

Rhythmic Cells and Organic Development: The Function of Harmonic Fields in Movement IIIb of *Livre pour quatuor* by Pierre Boulez¹

Jean-Louis Leleu

Among the “esthetic oppositions” which he submits to critical examination in “Toward an Informal Music” (lecture given in Darmstadt in 1961 and published in a reworked form in 1963), Adorno gives quite particular importance to the illusion of the “organic” work of art. The natural model of the living organism, which, in esthetics, already plays a central role in Hegel’s thinking, was established definitively by the major music theorists – particularly of tonal music – beginning in the first decades of the twentieth century. Heinrich Schenker, in a significant way, published two essays in 1926 in the second volume of *Das Meisterwerk in der Musik* entitled “On the Organicism of Sonata Form,” (“Vom Organischen der Sonatenform”) and “The Organicism of the Fugue” (“Das Organische der Fuge”).² As different as was his manner of analyzing and evaluating works, the same sense abounded in August Halm, assimilating the notion of “form” to that of “organism”, and judging composers in their capacity to create large forms which were more than the skillful succession of events determined by the simple application of a pre-existing schema.³ The ideal of an “organic whole” is no less present in Schoenberg,⁴ and more generally in the musicians of the Second Viennese School. Thus, Erwin Ratz based all of his “Introduction to the Theory of Musical Forms” on a vision of the musical work conceived as *Gesamtorganismus* (complete organism).⁵ In all cases, what is emphasized is the link of functional interdependence which should be established between the whole and the parts.

¹ This text is the revised version of an article published in French under the title: “Cellules rythmiques et développement organique : la fonction des champs harmoniques dans le mouvement IIIb du «Livre pour quatuor» de Pierre Boulez,” in *Musicalia : annuario internazionale di studi musicologici*, 2004 - N. 1 pp. 89 – 105.

² Cf. Heinrich Schenker, *Das Meisterwerk in der Musik*, vol. II, Munich-Vienne-Berlin, Drei Masken Verlag, 1926, pp. 43-54 and pp. 55-95, English translation: *The Masterwork in Music: A Yearbook*, William Drabkin, ed., trans. by Ian Bent et al. Cambridge [UK], New York: Cambridge University Press, 1994 - 1997.

³ See the richly documented commentary of Siegfried Schmalzfriedt in the essay with which he preceded his second edition of Halm’s writings (August Halm, *Von Form und Sinn der Musik*, Wiesbaden, Breitkopf & Härtel, 1978, p.19 et seq.).

⁴ We read right at the beginning of *Fundamentals of Musical Composition*, in the chapter dedicated to form: “Used in the aesthetic sense, form means that a piece is *organized*, i.e. that it consists of elements functioning like those of a living *organism*.” (Arnold Schoenberg, *Fundamentals of Musical Composition*, Gerald Strang and Leonard Stein [eds.], London, Faber and Faber, 1967, p. 1; composer’s emphasis). Even the term “*Gliederung*”, omnipresent in the writings of Schoenberg is intimately linked to the notion of an organic whole.

⁵ Cf. Erwin Ratz, *Einführung in die musikalische Formenlehre*, third edition revised, Vienne, Universal Edition, 1973, p. 18; the preface of the first edition (1951) forcefully underlines this assimilation of the musical work to a living organism. (*ibid.*, p. 8 et seq.).

The thought developed by Adorno in “Vers une musique informelle” is constructed, in the spirit of Halm, around the opposition of “organic”/ “mechanical”, in light of which the philosopher, attempts to sketch the outlines of a possible music to come beginning with a critical evaluation of recent musical trends. All in underlining what is problematic – even ideological – in the absolute identification of the work with a living organism, Adorno nevertheless maintains the demands of a rigorous organization which he feels is incumbent upon the composer/subject: the “process of concrete realization of a whole which is only at one with the sum of its parts and not a mere subsumption under some general abstract concept by which the parts could be juxtaposed”⁶ remains essential for him. Beside the idea of an organic whole, however, Adorno places that of organic *deployment*, characterized by a specific form of continuity in which the model is provided, in his view, by the “leading tone” (*Leitton*) of the tonal idiom and the chromatic shift:

– the minimal, so to speak effortless motion by semitone is regularly associated with the suggestion of vegetational impulse: as if it were, not organized but rather, spontaneously, growing to its goal without any subjective intervention.⁷

The characterization of Berg as “Master of the Smallest Link” – an expression itself which goes back to Wagner⁸ – puts the accent on the composer’s skill in allowing the music to “grow” in this way, as if by an almost vegetational development – to which, Adorno underlines, is added, a pronounced penchant for “organic proliferation” (*das organisch Wuchernde*)⁹: the entangling of musical texture, pushed to the extreme. This reflection on the analogical application of the term “organic” to specific musical situations prompts extension to composers to which it was only applied, at the very most, initially, and in an easy and imprecise manner, but whose musical thought it could rightly help clarify and characterize. It is of interest to see, in particular, how the issue of the organic and the mechanical - which Adorno strives to update and reformulate according to his own idea of the musical avant-garde of the ‘fifties in “Vers une musique informelle” - could be accessed and treated concretely in a significant work from the beginning of this avant-garde: in this case, the *String Quartet (Quatuor à cordes)* by the young Pierre Boulez (1948-49), which became, under a later reworking, his *Livre pour quatuor* in 1954.

