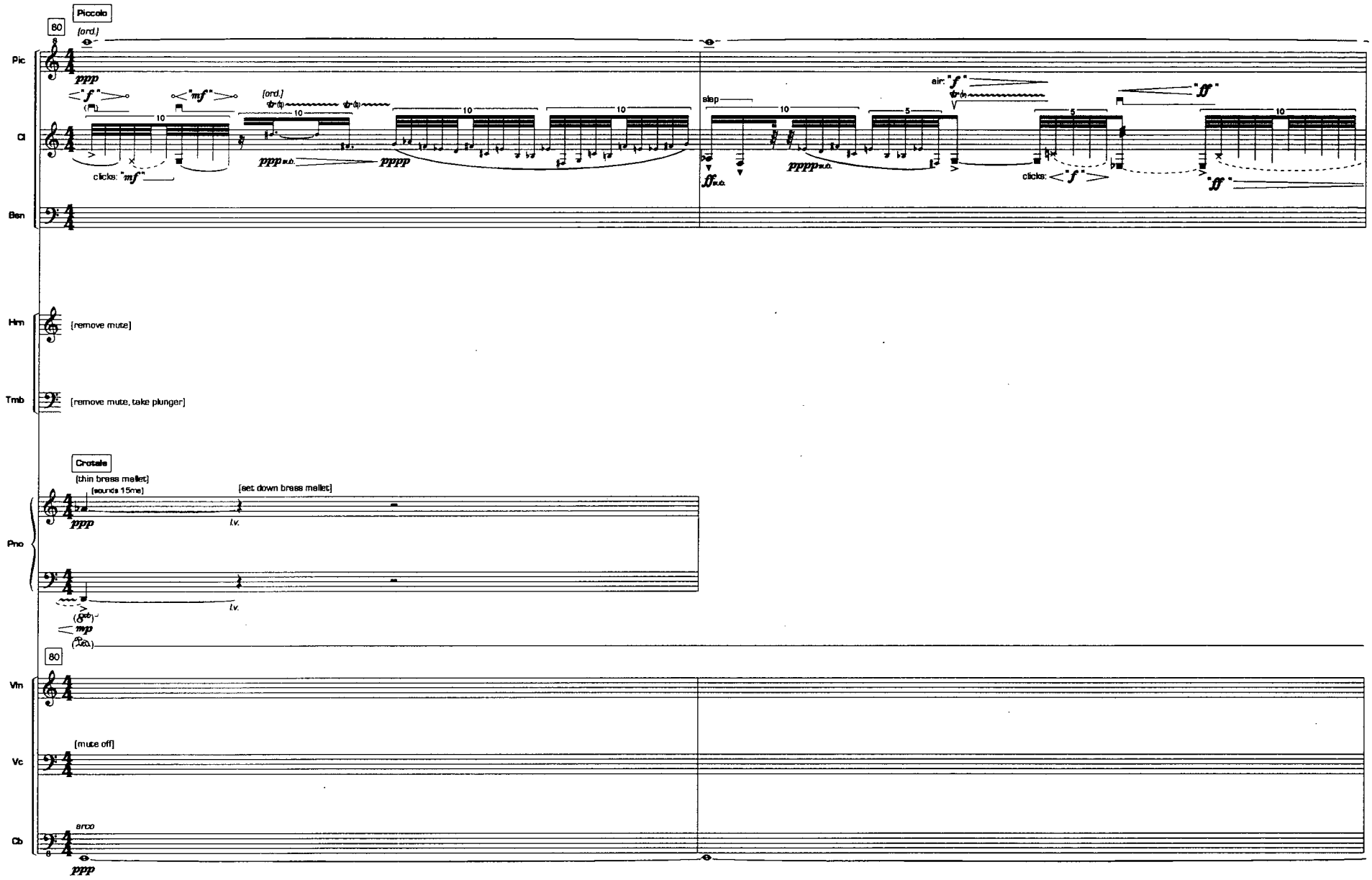

♩= 48
64
Fl
ppp
Cl
(ord.)
ppp
Bsn
ord.
(muted)
Hrn
ppp
ord.
(muted)
Tmb
ppp
inside piano
scrape string very slowly
with thumbnail
Pno
pp
complex harmonics
(touch strings in front
of dampers with RH)
fff
♩= 48
64
arco
behind bridge
Vln
ppp
arco
behind nut
Vc
ppp
Cb
mf

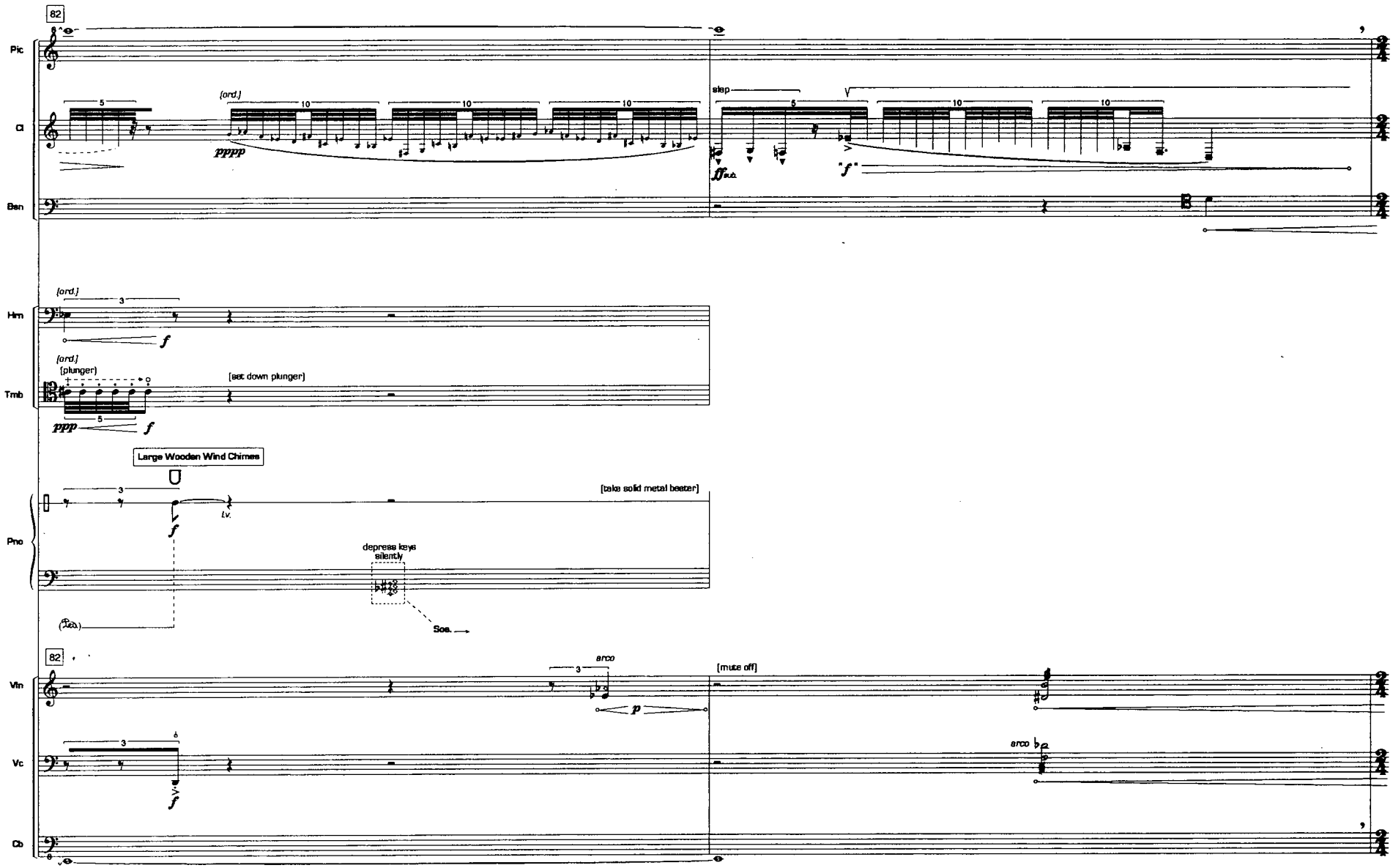

66
Fl
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
(air)
p
pp
f
fp
ppp
pp
over bridge
sul pont.
(sul pont.)
[over bridge]
arco
over bridge

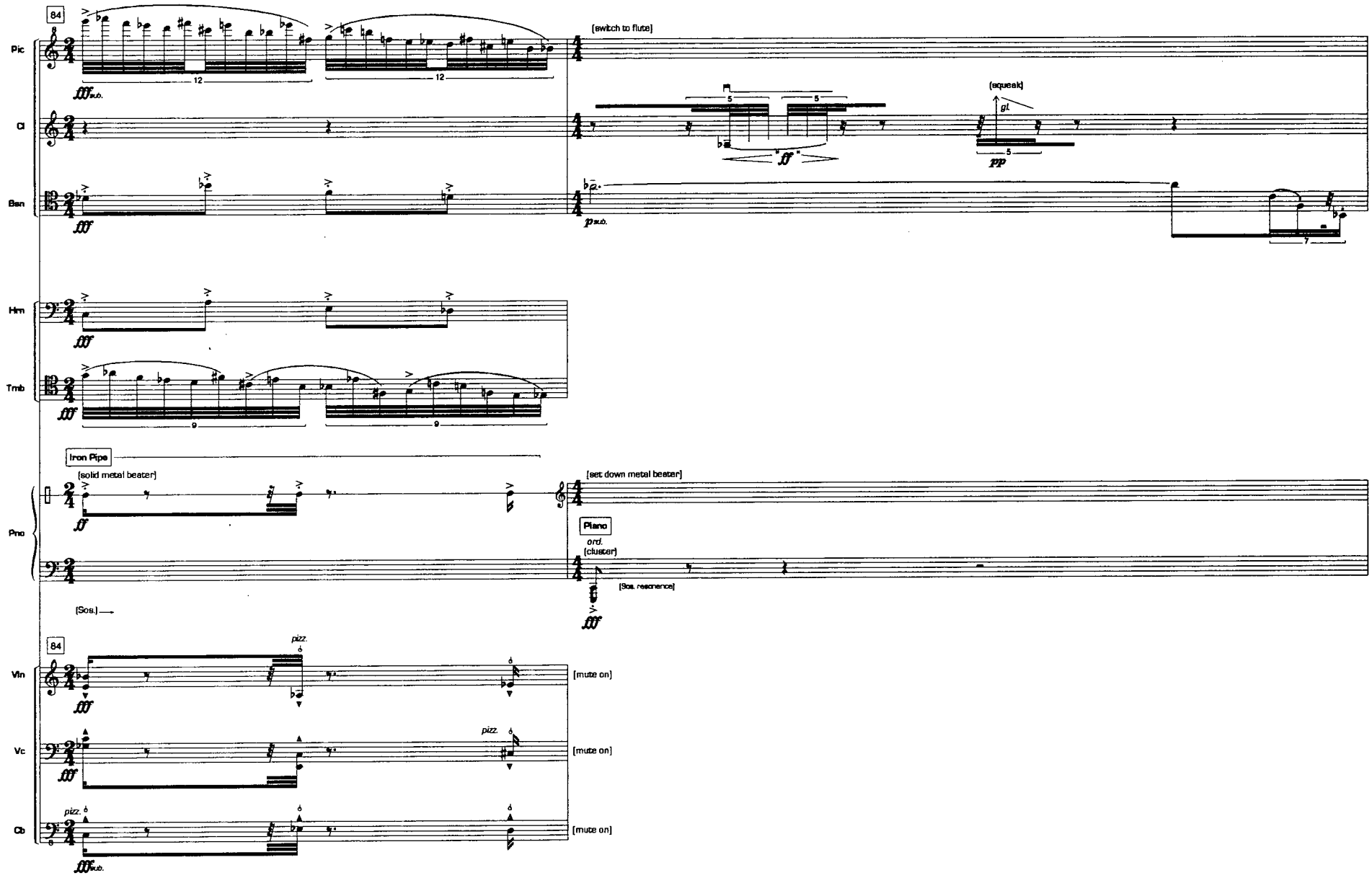

69
Fl
Cl
Bsn
breathy whistle, partially through instr.
(1cm from mouthpiece)
("p")
5"
7
Hrn
Tmb
(air)
breathy whistle, partially through instr.
(1cm from mouthpiece)
p
Pno
sul pont.
ord.
Vln
Vc
Cb
pp
(gl.)
(muta on)

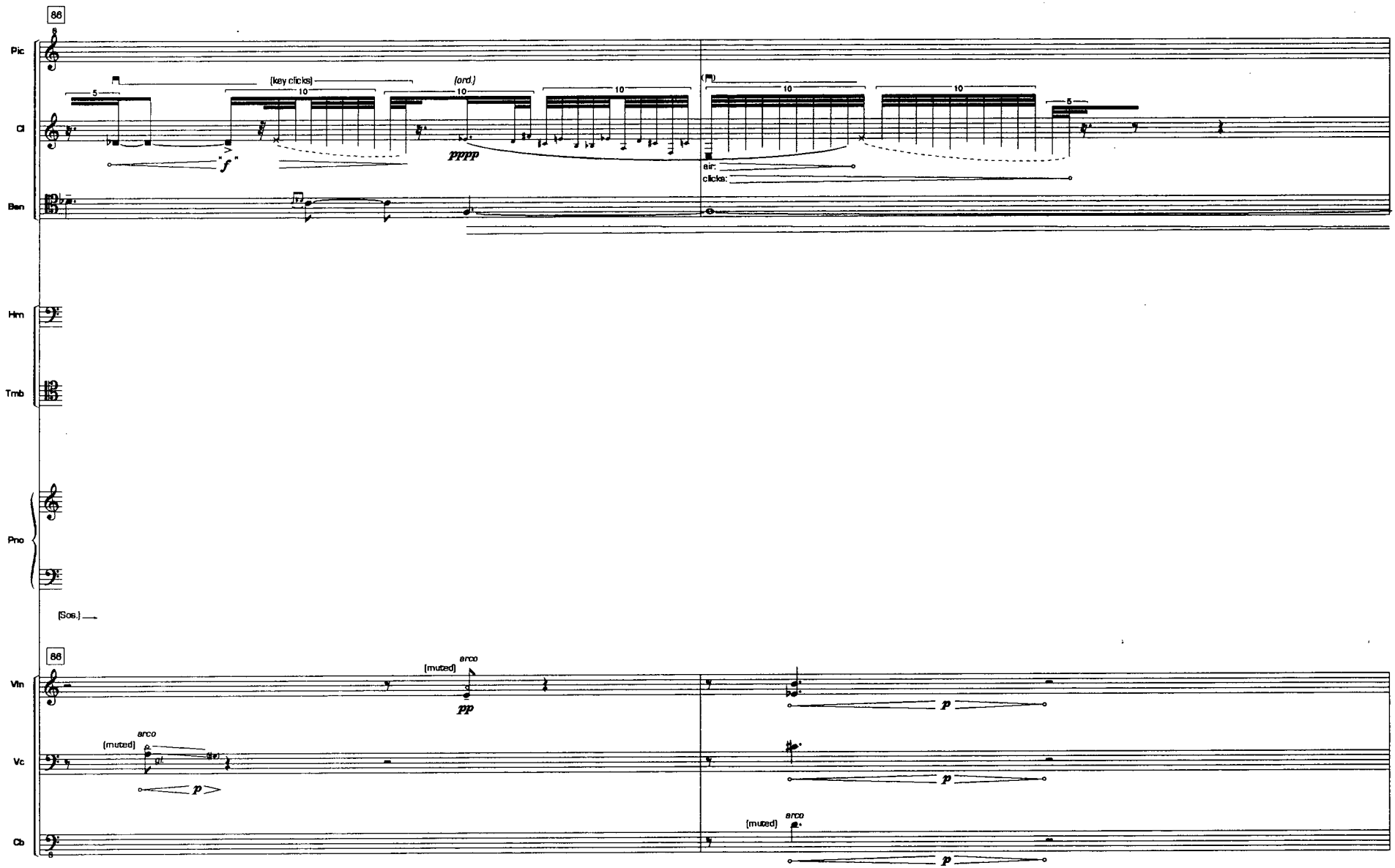

73
♩ = 72
Fl
[switch to piccolo]
Cl
Bsn
Hrn
Tmb
Pno
[take 1 thin brass mallet]
73
♩ = 72
Vln
Vc
Cb
(muted)
scr. tone
pizz.
rit.
(pizz.)
sul G
sul A
l.v.
7"
(muted)
sul pont.
pizz.
(pizz.)
sul C
l.v.
7"
(muted)
pizz.
sul A
(pizz.)
7"
[mute off]
(◆ = node, not sounding pitch)

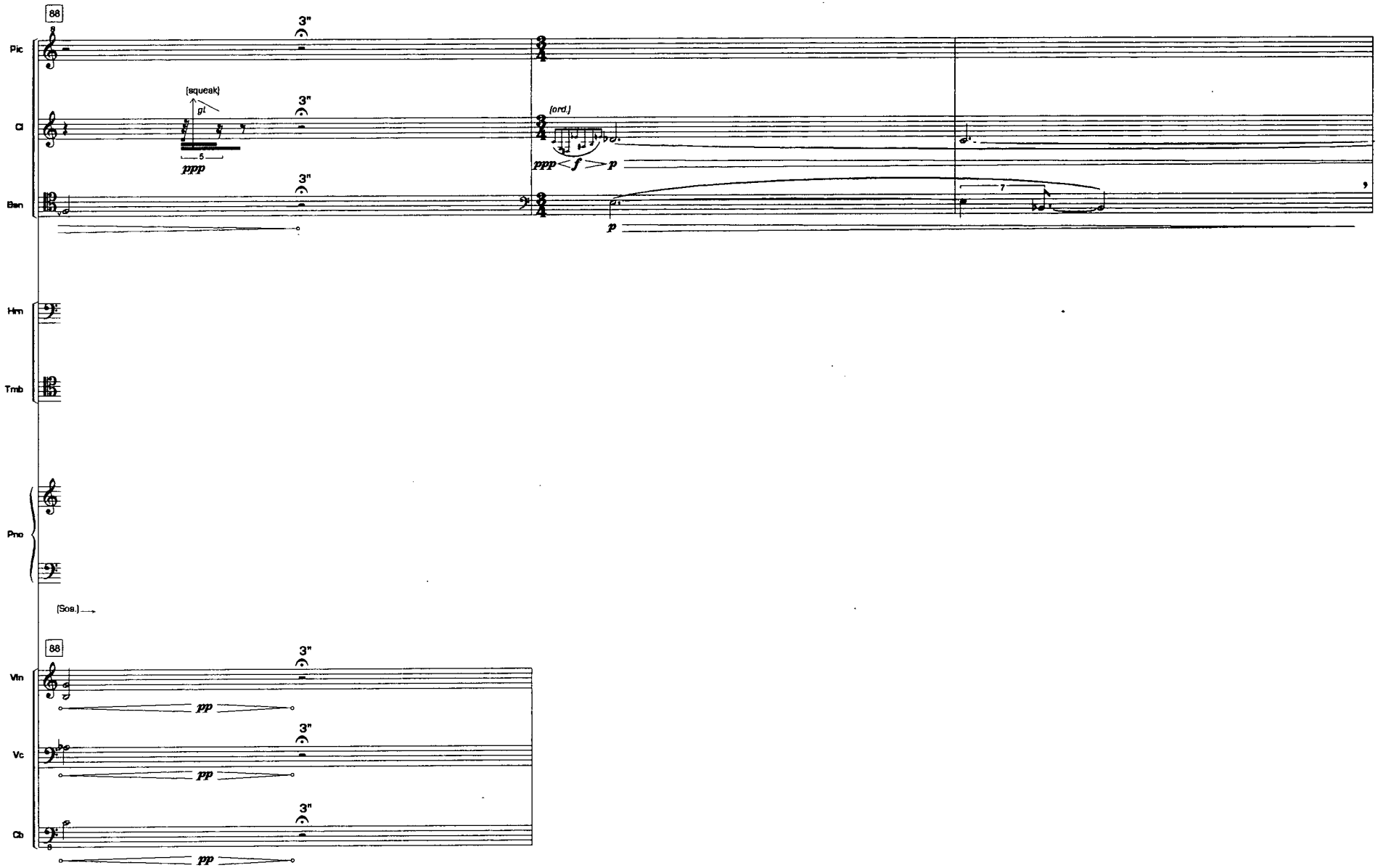

76
♩ = 60
Fl
Cl
Ben
Hm
Tmb
Pno
Vln
Vc
Cb
air:
(key clicks)
"mp"
inside piano
scrape string
with thumbnail
ppp
(muted)
arco
pp
p
gl.
sul pont.
pizz.
(ord.)
(pizz.)

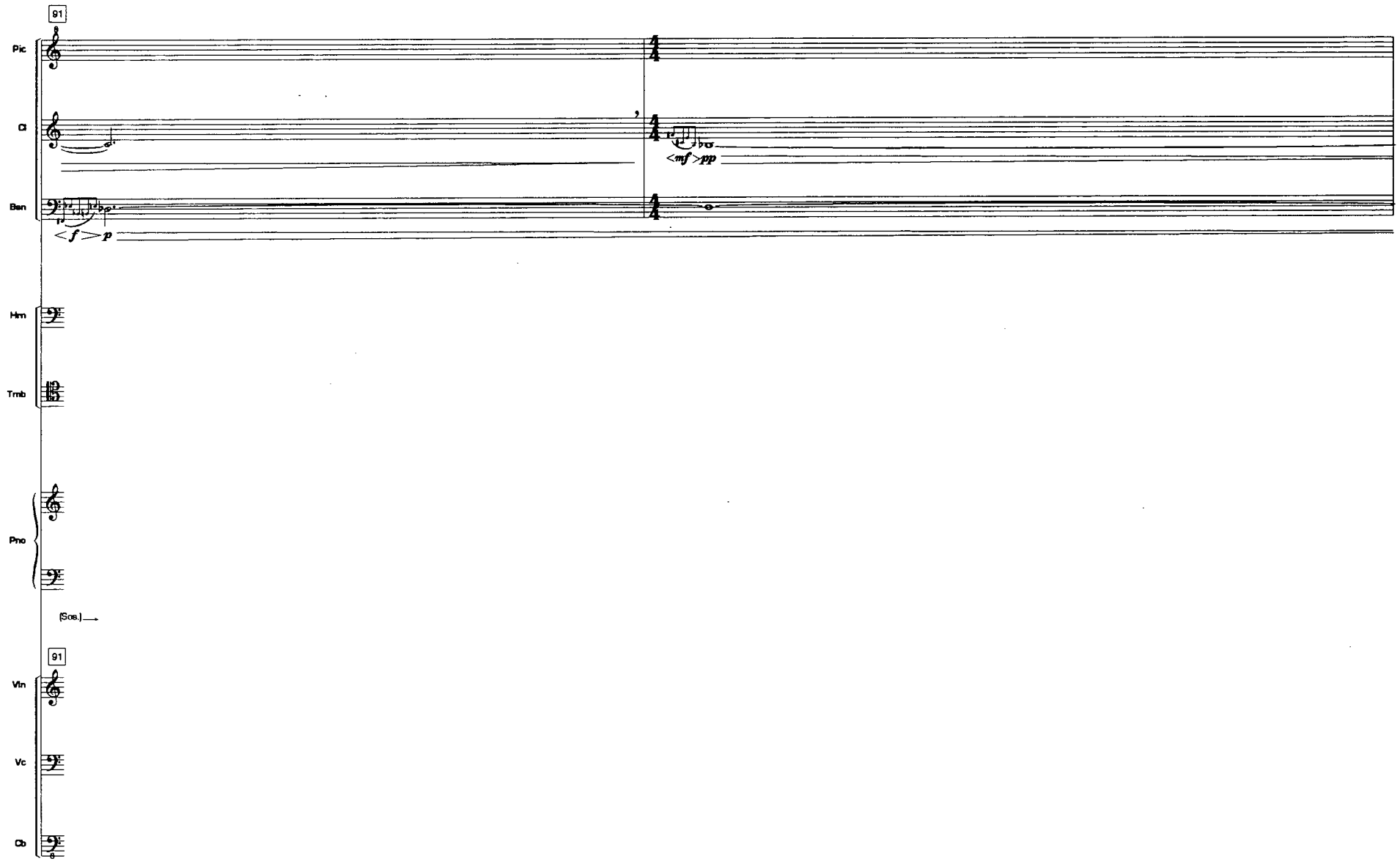

Piccolo
80
(ord.)
Pic
Cl
Bsn
Hrn
[remove mute]
Tmb
[remove mute, take plunger]
Crotale
[thin brass mallet]
(sounds 15ma)
[set down brass mallet]
Pno
80
Vln
[mute off]
Vc
Cb
arco

