Aspects of Form-Building of Pierre Boulez's *Tombeau* in the Context of Aural and Score Analysis

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ABSTRACT: The research object of this paper is the form-building of Pierre Boulez's *Tombeau* for orchestra and soprano (1959–1962). The piece is inspected from two different angles: first, the focus is on its aural appearance (applying some of the analytical tools of aural sonology); thereafter the composition technique is under scrutiny.

KEYWORDS: *perception, parametric organization, aural sonology, time-fields, technique of frequency multiplication, harmony, timbre*

INTRODUCTION. AURAL SONOLOGY

MUSIC, as one experiences it, discusses it, and enjoys it, is an aural phenomenon. Musical appreciation is unconceivable without considering how the music actually sounds. In active listening process (listening 'for meaning'), we trace objects and forms, observe their growth, transformations and disappearance, attempt to determine relations among them as we do when exploring the world. In the 1960s and 1970s a number of composers and musicologists critically evaluated the fact that the principles of parametric organization of serialism and post-serialism were estranged from their aurally perceptible manifestations – after all, syntax was the *raison d'être* of this music. The parametric organization – thus also the composer's intentions – in serial and post-serial music most often remains hidden for the listener, unless he has studied the score and follows it during the act of listening (also in this case he probably rather knows the structure than hears it).

Whilst hidden structures and symbolism certainly can enrich a musical work, one could argue whether score analysis *par excellence* should be considered as a premise for revealing some **rationality** in a musical work. Rather it seems that in the first place a musical work should reveal some rationality on the aural level alone. Thus the purpose of score analysis would lie in uncovering the inner mechanisms of the aurally grasped sonic discourse, as well as in discovering additional levels of signification that cannot be traced by the listening experience alone.

In this context it is rewarding to consider the analytical tools of aural sonology – a research into a novel approach to aural analysis of sound-objects and musical forms. It has been developed by Norwegian composers and theorists Lasse Thoresen and Olav Anton Thommessen. Their project began in the 1970s; the two main influences were: sonology as taught at the Institute of Sonology, Utrecht, Netherlands, and the phenomenologically oriented, spectro-morphological point of view articulated by Pierre Schaeffer's *Traité des objets musicaux* (1966). Here are some of the main principles of this approach as formulated by Lasse Thoresen:

Aural sonology attempts

- to analyze music as represented on a phonogram, rather than on a score;
- to enhance the listeners' ability to encounter and evaluate the sonorous results of any technical procedure, by an explication and conceptualization of its perceived 'aural syntax';
- to conceptualize and represent graphically that which makes syntactical sense in music-as-heard.

Regarding the methodological approach of aural sonology, a phenomenological perspective is combined with a pragmatic use of selected structuralist techniques. The structural models devised in aural sonology are related to a consistent selection of features in the perceived music. Music as heard is a concretum, and is therefore a composite of several attributes, containing an almost infinite amount of information, given the number of listener intentions by which it can be heard. In this context, the analyst will have to select and focus consistently on one strand of aural order; one that seems to be of importance to the organization of the music as a whole. Such a consistent focus on organizing features within the musical context could be termed an isotopy, the term being adopted from structural semantics. An isotopy in this context is a consistent strand of aural gestalts perceived to contain features essential for the organization of long stretches of the musical discourse. For each particular musical isotopy there is a corresponding particular selective listening intention. Given the composite nature of music, most often several isotopies can be found in a musical work; they may intertwine or interact (cf. Thoresen 2007).

In creating methodical approaches to isotopic structures, aural sonology has thus far focused on the level of musical form. The general isotopies relevant to form-building that Thoresen and Thommessen so far have managed to develop are:

- **time-fields** (the temporal segmentation of the musical discourse);
- **layers** (the synchronous segmentation of the musical discourse);
- **dynamic form** (time directions and energetic shape);

- **thematic form** (recurrence, variation, and contrast);
- **formal transformations** (looser and firmer gestalts, transformations between them).

ASPECTS OF FORM-BUILDING OF *TOMBEAU* IN THE CONTEXT OF AURAL ANALYSIS

When considering Pierre Boulez's *Tombeau* for orchestra and soprano[1] (1959–1962), time-fields, dynamic form and form-building transformations seem to be the three pertinent isotopies that reveal certain logic of the musical construction in its aural appearance.[2] In this paper we will take a closer look at the isotopy of **time-fields**.