⁶ Theodor W. Adorno, “Vers une musique informelle,” in *Gesammelte Schriften*, vol. 16, Francfort, Suhrkamp, 1978, p. 526s. [“der konkrete Prozeß einer werdenden Einheit von Ganzem und Teil, nicht ihre Subsumtion unter dem abstrakten Oberbegriff und danach die Juxtaposition der Teile.”]. English translation [“Toward an Informal Music”] in *Quasi Una Fantasia: Essays on Modern Music*, Rodney Livingstone, trans., London-New York : Verso,1992. On the difficulties of the position defended by Adorno, see the remarks by Gianmario Borio in *Musikalische Avantgarde um 1960*, Laaber-Verlag, 1993, pp. 103 et seq.

⁷ Adorno, *op. cit.*, vol. 16, p. 526. [“Der minimale, gleichsam anstrengungslose Übergang des Halbtonschritts assoziiert sich regelmäßig mit der Erinnerung an pflanzlich Treibendes, als wäre er nicht veranstaltet, sondern wüchse zu seinem Telos ohne subjektiven Eingriff von sich aus.”]

⁸ See the preface by Jean-Louis Leleu to the French translation of Adorno’s book on Berg: Theodor W. Adorno, *Alban Berg. Le maître de la transition infime*, Paris, Gallimard, 1989, p. 12.

⁹ Adorno, *op.cit.* vol. 16, p. 422. English translation [“Berg’s Discoveries in Compositional Technique,] also in *Quasi Una Fantasia: Essays on Modern Music*, Rodney Livingstone, trans., London-New York : Verso,1992.

Analysis

The group of constituent developments of movements III and V of the *Livre pour quatuor* draw their substance from the endlessly varied combination of a certain number of rhythmic cells which - according to the composer's own terminology - the current movement IIIc "exposes".¹⁰ In the initial state of the work (the *String Quartet* composed in 1948-49), IIIc constituted the first folder of the third movement, originally conceived as a single structural block (see Figure 1). Three families of cells (**a**, **b**, and **c**) are clearly distinguished in this "exposition." Their presentation gives way itself to three successive developments with well defined characteristics, somewhat like "zero developments"¹¹ - two "slow" parts ("*Lent, furtif*" / "*Plus large, affirmé*") framing a long central, more animated part ("*Un peu plus vif: très libre et mobile*"). The 25 cells from the **a** family and 19 from **c** which are played in the structural extremities (i.e. the "*Lent, furtif*" / "*Plus large, affirmé*") take the form of expressive, autonomous gestures clearly differentiated in the musical presentation: Boulez designates them with the term "rhythms" in the sketch where the schema of the third movement is written out in its initial conception.¹² Even in the extreme cases where they only contain a note surrounded by rests, each of these "rhythms," has its own respiration and physiognomy, and this remains true for whatever transformations they may undergo in their reappearance in the developments of IIIa and of IIIb. As for the central part, it is characterized by a polyphonic texture of extreme density, much in the spirit of what Adorno raises as the distinctive characteristic of Berg's music: each of the four instruments articulates, on both sides of a central point (measure 33), a succession of more or less complex cells engaged here in continuous motion: 33 cells (17 +16) in the first violin, 36 (2 x 18) in the second violin, 34 (2 x 17) in the viola, and 32 (2 x 16) in the cello.¹³

Movements IIIa, IIIb and V consist of a succession of developments in which the totality of cells (or "rhythms") of the three families "exposed" in IIIc is found in constantly varied dispositions and combinations.¹⁴ Movement IIIa, for example, comprises four developments: the first redistributes **c** rhythms to the four instruments (in retrograde) followed by **a** rhythms (original order), the fourth, conversely, the **a** rhythms (original order) followed by **c** rhythms (in retrograde) while at the center, two successive developments reiterate **b** cells

¹⁰ Cf. the sketch where the general organization of the third movement of the *String Quartet* is devised (Basel, Paul Sacher Foundation, Collection Pierre Boulez, Folder B, 1a). The different sketches relative to this movement are retranscribed (with some mistakes) with commentary in Thomas Bösch, "A propos du *Livre pour quatuor*," *Musik-Konzepte* 89/90, 1995, pp. 98-105 (the transcription of the sketch mentioned above is found on p. 98. et seq.)

¹¹ "Zero development" refers to a free-standing developmental structure unrelated to any exposition - typically in the initial formal position within the larger form and also possibly in larger sequences as in the *Livre pour quatuor*.

¹² Cf. note 9 above.

¹³ In the edited score, the middle of the section is indicated by a small vertical mark which is found at the end of measure 32 in the first violin and 'cello parts, and after the first sixteenth of measure 33 in the viola part.; in the second violin part where it is missing, the mark should be placed in the middle of measure 33. The dotted marks signal, for their part, the limits of different cells of the 'b' family (some are missing).

