Pitch Centricity as an Organizing Principle in *Speculum Speculi* of Charles Wuorinen*

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Speculum Speculi, composed in 1972 for the ensemble Speculum Musicae,[1] is a virtuosic work illustrating many of the compositional techniques that have characterized Charles Wuorinen's music over the past twenty years. This paper will explore several of these techniques as they relate to the concept of pitch centricity, an idea that has been central to Wuorinen's thinking, and one that pervades the musical structure of *Speculum Speculi*.

Pitch centricity may be most simply defined as the use of one pitch to anchor those pitches surrounding it. The idea, of course, is not new; pitch centers have played a well-defined role in tonal and pre-tonal music. In atonal music as well, theorists have often emphasized pitch-centric formations in discussing important masterworks of the twentieth century.[2] Nonetheless, atonal music that is also serial, as is the case here, presents even more intriguing and seemingly contradictory issues. Schoenberg, in his discussion of the origins of the twelve-tone method, immediately noted the apparent contradiction between serial techniques and tonal emphasis. In his essay, "Composition with Twelve Tones," he notes:

> The construction of a basic set of twelve tones derives from the intention to postpone the repetition of every tone as long as possible. I have stated in my *Harmonielehre* that the emphasis given to a tone by a premature repetition is capable of heightening it to the rank of a tonic. But the regular application of a set of twelve tones emphasizes all the other tones in the same manner, thus depriving one single one of the privilege of supremacy.[3]

*Parts of this paper were first presented at a colloquium at Brandeis University in March, 1986. The author thanks Charles Wuorinen, David Lewin, Stanley Boorman, and Severine Neff for their readings of earlier versions of the paper.

[1]The work is published by C.F. Peters Corporation, New York, N.Y., and is recorded on the Nonesuch label H-71300 by Speculum Musicae.

[2]Some pertinent writings on the subject include Arthur Berger's discussion of tonal priority in his article, "Pitch Organization in Stravinsky," in *Perspectives on Schoenberg and Stravinsky*, ed. Benjamin Boretz and Edward T. Cone (New York: W.W. Norton and Co., 1972). Andrew Imbrie discusses these issues in relation to Sessions's *String Quintet* in his article, "Roger Sessions: In Honor of his Sixty-fifth Birthday," *Perspectives of New Music*, 1/1 (1962), 117-147. See also David Lewin, "Inversional Balance as an Organizing Force in Schoenberg's Thought and Work," *Perspectices of New Music*, 6/2 (1968), 1-21.

[3]Published in *Style and Idea: Selected Writings of Arnold Schoenberg*, ed. Leonard Stein (Berkeley: University of California Press, 1975), 246.

Nevertheless, Schoenberg qualifies his viewpoint in his very next sentence: "It seemed *in the first stages* of composing with serial techniques immensely important to avoid a similarity with tonality."[4] Thus Schoenberg left open the possibility that in *later* stages of the development of the twelve-tone system, various elements previously associated with tonal music might once again be accommodated.

Wuorinen's comments about pitch centricity nicely complement Schoenberg's observations. In his own remarks, Wuorinen has specifically referred to the use of pitch centers within a serial framework as "bringing back an aspect of tonality which may have been abandoned unnecessarily."[5]

From a technical standpoint, the problems of combining pitch centricity with serial procedures are not inconsiderable. In tonal music, the complex interactions of tonal functions ensure the prominence of a tonic pitch within a tonal passage, and, over a longer span of time, a tonic key within a hierarchy of key relationships. Other metrical, durational, dynamic, and registral aspects of a passage may, in addition, contribute to the elevation of one pitch above all others. Although in non-tonal music, these non-pitched dimensions are at least as important in reinforcing pitch-centric formations as they are in tonal music; new, convincing *pitch* associations must be substituted in non-tonal music, in the absence of tonally functioning ones.

Section I of this paper will consider some of the techniques used to create hierarchical relationships among pitches within the twelve-tone framework of *Speculum Speculi*, and will examine specific instances of pitch centricity in the first part of the work. Section II will show how these pitch-centric areas generate others throughout the composition, thus helping to shape and delineate the overall formal structure.

I

The opening of the composition provides a clear example of the origins of pitch centricity within the work's twelve-tone structure. The music begins with a slow, stately succession of unisons and octaves that reveals the primary set of the composition: D C♯ D♯ E C F F♯ B G A♭ B♭ A (Example 1a). The opening phrase also introduces the primary pitch center of the work: D, a center that may be seen, in part, as an outgrowth of the row's structural properties. Aside from being the first pitch in order of succession, D is emphasized by the series' time-point characteristics. In this first crucial unfolding, as well as in other key places within *Speculum Speculi*, the series is stated in a one-to-one

[4]Italics added.

[5]Tanglewood Seminar, August 1971.

durational correspondence with its ordered pitch class interval equivalents, that is, the integers 11, 2, 1, 8, 5, 1, 5, 8, 1, 2, 11, and 5.[6] The correlation of the largest integer 11, with the first pitch immediately gives D the possibility of considerable durational weight.

The composer further emphasizes D in bars 1-10 by doubling it registrally, in the bass. Only this first pitch, and A, the last, are doubled in octaves in the opening statement of the series. Finally, the series (itself a mirror row,[7] as Example 1b illustrates) suggests other centering possibilities which are highlighted in the work's opening. The ordering of the row allows pitches to fan out chromatically and symmetrically from the initial D (see Example 1c). The directional contour and rhythmic phrasing which group together notes 2-4, 5-7, and 8-10 of the row suggest yet another interesting registrally-accentuated pattern evolving in contrary motion from D (Example 1d). The previously noted descent from D, which connects the first pitch of each of the three-pitch groupings, may be heard against a rising *whole* step ascent linking the third note of each of those units. (Since the last grouping proceeds downwards, rather than upwards, the "fanning out" pattern is obscured at this point.) All of these inner correspondences solidly anchor D within a network of subtlely inflected lines, and allow the work's basic material to emerge gracefully from the opening pitch.

Throughout *Speculum Speculi*, pitch centers are most notably established at cadential points. The first of these occurs near the end of Example 2a, at bar 22. This particular cadence is accomplished by the resolution of the harmony G F D♭ A♭ in bar 21, into the very stable sonority of bar 22,[8] a simultaneity comprised of a central d^1 in the oboe and the pitches a^2 and d^3 above.

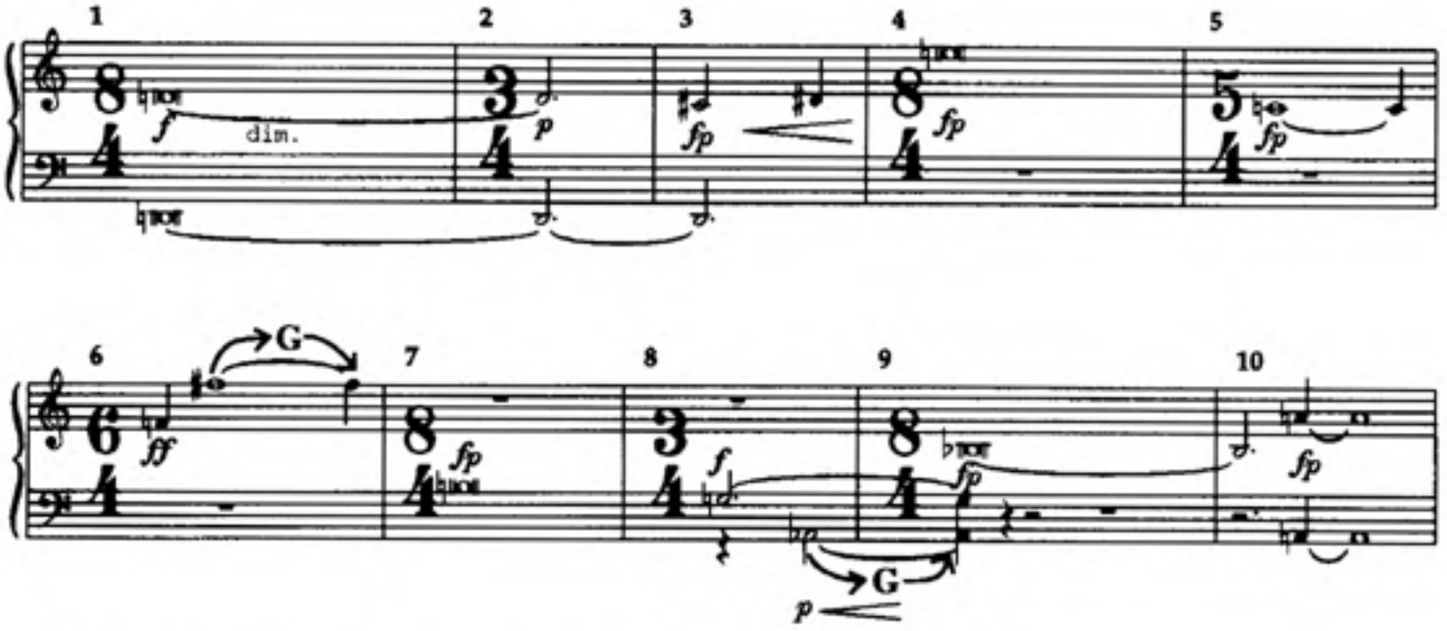
Several elements, some of which are traditionally associated with tonal structures, aid the effect of this cadence, and, similarly, help to establish the feeling of pitch centricity. There are fifth relations (the fifth being a stabilizing element) surrounding the cadence, and a prominent fifth in the chord of resolution at bar 22. The bass progression

[6]For a further discussion of the time point system, see Milton Babbitt, "Twelve Tone Rhythmic Structure in the Electronic Medium," *Perspectives of New Music*, 1/1 (1962), 49-79. For Wuorinen's discussion of time-points see his *Simple Composition* (New York: Longman, 1979), Chapter 10.

[7]The row's mirror construction directly relates to the work's title "Mirror of a Mirror," which, in turn, reflects the name of the group for which the work was written. This particular construction however is not exploited as noticeably as other symmetries in the opening section of the composition.