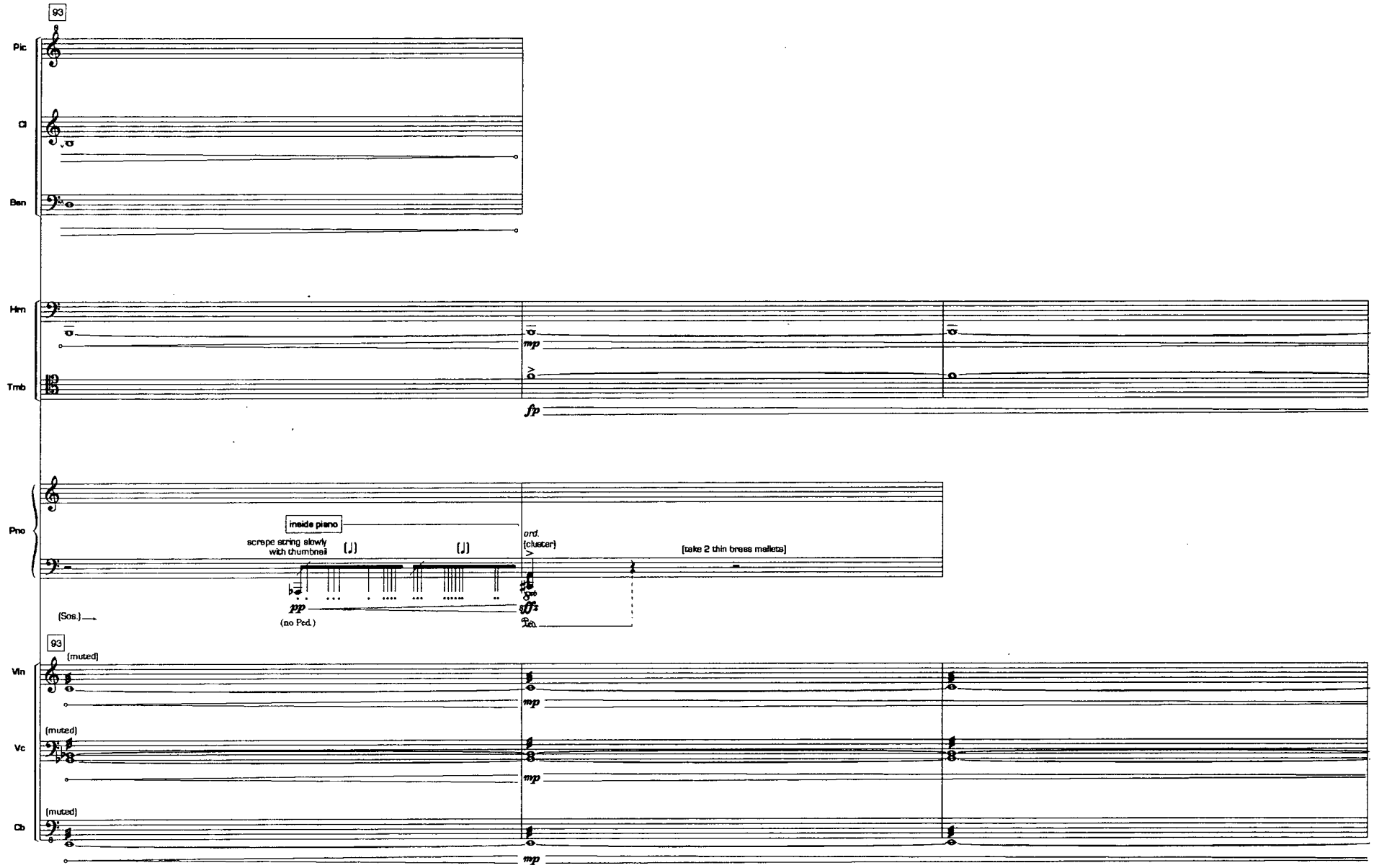

82
Pic
Cl
Bsn
{ord.}
pppp
step
ffsub.
f
Hrn
{ord.}
f
Tmb
{ord.}
[plunger]
[set down plunger]
ppp
f
Large Wooden Wind Chimes
[take solid metal beater]
l.v.
Pno
depress keys silently
Sos.
82
Vln
arco
p
[mute off]
Vc
arco
Cb

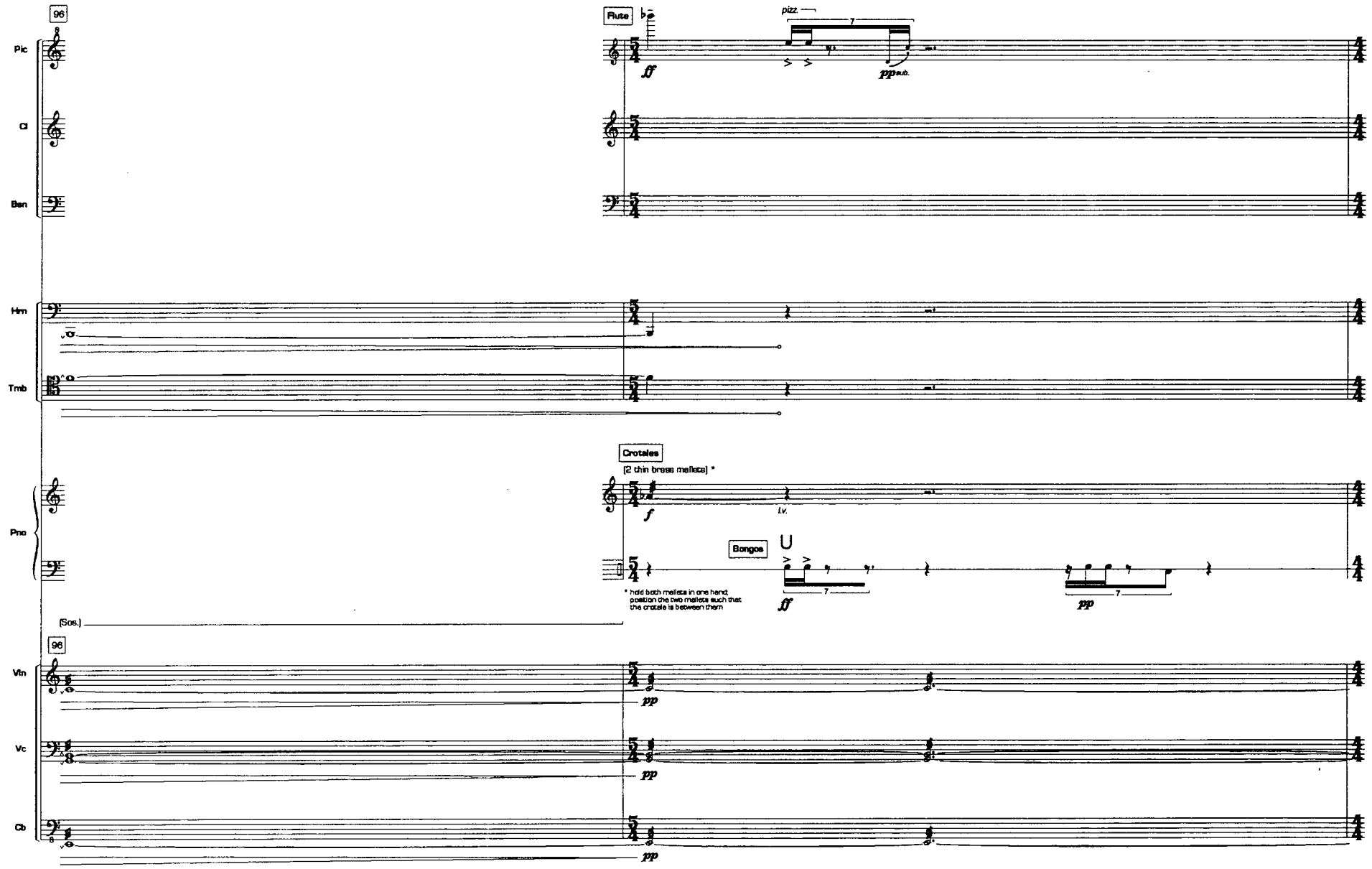

84
Pic
Cl
Bsn
Hrn
Tmb
Iron Pipe
Pno
Piano
84
Vln
Vc
Cb
[switch to flute]
[squeak]
[solid metal beater]
[set down metal beater]
ord.
[cluster]
[Sos. resonance]
[Sos.]
pizz.
[mute on]

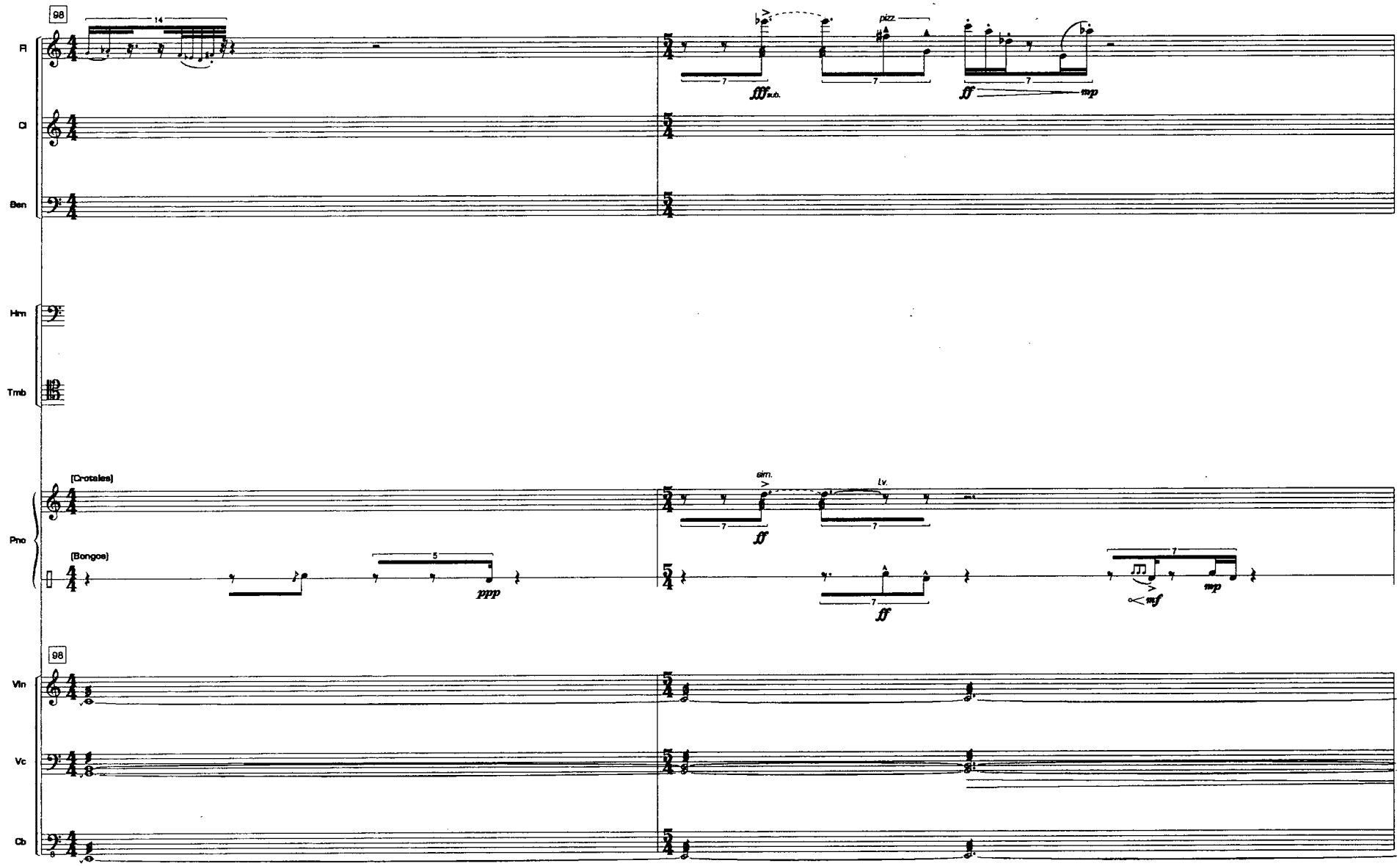

86
Pic
Cl
Bsn
(key clicks)
(ord.)
"f"
pppp
(Pl)
air:
clicks:
Hrn
Tmb
Pno
[Sos.]
86
Vln
Vc
Cb
[muted]
arco
pp
p

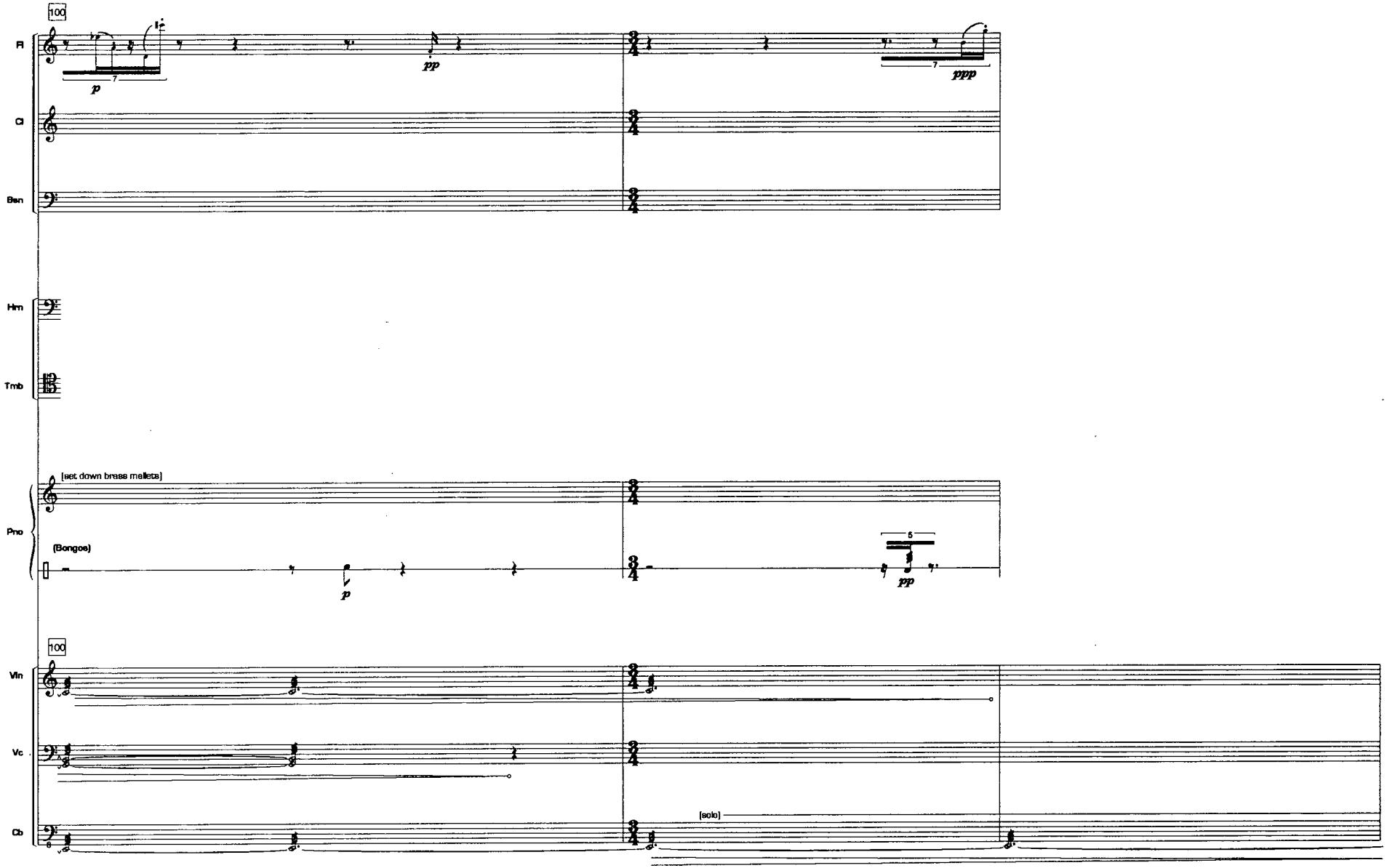

88
Pic
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
3"
[squeak]
gl
5
ppp
[ord.]
ppp < f > p
p
7
[Sos.]
pp

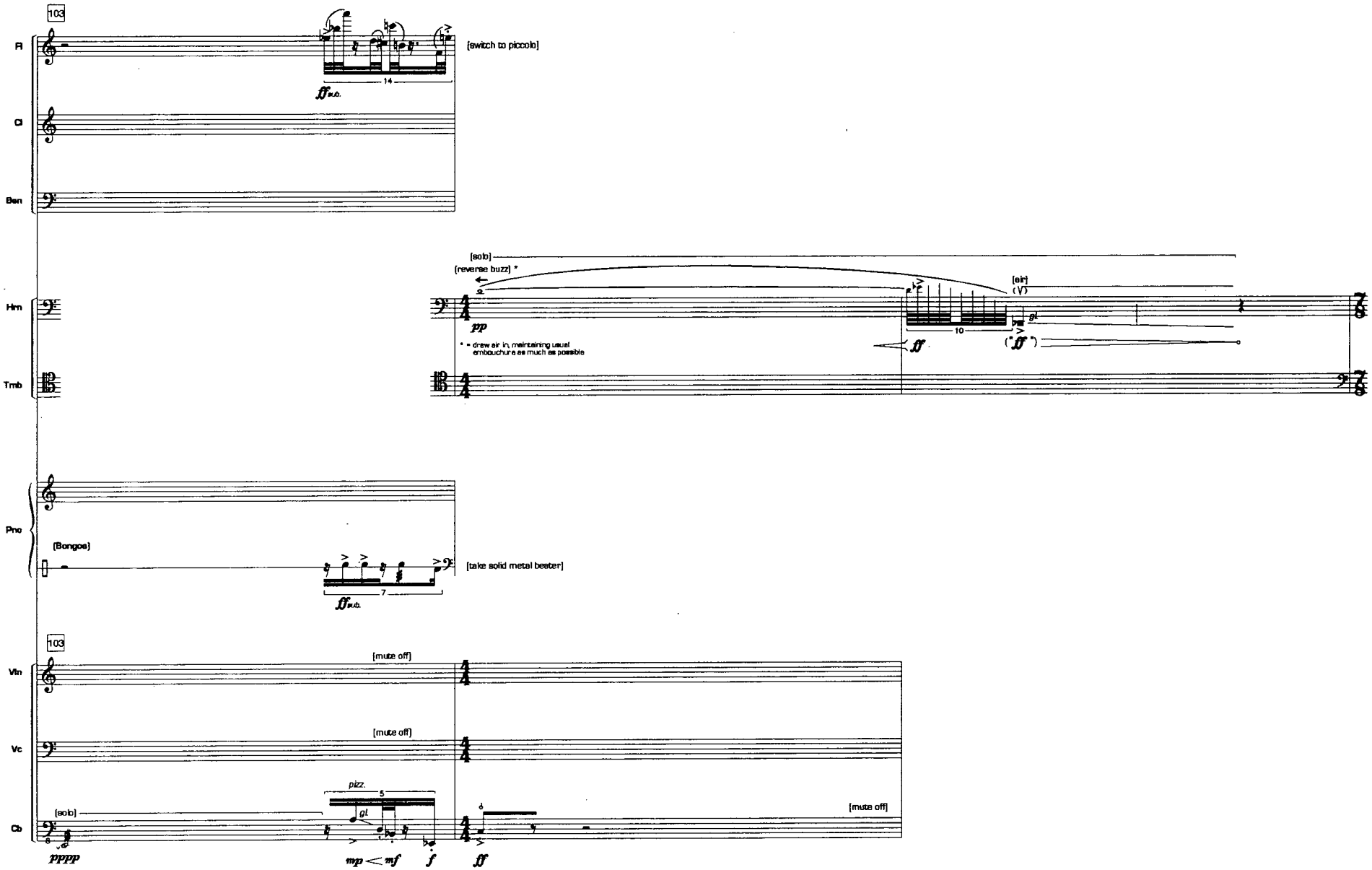

91
Pic
Cl
Bsn
<f>p
<mf>pp
Hrn
Trmb
Pno
(Sos.)
91
Vln
Vc
Cb

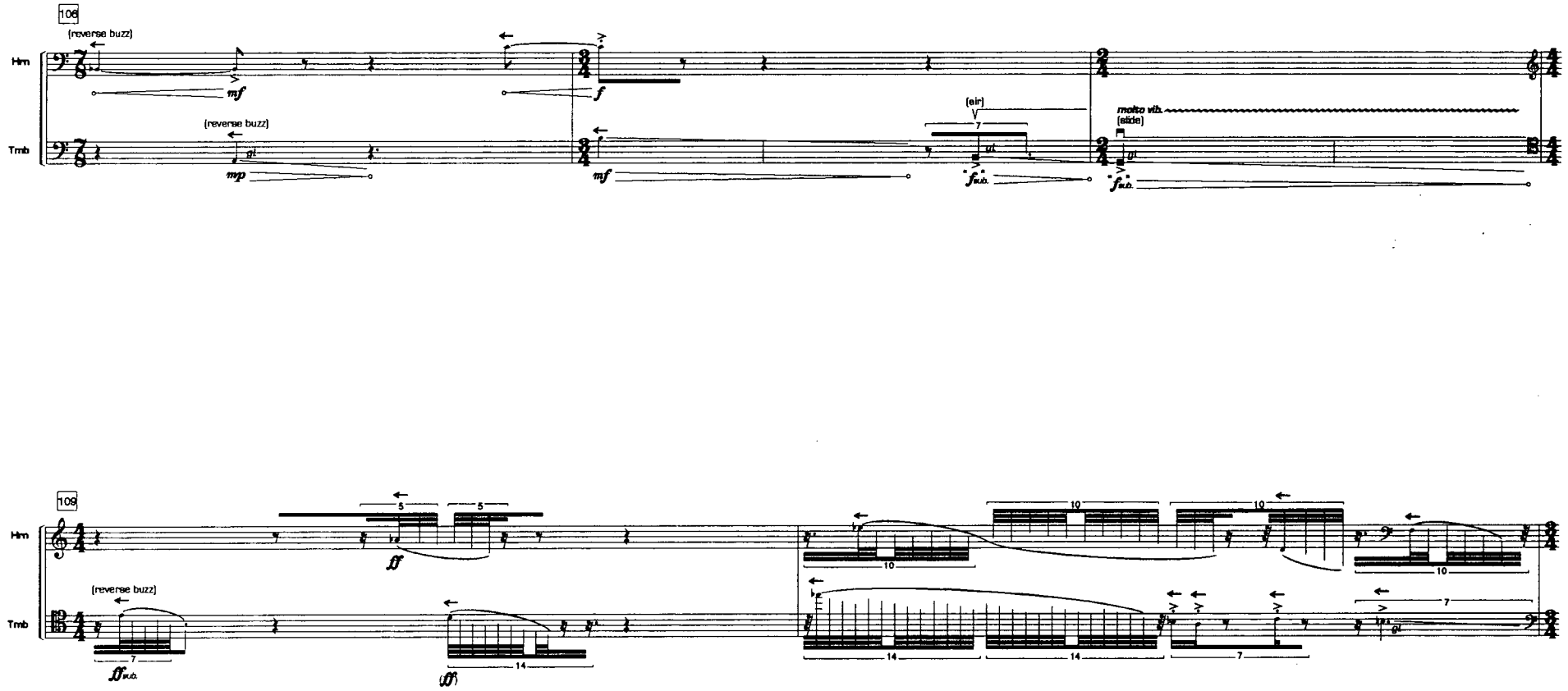

93
Pic
Cl
Bsn
Hrn
Tmb
mp
fp
Pno
inside piano
scrape string slowly with thumbnail
ord.
(cluster)
[take 2 thin brass mallets]
pp
(no Ped.)
(Sos.)
93
(muted)
Vln
Vc
Cb
mp

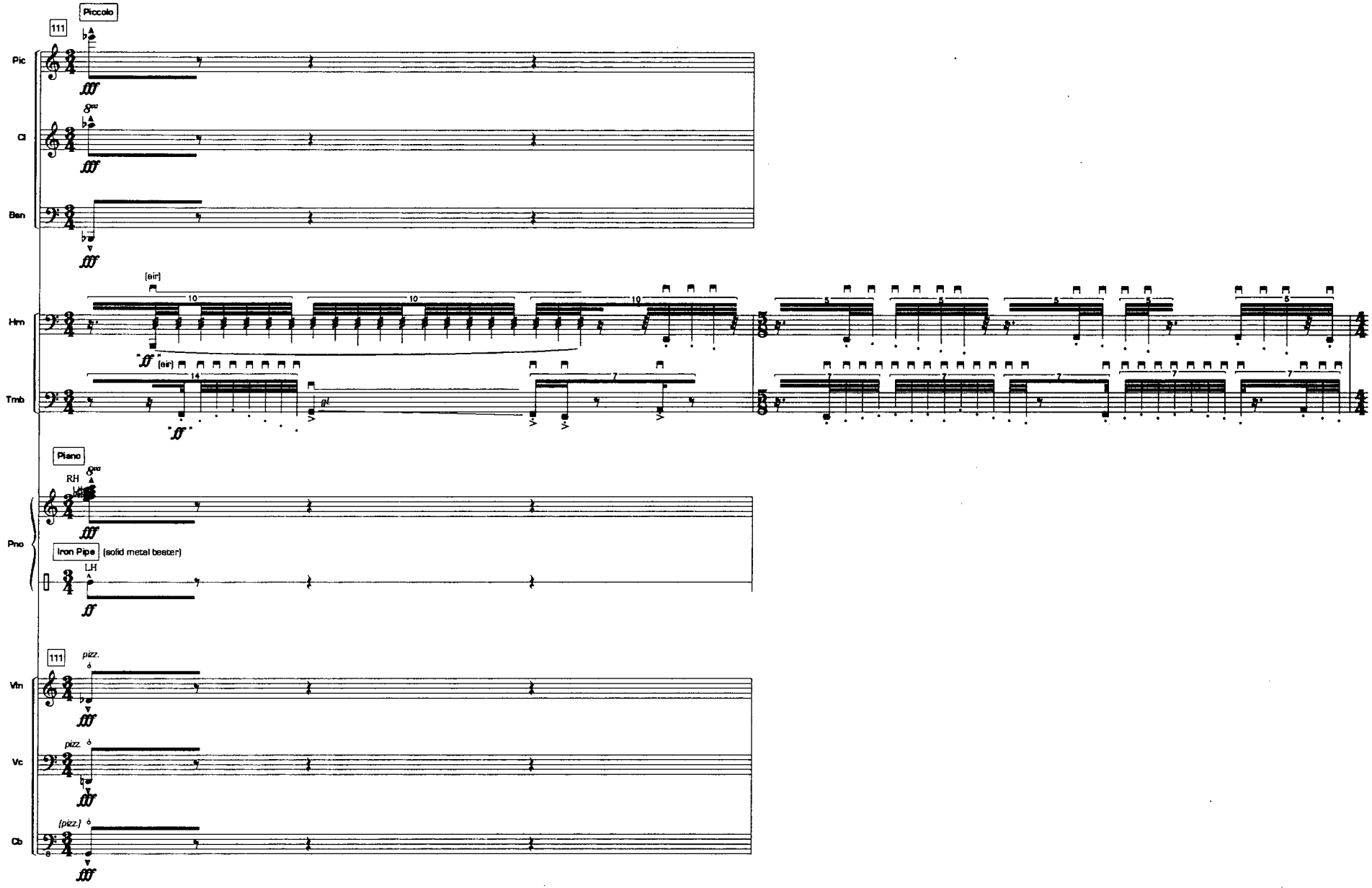

96
Pic
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
Flute
pizz.
ff
pp sub.
Crotales
(2 thin brass mallets) *
f
l.v.
Bongos
ff
pp
* hold both mallets in one hand; position the two mallets such that the crotale is between them
(Sos.)
96
pp
pp
pp