¹⁴ In the ink manuscript of *Livre pour quatuor*, the four movements bear the generic title of "*Mutations*": IIIc is "*Mutations: état*", IIIa "*Mutations: éclats*", IIIb "*Mutations: fragments*", and V "*Mutations: échange (alternative)*." Note that in the sketch mentioned above (note 9), Boulez reserves the term "development" for the sections where the cells of family **b** return. ("Dvt sur milieu b" [Dvt on middle of b]).

- IIIc: «exposition », in 3 phases = «0 developments»:
- a) «Lent, furtif » : **a** cells (mm. 6-21)
 - b) «Un peu plus vif : très libre et mobile» : **b** cells (m. 21-47)
 - c) «Plus large, affirmé» : **c** cells (m. 46-59) [46 since the parts overlap]
- IIIa : 4 «developments»
- a) Development 1, «Assez large» : **c** cells + **a** (mm. 4-33)
 - b) Development 2 = 2.1., «Un peu plus vif : très libre et mobile»: **b** cells (m. 34-61) [first mutation of b) of IIIc]
 - c) Development 3 = 2.2., «Tempo un peu plus rapide et encore plus mobile»: **b** cells (mm. 62-100) [second mutation of b) of IIIc]
 - d) Development 4, «Lent » puis « Plus large » : **c** cells + **a** (mm. 100-134)
- IIIb : 2 «developments»
- a) Development 1, «Assez vif, très mobile » : **b** cells (mm. 1-51) [third mutation of b) of IIIc]
 - b) Development 2, «Large, affirmé» puis «Lent, furtif»: **c** cells + **a** (mm. 52-76)

Figure 1: Formal Schematic of *Livre pour quatuor* in 1954 as Found in the Initial State of the Work in the *String Quartet* (1948-49)¹⁵

allocated in each case to a different instrument other than the initial instrument. The return of **b** cells, in IIIa as in IIIb, is effected according to very precise rules which the composer writes down in a separate sketch.¹⁶ In the first development of IIIa (measures 34-61), they are played one by one in strict alternation, starting either at the beginning or the end of the central part of IIIc and proceeding towards its middle: the first cell starts from the end of the central part of IIIc, the second from the beginning etc. or *vice versa*. Thus the first violin and the 'cello, who play the cells given respectively in IIIc to the 'cello and the viola, begin with the very last (retrograde in the first violin, original order in the 'cello), followed by the very first (the assignment of original and retrograde orders reversed between the violin and 'cello), and so on. The second violin and the viola, who play cells given (respectively) in IIIc to the first and second violins, begin equally with the very first followed by the very last etc. (following the same principle of original and retrograde presentations of the cells). In the second development (measures 62 – 100), the cells are played two by two, and, this time,

¹⁵ In the sketch where Boulez wrote the plan of movement III (before modifying the order of the parts) the current movement IIIc is properly designated as “exposition,” but the term “development” only appears for what he calls «middle of b» [“milieu b”] (in fact the term “rhythmes” – “cells”- is only used for materials **a** and **c**). In other words, he designates as «Dvt sur milieu b» [development on middle of b] parts b) and c) of IIIa, and as «2^e Dvt sur milieu b» [second development on middle of b] as part a) of IIIb in Figure 1.

¹⁶ Cf. Thomas Bösch, “A propos du *Livre pour quatuor*” (‘On *Livre pour quatuor*’), *op. cit.*, p. 101.

The image displays two systems of musical notation for a string quartet. The first system consists of four staves, each beginning with a treble clef and a common time signature. The first two staves are marked with a dynamic of *mf* and feature a mix of *Pizz* (pizzicato) and *Arco* (arco) passages. The third and fourth staves are marked with *mf* and *mp* respectively, with the fourth staff also including *Arco* and *Pizz* markings. The second system also consists of four staves, with the first two marked *mf* and the last two marked *mp*. This system includes *Arco* and *Pizz* markings, as well as specific articulation like *sul ponti* and *lasto*. The notation includes various rhythmic values, slurs, and dynamic markings such as *mf*, *mp*, and *f*.

Example 1: cont'd

T^o Encore plus libre 76 92 114 Pos. nat.

15

3/16 4/16 3/16 4/16

Arco non vibrato

Pizz

mf

20

4/16 5/16 4/16 5/16

Pizz

Arco (sul tasto)

mf

sul Ponticello non vibrato

mf

Example 1: cont'd

The musical score is divided into two systems. The first system begins with a circled number 25. It consists of four staves. The first two staves are in treble clef, and the last two are in bass clef. The first staff has a 3/16 time signature, followed by a 4/16, and then another 3/16. The second staff has a 4/16 time signature. The third staff has a 3/16 time signature, and the fourth staff has a 5/16 time signature. Performance instructions include *mp*, *mf*, *non vibrato*, and *sul Ponti.* The second system starts with a tempo marking $\text{♩} = 80 \sqrt{100} / 114$. It also consists of four staves. The first staff has a 3/16 time signature, followed by a 5/16, and then another 3/16. The second staff has a 5/16 time signature, and the third staff has a 3/16 time signature. The fourth staff has a 5/16 time signature. Performance instructions include *mp*, *non vibrato*, *Pos. nat.*, *Arco*, *Pizz.*, and *sul tasto*.

