The 'objets sonores': Rethinking Structural Conventions in Schaeffer, Boulez, Grisey

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Abstract

A rethinking of the conventional strategies of musical structuring has been intensively developed since WWII. At this time, not only the rules of the codified system of tonality were overcome, but also the notion of musical sound itself as it had been conventionally intended was questioned. The note, which implies the supremacy of pitch among sound qualities, was no longer accepted as the basic element of musical language. The notion of 'sonic object' was introduced, which entails the idea that musical sound can exceed the limits defined by conventional practice and codified system, and should be considered as an object to be researched and understood, in order to exploit its full potential.

The research consists of a comparative study of three musicians operating in France after WWII: Pierre Schaeffer, Pierre Boulez, and Gérard Grisey. Apart from the obvious geographical connection, they share the will to develop a new way to organise music on the basis of the accurate understanding and complete exploitation of the sonic object.

The research is organised in three sections, each devoted to the study of one musician, each using his theoretical and, where possible, his musical output to clarify his thought and the reasons of his practice. However, for every specific topic of discussion, comparisons between the musicians are undertaken, so that the originality and/or inconsistency of each is highlighted by a confrontation with the others.

Overall, the work shows how, notwithstanding evident superficial differences, especially in the definition and description of the sonic object, all three musicians had to confront very similar basic issues, and how the theoretical codification of any music is in fact, most of the time, a quest for a conceptual coherence which is always exceeded by musical practice.

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Introduction

The musical language has gone through a process of substantial revision during the last century. Although the development of this process has not been as linear as has often been described, it is possible to say that the substantial rethinking of the fundamentals of musical language that took place after WWII is a result of the process of erosion of tonal language begun in the Nineteenth Century. The necessity to substitute the traditional reference of tonality with other forms of codification and regulation of music had been resolved quite pragmatically by dodecaphony. Here, a simple and adaptable concept had been made the theoretical base for the extreme thematic elaboration of atonality. However, the effective structural functioning of thematic elaboration within perception had not been confronted. The musical structures of the Second Viennese School, deprived of the reference to a codified theory such as tonality, were largely produced on the basis of formal intuition, just as had happened before with atonal music.

This, of course, does not mean that tonal theory could provide the tools for a completely rationalised compositional process. This has not been the case for any musical theory, and the theoretical production of the decades after WWII is not an exception.

However, the need to clarify the functioning of musical perception and organisation became a central issue in the theoretical debates of the 1950s, and has remained so until now. The complexity of the issue has become increasingly clear, especially because, as is exemplified by the theories discussed in the present research, the influence of cultural education on perception was not sufficiently considered at first. Furthermore, not all the theoretical production has had either the same scope or the

same level of completeness and accuracy. In fact, composers tend to focus on the practical aims of their research, and, therefore, tend to be less interested in expounding theoretically on complex fundamental issues.

Schaeffer, Boulez, and Grisey, the three musicians studied in this research, exemplify this disparity of theoretical elaboration. They all have attempted to achieve the definition of a musical language without the support of inherited structural conventions. This, which is a common practice in contemporary music, has been done with a different level of theoretical awareness.

While Schaeffer has embarked on a long work of research aimed at an unrealistic completeness, Boulez and Grisey have more pragmatically limited their theoretical reflections to the definition of reference points useful to the compositional process. This does not mean that their musical practice does not imply a specific understanding of musical fundamentals that are not explicitly discussed.

The theoretical work of Schaeffer can be useful to highlight some fundamental categories of music that underpin any musical practice. Therefore, it can help to clarify those aspects of the music of Boulez and Grisey that have not been directly and thoroughly confronted in their writings.

Obviously, the present research does not aim to deal exhaustively with the problem. Schaeffer's theory represents an ambiguous critical means, since it is both a source for critical reflection and a theory historically determined. Moreover, it focuses on the description of sound perception, while it is incomplete for what concerns the study of the organisation of musical structures. However, in many ways the fundamental categories defined in Schaeffer's work, such as permanence-variation, identification-qualification and object-structure, are meaningful at a structural level. They underpin the compositional process of the music of Boulez and Grisey, and

therefore will be used to discuss the theoretical and musical production of both the composers.

Furthermore, the procedure adopted by Schaeffer to attain the definition of a musical language with no reference to previous linguistic conventions, shows many similarities to that of Boulez and Grisey.

The starting point of Schaeffer's theoretical elaboration is the *objet sonore*. This could be defined as a sonic event, which, through a particular listening technique,[1] is perceived as a unit and heard as an exclusively sonic phenomenon, with no reference to a generative source or a linguistic meaning.[2] Speaking in practical terms, the *objet sonore* is an abstraction, since, as is discussed in the chapter dedicated to Schaeffer, the perception of a sound as an exclusively aural phenomenon is probably not possible. However, the concept of *objet sonore* has other, more far-reaching implications. In fact, through the analysis and description of sounds isolated from any kind of context, Schaeffer expects to be able to define thoroughly all qualities of sound that are valuable to creating structural connections in music, without being affected by cultural habits that could influence his perceptual abilities. A similar procedure can be recognised in both Boulez and Grisey. Boulez aimed to attain liberation from cultural influence through the 'automatic' writing of his first serial experiments. In this way, he wanted to reach a stage where each sound could be neutrally described as the interrelation of the four classic parameters. On the other hand, Grisey relied on the analysis of sound spectra to achieve an understanding of the 'natural' characteristics of sound, and therefore of the qualities of sound that can have a structural function (i.e. connective role) in music. Obviously, neither Boulez nor Grisey explicitly define something like the Schafferian *objet sonore*. However, the idea of creating music that does not rely on inherited conventions implies necessarily the reference to a model of sound whose cultural traits

[1] See Schaeffer, 1977a: 270-272.
[2] See Schaeffer, 1977a: 268-270.

should have been somehow neutralised. A completely 'un-conventional' music needs to be based on structures, and therefore qualities of sound, that are universally perceptible, since there is no convention to rely on in order to communicate to the listener. The morphological models of sound defined by the three musicians studied in this research are substantially different, the 'universal' qualities of sound that they detect after the cultural de-conditioning process are different, but the conceptual reference to a culturally 'neutral' sonic phenomenon is common to all three musicians.

Once the structural qualities of sound have been defined, the organisation of music is based on the formal categories of permanence-variation and object-structure that are discussed in Schaeffer's theoretical work. Since the music of Boulez and Grisey does not refer to any structural convention, the only way to produce an alternation of permanence and variation is through identity (repetition, symmetry) and difference of the various sound qualities.

Therefore, the analytical commentaries, which follow the discussion of theoretical issues in Grisey and Boulez, will focus on detecting in the music the structural connections based on the relation of identity and difference. The analysis will be based on the notion of 'sonic object', which implies but does not correspond to the notion of *objet sonore* discussed earlier, and can be defined as a set of notes perceived as a unit on the basis of the identity of one or more qualities of sound. This definition is obviously all-encompassing, and allows for substantial freedom of interpretation in the identification of the sonic objects. However, this kind of structural pitch association is quite evident in the formal organisation of this music, and the lack of a precise theoretical regulation should not affect the acknowledgment of its organisational value.

The comparison of the approaches of the three musicians to the same technical issues will clearly show that their difference is often due to basic aesthetic convictions. In my view, in Boulez and Grisey these affect the organisation of music much more

than technical procedures derived from their morphological model of sound. This aesthetic contrast should not be surprising, since, although their periods of activity overlap, the three musicians belong to different generations. However, the presence in their work of similar fundamental issues shows how musical languages need to confront and resolve identical problems, and how this is done in ways that are different according to variables that are impossible to define exhaustively.

Chapter 1

Pierre Schaeffer: intentional units

Pierre Schaeffer's is certainly one of the most extensive work of research on the fundamentals of musical language. On the other end, the most common criticism that has been addressed to the *Traité des objets musicaux* (T.O.M.[1]), the most systematically organised and all-encompassing among Schaeffer's theoretical writings on music, is due to the limits of the work already implicit in the title: the research focuses on the process of identification and description of the *objets sonores* suitable to be musically functional, but fails to define a normative system capable of regulating their organisation in musical structures.[2] This shortcoming is recognised by Schaeffer himself,[3] and his dissatisfaction with it increased with the years.[4]

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[1] Throughout the chapter the title of *Traité des objets musicaux* will be abbreviated T.O.M, in accordance with the practice introduced by the *Group des recherches musicales* (G.R.M.).

[2] See, for instance, ed. G.R.M., 1976: 27-33.

[3] 'The main flaw of this work is in fact that it has been the only one of its kind, [...] the author should have produced also a *Treatise of Musical Organisations* of similar weight. [...] Therefore, the *Traité des objets musicaux* can be evaluated in two ways: favourably, as a cornerstone of what concerns the materials and the auditory faculties, but unfavourably, as it has missed the target, since it seems to ignore the other bank, the one of combinations that confer meaning on the assemblage of objects. Between these two banks runs the deep river of the structures of reference; this term [...] defines the intermediate configurations with which the transition is achieved' ['Le principal défaut de cet ouvrage est en effet d'être resté seul, [...] l'auteur aurait dû produire aussi un *Traité des organisations musicales* d'un poids equivalent. [...] Le *Traité des objets musicaux* peut donc être interprété de deux façons: positivement, comme une tête de pont du côté des matériaux et des facultés auditives. Négativement, comme ayant manqué l'objectif, puisqu'il semble ignorer l'autre rive, celle de combinaisons qui donnent du sens aux assemblages d'objets. Entre ces deux rives, un fleuve profond: celui des structures de référence, ce terme [...] désignant les configurations intermédiaires par quoi s'obtient le franchissement.'] (Schaeffer, 1977a: 663). Whenever the French version of the text is displayed, translations are mine.

[4] 'The research is not accomplished. The declaration of the shortcomings is here much more than an admission: it is the acknowledgement of the unexplored' ['La recherche n'est pas achevée. L'énoncé des lacunes est ici beaucoup plus qu'un aveu: c'est la reconnaissance de l'inexploré'] (Schaeffer, 1977a: 664). This constructive confrontation with the limits of the treatise was supplanted by a much more negative attitude in the following years: 'I was right to research if, by chance, beyond traditional music, beyond the music of the last epigones of serialism, there was not, somewhere, a musical continuation. I was right to do so because I have demonstrated to myself that the impossibility of this was not a theoretical statement of mine, but a statement that could be based on experience and the reflection on experience' ['[...] J'ai eu raison de chercher si par hasard en dehors de la musique traditionnelle, en dehors de la musique des dernière épigones de la musique sérielle, il n'y avait pas un prolongement musical quelque part. J'ai bien eu raison de le faire puisque je me suis démontré une impossibilité qui n'était pas une affirmation

In this respect, however, the impossibility of explicitly defining a musical syntax is a condition shared by both serial and spectral musical thought[5]. Notwithstanding Schaeffer's very critical opinions about his contemporaries, the quest for a system capable of reorganising the musical discourse on the basis of perceivable structures is the main concern for Boulez, and later also for spectral musicians such as Grisey. This concern is evident both in their musical output and in their theoretical writings, even though their approach to the problem is less systematic when compared to Schaeffer's work. In fact, the practical need to develop an effective compositional technique rendered it necessary for composers such as Boulez and Grisey to neglect the explicit discussion of many basic aspects of musical language. As a result, their theoretical output often consists of a simple reconsideration of formal models and parametrical hierarchies, which is generally based on increased attention to elements and procedures that are already operative in existing musical codes, although limited to a secondary role. The definition of an explicit and complete theoretical system is not attained, while more radical issues about the fundamentals of musical structural organisation and the general functioning of music as a means of communication are ignored, since their complexity would hamper the practical ambitions of the theoretical discussion. In this respect, Schaeffer's work is more effective, if not in solving the issues, at least in outlining more clearly the threshold of the unexplored field of research.

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théorique de ma part, mais qui était une affirmation basée sur l'expérience et la réflexion sur l'expérience'] (Schaeffer, 1990: 119).

[5] Spectralism is a musical style that developed in France during the 1970s. It should be considered more as a compositional attitude than as a school endorsing a specific aesthetic thought or adopting a particular compositional technique. Generally speaking, spectral composers share : a) the will to reaffirm, after the experience of serialism, the primacy of perception in musical organisation ; b) the attention paid to the 'natural' characters of sound, which is considered as an evolutional event, whose complexity has to be acknowledged and researched in order to produce music perceptually effective. A discussion of the main features of spectral music will be undertaken in the last chapter of the present research, with reference to Grisey. See also Dufourt, 1991 : 289-294 ; Fineberg (2000a).

In conclusion, the failed attempt of Schaeffer and his fellow researchers to codify a 'universal language'[6] starting with the definition of perceptually suitable basic units, shows an unrealistic abstraction which is shared by other musical theories blossomed in the 1950s and 1960s, such as serialism. Schaeffer acknowledged the abstraction of the procedure,[7] and the lack of realism in research which aimed gradually to achieve universality of language.[8] However, the fact that the attempt to reorganise a universal musical system starting from basic units is unrealistic does not obliterate the provocative trait of the work. The T.O.M. can be seen simply as a discussion of music intended as a phenomenon of perception and communication. Obviously, all the reflections in the treatise are deeply informed by Schaeffer's idealistic attitude and by a methodology that is historically determined. However, they are successful in undermining conventional interpretative patterns, with no need to attain definitive and acceptable conclusions. Schaeffer's work should not be approached and it has not been developed by the G.R.M. with the real expectation of reaching a definitive understanding of the musical process. Rather, although historically characterised, it represents a well articulated attempt to reflect upon that issue. From this point of view,

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[6] 'I would say that my utopia – or my envisaged programme – erred for excess of zeal, since I wanted to reinvent in my turn a universal musical language, starting with the grammar followed by the syntax, as they had wanted to do with Esperanto' ['Je dirai que mon utopie – ou mon programme anticipé – péchait par un zèle excessif, qui était de vouloir réinventer à mon tour une langue musicale universelle, par le chemin de la grammaire, puis de la syntaxe comme on voulut faire pour l'Esperanto'] (Schaeffer, 1977a: 681).

[7] 'Music is untranslatable or unpredictable. [...] Its genesis, made of attempts and mistakes, relies also on the reaction of the audience; not the current success of the concert [...] but the consensus that will appear as convincing only much later, [...] through a transformation of the imagination of a few in general understanding. At a certain point it is necessary to abandon the objects, and even if this means coming back to the treatise later, to start composing' ['[...] les musiques sont intraduisibles ou imprévisibles [...] Leur genèse, faite d'essais et d'erreurs, repose sur la réponse aussi des auditoires; non pas le succès actuel du concert [...] mais le consensus qui apparaîtra, beaucoup plus tard, comme convaincant [...] par une transformation de l'imaginaire de quelques-uns en intelligibilité collective. Il faut à un moment, délaisser les objets et, quitte à revenir plus tard au *Traitè*, se mettre à composer'] (*Ibid.*).

[8] 'If we give up the foolish idea of musical progress, we can admit that we are looking for a *different* music, to the point that we cherish the hope of discovering, one day, other musical «languages»' ['Si nous écartons l'idée stupide de progrès musical, nous pouvons bien admettre qu'on cherche la musique *autrement*, quitte à garder l'espoir de découvrir un jour d'autres «langages» musicaux'] (Schaeffer, 1977a: 689).

without the cloud of the unaccomplished task looming over it, the T.O.M. can regain an intellectual vitality.

Musical research: tradition and innovation

The music composed by Schaeffer does not represent his essential output if compared to the theoretical production. This characteristic distinguishes Schaeffer from the other composers investigated in this work. The theoretical swerve of the 1950s was due to a conviction developed over the years of composition of *musique concrète* rather than a simple dissatisfaction of Schaeffer with his musical work. The research is intended as a passage necessary to the mastering of the musical potential newly discovered. This idea gives to the entire musical experience of Schaeffer a trait that is not present in the other theoretical discussions of 1950s experimental music. Schaeffer's rigour is a manifestation of an idealistic extremism that the avant-garde more oriented towards concrete composition had to set aside very early. Despite the mild style of his prose, and because of his peculiar approach, Schaeffer confronts and tries to resolve issues that prove to be substantial, even if not always in an explicit way, for any revaluation of musical conventions. The unconventional use of traditional musical instruments or the drafting of new notational codes is a very common practice in the music of the 1950s and 1960s. The need to produce a concrete musical output forced composers to compromise between the aesthetic ideal and the tools that were actually at their disposal. Schaeffer can afford to rethink both musical instruments and solfeggio, starting with the analysis of the fundamental organisational categories that determine the very notions of instrument and solfeggio. If anything, the contradiction arises from an apparent awareness of the unrealistic nature of this attitude, and the choice to avoid

actual composition before a solid ground of knowledge could be created through research.

Schaeffer's historical attitude is different from that of Boulez or Grisey, since they both aim at a substitution rather than a broadening of traditional language. Boulez, for example, adopts a much more pragmatic attitude towards this issue. The quest for inner coherence in Boulez's theoretical output and compositional process does not imply a real interest in discussing basic questions about musical language in general. The tradition to which Boulez is opposed is very specific, and the un-conventional language that is elaborated through serialism does not claim to be definitive.[9] Grisey's attitude is similar in many respects, since it is in opposition to serialism, especially concerning the model adopted to describe sound and the approach to the issue of perception. However, this does not imply that the new theoretical points of reference can be considered as exhaustive. It is arguable that the reliance of spectralists on technological progress so as better to define physical and psycho-acoustic phenomena implies the conviction that an objective reality can be gradually unveiled. However, in their theoretical output there is not space left to the discussion of epistemological issues or to an attempt to highlight (and escape) the cultural conditioning of the perceptual process.

Moreover, they seem to overlook the fact that the understanding of both physical and psycho-acoustic phenomena does not generate by itself norms suitable for musical composition. In Schaeffer's work, perception of sound and perception of music are intended to be different, since the musical language implies the distinction of *valeur* (value) and *caractère* (character).[10] There seems to be no need to distinguish between

[9] This aspect of Boulez's theoretical thought will be discussed in the following chapter.
[10] The two terms will be more extensively discussed later in this chapter. Generally speaking, they refer to elements of a musical object that either have been codified by a normative system, that can be compared to similar elements with reasonable precision and therefore can be used for structural purposes (values),

sonic and musical perception in the theoretical writings of spectral musicians, for their analysis of the sound structure is not 'musically oriented'.[11] Evidently, they do not attempt a systematic and exhaustive research, that encompasses the definition of the structural units of sound perception. In the theoretical production of both Boulez and Grisey, the stress is pragmatically laid on a coherence consequentially derived from basic models more than on the utopia of an ultimate and all-encompassing code of musical organisation; their music is presented as an opposition to previous experiences within a process of transformation much more than evolution.[12]

Schaeffer's approach to tradition as it emerges in the T.O.M. is not oppositional or consequential, rather it is evolutionary. In his view, the traditional musical system had been based on a reduced number of perceivable elements, while it excluded many others capable of musical potential. *Musique concrète* disclosed the potential of sound, and the more specific work on the *objet sonore* aimed to find a codification for the surplus newly discovered. This, however, does not mean that the traditional system does not exhibit traits that can be considered fundamental to any musical codification. On the contrary, the system outlined in the T.O.M. tends to be defined on the model of the traditional system, through a work of comparison that produces a substantial overlapping of the two codifications. The process of identification and definition of perceptual elements and formal categories suitable to organise the *objets sonores* appears to produce a generalisation of the traditional system, rather than a substantially new system.

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or, on the contrary, to elements that lack a precise theoretical codification, that are operated empirically by composers and performers and cannot bear a primary structural functionality (characters).

[11] See, for instance, the description of 'universal physical model' in Malherbe, 1989: 49.

[12] The question is actually more complex than this. There is often an ambiguity in the theoretical output of these composers, which will be discussed in detail in the following chapters. Generally speaking, however, it is a fact that none of them ever embarked on the drafting of an allegedly definitive and exhaustive musical theory.

On the other hand, the term *solfège* holds in Schaeffer's thought a particular meaning, which is more articulated than the one currently in use in musical education. If in the traditional system *solfège* is meant to be a practice for learning and mastering the symbols of notation and, accordingly, the grid of parameters that articulate the musical discourse, for Schaeffer the *solfège* is concerned more with a work of analytical research on sound perception than with the actual writing and performing of music. The drafting of notation is not dismissed by Schaeffer, it is simply postponed, since notation can be developed only after the musical elements have been identified. Owing to its peculiar meaning, the *solfège* tends to be identified with the entire process of research that has been undertaken after the experience of the *musique concrète*. The *solfège* of Schaeffer is an ambitious project of identification and classification of what had been left aside by the traditional musical system.[13] In the T.O.M. the elements that have been treated as *caractères* by traditional notation, undergo the process of identification and qualification that allows them to potentially assume the role of *valeurs*. The *solfège* of Schaeffer does not really discover any 'unperceived quality of sound', but by identifying and classifying parameters not yet schematised in a theoretical grid, it makes them perceivable in a way that is different from both the qualitative (i.e. functional) and quantitative point of view. Instead of being a practice to learn a 'cultural' language, the Schaefferian *solfège* is an attempt to decipher a sort of postulated natural code of sound perception. In the resulting scheme, even the sound elements of traditional music can find their place, but they will be conceptually and terminologically reinterpreted. Schaeffer's research may well be an attempt to attain to a new codification of the much

[13] 'Schaeffer has belittled his own work defining it [solfeggio], a term that does not do justice to the significance of his own endeavour. An endeavour where, much more than making a simple list of notational symbols, it was the case of detecting unnoticed sonic qualities, of naming what had not yet been named and of classifying what had not yet been classified.' ['Mais Schaeffer a été bien dépréciateur vis-à-vis de son propre travail, en le nommant [solfège], [terme] qui ne rendait pas justice à la portée de sa propre entreprise. Une entreprise où, bien plus que de faire une simple liste de symboles de notation, il s'agissait de repérer des qualités sonores inaperçues, de nommer le non-nommé, de classer le non-classé'] (Chion, 1988: 53).

enlarged set of sonic choices produced by experimental music. However, this is done by referring to a conceptual framework that is in many ways predetermined by the influence of the traditional system (it is obviously arguable that substantially different ways of conceiving a codification of musical theory are actually possible).

The interrelation of *naturel/culturel*

The attempt to describe 'nature' with a terminology and through an experience that are necessarily informed by a cultural background, is a paradox that the T.O.M. obviously needs to confront. A similar problem will arise in the theories of Grisey and Boulez, and will by confronted by both of them, although with a different degree of awareness and attention.[14]

The research work on the morphology of sound is supposed to produce an analysis of aural perception in order to define specific traits that are assumed to be naturally suitable for the generation and perception of musical structures. The norms that should regulate the generation of the structures through a controlled linking of the elements of the objects, are not yet taken into account by the research work.[15] The totality of the musical system is not yet considered here, but already at this stage it is impossible to determine how much the grid of allegedly 'natural' morphological criteria describing sound is itself rooted in cultural reminiscences, notwithstanding Schaeffer's circumspection.[16] This is not only because of the implications of the notion of musically

[14] A discussion of the way this issue has been addressed by Boulez and Grisey is undertaken in the introductory paragraphs of the following chapters.