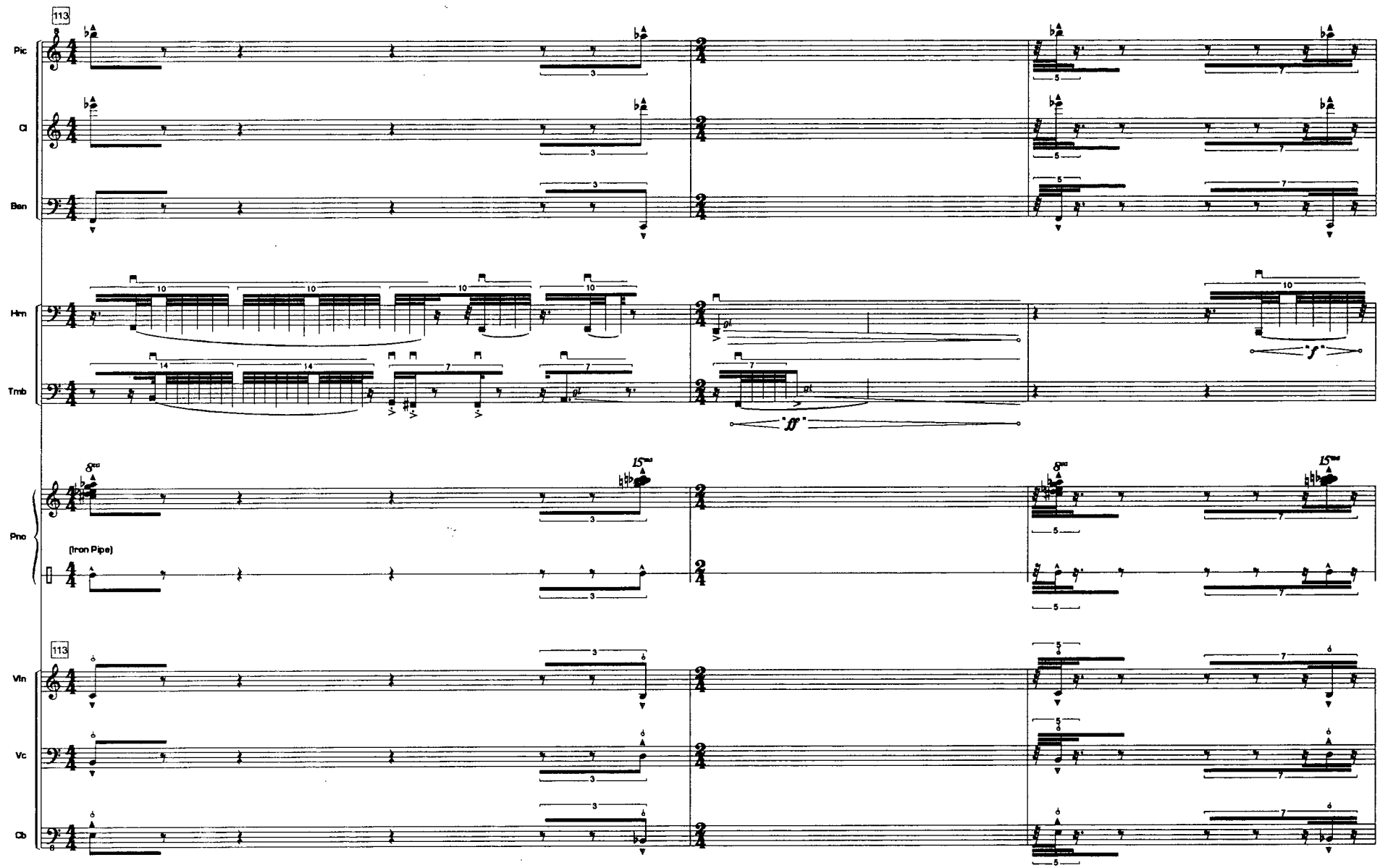

98
Fl
Cl
Bsn
Hrn
Tmb
Pno
[Crotales]
(Bongos)
98
Vln
Vc
Cb
pizz.
sim.
l.v.

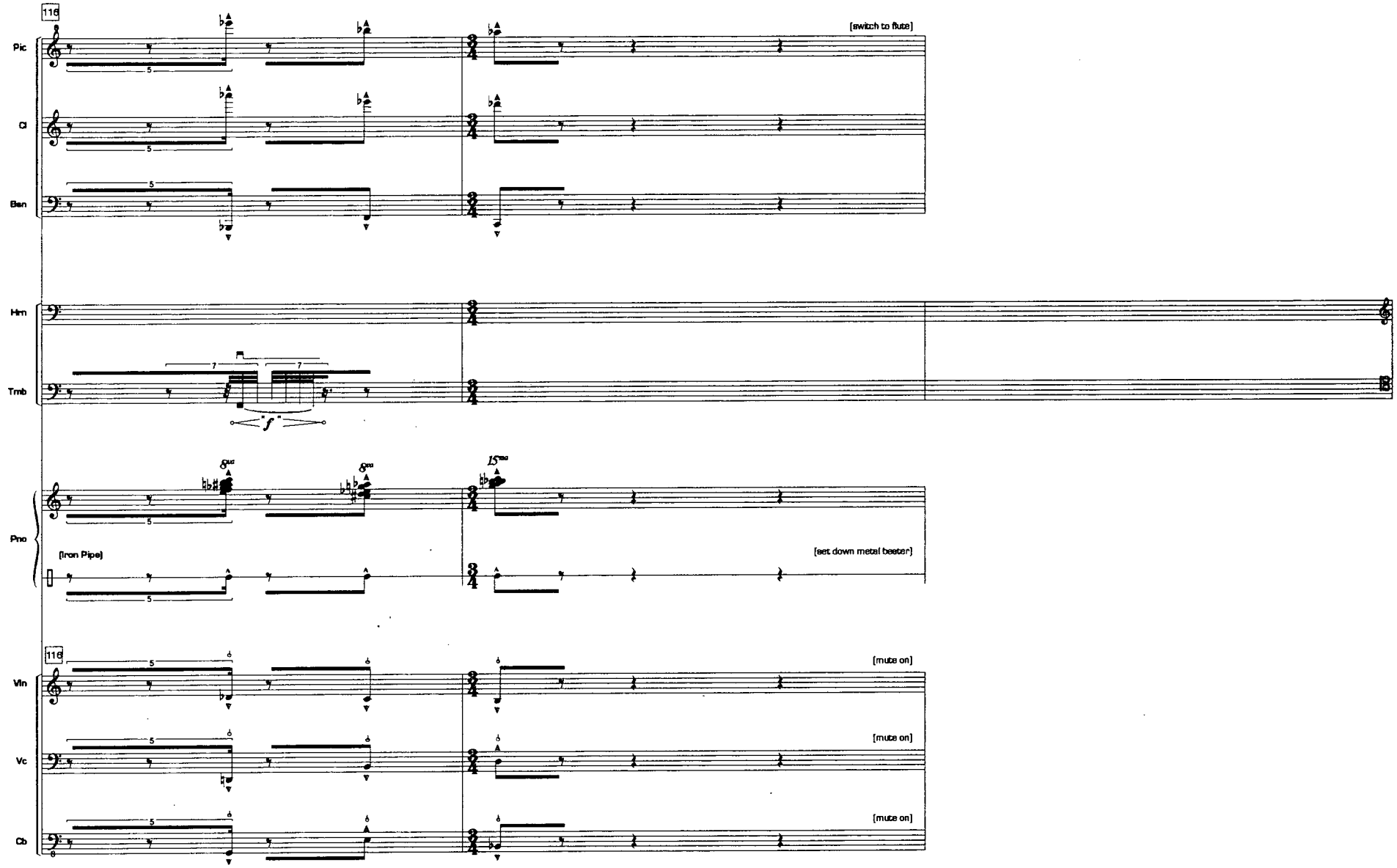

100
Fl
Cl
Bsn
Hrn
Tmb
[set down brass mallets]
Pno
(Bongos)
100
Vln
Vc
Cb
[solo]

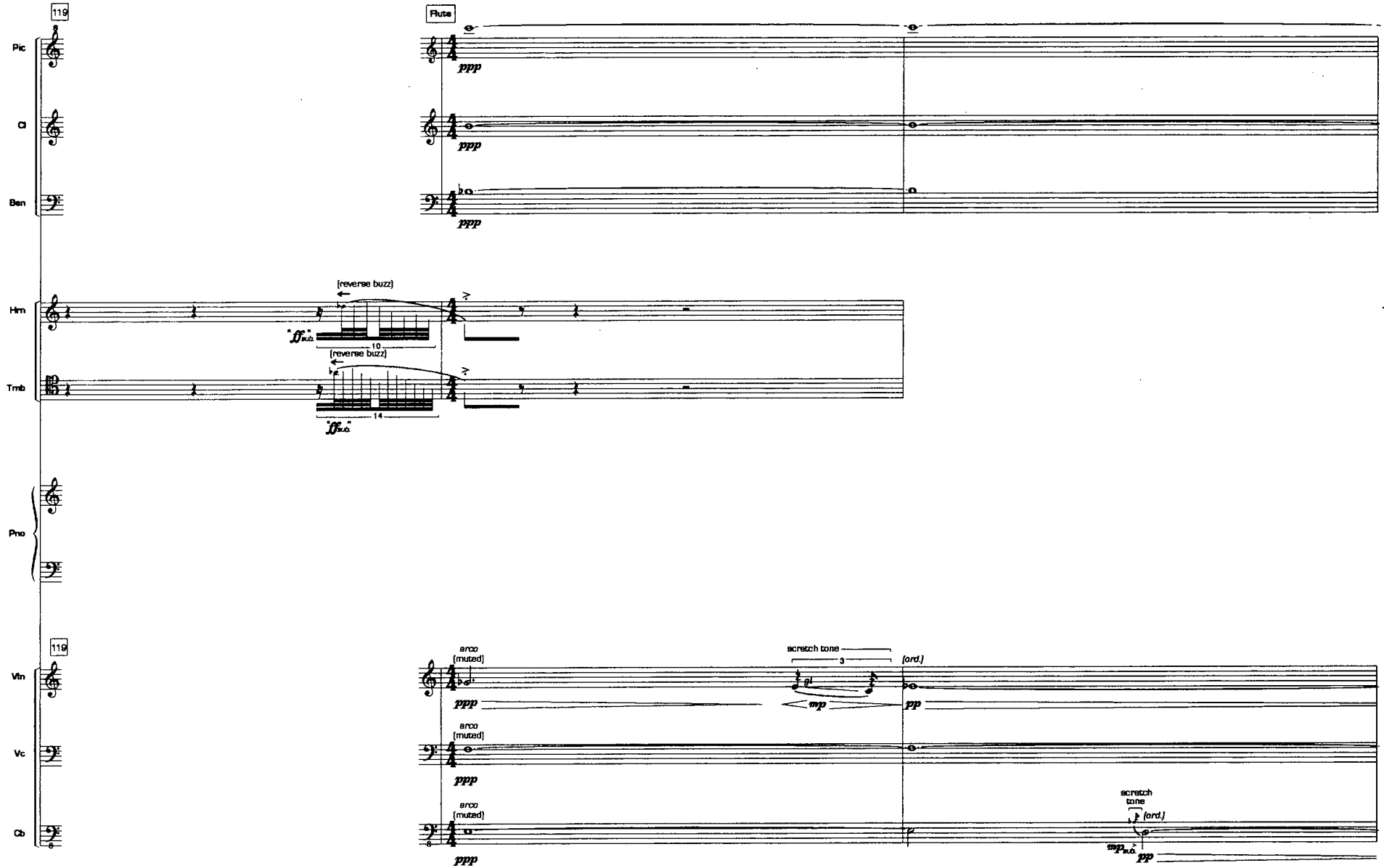

103
Fl
Cl
Bsn
ff sub.
14
[switch to piccolo]
[solo]
(reverse buzz) *
pp
* = draw air in, maintaining usual embouchure as much as possible
[air]
(V)
10
ff
("ff")
Hrn
Tmb
Pno
(Bongos)
ff sub.
7
[take solid metal beater]
103
Vln
Vc
Cb
[mute off]
[mute off]
[solo]
pizz.
5
gl
pppp
mp < mf
f
ff
[mute off]

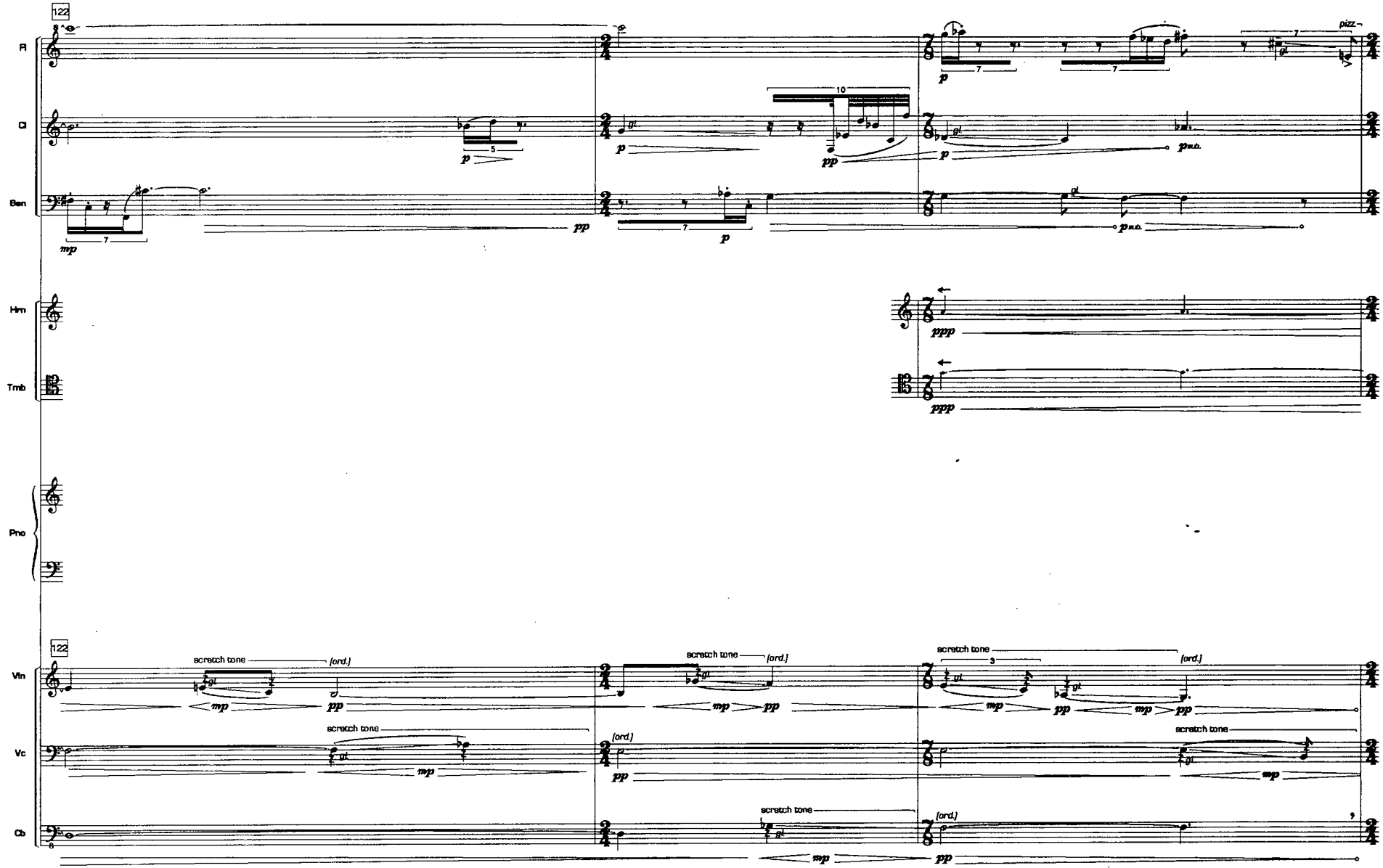

106
(reverse buzz)
Hrn
Tmb
mf
f
(reverse buzz)
mp
mf
(air)
molto vib.
(slide)
109
(reverse buzz)
ff
fff

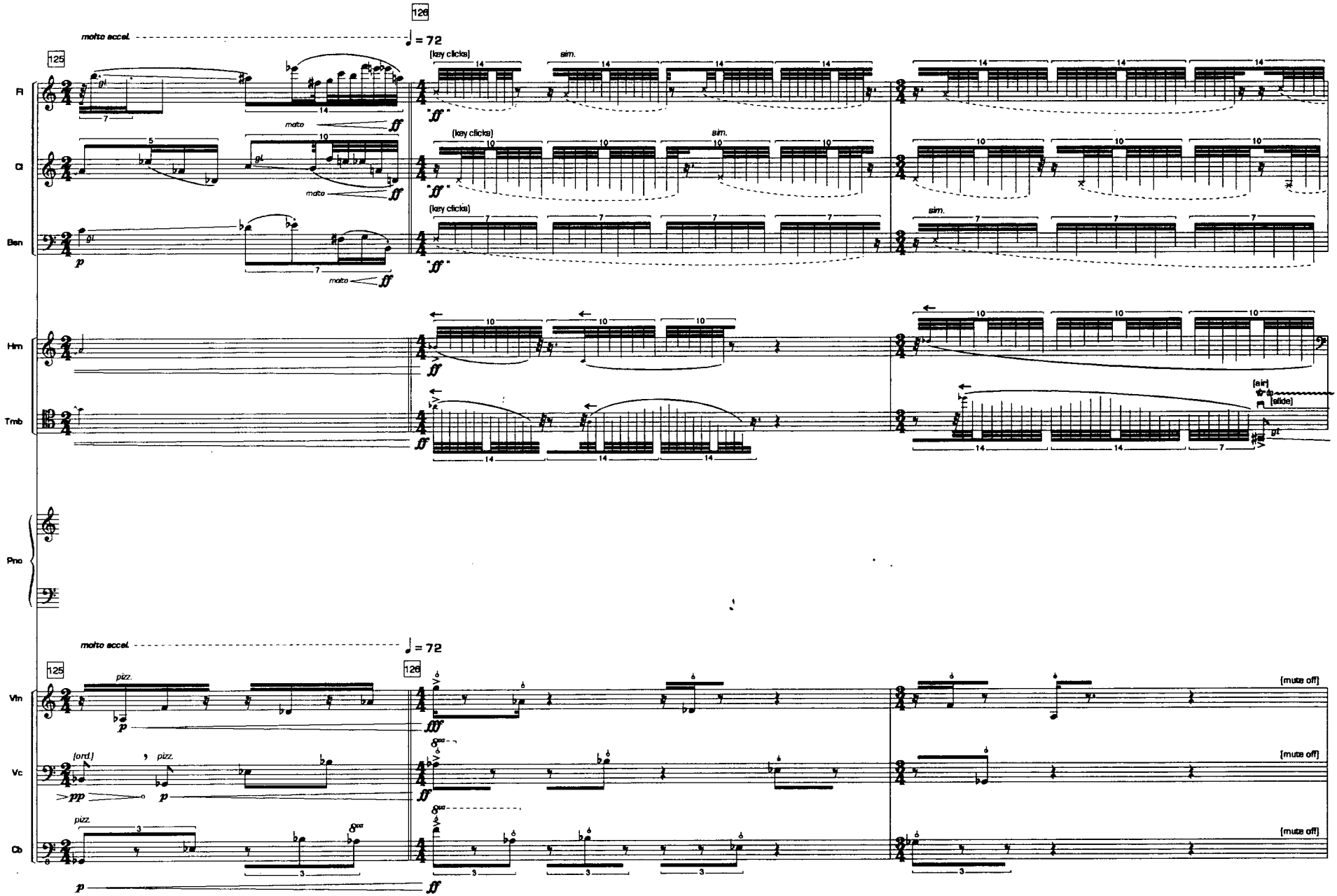

Piccolo
111
Pic
Cl
Bsn
[air]
Hrn
"ff" [air]
Tmb
Piano
RH
Pno
Iron Pipe (solid metal beater)
LH
111
pizz.
Vln
pizz.
Vc
[pizz.]
Cb

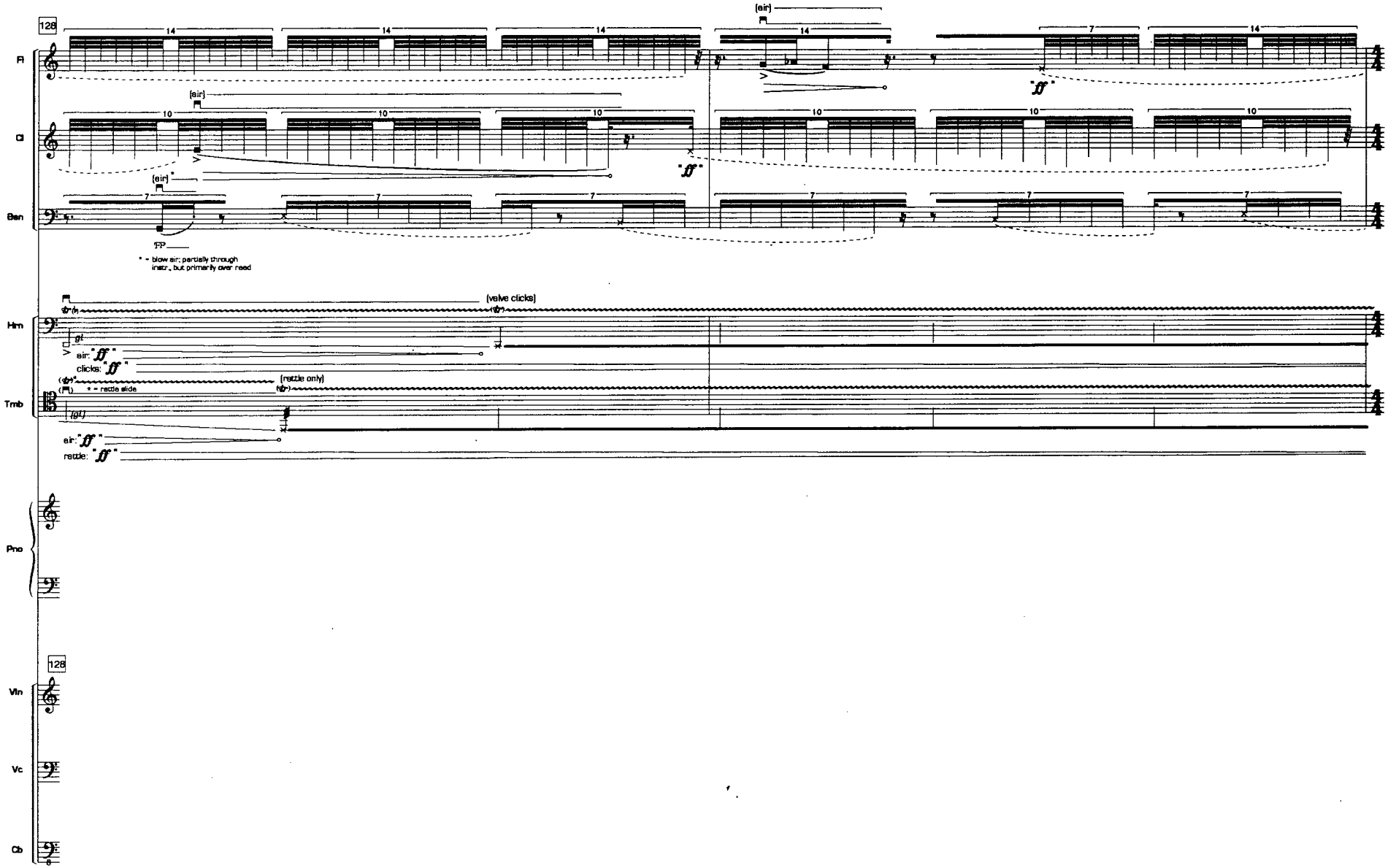

113
Pic
Cl
Bsn
Hrn
Tmb
Pno
(Iron Pipe)
113
Vln
Vc
Cb

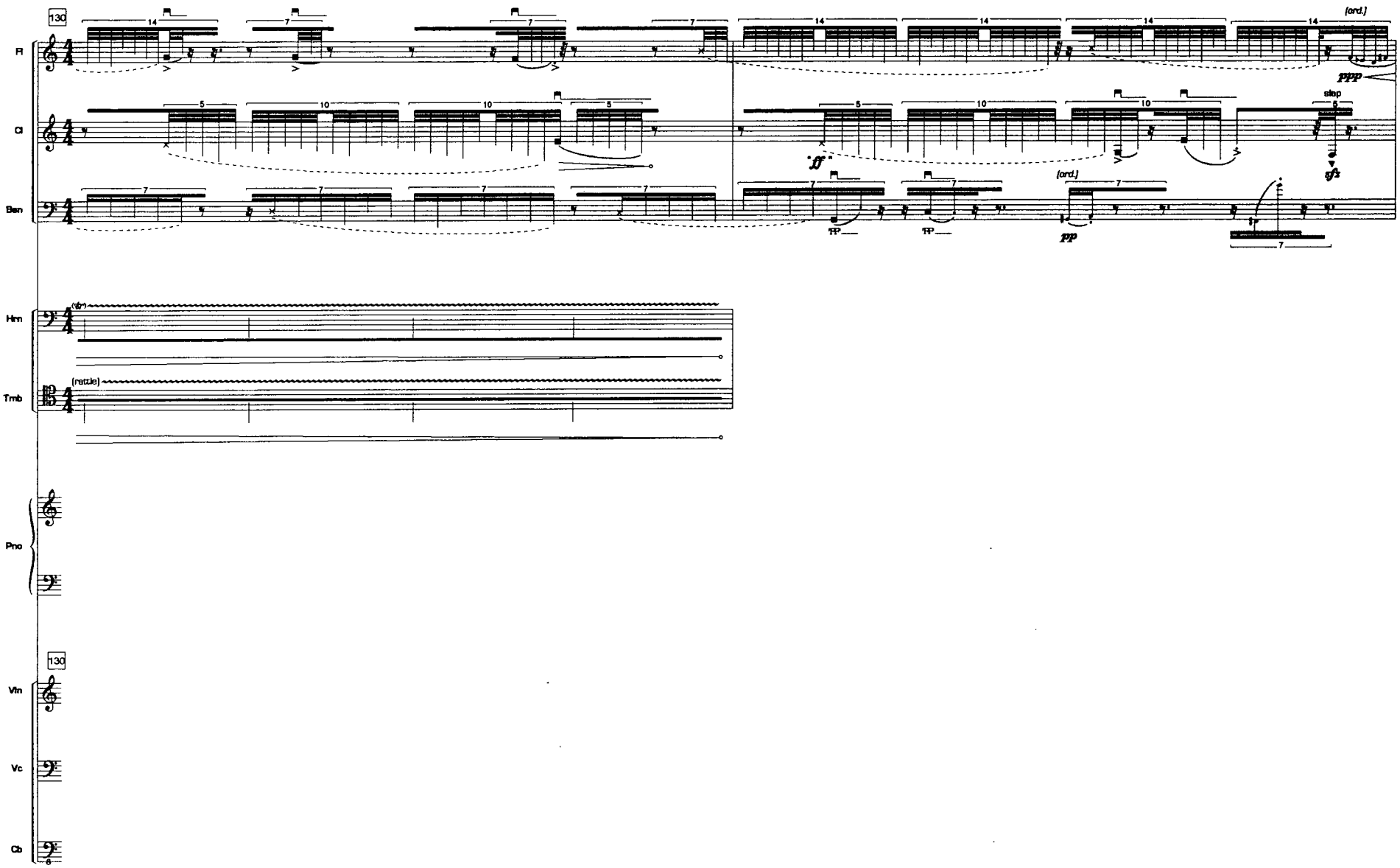

116
Pic
Cl
Bsn
[switch to flute]
Hrn
Tmb
"f"
Pno
(Iron Pipe)
[set down metal beater]
116
Vln
Vc
Cb
[mute on]
[mute on]
[mute on]