Example 1: conclusion

beginning, alternately from one extremity (initial or final) of the structure and going to the middle, and from the middle to the other extremity of the initial "exposition" part.¹⁷

It is not a question here of making an exhaustive account of the way in which the different developments derived from IIIc are organized. The object of the present study is rather, to show how the organization of rhythmic cells, obtained by the application of procedures as mechanical as those just described, can convert into an "organic" musical development in the composition itself, organized according to a clearly perceptible logic. Careful study of the beginning of IIIb (Example 1) provides a clear grasp of how this metamorphosis works. Movement IIIb comprises only two developments: the first (measure 1-51) is a third "mutation" of the central part of IIIc, the second (measures 52-76) a new presentation of "rhythms" **c** + **a**. The rule here which governs the organization of cells of family **b** is in some way symmetrical to that which the composer applied in the first "mutation" (the first of the two developments of IIIa): the cells are played in groups of three, reading always from the middle to the beginning or from the middle to the end of the "exposition" part which constitutes the center of IIIc. The first violin, thus, sounds the last three cells played *before*, then the first three cells played *after* the central point of the "exposition" by the second violin (the first ones in retrograde, the second in the original order), and this alternation is pursued until all of the cells have been heard.¹⁸

The 'cello does the same with the cells played in the "exposition" by the first violin, inverting the arrangement of the original/retrograde presentations. The schema is reversed in the second violin and viola parts where first the cells played in the "exposition" *after* the middle of the section, then the cells played *before* the middle of the section – respectively by the viola and 'cello – are heard, always in groups of three, and with the same game of oppositions between original and retrograde presentations. In a passage from *Jalons*, Boulez justifies as follows the recourse in composition to hidden principles of structuration, impalpable to the ear:

It is certain that the permutations of durations such as are found in *Chronochromie* by Messiaen are the transcription of such intricate numerical networks that is futile to even try to perceive them as such. But the impression that they give us of durations absolutely independent of pulsation, and nevertheless obeying a hidden law, of contrast between long values and short values which we judge at the same time uncertain and certain - uncertain in its principle but certain in its action - the composer would not have been able to obtain them with a more approximate means, his imagination relying no longer on an "objective" method which destroys up to a certain point, and in a certain domain, any subjective intervention.

¹⁷ In the transcription of the sketch which Thomas Bösche gives, the indication "de 3 en 3" ("3 by 3") – that is to say: by groups of three cells – at the right of the page, refers to the "third time", that is to say, to the first development of IIIb which will be discussed below.

¹⁸ The border of the groups of three cells is marked in the score by small continuous vertical marks, dotted marks indicating, within each group, the borders of the cells themselves. The indication is missing in many places (this is the case from the beginning - after the first cell - in the first violin and 'cello parts), but can be easily established if one refers to IIIc. More bothersome are the misprints or the actual imperfections in the score itself: we note in pages 1-2 of Example 1 in measure 6 (viola) the absence of the dot after the second sixteenth (harmonic A natural), in measure 9 (violin II) the missing beam at the beginning of the triplet rhythm (the first two notes are hundred twenty-eighth notes), and in measure 11, the missing tenor clef in the 'cello part, as well as the bad alignment of rhythms (the F natural of the second violin sounds at the same time as the B natural of the 'cello, in the middle of the measure).

And Boulez adds:

Of course, there is a danger of a deterministic, mechanistic unfolding of this type of structure: invention, in composition, can never amount to finding some latent combinatoriality upon which musical events would depend without exception. But even in such a rigidly established network of durations there still remains a large number of elements, the most audible - which are submitted to the free will of the composer, to more flexible laws, to spontaneous invention namely: choice of pitches, of chords, design of timbres, use of various playing techniques etc.¹⁹

The same issue can easily be applied to the "hidden law" which governs the rhythmic organization of the developments drawn from IIIc. Concerning the role of "free will," and even before getting to the other dimensions of the composition, it is striking to see that a "subjective intervention" by the composer, even in the domain where this law (the "rhythm") is applied, entails, in the first development of IIIb, a profound modification of the polyphonic texture. In fact, held notes arise here to interrupt the unfolding of groups of rhythmic cells: initially (up to measure 13), these suspensions of the melodic flux take place inside a single instrumental part at a time, the held notes passing successively from the viola to the second violin, then to the 'cello, and finally to the first violin; from measure 14 shifting groups of three instruments remain fixed in this way (*non vibrato*), allowing the fourth instrument - in turn (symmetrically) the first violin, the 'cello, the second violin and the viola - to express itself as soloist; in the last phase of the development (from measure 25), rhythmic cells and held notes are distributed in equal fashion, by pairs of instruments.²⁰ The process has an immediate effect of "aerating" the texture and allowing, at the same time, the emergence of specific harmonic configurations.²¹