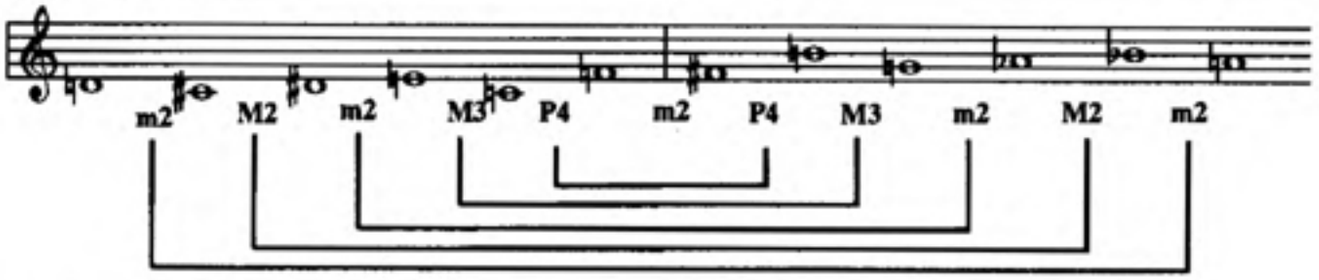
[8]In *Speculum Speculi*, characterizations of stability and instability, as well as those of consonance and dissonance, are not as difficult to make as they often appear to be in other non-tonal works. In cadential areas, in particular, intervals often project the qualities they assume in tonal settings; e.g., fifths and fourths are more consonant than seconds and sevenths, etc. As in tonal music, stable chords are constructed from combinations of more consonant intervals, while less stable chords derive from more dissonant configurations.

Example 1a: Bars 1–10 (piano reduction)

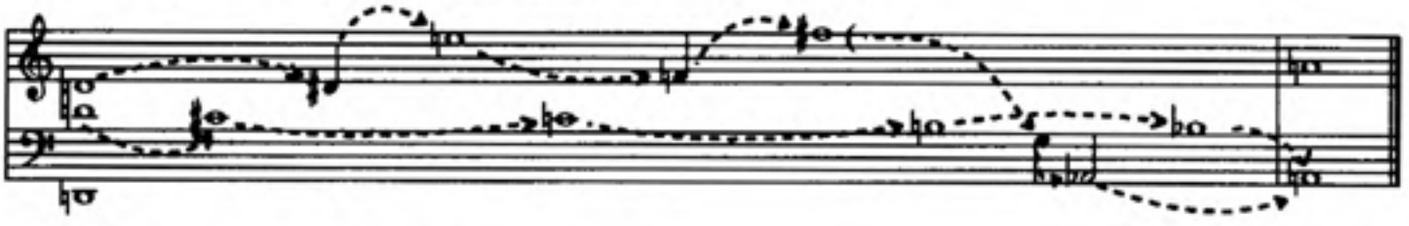


Pitch-class integers:	0	11	1	2	10	3	4	9	5	6	8	7	
Ordered pitch-class interval equivalents:	11	2	1	8	5	1	5	8	1	2	11	5	

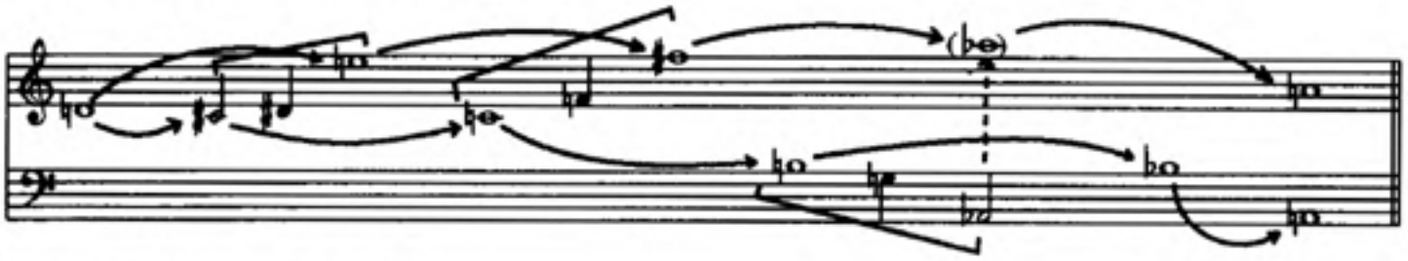
Example 1b: Row bars 1–10



Example 1c: Reduction bars 1–10



Example 1d: Reduction bars 1–10



of a fifth from G to D in the piano part of bars 21-22 firmly supports the cadential structure, and the pitches g^1 and a^2 in bar 23 are fifths above and below the D center, focusing upon it symmetrically. The C♯ in bar 21 in the oboe provides a "leading tone" approach to the D of bar 22. D is further emphasized as both the upper and lower notes of the chord of resolution.

Cadential and pitch-centric tendencies are supported by metrical, durational, and articulative characteristics, as well. The sonority at bar 22 is striking for its length, and by its arrival on a metrically strong beat. It begins a new phrase, and, interestingly, the phrase articulation itself is supported by the underlying row structure: bar 22 marks the inception of three new row forms; two previous ones end in bar 21.

A further look at the serial underpinnings of the relationships within the cadence at bars 21-22 provides insight into how the work's organizational framework has been used to support D centricity.

From bars 11-21, the row forms R6 and R11 (and their accompanying time point structures)[9] control the musical fabric. The change to a more stable sonority at bar 22 coincides with the application of a multiplicative operation upon the original row.[10] Since the original series contains a significant proportion of half steps, the effect of this operation is to transform the row into a succession of intervals characterized by perfect fourths and fifths: M^7 = D G A E C B F♯ F D♭ A♭ B♭ E♭ (Example 2b).

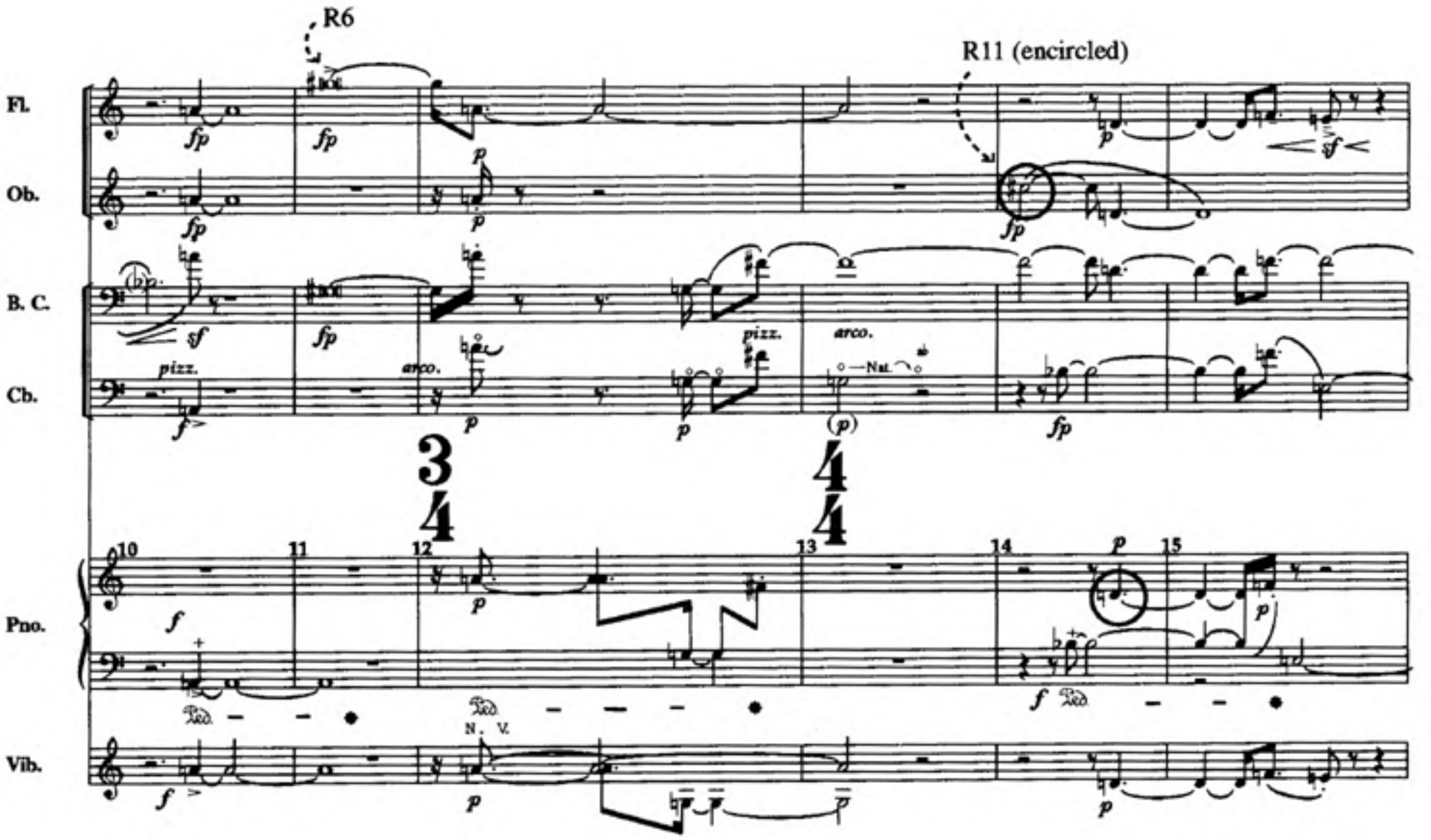
The row forms derived from the multiplicative operation and used in bars 22+ (M^7:P0, M^7:P7 and M^7:I0) are carefully chosen. All three forms include the pitches D and A within their first three notes, thus helping to ensure the primacy of D as the cadential center. The time-point correlation used in the work's opening is also employed consistently at bar 22 and after in all three row forms, so that each crucial initial pitch receives a relatively long duration.[11] Thus, the choice of row form becomes integrally linked to the preparation and establishment of a cadential formation.