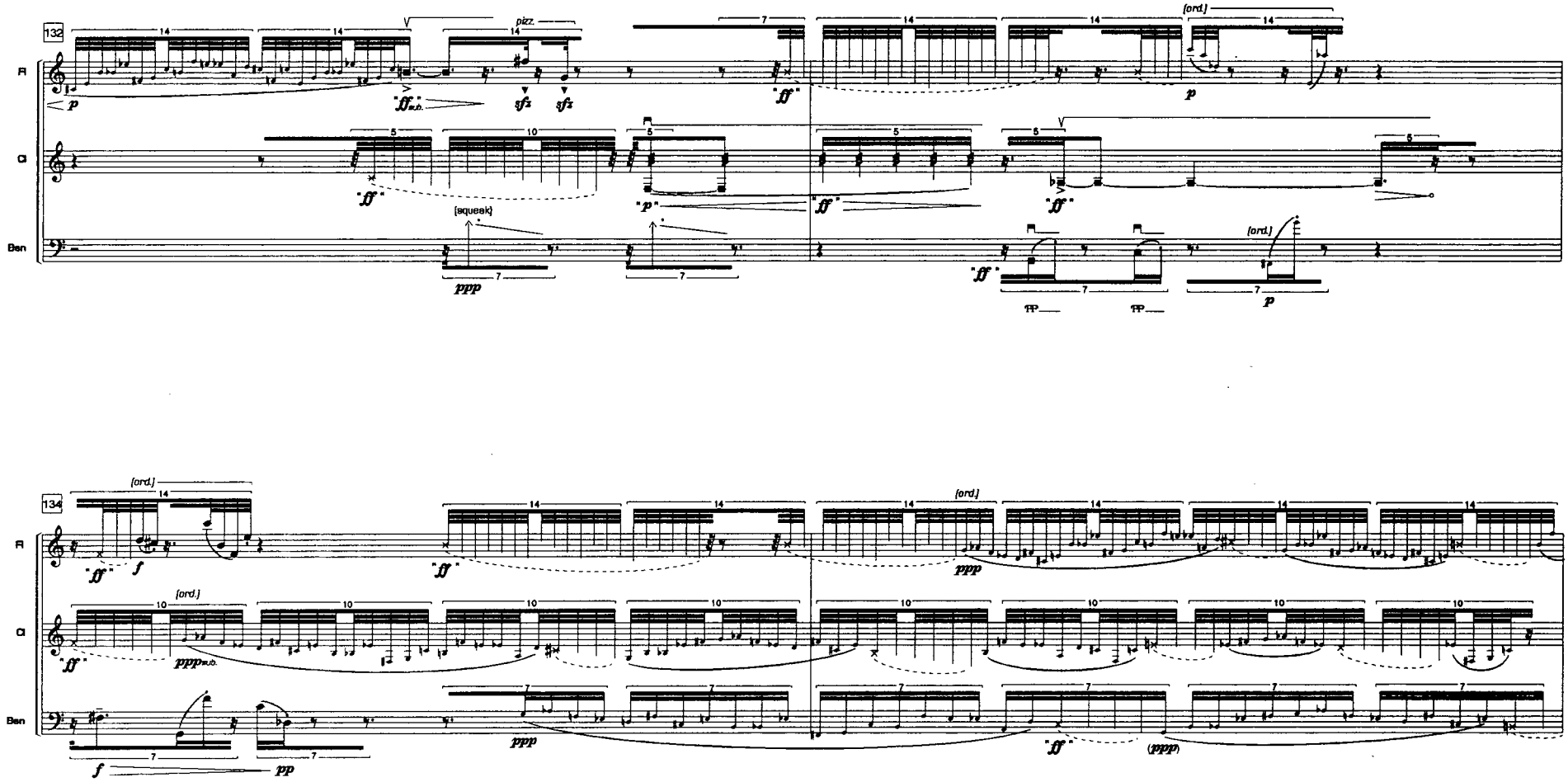

119
Flute
Pic
Cl
Ben
ppp
ppp
ppp
[reverse buzz]
Hrn
Tmb
"ff sub."
10
[reverse buzz]
14
"ff sub."
Pno
119
Vln
Vc
Cb
arco
[muted]
ppp
scratch tone
3
mp
[ord.]
pp
arco
[muted]
ppp
arco
[muted]
ppp
scratch
tone
[ord.]
mp sub.
pp

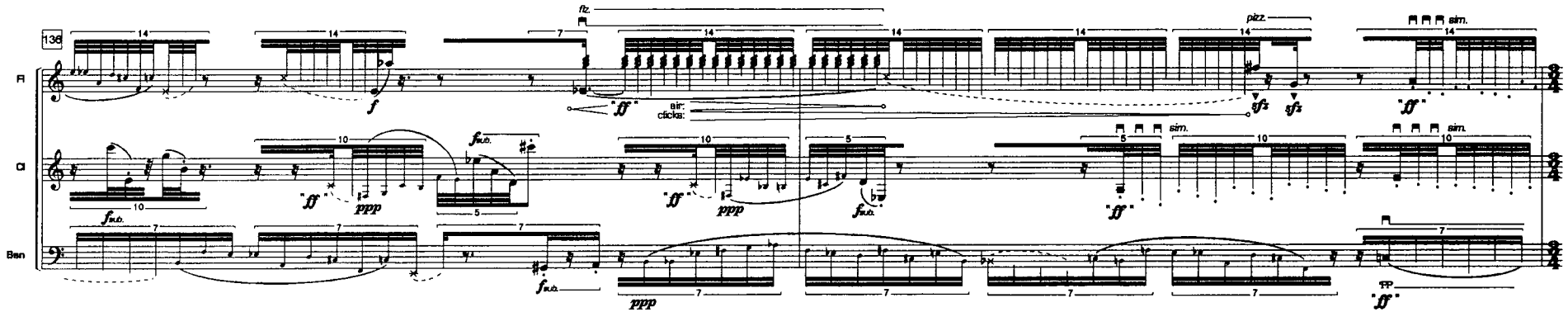

122
Fl
Cl
Bsn
Hrn
Tmb
Pno
122
Vln
Vc
Cb
pizz.
scratch tone
(ord.)

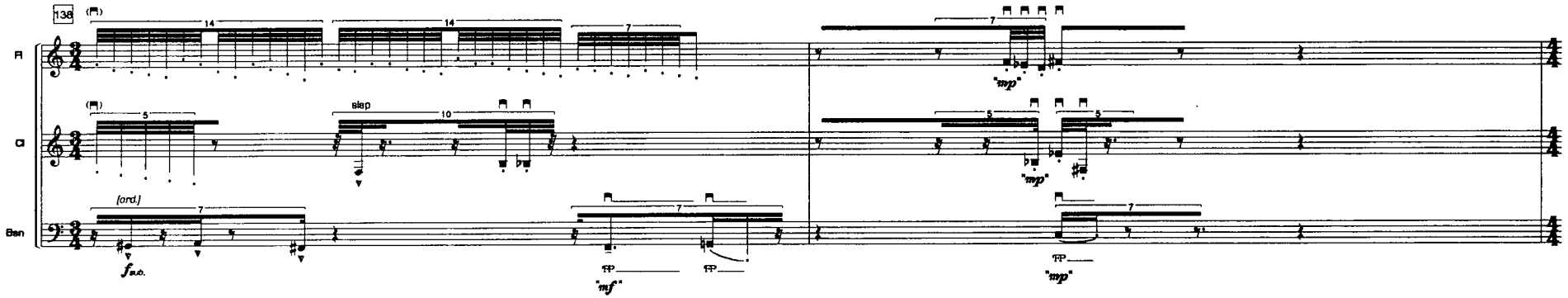

molto accel.
= 72
125
126
Fl
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
[key clicks]
sim.
mato
pizz.
[ord.]
[muta off]
[air]
[slide]

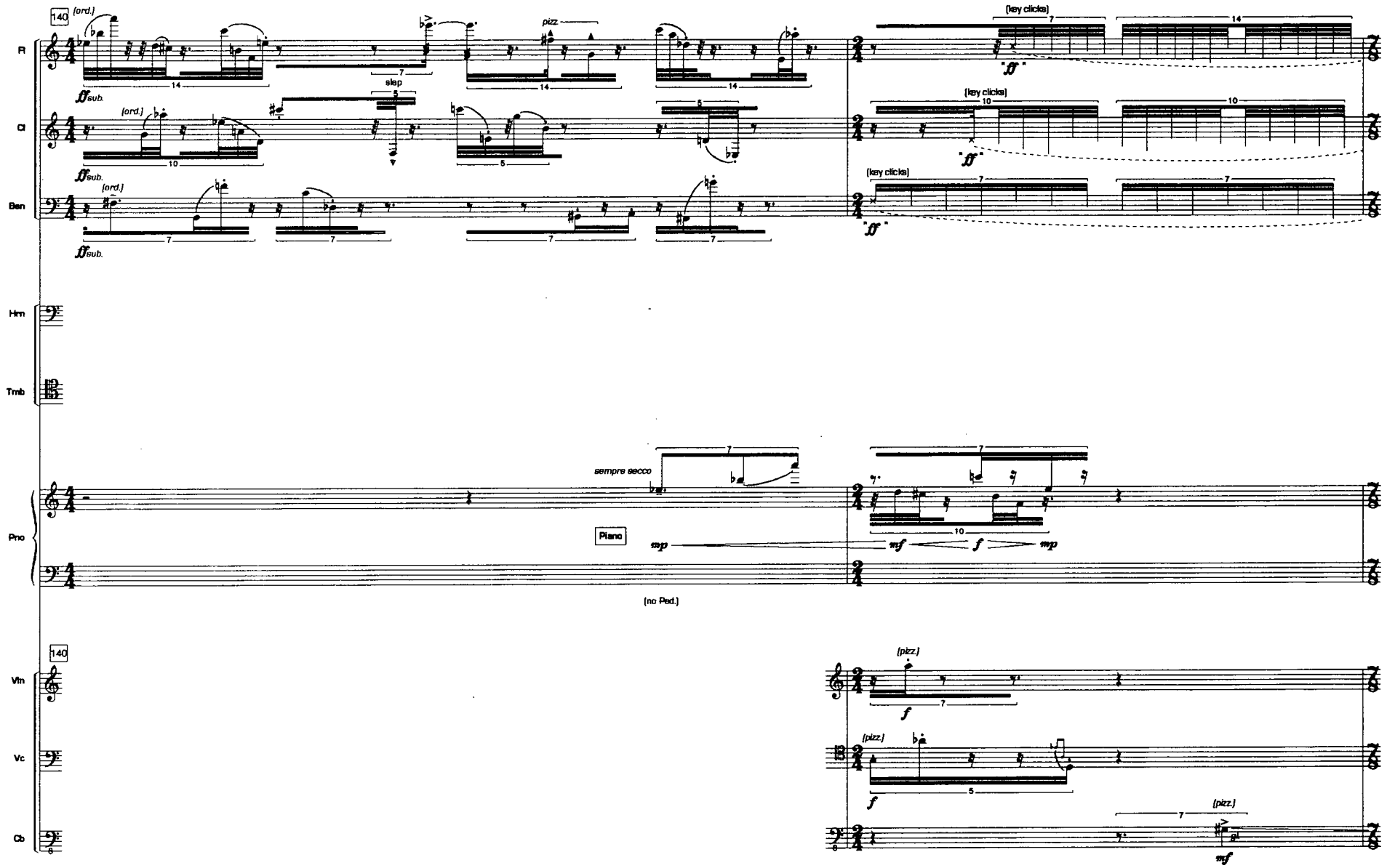

128
Fl
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
[air]
[valve clicks]
[rattle only]
air: "ff"
clicks: "ff"
rattle: "ff"
"ff"
ppp
* = blow air; partially through instr., but primarily over reed
* = rattle slide

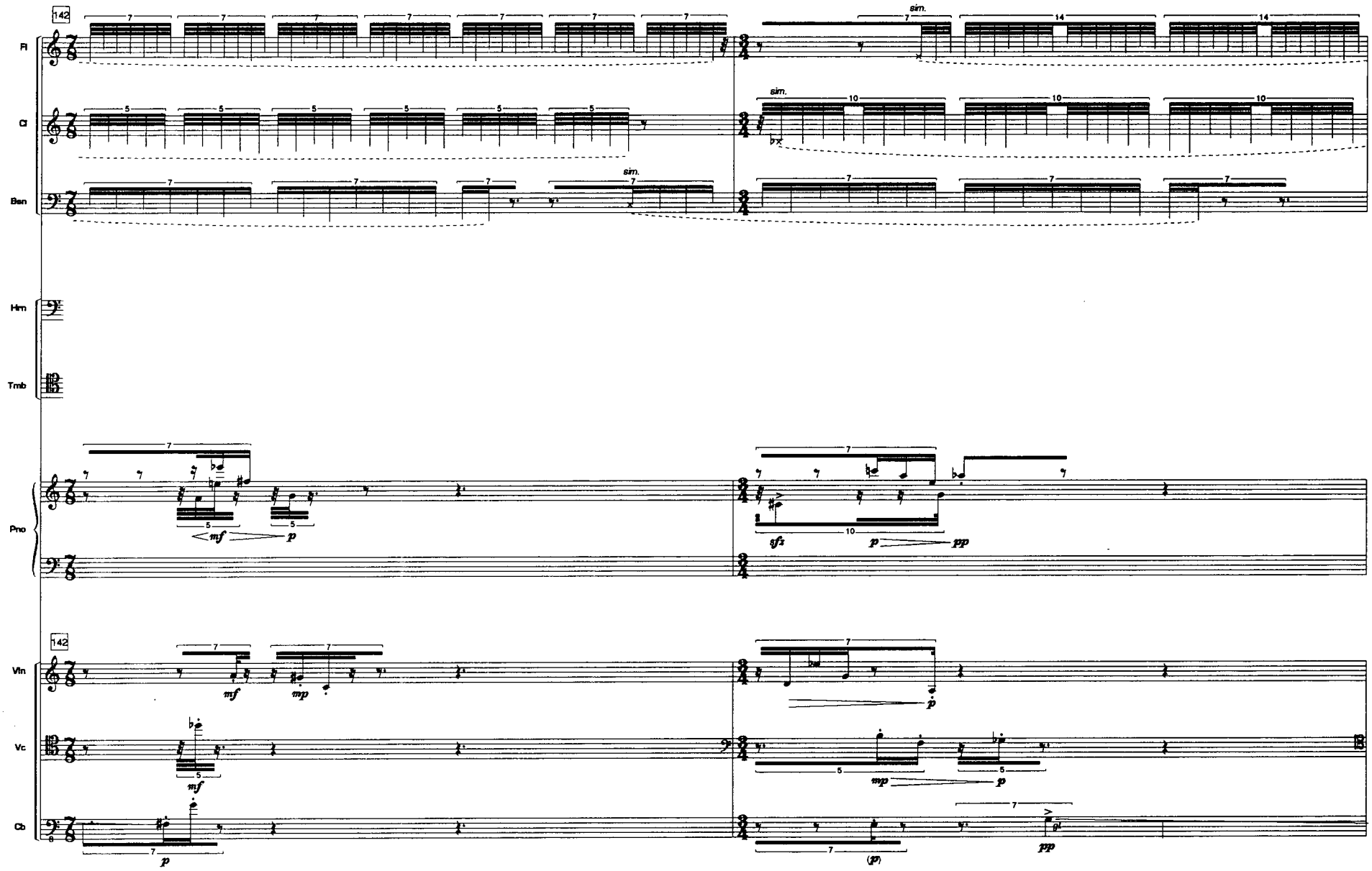

130
Fl
Cl
Bsn
Hrn
Tmb
(rattle)
Pno
130
Vln
Vc
Cb
[ord.]
pppp
slap
sfz
"ff"
[ord.]
pp

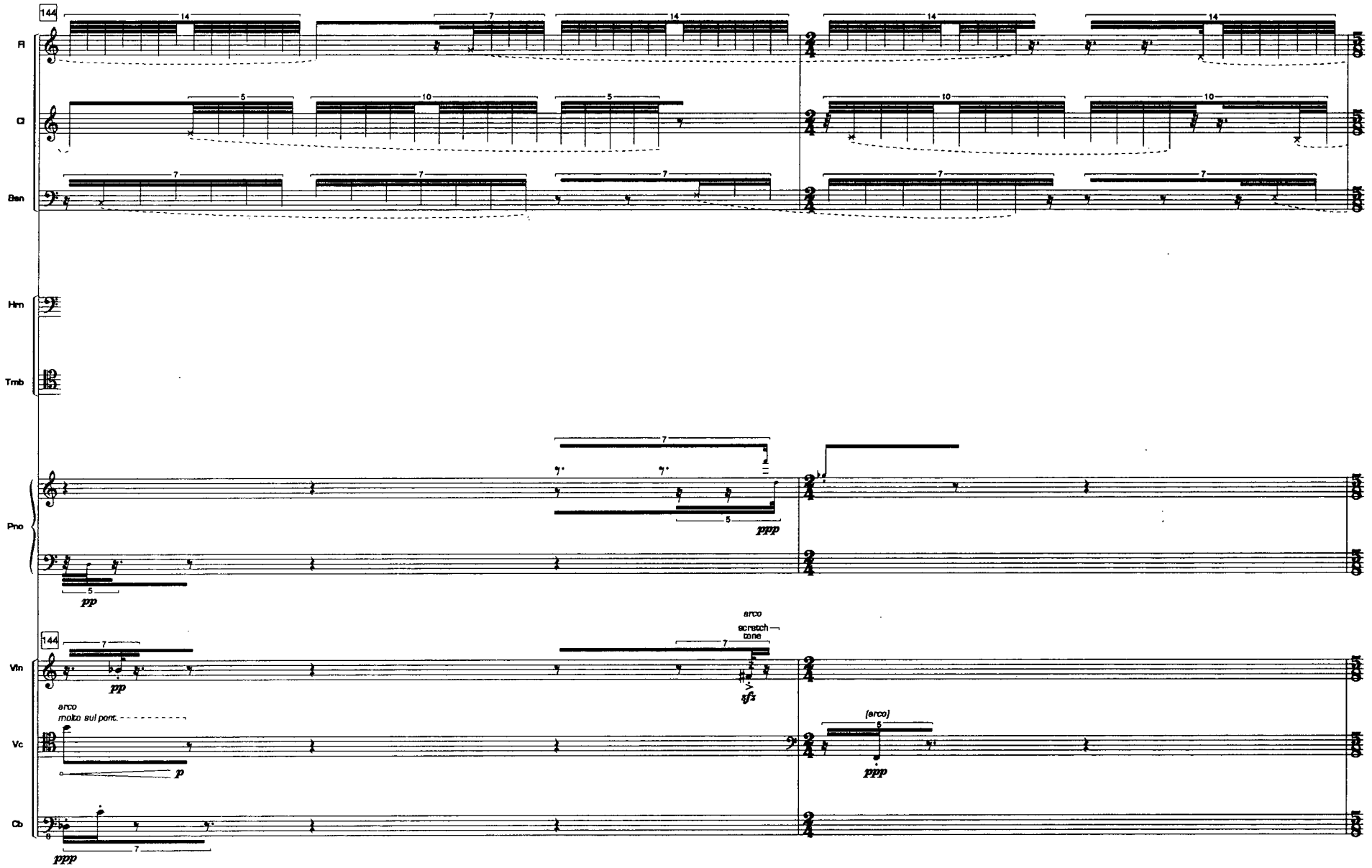

132
Fl
Cl
Bsn
pizz.
[ord.]
[squeak]
134

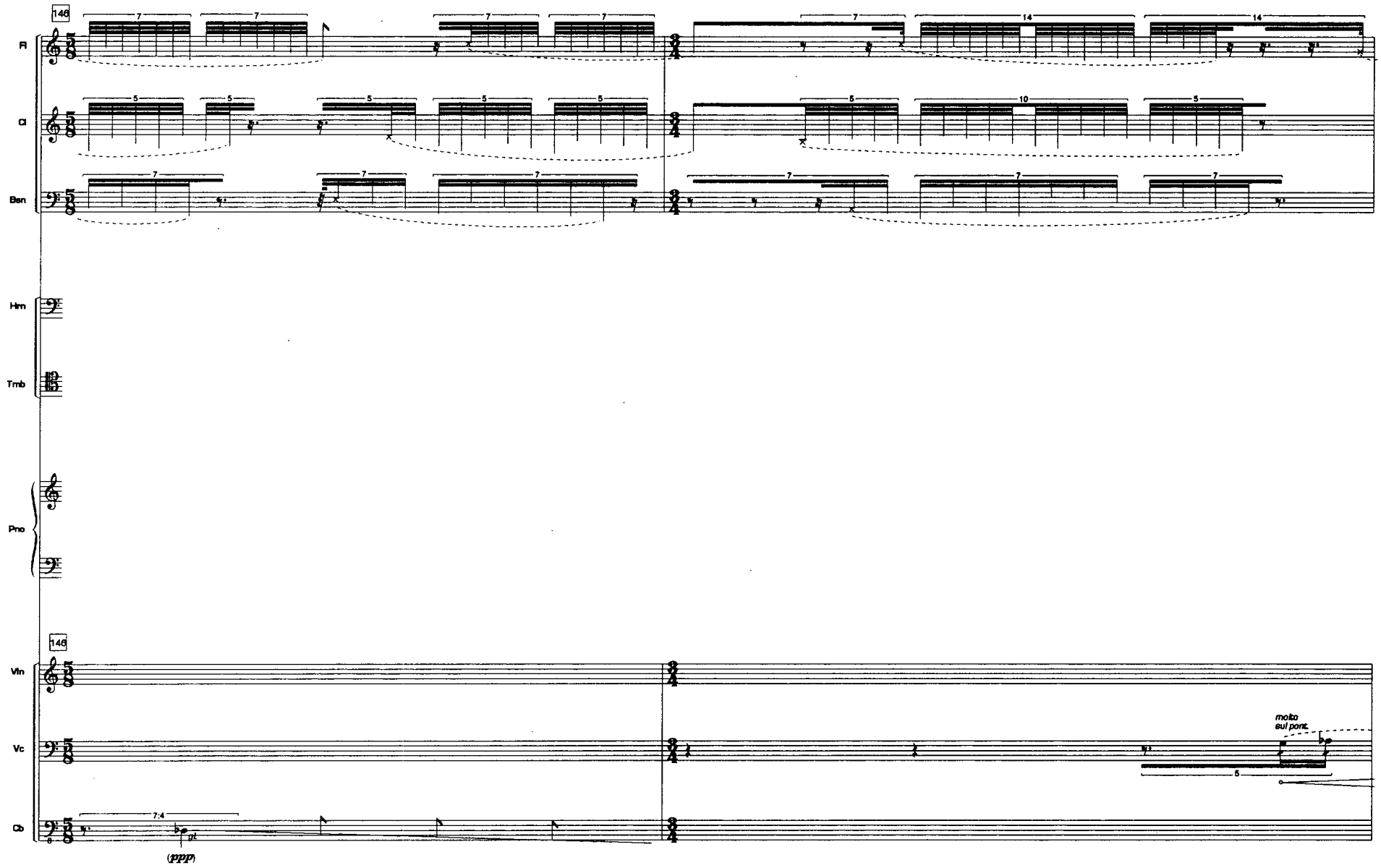

138
Fl
Cl
Bsn
flz.
air:
clicks:
pizz.
sim.
sim.
sim.
sim.

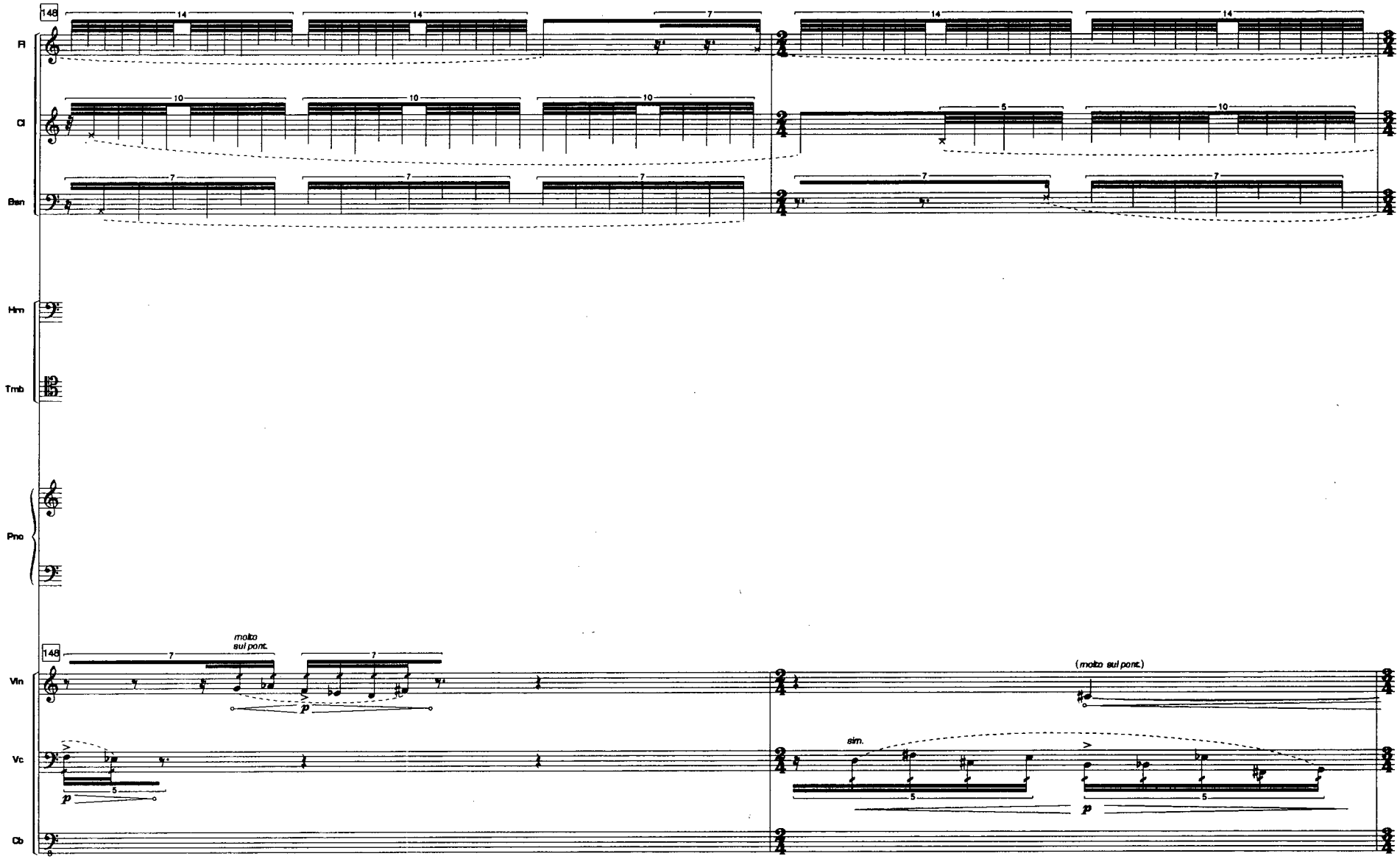

138
Fl
Cl
Bsn
slap
[ord.]


140
[ord.]
pizz.
slap
(key clicks)
Fl
Cl
Bsn
Hrn
Tmb
Pno
Piano
sempre secco
(no Ped.)
Vln
Vc
Cb
[pizz.]