In the preceding, only the aspects relevant to the rhythmic organization have been taken into consideration. Rhythms and pitches however are intentionally placed in relation to each other in the preliminary sketches mentioned above, where the internal

¹⁹ "Il est certain que les permutations de durées telles qu'on les trouve dans *Chronochromie* de Messiaen sont la transcription de réseaux numériques si intriqués qu'il est vain de vouloir même essayer de les percevoir en tant que tels. Mais l'impression qu'elles nous donnent de durées absolument indépendantes d'une pulsation, obéissant néanmoins à une loi cachée, le contraste entre valeurs longues et valeurs courtes que nous jugeons à la fois incertain et assuré, incertain dans son principe mais assuré dans son action, le compositeur n'aurait pu les obtenir avec un moyen plus sommaire, son imagination ne s'appuyant plus sur une méthode « objective » qui annihile jusqu'à un certain point, et dans un certain domaine, toute intervention subjective. ... Bien sûr, il y a danger d'un déroulement déterministe, mécaniste, de ce genre de structure: l'invention, dans la composition, ne saurait se résumer à trouver quelque combinatoire latente dont dépendraient les événements musicaux sans exception. Mais, même sur un réseau de durées si rigidement établi, il reste encore un grand nombre de données, les plus audibles, qui sont soumises au libre arbitre du compositeur, à des lois plus souples, à l'invention spontanée : choix des hauteurs, des accords, mise en place des timbres, emploi des divers modes de jeux, etc." Pierre Boulez, *Jalons (Pour une décennie): Dix ans d'enseignement au Collège de France (1978-1988)*, Paris, Christian Bourgois, 1989, p. 422.

²⁰ The total duration of the sustains is roughly equal for the four instruments (in sixteenths: 76 for the first violin, 74 for the second violin and viola – at the end of the second violin part, it is in fact a rest which is "held" – 79 for the 'cello).

²¹ A rarefaction of the polyphonic texture is intended from the second development of the central part of IIIa, where long expanses of silence are inserted by the composer within the instrumental parts. The contrapuntal enganglement (passed on from the "exposition" of IIIc itself) which still characterizes the first development, is substituted here by the more or less tightened alternation of duo and trio passages where the linearity and melodic continuity of the voices are placed in relief.

organization of the third movement of the *Quartet* is described. Before clarifying this further, note that movements III and V use a "derived series" (as opposed to the "principal series" used in movements I, II, IV and VI) which a table written in a separate sketch "declines" in its twenty-four forms in the Leibowitzian manner, that is to say transposing the first form from semitone to semitone and placing the prime forms and their "inversions" in view. Boulez subsequently expressed criticism on this manner of disposition. We read in "Possibly ..." (Eventuellement ...", text published in 1952):

In the past one wrote out the original series with its eleven transpositions in ascending or descending chromatic order. For each series one numbered the notes 1 to 12; and the same with the inversions. [...] The purely mechanical tabulation of successive transpositions from semitone to semitone implied a certain passivity on the part of the series toward the musical space whose chief regulator it was to be. It was a kind of relic on the idea of modal or tonal transposition, with its underlying horizontality, whereas in the modern perspective of which the discovery of serialism was the first acknowledgement, the most general object that presents itself to the composers' imagination, the sound-figure, transcends the traditional opposition of vertical and horizontal.²²

Indeed, the twelve-tone series has no structuring power in the *Livre pour quatuor*. It is not that the "derived series" used in movements III and V, does not present, intrinsically, remarkable properties (Figure 1a/b). Its two hexachords revert in fact into symmetrical *pitch-class collections*, which allows that for any prime form there is a corresponding inversion whose hexachords consist of the same notes: for example, in Figure 2b, the forms numbered X and 11 - chosen here because the notes of their hexachords are, to the letter, the pitch classes which represent the double collection 11A. / 11B.: [0,2,5/6,9,11] and [1,3,4/7,8,10] in George Perle's nomenclature.²³ But it does not seem that in the linking of the "series" Boulez had paid particular attention to this form of complementarity. More interesting, in his eyes, could have been the fact that the two hexachords possessed the same interval vector, that is they contained the same number of the same interval classes, and in a very balanced way: two semitones, two whole tones, four minor thirds, two minor thirds, three fourths and two tritones.²⁴ Nevertheless nothing leads us to believe that the hexachords here play, as such, the least structural role. The usefulness of the series in the *Quartet* is above all to place as great a reserve of notes at the disposition of the composer as he needs, all in guaranteeing, by the use of different forms, a constant permutation of the twelve pitch classes.²⁵

²² Pierre Boulez, "Possibly ...", in *Stocktakings. From an Apprenticeship* (translated from the French by Stephen Walsh), Oxford-New York, Oxford University Press, p. 115 et seq. In Schoenberg, and in an even more manifest fashion in Webern, any prime form in the *Reihentabelle* itself is placed in relation with an inversion, relative to a specific axis of symmetry. Concerning the narrow link which is established between this type of disposition and the composition itself, see. Jean-Louis Leleu, "Intuition et esprit de système: réflexions sur le schéma formel du deuxième mouvement des *Variations pour piano* op. 27 de Webern," *Revue Belge de musicologie*, vol. LII (1998), p. 102, note 5.