[15] 'I am only describing phenomena [...] Classification is not a research of laws, it is only a precondition' ['J'en suis à décrire les phénomènes [...] Classification n'est pas recherche de loi, préalable seulement'] (Schaeffer, 1977d: 258).

[16] 'Ultimately, a generalised *musical intention* [...] endows the morphology. [...] It instils the urge [...] to proceed to the musical by some kind of diversion. It is in fact a diversion, an indirect tendency, since everything we take to be culturally, routinely or naturally musical in our intention, would irresistibly take us back to the conventional system' ['C'est donc finalement une *intention musicale* ainsi généralisée [...] qui fonde la morphologie. [...] Elle introduit une tension [...] à passer au musical par quelque biais. Il

oriented criteria (the definition of music has an obvious cultural origin, and therefore affects the identification of constitutive elements as musically appropriate). In Schaeffer's view, there are subtler forms of cultural conditioning of sound perception and description, such as those determined by experiences other than conventional language:

> What is, then, this *natural*? Thinking about it, it is not opposed to the cultural, but more precisely to the conventional: instead of focusing on the concepts, and linked to sounds by means of an arbitrary connection that only a prior knowledge of the code will allow us to identify, natural listening gives a meaning to what it grasps without the need to refer to a convention, but only by relying on a previous experience already elaborated [...]. Exactly as a spoken language, this one results from *an individual learning within a collective environment*: this is the repertoire of *noises*. Would it be possible to understand these noises, that we would happily attribute [...] to the side of the *natural*, without the aid of experience, where civilisation adds to nature? (Schaeffer, 1977a: 335) [17]

From this point of view, the idea of a definition of universal morphological criteria of sound appears to be undermined from the outset, even on a strictly theoretical basis.

The elements more convincing and conceptually useful for analysing perception that Schaeffer singles out, prove to be general categories of formal organisation able to clarify the functioning of any kind of language and perception. It is a fact that Schaeffer broadened his field of research after writing the T.O.M., focusing his attention on the phenomenon of communication as a whole.[18] This is owing to the development of the idea that communication systems all rely on basic categories that can be considered

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s'agit en effet d'un biais, d'une tension oblique, puisque tout ce que nous trouverions de culturellement, d'habituellement ou de naturellement musical dans notre intention, nous ramènerait, irrésistiblement, au système conventionnel'] (Schaeffer, 1977a: 399).

[17] 'Qu'est donc que ce *naturel* ? A bien y réfléchir, il ne s'oppose pas au culturel, mais plus précisément au conventionnel: au lieu de viser des concepts, unis à des sons par un lien arbitraire, et que seul une connaissance préalable du code permettra d'identifier, l'écoute "naturelle" donne un sens à ce qu'elle saisit, sans passer par une convention mais en s'appuyant sur une expérience antérieure déjà très élaborée [...]. Tout comme l'apprentissage d'une langue, celui-ci résulte d'un *apprentissage individuel en milieu collectif*: il s'agit du répertoire des *bruits*. Ces bruits, que nous rangeons volontiers [...] du côte *naturel*, les comprendrait-on sans le secours d'une expérience où la civilisation ajoute à la nature?'

[18] The results of this work were initially presented in Schaeffer (1970-1972). However for a complete account of Schaeffer's research work on the issue of communication and language, see Martial (1999-2002).

'natural'.[19] It is evident that the categories will prove to be very general, as is the case for the pairs *identification/qualification, permanence/variation, distinction/repetition, objet/structure*. The idea of producing functional structures with specific criteria defined in a morphology of sound relies on the postulation of these archetypes of perceptual organisation. However, their effective functioning and the identification and selection of morphological criteria could evidently be affected by cultural habits.

A similar problem arises when dealing with the concept of *objet convenable* [suitable object][20] outlined by the typology. The definition of a typology of sound relies on mnemonic and analytical abilities of auditory perception, which are determined by the perceptual categories *permanence/variation* and *distinction/repetition*. However, the definition of what comes within the category of not *convenable* is obviously related to the level of development of those abilities, determined, among other things, by musical education. There is clearly no escape from the influence of cultural heritage, whether it is intended as an evident and recognisable system of conventional elements, defined by a more or less explicit system of signs, or whether it is intended as a reminiscence of experience derived from language or social and environmental habits.[21] Furthermore, the distinction between convention, intended as codified communication, and culture, a

[19] 'I tried, but in vain, to apply to the image what I knew about sound. I then realised that [...] these detailed parallelisms were only misleading. By contrast, I observed that the access was more generalised and easier moving down from complex to simple, and that eventually the *languages*, if the totality of messages that men can produce and communicate is included in this imprecise term, form an immense ensemble, whose gates open spontaneously provided that one has the eyes and ears of common sense [...]' ['J'essayai, mais en vain, d'appliquer ce que je savais du son a l'image. J'ai compris alors que [...] ces parallélisme élémentaires ne faisaient qu'égarer. En revanche, je constatai que l'entrée était plus général et plus facile en redescendant du complexe au simple, et que les *langages*, finalement – si l'on englobe sous ce vocable approximatif l'ensemble des messages que l'homme sait produire et communiquer –, formaient un immense ensemble dont le portail s'ouvrait spontanément, à condition d'avoir les yeux et les oreilles du bon sens [...]'] (Schaeffer, 1971b: 8).

[20] The notion of 'suitable object' is conceptually fairly transparent, but its practical application is extremely subjective. After much research work on the sonic objects, made possible by the use of tape-recorder, Schaeffer came to the conclusion that not all of them are actually suitable for use in a musical context. This is because they prove to be either too complex to be perceptually analysed or too simple to hold a structural function. In both cases, this kind of object is too excessively characterised to be inserted into a musical structure without creating a break in the developmental flow. Consequently, as opposed to 'non-suitable objects', Schaeffer identifies the general category of 'suitable object', which is further developed in the typology.

[21] See note 17.

much more general notion, is a subtle one, and proves to be relatively unclear when considering that in Schaeffer's view both contribute towards shaping the experience of objects *and* analytical apparatus.[22] The phenomenological approach, through *écoute réduite* [reduced listening][23] and the resulting *objet sonore*,[24] is not sufficient to ensure that cultural conditioning is overcome. The *objet sonore* becomes, as it is, an object, described and understood through language. Although in this case the language used for the descriptive process does not refer to traditional terminology, and for this reason a certain freedom from convention should be granted. Still, the terminological and perceptual grid underlying the analytical process is embedded in culture, and therefore results in being influenced by conventional reminiscences. The entire conceptual layout of Schaeffer's system does not appear to withstand a slightly more attentive scrutiny. It is probably more effective to look at it from a pragmatic point of view, that accepts the obvious relativity of the results, intending them as a point of reference for further discussion.

The problematic interrelation of *naturel* and *culturel* clearly emerges in Schaeffer's evaluations of the theoretical conceptions of his contemporaries.

Cage and Boulez have been considered by Schaeffer as representative of two opposite and complementary aesthetic tendencies.[25] The issue of the coexistence of conventionally and naturally determined schemes of perception is a central problem for

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[22] 'In the relationship observer–observed [...] let us say that one discipline [physics] focuses on what man observes, but obviously relying on his language, while another discipline [linguistics] focuses on the «interpreter», man, but only through his product, the act of knowledge exerted on the objects' ['Dans la relation de l'observateur à l'observé [...], disons que l'une des sciences vise ce qu'observe l'homme, mais grâce évidemment à ses langages, l'autre vise l'«interprétant», l'homme, mais seulement dans ses produits, dans cet acte de connaissance qu'il pratique vis-à-vis de choses.'] (Schaeffer, 1971c: 32).

[23] This term will be thoroughly discussed later in the chapter. It refers to the technique of listening developed by Schaeffer in order to render perception of sound free from cultural influences.

[24] The expression *objet sonore* has to be understood in Schaefferian terms. It refers to the perceptual result of 'reduced listening'. In other words, with *objet sonore* Schaffer defines the sonic object perceived as pure sound, when the attention of the listener has been diverted from linguistic function and/or source denotation. At this stage, the sound can be analysed only through its constitutive and perceptible elements. The *objet sonore* is therefore distinguished from the *objet musical*, since the latter has been reinstated in a functional and communicative structure. The *objet sonore* has to be intended as a research tool, as yet devoid of musical value.

[25] See Schaeffer, 1971a : 147-160.

both of them. Schaeffer's dissatisfaction with the solution provided by their theoretical and musical output outlines another nuance attributed to the idea of 'nature'. To clarify his position, Schaeffer refers to a fundamental concept expressed in the words of Jaques Monod:

> The cornerstone of the scientific method [...] is the postulate of the *objectivity of Nature*, which means the *systematic* refusal to consider as capable of leading to a «true» knowledge any interpretation of phenomena in terms of final aims, or «project» [...]. This is a pure, indemonstrable postulate, because it is obviously impossible to imagine an experiment that could prove the *non-existence* of a project [...] anywhere in nature. (Schaeffer, 1971d: 164)[26]

This position is challenged by Schaeffer's own reflection:

> One will say [...] that man and humanity, integral parts of universe and life, are submitted to these same laws. Or: human science can only exist if it is based on the same postulate of objectivity. That is to say: by rejecting every interpretation [of humanity] in terms of final aims? *And therefore, I imagine, any assumption of a human intention?* (Schaeffer, 1971d: 164)[27]

Monod's distinction between nature and the human perception of nature is clearly rejected by Schaeffer, whose conception of the relation man–nature is completely different. As a matter of fact, Schaeffer proceeds in a way that is opposite to Monod's, since he aims at the integration of men with universal reality by ascribing to nature the 'intentional' disposition experienced and observed in human life.[28] In Schaeffer's view, which, however, seems to be strongly focused only on particular elements of the thought of his contemporaries, both Boulez and Cage appear passively to base their

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[26] 'La pierre angulaire de la méthode scientifique [...] est le postulat de *l'objectivité de la Nature*, c'est-à-dire le refus *systématique* de considérer comme pouvant conduire à une connaissance «vraie» toute interprétation des phénomènes en termes de causes finales, c'est à dire de «projet» [...]. Postulat pur, à jamais indémontrable, car il est évidemment impossible d'imaginer une expérience qui pourrait prouver la *non-existence* d'un projet [...] où que ce soit dans la nature.'

[27] 'On dira [...] l'homme et l'humanité, parties intégrantes de l'univers de la vie, sont soumis à ces mêmes lois. Ou encore: il n'y a de science de l'homme qu'à partir du même postulat de l'objectivité. C'est-à-dire en refusant toute interprétation en termes de finalité. *Et donc, j'imagine, toute intention de sa parte?*'

[28] With reference to the question of the identification of human and natural life see also note 71.

creative expression on an allegedly flawed understanding of natural systems, the former by relying on the 'necessary constraints' of serialism, the latter by relying on the aesthetics and the compositional technique of aleatoricism.[29] There are many reasons for Schaeffer's polemical attitude towards serialism and aleatoricism. In this case, his criticism abandons for once the strictly technical field of the structures of perception, to enter the domain of aesthetics. Even with respect to Boulez, the problem has to do not with non-perceptible structures, but with the concept of automatic writing, and, implicitly, with the idea of open work entailed by this compositional technique. The reliance on the automatic system leads to a work with no end from the point of view of both *faire* [to do] and *entendre* [to listen],[30] and contributes, as much as aleatoricism does, to the creation of a man not responsible for his project. In this way, the musical product results in being 'unnaturally' deprived of an evident development.

Leaving aside the superficiality Schaeffer's judgement on Boulez and Cage and the confused organisation of the discourse, Schaeffer's attempt to demonstrate a consistent connection between 'natural' fundamentals of music and human integrity betrays the desire to connect both of them to a more general system of laws intended as

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[29] See Schaeffer, 1971d: 165.

[30] *Faire* and *entendre* have extremely complex meanings, whose accurate explanation is further complicated by the loose terminological choices that often undermine the clarity of the T.O.M. In this case, *entendre* has little to do with the term used to define one of the four kinds of listening outlined in the second book of the T.O.M. It has to be understood, instead, within the opposition *faire/entendre* which is a variation of the concepts of *écriture* [writing]/*perception* commonly used in French musical theory. *Faire* and *écriture* both refer to musical processes relying on some kind of codification. This can be determined by notation, but also by the limited framework due to instrumental features (this is the broader meaning entailed by the Schaefferian term *faire*). Both notions imply a rationalised definition and manipulation of the code, whereas *perception* and *entendre* refer to the entire perceptual result (which does not exclude structural and linguistic auditory results), which exceeds the limits set by the explicitly codified elements of the system.
The choice of the term *entendre* is not random. In this case Schaeffer uses neither *ouïr* [hear] nor *écouter* ['listen up to'], which are the terms generally used in the T.O.M. to define the stage of, respectively, a passive hearing and a more attentive focusing on specific elements of sound. Within the description of the listening process, *entendre* defines the stage when the listener starts to pay attention to the sound in order to qualify it and to identify elements that can be useful for interpreting it. Consequently, *perception* and *entendre* have to be understood within the previous oppositions as processes focusing not on sound in general, but on the musical result, which escapes the 'written' codification and the message deliberately produced by the composer.

definitive and universal.[31] As will also emerge when discussing technical issues, Schaeffer opposes the aesthetic development of 1950s music by trying to recreate the evident narrative structures of traditional music. In order theoretically to endorse this endeavour, he postulates the correspondence of universal order, human experience and natural norms of language.

In this specific case Schaeffer is referring to the formal structure of music more than to constitutive elements of sound. Therefore, the entire discussion is carried on by intuitive evaluations rather than by accurate experimental research. However, it is notable that when a supposedly natural sense of form is taken into consideration, the idea of linear progression seems to be the organisational scheme more suitable to conform to 'natural' needs. The unsettling effect produced by the discovery of new sounds made by the *musique concrète* is substantially annihilated by the attempt to organise them in structures that conform to an arguably natural linear progression. This is a view that will later be shared by spectral musicians and will be embodied by the introduction of the formal and compositional notion of 'process'. Grisey justifies his choice with more practical reasons of perceptibility and opposition to the unviable complexity of serialism.[32] Schaeffer attempts to find justifications for his formal ideal of music in a slightly dogmatic and rather confused interpretation of reality.

A similar attempt to justify traditional convention with an alleged natural necessity is made when Schaeffer discusses the interrelation of *faire* and *entendre* in serial music.

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[31] Quoting François Jacob: '*"But in any case, it is the aim to reproduce that justifies the structure of currently living systems as well as their history ".* Here, however, the term «aim» is used, synonymous with «teleonomy», even if it is limited to the objective of reproduction.' ['*"Mais dans tous le cas, c'est la finalité de la reproduction qui justifie aussi bien la structure de systèmes vivant actuellement que leur histoire".* Voici pourtant le mot «finalité» lâché, synonyme de «téléonomie», même s'il est limité à l'objectif de reproduction'] (Schaeffer, 1971d: 164).

[32] But in his writings there are also references to biological and natural rhythm: see Grisey (1987).

In his view, the lack of precise knowledge of the natural laws underlying human perception prevented contemporary composers to create a music in which *faire* and *entendre* were balanced in a process of mutual enrichment. If serialism is considered to lean excessively towards codified abstraction, *musique concrète* results in an inconsistent juxtaposition of objects too distinctive to be arranged in a connective structure.[33] Aleatoricism obviously adds to the disconnection between *faire* and *entendre* the aesthetic inconsistency outlined above.[34]

As a matter of fact, the concepts of *faire* and *entendre* prove to be not well determined when speaking in practical terms. If aleatoricism effectively seems to fracture the interrelation of *faire* and *entendre* in a temporal succession (to do–to listen), then serialism simply revises the relationship between the two elements of the pair, broadening the possibility of perception through a particular technique of composition. The link between the two elements is still present, although it is made looser than it

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[33] 'It can be seen that the two methods [serialism applied to electro-acoustic devices, and *musique concrète*] result, in opposite ways, in the negation of the instrument as a tool for a properly musical expression. One music was the by-product of an interplay of parameters, the other was a simple juxtaposition of objects' ['On voit comment les deux démarches aboutissaient, de façon opposée, à la négation de l'instrument en tant qu'instrument d'une expression proprement musicale. L'une des musiques était le sous-produit d'un jeu de paramètre, l'autre une simple juxtaposition d'objets'] (Schaeffer, 1977a: 65).

[34] For this reason, the only valuable result that, for Schaeffer, both aleatoricism and serialism seem capable of producing is the one also shared by *musique concrète*: they generate an awareness of a musical potential not yet exploited: 'As soon as it is made the discovery of a practically limitless number of sonic objects, where the pitch no longer appears as the only dominant quality, the notion of series is applied more effectively. The negative trait of atonality disappears. While only the day before it appeared as a desperate attempt leading to a cul-de-sac, it now turned out to be a liberation act that might have been necessary to allow precisely the introduction of new sonic objects' ['A partir du moment où se fait la découverte d'objets sonores en nombre pratiquement illimité, où la qualité de degré n'apparaît plus comme la seule dominante, la notion de série s'applique avec plus d'évidence. Le caractère négatif de l'atonalisme disparaît. Tandis que, la veille encore, il apparaissait comme un geste désespéré ne conduisant qu'à un cul-de-sac, il se révèle comme un geste de déblayage qui était peut-être indispensable pour que puisse être admise précisément l'introduction d'objets sonores nouveaux'] (Schaeffer, 1977c: 193). However, the same concept expressed in 1953 will acquire a much more negative nuance some twenty years later: 'I'll go so far as to insinuate that the current interest of composers in aleatoric schemes and «open forms» betrays, on their behalf, an implicit conviction: the ear will always manage to organise any sonic texture, and to find a meaning for it, even if incomplete [...] However, rather than making an admission that does not flatter their self-respect as creators, the majority of musicians codify the rules of the game and justify studiously their whims' ['J'irai même jusqu'à insinuer que l'intérêt actuel des compositeurs pour les schémas aléatoires et les «formes ouvertes» trahit, de leur part, une certitude implicite: l'oreille se débrouillera toujours pour organiser n'importe quel tissu sonore, et pour lui trouver un sens, fût-il partiel [...] Plutôt cependant que de consentir un aveu qui flatte mal leur amour-propre d'auteur, la plupart des musiciens codifient les règles du jeu, justifient doctement leurs caprices'] (Schaeffer, 1976: 65).

usually is in traditional techniques of composition. To a certain extent integral serialism started by paying excessive attention to *faire*. However, it is precisely the reinstatement of the fruitful interdependence of *faire* and *entendre* that Boulez described when speaking about the compositional process of the first book of *Structures*.[35] It is possible to state that, in a sense, the meaning of the conceptual opposition 'necessity/freedom' in Boulez overlaps the one of Schaefferian '*faire/entendre*'. The Boulezian 'local freedom' allows for an evaluation and readjustment of the results of the serially codified system on the basis of perceptual criteria. Boulezian *faire* entails from the outset the process of *entendre*, in the two senses of compositional re-elaboration and interpretative re-organisation.

As mentioned above, it is evident that Schaeffer rejects the alleged lack of respect for perceptual criteria as much as the aesthetic principle underpinning serialism and aleatoricism. Schaeffer's idea of a convenient relationship between *faire* and *entendre* does not adjust to the apparent lack of formal directionality, and to the extremely virtuosic entanglement of *faire* and *entendre* in Boulez's serial music. However, the criticism appears to be due more than anything else to a matter of compositional procedure and complexity of the resulting musical structures, since the relation of *faire* and *entendre* is never totally consequential, not even within the traditional system. The laws that Schaeffer is researching are theoretically definitive, but in fact they are suitable for justifying a music in many ways indebted to a traditional formal consequentiality that serial music explicitly opposes. Schaeffer's aspiration to achieve a complete codification of sound parameters is an idealistic development of a traditional practice, which entails the deliberate choice of each sound, or at least of each *valeur*, during the compositional process. However, the exact correspondence of *faire*

[35] See Boulez, 1989 : 257-262.

and *entendre* is not guaranteed by this procedure, and, even in Schaeffer's view, it is not actually desirable.

From this perspective, even the organisation of a *solfège* based on the kind of scalar morphology of sound described in the T.O.M. could reveal a cultural influence, as has been shown above for the notion of 'directional' musical forms:

> The main reproach that I would make against the T.O.M. is owing to the fact that, deliberately, all the musical perspectives glimpsed by Schaeffer are abstract prolongations inherited from a cultural past and they absolutely prevent musical research or even musical thinking from being consistent [...] with the means of the electro-acoustic studio. Therefore [...] a perspective relying on the means of the electro-acoustic studio as ways of thinking of music, of «writing», is explicitly denied, [...] the only possibility is a music with pseudo-linguistic structures, made of hypothetical scales, with a nostalgic reminiscence of J. S. Bach. (Guy Reibel in ed. GRM, 1976: 31-32)[36]

In conclusion, not only is evident that the inescapable interrelation of nature and culture informs the system of Schaeffer, but also that its influence is often disguised and therefore fundamentally undermines the consistency of the theoretical discussions.

Intentional listening

It has been said that the T.O.M. can be considered a treatise on the process of listening.[37] This is not necessarily an accurate description of Schaeffer's work if the

[36] 'Le reproche fondamental que je ferais au Traité, c'est le fait que, volontairement, toutes les perspectives musicales entrevues par Schaeffer sont les prolongements abstraits hérités d'un passé culturel traditionnel et qui refusent complètement qu'un e recherche et même qu'une pensée musicale puisse être contingente [...] aux moyens du studio. Donc [...] une perspective qui s'appuie sur le moyens du studio en tant que moyen de penser la musique, d' «écriturer», sont explicitement refusés, [...] la seule issue possible étant une musique avec des structures pseudo-linguistiques, fait d'échelles hypothétiques, dans la souvenance nostalgique de J.-S. Bach'.

[37] 'Schaeffer's *Traité des objets musicaux* is first of all a treatise about the ways of listening' ['[Le Traité des objets musicaux] de Schaeffer est d'abord un traité sur les façons d'écouter'] (Augoyard, 1999: 87).

notion of 'listening' is not understood in the broader meaning emerging from the T.O.M., which entails the notions of both communication and perception.

The entire *solfège* in the T.O.M. is actually based on the analysis of the phenomenon of listening outlined in the second book of the treatise, and especially in the distinction made between types of listening determined by the focalisation on different elements of sound, either abstract or concrete, as they have been defined above in this chapter. Although there can be no doubt about the originality of the discussion, its value is partially clouded by the relative lack of terminological precision.