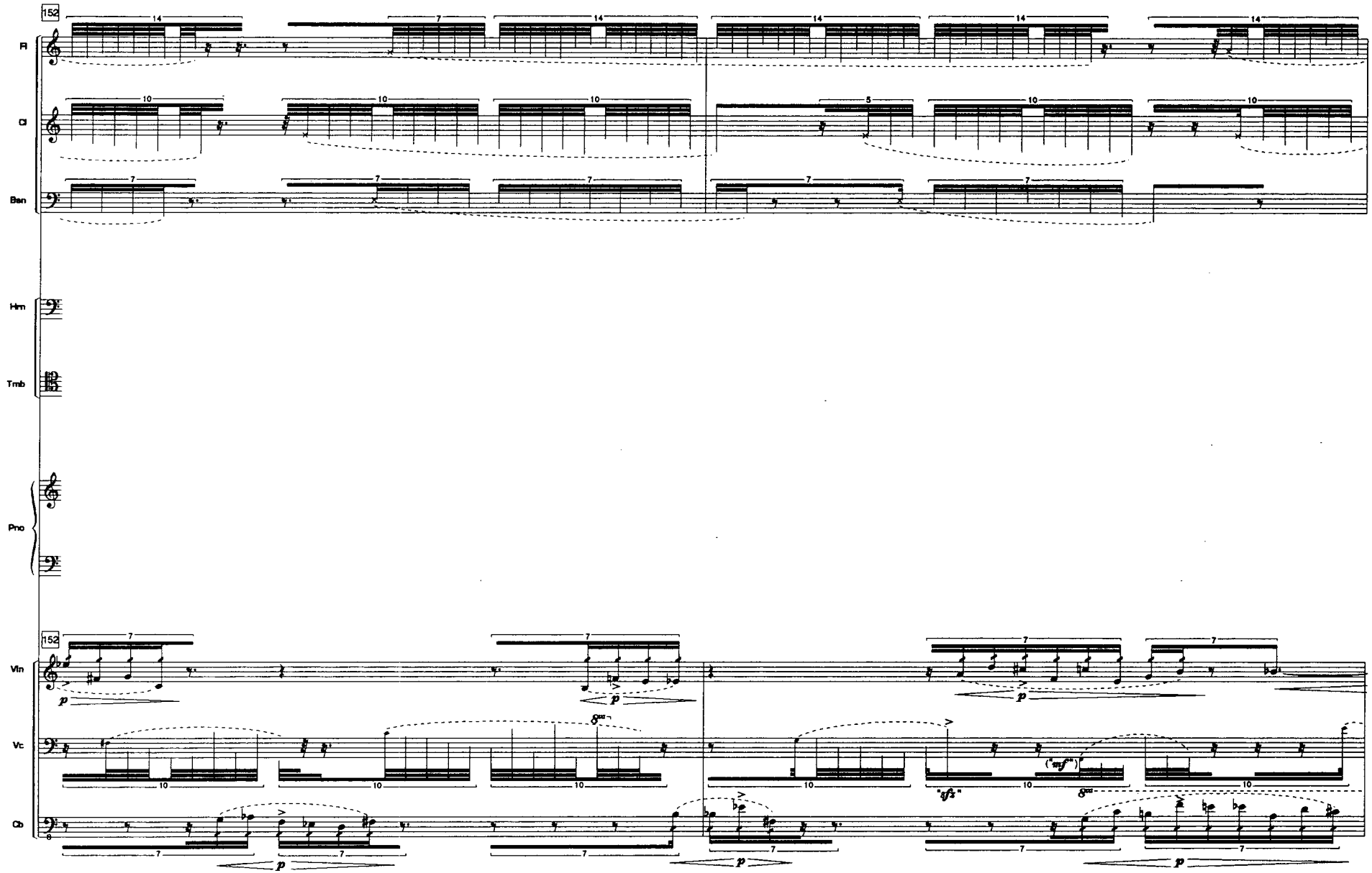

142
Fl
Cl
Bsn
sim.
Hrn
Tmb
Pno
mf
p
sfz
pp
Vln
Vc
Cb
mp
(p)


144
Fl
Cl
Bsn
Hrn
Tmb
Pno
pp
ppp
144
Vln
arco
scratch tone
sfz
arco
molto sul pont.
p
(arco)
ppp
Cb
ppp

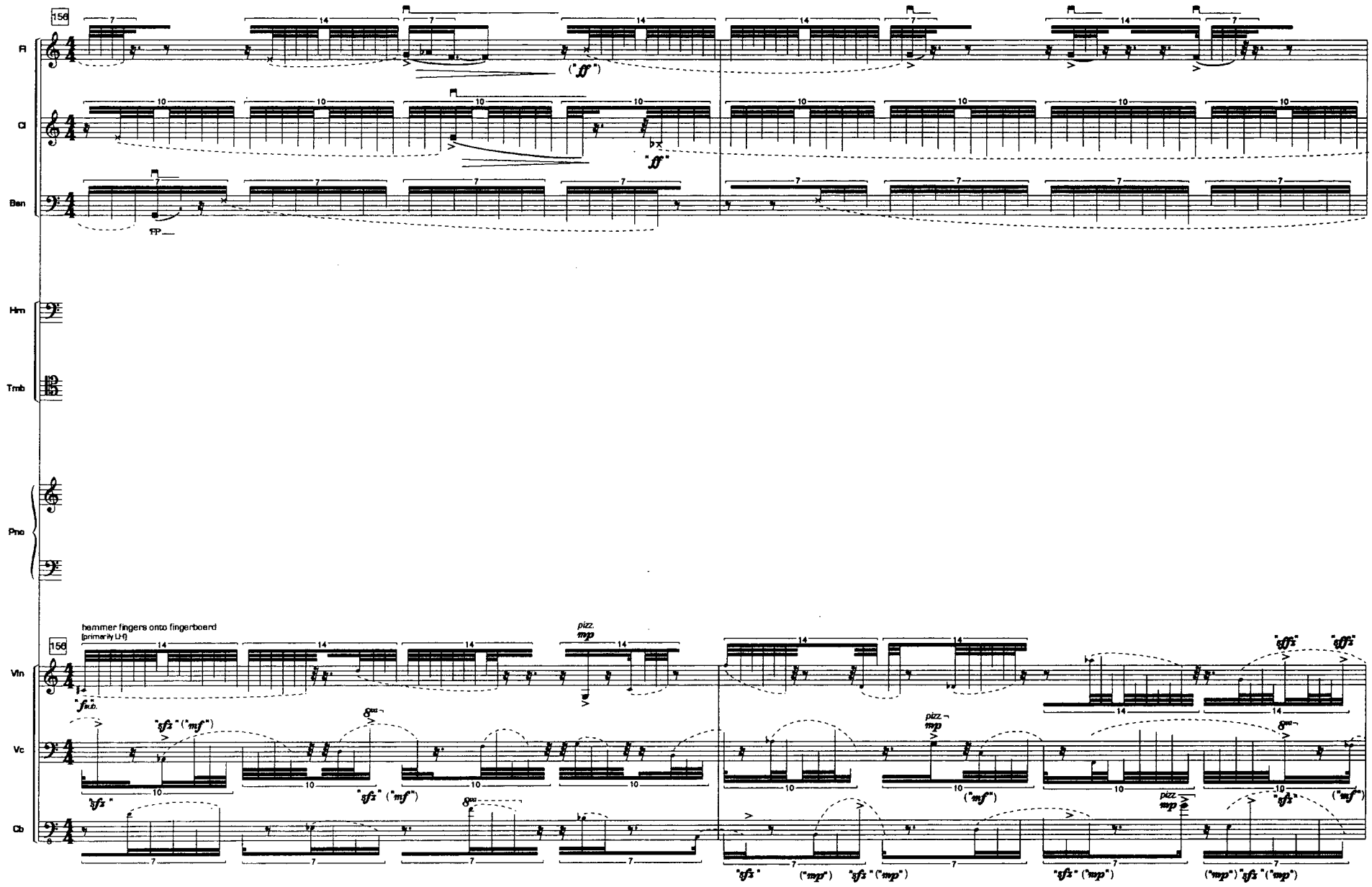

146
Fl
Cl
Bsn
Hrn
Tmb
Pno
146
Vln
Vc
Cb
7:4
(ppp)
molto
sul pont.

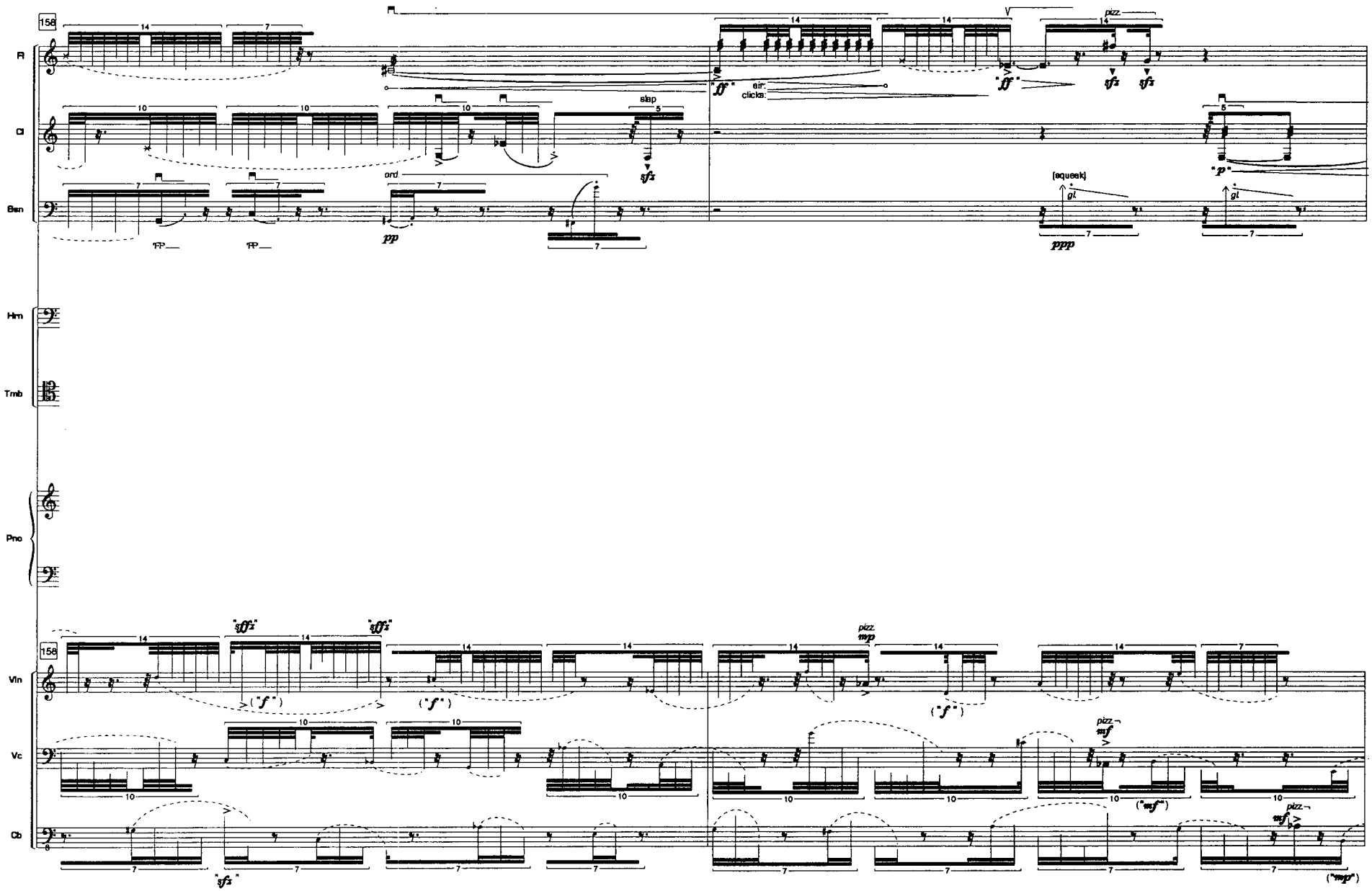

148
Fl
Cl
Bsn
Hrn
Tmb
Pno
148
Vln
Vc
Cb
molto sul pont.
(molto sul pont.)
sim.

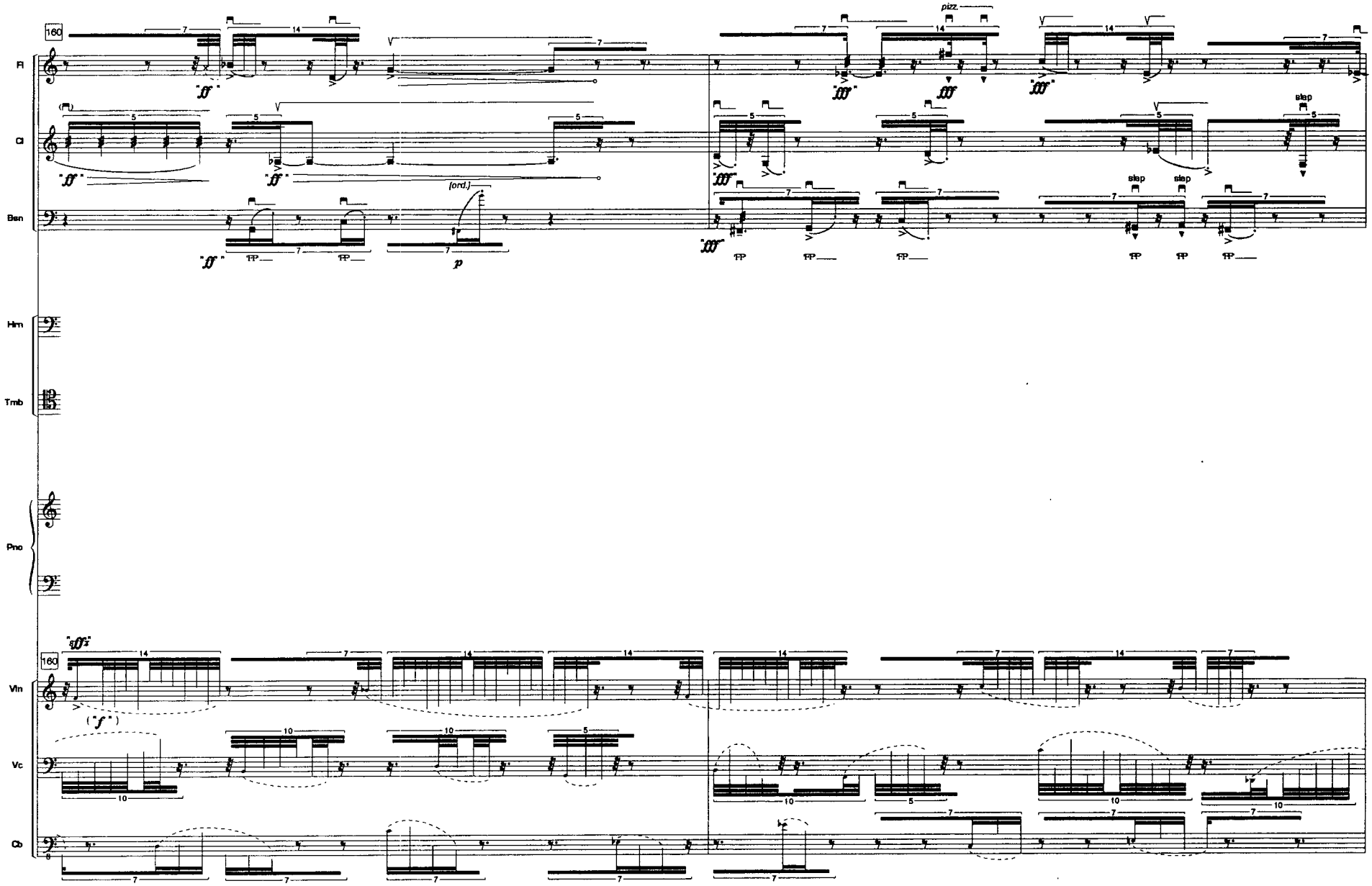

150
Fl
Cl
Bsn
Hrn
Tmb
Pno
150
Vln
Vc
Cb
mp
sim.
p
hammer fingers onto fingerboard
(primarily LH)
mf s.v.
molto
sul pont.
arco
sim.

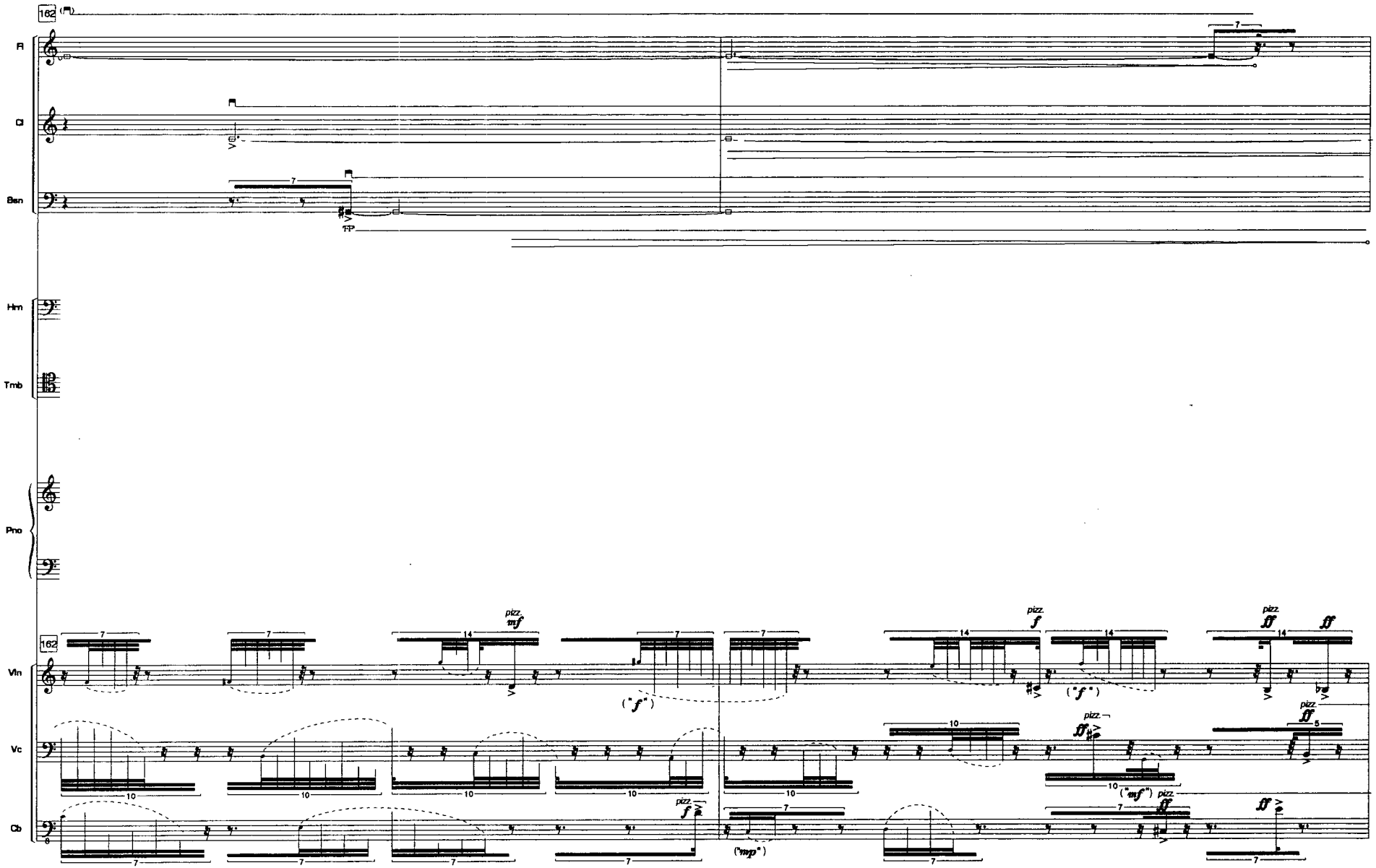

152
Fl
Cl
Bsn
Hrn
Tmb
Pno
152
Vln
Vc
Cb
p
"sfz"
("mf")

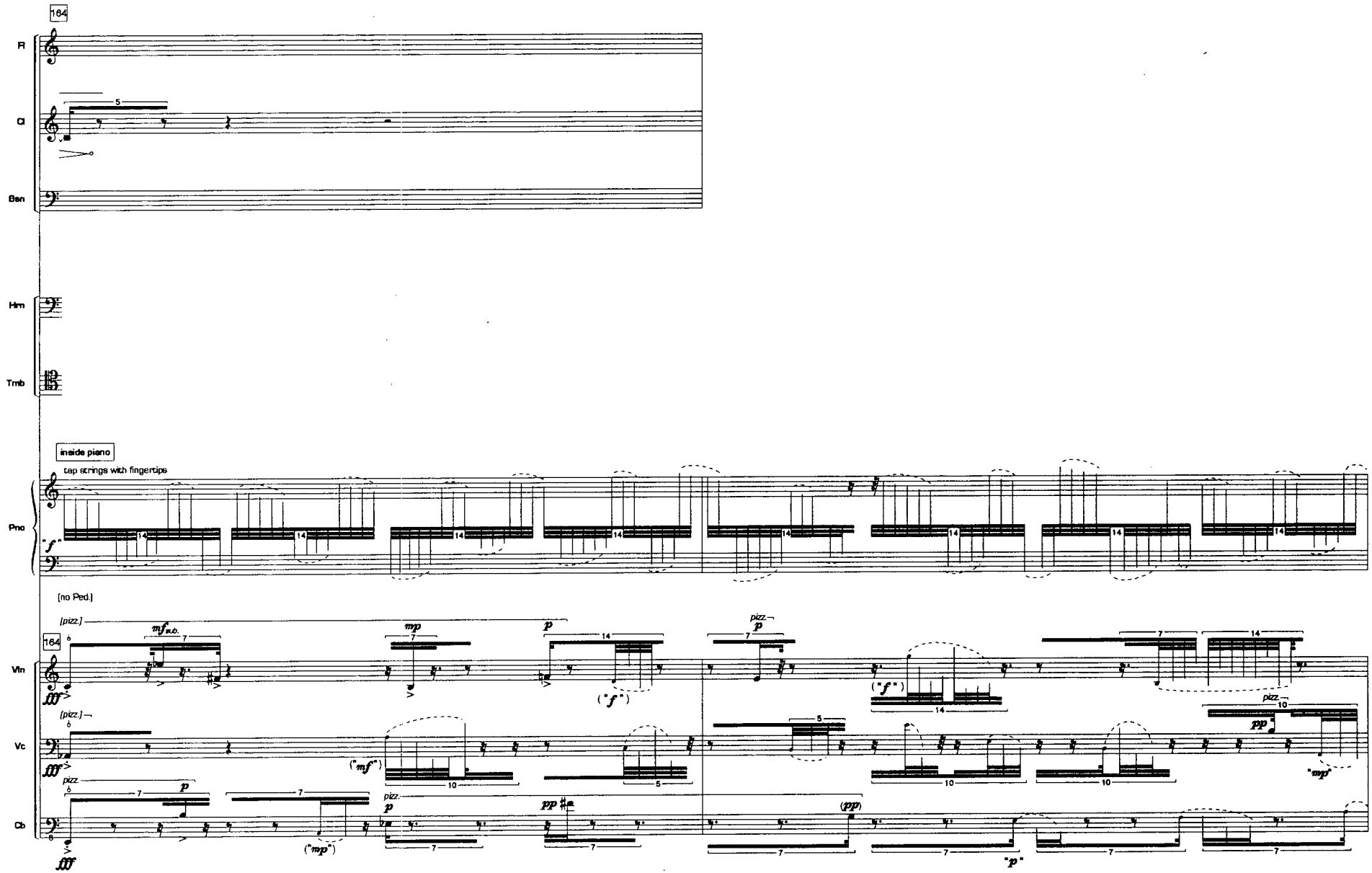

154
Fl
Cl
Bsn
Hrn
Tmb
Pno
154
Vln
Vc
Db
mp
mp
mp
p
"sfz"
("mf")
"sfz"
("mf")
"sfz" ("mp")
"mp" sub.
hammer fingers onto fingerboard
(primarily LH)