²³ George Perle, *Serial Composition and Atonality* (6th edition, revised), Berkeley-Los Angeles-Oxford, University of California Press, 1991, p.154 (first edition, 1962).

²⁴ Intervals are, of course, to be considered here as interval classes (perfect fourth = perfect fifth). On the notion of *interval vector* see, in particular Allen Forte, *The Structure of Atonal Music*, New Haven-London, Yale University Press, 1973, p.13 et seq. In Forte's inventory the series from movements III and V of the *Livre pour quatuor* comes down to the "Z-related" pair of hexachords 6-Z50 et 6-Z29.

²⁵ The comparatively easy identification of the forms of the "principal series" used at the beginning of the second movement shows that equally in the linkage of forms in the *Quartet* Boulez resorts to the "somewhat empirical procedure" which will be denounced in *Relevés d'apprenti*: "One could link series either by similar patterns – where groups of notes show common elements horizontally or even

a: starting form [I];

b: forms 11 et X and reduction to hexachords 11A / 11B in Perle's nomenclature

Figure 2: *String Quartet*, "Derived Series"

The treatment of pitch classes in movements IIIa and IIIb however, also obeys an "objective law" which nevertheless has only a distant relationship with the serial technique. Following a principle well established in the rough design of the third movement for the developments related to "rhythms" **a** and **c**, Boulez proceeds to an "inversion between the rhythms and notes": the rhythms of **a** are combined with the notes of **c**, and vice versa, according to the various modalities (transposition and/or inversion, original or retrograde reading).²⁶

Concerning the **b** cells, their reorganization in the developments of IIIa and IIIb is coupled in each instrumental part with the reprise of notes played in the "exposition" by another instrument according to a carefully controlled game of exchanges. In the development of IIIb which interests us, the notes of IIIc are read in retrograde (that is returning from the end of the "exposition" to its beginning), and transposed at the augmented fourth according to the following disposition: the first violin in IIIb plays the notes of the 'cello part of IIIc, the second violin the notes of the first violin part, the viola the notes of the second violin, and the 'cello the notes of the viola.²⁷ An examination of the score however, shows that, far from applying the procedure in a purely mechanical fashion, the composer continuously "intervenes" in modifying the order of the notes within the units defined by the rhythmic cells. For example: the 'cello, in measures 19-20, clearly reiterates in retrograde order and transposed at the tritone, the notes played by the viola in measures 33-35 of IIIc (Example 2a/b), but it disturbs the order of the succession, B-E-D#-F#-B-F-A becoming B-D#-F-E-A-F#-B.²⁸ Or, even more clearly: the melismas of the viola solo of measures 23-24 clearly

vertically (independently, that is, of the serial order) – or by pivot-notes, notes [...] common to the start of one series and the end of another." (*Stocktakings*, p.116).

²⁶ See the detail of the combination retained by the composer in the transcription of the sketch given by Thomas Bösche (*op. cit.*, p. 98 et seq.).

²⁷ See the sketch transcribed by Thomas Bösche on page 101 of the text already cited.

²⁸ The first two notes of the triplet of triple eights of the viola (D#-G) are only replayed by the 'cello after its long sustain on B natural (in measure 26), in the correct order: G#-D (the notes of the tritone transposed at the tritone, remaining unchanged). The indications given in Example 2a above the staff (b1,b2,b3) refer to the rhythmic cells: calling the cells situated *after* the middle of the

take the notes played by the second violin in measures 32-35 of IIIc, always in reverse order and transposed at the tritone, (Example 3a/b) but the order of succession is profoundly modified: what should be E-C-C#-F#-G#-G natural (b4 to b2) / D#-B-B \flat -G-E (b1 to a16) becomes (starting at the arrow) E-C#-G / G#-D#-F#-G-B \flat -B-E; the C (=F# of cells b3-b4 of Example 4a) has, itself, already been played in measure 13, just before the long sustained harmonic on G# (which is therefore present twice in the viola solo).

Example 2: *Livre pour quatuor*, derivation of pitches in the third movement (1)

a: IIIc, viola, measures 33-35; b: IIIb, 'cello, measures 19-20

Example 3: *Livre pour quatuor*, derivation of the pitches in the third movement (2)

a: IIIc, violin II, measures 32-35; b: IIIb, viola, measures 23-24

The question is to know to which logic these "corrections" by the composer respond. This leads us to envisage the process of composition from a new angle: that of the choice of register (up to here, pitches were only considered as pitch classes). But then, we enter into a domain where no "objective method" applies, and where the "subject's" complete freedom is exercised, leaving it to his personal musical sense – to his personal "ear." In a letter addressed to Karlheinz Stockhausen in October of 1954, Boulez himself, insists, precisely on the matter of the *Quartet* - whose text he had just reworked in light of the premiere of movements I and II by the Marschner Quartet - on the importance of what he calls "harmonic control" :