The scheme presented in the T.O.M. (see Ex. 1) displaying the four types of listening does not aim to outline a chronological succession of different perceptions of the same sound. Rather, it is an attempt to analyse the complexity of linguistic reception through the description of perceptual activities strictly interrelated and constantly renewed.[38] The definition of the four types of listening relies on the concept of 'intention of perception'. In Schaeffer's view, the ability to focus on a specific element of sound is a feature of human perception. Sound undergoes a process of perceptual analysis that changes on the basis of the different functions it has to carry out. *Ouïr* [hear], *écouter* [listen up to][39], *entendre* [listen], *comprendre* [understand] correspond to specific perceptual stages that require a focus on a different combination of elements within the same sound.

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[38] 'From our divisions and numberings it must not be inferred that there is a chronology or a logic to which our perceptual apparatus conforms. [...] Passing from one sector to the other with the intention of giving a logical description of a particular perceptual operation is only a descriptive device, and certainly it does not imply any real temporal succession in the actual perceptual experience. The deciphering of perception is done instantaneously, even when the four sectors are all involved' ['Il ne faut pas inférer de nos divisions et numérotations une chronologie ni une logique, auxquelles se conformerait notre mécanisme perceptif. [...] Devoir passer d'un secteur à l'autre dans un but de description logique à propos d'une opération particulière de la perception n'est qu'un artifice d'exposition, et n'implique bien sûr aucune succession temporelle de fait dans l'expérience perceptive elle-même. Le déchiffrement de la perception s'effectue instantanément, même lorsque les quatre quadrants sont en jeu'] (Schaeffer, 1977a: 117).

[39] Although grammatically imprecise, this translation conveys the nuance of meaning that Schaeffer attributes to the French term. It has been used in Palombini (1993a).

Ex. 1 'Table of the functions of listening' (from Schaeffer, 1977a: 116)

1. *Tableau des fonctions de l'écoute*

4. COMPRENDRE	1. ÉCOUTER	
— pour moi : signes — devant moi : valeurs (sens-langage) Émergence d'un contenu du son et *référence*, *confrontation* à des notions extra-sonores.	— pour moi : indices — devant moi : événements extérieurs (agent-instrument) *Émission* du son	1 et 4 : objectif
3. ENTENDRE	2. OUÏR	
— pour moi : perceptions qualifiées — devant moi : objet sonore qualifié *Sélection* de certains aspects particuliers du son	— pour moi : perceptions brutes, esquisses de l'objet — devant moi : objet sonore brut *Réception* du son	2 et 3 : subjectif
3 et 4 : abstrait	1 et 2 : concret	

Although the four kinds of listening are not understood as parts of a chronological succession, they do represent a gradual passage from a passive listening to the decoding of a message that goes beyond the realm of mere perception. In other words they represent a displacement of attention from the concrete of perception to the abstract of linguistic meaning. This is obtained through a chain of identifications and qualifications of sonic elements, which starts from the generic continuum absorbed by an unfocused perception, and proceeds through the identification/qualification of structures, objects, sound parameters or *critères* [criteria] [40], *caractères* and *valeurs*. Each identification is followed by a qualification that, while describing the sound, identifies further details, in a gradual process of focalisation which singles out the elements responsible for linguistic communication.

The notion of 'listening intention' also makes possible the definition of the idea of *objet sonore* introduced at the end of the second book in the T.O.M. It is a specific 'listening intention' that diverts the perceptual focus from the search of *sens* [meaning] or *indices* [index][41] to sound itself, and in this way generates the *objet sonore*. The 'listening intention' is obviously informed by the strong connection of *naturel/culturel*, which shakes the theoretical foundations of the *objet sonore*. If the focus of perception is intentionally diverted from *sens* and *indices*, both of them nonetheless influence the 'intentional' process of perceptual analysis of the *objet sonore*, since they represent a background of perceptual habits and limitations that inevitably affects the analysis of the listener. This is the same kind of contradiction already pinpointed within the ideas of natural and universal language discussed earlier.

[40] With this term, Schaeffer indicates the sound parameters identified in the morphology. They are seven, hence not limited to the traditional parameters usually referred to by composers and physicists.
[41] *Sens* and *indice* identify the information conveyed by the sound as opposed to sound itself. *Sens* refers to linguistic information, while *indice* refers to the information about the source that generates the sound.

Leaving aside the interpretative nuances of Schaeffer's theoretical fundamentals, it is evident that the T.O.M. attempts to unify a theory of the perceptual phenomenon of listening with the new, universal musical system.

However, this is done using a terminology that often seems inadequate to the task, and also through some conceptual generalisations that contribute to undermine the coherence of the work.

Permanence/variation in musical systems

As discussed earlier, Schaeffer makes a distinction between the concepts of 'convention' and 'culture'. His distinction corresponds in many ways to the one currently in use, with the former term necessarily entailing the latter and being substantially synonymous with the notion of 'language' in its broadest meaning.

However, the difficulty in actually attaining an exact delimitation of both conventional and cultural domains is made evident by the analysis of all the theoretical discussions in the present research. Since, as suggested earlier, the attempt to reorganise musical language is in Schaeffer's work more far-reaching than in Grisey and Boulez, it is obvious to expect that his definition of 'convention' will be more widely inclusive. Generally speaking, in Schaeffer the conventional domain that undergoes the process of revaluation is substantially enlarged by the inclusion of notation. Interestingly enough, the problem of notational limitations is not substantially discussed in the theoretical works of either Boulez and Grisey, and the reference point of the note is never definitively abandoned in their music. Grisey has, on occasions, resorted to an unorthodox notation, but has never undertaken a systematic rethinking of notational symbols on the basis of a revised parametrical hierarchy. The sonic objects identified by

an unconventional notation, where pitch may momentarily lose the dominant status, are usually not meant to be inserted in a well defined and coherently developed structure. They often appear in the late phase of the developmental process, when articulated sound has completed the transformation into noise. This means that the instruments provided by technological progress may well allow and generate a different approach to theoretical speculation, but notation and analytical categories maintain a fundamental influence on the structural and perceptual organisation of music. Grisey's tools of analysis and synthesis have been far more advanced in comparison to the ones used by Schaeffer. Yet, the analytical terminology tends to relocate the results of spectral analysis of sound back to the conventional symbols used by traditional music.

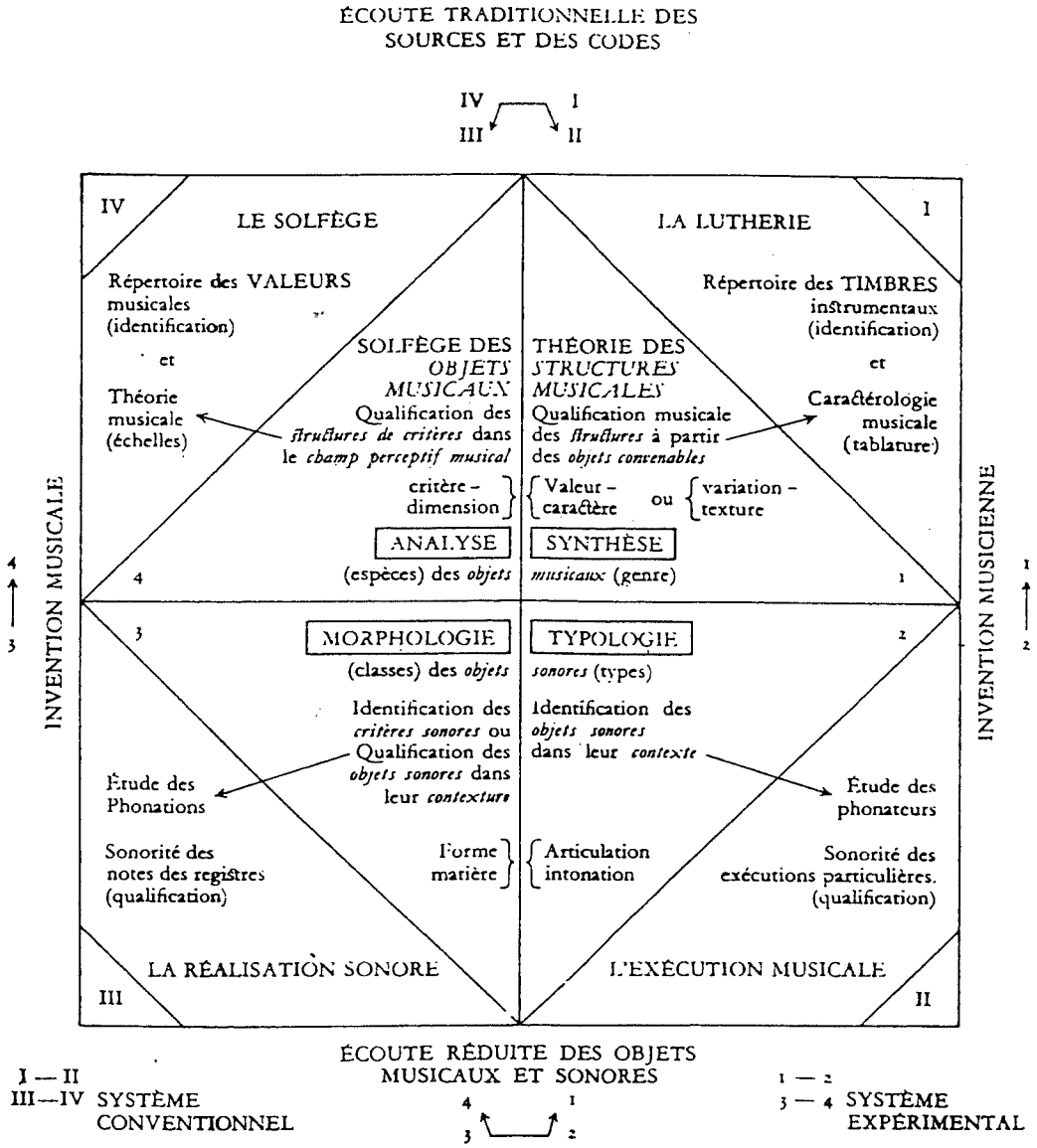
Similarly, tape-recording has been used by Boulez,[42] with results very different from Schaeffer's, owing to a different location of the theoretical line defining 'convention'. When dealing with electro-acoustic devices, Boulez does not substantially revise his code of reference derived from acoustic composition.

It is true that Schaeffer recognised the dominant status of pitch within the structural criteria, but the entire research work of the T.O.M. precisely aims to provide the technical tools to alter this status. In my view, Boulez relies almost entirely on pitch to organise the structural details of his music, to the point that often the other parameters, including rhythm, seem to function only to locate pitches in unpredictable positions within the perceptual field. This conception may be informed by the heritage of dodecaphony, with obviously a special reference to Webern.

There is no doubt that this situation is also due to the different aims of the theoretical speculations: while Schaeffer carries on with abstract research, Grisey and Boulez are more interested in the definition of a set of organisational reference points to

[42] It is well known that Boulez was involved for a short period of time in the research work of the *Groupe de Recherches de Musique Concrète*. On that occasion, Boulez has used tape-recording to produce two *Études* (1951-1952).

Ex. 2 'Program of musical research' (from Schaeffer, 1977a: 369)



be immediately used in practical composition. Hence, in their theories the redefinition of 'conventional' notions stops where basic communication through scores and the use of trained instrumentalists are still possible. In contrast, the entire traditional system is rethought by Schaeffer starting from the basic elements and including musical instruments and performing practice.

As is often the case with the T.O.M., the use of schemes apparently suitable to allow a better understanding of complex issues, results in an excess of generalisation. This is also the case of the scheme of comparison between the elements of the traditional system and the new notions of the experimental system (see Ex. 2), which creates all sorts of ambiguities and paradoxes that demonstrate once more the real nature of the entire research work, speculative rather than prescriptive.

As Schaeffer puts it, the subdivision of the scheme hinges on the conceptual opposition *permanence/variation*.[43] This conceptual dualism underpins the notion of *valeur–caractère*, but also, more interestingly, the one of timbre and tablature (i.e., the subdivision of the sonic continuum in registers, the procedure that in the traditional system is based on scales). The traditional musical system is presented by Schaeffer as a particular instance of the application to music of these perceptual categories. Traditional musical language theoretically relies on the organisation of discreet elements, the notes, connected by the common quality of instrumental timbre. Schaeffer's research programme aims to overcome what he considers the abstraction of the notion of timbre as it is conventionally intended, since, in his view, the definition of timbre on the basis of the instrumental source is a simplification.

The approach of Schaeffer to acoustic research was obviously not sustained by a strong technological support. Nonetheless, his research work had already acknowledged

[43] See Schaeffer, 1977a: 368.

that the perception of timbre did not rely exclusively on the structure of the spectrum, but also on its dynamic evolution.

The latter, as well as the perception of spectral components, varies with the registers, in a way that is different for each musical instrument.

Moreover, specific instruments of the same type and individual players can also generate a variation in the similarity of timbres. In other words, the quality of sound defined conventionally as 'timbre' and traditionally associated with the instrumental source does not necessarily correspond to a real perception. The instrumental standardisation of the traditional system has given functional value only to a specific set of *caractères*, leaving the rest to a secondary connotative role, determined by the empirical and imprecise sensibility of composers and instrumentalists. This has produced perceptual and organisational patterns that allow an incomplete set of criteria codified as timbre to carry out its connective function, but prevent the full exploitation of traditionally secondary parameters.

This is another fundamentally original trait of the T.O.M. The notion of instrumental 'timbre' has been acknowledged as incapable of fully exploiting the perceptual category that it relies on. For this reason Schaeffer introduces the notion of genre [kind][44] (association of critères defining a 'timbral' quality of sound), which maintains the functional role attributed to instrumental timbre, but is far more open to concrete exploitation.

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[44] The notions of *caractères* and *genre* can generate a certain confusion to the reader of the T.O.M. Chion presents them as substantially synonymous (see Chion, 1983: 104). In my understanding, the two terms are not precisely synonymous, although they tend partially to overlap. Generally speaking, they refer to the two procedures of classifying and structuring the elements constituting a sonic object. *Caractères* define every aspect of sound that cannot be, or has not been, resolved in a primary perceptual criterion (i.e. one of the criteria outlined in the morphology). In other words, the term distinguishes primary and secondary elements in a sound, and consequently determines their musical potential. When the object is inserted in a structure, the *valeurs* become a meaningful organisation (*sens*), based on the functional support of those unresolved sound elements (*genres*) that create a pattern of homogeneous backgrounds. Not necessarily all the *caractères* contribute to this structural organisation, and for this reason a distinction between *genres* and *caractères* is possible, in the same way that was possible with the instrumental timbre. If in traditional music timbre and attack (or touch) are notions partially distinguished, and undergo a different level of control by the composer, Schaeffer overcomes the distinction in his experimental system.

The revaluation of the notion of timbre as a structural parameter has been notoriously carried on by contemporary musicians, especially by spectralists. Schaeffer's approach, as usual, is made original by the stress laid on perceptual phenomena. His description of the inner organisation of sound may be simplistic if compared to the model resulting from accurate spectral analyses. However, the sonic object of Grisey is much more physical than perceptual and it is described through a terminology that is absolutely traditional[45]. Spectral music often relies on the assumption of the possibility of safely associating acoustics and perception that has been opposed by Schaeffer.[46] The particular codification of sound parameters in the T.O.M. is derived not only from the awareness acquired through experiments with tape-recorded sounds and music. It also represents the tangible result of a conceptual approach. The perception of Grisey is still focused mainly on what can be described through conventional or scientific language. The research of Schaeffer aims to set new operational limits for music through an exhaustive classification of what can be considered sound parameters with musical potential. His approach can be regarded as flawed from the point of view of practical feasibility, which includes the difficulty of defining a satisfactory terminology. However, the aim to set limits to the choice of sonic phenomena on the basis of their musical potential allows Schaeffer to adopt a methodology that not only can be more systematic, but also leads to a more substantial revaluation of musical language. Grisey and Boulez make a clear and consistent distinction between the qualities of sound that *can* be 'musical' (i.e., that can be inserted in a structural hierarchy) and the ones that cannot be, although their organisational choice is already made richer than what it used to be within the tonal system by the stronger role attributed to notated parameters other than pitch. Schaeffer overcomes the traditional distinction through a complete obliteration of any reference to conventional

[45] See Grisey (1991).
[46] See for instance the discussion about resultant tones in Grisey, 1991: 369-370.

systems.[47] It has been suggested earlier that this approach is hardly credible, since cultural influence informs the research through channels that do not always correspond to easily detectable conventions. Nevertheless, this comparison gives a picture of how much the use of conventional symbols necessarily informs musical thinking. Schaeffer eliminates note and timbre,[48] which in the traditional system embody the fundamental categories of *permanence/variation*. His aim is to go beyond the historic language and investigate the potential of the fundamental categories that underpin those traditional linguistic elements.

Valeur/caractère

The idea underlying the research work on the *objet sonore* is that a new function can be attributed to elements of sound by overcoming the limitations imposed by the traditional system. This includes both 'abstract' and 'concrete' elements. *Abstrait, valeur*, refer to the part of sound that can be perceived as organised within a codified system, such as a hierarchy of values. *Concret, caractère* define the part of sound that cannot be identified so precisely, and that traditionally escapes a complete theoretical classification.

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[47] 'Therefore, in the experimental system we ignore, at the beginning, what is a timbre, and even what is a value. We start again from the sonic chains' ['Dans le système expérimental, nous ignorons donc, au départ, ce qu'est un timbre, et même une valeur. Nous repartons des chaînes sonores'] (Schaeffer, 1977a: 384).

[48] 'If one wants to leave behind the traditional system in order to devote oneself to the research of an experimental system, one has to *give up the notion of timbre*, which is too vaguely defined, and also to give up the idea of reinstating that notion as a value, [...] in the way the adepts of the *Klangfarbenmelodie* have done.' ['Si l'on veut quitter le système traditionnel pour s'adonner a la recherche d'un système expérimental, on doit *renoncer à la notion de timbre*, trop floue dans sa définition, et renoncer à la réincorporer comme valeur, [...] comme ont essayé de le faire les adeptes de la *Klangfarbenmelodie*'] (Chion, 1983: 52).

Within a musical structure, it is only through the invariance of *caractères* that the perception of variation of *valeurs* is made possible.[49] In fact, this clear distinction has proved to be an abstract schematisation rather than an accurate description of the perceptual functioning of musical structures. The elements of a sonic object seem to be organised following a hierarchy that is much more complex than what is describable through this elementary opposition. This is obviously owing to the variable degree of perceptual relevance of the criteria.

The formal opposition *permanence/variation*, which proves to be quite intuitive, is present in Boulez's theoretical discussions, with reference to both the combinatorial elaboration of the series and the actual musical exploitation of the pre-compositional material,[50] as well as in Grisey's discussion about the notion of pre-audibility.[51]

The definition of *valeurs* and *caractères* is not explicitly outlined, but since pitch and duration are identified by Boulez as the only parameters of sound really effective for the determination of a musical hierarchy, it is obvious that Boulez's sonic objects must be identifiable by a clear structural potential of one of these two components. Although there are exceptions, generally speaking this is a predictable result of the use of traditional solfeggio in Boulez's notated music.

Moreover, since 'abstract' and 'concrete', *valeurs* and *caractères*, are still derived from traditional convention in serial music, secondary pitch structures can often be interpreted as *caractères*, with a stabilising function more relevant than timbre or

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[49] It is useful to give here Schaeffer's definition of this fundamental concept: 'Within a musical structure, *the objects are singled out as values by their similarity of characters*. Only these two functions, and not a substantial difference, define these two terms one in relation to the other. Values provide a differential structure; the similarity of characters indirectly does so as well, by weakening the interest that one might develop for the identification of objects, that otherwise would appear as a series of heterogeneous and isolated events.' ['À l'intérieur d'une structure musicale, *les objets se distinguent en valeurs moyennant leur ressemblance en caractères*. Et ce sont uniquement ces deux fonctions, non point une différence de nature, qui définissent, l'un par rapport à l'autre, ces deux termes. Les valeurs assurent une structure, différentielle; la ressemblance en caractères l'assure aussi, indirectement, en affaiblissant l'intérêt qu'on peut prendre à l'identification des objets qui se présenteraient, autrement, comme une série d'événements hétérogènes, indépendants les uns des autres'] (Schaeffer, 1977a: 303).

[50] See Boulez, 1971: 106-114.

[51] See Grisey, 1987: 258-259.

dynamics. Let us not forget that even in tonal music the system of values is much more articulated than the simple opposition note–timbre. At least in theory, the harmonic background works as a stabilising element, with a function that is similar to Schaeffer's *caractère.*

As a matter of fact, in general, it is the peculiar use of pitch structures, the way in which they gain perceptual relevance and therefore hierarchical value, that represents the shocking novelty of serial music. The intricacy and swift variation of the association of pitch with other parameters such as intensity, register, attack, generates the complex pitch hierarchy of serial compositions. Schaeffer's idea of articulating in scales traditionally secondary sound parameters (such as *grain* or *allure*[52]) in order to confer on them the potential to function as *valeurs* is pragmatically discarded by Boulez. This also entails the disregard for the second substantial, although unachieved, aim of the T.O.M., which is the codification of the *caractères*, in order to precisely and explicitly control their musical organisation. The impression is that the codified system required by Schaeffer would be too complex to be really effective as a compositional tool.

Analysis and synthesis: transition to music

The passage from the description of sound to the creation of premises for a musical organisation of *objets sonores* is left unaccomplished in the T.O.M. It is nevertheless useful to outline the fundamental ideas that should have underpinned the research of rules for musical organisation. In the case of Boulez and Grisey, these concepts are left implicit, and the compositional process relies on a sensibility for the relationship of

[52] The term 'grain' holds substantially the same meaning in French and English. With the word *allure* Schaeffer indicates the quality of sound that in traditional musical terms is defined as 'vibrato'. Therefore *allure* corresponds to a generalised notion of vibrato (see Chion, 1988: 158).

sonic elements that cannot be tracked back to any kind of explicit theory. In this sense, the Schaefferian compositional process that goes from objects to structures is not effective: musical composition relies on a synthetic understanding of the interrelations of structures and objects, which have proved to be too complex and variable to allow the creation of an exhaustive theory both consistent and explicit. The experience of the three musicians analysed in this research not only shows the difficulty of drafting a theory of musical composition, but also, and more interestingly, it clarifies the real nature of what is currently called 'musical theory'. Traditional notation and the theory of tonal music not only fail to define and regulate sound parameters that hold a functional, although secondary, role in the musical structuring, but they do not even produce a comprehensive normative system for the interrelation of the sound parameters that are explicitly taken into account (for instance, how dynamics or register affect the identification and structural functionality of a melodic profile or a tonal function). The set of operative norms offered by a theoretical apparatus as rich and developed as the tonal system is surprisingly limited if compared to the amount of comparative evaluations that are required by the compositional process. Schaeffer's attempt to define every perceptual element contributing to the musical organisation is evidently bound not only to further increase the complexity of the system, but also to determine what is probably an excessively rationalised control of the compositional process.