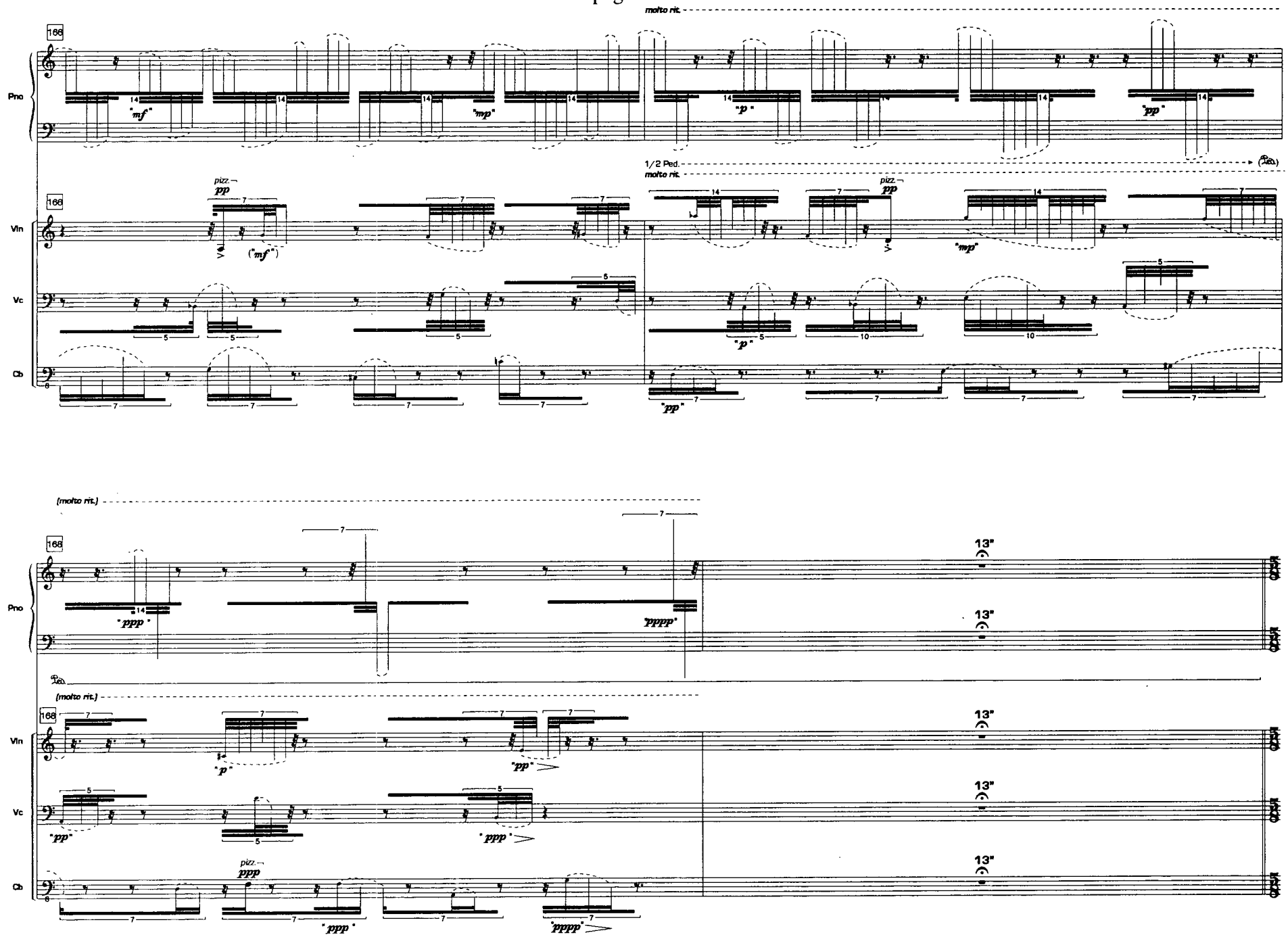

156
Fl
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
hammer fingers onto fingerboard
(primarily LH)
pizz.
mp

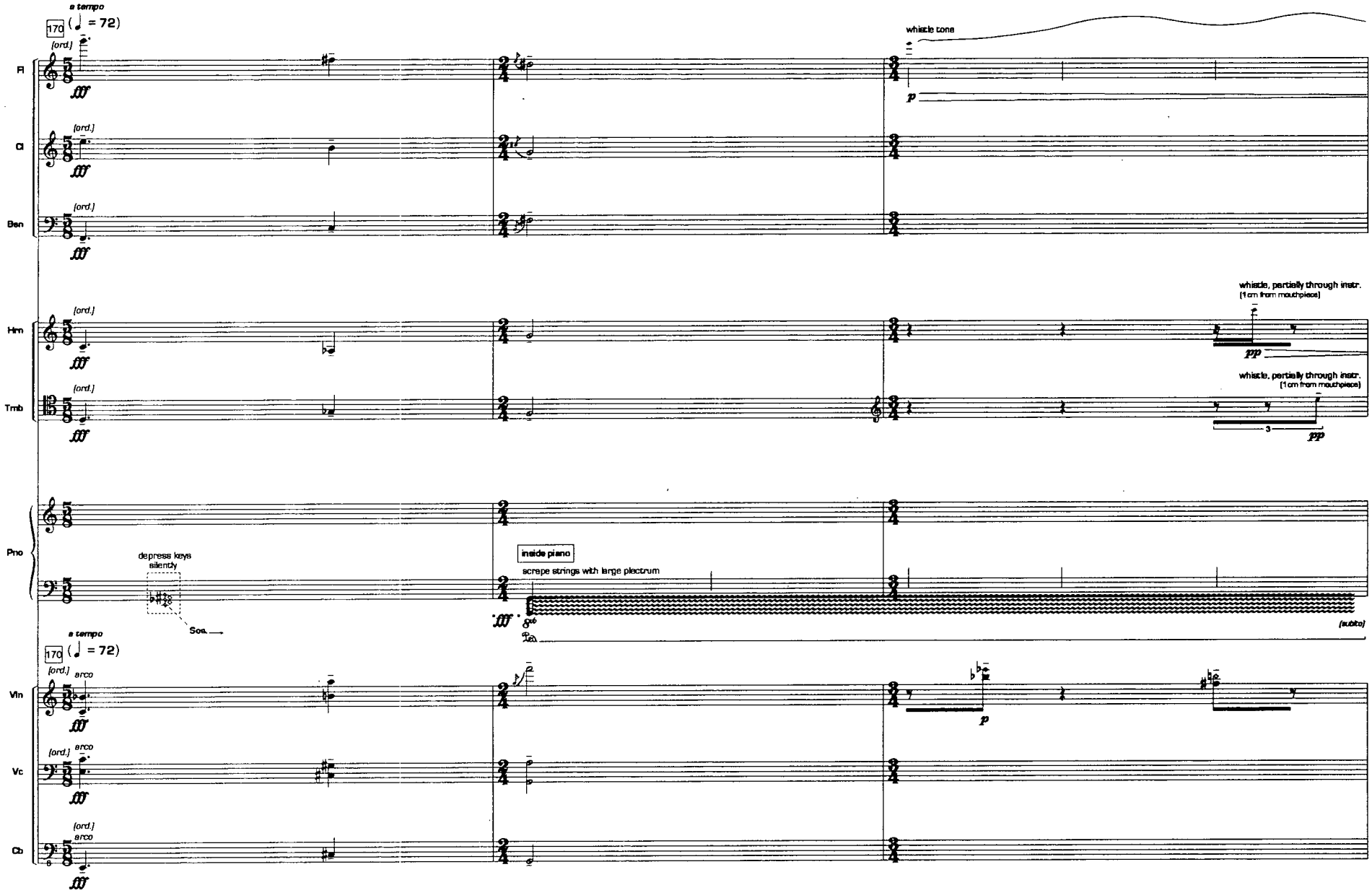

158
Fl
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
pizz.
slap
ord.
[squeak]
gli:
clicks:
158

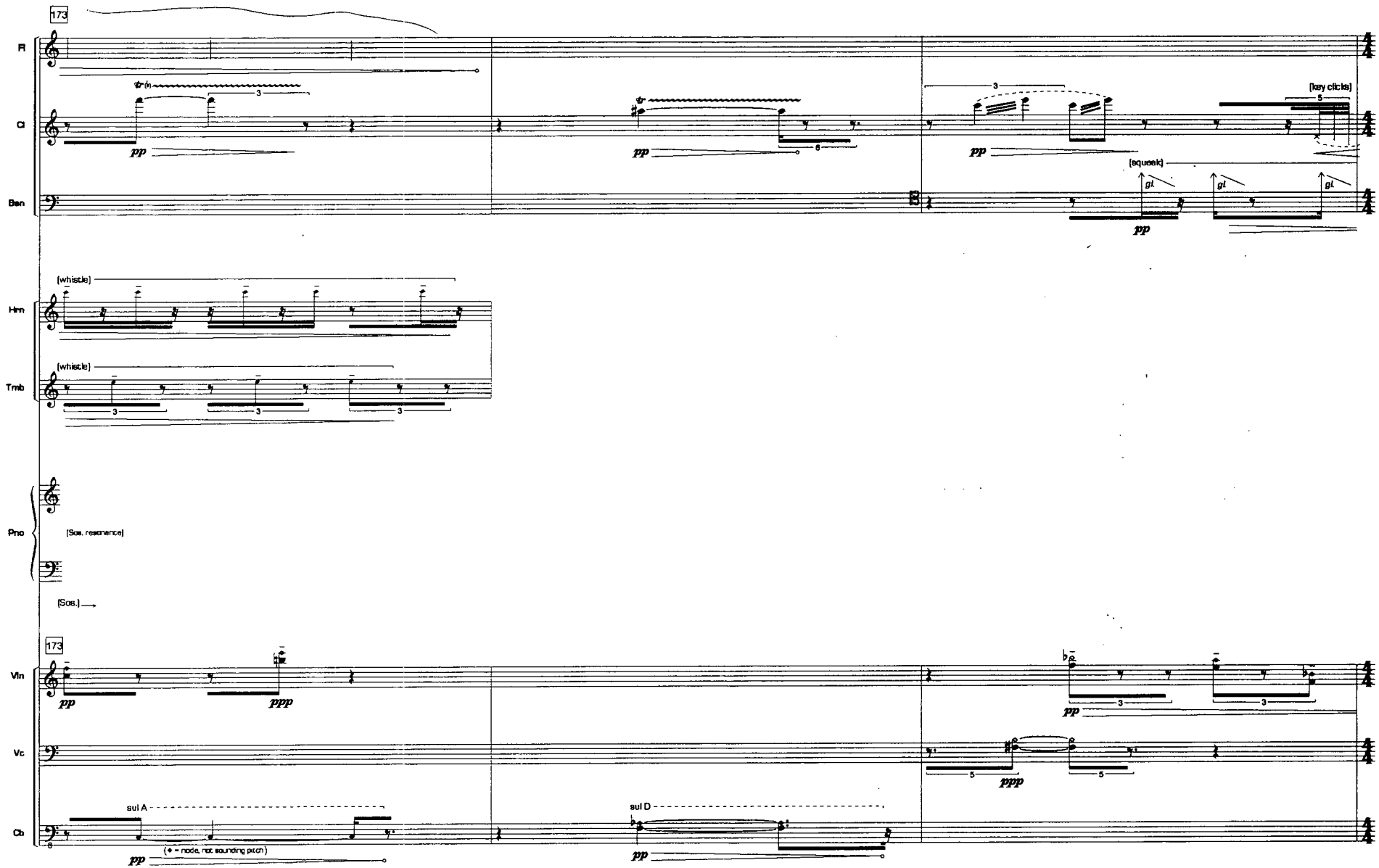

160
Fl
Cl
Bsn
Hrn
Tmb
Pno
160
Vln
Vc
Cb
pizz.
slap
slap
slap
[ord.]

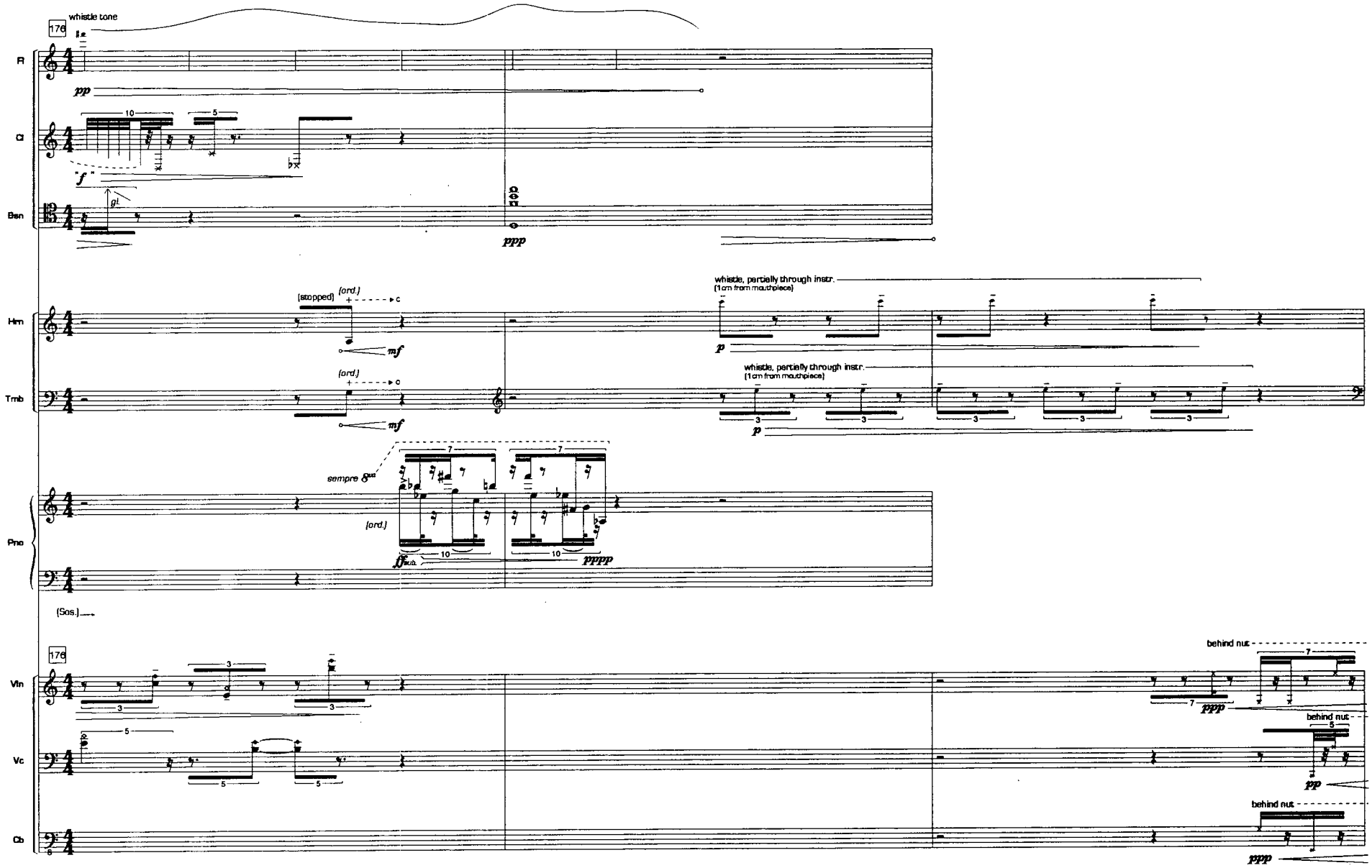

162
Fl
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
pizz.
("f")
("mf")
("mp")

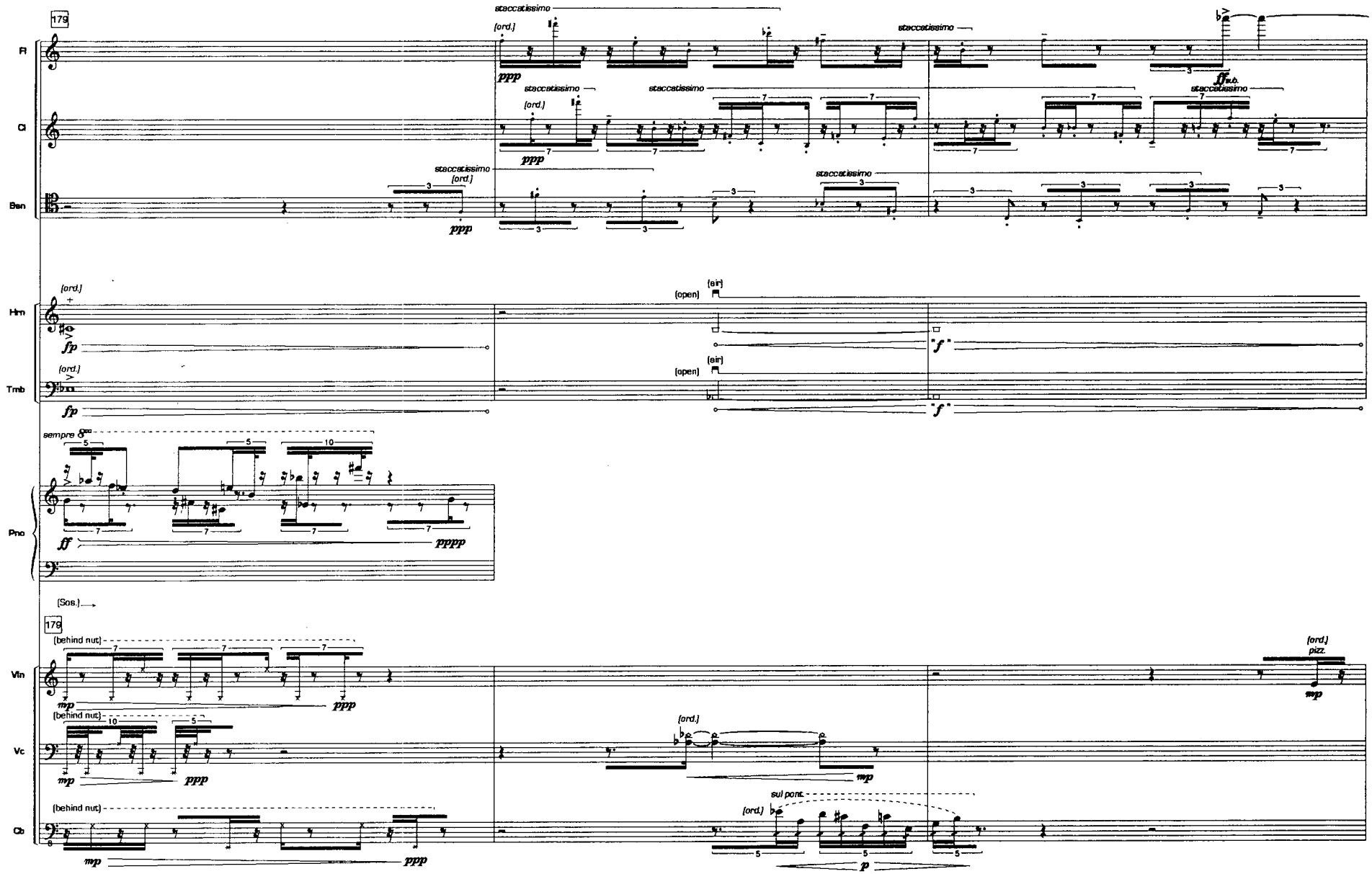

164
Fl
Cl
Bsn
Hrn
Tmb
inside piano
tap strings with fingertips
Pno
(no Ped.)
[pizz.]
Vln
Vc
Cb
pizz.

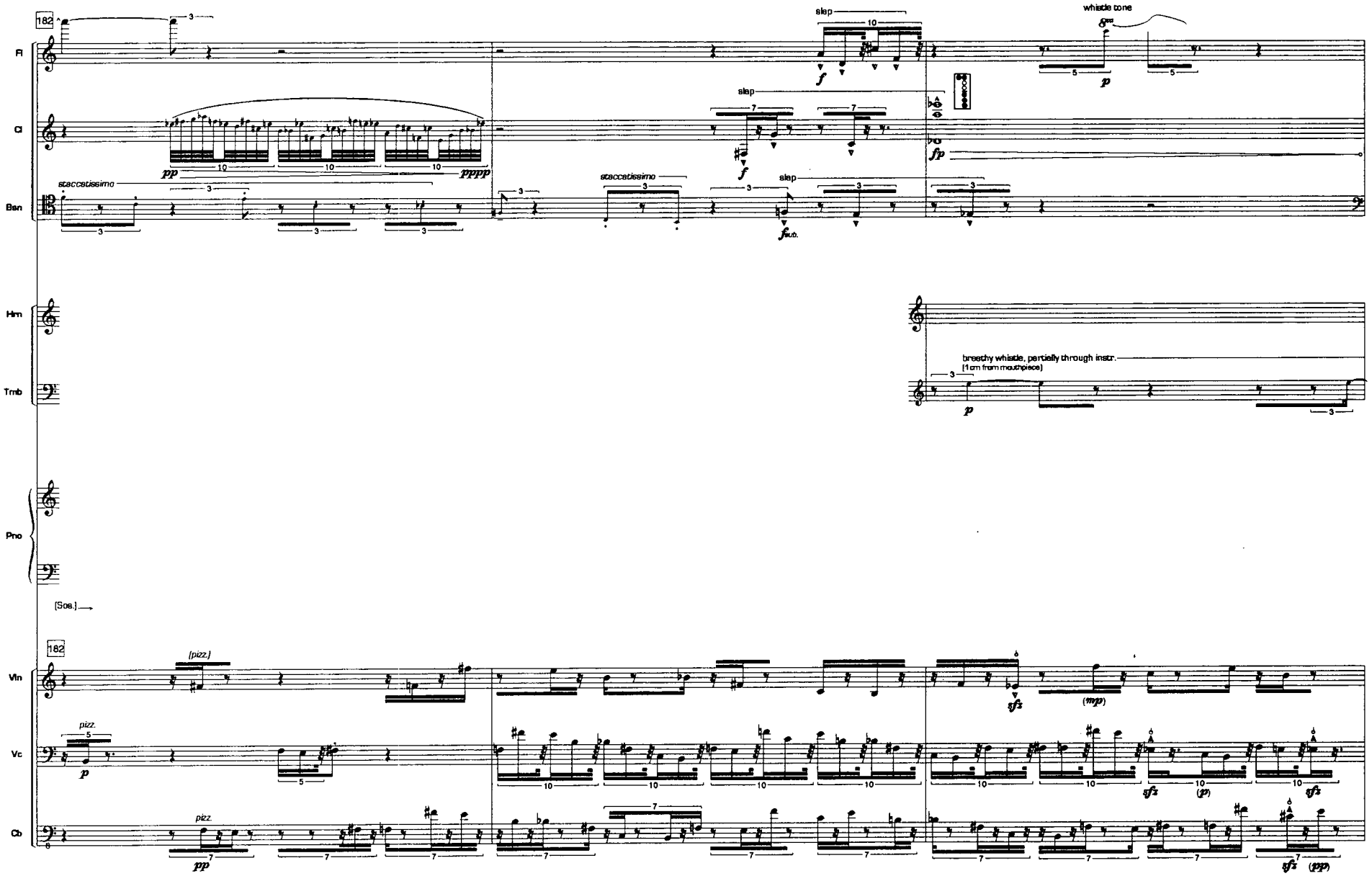

molto rit.
166
Pno
"mf"
"mp"
"p"
"pp"
1/2 Ped.
molto rit.
Vln
Vc
Cb
pizz.
pp
("mf")
"mp"
"p"
"pp"
(molto rit.)
"ppp"
"pppp"
13"
Ped.
"pp"
"ppp"
"pppp"