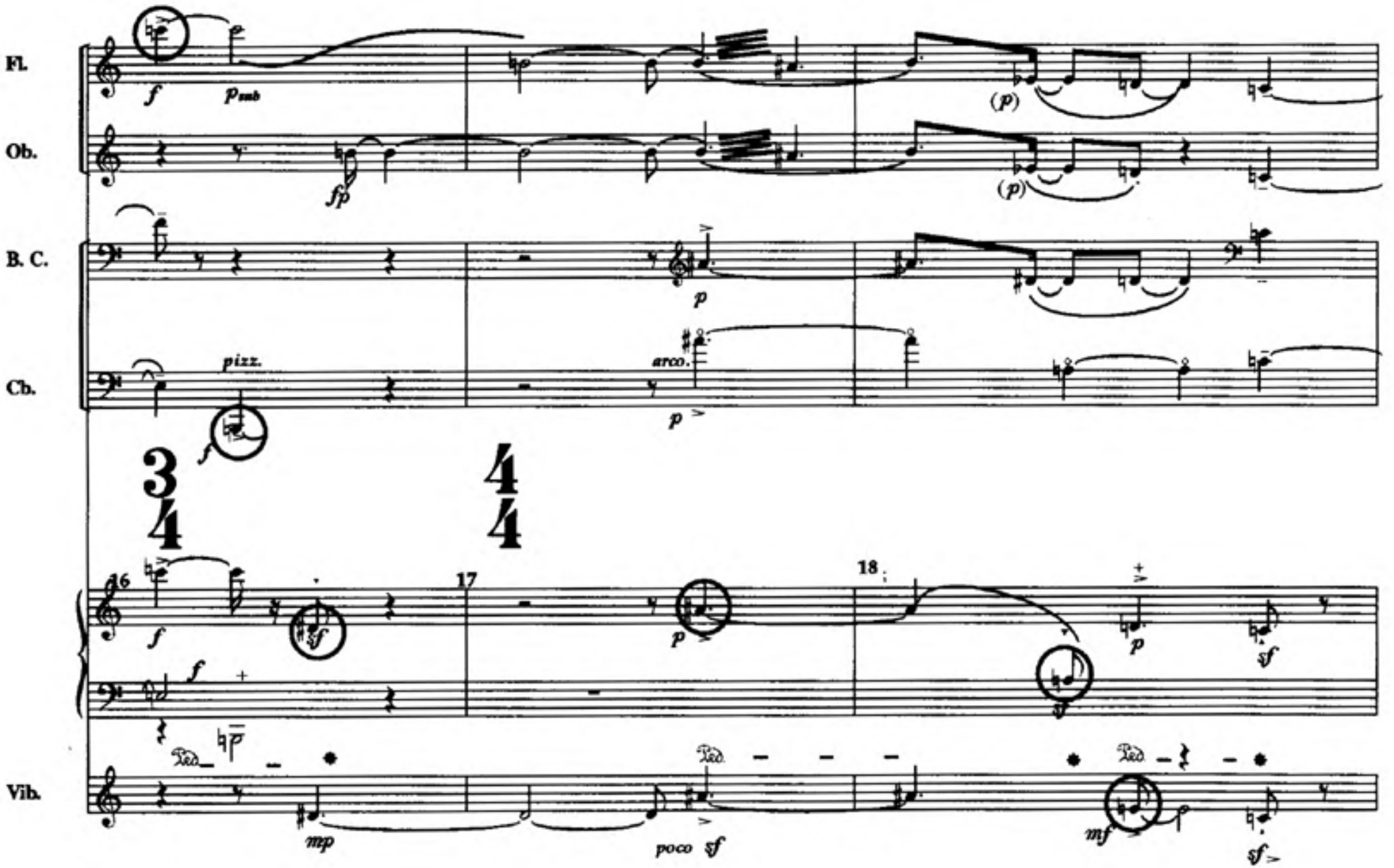
[9] ♪. is the basic unit for the time-point row used with R6 at bar 11; ♪ is the basic unit of the time-point row used in *retrograde* with R11 at bar 14.

[10] For a discussion of the multiplicative operation, see Wuorinen, *Simple Composition*, 98-101. See also John Rahn, *Basic Atonal Theory* (New York: Longman, 1980), 53-55.

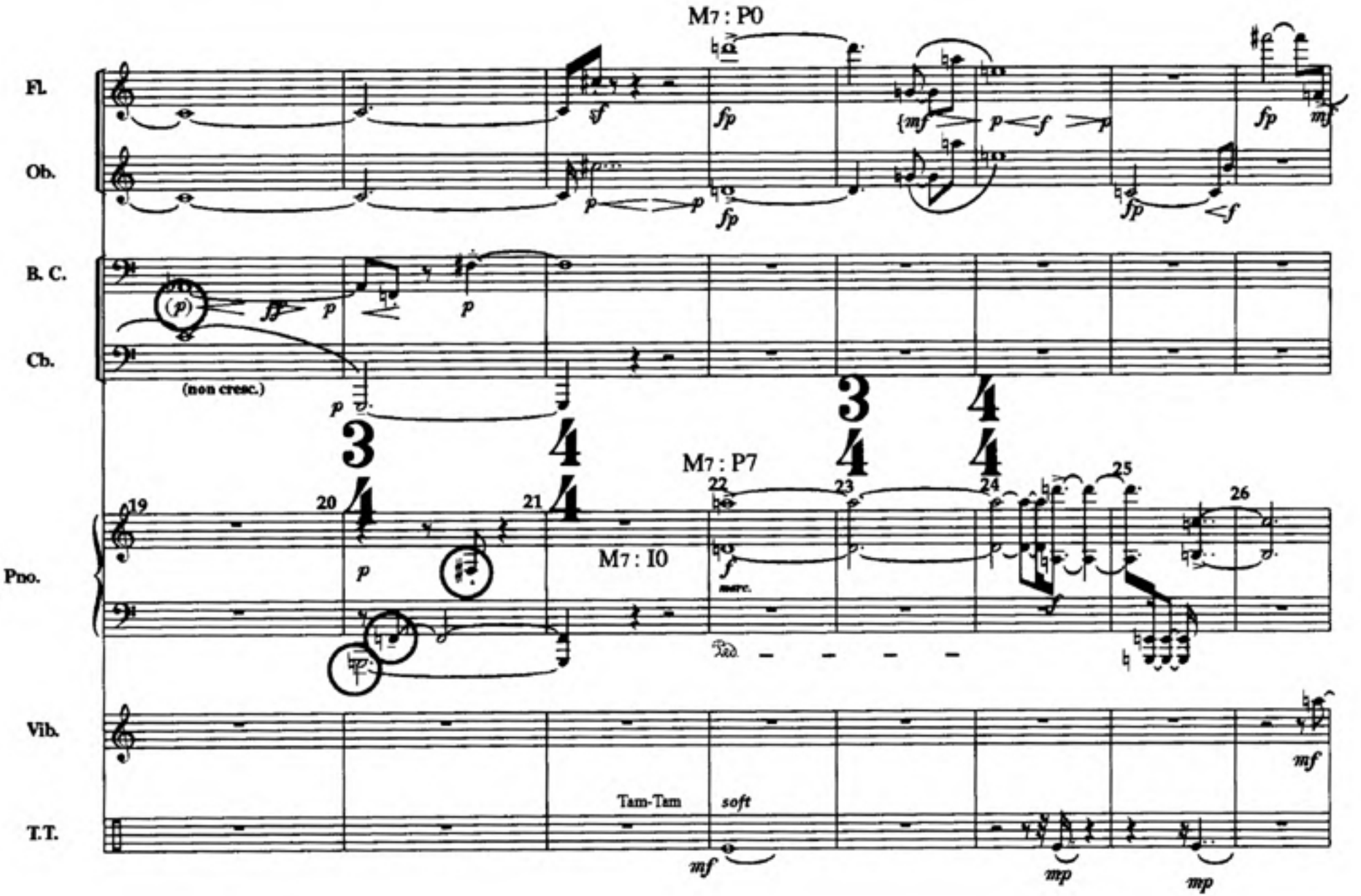
[11] The basic time-point unit of M^7:P0, used in the flute and oboe parts at bars 22+, is an eighth note value; that of M^7:P7 and M^7:I0, used in the piano part at bars 22+, is a value representing seven thirty-second notes (♪..). (Since the first time interval has the value 11, the first piano duration is exactly 77 𝅘𝅥𝅯's (11×7) or 9 ⅝ beats.) The beginning of M^7:P7 is represented by the upper notes of the dyads from bars 22+ until the last sonority of bar 25 where it is transferred to the lower note of the dyad. M^7:I0 is represented by the remaining piano pitches.

Example 2a: bars 10-26




Fl.
Ob.
B. C.
Cb.
Vib.
pizz.
arco.
3/4
4/4
16
17
18
Ped.
mp
poco sf
mf

Example 2a, cont.