In order to generate musical structures, Schaeffer obviously relies on the perceptual ability to relate similar elements of different sounds:

> The first faculty of the perceptual field is the ability to compare two objects, by detecting one common characteristic. The second faculty, is the ability to order these values. The third is the ability to determine, with variable precision, the grades of this scale. (Schaeffer, 1977a: 383)[53]

[53] 'Une première faculté du champ de la perception est de pouvoir comparer deux objets, leur découvrant une même propriété. Une seconde est de pouvoir ordonner ces valeurs. Une troisième est de pouvoir, avec plus ou moins de précision, fixer les degrés de cette échelle.'

Schaeffer's aim is to reach a precise definition of a scale of *valeurs* for each *critère*. In order to attribute a structural function to a specific sound element, this has to be precisely located in the field of perception. For this reason, in the unaccomplished research stage of analysis, Schaeffer introduces the concepts of *site* [site] and *calibre* [calibre]. These serve to analyse respectively the position and the amplitude of a sonic element within the perceptual range of a specific *critère*. The attempt to create a new *solfège* based exclusively on perception has made it necessary to recreate a set of registers able to codify any *objet sonore*, a sort of new tablature that does not refer to musical codifications, but to a supposedly natural framework of perception:

> It is the case of retrieving collections [...] analogous to the ones of the notes of a piano or violin leading to the definition of registers. These registers, even if they had all sorts of criteria varying along with the pitch, would not disturb the perception [of *valeurs*]. (Schaeffer, 1977a: 381)[54]

This analytical work should overcome the imprecision of compositional methods used by serial musicians, since they rely on structural parameters that prove to be an abstractly limited schematisation of real perceptual categories.[55]

In Schaeffer, the clear distinction of *valeurs* and *caractèrs* will depend on the balance of the sound elements in every single connection of the objects within the structure:

> We create collections of objects where we distinguish one sonic criterion, and we look to see if these objects, notwithstanding the dissimilarity of their other criteria, will make appear relations of the considered criterion that

[54] 'Il s'agit de rétrouver des collections [...] analogues à celle des notes du piano ou du violon conduisant à des registres. De tels registres, tout en ayant toutes sort de critères également variables en fonction de la hauteur, ne perturbaient pas cette perception.'

[55] The procedure that, starting from the undefined sonic texture, aims to recreate a set of registers is conceptually not far from that adopted by Boulez. It is described in Boulez (1971) and it relies on the notion of 'module' and 'absolute value'. The partial terminological correspondence could be fortuitous. Nevertheless, the notion of structural value is common to both Schaeffer and Boulez, and, although applied to different parameters, it entails a similar distinction between two different functions that the constitutive elements can carry out within a sonic object. In the case of Boulez, however, it is probably more appropriate to refer to primary and secondary structures of values, since the same sound criterion (usually pitch) can be responsible for both the functions.

> have a meaning, which means, that can be to qualified, ordered or located in our musical perceptual field. [...] We know that this experiment [if compared to the conventional relation note–timbre] was already less convincing with the most powerful musical value [the pitch]. How tentative will be those experiments where, within the dissimilarity of the characters, we will strive to postulate the structures of an unknown criterion, necessarily less established than pitch ... This is the *invention of the musical*. (Schaeffer, 1977a: 381)[56]

It is evident that this conceptual apparatus proves to be a schematisation when applied to specific instances. The precise control of the functional modification of each element within the structure is very unlikely to be effectively controlled by a codified set of rules. This is not only an evidence of the number of problems left to implicit reflection and synthetic sensibility when composing music, but also an explicit evidence of the way the problem of functional hierarchy has been resolved by the traditional system.

Objet sonore

> What is then the musical «un-thought of» that the treatise has approached in the first instance? It is the gap, often disguised, between the two knowledges that in vain refer one to the other. Traditional musical knowledge rests on a solid tripod [...] solfeggio for the ear, practice for instruments, writing for works. [...] Contemporary music may well reject scales, but it has seized on [...] a second tripod, the «trihedron of reference»: pitch graduated in frequencies, intensities graduated in decibels, durations graduated in seconds. (Schaeffer, 1977a: 664)[57]

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[56] 'Nous formons des collections d'objets où nous distinguons tel critère sonore, et nous cherchons si ces objets, malgré la disparate de leurs autres critères, feront apparaître des relations du critère considéré, qui aient un sens, c'est-à-dire qui soient qualifiable, ordonnables ou repérable dans notre champ perceptif musical. [...] Nous savons que cette expérience était déjà moins probant pour la valeur la plus robuste du musical. Combien fragiles seront celles où, dans le disparate des caractères, on s'efforcera de postuler les structures d'un critère inconnu, forcément moins affirmé que la hauteur ... Telle est l'*invention du musical*'.

[57] 'Quel est donc l'«impensé» musical que le *Traité* a abordé en première urgence? C'est la faille, souvent dissimulé, entre deux savoirs qui se renvoient inutilement l'un à l'autre. Le savoir musical traditionnel repose sur un solide trépied [...] un solfège pour l'oreille, une pratique pour les instruments, une écriture pour les œuvres. [...] La musique contemporaine a beau refuser les gammes, elle s'est saisie [...] d'un second trépied, le «trièdre de référence»: hauteurs graduées en fréquences, intensités graduées en décibels, durées graduées en secondes.'

The '*impensé*' (un-thought of) referred to in the quotation is precisely what *musique concrète* implies from the outset, without explicitly defining it:[58] the *objet sonore* gives access to a world of sonic events not yet considered and offered to perception (in the Schaefferian meaning of sensation *plus* intention) only through the de-conditioning process made possible by the *écoute réduite*.

The 'unforeseen' created by systematic rigour is a recurrent concept in writings by Boulez, and the concept of '*musique liminale*'[59] inferred by Grisey from the analysis of sound perception, clearly implies the idea of a development of the control of sound capable of providing access to a sonic and linguistic domain not yet accessible and exploited. However, in the case of Schaeffer, the *impensé* is defined through an opposition to both musical tradition and scientific description. The *impensé* is what can be neither conceived nor analysed by the above mentioned systems of reference, since it relies on a listening intention directed to elements previously neglected. This is the difference that Schaeffer sees between his concept of escaping tradition and the one of his contemporaries. They are, in Schaeffer's view, indebted to one or both the reference systems that limit musical language and, through their excess of abstraction, can prevent the creation of a perceivable musical organisation. To escape from both those systems through the experience of the *musique concrète* first, and then through a rigorous work of research, means for Schaeffer, at least at the time of the T.O.M., to gain access to a universal music, which is supposedly understandable with no need of any conventional system. The notion of *objet sonore* is supposed to give access to this music through a

[58] 'This [flaw] is the object of the *Traité*, that starts again from this historical situation, complicated by a precedent: *musique concrete*. Strangely, this «savage» practice appeared alone [...] to fill the gap mentioned above' ['Ce [faille] fait l'objet du *Traité*, qui repart de cette situation historique, compliquée d'un précédent: la musique concrète. Bizarrement, cette pratique «sauvage» se présenta seule [...] pour combler la lacune en question'] (Schaeffer, 1977a: 664).

[59] 'Music of the threshold' is the definition that Grisey preferred to 'spectral music' (see Grisey, 1991: 377). This arises from the fact that his concern was primarily to create developmental processes based on the most precise regulation of the parametric (and therefore perceptual) variations. The control of the perceptual results of the compositional process was done through the accurate determination of what Grisey referred to as thresholds of pre-audibility.

complete obliteration of any possible reference to generative sources or linguistic systems. But in reality, this is arguably not the case. The issue of cultural and natural references has been addressed above and it is not necessary to discuss it any further. However, the process that leads to the definition of the notion of *objet sonore* in the T.O.M. is worth attentive scrutiny, since it displays a systematic logic not always easy to detect at first sight.

In a way that clearly reminds us of Boulez and his *Structure Ia*, Schaeffer uses *écoute réduite* to overcome cultural conditioning. Boulez claims to have achieved a new, fresher awareness of the material by letting the material speak by itself. This kind of almost automatic writing cannot be considered the 'tabula rasa' that Boulez claimed it to be. Nevertheless, the perception of structures conceived to alter the usual organisational patterns of thematic and tonal music, has contributed to unsettle creative habits and to indicate new directions of development for musical composition. The difference between Schaeffer and Boulez in the procedure adopted to achieve cultural de-conditioning reflects in many ways their overall attitude to the problem of overcoming traditional conventions. If Schaeffer relies on a systematic work of research aimed to *unveil* a code that transcends and includes the traditional system, Boulez aims to shatter the limitations imposed by the conventional structures by replacing them with other, comparatively un-conventional structures. In other words, Boulez ultimately aims at a realistic overcoming of language through the clash with another language. The case of Schaeffer is, once again, different because of the systematisation and the articulated theoretical justification of the process. The reasons and aims of Boulez's experimental works, as will be seen in the following chapter, are much more ambiguous, since they prove to be a blend of a struggle for theoretical coherence and a more plainly pragmatic musical experimentation.

Épochè and *écoute réduite*

It is well known that Schaeffer's theoretical work appears to be rooted in some of the principles of phenomenological thought. As a matter of fact, Schaeffer does not claim to have deliberately referred to and used the concepts of phenomenology.[60] In the chapter of the T.O.M. devoted to defining the notion of *objet sonore* he refers to Husserl and Merleau-Ponty only better to explain a conceptual attitude and a practical procedure entirely functional to his research project. Schaeffer's concern is to give a solid backup to his idea of conceiving a musical linguistic system on the basis of uniquely perceptual categories. Phenomenology and any other pure theoretical system is left behind immediately after having been used to produce a coherent description and justification of some fundamental steps of the research process.

Furthermore, the *objet sonore* represents a temporary tool, since it is meant to be developed into an *objet musical*. From this point of view, the similarity to Boulez's experience is more evident. Both musicians have gone through an experience of extreme self restraint, in order better to feel free to evaluate effectively, without assumptions, the material at their disposal. Phenomenology represents to Schaeffer something similar to the theoretical quest for coherence outlined by Boulez (1971). It is made evident by the theoretical output of both musicians that the intuition of the possibility to organise music on the basis of complex units (objects or structures), where different sonic parameters can carry out a function that used to be limited to pitch in traditional music, is accompanied by a need to lay theoretical foundations that, however, result in being frustratingly unsteady.

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[60] 'For years, we have often done phenomenology without knowing it [...] It is only afterwards that we have recognised, defined by Edmond Husserl with a heroic demand for precision that we are far from pretending to, a conception of the object that our research postulated' ['Pendant des années, nous avons souvent fait ainsi de la phénoménologie sans le savoir [...] C'est seulement après coup que nous avons reconnu, cernée par Edmond Husserl avec une exigence héroïque de précision à laquelle nous sommes loin de prétendre, une conception de l'objet que postulait notre recherche'] (Schaeffer, 1977a: 262)

The first step of Schaeffer's theoretical elaboration is a description of the phenomenon of perception through the words of Husserl. The feature of perception that Schaeffer wants to point out is the constant modification of the perceptual flux, which contradicts the idea of an immutable 'transcendental object':

> The object is a 'pole of identity immanent to particular experiences, and yet transcendent in the identity that goes beyond those particular experiences' [...] These particular experiences are the multiple visual, auditory, tactile impressions, that follow one upon the other in an endless flux, and through which I tend towards a certain object. (Schaeffer, 1977a: 263)[61]

This is a characteristic that Schaeffer has already acknowledged with his experience of acousmatic listening. The object never appears to be the same, not even to the same individual. However, it is possible to confront different descriptions of it, in order to indicate the constitutive elements that tend to be constantly perceived in a similar way.

The fundamental passage here is that a singular object can never be really perceived as such. The notion of 'transcendental object' is an abstraction derived from the synthetic elaboration of perception:

> In what sense is the object [...] *immanent*? In the fact that it constitutes an *intentional unit*, corresponding to acts of synthesis. (Schaeffer, 1977a: 263)[62]

In the act of synthesis rests the seed of what Schaeffer intends as the fundamental concept of phenomenology. The object does not actually exist outside the subject, it is generated as 'transcendental' in the latter's consciousness. Schaeffer rejects both the idea of a physical correspondence of signal and perception[63] and the idea of perception

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[61] 'L'objet est "le pôle d'identité immanent aux vécus particuliers, et pourtant transcendant dans l'identité qui surpasse ces vécus particuliers" [...] Ces vécus particuliers, ce sont les multiples impressions visuelles, auditives, tactiles, qui se succèdent en un flux incessant, à travers lesquelles je tends vers un certain objet.'

[62] 'En quoi l'objet [...] est-il *immanent*? C'est qu'il constitue une *unité intentionelle*, correspondant à des *actes de synthèse*.'

[63] The third book of the T.O.M. is devoted to the study of the 'anamorphoses musicales', i.e. the discrepancies between physical description and perceptual sensation of the same sonic event.

as an exclusively subjective interpretation of reality. In both cases, the same assumption, 'naïve' in Schaeffer's words, is evident even if it leads to different conclusions: the distinction between objective and subjective reality is uncritically accepted. Both hypotheses do not take into account that:

> It is the perceptual experience that started by telling me that the object that I confront as a *per-se*, ultimately unknowable to perception, existed. (Schaeffer, 1977a: 266)[64]

Perception must be intended here as the phenomenon of sensation, intention *and* mnemonic synthesis described above.

The problem is not whether an objective world exists or not. Faith in its existence is part of the perceptual world of the subject. Borrowing from Husserl the concept of *epoché*, Schaeffer states the necessity of putting aside the problem of the existence of an objective world. On the contrary, the illusion of its presence has to be recognised as an act of mental creation produced by any kind of perceptual sensation:

> the style characteristic of perception, the fact that it never exhausts the object and that it proceeds by sketches [...] is precisely the way the world is given to me as distinguished from myself. [...] Therefore, to every domain of objects corresponds a type of 'intention'. *Each one of their properties refer to the activities of the consciousness that 'constitute' them: and the perceived object is no more the cause of my perception. It is its 'correlate'.* [italic in the text]. (Schaeffer, 1977a: 267)[65]

The perceived object does not generate perception, it is perception that creates the object on the basis of categories (types of perceptual intention; acts constitutive of consciousness) that are naturally existent and culturally developed. *Écoute réduite*, the

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[64] 'L'objet que j'oppose comme un *en-soi*, finalement inconnaissable à la perception, c'est l'expérience perceptive qui a commencé par me dire qu'il existait.'

[65] 'le style propre de la perception, le fait qu'elle n'épuise jamais son objet, procède par esquisses [...] est le mode même selon lequel le monde m'est donné comme distinct de moi. [...] *A chaque domaine d'objets correspond ainsi un type "d'intentionalité". Chacune de leurs propriétés renvoie aux activités de la conscience qui en sont "constitutives": et l'objet perçu n'est plus cause de ma perception. Il en est "le corrélat".*'

practice aimed to free aural perception from cultural conditioning (in the double meaning of both linguistic convention and social and environmental experience), should lead to the recognition of perceptual categories and their functioning. However, *écoute réduite*, along with the correlative *objet sonore*, is bound to be overcome, at least ideally, once the process of liberation from cultural conditioning has been completed, and a new system of references derived exclusively from perceptual categories has been outlined.[66] In this sense the reference to phenomenology is clearer, since it entails the dependence of any kind of given reality upon perception, so that the understanding of the perceptual process becomes the only possible starting point to an understanding of reality as a whole. The development of the *objet sonore* in the *objet musical* should evidently unfold on the basis of the perceptual laws unveiled by the practice of *écoute réduite*. The system of reference necessary to a musical language[67] should be at this point finally authentic and faithful to universal laws of perception.[68] The theoretical elaboration of these concepts is less linear in the actual words used by Schaeffer in the T.O.M. This is owing to his usual lack of consistency in the use of certain notions, especially that of '*naturel*'. However, it is evident that his effort to give solid theoretical foundations to a method of research was meant to oppose the more established theories of the avant-garde. But the positive support given by this conceptual apparatus to actual

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[66] 'It [*époché*] is a "return to the sources" – to the "original experience", as Husserl would say – that is made necessary by a *change of the object*. Before a new training is possible for me, so that I am able to elaborate another system of references, suitable, this time, to the *objet sonore*, I will have to *liberate myself from the conditioning* created by my previous habits, I'll have to go through the test of *époché*' ['Il s'agit d'un "retour au sources" – à "l'expérience originaire", comme dirait Husserl – qui est rendue nécessaire par un *changement d'objet*. Avant qu'un nouvel entraînement me soit possible et que puisse s'élaborer un autre système de références, approprié à l'*objet sonore* cette fois, je devrai *me libérer du conditionnement* créé par mes habitudes antérieures, passer par l'épreuve de l'*époché*'] (Schaeffer, 1977a: 270).

[67] 'It [*époché*] is absolutely not a return to nature. Nothing is more *natural* for us than to obey our conditioning. It consists of an *anti-natural* effort to become aware of what was previously determining consciousness without it knowing it' ['Il ne s'agit nullement d'un retour à la nature. Rien ne nous est plus *naturel* que d'obéir à un conditionnement. Il s'agit d'un effort *anti-naturel* pour apercevoir ce qui, précédemment, déterminait la conscience à son insu'] (Schaeffer, 1977a: 270).

[68] 'Can we, by liberating ourselves from the banal, find another level, an authentic *objet sonore*, the result of the *époché*, that will possibly be accessible to every man capable of hearing ?' ['pouvons nous, nous délivrant du banal, trouver un autre niveau, un authentique *objet sonore*, fruit de l'*époché*, qui serait si possible accessible à tout homme écoutant ?'] (Schaeffer, 1977a: 271).

technical work may be doubted. In many ways, this stubborn reference to a theoretical system in order to justify technical research reminds us of the attitude of both Boulez and Grisey. As will be discussed in the following chapter, Boulez's salvaging of the notion of series has much less to do with compositional technique than with theoretical consistency. There is actually no need for Boulez to respect the principle of non-repetition and chromatic completion of the series, since his combinatorial procedures obliterate immediately both these qualities of the series, rendering them valuable only from a strictly theoretical point of view. Grisey's reference to natural phenomena in order to organise both the general structure and the details of his music can be seen in a similar way. The idea of organising a musical structure on the model of a temporally expanded sonic phenomenon has little to do with the reality of perception. There is no actual evidence that an extended spectrum is perceived as a cohesive organisation: the reference to a natural phenomenon appears to be merely a quest for theoretical support.[69] It is not by chance that, over tieme, all three composers discussed in this work have considerably softened their approach: both Grisey and Boulez have actually started to refer to their compositional procedures as mere technical devices. The reaction of Schaeffer to his own theoretical apparatus, as has been already shown, was even more radical.

To further erode the value of phenomenology in Schaeffer's thought we can consider the concept of '*language de choses*'. The idea is discussed many times in Schaeffer's writings, but since the first article written during the 1940s that introduces the expression (in the title[70]), there has been a certain inconsistency in the discussion of the same concept in later writings. In the article just mentioned, Schaeffer talks about the difference between communication through spoken language and the newly

[69] Post-spectralists like Dalbavie or Hurel have not been particularly bothered by this kind of problem, as their compositional attitude is more influenced by the eclectic procedures of postmodernism.
[70] 'Le language de choses', which can be read in Schaeffer, 1977b: 71–77.

discovered communicative potential of images and recorded sound. In Schaeffer's view, images and recorded sound overcome conventional language, and allow an immediate communication that has the double advantage of being both more comprehensive than the limited convention and more respectful of natural structures.

Schaeffer, however, is not only interested in the expansion of communicative tools allowed by the concrete approach. He also demonstrates faith in an objective reality that follows the same rhythm as the human body, an outer world distinguished from the inner world of the human mind and perception. The '*language de choses*' is not only an expanded human language allowed by the use of objects, it is also a universal energetic rhythm that links objective and human reality.[71] It is obviously true that the *époché* is a momentary suspension of judgement on the existence of the object external to the subject. Consequently, it does not necessarily imply the *non-existence* of the object. It simply excludes the possibility of the formulation of such a judgement, and prefers to focus on the investigation of the perceptual organisation of the object. Nevertheless, the colourful language of Schaeffer seems clearly to distinguish, on occasions, an external and internal reality. Moreover, it suggests the possibility of a music universal in the sense of being intimately related to the life of natural reality, both human and objective.

This is not just to pinpoint another contradiction in Schaeffer's thought, rather it is to underline how ephemeral the reference to phenomenology seems often to be. Morphological analysis outlines the categories of perception that make possible the

[71] 'The simple relations, the simple rhythms so close to our physiological rhythms, the sonic dynamics so close to muscular effort, which is similarly logarithmic, make of the ear [...] a sort of organ of primary sensation, an organ of the almost innate correspondence between external and human world. [...] Its [the ear's] sensations are the ones of pressures, vibrations, explosions, extinctions, in short the sensations of many energetic phenomena that are «cosmic parables» as much as they are real experiences.' ['Les rapports simples des intervalles, les rythmes simples, si voisins de nos rythmes physiologiques, la dynamique sonore, si proche de l'effort musculaire, logarithmique comme elle, font de l'oreille [...] une sorte d'organe de la sensation première, de la correspondance quasi innée entre monde extérieur et monde humain. [...] Ses sensations sont celles des pressions, des vibrations, des explosions, des extinctions, bref de nombreux phénomènes énergétiques qui sont des «paraboles cosmiques» autant que des événements vécus'] (Schaeffer, 1971c: 27).

generation of the object, but as soon as the *critères* have been defined, Schaeffer abandons the suspension of judgement, to resume the 'naïve faith' in external reality.

Moreover, the concept of *objet sonore* does not represent a credible phenomenological reference, since the illusory object of perception does imply *indices* and *sens*. The phenomenological approach does not analyse the real perception of reality, but only a 'corrected' version of it, cleared of references other then aural, as if perception was each time given in a neatly limited field.[72] Even synthesised sonic objects are acknowledged to be perceived as referring to other perceptual dimensions.[73]

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[72] 'In fact, the phenomenological apparatus that Schaeffer surrounds himself with is in absolute contradiction with what it wants to account for. The phenomenological brackets, that suspend the validity of the «*thèse du monde*», put us in the position of facing the pure consciousness, which means the experience and myself, and they allow us [...] to highlight the true meaning of the transcendence of the object and the moment of its constitution. [...] Now, the operation that the subject of the *écoute réduite* devotes himself to, is aimed at the correction of intentional experiences. When I suspend the thesis of the existence of the world, in a perspective authentically phenomeonological I do not suppress the tendency that, in natural listening, directs me towards research of the spatial situation of the sonic source. I have precisely to give account for this tendency and I have to base it on the procedures of consciousness. *Écoute réduite* is poles apart from phenomenological procedure: it is a corrective procedure, an artificial process that is aimed to modify our natural relation to the sonic world precisely by means of the new possibilities offered by the technology' ['En fait, l'appareil phénoménologique dont s'entoure Schaeffer est en contradiction absolue avec ce dont il veut rendre compte. La mise entre parenthèses phénoménologique, qui suspende la validité de la «thèse du monde», nous place en face de la conscience pure, c'est-à-dire des vécus et du moi, et nous permette [...] de mettre en évidence le sens même de la transcendance de la chose et les moments de sa constitution. [...] Or, l'opération à laquelle se livre le sujet de l'écoute réduite est une correction des vécus intentionnels. Lorsque je suspends la thèse de l'existence du monde, je ne supprime pas, dans une authentique perspective phénoménologique, la visée qui, dans l'écoute naturelle, m'oriente vers la recherche de la situation spatiale et de la source d'un son, je dois précisément rendre compte de cette visée et la fonder sur les opérations même de la conscience. L'écoute réduite est aux antipodes de la démarche phénoménologique: c'est une démarche correctrice, un procédé artificiel qui a pour but de modifier notre rapport naturel au monde sonore grâce précisément aux nouvelles possibilités qu'offre la technique'] (Molino, 1999: 130–131).