At the outset we will provide the theoretical basis of the concept of time-fields as formulated by Lasse Thoresen. Time-fields are musical units or segments that are perceptually discerned by the listener. Time-fields are related to the traditional concepts of a musical phrase, period, sentence or section. Thus a time-field is mostly composed of several sonic objects, or of shorter time-fields. In musical organization the temporal continuum can be conceived as a simultaneous hierarchy of time-field levels. Each of the levels serves a musical function that is not only quantitatively, but also qualitatively different from the others. The time-field levels are considered as 'field depths'; they are numbered beginning with the surface level. An important subject of investigation is time-field conjunctions, i.e., the manner in which time-fields on the same level of field depth are joined. This aspect is divided in two sub-categories: field positioning – the placement of the time fields (the focus is on the proximity of fields; refer to Table 1) – and field demarcation – the way in which the end (and sometimes the beginning) of a time field is demarcated (refer to Table 2) (cf. Thoresen 1987: 211–212).

[1] Soprano voice enters at the very end of the piece (poem by Stéphane Mallarmé).

[2] The basis for the analysis is the recording made by soprano Halina Lukomska and the BBC Symphony Orchestra, conducted by Pierre Boulez (recorded at the EMI Studio in London, May 8–10, 1969, Audio CD, 1995, Sony, B000002C06, producer Paul Myers).

Designation	Notation	Definition
separate positioning		two time-fields are separated with a noticeable silence
bridged positioning		two time-fields are joined by the help of a transitional passage, or by an uninterrupted background
joint positioning		the next field begins just after the first one is ended

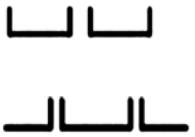
close positioning		the other field takes over in very tight succession
hinged positioning		the ending of the previous time-field forms the beginning of the next
overlapping positioning		the next time-field begins before the previous one is ended
superimposed positioning		time-fields in (at least) two layers are superimposed, and the beginnings and endings of these fields do not coincide

Table 1. Time-field positioning. From Thoresen (1987: 213).

Designation	Notation	Definition
vague demarcation		it is not clear exactly where one field starts and another ends
open demarcation		the usual manner for ending a phrase-field in classical music
conclusive demarcation		a strong demarcation of the field's ending; the normal way to end a sentence-field in classical music
cut demarcation		a sudden time-field ending (or abbreviation); or a sudden beginning
disjointed demarcation		a very abrupt time-field ending (or beginning)

Table 2. Time-field demarcation. From Thoresen (1987: 213).

The perception of the musical form of *Tombeau*, as gained from listening to the phonogram, is strongly determined by relations between areas of clear-cut segmentation (more or less distinct time-fields) and those of blurred or even no perceptually discernible divisions of the musical flow

(vague or dissolved time-fields). In this respect, we can notice a five-part structure:

- **A** (clear-cut segmentation) – from 0'00" till 0'50" (bars 1–41 in the score): each time-field on the surface level is articulated by a discrete sonic object with an average duration of but a few seconds;
- **B** (clear-cut segmentation with occasional 'complexities') – from 0'50" till 2'36" (bars 42–127): the average durations of the time-fields on the surface level increase; occasionally the time-field demarcation is vague;
- **C** (blurred segmentation) – from 2'36" till 8'16" (bars 128–369): the durations of the time-fields on the surface level are varied and highly irregular, occasionally with drastic leaps from relatively short to long and/or vice versa. They are quite frequently positioned in overlapping manner; their demarcation is sometimes vague.
- **D** (no segmentation) – from 8'16" till 11'24" (bars 370–518): this fragment resists attempts for syntactical division;
- **E** (clear-cut segmentation) – from 11'24" till 13'50" (bars 519–548): each time-field on the surface level is articulated by a more or less discrete sonic object with an average duration of but a few seconds, alluding to the beginning of the piece.

Thus from the beginning of the piece until 11'24" the listener's ability to aurally subdivide the musical flow gradually decreases; the attention is drawn to ever deeper time-field levels: from level 0 via level 1 to level 2 (the time-field hierarchy of Boulez's *Tombeau* consists of four levels: 0–3). Such a process results from increasingly more and more amorphous state of the sonic substance, grading out the inner differentiation and temporal segmentation of the musical material. Hence the listener's perception during the piece becomes increasingly more general and passive. The climax of this process – the musical fragment from 8'16" to 11'24" – is in a sharp contrast to the beginning of the piece where discrete musical objects can be distinguished as characteristic and distinctive sense-units. Thereafter, in the musical fragment from 11'24" until the end of the piece, the focus of perception is drawn back to the time-field level 0: from 11'24" to 13'06" $fields_0$ consist of characteristic sound patterns, a kind of motivic elements, but from 13'06" until the end of the piece we hear a sequence of pointillistic sound objects that closely relates to the beginning of the piece. Table 3 illustrates the structure of the time-field isotopy in this piece.[3]

[3] A time-field focus is occasionally marked in this table (using a tagged line), designating moments when the listener's attention is noticeably shifted from one level of the time-hierarchy to another. The timing is rounded up to seconds.