In working, I realized that the harmonic control was of capital importance. The class of aggregates is very important, as with the disposition of intervals, in some way, the tension of the chord – by its

"exposition," "b" (1, 2, 3, etc.) and those *before* the middle of the "exposition" "a" (from 1 to 17, for example in the case of violin II, see Example 3 below); cf. note 12 above.

content and realization. This has not been sufficiently taken into account to the present: the distribution of intervals and their function of tension.²⁹

The question of the relation between "elaboration of rhythm" and registration of pitches is explicitly broached by Boulez in "Propositions", ("Proposals") article published in 1948 whose redaction must have shortly preceded the composition of the *Quartet*, even to the point of demonstrating where the necessity laid for an "integration of rhythm with polyphony".³⁰ Insisting on the independence or the dependence which could be established according to the type of development imagined between the rhythm and the "contrapuntal figures," Boulez writes:

Clearly the dynamism or stasis of the pitch scale can be matched by those of rhythm, either directly or by opposition. I ought first to define what I mean by dynamism or stasis of the pitch scale. In order to obtain with twelve-tone technique a value that corresponds to tonal values such as modulation, it seems to me imperative to resort to quite different procedures based on the mobility or fixity of the pitches. Mobility means that each time a note occurs it will be in a different register; and fixity, that the twelve notes has a fixed location.³¹

It is remarkable that Boulez would establish here an equivalence between the change of disposition – of "tessitura"³² – and "modulation," that is to say one of the means which, in a tonal composition, allows the articulation of the musical discourse according to a precise logic. The composer next illustrates his remark by means of an example taken from the *Second Piano Sonata*, where the fixity of two "adjacent rhythms" which irrigates the contrapuntal fabric, corresponds to that of a "pitch scale" in the form of an ordering of the twelve (actual) notes from low to high.³³

An attentive examination of the beginning of IIIb shows that the twelve tones are distributed in the tonal space so as to produce a succession of characteristic harmonic fields, in which interval configurations - chosen by what Boulez in his letter to Stockhausen

²⁹ "En travaillant, je me suis rendu compte que le contrôle harmonique était d'une importance capitale. La classe des agrégats est très importante, de même que la disposition des intervalles, en quelque sorte la tension de l'accord – par son contenu et sa réalisation. On n'a pas tenu compte de cela suffisamment jusqu'à présent : la distribution des intervalles, et leur fonction de tension." Letter of October 16 1954, Basel, Paul Sacher Foundation, Karlheinz Stockhausen Collection, n°67. It is in this letter that the first mention (to the present) is found of the title "Livre pour quatuor," ("Because, [for] this quartet, I am having its movements edited, and it will become a book for quartet." It is well to clarify that the reworkings brought up by Boulez concern, essentially, the first movement (1a, 1b) ; the text of the third movement – even though this was only premiered in 1962 at Darmstadt – was not, itself, "reworked."

³⁰ "Proposals", *Stocktakings*, p. 49.

³¹ *Ibid.*, p. 49 et seq.

³² See the following passage of "Possibly ..." putting in relation series and pitch registers: "I should not wish to end this brief study of the series without mentioning the importance of register, since I have talked about serial intervals in the abstract. There are many kinds of interference to be set up between the series itself and the *tessitura*, on the basis that either of these elements can be mobile or immobile in relation to the other. One has only to imagine the instability arising out of the relation between an unchanging series and a continuously changing register, or between changing series and a completely fixed register: the extreme points in the play of ambiguities of pitch, which may equally combine with ambiguities of rhythm or dynamics." (*Stocktakings*, p. 119 et seq.)

³³ "Proposals", *Stocktakings*, p. 49 et seq.

calls their internal "tension" - are in turn given values. It is easy to see, with the help of the table in Figure 3 showing (in the same way as in the example from "Propositions") the successive tessituras chosen by the composer, how, in this passage, the different harmonic fields link one to another in a smooth, often imperceptible manner, and that a majority of notes, at each stage of the progression remained fixed. A logic of musical process is put in place which permits the composer to create, beginning with the purely mechanical organization of the rhythmic cells taken from IIIc, a continuous quasi "organic" development. At the same time, each moment of the passage is characterized by the presence of remarkable interval configurations, carefully placed in view by the spacing.

Segment of C5

1-2/1

2/2-3/1

3/2-4

5-7

8-9

10

11

12-13

14-24

25-27

C2₀

C2₀ (complete)

C2₁ (complete)

C2₁ (complete)

C3₁

C2₁

C2₀ (complete)

meas. 20

(meas. 20) (meas. 16)

(meas. 18)

Figure 3: *Livre pour quatuor*, mouvement IIIb, Successive registrations from measure 1 to measure 27

Figure 3 underlines the importance of various “modal” configurations based on interval cycles – such as the whole-tone scale, clearly isolated several times (for example in measures 5-7).³⁴ As for chromaticism, it is present in the form of disjunct intervals such as in the melodic pattern of the second violin, measure 20, which seems to come straight from a score of Webern (C#4-D5-E ♭6-C5-B3), the end of the melisma being inscribed, for its part, within the realm of the whole-tone scale (B3-C#4-F4 [E5]).³⁵ In specific situations, Boulez does not prohibit, the sounding of pure triads such as the broken six-four chord played in measure 26 by the ‘cello C5-G4-E5, or the minor triad, clearly perceptible as such, and produced in a striking manner at the juncture of measures 11-12 between the E3 of the ‘cello (the lowest note heard up to this point in the movement), the B3 of the viola and the G4 of the second violin - whose appearance determines, for a large part, the softening of the polyphonic flux leading to its dissolution beginning in measure 14.