Example 2b: The multiplicative operation at bar 22

Pitch-class integers:

P0 =	0	11	1	2	10	3	4	9	5	6	8	7
×7 (mod 12) =												
M^7: P0 =	0	5	7	2	10	9	4	3	11	6	8	1

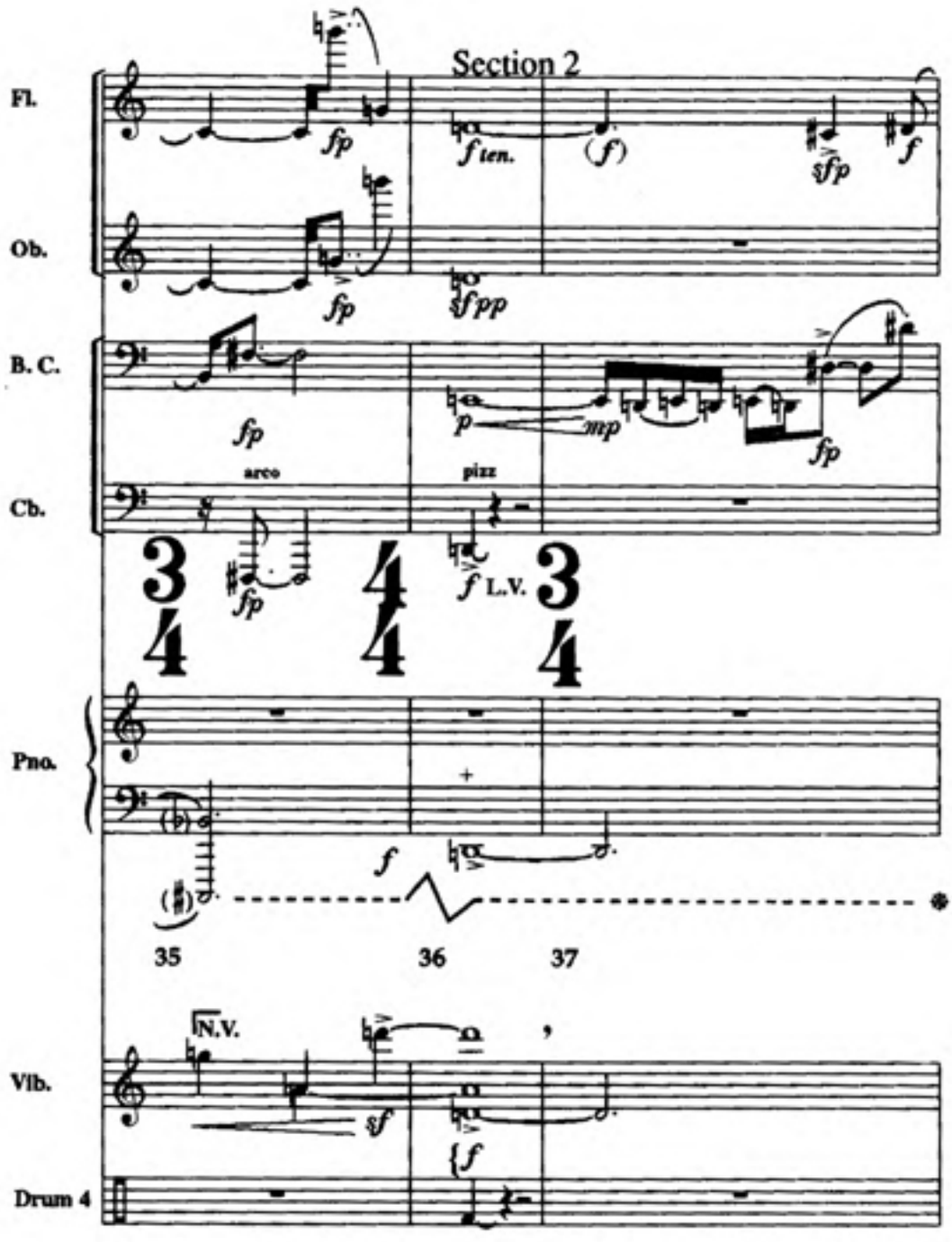
Many similar traits appear in other cadences of *Speculum Speculi*, some of which are illustrated in Examples 3a, 3b, and 3c.[12] Examples 3a and 3b are additional cadences centered on D; Example 3c introduces a section of music focused around A♭. The cadences of Examples 3a and 3b are largely supported by fifth relations, and by symmetries surrounding their pitch centers. Example 3b, the most subtle of the cadences, relies more on articulative and metrical forms of emphasis. Located in the center of Part I of *Speculum Speculi*, this is the last of a series of cadences in D, and, as such, requires the least amount of centric reinforcement.

II

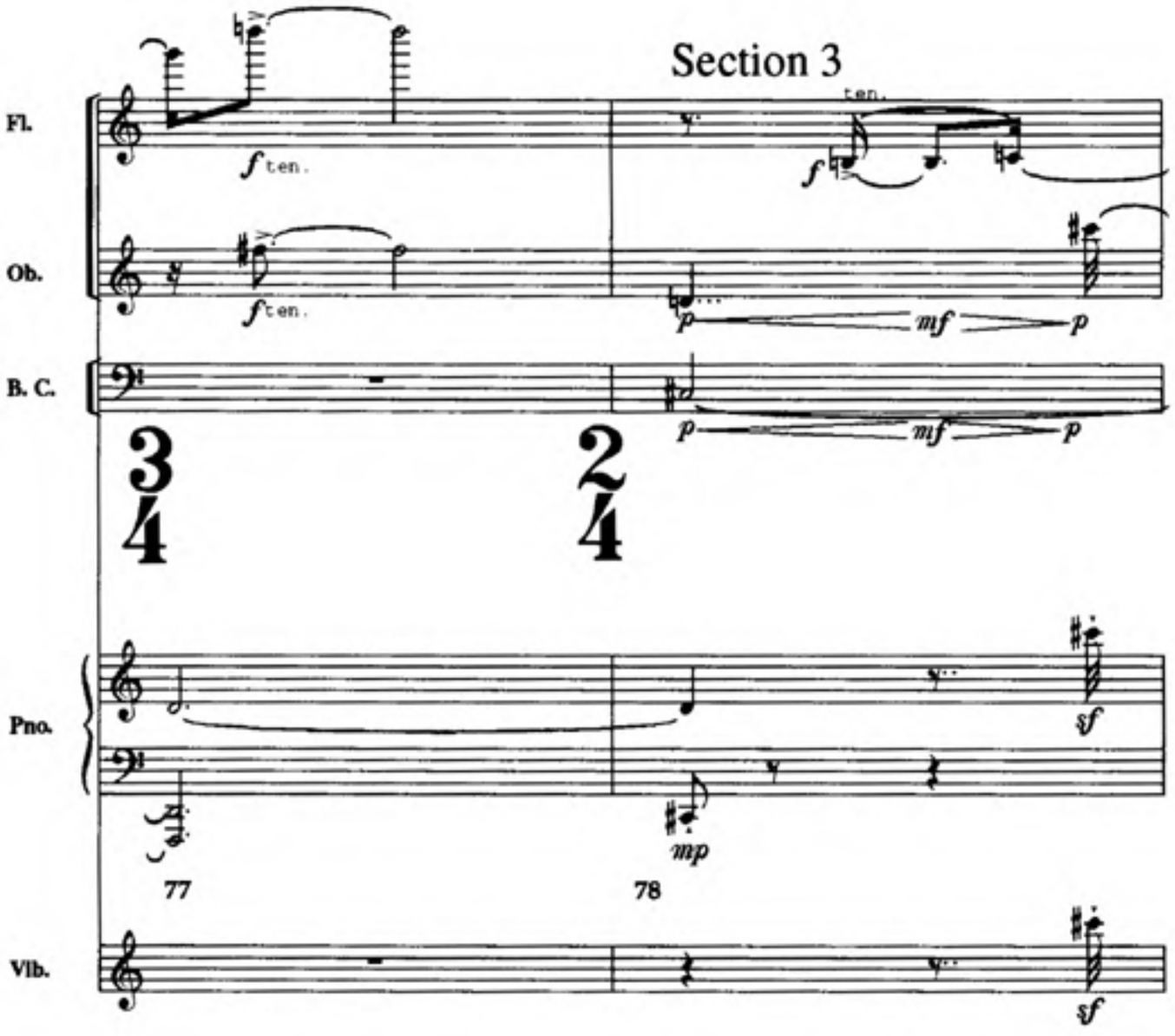
Pitch centricity also helps to organize *Speculum Speculi* as a whole. The basic musical material of the work is presented in its first 144 measures; three transformations of this material follow. Since each of the transformations repeats *all* the material of the first 144 measures, each contains cadences similar to those of Examples 2 and 3. Several types of operations are employed in the generation of each transformation; these operations serve to vary, but never to obscure, the pitch-centric emphasis of each part. One may begin to study the transformations by comparing Examples 4a, 4b, and 4c (bars 162-166, 303-304, and 390-392 of Parts II, III, and IV, respectively) with their equivalent material from Example 2 (bars 22-26 from Part I). The most obvious change is one of transposition level. In Example 4a, the notes of bars 162-166 have been transposed up a

[12]The three cadences of Example 3 divide Part I of *Speculum Speculi* into four sections. Each section becomes gradually denser and faster, a characteristic which is also reflected in the progression of the work as a whole. Interesting similarities and transformations abound between sections. Transformations emphasizing a registral compression of the opening statement may be found immediately following the cadences of Examples 3a and 3b. Timbral variations transform steady vibraphone notes in Sections 1 and 2 into non-pitched tom-tom passages in Sections 3 and 4. Another interesting interrelationship is the retrograding of bars 26-35 of Section 1 in bars 95-106 of Section 3, providing a direct link between these two sections.