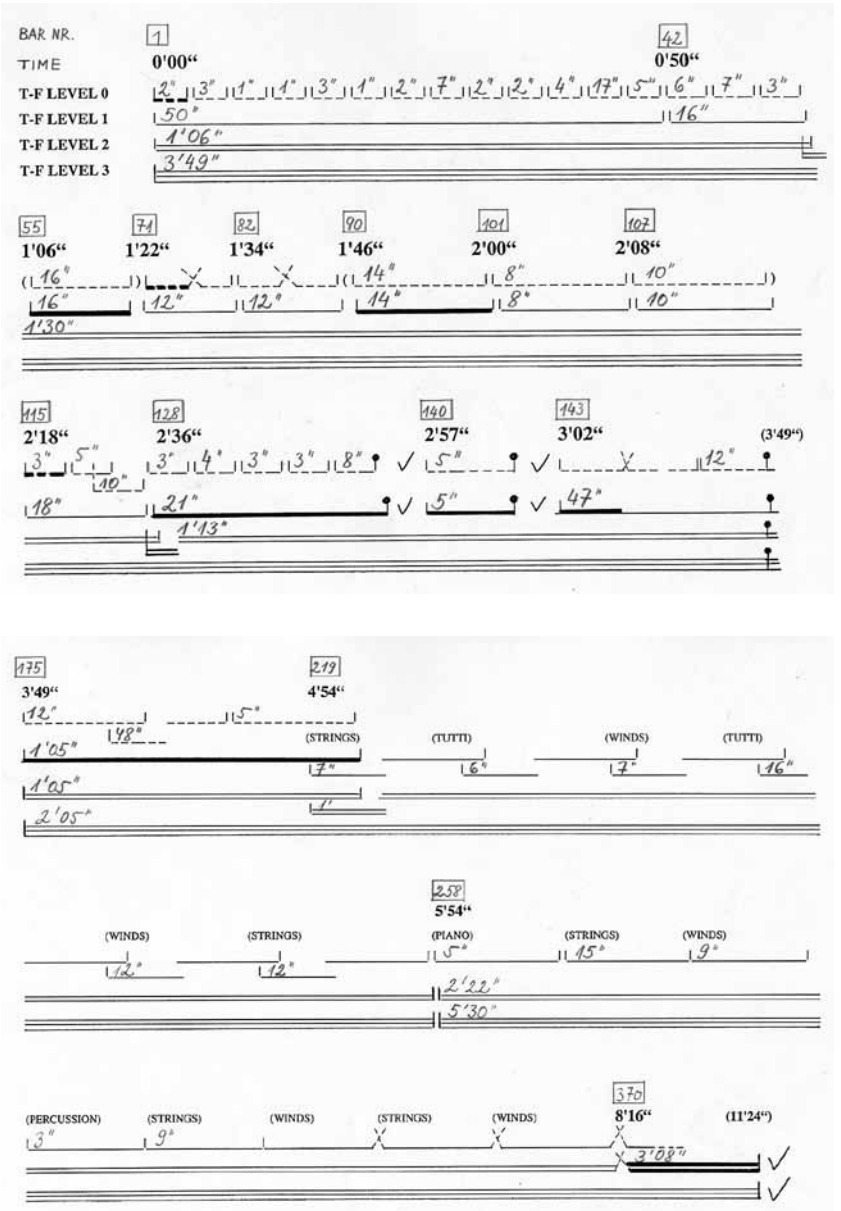


Table 3. The structure of the time-field isotopy in *Tombeau*.

ASPECTS OF FORM-BUILDING OF THE FIRST SECTION OF *TOMBEAU* IN THE CONTEXT OF SCORE ANALYSIS

It seems reasonable to assert that the parameter of harmony functions as the 'backbone' in the structural organisation of the first section of *Tombeau* (bars 1–174). The harmonic material is generated using the technique of frequency multiplication[4] – Boulez's own original extension of serial method that he first utilized in the vocal cycle *Le marteau sans maître* (1955). Like Stockhausen's group technique, Boulez's technique of frequency multiplication marks a new stage in the serial thinking, being motivated by the desire to overcome the static, repetitive nature of dodecaphony and total serialism. The following citation from treatise *Boulez on Music Today* (first published in 1963 as *Musikdenken heute-1*) reflects the basic notion of his individualized conception of serialism:

> *The series is – in very general terms – the germ of a developing hierarchy based on certain psycho-physiological acoustical properties, and endowed with a greater or lesser selectivity, with a view to organising a FINITE ensemble of creative possibilities connected by predominant affinities, in relation to a given character; this ensemble of possibilities is deduced from an initial series by a FUNCTIONAL generative process (not simply the consecutive exposition of a certain number of objects, permutated according to restrictive numerical data)* (Boulez [1963] 1971: 35-36).