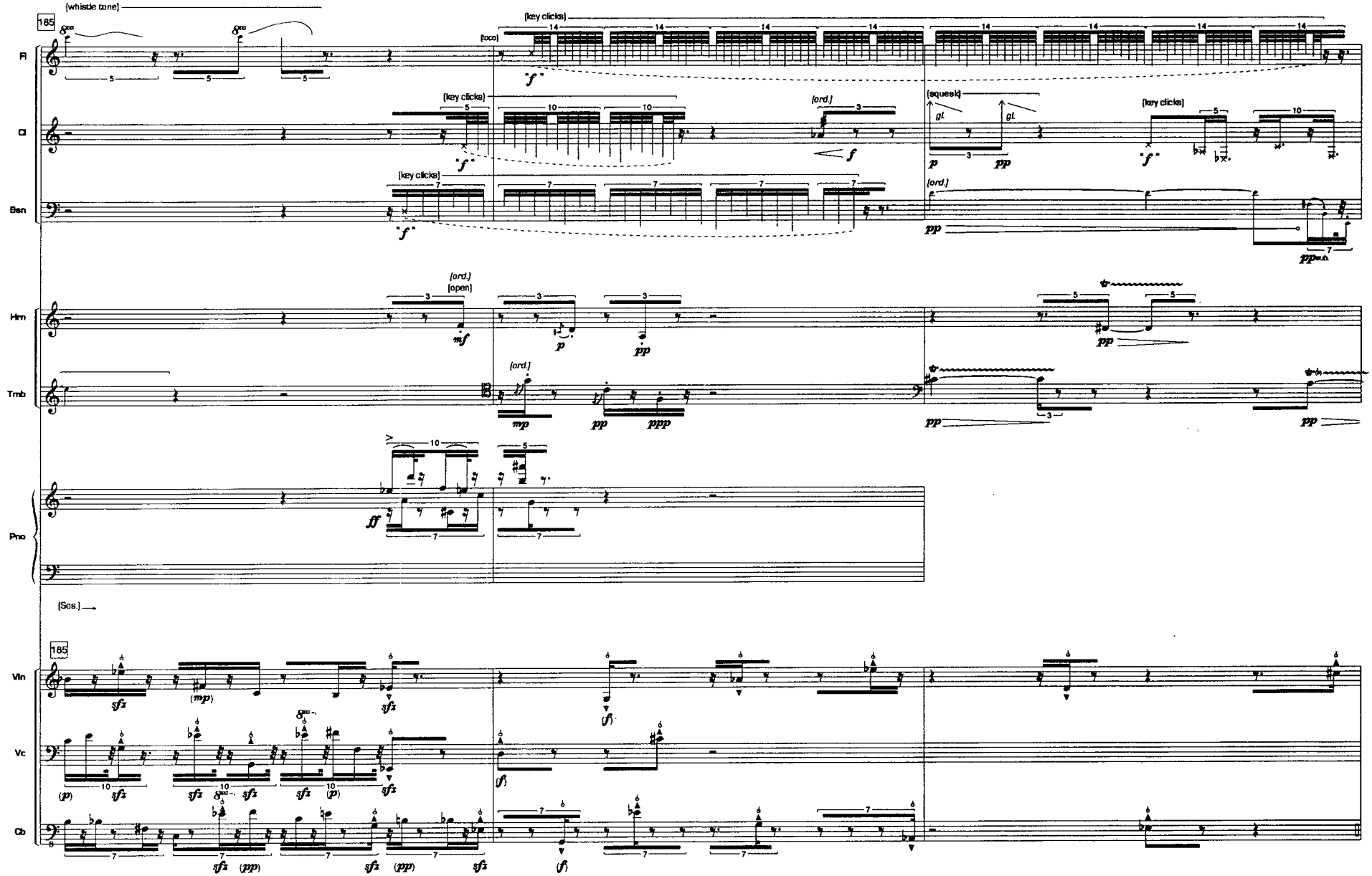

a tempo
170 (♩ = 72)
[ord.]
Fl
Cl
Ben
Hrn
Tmb
Pno
Vln
Vc
Cb
arco
whistle tone
whistle, partially through instr. (1 cm from mouthpiece)
depress keys silently
Sos.
inside piano
scrape strings with large plectrum
(subito)

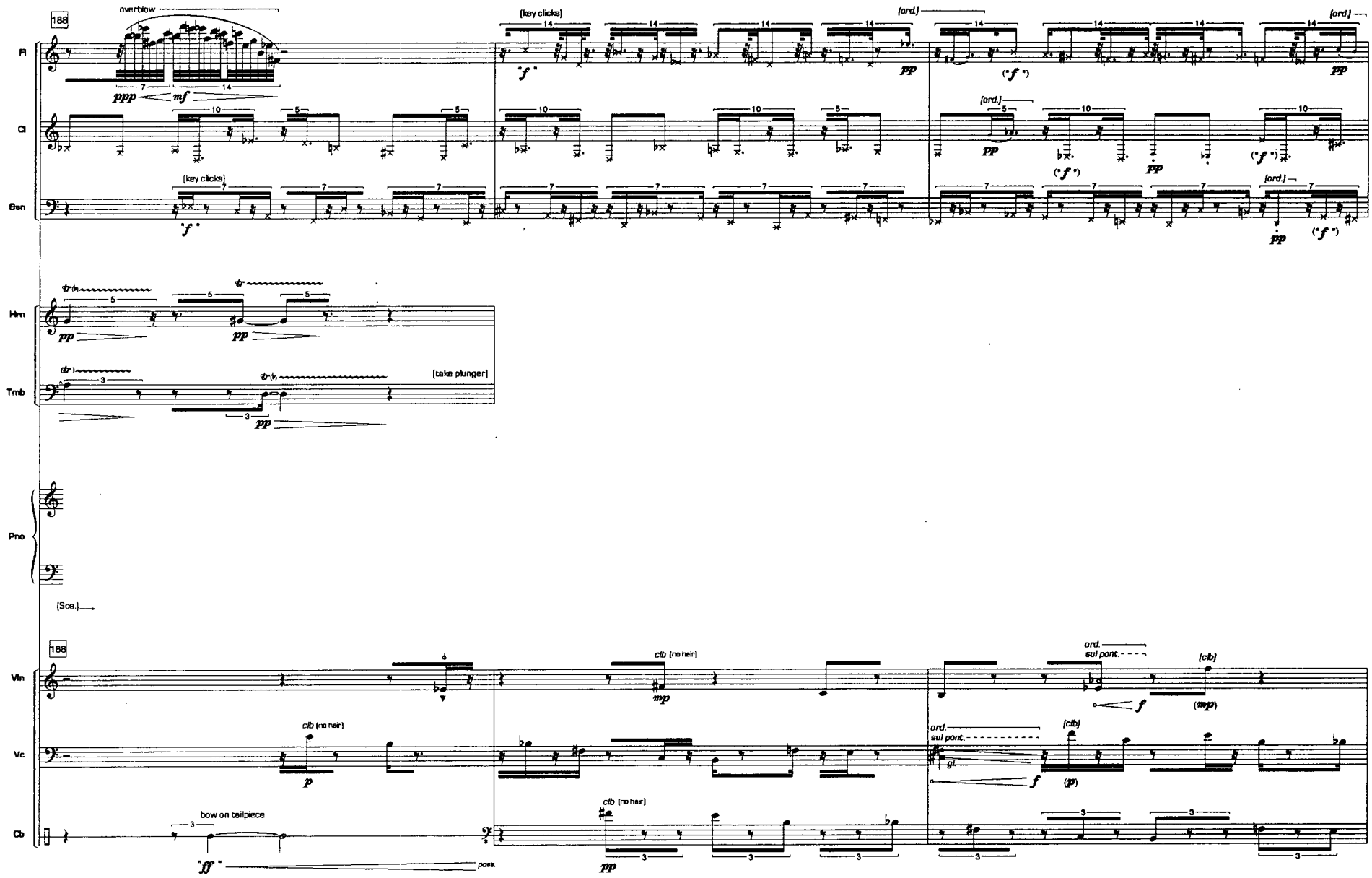

173
Fl
Cl
Bsn
pp
[key clicks]
[squeak]
gl
[whistle]
Hrn
Tmb
Pno
[Sos. resonance]
[Sos.]
Vln
Vc
Cb
ppp
sul A
sul D
(♦ = node, not sounding pitch)

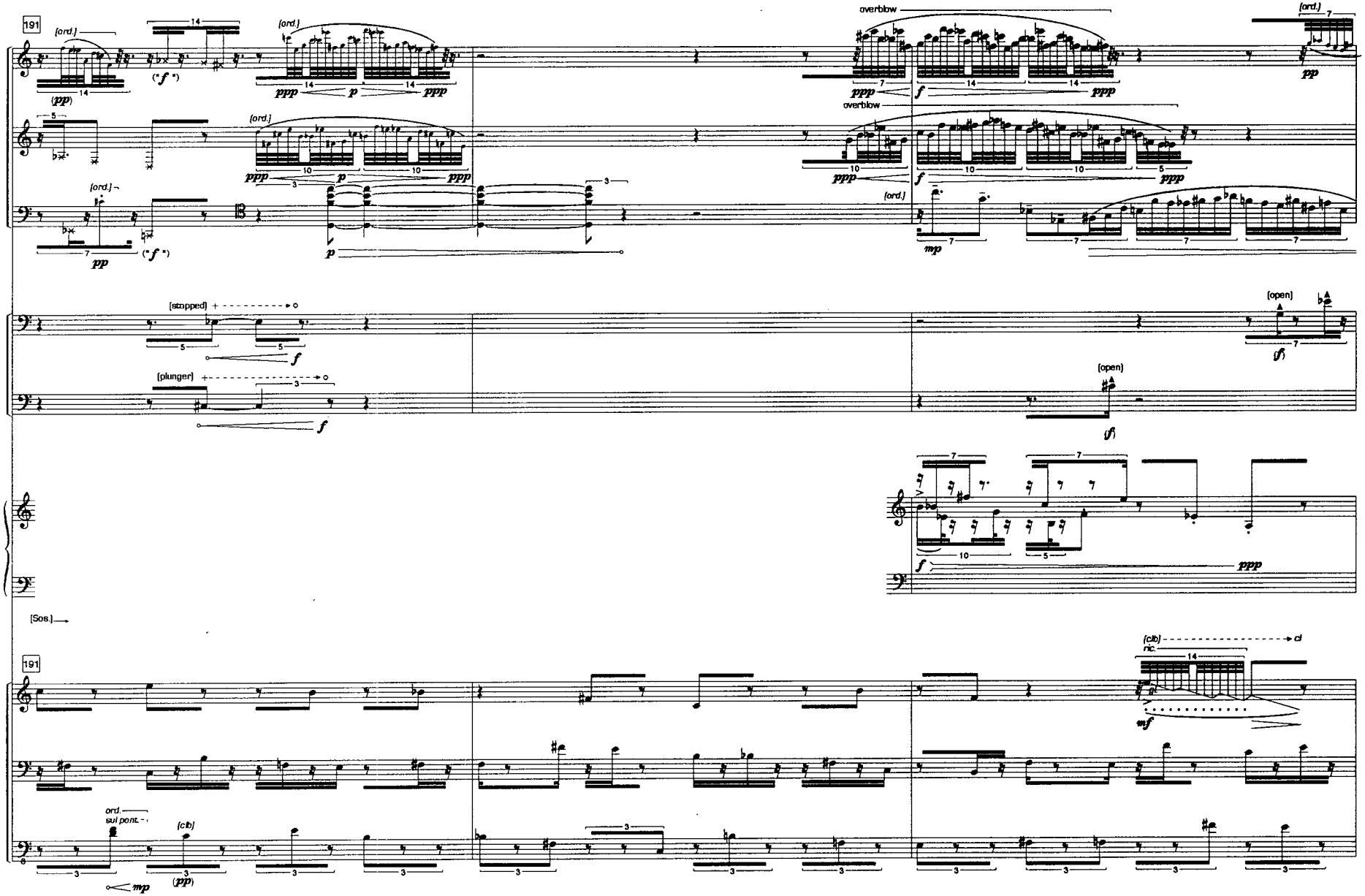

176
whistle tone
Fl
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
[stopped]
[ord.]
whistle, partially through instr.
(1cm from mouthpiece)
sempre 8va
(Sos.)
behind nut

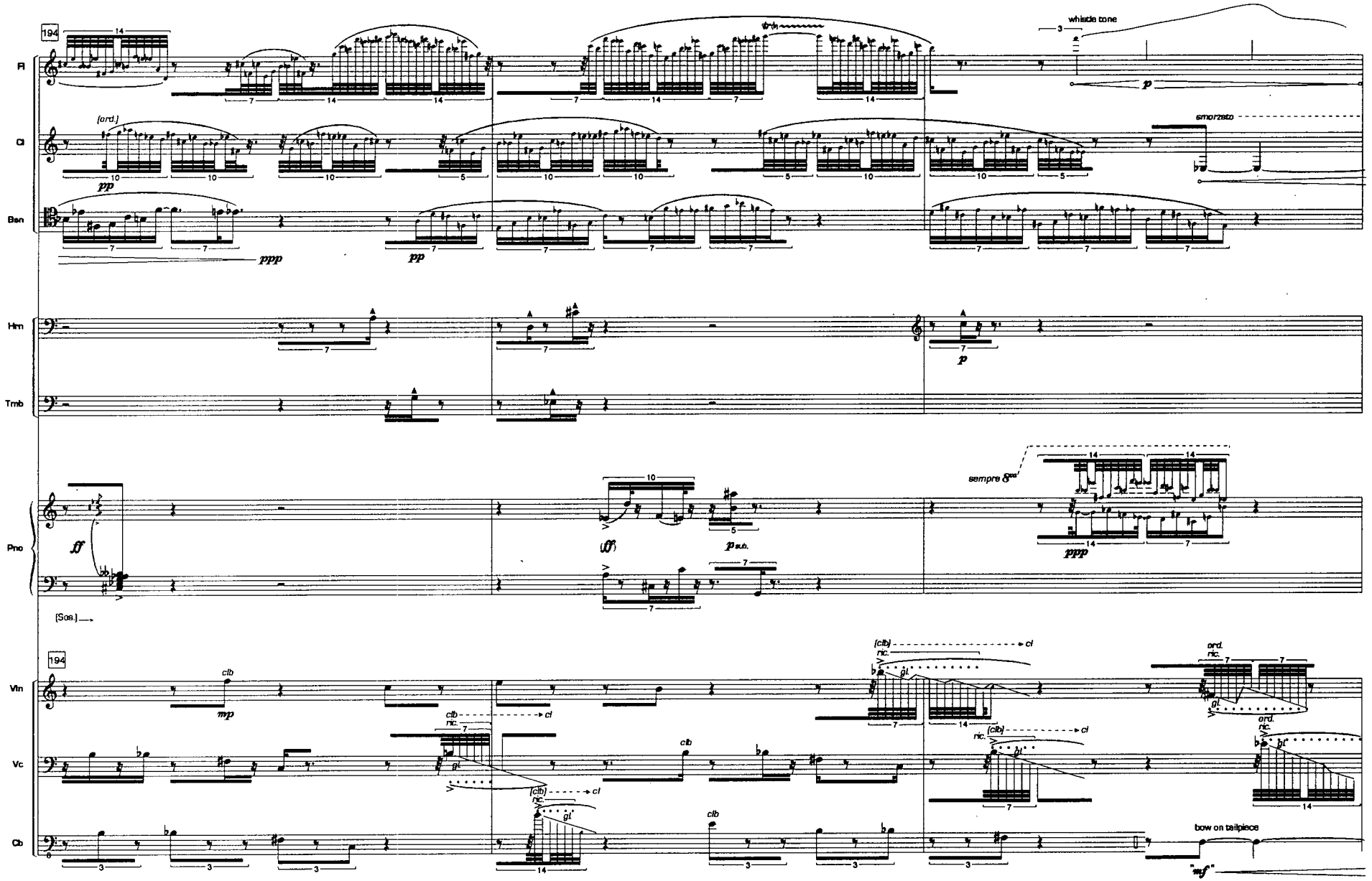

179
Fl
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
staccatissimo
[ord.]
ppp
ff sub.
[air]
(open)
fp
f
sempre 8va
ff
pppp
[Sos.]
(behind nut)
mp
[ord.]
pizz.
sul pont.
p

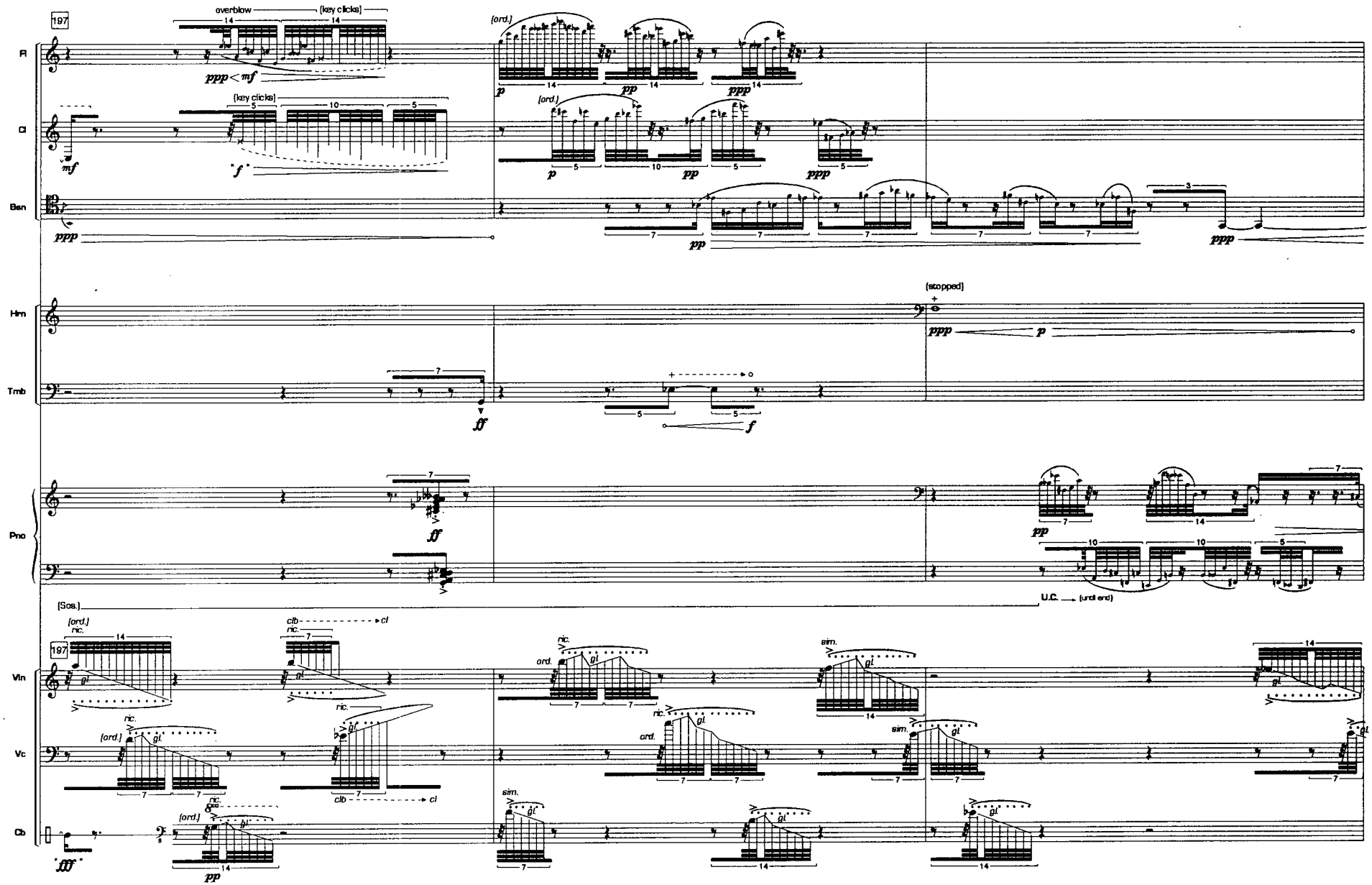

182
Fl
Cl
Bsn
Hrn
Trmb
Pno
Vln
Vc
Cb
staccatissimo
slap
whistle tone
breathy whistle, partially through instr.
(1 cm from mouthpiece)
[pizz.]
pizz.
[Sos.]

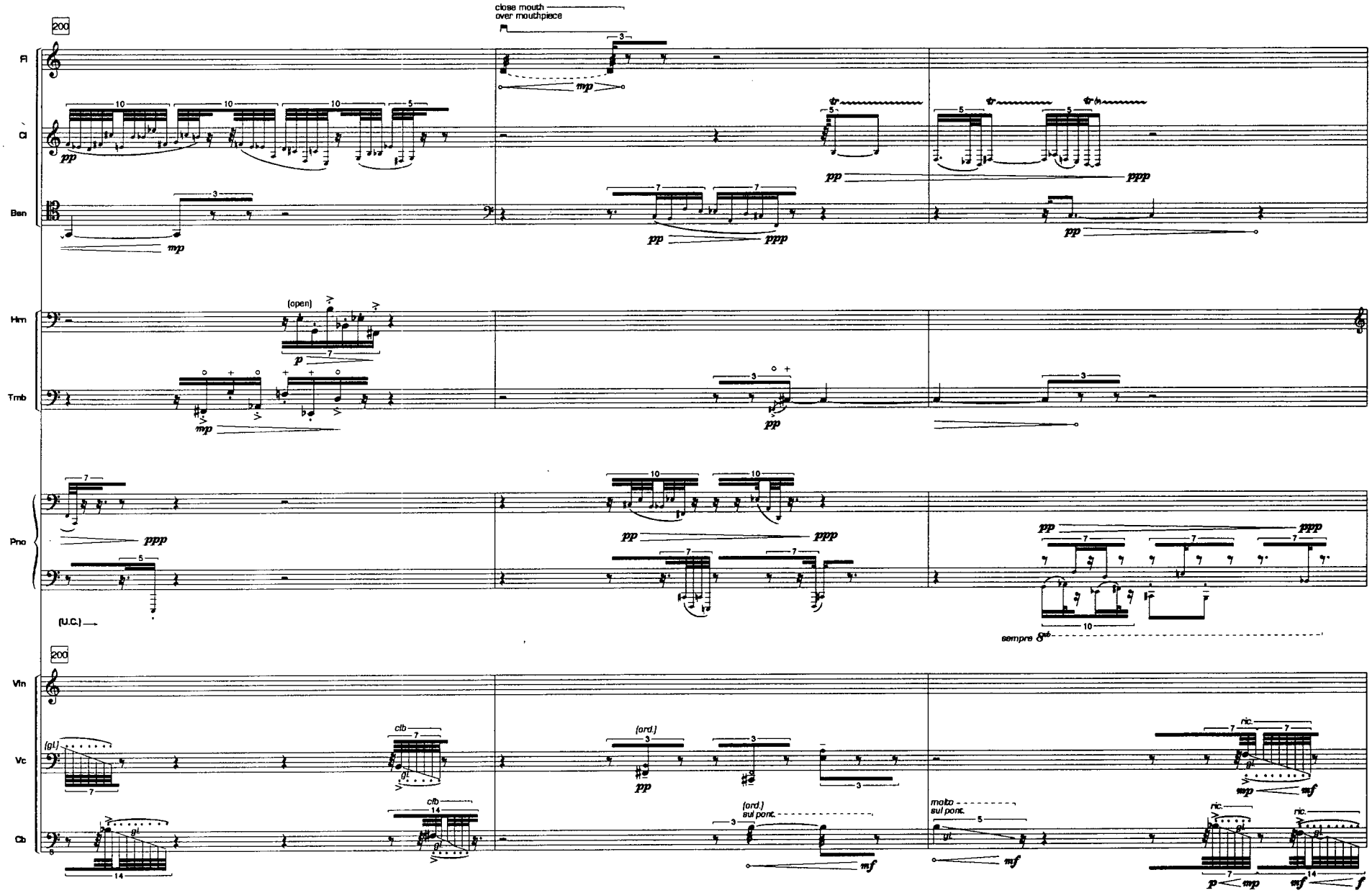

185
[whistle tone]
[key clicks]
(loco)
Fl
Cl
Bsn
[key clicks]
[ord.]
[squeek]
gl.
[key clicks]
[ord.]
[open]
Hrn
Tmb
[ord.]
Pno
[Sos.]
185
Vln
Vc
Cb

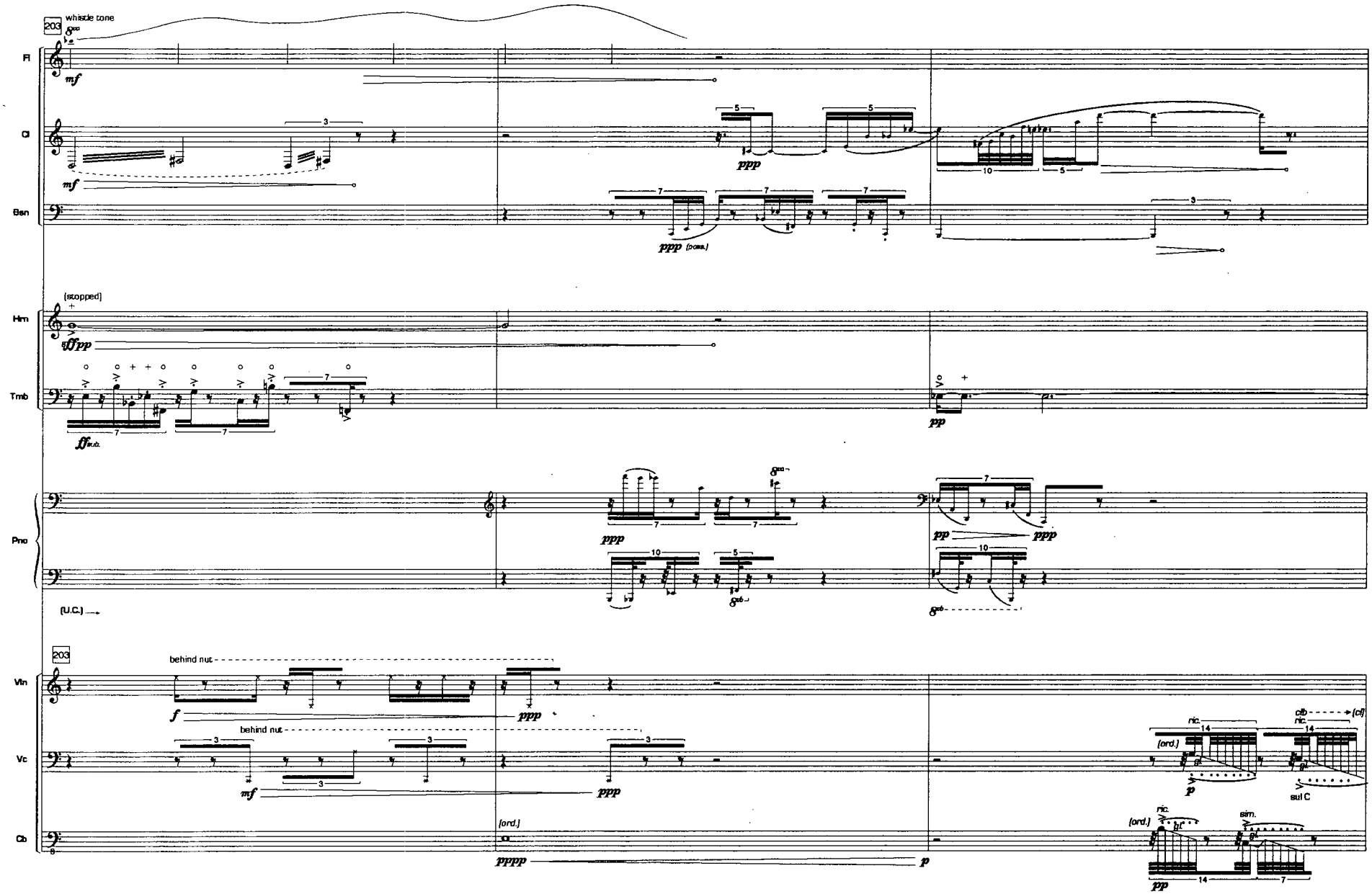

188
overblow
[key clicks]
[ord.]
Fl
Cl
Bsn
Hrn
Tmb
[take plunger]
Pno
[Sos.]
188
Vln
Vc
Cb
clb (no hair)
ord.
sul pont.
[clb]
bow on tailpiece
pizz.