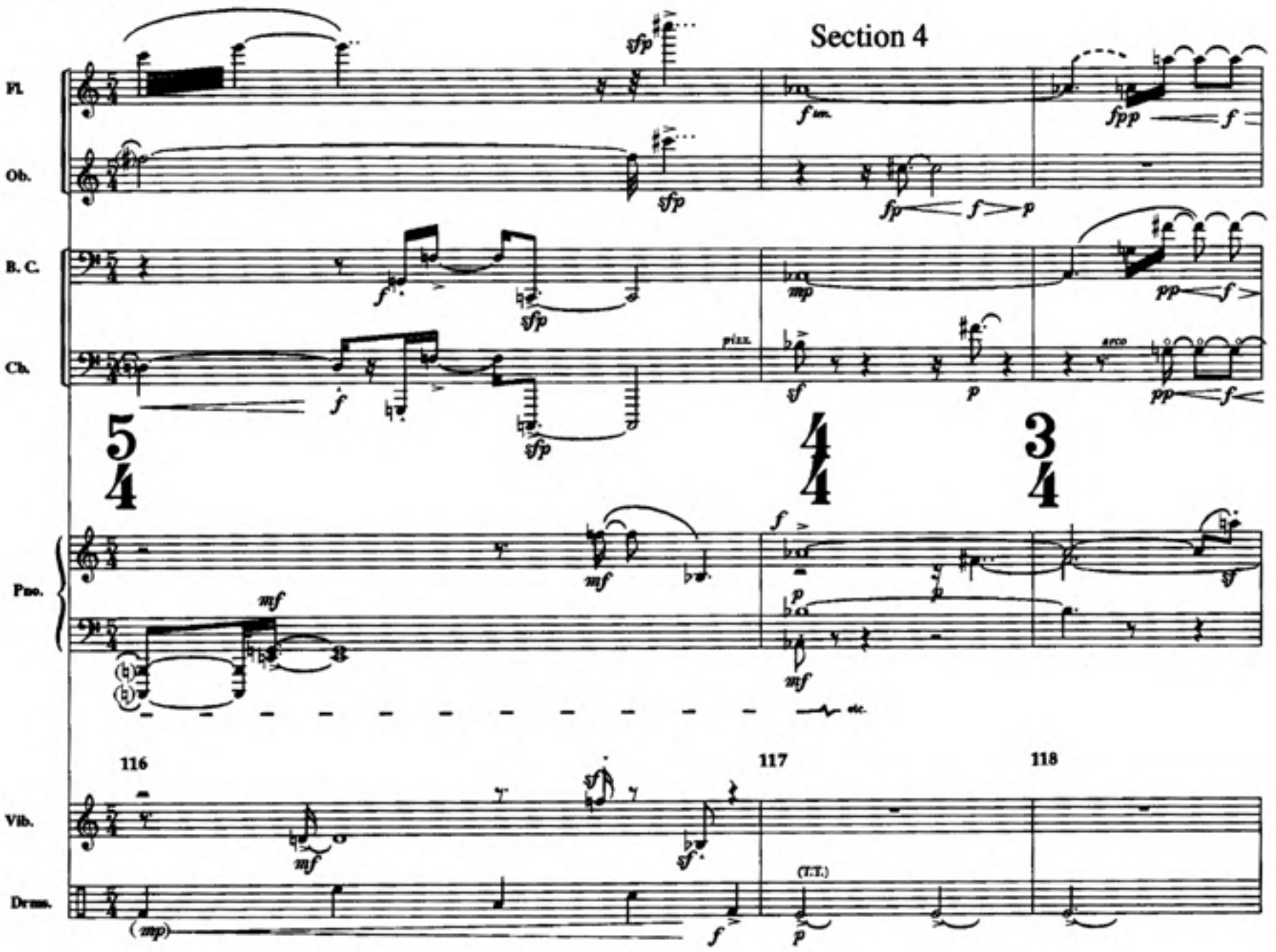
Example 3a: bars 35–37



Example 3b: bars 77–78



Example 3c: bars 116–118



major third from their original pitch level; in Example 4b, bars 303-304 have been returned to their center on D, although other dimensions have been noticeably altered. In Example 4c, bars 390–399 have been transposed *downward* by a major third to B♭.

In each part of *Speculum Speculi*, only one transposition level is utilized throughout the *entire* part. Since most of the cadences of Part I (Examples 2, 3a, and 3b) are focused around the pitch D (the one exception being a secondary area around A♭ in Example 3c), the cadences of each succeeding part likewise emphasize only one primary center. Thus F♯, then D, and finally B♭ emerge as the primary pitch centers of Parts II, III, and IV, repectively. This larger framework, of course, contains its own pitch-centric symmetry, as an equidistant major third relationship is established on either side of the original center, D.

The work's plan is completed by the addition of a Coda which begins at bar 406 (Example 5). The Coda, a singularly virtuosic piece of writing, harkens back to the first statement of the row in the work's opening measures (Example 1a). The piano part of the Coda reiterates the row at its original speed, but combined with it are four other statements of the series, all unfolding at faster rates in the other instrumental parts. Since all the parts unfold at the original D pitch level, the effect is one of re-establishing the initial center as the material of *Speculum Speculi* is summarized and brought to a close.[13]

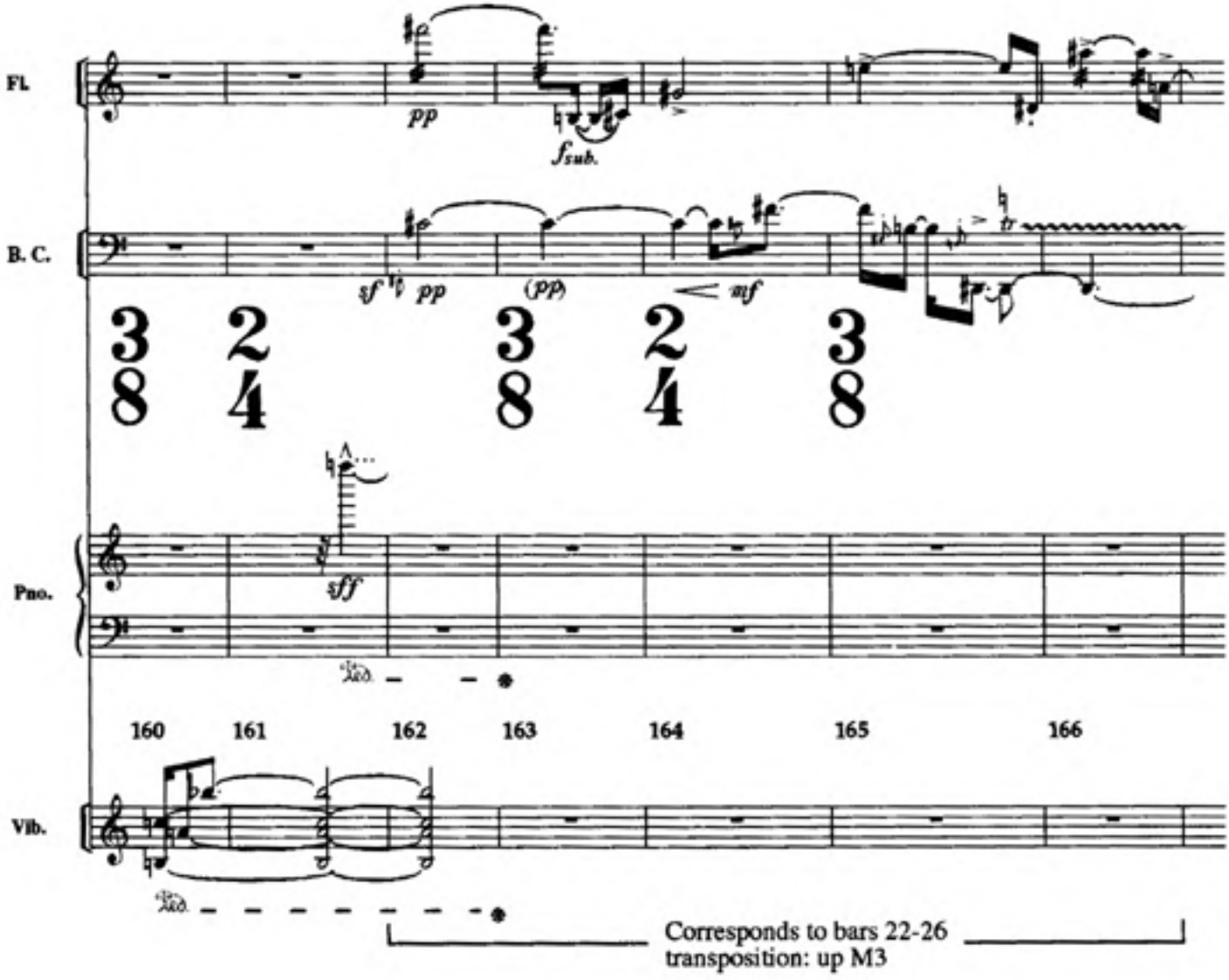
Thus, the completed pitch-centric plan is: D F♯ D B♭ D. The four parts of the work, established by the points at which the new transpositions of material begin, are:[14]

Part I	Part II	Part III	Part IV
bars 1-144	bars 145-261	bars 262-317	bars 318-405

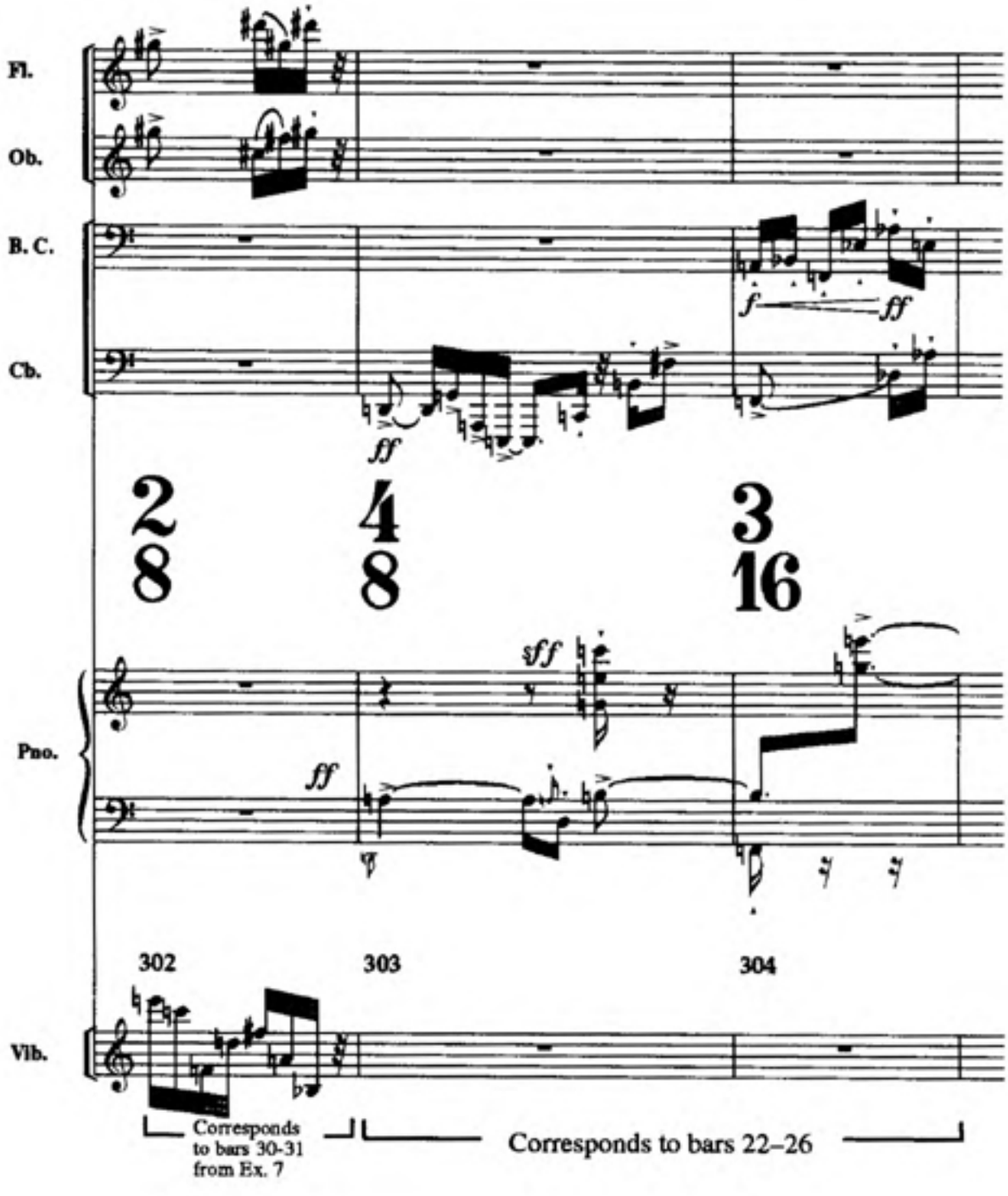
[13]Other pitch centers are also present in the Coda, which summarizes, in many ways, the entire work. A pitch center on G♯ at bars 422+ follows the one on D. At bar 436, a twelve note chord is struck by all instruments simultaneously, from which notes are released in the retrograde order of their position within P0. This leaves a lone D at the final cadence of the work, a note which is followed by a final chord containing F♯, A♯, and G♯. These are the important "secondary" centers of *Speculum Speculi*. The final G♯ is held briefly longer than the other two notes, allowing an additional symmetrical centering to linger as the last chord dies away.