In creating "a finite ensemble of creative possibilities" (quoted after Boulez 1971: 35) in the pitch sphere, Boulez utilizes a generative process consisting of four stages. In the context of *Tombeau* these stages can be traced in the following way[5]:

- design of the general series (refer to the pitch disposition of the structure **A** in Table 4);
- segmentation of the general series in **frequency groups** (Lev Koblyakov's term; here and further cf. Koblyakov 1993) according to the chosen proportion row 2-4-2-1-3[6] (refer to the frequency groups **a**, **b**, **c**, **d**, **e** of the structure **A** in Table 4);
- rotation of the proportion row (4-2-1-3-2, 2-1-3-2-4, 1-3-2-4-2, 3-2-4-2-1), thus obtaining four derived series with new frequency groups (refer to the structures **B**-**E** in Table 4);
- multiplication of the frequency groups within each series: one group is 'multiplied' with another (**aa**, **ab**, **ac,** etc.), namely, one group is transposed onto all the frequences of another group, resulting in a new kind of complex – we will name it a **harmonic block** (Boulez treats it as a set of pitch-classes – not absolute pitches: hence octave doublings, if any, are removed – whose octave dispositions are to be determined by other organisational

[4] Boulez uses word "frequency" instead of "sound" (see Boulez [1963] 1971).

[5] Significantly, there are direct links between the harmonic materials of *Le marteau sans maître* and *Tombeau*: the two pieces share a common general series as well as specific strategy of its frequency multiplication. Thus Lev Koblyakov's account on *Le marteau sans maître* (in his book *Pierre Boulez: A World of Harmony*, published in 1993) has served as the guidline for tracing the generative process of the pitch material in *Tombeau*.

[6] The numbers in the proportion row denote the quantity of tones in frequency groups.

factors). Thus from each series five **harmonic fields** (Koblyakov's term) are deduced (**A/I–V**, **B/I–V**, **C/I–V**, **D/I–V**, **E/I–V**). The five harmonic systems obtained (after Koblyakov – **harmonic domains**) make up the harmonic reservoir for the piece – the "finite ensemble of creative possibilities" (refer to Table 5; note that Boulez replaces the first harmonic field of each harmonic domain with the relevant series – general or derived – in its characteristic segmentation).