[73] 'The notion of "thing" is aimed firstly to embody the hypothesis that the most abstract, the most neutral, the most artificial sound will always remain the sound of something. The notion of "thing" aims to disconnect the issue of the *cause imagined* or represented by the listener from the issue of the real, objective cause. "Thing" also conveys the fact that when one has somehow named an objective real cause that one gives to the sound [...], this absolutely does not exhaust the question of the causal representations associated, in consciousness, to listening to sound. In fact, the "thing" must not be confused with the name of an objective cause that might be imposed to it [...], because, in the case of sounds with vague or indefinite causes, this name could be different for each person, conveying personal associations' ['La notion de chose vise d'abord à incarner l'hypothèse que le son le plus abstrait, le plus neutre, le plus artificiel resterait toujours pour l'être humain le son de quelque chose. La notion de chose vise a décoller la question de la *cause imaginée* ou représentée chez l'auditeur de la question de la cause réelle, objective. La chose traduit également le fait que lorsqu'on a nommé tant bien que mal une cause réelle objective que l'on donne au son [...], cela n'épuise pas du tout la question des représentations causales associées dans la conscience à l'audition du son. La chose n'est pas en effet a confondre avec le nom qu'on lui donnerait, correspondant à une cause objective [...], car dans le cas des sons à causalité vagues ou indécises, cet mot peut être différent pour chaque personne, véhiculant des associations personnelles'] (Chion, 1988: 58). A similar view has been taken by François Bayle, who introduces the notion of *image-son* (see Bayle, 1993: 93-101).

In conclusion, the theoretical influence of phenomenology on Schaeffer's is only one among many others, which are less clearly rooted in a precise theoretical system.

Objects and structures

The opposition identification/qualification is identified by Schaeffer as a basic conceptual point of reference for the definition of a musical system. The two terms are completely interdependent, and the perceptual procedures that they label unfold in a perpetual alternation. To single out an element from the background requires first a description, i.e. qualification in Schaeffer's terms, of that same background. The element identified can undergo a further qualification, becoming the background for other tinier details.

These perceptual categories are the basis for the opposition objet/structure, often referred to in the T.O.M. The perpetual alternation between identification of objects within a qualified structure and identification of further elements qualifying the object is an intuitive process typical of any kind of perception. The same interchangeable terms of opposition emerge very often in the writings of Boulez. There, as in Schaeffer, it seems that the only real difference between structure and objects is less a matter of quality than a matter of quantity. The decision to avoid qualification of an element of the basic object is purely empirical. In Boulez's music, the use of conventional notation is an evident limit to the gradual descent from larger structures to reduced objects. In Schaeffer, the theoretical limit is determined by the musical aim of the research, that should stop when the analysis of sound can no longer be useful to the creation of a musical language.

In Boulez's later writings such as Boulez (1989), the concept of structure, which had been thoroughly discussed in Boulez (1971), is replaced by the looser concept of

enveloppe. Although more generic if compared to the idea of structure based on serial elaboration, this concept is evidence of the different approach that Boulez has taken towards composition and, especially, theoretical investigation of music. In a way that seems to endorse the results of Schaeffer's work on *genres*, Boulez has given up on the attempt to create perceptual structures on the basis of sound parameters whose function is individually and precisely determined. The *enveloppe* is an analytical tool more flexible and suitable for describing musical structures where the interrelations of sound parameters are so complex that their individual analysis and control become excessively complex.

The notion of structure is replaced by that of process in Grisey. This term defines the temporal unfolding of a musical structure, and refers to an organisational form consisting of the metamorphosis of sound objects through the gradual modification of their constitutive elements. Here the pair object–structure reaches its higher level of mimesis, since the gradual evolution of the structure tends to inhibit the perception of individual objects.[74] Spectral techniques have in fact been referred to as compositions of timbres,[75] where a notion similar to Schaeffer's *genre* (structure) as opposed to *valeur* (object) is meant to replace both the instrumental timbre and the note of the traditional system.

As Schaeffer has clearly shown in his comparison of traditional and experimental systems, any musical theory resolves the same problem in its own way. Conventional language had referred to the notions of instrumental timbre and note to allow the process of identification–qualification. Contemporary music, where the definition of *valeurs* and *caractèrs* is revised, and changes often within a single musical

[74] This description is actually simplistic, since this ideal formal organisation is very rarely used in actual compositions, owing to its evident lack of variety. The 'process' remains the main formal archetype underpinning spectral music, although the real developmental forms in Grisey's compositions are often complex and very articulated.

[75] With regard to the question of timbral composition, a still-fundamental reference is ed. Barrière (1991).

episode, has shown that it is possible to organise a system of objects and structures without an explicit convention. At the same time, compositional practice has demonstrated that the distinction between *valeurs* and *caractères* is not always as clear as Schaeffer wanted it to be. Especially in very complex music, as is the case of serial music, the same element can fulfil both roles, sometimes for more than one structure at a time. The limitation to one single functional value per object is probably one of the main abstractions of Schaeffer's work. Serialism has certainly indulged on occasions in an excess of complexity, but it has clearly demonstrated that different structures of values can function at the same time, determining a temporary and very complex hierarchy between them. The notions of object and structure appear to be mere abstractions when compared to the actual complexity of perception.

Intentional units

The complexity and ambiguity of the processes of identification and qualification are also evident in Schaeffer's definition of the morphological criteria. Some of the criteria chosen to give a description of sound valuable from the musical point of view are clearly original if compared to what is normally conceived as a structural sonic criterion. *Grain* and *allure*, for instance, are elements that do not have a notational apparatus and have been substantially neglected by the traditional code. However, more subtly original than the choice of new parameters of qualification is the treatment of traditional notions such as pitch and timbre.

The relation outlined in the morphology between *masse* and *timbre harmonique* reintroduces, in a wider frame, the traditional notions of pitch and timbre. The distinction between the two seems, in the imprecise language used by Schaeffer, to be a

matter of intention and analytical skills.[76] This makes the two terms correlative synonyms,[77] so to speak, and prompts some further consideration on the general notion of timbre.

The reappearance of the distinction pitch–timbre in the morphology can be connected to the interrelation identification–qualification outlined above, which is a matter of listening intention. The process of identification and qualification comes to an end when the analysis of sound has reached a stage of precision that is functionally useful. Therefore, the perception of a timbre as such is also a matter of intention (or at least of analytical feasibility, due to a blend of natural and cultural elements), depending on the function that it has to carry out within the structure. It seems that the three classical parameters (frequency, intensity, duration) are actually suitable to describe musical perception, although, for reasons of structural functionality or analytical feasibility, the listener *intends* to perceive some of the parametrical structures as a 'quality' of sound. From this point of view, the new sound qualities introduced in Schaeffer's scheme prove to be structural syntheses of the three classical parameters. In this sense, the quality of timbre can hold a structural function, as has been stated by spectralists. The structural potential, necessary to any sound criterion, is perceptually determined by an empirical process of comparison with timbral units of reference. However, the perceptual process is far more complex, as it would result from a further effort of analysis. In a structure consisting of the succession of two timbres, perceptual

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[76] 'In the general instance represented by non-tonic sounds, mass is less simple to perceive, but *what we do not localise as* an integral part of mass is still a timbre [...]. In fact, the listener can, on the basis of his ability, determine the distinction between mass and timbre in a very variable way' ['Dans la généralité des cas: sons non toniques, la masse est moins simple à percevoir, mais *ce que nous ne localisons pas* comme faisant partie intégrante de la masse est encore un timbre [...]. En effet, l'auditeur peut, selon qu'il est plus ou moins habile, plus ou moins attentif, et d'autre part selon l'environnement de l'objet qu'on lui propose, établir la distinction entre masse et timbre de façon fort variable'] (Schaeffer, 1977a: 516). The term 'non-tonic' refers to those sonic objects where it is not possible to perceive a clear pitch within the general mass.

[77] ' We propose [...] to use the two criteria of *mass* and *timbre harmonique* in connection with each other, considering them as communicating vessels [...]' ['Nous proposons [...] d'utiliser les deux critères de *masse* et de *timbre harmonique* en liaison l'un avec l'autre, en les considérant un peu comme des vases communicantes [...]']](Schaeffer, 1977a: 517).

analysis determines a quantitative variation of constitutive elements that are immediately re-synthesised in a unit identified as a new timbre. The distinction of *valeur* and *genre* at this level tends to disappear only because perception *intends* to listen to the constitutive elements of the sound as to a qualitative unit. The real *genre* for a structure of timbres will be provided by other criteria, such as mass and dynamics. That, in their turn, could be actually constitutive of timbre itself, but are simply *intended* as distinguished from the unit that is considered timbre.

Although the exposition of the T.O.M. presents some slight inconsistencies,[78] the distinction between *timbre harmonique* and *genre* is clear, at least theoretically speaking, and is due to a difference in function. The notion of *genre* refers already to musical organisation, whereas *timbre harmonique* is still a criterion of description of sound. In both cases, although at different levels of perceptual functionality, timbre corresponds to the part of sound perceived as a generic sonorous synthesis, opposed to a more localised reference point. However, since the *timbre harmonique* is a primary structural criterion, it is possible that all other parameters could become, in an extreme instance, part of a *genre* defining *timbre harmonique* as a value. This is the case of some musical structures of the spectralists, but from the perceptual point of view, the inner articulation of the unit defined as timbre could be intended in other ways.

This paradoxical description of common auditory experiences highlights the complexity of the phenomenon of musical perception. The interpretation offered by Schaeffer presents all the flaws of an abstract schematisation. However, from this discussion it emerges that the notion of 'intentional unit' proves to be probably the most fundamental among the perceptual categories highlighted by the T.O.M. It introduces

[78] See for instance the sketchy discussion about *genres* of *timbre harmonique* (in Schaeffer, 1977a: 525), where Schaeffer refers again to instrumental timbre as evidence of timbre independent from mass. In this case, notwithstanding Schaeffer's explicit distinction of timbre and harmonic timbre, the two notions appear to be confused. The reason for this is probably to be found in the incompleteness of *caracteriologie*, especially with reference to some of the morphological criteria.

the idea of subjective intention (and, therefore, of cultural influence) in perception and clearly shows the impossibility of the definition of a universal language, where, unrealistically, the complex mechanism of subjective definition of the structural units should be definitively deciphered.

Chapter 2

Pierre Boulez: from structures to objects

A conceptual opposition: '*tabula rasa*' and traditional heritage

Boulez's inclination to discuss and analyse technical and aesthetic issues raised by compositional practice is well known and not an isolated instance among twentieth-century musicians. The lack of a systematic plan for his vast theoretical output does not prevent the reader from identifying patterns of conceptual development, stretching across writings even very distant in terms of publication date and stylistic character. A survey of Boulez's theoretical production from the early 1950s to the 1980s reveals that the discussions ultimately revolve around the same questions: elaboration of procedures for a cogent production and selection of the musical material; identification and logical integration to the musical structure of statistically produced sonic relations; treatment of the multiple parameters of sonic objects in accordance with limits of perceptual organisation; revision of inherited formal categories. These issues are all encompassed by the general opposition of system and idea[1], which has been acknowledged by Boulez as a conceptual reference common to any musical discourse, and which, starting especially with some of the considerations included in *Jalons* (1989), is observed and discussed in its historical development.

However, in spite of a more or less explicit thematic cohesion, the aim and stylistic character of Boulez's theoretical output are greatly diversified. The impression is that in later writings such as Boulez (1989), Boulez mitigated the effort to produce a

[1] See Boulez, 1989: 316-391.

strictly systematic arrangement of his technical and aesthetic principles, in order to focus on a more limited elaboration of specific topics that he still considers relevant for his musical thought. In my view, this change of attitude, which is evident when comparing works like Boulez (1971) and Boulez (1989), is connected to a progressive fading of the preoccupations to demonstrate the radical renewal of the principles of musical organisation.

In fact, the ideal of a new beginning for music has belonged to Boulez, among many others. Even if its significance within his aesthetic system is very ambiguous, the attempt to outline a coherent musical system based only on logical, formal and perceptual (but not cultural) fundamentals is conspicuous in writings such as 'Musical Technique' in Boulez (1971). However, this concern soon underwent a substantial revaluation, due to the clash with practical compositional problems. This process became increasingly evident over the years. The utopian ideal of the *tabula rasa* evolved, finding a more realistic incarnation in the modernist values of continuous aesthetic and technical renovation. The evolution of Boulez's music should not be seen as a contradiction to modernist aesthetic. Often, the influence of post-serial and post-structural concerns about communication has been detected in the development of his musical production.[2] However, the strategies adopted to make the music more immediately understandable, such as the use of more perceptible repetitions and symmetries, should not necessarily be considered as the rediscovered heritage of tradition.[3] Rather, to those acquainted with Boulez's theoretical and musical work, they

[2] 'If it is necessary to use a definition for [*Répons*], which emerges in history at the junction of modernism and post-modernism, I would qualify it as *post-structuralist*. Post-structuralist, first of all because Boulez has not conceived *Répons* as a pure game of structures, but on the contrary, by conceiving its poietic in function of the listener, he reinstates the aesthesic in the compositional project, and thus he transcends on each side the immanent ontology' ['S'il faut user d'un mot pour [*Répons*], qui émerge dans l'histoire à la charnière du modernisme et du postmodernisme, je le qualifierai de *postructuraliste*. Postructuraliste, tout d'abord, parce que Boulez n'a pas conçu *Répons* comme un pur jeu de structures, mais au contraire, parce que, concevant sa poïétique en fonction de l'auditeur, il réintègre l'esthésique dans le projet compositionnel, et déborde ainsi de toute part l'ontologie immanente'] (Nattiez, 1993: 215).

[3] 'For all that, is *Répons* a post-modern work? Definitely not, because, at the same time that it presents

appear to be developments of an attention paid to the phenomenon of perception that, as will be shown later, is present from the outset, although with a trait of slight idealisation.

Furthermore, the ideal of laying new foundations for music contradicts what Boulez had already been enquiring into and discussing in many of his early writings:[4] historical development and traditional heritage. Paradoxically, the alleged attainment of a basic level of musical language, achieved with his early serialist experiments, is considered by the composer both a passage necessary to annihilate cultural conditioning, and an extreme result of a process begun by earlier composers. The latter need not be understood only as the composers of the Second Viennese School, but also include musicians such as Messiaen, Mahler and Debussy, whose experiments with timbre and form, according to Boulez,[5] had an invaluable role in the process of liberating sound from the constraints of both tonality and predetermined formal schemes. While Debussy, for instance, is obviously not considered by Boulez as a proto-serial musician, the supposedly new concept of form displayed in compositions such as *Jeux* is considered particularly advanced because of the tendency to create form from the material, thus reversing the compositional procedure that Boulez believes to have been traditionally dominant. Even if this kind of evaluation seems too pat not to have been created in order to endorse his personal need for historical coherence, it nevertheless casts light on the conceptual basis of Boulez's theoretical thinking. With an attitude similar to the one shown towards Webern and serial technique, Boulez finds in

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itself as a work-for-the-future, it is also a defiance of post-modernism. While it tries and manages to rejoin its public, it does with no turning back whatsoever and remains faithful to a kind of writing that, as for it, comes from the modernist aesthetic' ['*Répons* est-elle pour autant une oeuvre postmoderne? Certainement pas. Car, en même tempe qu'elle ne se donne plus comme une oeuvre-pour-l'avenir, elle est un défi au postmodernisme. Cherchant et réuissent à rejoindre son public, elle le fait sans aucun retour en arrière et en restant fidèle à un type d'écriture qui, lui, relève de l'esthétique moderniste'] *Ibid.*

[4] See especially the essays included in Boulez (1968) but also elsewhere, such as the first chapter of Boulez (1977).

[5] See 'Corruptions in the Censors' and 'Claude Debussy' in Boulez (1968).

Debussy's music a useful historical justification for one of the fundamental formal developments of modern avant-garde music.

In many ways, the interpretations given by Boulez are acceptable, since from the vantage point of fifty years later, the historical reasons for serial thinking and its aesthetic and formal implications appear increasingly clear. However, as suggested above, they evidently contradict the early claims of uncompromising rejection of traditional heritage.[6]

Consequently, it seems that the gradual loss of interest in the demonstration of complete renovation of musical principles is the result of a developed intuition, rather than an abrupt break away from a dogmatic principle. The position of Boulez with respect to the issue of tradition and of a potential 'beyond tradition' has been ambiguous from the outset.

With the considerations that is possible to read into *Jalons*, Boulez does not attempt to attain a strictly systematic reorganisation of musical principles, does not try to outline self-sufficient logical deductions of formal categories, and does not even expect to be able to safely dismiss history and traditional heritage; rather, he updates his approach to a more historical-oriented analysis, and focuses his attention on the connection of his aesthetic and formal research to historical foundations rather than to self-contained coherence. In order to do so, he introduces in his writings formal concepts intended as archetypes valid for any musical language: system, idea, figure, theme, *enveloppe*, *signal*, and others.[7] Their broad meaning allows Boulez to insert real musical instances within an ideal connective line that allows him both to demonstrate

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[6] Boulez did not appear to be concerned about this ambiguity even recently: '[...] I am very much preoccupied by *not* inserting myself into history. There are many ways of inserting oneself into history. The best way for me is not to think that you can insert yourself into history. Rather, I am trying to continue along the path of the people I have seen as models – even if that means a break with those models; especially when you are young, this break may be necessary. Then after a while, when time passes, you see the continuity of your undertaking; that for me is important' (Di Rocco, 2001: 86).

[7] This terminology is repeatedly used in Boulez (1989). Many of these terms will be discussed later in the chapter when it will be possible to refer them to concrete instances.

their original trait and to avoid outlining their logical deduction from explicitly defined basic principles.

Sound and perception

The ambiguity of the concept of *tabula rasa* in Boulez is evident even in the discussions dealing with the most general issues, such as the definition of the notions of sound and perception. The description of physical sound and perceptual categories given by Boulez are certainly more sophisticated than what Schaeffer's interpretation would concede. However, they explicitly refer to a cultural model, with a blend of dogmatic belief and realistic awareness that is probably impossible to clarify entirely. In this respect, it is useful to recall Boulez's definition of sound as opposed to noise:

> [...] it is superficial to divide the sound phenomenon into two such separate categories; it seems that sensations of noise and sound arise primarily from the greater or lesser selective analytical ability of the ear. (Boulez, 1971: 42–43)

Boulez does not appear to be interested in giving a definition of sound as a physical phenomenon. His main interest is the organisation of sound within formal categories of perception. Revealing a pragmatic attitude which is often evident in his writings, Boulez is interested in what can be functionally useful for his music, much more than in giving questionable definitions of natural laws. He never claimed any definitive natural justification for his theoretical views, although occasionally, as for instance in Boulez (1971), he has dealt directly with the problem.

Similarly to Schaeffer, Boulez has tackled epistemological issues, but their two perspectives are quite different. In Boulez's case, the conceptual reference is given in the words of Rougier:

> there is a limitless number of equivalent systems of concepts and propositions which can be used as starting points, without any one of them *imposing itself by natural right* [...] we call "laws of nature" those formulae which symbolise the routines resulting from experience [...] It is a pure anthropomorphic language, for the regularity and simplicity of these laws are only true in the initial evaluation, and frequently the laws degenerate and disappear on further examination. (in Boulez, 1971: 31)

From this perspective, which does not contradict the ideas of Monod discussed by Schaeffer, serial thinking is deprived of any natural justification. The only reference to an objective natural reality accepted by Boulez for his system could be the concept of 'representative model' that he expounds quoting Brouillion:

> "[...] Nature is much too abundant for our minds to be able to embrace it. We isolate fragments, observe them, and devise representative models[8] (simple enough to be used) [...]"; he also recalls "the essential role of *human imagination* in the invention" – *not* the discovery – "and the formulation" of these celebrated laws.[9] (Boulez, 1971: 31)

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[8] As suggested earlier, Boulez does not expound on the description of *his* representative model, seemingly considering it a quite academic question. Nonetheless, in the first pages of 'Musical Technique' he does briefly mention an organic model apt to endorse the serial organisation of sounds: 'Acoustic phenomena are organic examples of this principle [the principle of interaction or interdependence of the various sound components]: a sound – generally defined – is, in fact, a sum of frequencies observed in their proportional relationships – variable or not – that are fixed in quality and number, and have a coefficient of dynamics – variable or not. Frequency being in itself a function of time (cycles per second), the sum of the frequencies is subject to a collective dynamic envelope, also a function of time. Thus, from the very first, the complete sound-entity is the result of the interaction of vibration, time and amplitude' (Boulez, 1971: 36). The definition shows the well known intricacies that are characteristic of these pages, but it is nonetheless revealing for what concerns the sensibility with which the problem is confronted. In spite of the apparent precision, the description of the sonic phenomenon is very schematic. The 'representative model' mirrors *within* the sound the same serial organisation of sounds in structures that is going to be described later in the same chapter. Sound is 'represented' as ideally constituted by elements (displayed in variable mutual proportions) that can be described with the same parameters used to define musical structures: frequency, duration, dynamic and, supposedly, resulting timbre. There is no acknowledgement of the substantial differentiation of the temporal phases of a sonic object, a trait that has been highlighted by spectral analysis. On the contrary, in Boulez's definition, sound is an organised structure that can be related to other structures on the basis of measurable discreet units.