[14]These divisions are not only structurally important; they are also quite audible. The texture of the music varies considerably from one part to another, owing to all of the transformations being applied consistently within a part, and being varied considerably at each divisional boundary. The boundaries are, in addition, articulated by the use of the tom-toms, which suddenly appear or disappear at each juncture point, or abruptly change speeds.

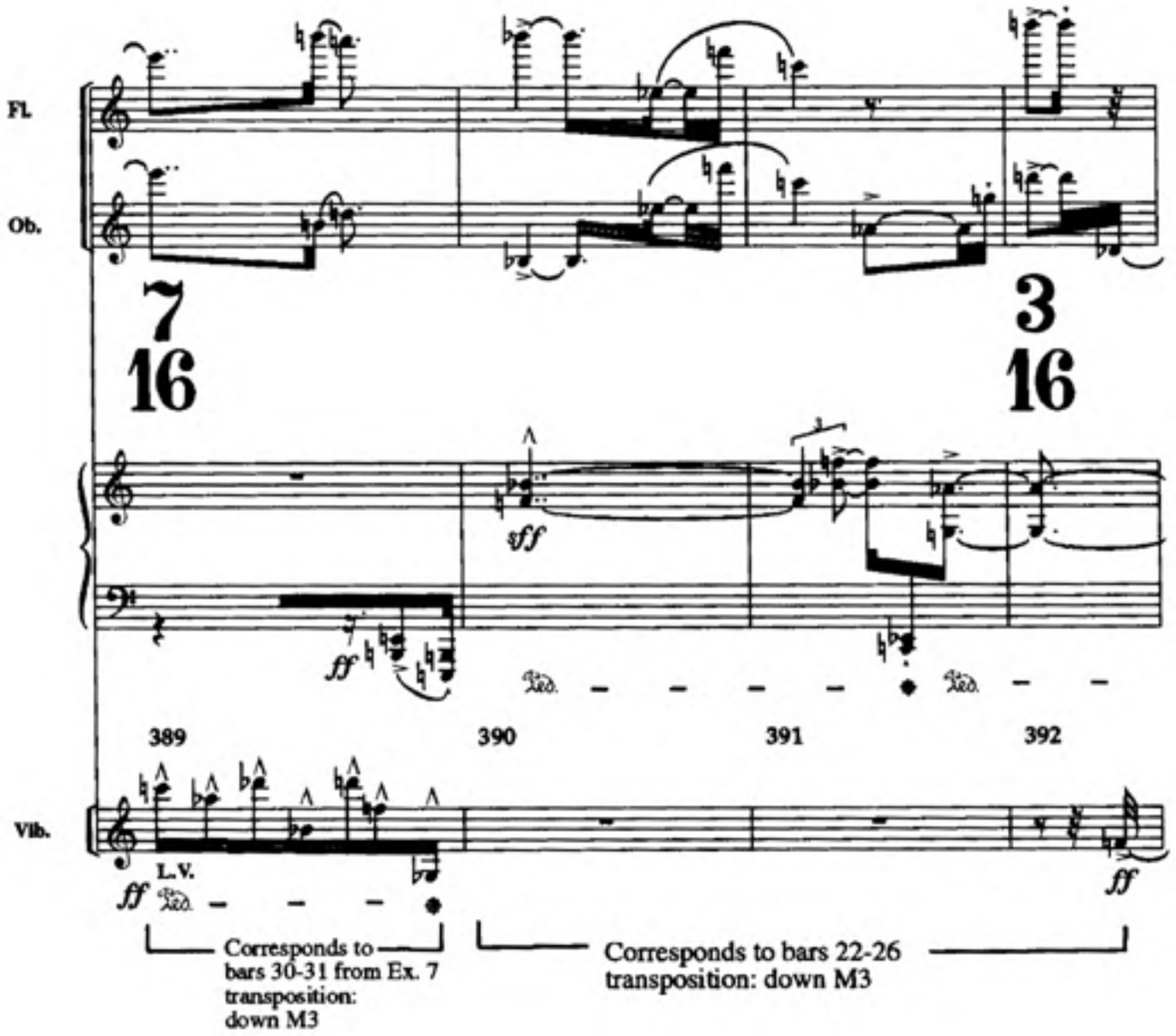
Example 4a: Bars 160–166 (from Part II)



Example 4b: Bars 302–304 (from Part III)



Example 4c: Bars 389–392 (from Part IV)



Returning to the cadences of Example 4, notice that time operations, specifically those applying to the speed of the music, also serve to transform the material of bars 22–26. By comparing the rhythmic values of Example 1 (bars 22-26) with the corresponding values in Examples 4a, 4b, and 4c, the following correlations (summarized in Example 6a-d) may be deduced:

Part I	Part II	Part III	Part IV
original speed	2×	8×	4×

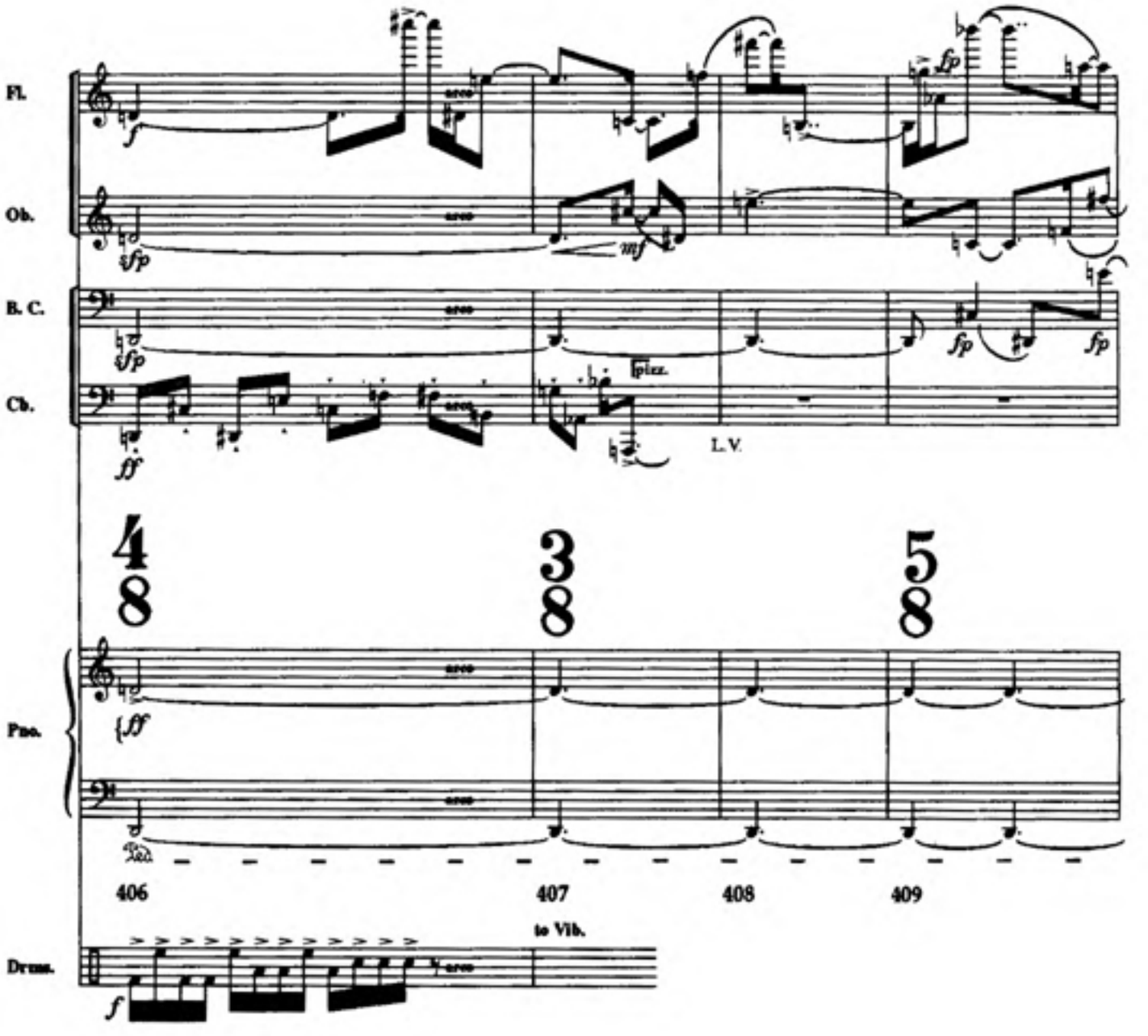
(The Coda, of course, is a summary of all these speeds, plus others). Like the transposition operation, each transformation of speed is applied not only at cadential points, but uniformly throughout an entire part. Since the entire composition is performed at one tempo (♩= 72), the general schema above suggests a temporal syntax for the work.