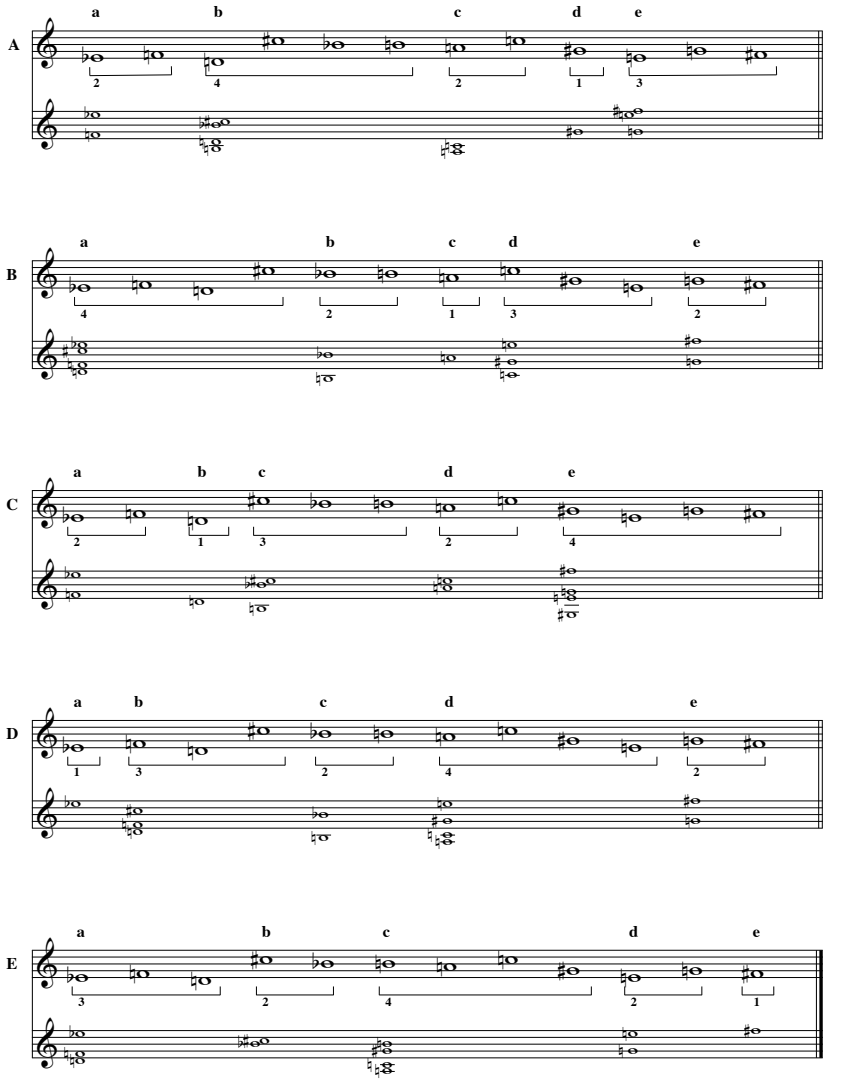


Table 4. General and derived series with their respective frequency groups.

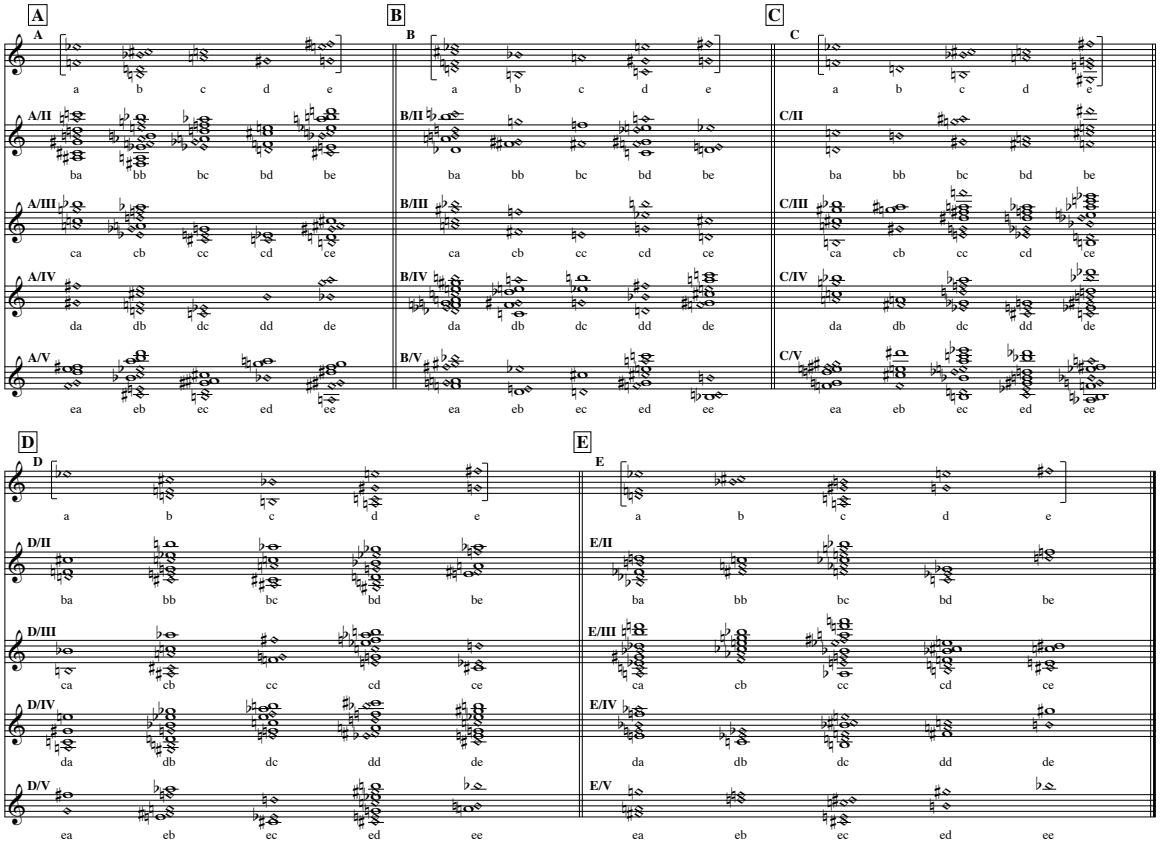


Table 5. Multiplication of the frequency groups. The table made on the basis of Koblyakov (1993: 137).