The long static expanse of measure 14-24 is marked by the fullness which is acquired by a “diminished seventh” structure (C31) consisting of the superposition of the tritones C#4-G4- and B flat4-E5, which the composer couples in the mid low register with a complete whole-tone scale (A3-B3-C#4-E ♭4-F4-G4). The configuration of tritones is treated in such a way that it is affirmed with growing insistence in the course of the passage: if, at the onset, it is especially the tritone C#4-G4 which is emphasized – the two notes are held, one by the second violin, the other by the ‘cello (as a natural harmonic on the G string), but G4 is also the note around which the violin’s melisma is constructed. The ‘cello’s line, for its part, projects, in particular, the E5 in the high register whose timbre changes from one melodic pattern to another: first a natural harmonic on the A string – then a stopped note with vibrato. The E5 is next held at length by the second violin, which at the end of its intervention, sounds the first appearance of the E5-G4-B ♭4 structure. But it is finally in the viola part that the “diminished seventh” is fully displayed: the double succession (E5)-C#4-G4 / (G4)-B ♭4-E5 (obtained through an internal permutation of the notes from IIIc) emerges forcefully because of the rhythmic contour, the E5, here again, changing color, and even exact pitch, within the melisma (first a stopped note, then the fifth natural harmonic on the low C, sounding lower therefore, than the preceding tempered E natural).

Conclusion

This study has allowed us to see how, in the beginning of IIIb, on one plane, the organization of rhythmic cells - predetermined by means of “objective” rules, then refined empirically according to the desired texture - and, on another plane, the treatment of pitches - derived mechanically, at first, from the “exposition” constituted by IIIc, then “controlled” by the ear in a way so as to produce a succession of harmonic fields tracing various remarkable configurations - help bring about a development whose internal articulation adheres concretely to a continuously creative principle. The unbroken continuity of this

³⁴ The interval cycles are notated in Figure 1 following the usage adopted by George Perle (see in particular *The Operas of Alban Berg*. Vol. 2: *Lulu*, Berkeley-Los Angeles, University of California Press, 1985, p. 199) for example, C20 and C21 for the two whole-tone scales – 2 designating the intervals, 0 and 1 the transposition in question: for example C20 is the cycle of interval class 2 which includes the pc 0 (that is, the whole-tone scale including the C natural); in the same way, C31 is the cycle of minor thirds including C# etc.

³⁵ Note already in measure 19, the very closely related melisma of the ‘cello (B3-D#4-F4-E5).

principle, moreover, is ensured by the composer even at the end (measures 47-48), at the completion of the transition from the first to the second section where the **a** and **c** rhythms reappear (thus the long trilled notes which give this second section its color are prepared, from measure 43, by the viola's trill then that of the first violin). Already at the conclusion of "Propositions," Boulez was clearly marking the boundary between what can be formalized and what the composer has grown to appreciate subjectively, outside of any previously defined "method" :

At the same time that we choose the registration of a phrase, we must register the rhythms as well. For this it is difficult to offer a precise method, since it is obviously a strictly personal equation.³⁶

In this early work, which is without dispute, as an avatar of the *Quartet*, the *Livre pour quatuor* itself, the two modes of invention tend to appear side by side. And probably the work takes a certain strength from this unresolved tension, which, paradoxically, is not without recall of tonal works in which the logic of musical discourse collides with the presence of formal schemas imposed from outside. The second movement of *Livre* – with the exception of the long central development – leans openly toward the mechanical aspect: it is formed from a succession of short developments closed upon themselves, whose internal organization is governed by eminently "objective" principles, such as the rhythmic canon.³⁷ The sixth movement, which is nothing but a vast – amplified - "mutation" of the central development of II, constitutes, in this regard, a form of "synthesis" fulfilling itself from within the work.³⁸

³⁶ "Proposals," *Stocktakings*, p. 54.

³⁷ See on this subject, Jean-Louis Leleu, "L'écriture polyphonique dans le *Livre pour quatuor* de Pierre Boulez: aspects techniques et esthétiques," in *Pierre Boulez: techniques d'écriture et enjeux esthétiques*, Jean-Louis Leleu et Pascal Decroupet (eds.), Genève, Contrechamps, 2006, pp. 13-38.

³⁸ The score excerpts here have been reproduced with the kind authorization of Éditions Leduc, and the passage of the letter from Boulez to Stockhausen with that of the Paul Sacher Foundation. I warmly acknowledge the care taken by Pascal Decroupet and Jean-François Trubert in the realization of the musical examples.