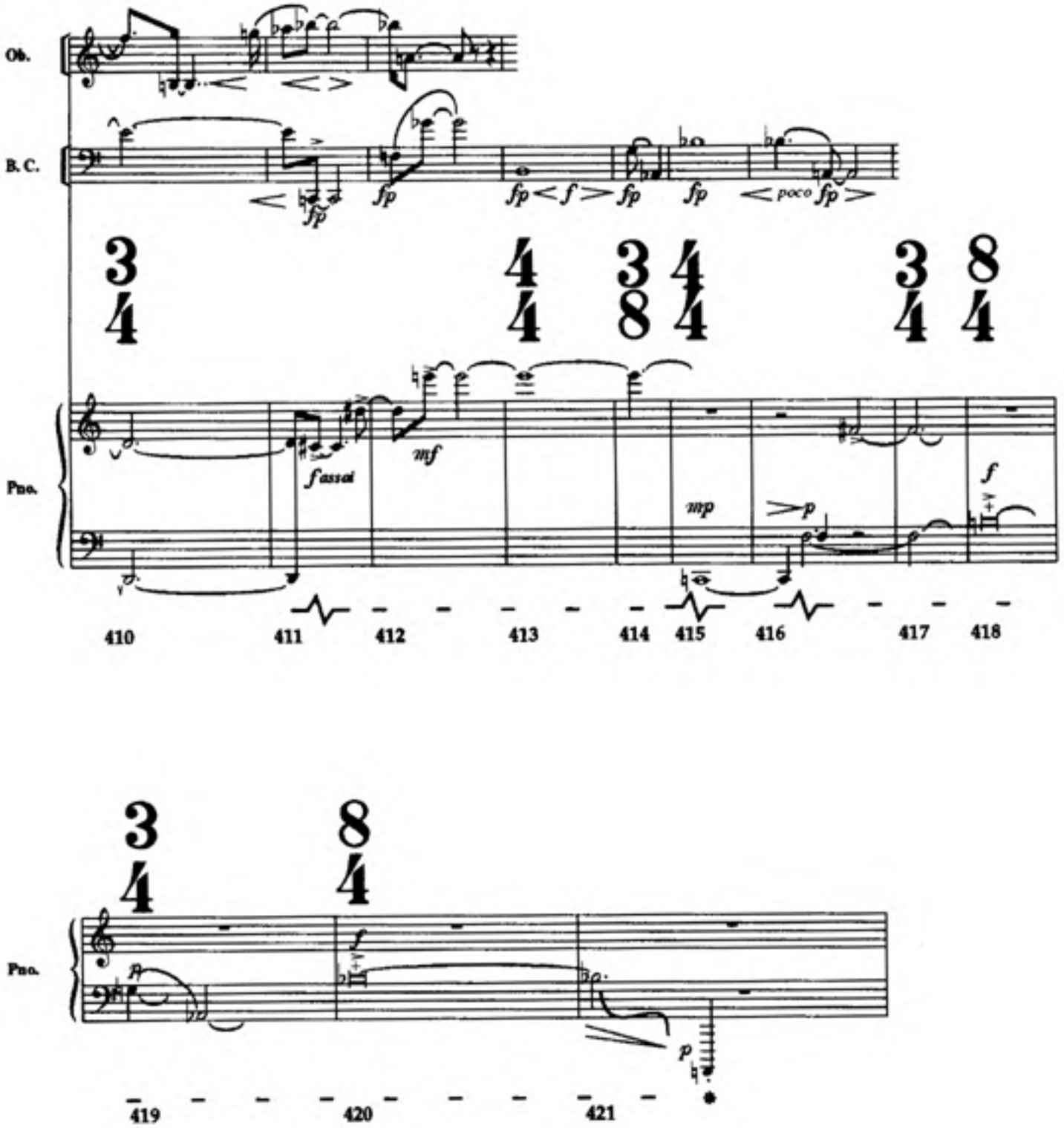
The varying of the speed of the music, of course, has ramifications for the projection of the centricity of each part. In the fastest sections, cadences are often highly compressed, and presented fleetingly. Nonetheless, in no section does the compression of the material cancel the pitch-centric function of the established cadential points. Of particular importance here is the metric placement of the cadential resolutions themselves. In each instance of Example 4, the "downbeat" quality of the sonority of bar 22 is conspicuously preserved. Were this not the case, the cadential feeling would be, at the very least, somewhat diluted, and more likely, significantly altered.

The voice-leading and inner fabric of the material in Parts II, III, and IV are also influenced in varying degrees by the transformations of speed. As the work moves progressively faster towards its center, the initial musical lines, already compressed, are often rearranged as well. If one compares bars 22-26 with bars 303-304 of Part III (Example 4b), all notes are accounted for, but the material is so highly concentrated, that the original contrapuntal strands are somewhat obscured and important new lines begin to emerge. In bar 303, for example, the long a moving to b in the bass of the piano is, in performance, a striking event. This new line is derived from pitches which are not particularly registrally connected in bars 22-26 (a^2 in the piano in bar 22 and b in the piano in bar 25). Rearrangement and combination of individual lines lend a particularly developmental character to Part III.

This is not the case when one compares bars 22-26 with bars 390-392 of Part IV (Example 4c). In this instance, the lines are compressed in time, and somewhat varied registrally, but are otherwise left intact. Part II falls somewhere between these two extremes.

Example 5: Bars 406–421




Ob.
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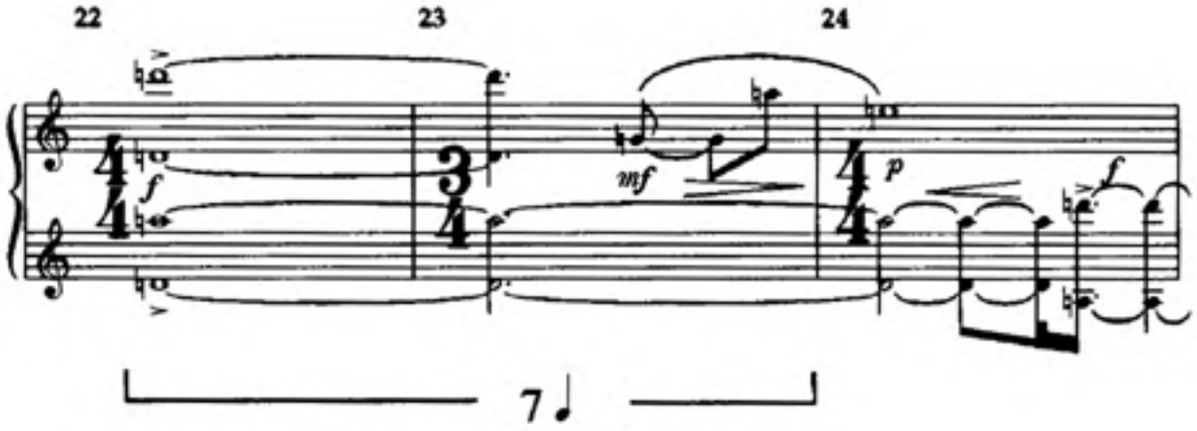
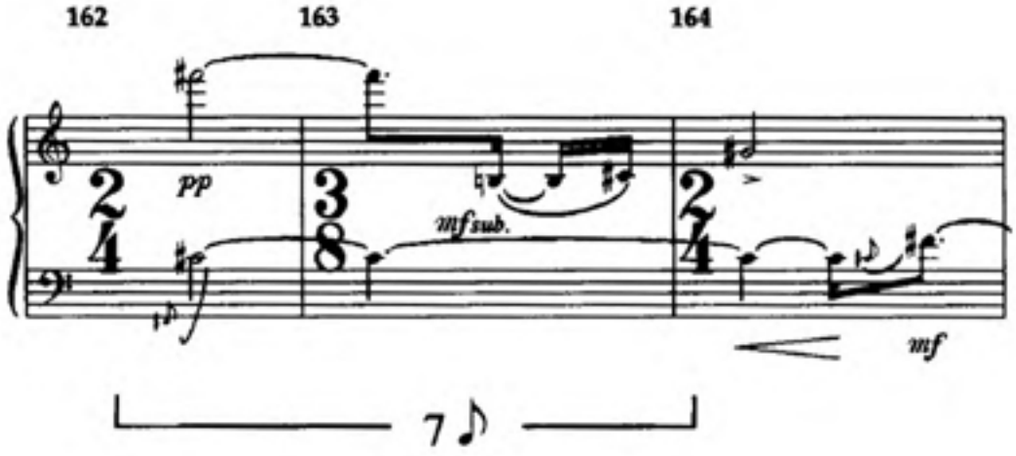
421

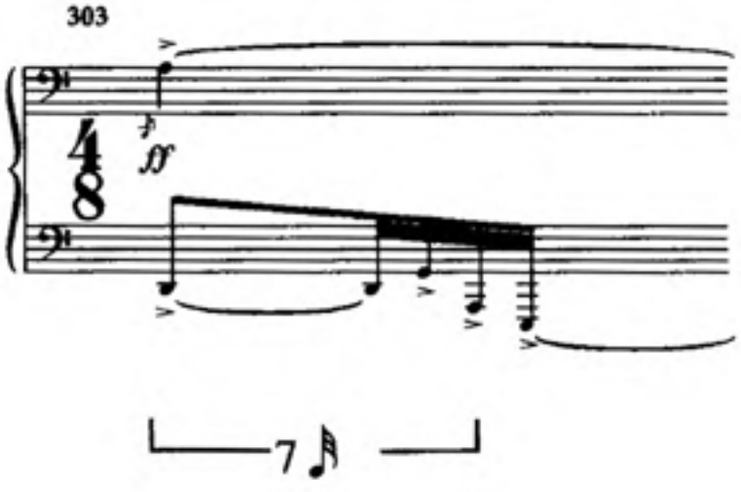
Example 6a: Bars 22–24 from Part I (piano reduction)