During the first section of *Tombeau* the texture is gradually stratified in three interdependent, hierarchycally related layers (the onset points of these are: first layer – bar 1, second layer – bar 42, third layer – bar 84). The first layer functions as a pillar, a kind of *cantus firmus*. When considering its construction, we would like to focus on the coexistence of the seemingly independent structures of **harmony** and **timbre**. The harmonic material of *cantus firmus* is formed by the general series and four derived series that altogether constitute a sequence of 25 frequency groups. This sequence is cyclically repeated four times (fourth cycle is incomplete), the periodicity being marked by the pitch-classes only, since their octave dispositions constantly change (refer to Table 6). The manner in which Boulez links the frequency groups in the *cantus firmus* layer does not create an impression of a progression where one frequency group leads to the next, but rather embodies a continuously evolving harmonic field, whereby a frequency group or some portion of it is frequently sustained as a kind of resonance during the sounding of one or two (occasionally even more) subsequent

frequency groups (the frequency groups are executed at irregular time-intervals).

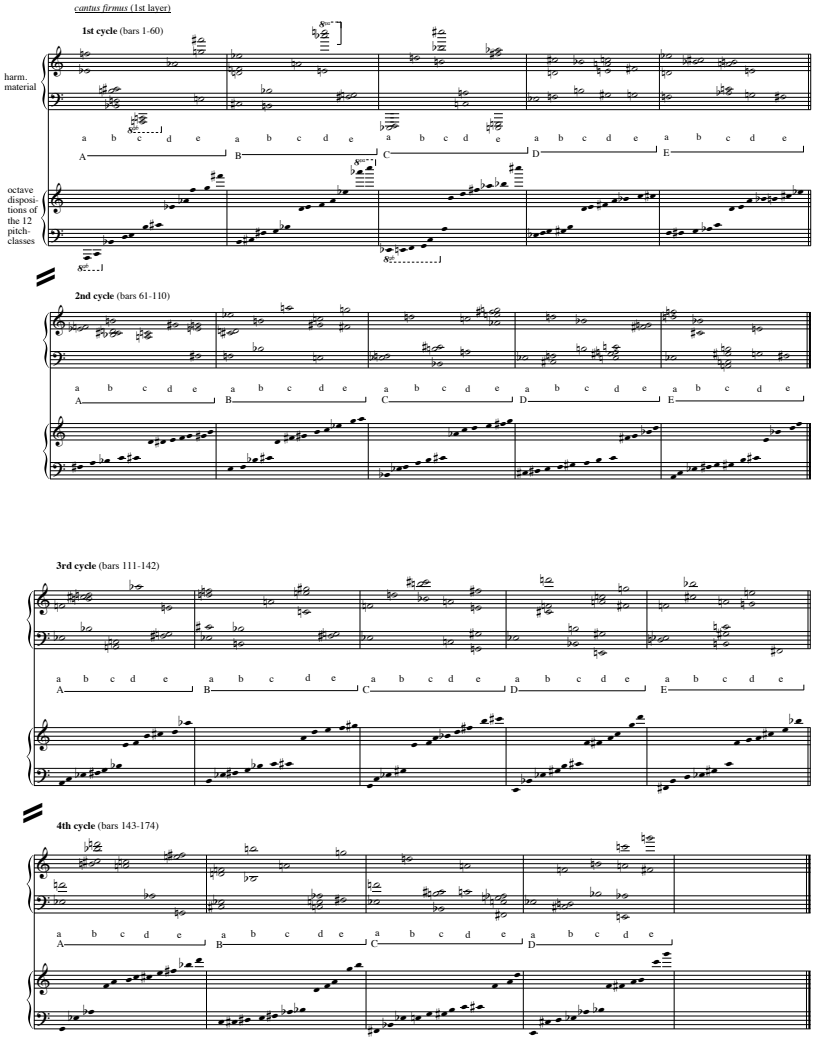


Table 6. The harmonic material of *cantus firmus* layer (bars 1–174).