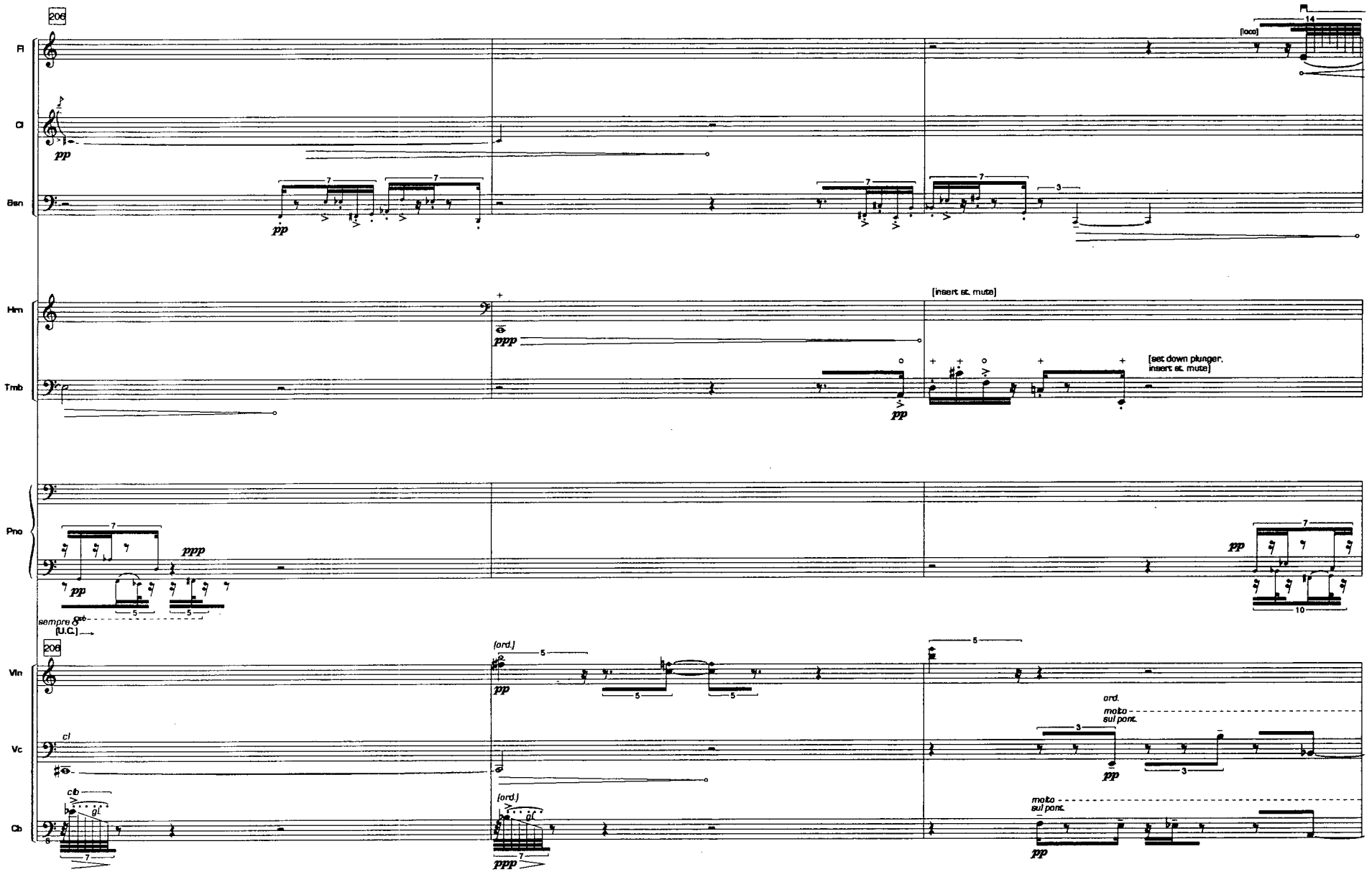

191
Fl
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
[ord.]
overblow
[stopped]
[plunger]
[open]
[Sos.]
[clb]
ord.
sul pont.

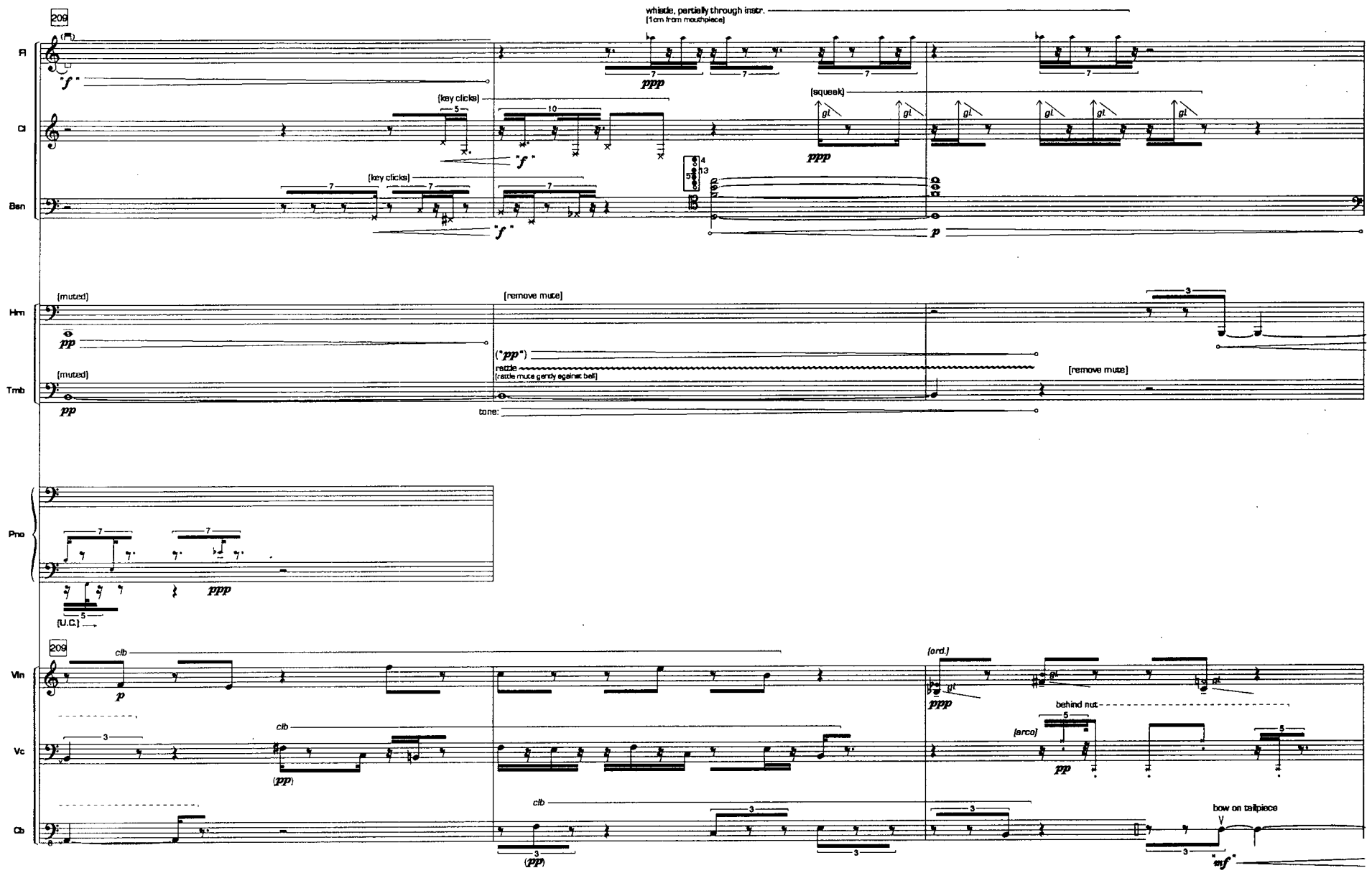

194
Fl
Cl
Bsn
Hrn
Trb
Pno
Vln
Vc
Cb
whistle tone
smorzato
sempre 8va
(Sos.)
bow on tailpiece

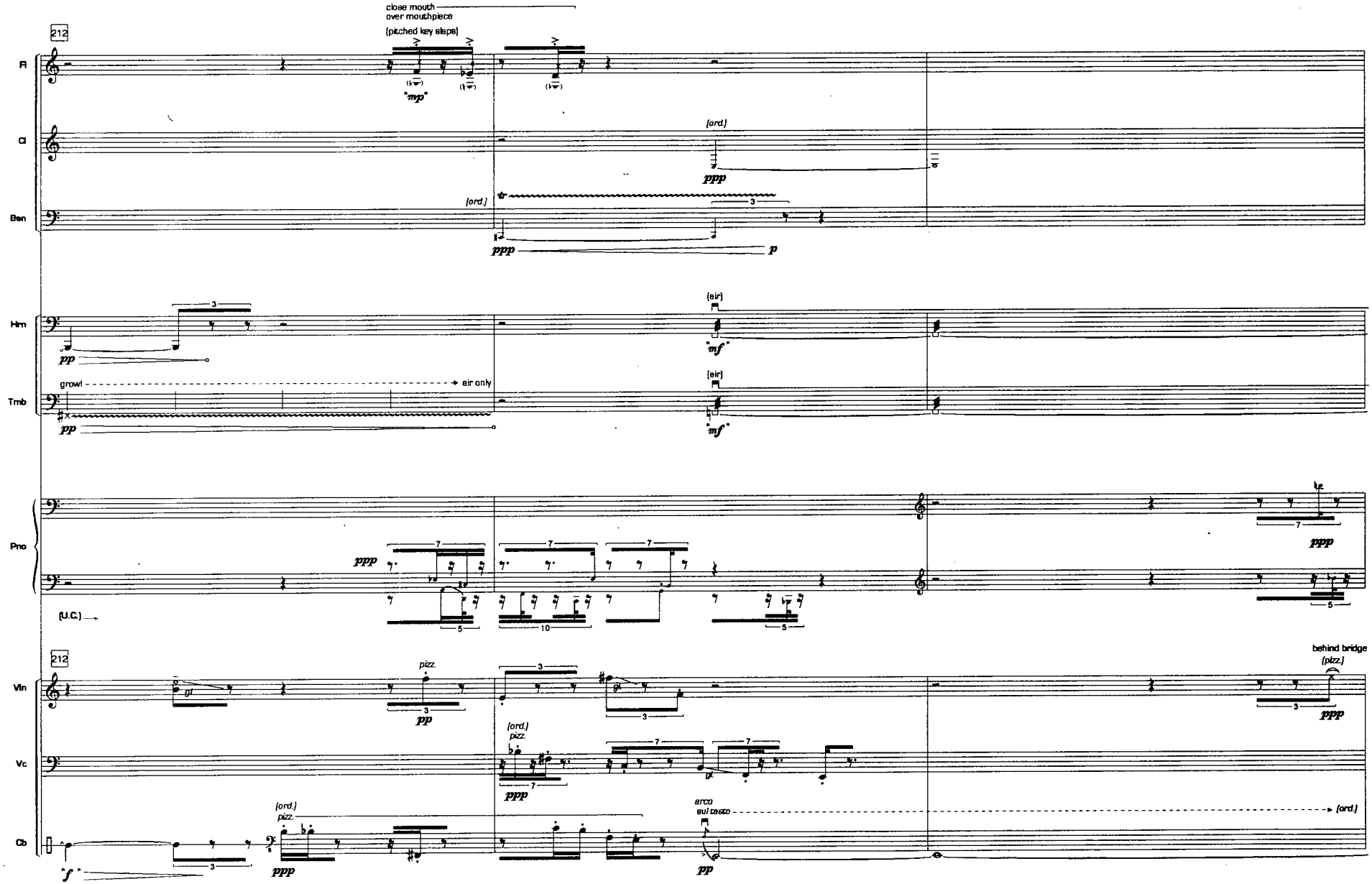

197
overblow
{key clicks}
Fl
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
{ord.}
{stopped}
{Sos.}
U.C.
{unst end}
nic.
ord.
sim.
gl.
clb
cl

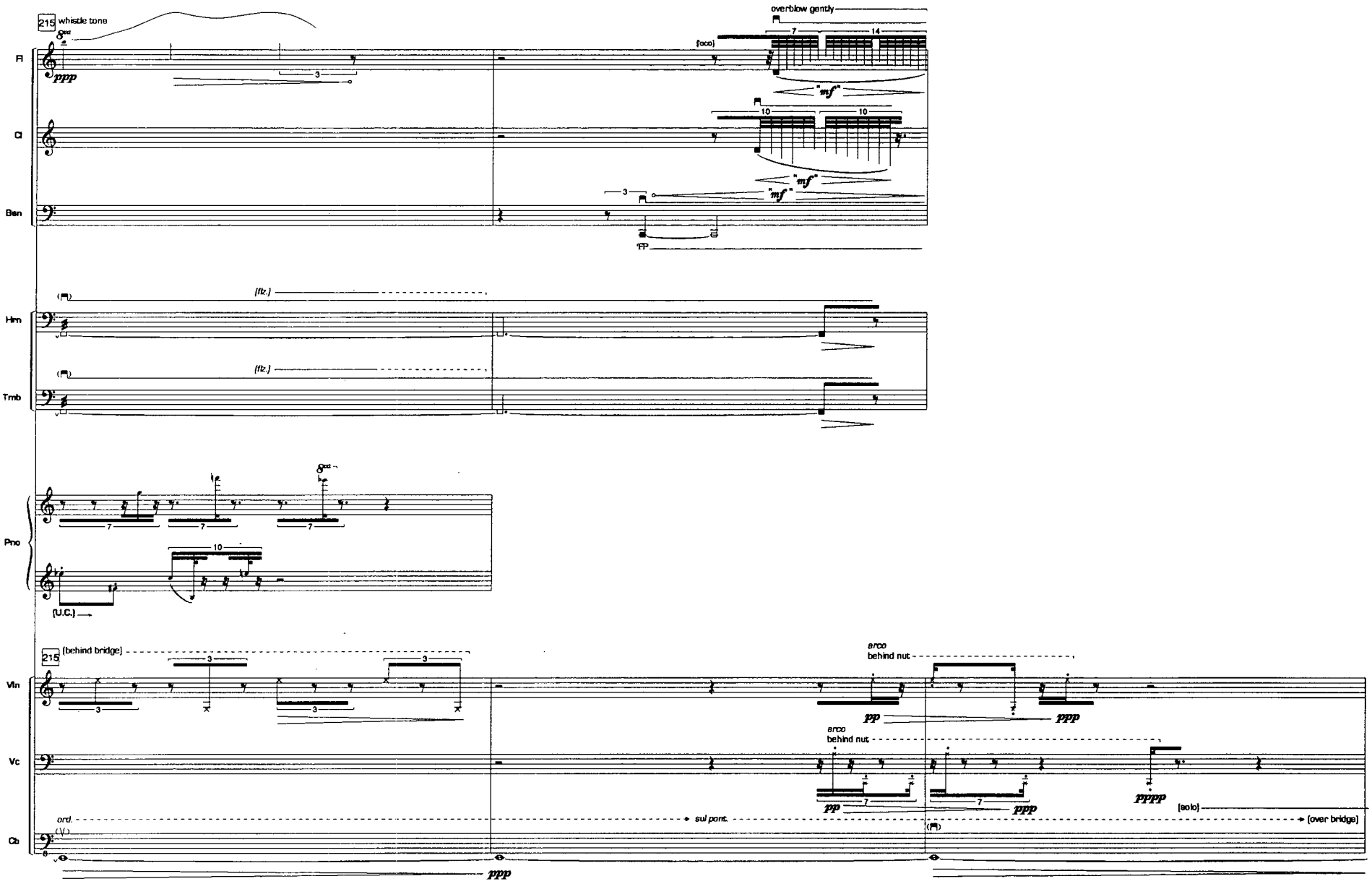

200
close mouth
over mouthpiece
Fl
Cl
Bsn
Hrn
Tmb
Pno
(open)
(U.C.)
sempre 8va
Vln
Vc
Cb
clb
(ord.)
sul pont.
molto
sul pont.
ric.

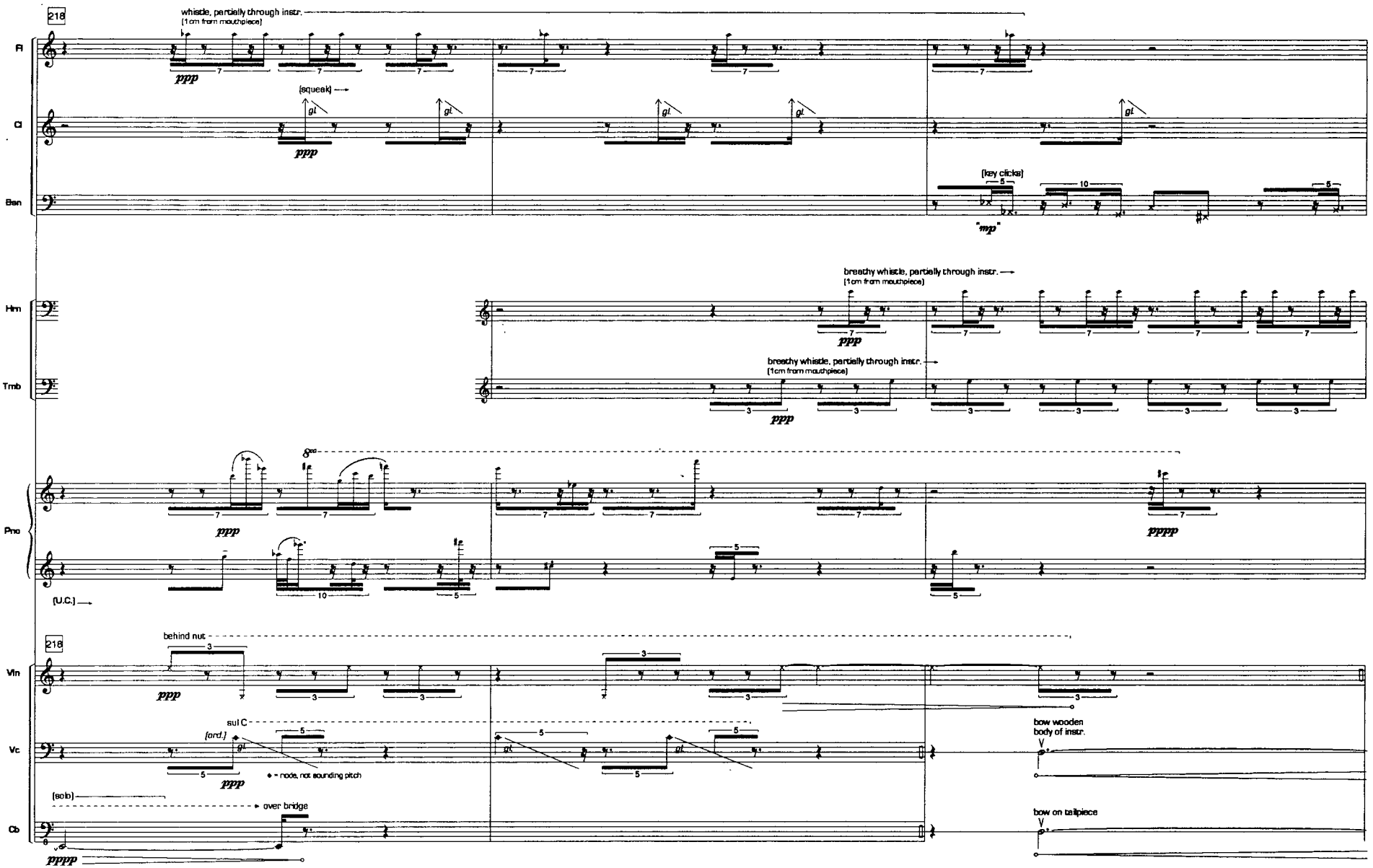

203
whistle tone
Fl
Cl
Bsn
Hrn
[stopped]
Tmb
Pno
(U.C.)
203
behind nut
Vln
behind nut
Vc
Cb
[ord.]
[ord.]
sul C
sim.

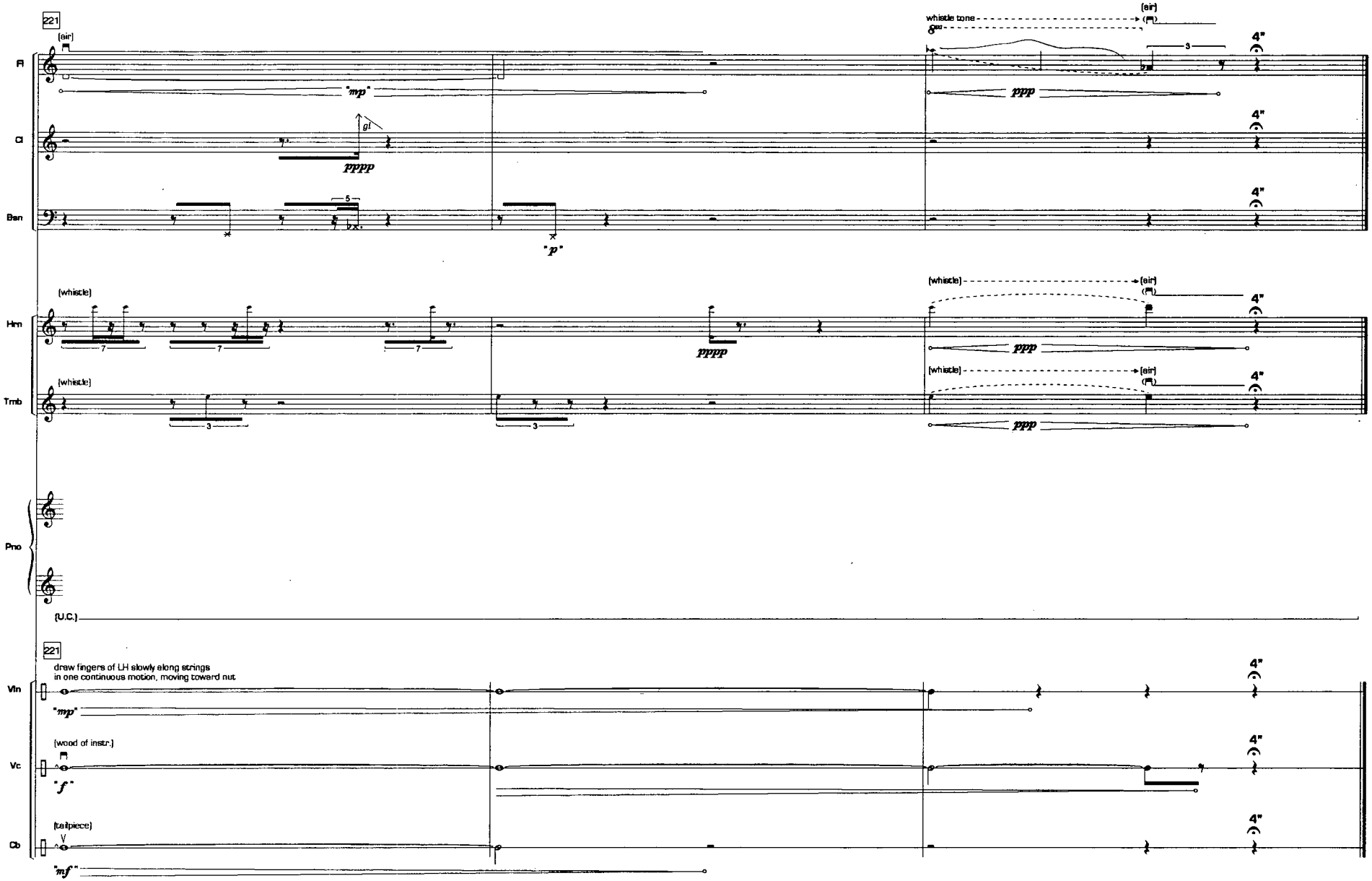

206
Fl
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
pp
ppp
[loco]
[insert st. mute]
[set down plunger, insert st. mute]
sempre 8va
[U.C.]
[ord.]
cl
cb
gl
ord.
molto sul pont.


209
Fl
Cl
Bsn
Hrn
Tmb
Pno
Vln
Vc
Cb
whistle, partially through instr.
[1cm from mouthpiece]
[key clicks]
[squeak]
[muted]
[remove mute]
rattle
[rattle mute gently against bell]
tone:
[U.C.]
clb
[ord.]
behind nut
[arco]
bow on tailpiece


212
close mouth
over mouthpiece
(pitched key slaps)
Fl
"mp"
Cl
(ord.)
ppp
Bsn
(ord.)
ppp
p
Hrn
(air)
"mf"
pp
growl
air only
Tmb
(air)
"mf"
pp
Pno
ppp
(U.C.)
ppp
212
Vln
pizz.
pp
behind bridge
(pizz.)
ppp
Vc
(ord.)
pizz.
ppp
Cb
(ord.)
pizz.
ppp
arco
sul tasto
(ord.)
pp
"f"


215
whistle tone
overblow gently
(loco)
Fl
Cl
Bsn
Hrn
Tmb
Pno
(U.C.)
(behind bridge)
arco
behind nut
Vln
Vc
Cb
ord.
sul pont.
(solo)
(over bridge)


218
whistle, partially through instr.
(1cm from mouthpiece)
Fl
ppp
Cl
(squeak)
ppp
Bsn
(key clicks)
"mp"
breathy whistle, partially through instr.
(1cm from mouthpiece)
Hrn
ppp
breathy whistle, partially through instr.
(1cm from mouthpiece)
Tmb
ppp
8va
Pno
ppp
pppp
(U.C.)
218
behind nut
Vln
ppp
sul C
[ord.]
Vc
ppp
◆ = node, not sounding pitch
(solo)
over bridge
bow wooden body of instr.
Cb
pppp
bow on tailpiece


221
[air]
Fl
"mp"
whistle tone
[air]
4"
Cl
gl
pppp
ppp
Bsn
"p"
[whistle]
Hrn
Tmb
[whistle]
[air]
Pno
{U.C.}
221
draw fingers of LH slowly along strings
in one continuous motion, moving toward nut
Vln
"mp"
[wood of instr.]
Vc
"f"
[tailpiece]
Cb
"mf"