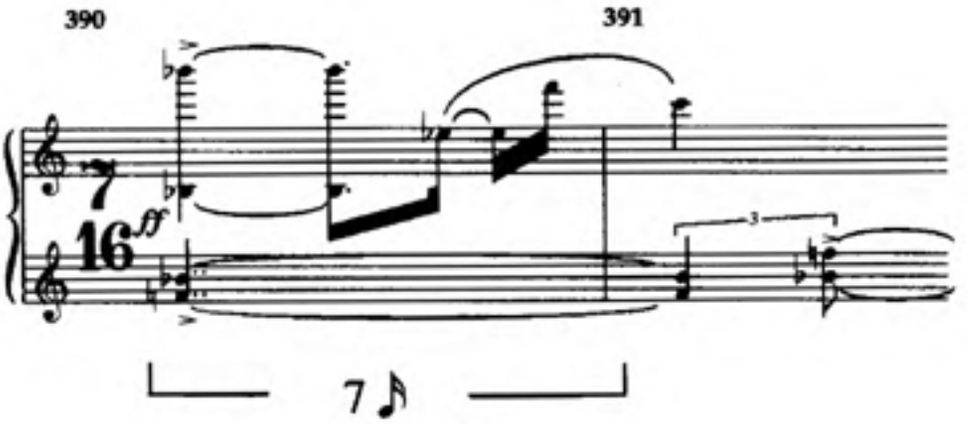
Example 6b: Bars 162–64 from Part II (piano reduction)



Example 6c: Bar 303 (beginning) from Part III (piano reduction)



Example 6d: Bars 390–91 (beginning) from Part IV (piano reduction)

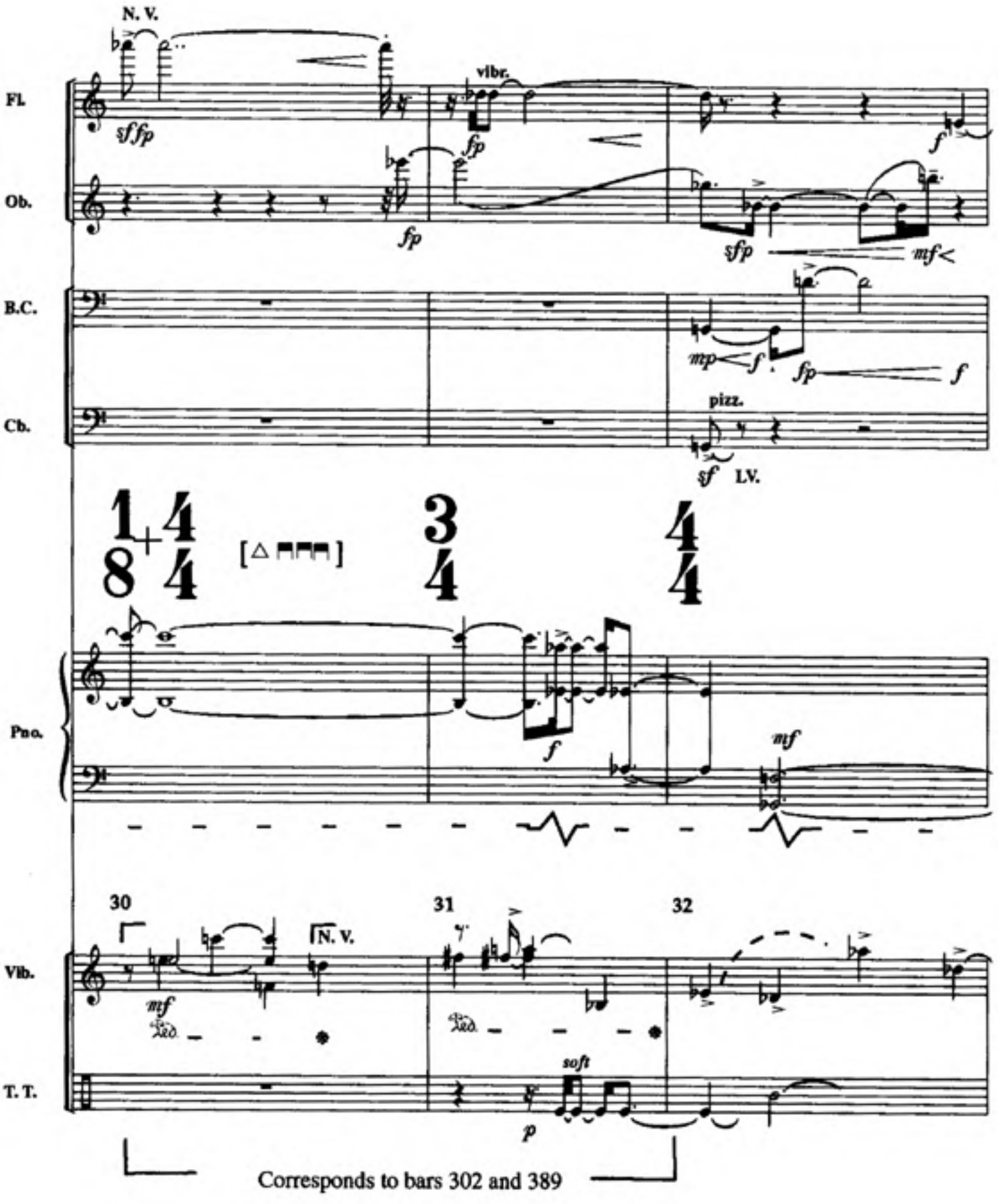


The final significant transformational technique of *Speculum Speculi* is more unusual. It involves "parsing" the material of Part I into small units, and then presenting these units in reverse order. Within each unit, material is presented forwards, thus making this technique quite different from a straight-forward retrograde operation. The "parsing" technique is employed throughout all of Parts III and IV. The appendix (see below) gives the correspondences between the measures of Parts I and III. The divisions established within Part I are then applied identically to produce the music of Part IV.

This technique of variation considerably transforms the music which has been originally presented. New relationships are now forged by combining the end of one passage with the beginning of another that had previously preceded it. An understanding of this procedure now allows us to compare bar 302 of Example 4b, and bar 389 of Example 4c, with the material from which these segments are derived—bars 30-31 of Part I (see Example 7).

The new juxtapositions change the approach to the pitch centers of Examples 4b and 4c from the music which had approached their corresponding cadences in Parts I and II (Example 2a and 4a). Despite these changes, the cadences of Parts III and IV sound as convincing as the earlier ones. The preeminence of d♭ (C♯) in the flute, and e♭ in the piano at bar 31, nicely anticipates the possibility of an upcoming D center, and are important factors in the smoothing of the later "seams." The other cadences noted in Example 3 are accorded the same careful treatment throughout the "parsing" operations of Parts III and IV, and the integrity of their pitch-centric emphasis is equally preserved.

Example 7: Bars 30–32 (from Part I)



A picture of the overall compositional procedure now emerges, and may be summarized as follows:

Parts:	I	II	III	IV	Coda
Primary Pitch Level:	D	F♯	D	B♭	D
Speed:	original	2×	8×	4×	1, 2, 4, 8, +
Presentation of musical surface:	forward	forward	"parsed"	"parsed"	

As the chart illustrates, each transformational operation follows its own inherent pattern. The pitch transformations stray from, but regularly return to D. The speed of the unfolding of the material increases rapidly towards the center of the work, but never extensively recapitulates the leisurely pace of the opening. The exclusive use of the "parsing" operation in Parts III and IV divides the work in half with regard to this particular dimension.

Because the patterns of the various operations are not similar, in combination, their effects sometimes counteract one another. In Part III, for example, the return to the original transposition level of D aids our association of this music with the music of Part I, while the extreme speed of Part III tends to obscure the association. Taken together, the techniques illuminate a formal structure which is highly varied, yet expertly controlled, and which is reinforced by the pervasive pitch-centric associations.

Speculum Speculi is not only composed in a virtuosic manner; it makes formidable demands upon its performers as well. The asymmetries and complexities of the musical surface begin to appear more meaningful after one has linked particular areas to others throughout the work. The details are seen to be interconnected by a wealth of relationships, and these, in turn, reveal and accentuate the structure of a thoughtful, yet dramatic composition.

Appendix

Part III		Part I	
	1. bar 262 (first eight 32nds)		bars 142-144
	2. bar 262 (remainder)		bar 141
	*3. bars 263-264		bars 133-140
	4. bars 265-266		bars 129-132
	5. bar 267		bars 126-128
C	6. bars 268-270	C	bars 117-125
	7. bars 271-272		bars 113-116
	8. bar 273 (first seven 32nds)		bars 111-112
	9. bar 273 (remainder)		bar 109 (second half)
	10. bars 274-276		bars 101-109
	11. bar 277		bars 99-100
	12. bars 278-279		bars 95-98
	** 13. bars 280-284		bars 85-94
	14. bar 285		bars 82-84
C	15. bars 286-287	C	bars 78-81
	16. bars 288-289		bars 71-77
	*17. bar 290		bars 69-70
	18. bar 291		bars 65-68
	19. bars 292-293		bars 61-64
	* 20. bars 294-295 (first half)		bars 53-59
	21. bars 295 (second half)-296		bars 48-52
	22. bar 297		bars 45-47
C	23. bars 298-299	C	bars 36-44
	24. bars 300-301		bars 32-35
	25. bar 302		bars 30-31
C	26. bars 303-305	C	bars 22-29
	27. bars 306-308		bars 14-21
	28. bars 309-310		bars 11-13
	29. bars 311-317		bars 1-10

C denotes cadential points

* denotes a correlation in which several notes do not correspond.

** In this section tom-tom notes are substituted in Part III for the pitched attacks of Part I. This substitution is also present in the corresponding areas of Parts II and IV.