[9] More considerations about this subject are included in the essay 'Aesthetics and the Fetishists', which was written more or less in the same period as Boulez (1971) and was later included in Boulez (1986). More quotations of Brouillion are produced there, but Boulez is even more explicit in his own words: 'Every system is simply a working hypothesis for the solution of the problems confronting an individual epoch, a working hypothesis that will be replaced by another once the old hypothesis has proved

Boulez is well aware of the difficulty of producing an exhaustive description of physical reality. In particular, he is aware of the role of the human subject in any descriptive process. This is why he focuses his attention on much more general organisational categories that he believes are used by the subject to analyse and define the external world. In Boulez's view, the cognitive relation of the subject to the object appears to be forced through a process of identification and analysis of structural functions:

> This key word, structure, leads us to a conclusion, again drawn from Rougier, which can equally well be applied to music: "What we can know of the world is its structure, not its essence. We think of it in terms of relationships and functions, not of substances and accidents." Similarly we should not start with the "substances and accidents" of music but rather think about it "in terms of relationships and functions". (Boulez, 1971: 32)

It is evident that the evaluations of serial thinking produced by Schaeffer are partially misleading. The concept of 'representative model' implies a suspension of judgement about natural laws that has nothing to do with the passive conformity with scientific dogmas attributed to Boulez in Schaeffer's writings. Furthermore, the description of human understanding of reality as based on a fragmentation of experience in a net of *functional* relations, endorses in many ways the notion of 'intentional' human perception that Schaeffer so often postulated. The representative model of Boulez is obviously indebted to the traditional postulate of a direct link between physical and perceptual analysis of sound. However, this is acknowledged as a schematic description, which is pragmatically functional to actual musical composition.

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insufficient at any given point. Of one thing we may be certain: that the creative imagination will never fail to provide the "models" of which Brouillion speaks. The periods of evolution and mutation will be determined either by extrapolating from the laws of one system or by a radical revision involving the creation of a new system. All things considered, it is oddly paradoxical to talk of misplaced arrogance when describing what is actually no more than an awareness of the limitations of the creative artist' (Boulez, 1986: 42).

From this perspective, it is clear why the distinction between sound and noise can be easily overcome, since there is no interest in defining the sound independently from an organisation in structures:

> In my opinion, then, sounds and noises must be stated as a function of the formal structures which employ them, which *reveal* them for what they are, so to speak. [...] There is a dialectic between structure and material, by virtue of which the one reveals the other. (Boulez 1971: 42–43)

The concept of sonic object in Boulez's thought is based on a subjective coherence. The sonorous space remains amorphous until a logical process produces a delimitation of sections that can host a micro-universe of 'absolute and relative values',[10] an articulation in modules and units of analysis related by identities and variations. The representative model used as conceptual reference will determine the specific nature of the constitutive elements, but the structuring process is intended by Boulez as a basic organisational category.

The importance of clarifying the lack of interest of Boulez in the distinction between objective sound and subjective perception is obviously owing to the significance of perceptual 'intention' in a system which claims to start from a *tabula rasa*. The analysis of Schaeffer has clearly shown that the reference to a code defines perceptual patterns of analysis, thus creating a hierarchy among the constitutive elements of a perceptual object that clearly inform linguistic production and reception. In many ways, it is possible to say that the research of Boulez and Grisey stops where the work of Schaeffer begins. Since conformity with the traditional solfeggio determines a choice of parametrical hierarchy that is pragmatically not questioned by either Boulez or Grisey, their music proves to be clearly inscribed in an historical

[10] See Boulez, 1971: 38.

development, and the concept of *tabula rasa* is revealed once again to be a pure abstraction, based on a representative model inherited from tradition.

The representative model adopted by Boulez, however, although very simple, is suitable for a theoretical discussion. The analysis of serially structured music, included in 'Musical Technique', is organised on the basis of the parameters given by Boulez's 'representative model', which are obviously mirrored by conventional notation. Here, the concept of 'series' provides a theoretical reference for the organisation of frequencies, durations, dynamics, timbres, each one at first analysed individually, and then redefined within wider structural complexes. However, as will be shown, in these pages an aesthetic urge for conceptual unity inherited from tradition and embodied in the notion of series interacts not always consistently with the coherence of the compositional work and with the perceptual effectiveness of the music.

Structure Ia: functional experimentalism

The Darmstadt school cannot be considered as a well-defined singularity. Although much of what happened in those summer events is probably still unclear and not extensively documented, it is evident that Darmstadt has been a meeting place for many and contrasting personalities. The fact that in subsequent years some composers have been more widely recognised than others has coloured our evaluation of the event, making its development appear more linear than what it actually has been. We have lost track of the peripheral world of the unknown, or less known, composers who must nonetheless have had a major role in the summer courses. In particular, the most extreme experimentalists, who are now confined to anecdote, have faded in memory, leaving a major flaw in our knowledge.

The experience of Darmstadt has been recognised by Boulez as being fundamental to his development as a musician, although in many ways he has proved to be clearly distant from the most extreme aesthetics developed there, similarly to musicians like Nono, Berio and Stockhausen. These personalities seem to have shared a similar rejection of both the numerological dogmatism of some serial extremes, and the self-destructive excess of a certain type of 'dadaist' avant-garde.

A review of Boulez's musical production in the 1950s reveals that his experimentalism always succeeded in works that maintained a clear link with the Western notion of musical oeuvre. The proper experimental period of Boulez is limited to no more than a few years at the beginning of the 1950s, following Messiaen's *Modes de valeurs et d'intensités*, often recognised as the first instance of integral serialism.[11] In the space of two years, 1950 and 1951, Boulez composed *Structures Ia* and *Polyphonie X*, both based on the principles of integral serialism. From the point of view of pure experimentalism, these are the most extreme works by Boulez, since they rely strictly on predetermined serial schemes. They appear to have represented a turning point for Boulez, who was the first proponent of this interpretation in a clear attempt to give logical continuity to his artistic evolution. These experiences of extreme self-restraint have allegedly functioned as filters for the remainder of the traditional heritage still present in the dodecaphonic thinking of earlier works. Through the complete

[11] It is important to remark that the aim of the experiment of *Modes de valeurs et d'intensités* was quite distant from the interpretations that have subsequently been given by the composers of Darmstadt: 'Where Messiaen sees only an experience among others, based on the principles of Einstein relative to "the influence of speed on the appreciation of events", his young disciples observe [...] this "first integral and methodical exploration of the sonic space", [...] and from that deduce consequences that, as in the case of *Polyphonie X*, will lead sometimes to an impasse' ['Là où Messiaen n'entrevoit alors qu'une simple expérience parmi d'autres, fondée sur les principes d'Einstein relatifs à "l'influence de la vitesse sur l'appréciation des événements", ses jeunes disciples observent [...] cette "première exploration intégrale et méthodique de l'espace sonore", [...] et en déduisant des conséquences telles qui aboutiront parfois, comme le Boulez de la *Polyphonie X*, à l'impasse'] (Perrier, 1979: 113). The composer himself was apparently disconcerted : 'I think that it was an interesting discovery – that has not been remarked [...] Everybody talked only about the super-serial aspect! [...] They had the impression that I was following the lessons of Darmstadt' ['je crois que c'était une découverte intéressante – que l'on n'a pas remarquée [...] Tout le monde n'a parlé que de l'aspect super-sérial! [...] On avait l'impression que je poursuivais les leçons des Darmstadt'] (Messiaen, 1986: 85).

serialisation of all parameters, Boulez claims to have reached a stage where sounds can be treated as discreet units, suitable for organising musical structures through a precise control of the proportional relations of their constitutive elements. From this point of view it is possible to oppose a structural musical thinking to a musical thinking based on motives, prominent in tonal and traditionally melodic music, but also in the dodecaphonic thinking of Schoenberg. Comparing this conception of musical structure with that of Schaeffer, it seems clear that both musicians aimed to reach a complete and explicit control of all the elements entailed in musical composition. Boulez's analysis encompasses a perceptual field reduced with respect to Schaeffer's, since notation excludes the production of the proportional relations that can not be controlled by the notated code. Furthermore, serial music generally accepts the traditional definition of timbre, which is limited by the conventional conditioning highlighted by Schaeffer. From this point of view, the 'concrete' compositional procedure allowed by electro-acoustic music is obviously an advantage, since it can ignore the limits of discreet codification. Comparing the ways of thinking of Boulez and Schaeffer with compositional thinking based on motives, it seems that, more than anything else, the distinction is due to the level of explicit and precise definition of the proportional relations between the elements.

The extreme experimentalism of *Structures Ia* proves to have a functional purpose. The aim of *Structures Ia* is not simply to discover new sonorous objects using automatic procedures, nor can the piece be associated with some metaphysical ideal connected to depersonalisation and automatic writing. On the contrary, the idea that drove Boulez was to investigate the results of a compositional technique based on the most rigorous control of the interrelations of sound parameters. It is clear now that the main target of this experience was the exploration of the limits of perceptually effective musical organisations. Once made aware of the limits of this compositional procedure,

Boulez refuses to go further in this direction and to surrender to extreme aesthetic principles, thus attesting his fundamental faith in the basic notions of Western art. In many ways, this can also be considered as one of the main differences between Boulez and Cage in dealing with the issue of chance in music: *Structures Ia* does not represent a temporary indulgence in the annihilation of the subject, but rather a method for filtering musical thought, ideally making possible the conception of a solid formal organisation unburdened by the old habits and inconsistencies of traditional forms.[12] The unrealistic attempt to codify all the structural relations of sounds does not invalidate the experiment, and does not imply any finality other than a pragmatic exploration of compositional techniques.

In Boulez's case the idea of the structural organisation of sound is strictly connected to the need for unity and coherence implicit in serial thinking and to a rethinking of the overall form of musical pieces. Through a rigorous control of all the interrelations of sound parameters, it is allegedly possible to generate a music based on an evident coherence. However, logical deduction soon proves to be perceptually ineffective, and musical language reveals itself to be far more complex than the experiments of the 1950s would suggest. Consequently, Boulez was forced to revise his approach starting with the revaluation of the concept of series. After the extreme experiments of the 1950s, his efforts have been devoted to finding a coherent theoretical

[12] As will be underlined in the following paragraphs, the structural organisation produced by these musical experiments is often confused with a 'statistical' form: 'In opposition to a *directionality* of the deduction, it is possible to imagine a deduction which is absolutely non-directional. We are obliged neither to listen one by one to the solutions proposed to us en masse, nor to choose them one by one; they are present within a certain context and they can appear, they can define themselves, when another event provides them with an envelope to delimit and determine themselves, [...] it represents, however, a certain limitation of the constitutive elements to a degree zero of language, as in the case of *Structure Ia*' ['Face à une *directionalité* de la déduction, on peut imaginer une déduction absolument *non directionelle*. Nous ne sommes pas obligés d'entendre une par une les solutions qu'elle nous propose en masse, ni de le choisir une par une ; elle sont présentes dans une certain contexte et peuvent *apparaître*, se *préciser*, à l'occasion d'un autre événement qui leur donne une enveloppe pour se délimiter et se déterminer [...] il s'agit, cependant, d'un certain blocage des éléments constitutif au niveau zéro du langage, comme dans *Structure Ia*'] (Boulez, 1989: 119). In this case, *Structure Ia* has already been reinterpreted as a statistical form, whereas in my understanding, the piece was conceived as an experiment about the possibility to perceive individual structures produced systematically.

apparatus able to maintain the serial reference and at the same time to assure communication through perceived music.

Series and alea

a) series

> 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 1971: 35)

This well known definition is taken from the first pages of 'Musical Technique'. Here Boulez attempts to find a logical and coherent definition of the principles of serial composition. To an attentive analysis of these words, the clash of perceptual and conceptual appears evident. Boulez inherits the concept of series from tradition, and uses it to justify his multi-parametrical structures. However, the presence of the series itself is in no way justified from the point of view of the psycho-physiological acoustical properties. The series is mainly a concept, which provides an ideal unity, given by non-repetition and completion.[13] With time, and the gradual weakening of the need for an explicit logical deduction of the system, the completion of the whole chromatic will no longer be a necessary feature of the series. Boulez will use sets of pitches that respect only the postulate of non-repetition. The fundamental principles of the series are the only ones to have survived. Boulez no longer needs logically to justify

[13] Boulez gives a logical foundation to the use of the whole chromatic pitch set in the first pages of 'Musical Technique', relying on the concept of reproduction of discreet units (the semitone) within a given module (the octave) (see Boulez, 1971: 38).

the generative process of the series through the concept of 'module'.[14] The sole fundamental elements in the notion of series prove to be *finitude* and *functional* potential (i.e. inner hierarchical organisation). The graphic layout of the definition given above is evidence of the value attributed to the concepts of finitude ('FINITE ensemble of creative possibilities') and of deductive coherence ('a FUNCTIONAL generative process').[15] The series represents a limited set of possibilities for combinatorial procedures. Repetition would be a redundancy jeopardising the cohesion of the serial set by inserting an excess of hierarchy. However, this is only a conceptual concern, since repetition within the series would not necessarily be relevant from a perceptual point of view after the combinatorial manipulations. On the basis of conceptual unity, Boulez can create a perceptual hierarchy based on 'affinities' (i.e. a variable degree of identity among objects). However, after the elaboration of functional 'generative processes', such as pitch multiplication, the relation of the structures to the series will be only conceptual. The series is the only explicit theoretical reference of serial music. Therefore it fulfils the two main roles of any theoretical codification of music: to give a logical justification to compositional procedures and musical results, and to set boundaries to the imagination of the artist.

The analysis of *Éclat* will show that in Boulez's works the presence of the serial system is often suggested by means of signs in the score, such as slurs, or particular attacks that prove to be virtually inaudible. It is unlikely that they are simply meant to be a trace for the analyst as has been suggested by others,[16] but it can be assumed that they are indications of the presence of a system, which, although perceptually virtual,

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[14] However, it is possible to suppose that the module could be implied by a defective series, along with a coherent procedure to extract from the complete chromatic set the pitches that actually appear in the series.

[15] The following lines stress the same concept: 'Consequently, all that is needed to set up this hierarchy is a necessary and sufficient premise which will ensure the total cohesion of the whole and the relationships between its successive parts. This premise is necessary, because the set of possibilities is *finite* when it observes a controlled hierarchy; it is sufficient since it excludes *all* other possibilities' (Boulez, 1971: 36).

[16] By Olivier Meston in Meston (2001). See the following analysis of *Éclat*.

justifies the music by its consistent connection to a fundamental, if musically unreal, organised structure. This concept of finitude generating coherence is at the basis of Boulez's thought right from the outset. Precisely this kind of confusion between abstract concepts (unity given by the reference to a self-contained and cohesive set of related elements, a virtual structure) and concrete necessity (psycho-physiological categories of musical organisation) is the main reason for the obscurity of some logical connections in his writings. The traditional heritage is evident here in the ideal of proliferation of music from the seed of the series. This seems to be a conceptual centre sufficiently stable to sustain the experiments on new perceptual possibilities.

As suggested above, Boulez has progressively overcome this need for systematisation in both his writings and his musical production. The issue of the pre-compositional system logically derived from the series shades off into a more vaguely defined formal inventiveness, that tends towards a kind of virtuosity, but it is also more attentive to the requirements and possibilities of human perception. This is something Boulez does not talk about comprehensively, since it does not appear to be a process resulting from a well determined choice, but rather a transformation acknowledged only at a later stage. Yet, it is a phenomenon quite clearly detectable in Boulez's music beginning at the end of the 1960s, and the composer himself does not deny it.[17] The conceptual bases of the definition and elaboration of sonic objects are comparable to those described in 'Musical Technique', but having isolated the core of this conceptual centre allows a more supple approach both to the combinatorial process and to the musical composition. Boulez no longer needs to be explicit about the logical roots of his compositional procedure. It is likely that if the need to emphasise theoretical coherence has become of lesser importance over the years, recent musical aesthetics have influenced Boulez, diverting his attention from a systematic to a perceptual logic.

[17] This is implicit in this synthetic statement: 'I benefited very much from performing. Because [now] I know what you can hear and what you cannot hear' (in Mawhinney, 2001: 4).

b) alea

There is another aspect to consider when dealing with Boulez's early systematic approach to musical theory, in order to demonstrate how all the issues discussed later were already implicit in the early theory conceived more systematically. It is possible to say that Boulez's concept of serial coherence, obtained with the interrelation of more or less explicit identities, implies from the outset the notion of chance, since it is not possible to accurately and completely predict the results of the procedures used to generate musical material. When Boulez claims a logical coherence by multiplying pitch classes, it is undeniable that this kind of interval-class transformation of different chords makes their generation coherent, since each is multiplied by the same intervals, and the process gives to the objects a real, sonorous similarity. This is a 'functional' process, based on the elaboration of the series through the interrelation of its constitutive elements: a group of intervals re-organised on the basis of another group of intervals in the same serial structure. However, the same objects are going to be related not only on the basis of this imposed coherence. Further connections, local coherences, so to speak, develop among them, such as repeated notes and similarities of density and of register. The connective links are due to elements that do have a codification in the musical notation. Intentional perception cannot rely on a system of hierarchies effectively codified. Coherence becomes much more conceptual than concrete, interacting with local consistencies that destabilise it:

> When the elements [in this case the series of frequencies] are placed simultaneously in relative tessituras, they follow or oppose the acoustic proportions of 'least resistance' (I am referring to simple relationships which we call the 'natural' harmonic series); from this very fact, they acquire reciprocal functions, the one corroborating or destroying, reinforcing or negating the other, and these give the material its internal profile, its energy potential, its malleability and its cohesive properties. These are all extremely important characteristics, whose structural

> consequences will be no less essential in the establishment of a form than those of serial linking. (Boulez, 1971: 45)

There is a net of relations among the objects that develops beyond the serial organisation. This implication of chance within the serial system has not been immediately acknowledged and confronted by Boulez. In 'Musical Technique' the 'psycho-physiological' parameters are given a fundamental value from the outset. However, here much more than in Boulez's recent writings appears the illusion of a potential identification of serial with sonorous consistency.[18] This is why *Structures Ia* should be considered less as a de-conditioning device and more as an experiment. This interpretation tends to be overshadowed by the overrated process of development from automatic to systematic, allegedly entailed by the three pieces of the first book of *Structures*. On the contrary, in my view there is a failure experienced by this kind of integral serialism (let us not forget *Polyphonie X,* which was actually written after *Structure Ia* and was subsequently withdrawn), which pushed Boulez, and other significant musicians like Nono or Stockhausen, to overcome serialism itself. This does not mean that these same composers stopped striving to reach an acceptable compromise between systematic and sonorous logic. One of the reasons for the ambiguities of 'Musical Technique' is probably the quest for that compromise.

> This, then is the fundamental question: the founding of musical systems upon exclusively musical criteria, rather then proceeding from numerical, graphic or psycho-physiological symbols to a musical codification (a kind of transcription) that has not the slightest concept in common with them. (Boulez, 1971: 30)

[18] Boulez has acknowledged that this approach is unrealistic: 'The «serial» development of the 1950s was based essentially on the utopia of the writing creating the phenomenon [...]. Thanks to this experience we lived, however, with great intensity the antinomy between will to order and perception of order; if not the antinomy, at least the complexity and, sometimes, the unpredictability of the relations project/object.' ['Le développement «sériel» des années cinquante se basait essentiellement sur l'utopie de l'écriture créant le phénomène [...]. Grâce à cette expérience, nous avons vécu cependant avec grand intensité l'antinomie entre la volonté d'ordre et la perception d'ordre, sinon l'antinomie, du moins la complexité et, parfois, l'imprévisibilité des rapports projet/objet.'] (Boulez, 1989: 301).

The ambiguity lurking in this essay is evident here, through a lack of clear definition of what is considered to have both a logical consistency and a sonorous value (i.e. what is perceived, at least ideally). Although Boulez expects to be able to 'treat certain complexes by methods involving other complexes' (Boulez, 1971: 40), he does not imply that the resulting relations are simply theoretical. Quite possibly, the illusion of the potential perception of those relations encourages him. The apparent ambiguity between theoretical abstraction and musical reality is a matter of complexity rather than a real substantial difference. Moreover:

> It must be clearly remembered that the word *structural disposition* is not meant to suggest a simple summation of these local structures. 'A form', as Paul Guillaume states, is something *other* or *greater* than the sum of its parts. (Boulez, 1971: 32)

The functional connections of the series of values for the different parameters must aim at a final result, which is, according to the above quotation, musical.

Various attempts have been made to overcome the problem of excessive complexity in Boulez's music, especially by considering the denser structures as textures more than as a complex of individualised objects.[19] However reasonable and convincing these interpretations may be from a pragmatic point of view, it seems that the problem can not be resolved so easily, since the music is not always conceived

[19] Cross, for instance, suggested that the music of Boulez, as well as other serial composers, could be interpreted as an alternation of 'readable' and 'unreadable' sections. He understands the excessive density of certain passages in serial music as a kind of aleatoric structure because of their lack of form, in a sort of re-proposition of the scheme tension/relaxation of the tonal music in the alternation of static/amorphous (dense) and developing/structured sections (see Cross, 1968: 316). Anne Trenkamp gives a similar 'textural' interpretation of the structure of this music, in her analysis of *Constellation–Miroir*: 'Within each section various facets of each type of texture may be presented, allowing subtle differences in texture. The structural organisation of this work, then, depends on juxtapositions of textures' (Trenkamp, 1976: 9). She goes so far as to state that the aleatoric procedures left to the performer are of no real importance, since the textural organisation is what really matters for the musical form: 'This is the way Boulez has loaded the dice of chance: he has only conceded to the performer the things that do not matter; the perceptible structure is decided by Boulez himself [...] This is a piece whose form is articulated by what are generally considered the lesser materials of music: texture and timbre (in the sense of range, spacing and specially devised effects for the piano)' (Trenkamp, 1976: 9–10).

statistically, even if it is sometimes impossible to detect the complex structural organisation.

Boulez's musical imagination appears vastly to exceed the constraints of the abstract system. He states this repeatedly in his essays, yet the difficulty of inferring from the score the precise technique used to distribute the series, renders a 'correct' interpretation of the music uncertain. The precise clarification of the musical exploitation of serial material would be useful in directing the analyst's intuition, defining boundaries that can be important to distinguish what is meant to be textural from what is meant to be structural. By this I don't mean to suggest that the textural sections of the works are intended as patches of completely chaotic sound. There is nothing completely unforeseen in Boulez's music. The textural sections are conceived as phases of music where the sonic objects are not controlled in every single aspect, but the overall result of their interaction is deliberately defined and a certain analytical process of perceptual interpretation is still required.

In conclusion, Boulez's sonic object belongs to two different systems that can be mutually contradictory: a serial system defines a generative coherence, which gives each object a common origin in the series or in the complex of series at the basis of the musical structure, while an often more localised system organises the hierarchies of sounds on the basis of audible connections, such as symmetries, repetitions, permutations and oppositions. At the basis of the evolution of Boulez's music there seems to be an attempt to generate a more effective connection of the two systems. This in many ways entails a mitigation of the dominance of the series, which has been an approach common to many serialist musicians after the early years of extreme experimentalism[20].

[20] 'The realisation that abstract proportions were not only insufficient but perhaps completely at odds with what composers were trying to achieve led to a much freer interpretation of serial methodology with the specific aim of a more effective realisation of serial principles. This is nowhere more striking than in the

From structures to objects

It has been shown how the overlapping of an abstract logic, which is the origin of the entire set of serial notes in a piece, with a perceptual logic of the musical connections, is the more ambiguous of the concepts put forward in 'Musical Technique', and indeed it is probably the most problematic issue raised by serialism itself. In other words, we do not always know where serial system and musical organisation diverge. It must be pointed out that, among the many ideas emerging from the debates of the early 1950s, Boulez had been interested by the intuition of a potential evolution in human perceptual capabilities. This clarifies some sections of 'Musical Technique' that would otherwise be interpreted as no more than abstract speculation.