The timbre structure of *cantus firmus* is characterized by specific alternation of the structural units that we will name the **timbre blocks**; a timbre block comprises the color of one or two (mixed) orchestral groups[7] (e.g., I or I/II). The timbre blocks are organized according to the principle that we will name the **timbre patterns**; in a timbre pattern some orchestral group distinguishes itself as the leading color, whilst the other orchestral groups take turns as supplementary timbres (e.g., the first timbre pattern: I – I/II – I/III – I – I/IV – I/V – I/VI – I – I/V). In the four timbre patterns the orchestral groups I, V, IV and VI act as the respective leading colors. The number of timbre blocks in the timbre patterns is varied, as is the number

[7] The orchestra consists of six groups: I – solo piano; II – 2 harps, celesta, vibraphone, guitar (electrically amplified); III – horn, 2 trumpets, 3 trombones; IV – 2 flutes, English horn, 3 clarinets, basson; V – xylophone, bells, timpani, vibraphone, 3 gongs, 3 tam-tams, bass-drum; VI – 4 violins, 4 violas, 2 cellos, 2 double-basses.

of frequency groups per timbre block. The junctures of timbre patterns do not coincide with those of the pitch series or the cycles of 25 frequency groups: the structures of timbre and harmony unfold as if independently from one another. The difference between the two parametric organisations is underlined by the essentially contrasting nature of their construction: the predominant periodicity (thus statics) in the pitch sphere is opposed to the clear procesuality (thus dynamics) in the timbre sphere (refer to Table 7).

(beginning)

Harmonic structure	Cycles	1st cycle: bars 1–61							
	Series	**A**		**B**			**C**		**D**
	Frequency groups	**a b c d e**		**a b c d e**			**a b c d e**		**a**
Timbre structure	Timbre patterns	**1st pattern** (9 timbre blocks): bars 1–42							
	Timbre blocks	**I**	**I/** II	**I/** III	**I**	**I/** IV	**I/** V	**I/** VI	I	**I/** V
The nr. of frequency groups in each timbre block		2	4	2	1	1	2	2	1	1
The nr. of frequency groups in each timbre pattern		16								

(cont.)

(1st cycle)				**2nd cycle:** bars 61–111			
(D)		**E**		**A**		**B**	
b c d e		**a b c d e**		**a b c d e**		**a b**	
2nd pattern (8 timbre blocks): bars 43–83							
V/ II	**V/** III	**V/** IV	**V/** VI	**V/** III	**V/** II	**V/** IV	**V/** VI
2	2	2	2	2	2	2	2
16							

(2nd cycle)								**3rd cycle:** bars 111–142				
(B)		**C**		**D**	**E**			**A**		**B**		**C**
c d e		**a b c d e**		**a b c d e**	**a b c d e**			**a b c d e**		**a b c d e**		**a b**
3rd pattern (10 timbre blocks): bars 84–127												
IV	**IV/** VI	**IV**	**IV/** III	**IV/** II		**IV/** VI	**IV/** III	**IV/** II	**IV/** III		**IV/** VI	
2	1	1	4	6		1	3	4	4		4	
30												

Table 7. The outline of the pitch/timbre parametric polyphony in the *cantus firmus* layer (until bar 125).

The idea of harmonic cycles is preserved in the construction of the second and third textural layer as well. In the second layer one cycle comprises a sequence of five harmonic fields (25 frequency groups): **B/II–C/II–D/II–E/II–A/II**; it is repeated three times (first cycle – bars 42–107, second cycle – bars 108–161, third cycle (incomplete) – bars 161–174). In the third layer one cycle comprises a sequence of five harmonic fields (25 frequency groups): **C/III–D/III–E/III–A/III–B/III**; it is repeated two times (first cycle – bars 84–158, seconds cycle (incomplete) – bars 159–174). Significantly, the lenghts of the harmonic cycles of the three layers do not coincide (refer to Table 8).

<table>
<tr><td>Bar nr.</td><td>1–42</td><td>43–61</td><td>61–83</td><td>84–107</td><td>108–111</td><td>111–142</td><td>143–158</td><td>159–161</td><td>161–174</td></tr>
<tr><td>First layer (cantus firmus)</td><td colspan="2">1st cycle
(A-B-C-D-E)</td><td colspan="3">2nd cycle</td><td>3rd cycle</td><td colspan="3">4th cycle (incomplete)</td></tr>
<tr><td>Second layer</td><td></td><td colspan="3">1st cycle
(B/II – C/II – D/II – E/II – A/II)</td><td colspan="3">2nd cycle</td><td>3rd cycle (incomplete)</td></tr>
<tr><td>Third layer</td><td colspan="3"></td><td colspan="3">1st cycle
(C/III - D/III - E/III - A/III - B/III)</td><td colspan="2">2nd cycle (incomplete)</td></tr>
</table>

Table 8. The outline of the interaction of the three layers'harmonic materials.