Having said this, it is also true that 'Musical Technique' is one of the more significant documents about the theory of serialism, even with its unrealistic ideas about perception and coherence. The work is organised in a systematic progression from the coherent generation of the series (definition of modules and units of analysis, definition of the series as a structure based on hierarchies of identity), to a description of the organisational potential of the four parameters of sound: frequency, duration, dynamics and timbre. The distinction between serial and perceptual is already lurking in the system through the concepts of absolute and relative value, or tessitura.[21]

To rely on the vocabulary used by Boulez in his writings can be confusing in many cases. The meanings of words such as 'functional' or 'structural' are sometimes

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case of Goeyvaerts [...] In his previous compositions he had deliberately rejected the idea of connection between tones, preferring instead the depersonalised presentation of a series of simple proportions. Now, however, he found that those aspects of musical experience which he had attempted to bracket out returned of their own accord; he turned to planning compositions consciously and specifically dedicated to the effects of minute changes of frequency on the timbral quality of sine tone mixtures: "It is therefore no longer the "truth of the procedure" which counts, rather the only valid musical truth: that of acoustic perception."' (Grant, 2001: 92)

[21] 'A pitch is analysed according to its *absolute* place in a serial function, and according to its *actual* place in the dispositions of tessitura' (Boulez, 1971: 107).

so broad as to be misleading. Nevertheless, it is possible to pinpoint some basic concepts useful not only for aesthetic but also practical reasons.

The term 'structural' is overused throughout the essay. In some cases, however, it seems clear that it is applied only to sets of musical events that are derived from serial elaboration. An example of this can be observed in the section of the essay dealing with the influence of tessitura on serial structures. The relation is defined as 'organic' when the material is elaborated using as passing bands objects serially derived. This same simple procedure is defined as 'non-organic' when the objects used as passing bands are not obtained by serial elaboration, but are simply presented as a pitch set determined by the composer with no apparent reference to the system. These objects are defined as 'non-structural'.[22] This example[23] is presented within the paragraph devoted to the 'criteria of selection', which describes how serial structures are manipulated in order to be exploited in real music. As the example shows, the ways in which the notes within a structural series can be selected to become means of musical organisation are many and can be variously related to the serial structure itself. Once again a very clear differentiation is made between serial structure and musical organisation: 'These [criteria of selection] are, of course, extrinsic characteristics, and must not be confused with the true structural criteria which define the series' (Boulez, 1971: 106). The distinction is, however, extremely difficult to pinpoint in the real procedures known to be used by the composer.

It is precisely here that the current analytical trend finds its main obstacle. To investigate the pre-compositional system (i.e. serial structure) is safer than to try to determine what criteria of selection are working in specific sections of the music. The procedures of selection described by Boulez in the last part of his essay are so subtly

[22] By this procedure 'the internal and external structural characteristics of [the serial object] are forced to disappear, or are at least strongly eroded, by being placed in conflict with a structure of inorganic tessitura' (Boulez, 1971: 114).
[23] See Boulez, 1971: 113–114.

elaborated as to become extremely difficult to detect. Selection can be a matter of 'placing', which refers to the choice and the respective positioning of serial structures to be effectively used in the score, or it can be a matter of 'production', which implies a transformation of the serial structure itself. This can be internal, such as the association of serial elements or such as the addition of an 'enrichment' of pitches, or external, such as, for instance, a simple choice of attack.[24] The procedure conceived to produce an 'enrichment' of serial objects seems to be left to an elaborative process that only the composer can know. Once again it is impossible to define where the serial generative process ends.

The further step in this systematic description (logical derivation of the series, serial structuring of the four parameters of sound, organisation of local structures on the basis of criteria of selection), is the combination of local forms in a syntactic organisation:

> the forms of syntactic organisation are simple: monody, heterophony, polyphony; but they can equally well have recourse to complex concepts: polyphony of polyphonies, heterophony of heterophonies, heterophony of polyphonies, etc. (Boulez, 1971: 115)

As already stated, the complexity of this description is sometimes so great as to become a pure abstraction. Serial structure and real musical event are connected by a deductive process which, often, only ideally can give a musical meaning to mere logical elaborations:

> I have systematically described all these operations, but their usefulness will obviously increase with more supple applications: they serve to endow the embryonic organisms with personality, and are ostensibly the most indispensable and active auxiliaries of the work of organisation, of *composition*. Structures which have so far been considered as abstract networks of possibilities, now appear as precise figures, soon to become direct agents of the form. (Boulez, 1971: 114)

[24] See Boulez, 1971: 108.

It is reasonable to wonder if the choices made by Boulez in order to arrange the serial material in the score have ever been led by elaborative processes as complex as the ones outlined in the last pages of 'Musical Technique'.[25] Unless sketches by the composer are provided, it is unlikely that the real elaboration of the structures will ever be completely understood. A fragmentary identification of local organisations is the predictable audible result of this compositional procedure. In fact, technical discussions in Boulez (1989) seldom make use of the term 'structure'. More often, the description of formal organisation is based on terms such as *enveloppe* and *objet*. Boulez has evidently acknowledged that the compositional process outlined in 'Musical Technique' is ineffective because redundant. The statistical is implied in the system from the outset, not only from the point of view of the composer,[26] but also from that of the listener. The fragmentation of the structure in smaller units connected by more evident similarities introduces the formal category of sonic object. Once this has been accepted, the creation of sets of objects with a degree of identity can be developed without starting from the fundamentals of the series (the definition of module and unit) and without explicitly going through every stage of the serial elaboration. Once the material has been systematically produced, there is no need to trace *explicitly* every stage of its

[25] See for instance pp. 136–137.

[26] 'The play of structures implicitly suggests a scale of relationships going from the chance of automatism to the chance of choice [...] Perhaps we are only being wise after the event, and perhaps reflections on form have themselves initiated the search for polyvalent forms; but the hierarchy must be re-established in its true perspective: morphology can be held responsible for the abolition of fixity in musical structures' (Boulez, 1971: 106). The concept is still underdeveloped here, but Boulez has come back to the subject: 'Reconsidering my own efforts, I realise that my use of "automatic" structures with no "aesthetic" decision, as in the case of the first book of *Structures pour deux pianos* – and my use of aleatoric forms – as in the case of my *Troisième Sonate pour piano* or *Éclat* – represent, in fact, a statistical approach to the development that has concerned me for a long time and that I understand more clearly today' ['En reconsidérant mes propres démarches, je peux comprendre que mon utilisation des structure «automatiques» sans décision «esthétique» comme dans le premier livre des *Structures pour deux pianos* – et mon utilisation des formes aléatoire – comme dans ma *Troisième Sonate pour piano* ou *Éclat* – sont, en réalité, une approche statistique du développement qui m'a préoccupé depuis longtemps et que je comprends plus clairement aujourd'hui'] (Boulez, 1989: 119).

exploitation (whether it be statistical[27] or deliberately organised) back to the serial development. The presence of every note is justified by its systematic derivation, for Boulez has already demonstrated that he can outline a logical root for every single element in the score.[28] The objects follow a perceptual organisation based on identities (whether they be defined by the composer or left to the interaction of statistical texture and listener) which can now freely diverge from the systematic serial development, since the existence of each object is logically justified by reference to serial principles.[29] The confusion on this point is due to the fact that works such as the *Third piano sonata*, the first and second book of *Structures* and *Le Marteau sans maître* can actually be listened to relying only on smaller structures (i.e. sonic objects), and Boulez confronts the issue of statistical listening (or, to put it simply, the fragmentation of the structures into smaller objects by the listener) only when he speaks about textural organisation. The only reason why we can assume the existence of serial structures in the music is that we can read their description in the last section of 'Musical Technique'. The complexity of those elaborative processes has until now prevented the recognition of the resulting structures in the musical score. The interrelation of *faire* and *entendre* had necessarily to be reconsidered here, since the distance between written and perceived structure was excessive, and rendered creative elaboration mute, so to speak. This is

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[27] 'Statistical development accepts the *stylistic* and *grammatical* elements [italics mine], but it displaces the accent towards the expectation of multiple solutions, of fields of development; it will be the same, then, to make use of one precise solution rather than another one' ['Le développement statistique accepte *le données stylistique et grammaticales*, mais il déplace l'accent vers la prévision de solutions multiple, de champs de développement; il sera indifférant, dès lors, de se servir d'une solution précise ou d'une autre'] (Boulez, 1989: 118–119).

[28] In 'Musical Technique', through the description of the systematic development starting with the definition of module and unit of analysis.

[29] Speaking of the period following the composition of the first book of *Structures*, Boulez has stated that: 'Therefore it looked to me that the first and most urgent "reform" at the time was to revise the notion of series itself which, because of the increasing and enlarging of its functions, had become a serious handicap to the freedom of invention. Of this series that organised all the functions from the outset, it was necessary to retain essentially the notion of reference, and also the notion of *temporary* reference' ['Le première «réforme», et la plus urgente à l'époque, me semblait donc de réviser la notion de série elle-même qui, par le renchérissement, par l'élargissement de ses fonctions, était devenue un handicap sérieux pour la liberté de l'invention. De cette série qui organisait toutes les fonctions dès le départ, il fallait conserver essentiellement la notion de *référence*, et même la notion de référence *momentanée*'] (Boulez, 1989: 263).

when the notions of *enveloppes* and *objets* had to be introduced, along with the idea of the multiple interpretations of part of the functional connections. If we can define a structure as a set of elements connected by relations of similarities that can be more or less effective (i.e. perceptible), and for this reason can be hierarchically organised, the could be identified with a synthetic structure included in connective *enveloppes.* As will be shown in the analysis of *Éclat*, the sonic objects maintain traces of the system only as vestiges of their implicit serial derivation.

Analysis: system and open objects

The analysis of some of the sonic objects in *Éclat* will be developed on the basis of the information about the pre-compositional system offered by Olivier Meston,[30] in order to provide an instance of the traces left by the system in the musical score. Although Meston's research was conducted relying on sketches of the composer, it still cannot safely claim to be considered exhaustive, not even with reference to the pre-compositional system, which is the only object of Meston's analytical work. This is by no means a criticism to Meston's research, rather it is a clear instance of a recurrent scenario when dealing with analyses of Boulez's music.

The system is worked out in order automatically to produce sets of material (such as pitch sets, rhythmic cells, timbral attacks) that are going to be elaborated by the composer in the music. Boulez always avoids relinquishing the organisation of all the formal parameters to the system. The number of parameters that the system does not control is variable according to a logic which is specific to each individual structure in the piece. Moreover, as Meston's analysis clearly demonstrates, the combinatorial

[30] In Meston (2001).

process unfolds following a creative imagination that is not simply musical. With this I mean that the system is not only conceived to produce sonic materials, but it may also create an abstract consistency which holds the status of aesthetic expression in itself. The emblematic figure of the diagonal, for instance, which implies the opposition real/virtual, underpins the organisation of the piano solo at the beginning of *Éclat*.[31] This formal scheme does not give any audible result, and we must assume that it is meant to be a mere conceptual invention providing the pre-compositional work with an aesthetic consistency. It has a value for the *oeil* [eye] and not for the *oreille* [ear],[32] and can be revealed only through an analysis of the sketches. However, details of this organisation maintain a role in the musical setting, through the particular value accorded to singular pitches or particular relationships between them. The system insinuates itself, so to speak, into the sonic objects.

The analysis of the system not only cannot assure us that its relation to all the sound parameters has been unveiled, it also has to deal with the difficult task of giving a reason for the specific choices of its organisation. It is impossible to define precisely where musical and abstract consistency intersect.

It must be said that the distinction between system and music cannot be intended simply as the definition of two steps of the creative process in chronological succession. The composer himself has suggested that the elaboration of the system is an integral part of the artwork.[33] The entire issue of the conflict between system and music has been addressed by Boulez especially in Boulez (1989).[34]

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[31] See Meston, 2001: 26–28.
[32] The eye and the ear are a further variation on the theme of *écriture* and *perception* discussed in the previous chapter. In the case of Boulez, the codified elaboration entails both the pre-compositional process and the exploitation of the structural potential of the material in the actual arrangement of the score. Boulez has thoroughly discussed the issue in his writings (see Boulez, 1989: 293–315).
[33] See Boulez, 1989: 314.
[34] See Boulez, 1989: 316–390.

For these reasons, the claim to a complete understanding of the pre-compositional system is as academic as the claim to a complete understanding of any set of musical material would be. The unveiling of the combinatorial procedures can not only never be safely proved to be complete, but it does not even imply the understanding of the reasons of these procedures, whether they be purely technical or derived from aesthetic ideas.[35] System and musical composition are linked in a connection that it would be reckless to reduce to a mere succession of combinatorial elaboration followed by actual musical setting.

These arguments are clearly critical of a certain way of approaching analytical work on Boulez's music. Analyses of his music are usually limited to the unveiling of the pre-compositional system. When the audible results are taken into account, the analytical work is conducted on the basis of formal categories still substantially indebted to traditional concepts such as 'motive', 'theme' and 'development'.[36] By this I do not mean that those formal concepts have completely lost value in Boulez's thought and music. However, if we are to investigate the potential novelty of formal ideas, it seems appropriate for us to introduce different concepts to define analytical and formal categories. The traditional approach to Boulez's music is very useful to pinpoint the actual occurrences of the formal heritage that the composer has appeared to be so keen to eradicate from his technical and aesthetic thought. They can also be useful to outline

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[35] Furthermore, Boulez has clearly affirmed his conviction in the aesthetic value of ambiguity, and this includes the pre-compositional system: 'And what if the author wanted precisely to force us to lose consciousness of his means each time we approach the deep layers of his work? Does the only way consist of spreading constantly this unsustainable clarity about what he wants to say and how he intends to express it?' ['Et si l'auteur voulait précisément nous obliger à perdre conscience quant à ses moyens chaque fois que nous approchons de la réalité profonde de son œuvre? La seule démarche consisterait-elle à répandre constamment cette insoutenable clarté sur ce qu'il veut dire et comment il entende l'exprimer?'] (Boulez, 1989: 312); the same concept is restated elsewhere: 'The author can even manifest his propensity to conceal secrets only destined to himself, to give to certain aspects of his work an esoteric content, to cover it with cryptic symbols' ['L'auteur peut même manifester sa propension à enfouir des secrets destinés à lui seul, à donner à certains aspects de son œuvre un contenu ésotérique, à la revêtir de symboles cryptiques [...]'] (Boulez, 1989: 312).

[36] See for instance the analytical survey of a good part of Boulez's music made by Susan Bradshaw (1986). The discussion, extremely revealing in many ways, is however conditioned by reference to a formal thinking that is still thematic more than structural.

the development, if that is the case, of harmonic and melodic traditions in modernist music. However, to cast light on the novelty of Boulez's thought it is necessary to acknowledge the multi-parametrical thinking implied by serialism. The notion of 'sonic object' can be a valid means to do this, both for the aesthetic references and the technical implications.

The ambiguity of the music is obviously of no help to the analytical work. In fact, there are no theoretically explicit norms in the latter that enable the listener to chose a specific connective path between sounds.

Boulez himself has asserted the value of a creative musical analysis. Accordingly, he includes alternative perceptual patterns in the form itself. The listener, who, although at variable levels, always analyses music, becomes a part of the formal organisation of the piece through his multiple understandings of the potential links among and within various parameters of sound.

This characteristic is obviously not exclusive to Boulez's music. However, in this case, what can be considered a typical trait of artistic expression has been included in the aesthetic principles underpinning the compositional technique. This is an instance of how the issue of chance, or statistical development, in music gathers a distinctively peculiar nuance in Boulez's thought: unpredictable occurrences in the interaction composer–performer–listener are pragmatically acknowledged and attain a theoretical justification. The linear development of Boulez's thought from the systematic approach of the first book of *Structures* to the proliferating serialism of *Incises* is an abstraction only if the two aesthetic and compositional attitudes are obtusely considered as self-contained systems. In my view, the unavoidable clash with the reality of perceptual limitations and musical communication has forced Boulez to shift from a mainly systematic to a statistical coherence.

The term 'sonic object' has been used extensively by Boulez in his writings.[37] However, it has never been precisely defined, so an accurate identification of sonic objects in the score will always be questionable. Generally speaking, considering Boulez's compositional procedures, the most satisfactory definition of sonic object would appear to be that of a set of pitches that has been logically determined at the pre-compositional level,[38] and which maintains a clear perceptual connection in the score.[39] This theoretical definition, however, does not always accurately describe reality. In fact, as was discussed earlier, the disconnection of pre-compositional serial elaboration and actual organisation of the material in the score is always an open issue when analysing Boulez's music, since it follows a logic that is variable and not explicitly expressed. This means that individual objects conceived serially can be arranged in the score in such a way that they become perceptually unrecognisable as a unit. Considering also the difficulties in attaining a complete understanding of the pre-compositional system, it would be ineffective to try to identify sonic objects in the score on the basis of the serial material. Musical function, rather than serial logic, should be the defining parameter. This, however, can be determined only when the composer has given a clear associative function to parameters such as timbre or dynamics, which can render the individuality of the set of pitches evident aurally, in the music, and visually, in the score. In the analysis of *Incises* this procedure will appear evident.

Instead, it is more likely that structural ambiguity will be generated when, within a larger structure, it is not possible to single out one set of pitches on the basis of an associative parameter. In fact, while sonic objects can still be identified by more subtle connections, such as interval association, secondary structures could be created among their constitutive elements. This particular situation occurs in the sections of *Éclat*

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[37] See, for instance, Boulez, 1971: 41 and Boulez (1989).
[38] See Boulez, 1971: 80.
[39] See Boulez, 1971: 117.

which will be analysed later. Here the objects as they are notated in the score correspond exactly to the pre-compositional material, but their inner cohesion does not always withstand the centrifugal force of secondary pitch structures.[40]

Overall, the identification by the listener of objects and structures through an 'intentional' perception is a process that cannot be completely controlled by any compositional technique, in particular if the normative system has not been made explicit and has not been assimilated by the listener in patterns of perceptual organisation. It is evident that the aim of Boulez's music is precisely to avoid the stabilisation of perceptual patterns, and that is why his reference points are never functionally univocal. Very seldom Boulez conceives objects that are exactly symmetrical and unambiguously connected. In this way, any kind of perceptual and intellectual relaxation is prevented.

In conclusion, however, the value of the notion of sonic object should not be diminished by the analytical difficulties. In fact, as with any notated music, Boulez's musical structures are substantially based on the interrelation of pitch sets that are presented as a unit using various associative devices. What in tonal music is identified as 'melody' and 'harmony', has been given a different, more general definition in serial and post-serial compositional thinking, since the structural functions of musical units are not controlled and predetermined by a theoretical codification. Therefore, the formal concept of sonic object is not, in itself, an abstraction. However, the identification of the objects and the distinction of object and structure is left to compositional and perceptual intention, and, for this reason, will always remain substantially debatable.

[40] See, for instance, the analysis of structure 3.

Éclat

The piano solo that opens *Éclat* is conceived as a virtuosic cadenza. The virtuosity does not prevent Boulez from carefully organising the objects on the basis of a logic which is both systematic and musical.

The section relies on material determined by a complex combinatorial procedure. The details of the pre-compositional system have been uncovered by Meston's analysis. Generally speaking, it can be said that the combinatorial process of this section of the piece results in six sets of sonic objects, which a) range in structural complexity from the single note to the cluster, b) hold a fixed register, and c) lack rhythmic characterisation. Attacks and rhythmic organisations are used in the actual musical setting in order to define the various structures by giving them both a timbral uniformity and a inner articulation, thus contributing towards creating the connective envelopes and the functional hierarchies discussed above.

An analysis of the musical structures reveals an organisation much more complex than what can be discerned by an understanding of the pre-compositional system or even by a simple listening, when details are obscured by speed. With respect to this, and as a reply to criticisms that are regularly addressed to Boulez's music, it is necessary to emphasise that the elaboration within the sonic texture of details intended for the ideal listener is a procedure typical of any kind of music, tonal music included. The tradition of virtuosic cadenzas and etudes for solo instrument offers an unlimited source of examples of this compositional technique. The elaborate arrangement of almost imperceptible details has the power to convey a strong sense of cohesion, within both the local structure and the overall musical discourse. The musical organisation is

perceived simultaneously at more than one level, thus allowing the perceptual analysis of general texture and articulated structure at the same time.[41]

Furthermore, the absence of a precise correspondence of *écriture* and *perception* is a specific aesthetic feature of Boulez's music, and it constitutes a problem[42] only if it is expected that serial music will have a linear connection of project and product that is not usually required of tonal and late tonal music. The Schaefferian opposition of *faire* and *entendre* implies the mutual influence of the two elements, which is produced by the absence of an exact correspondence between projected structure and perceived music. Boulez has managed to overcome the apparent unproductive constraints of the system by conceding an aesthetic value to the potential for multiple interpretation of the functional hierarchies within his music. In this way, the divergence of *faire* and *entendre* owing to the subtlety of the details is made part of the fruitful creative process.

The opposition *oeil/oreille* which has been introduced earlier is therefore complicated by the extreme subtlety of Boulez's musical organisations.

In this perspective the details of the score apparently conceived only to allow the de-codification of the pre-compositional system, can also be heard as subtleties of the actual musical structure. As an example, it is possible to refer to the resonance sign which stresses the notes of the series in the score of *Éclat*. Meston understands it as a

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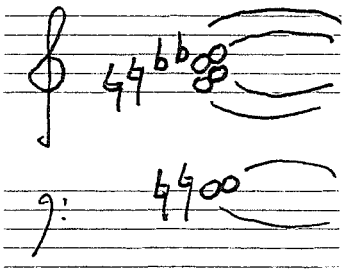
[41] This issue has been discussed by Boulez, who tends to assimilate the acceleration of tempi to other elaborative devices (such as the partial obliteration of a melodic line), able to produce a distortion in the perception of the structures while maintaining the intuitive notion of an inner consistency (see Boulez, 1989: 423).

[42] '[In] *Éclat* [...] for instance the piano solo is based on a very complex process of construction, which requires a long time for elaboration, while what is perceived goes by very fast and does not account for this complexity. It could be possible at this point to start a polemic by saying that this last part, the performance, in the case of the piano solo is superfluous, that its aim is the mental process set to work' ['[Dans] *Éclat* [...] le solo de piano par exemple est bâti sur un processus de construction très complexe, sollicitant beaucoup de temps d'élaboration, alors que ce que l'on perçoit file très vite et ne rend pas compte de cette complexité. On pourrait à ce propos ouvrir une polémique en disant que cette dernière partie, la création, dans le cas du solo de piano est superflue, que sa finalité est le processus mental mise en œuvre'] (Meston, 2001: 96). Here, in my view, Meston credits the pre-compositional system with a value that proves to be excessive. Often Meston's interpretation of the relation of system and idea in Boulez inaccurately assumes the correspondence of the material produced by the combinatorial elaboration and the actual arrangement of the material in the score. They are two distinct phases of the compositional process, and none of them, in my view, is meant to produce a univocal aesthetic message.

pure analytical trace,[43] meant to be a reference point for the analysis of the pre-compositional system. My view is that the interpretation may not be so simple, since the sign has in fact a musical meaning, ideally audible.