In the second and third layer, like in cantus firmus, the periodicity is marked by the pitch-classes only; their octave dispositions at any given moment are adjusted to those set by the cantus firmus. Thus octave doublings are avoided, and the common register becomes one of the main reasons for the convergence of the layers. From this compositional decision alone we can infer that Boulez intended the second and third layer to function as a kind of 'resonance chamber' for the cantus firmus. Two further observations contribute to such an evaluation of the relations between the layers. Firstly, the manner in which Boulez links the frequency groups: in contrast to the continuity of cantus firmus, the two other layers are 'notched' with relatively long pauses (from bar 128 onwards, however, the second layer is continous), thus being fragmented in segments with varied number of frequency groups (like in cantus firmus, here too the frequency groups are executed at irregular time-intervals):

second layer	2-4-4-4-4-4-4-2-2-5-**24**
third layer	2-4-1-1-2-2-6-2-2-4-2-2

Moreover, the frequency groups here are not overlapped, but rather clearly juxtaposed. Secondly, until bar 127 only orchestral groups I and V are used: significantly, the sound of their instruments dies away after the attack, thus effecting the subordinate nature of these layers. However, it should be pointed that from bar 128 onwards the second layer rises as equal to the *cantus firmus*: the change of its status is determined by its henceforth continous structure (no 'notches') as well as the use of orchestral group IV (woodwind instruments) with its sustained sound instead of orchestral group V (percussion).

In the construction of second and third layer we also can discern parametric polyphony of harmony and timbre, however, it is less evolved compared to the *cantus firmus*: the timbre patterns are simplified, since no supplementary timbres are added to the orchestral groups that function as leading colors. While the harmonic structures of the three layers coexist, runing as if independently from one another, it is another matter regarding their timbre structures: they are closely integrated on the basis of canonic relations with almost synchronized juncture points of the timbre patterns. Thus a compound timbre structure is created; timbre here becomes one of the perceptually most efficient sonic components exhibiting a clear procesual tendency (from sound that dies away after the attack to the sound that is sustained) and dividing the first section of the piece into four subsections. Some other parameters – tempo, vertical density, (dis) continuity, horizontal density – with varying degree of perceptive efficiency also contribute to such a segmentation as well as to the effect of processual transformation. The following table schematically reflects the interraciton of these parameters and provides the summary of the procesual tendencies.

<table>
<tr><td colspan="2">Bar nr.</td><td>1</td><td>42/43</td><td>82/84</td><td>126/128/130</td></tr>
<tr><td rowspan="6">Timbre</td><td rowspan="2">The leading timbre of the first layer (orch. group nr.)</td><td>I</td><td>V</td><td>IV</td><td>VI</td></tr>
<tr><td colspan="2">sound dies away after the attack</td><td colspan="2">sound sustained</td></tr>
<tr><td rowspan="2">The timbre of the second layer (orch. group nr.)</td><td rowspan="2"></td><td>I</td><td>V</td><td>IV</td></tr>
<tr><td colspan="2">sound dies away after the attack</td><td>sound sustained</td></tr>
<tr><td rowspan="2">The timbre of the third layer (orch. group nr.)</td><td></td><td></td><td>I</td><td>V</td></tr>
<tr><td></td><td colspan="2">sound dies away after the attack</td><td></td></tr>
<tr><td colspan="2">Tempo</td><td>minim = MM. 60</td><td>minim = MM. 50</td><td>minim = MM. 44</td><td>minim = MM. 40</td></tr>
<tr><td colspan="2">Vertical (textural) density, i.e., the number of polyphonic layers</td><td>1</td><td>2</td><td>3</td><td>3</td></tr>
<tr><td rowspan="3">Continuity / discontinuity</td><td>The first layer</td><td colspan="4">continuous</td></tr>
<tr><td>The second layer</td><td></td><td colspan="2">discontinuous</td><td>continuous</td></tr>
<tr><td>The third layer</td><td colspan="2">predominantly figural/gestural treatment (relatively high horizontal density (‘complex’)</td><td colspan="2">discontinuous</td></tr>
<tr><td colspan="2">Horizontal (rhytmic) density, i.e., the manner in which frequency groups are exposed</td><td>predominantly block-like entities with various grace-notes (relatively low horizontal density, ‘simple’)</td><td colspan="2">→</td><td>predominantly figural/gestural treatment (relatively high horizontal density, ‘complex’)</td></tr>
<tr><td colspan="2">Summary of the procesual tendencies of the above parameters into formal functions</td><td>initio – exposition</td><td colspan="2">movere – development (growth, differentiation)</td><td>terminus – climax</td></tr>
</table>

Table 9. Interraction of several parameters dividing the first section of *Tombeau* into four sub-sections.

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