The series of six pitches that forms the basis of the pre-compositional elaboration in *Éclat* is stated at the beginning of the piano cadenza as a chord to be played *pianissimo*, and to be sustained with the sostenuto pedal throughout the entire cadenza. This means that each time a pitch belonging to this 'original' chord is played by the piano in the following musical development, the sound will be sustained. It is true that the speed at which the cadenza is played tends to obliterate this effect, but for the ideal listener, the chord is actually maintained as a sort of aural shadow throughout the whole section.

Ex. 1 *Éclat*, serial chord

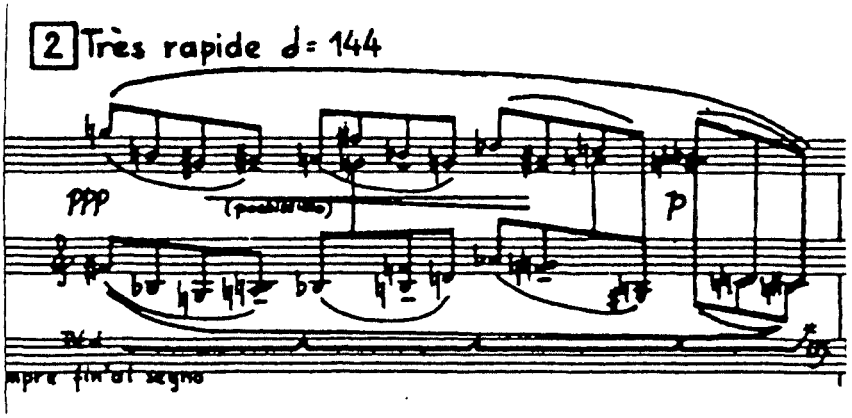


For this reason, it should be considered as an ambiguous object, which is meant to appear in relief in the actual music, suggesting the presence of the complex combinatorial elaboration that Meston unveiled in his study. This overlapping of abstract and sonic objects is a constant feature of Boulez's musical imagination. As I suggested earlier, the attempt to solve the entire pre-compositional issue and to distinguish it clearly from the actual musical setting is, in my view, merely academic. The artistic value of the combinatorial process cannot be separated by the music, in the

[43] Meston, 2001: 15–16.

The first structure of the piano solo consists of one main melodic line doubled by a secondary lower line at variable intervallic distances (minor ninth, major seventh, perfect fourth, minor third and major second). The notation and the following analysis show that, structurally speaking, the lines can be paired and divided into four sections so as to define four sonic objects. Although the melodic shape of each object is individually characterised, the first structure of the piano solo is organised on a clear descending line given by the main upper melodic line. This also articulates the structure in two subsections consisting of a pair of objects each.

Ex. 2 *Éclat*, structure 1



The articulation is obtained through the repetition of the same note in the upper line at the beginning and at the end of each subsection. The repeated pitches, respectively G natural and D flat, in both cases are displayed first as the highest point of the subsection and then in the lower octave, in accordance with the overall descending movement of the melodic line.

Moreover, G natural is repeated twice in the first quaver object, thus defining the range of register of the entire structure (see Ex. 3). This is possible since the descending movement of the structure is produced by the upper line of quavers only, while the bottom line maintains generally the same register. This is consistent with the general

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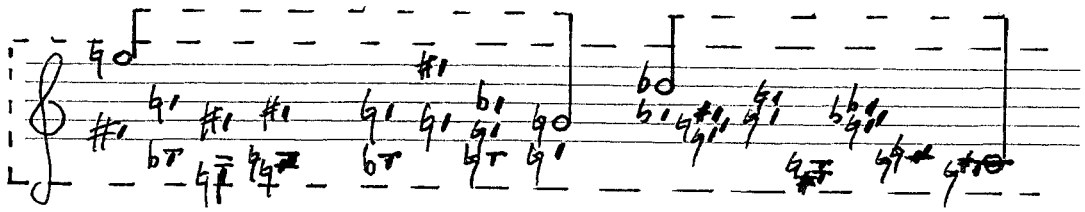
Moreover, G natural is repeated twice in the first quaver object, thus defining the range of register of the entire structure (see Ex. 3). This is possible since the descending movement of the structure is produced by the upper line of quavers only, while the bottom line maintains generally the same register. This is consistent with the general musical thinking of Boulez, who only very seldom conceives regular objects. On the contrary, the structural organisation usually presents connections that appear to imply a displaced symmetry.

Ex. 3 *Éclat*, structure 1, range of register and subsections 1 and 2



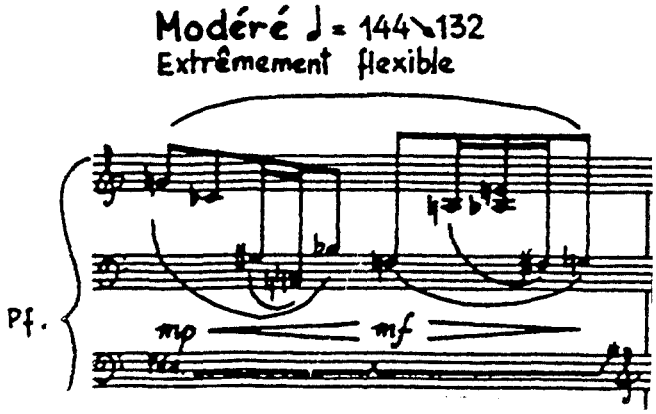
G natural in the first object of structure 1 has another distinctive feature, since it is associated with F sharp in the lower melodic line. As it happens, these two pitches delimit the passing band of the cadenza in the pre-compositional elaboration,[45] even if in the score F sharp has been raised an octave. This pitch association will be often

[45] The passing band acts as a frequency filter and is determined by two pitches which frame a range of register. Every pitch not included in that range of register, will be excluded from the compositional elaboration; see Meston, 2001: 26.

repeated within the cadenza in different registers: on the second beat of object 2, in the bottom line of structure 3 (see Ex. 8) ,[46] at the end of the second object of structure 2, when the predominance of G natural is temporarily suspended.

This is another instance of the interrelation of composition and pre-composition. Meston's analysis does not provide an explanation for the choice of precisely these two pitches as limits of the passing band in the pre-compositional material of the piano cadenza. However, their association is made clear from the outset, within the limits imposed by the elaboration of pre-composed material that has to fulfil many other functions.

Ex. 4 *Éclat*, structure 2, objects 1 and 2



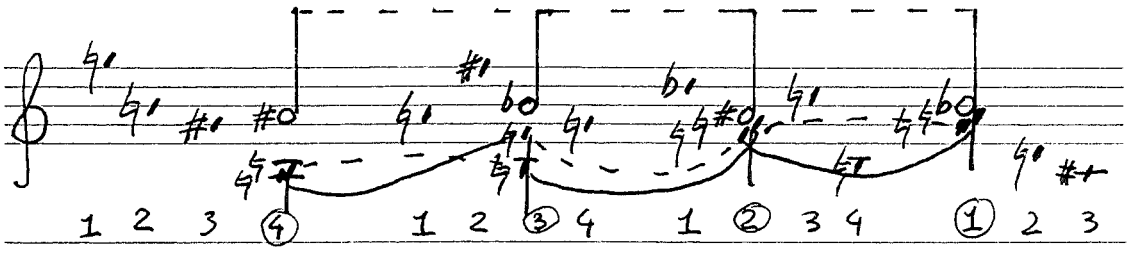
It is possible that the perceptually relevant association of the two pitches in the score is also designed as a clear indication for the analysis of the pre-compositional system. However, the perceptible value of these occurrences of the same pitches linked in various ways (respectively: a) simultaneous occurrence, later repeated in inverted register (see Ex. 2), b) register identity, c) immediate repetition), cannot be overlooked. This is another instance of the interference of *oeil*, in its broader meaning, and *oreille*.

[46] The numbering of the structures corresponds to the one displayed in Meston's analysis, which follows the pre-compositional organisation. The order of the structures in the score is rearranged by Boulez.

A similar example is given by the elaborative process concerning B flat. This pitch represents the reference point in the combinatorial elaboration that presides over structure 1, which has been described by Meston.[47] The location of the pitch within the objects is arranged in order to obtain the repetition of the same sound in the same register on a beat different for each object in the structure. To be precise, the repetitions form a regular succession: beats 4, 3, 2, 1 respectively for objects 1, 2, 3, 4.

Moreover, thanks to a subtle elaboration of the material at the pre-compositional stage, each repetition of B flat happens to be included in a tri-chord. Every other pitch within the objects is displayed in dyads. This increment of density produces a multiple result: a) it stresses the note B flat, generating a rhythmic structure superimposed on the one of the quadruplets; b) it creates elements that change in interval content, but retain a perceptual similarity given by the B flat constantly repeated in the same register; c) it introduces variable pitch density within the objects and the structure, which is a feature characteristic of the entire cadenza.

Ex. 5 *Éclat*, structure 1, elaboration of B flat



Once again, the *oeil* of the pre-compositional, the *oeil* of the *écriture*, and the *oreille* of the music (for the ideal listener), are interrelated.

[47] See Meston, 2001: 31.

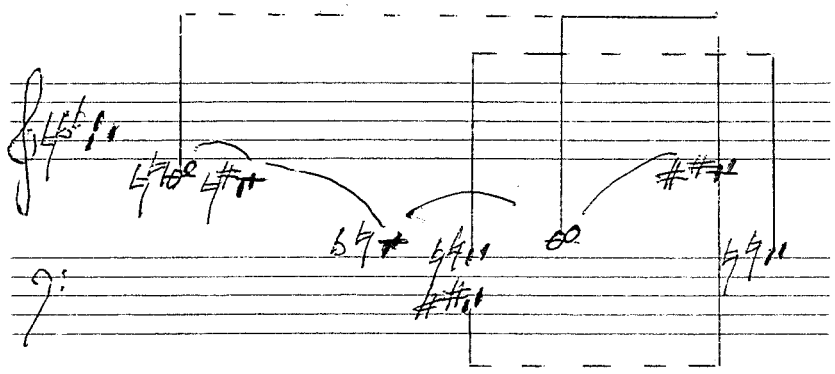
The rest of the pitches in structure 1 are organised in sub-structures produced by both identity of register and intervallic relations. It is possible to survey single lines of the stave to detect the succession of the same pitches on different beats of the quavers' objects. This arrangement creates rhythmic structures through repetition, and connections with other pitches related by semitone. The resulting sub-structures interlock with the clearer evolution of the envelope. While producing this elaboration of the material, Boulez must have taken into consideration the ambiguity and the multiple relations of many of the pitches. The constraints of the system may have forced him to make specific choices of pitch order, but his creative process is endorsed by the characteristic of the material that ensures a certain amount of repetitions, and for this reason, a certain amount of connections. The complex nature of the objects makes it possible to create a great number of connections between the pitches, so that multiple hierarchical organisations can be determined using links that have a different level of perceptual relevance. The phase of the compositional process that Boulez has defined as 'description'[48] consists of a selection of an organisational arrangement among the set of possibilities given by the material. In the case of the first structure, the set of possibilities is extremely reduced, since the register of each pitch is already determined at the pre-compositional stage. The only choice left to the composer is the ordering of the objects and the ordering of the pitches within the objects. In order to do this, it is necessary to invest every single note of the pre-compositional material with a functional role. However, certain relationships are clearly meant to be univocal, while others are included in a more ambiguous connective net. It can be assumed that the second type of relation is usually produced when the material does not allow the creation of links relying on more perceptible connective procedures, such as identical repetition, or register. In this case, even not identical repetitions can function as connective elements.

[48] See Boulez, 1989: 383.

However, in this case the link will inevitably be more ambiguous, and perception will be searching for other relations to support the unsteady functional value of the object. An instance of this structural complexity can be given by the elaboration of the last two beats of structure 1. The dyad C natural–D natural reappears at the end of structure 3 (see Ex. 8), while the dyad C sharp–D sharp is the first element of structure 4.

They are clearly meant to create a connection between those specific structures, which in this way begin and end in the same register and with similar intervallic material. However, the dyads are never identically repeated.

Ex. 6 *Éclat*, connection of structures 1, 3, 4



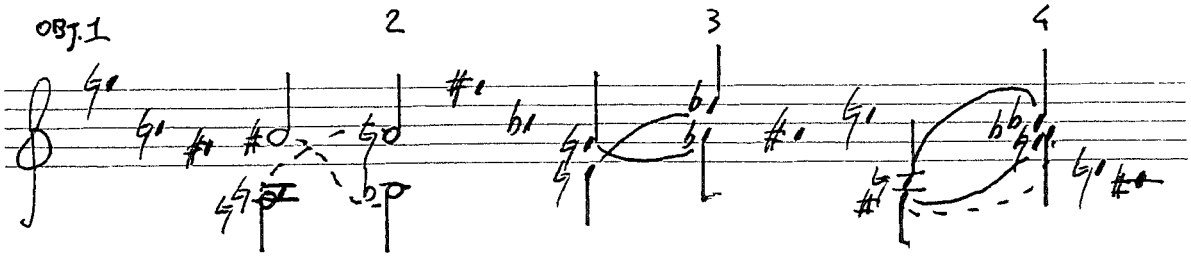
The dyad C natural–D natural is made evident in structure 3, since it is positioned at the end of the ascending line that characterises the entire structure. Structure 3 returns to the register reached at the end of structure 1, and counterbalances with an ascending line the descending movement of the first structure. However, in structure 1 the dyad C natural–D natural is the one before the last. This means that the connection of sections 1 and 2 is obscured by the dyad B natural–C sharp, the last of structure 1, which is similar to the former but not identical.

A comparable effect is given by the dyad starting structure 4. The result is that a connective dyad is localised around the interval C natural–D natural, without this

representing a stable point of reference. Other relations weaken its function, as for instance the sequence of dyads C sharp–D sharp and A natural–B natural in structure 4, which recalls the chord before the last in structure 3. The function of the connective dyads is therefore duplicated. This is a regular occurrence in Boulez's music. However, on other occasions it is possible to distinguish more clearly primary and secondary links.

In structure 1, for instance, the connection of the objects is much more straightforward, since they are disposed in an uninterrupted sequence.

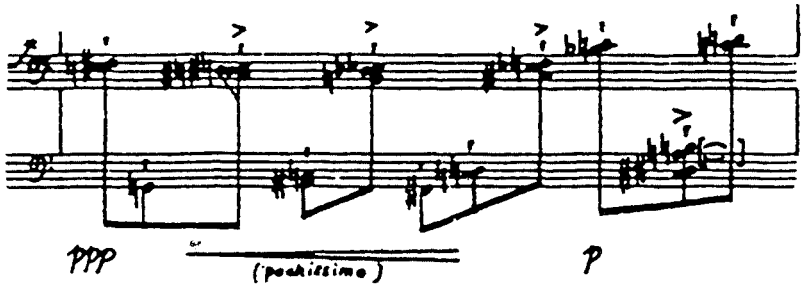
Ex. 7 *Éclat*, structure 1, connection of objects 1,2,3 and 4



G natural starts and concludes the main voice of the first couple of objects, which is connected by the semitone relation A sharp–A natural (between objects 1 and 2). The second and third objects are linked by crossed relations of semitone between the two voices, while the third and fourth objects are linked by relations of semitone in the same voices (with an A flat added in object 4 that repeats the G sharp of object 3 in the higher register). The weight and effectiveness of each link are clearly variable, although the quality and amount of the variation can be arguable. However, it is quite obvious that the link between the first couple of objects is clearer and more effective, since it is given by both melodic movement and repetition of pitches. This does not imply a

weakness in the treatment of the other connections. Rather, it is a matter of variation of function and of multiple connective links.

Ex. 8 *Éclat*, structure 3



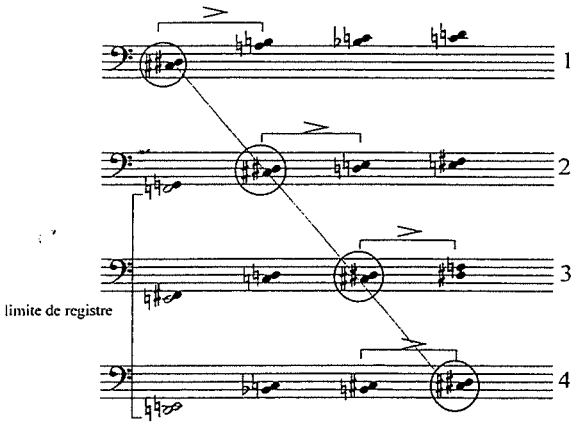
In structure 3, the pre-compositional elaboration starts with a transposition of the series on C natural, which is a pitch subsequently excluded from the set of four used to generate the final material, according to a procedure applied to all the structures of the piano cadenza.[49] As a result, the material is generated on the basis of the defective series D natural – B flat – B natural – C sharp. Boulez, however, does not use the series itself, but obliterates its constitutive pitches as absent centres of dyads formed around them. The first dyad C sharp–D sharp, for instance, is conceived around a virtual centre represented by D natural.[50] The two pitches, C natural and D natural, made virtual in the pre-compositional system, are displayed in the most dominant positions in the score: they are the last event in the structure, they occupy the highest register at the end of the ascending line, and they are connective pitches to structures 1 and 2. Once again, aesthetically relevant elements of the pre-compositional elaboration hold in the score a perceptible and structural role.

Moreover, as in structure 1, the real transposition pitch, which generates the diagonal in the pre-compositional scheme of the structure, in this case the dyad C sharp–D sharp (see Ex. 9), is made perceptually relevant by adding to it an ornamental

[49] See Meston, 2001: 28-30.
[50] See Meston, 2001: 35.

element. To this purpose, the dyad C sharp-D sharp is regularly linked to one of the other dyads resulting from the combinatorial elaboration.[51]

Ex. 9 *Éclat*, structure 3, pre-compositional material (from Meston, 2001: p.35)



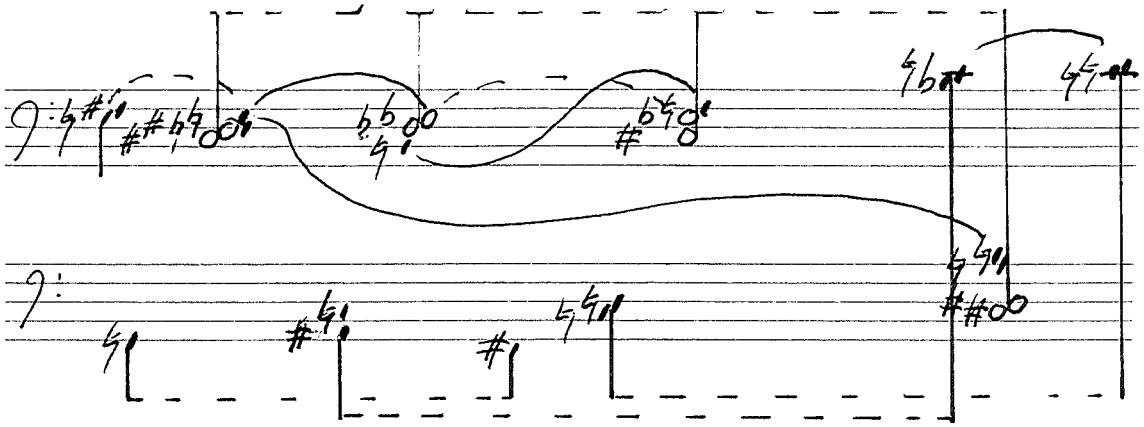
This abstract association leads to a simultaneous display of the linked dyads in the score. The resulting chords are stressed in the score by an indication of 'marcato'. As Meston suggests, the sign is meant to be a trace for the analysis (of the pre-compositional system), but the actual result (for the ideal listener) is that the main dyad C sharp–D sharp is highlighted by the attack and by the increased density of the chords in which it appears, as it were, to be carved. In this way, it becomes an irregular but distinguishable point of reference in the structure.

It is possible to notice that the actual disposition in the score generates an evident structural connection between these chords: the first chord is a chromatic cluster, the second is constituted by the main dyad plus lower major second, the third is constituted by the main dyad plus higher major second, the fourth consists of a couple

[51] *Ibid.*

of dyads in broad disposition. The second and third chord mirror each other in the disposition of their intervallic content.

Ex. 10 *Éclat*, structure 3, pitch organisation



The first and last chords are related by number of pitches (four), by the location at the two extremes of the structure, by contrasting disposition, and by their connection with following and preceding sonic events. In this respect, the link of the last chord with structure 4 has already been underlined; the first chord (the chromatic cluster) is related to the first event of the structure (E natural–F sharp) by register, and by the shared pitch E natural.

Moreover, E natural and E flat, which create through repetition and linear progression a sort of melodic line connecting the first three chords, are also the only missing pitches in structure 1. This is another technique used by Boulez in order to give coherence to his music. In this specific case, it is not easy to decide if the chromatic completion is due to choice or statistical coincidence.

However, the ordering of the objects derived from the pre-compositional elaboration is actually due to deliberate choice, so it could be suggested that, since the object chosen to start structure 3 is the only one that displays both E natural and E flat,

this is the reason for its location at the beginning of the structure. However, it has also been suggested that the arrangement of the material most likely follows the connective logic of the 'marcato' chords and of the overall ascending line. This would have designated line 2 of the combinatorial scheme as the best starting point, as it is in fact in the score. So, is this completion of the whole chromatic pitch set a pure coincidence? This is a good instance of how the outburst of speculative and aural connections can create links that may have not been foreseen by the composer. It must be said that in other cases, as will be seen in *Incises*, the relation of chromatic completion is much clearer in the score and, through specific strategies of disposition of the notes, much more perceptually evident.

To summarise, the overall organisation of structure 3 is based on a central line determined by the 'marcato' chords, and by other minor sub-structures constituted by single notes and dyads that variously relate to each other and to the central line.

The major seconds A sharp–C natural and C natural–D natural of objects 2 and 3, for instance, clearly revolve around the main pivot note C natural, but also relate to their exact repetition in the higher register of object 4. The dyad C natural–D natural is also connected to the 'marcato' chord of the last object by the close similarity of part of the pitch content. Furthermore, it also connects to the previous and following structures, as has been seen, producing in this way a triple connection in two different registers. The determination of the exact functional value of the elements is necessarily left to the listener.

The sonic object in Boulez's music is highly cohesive, logically rooted, carefully forged in its sonorous articulation. However, it maintains a formal openness that mirrors the openness of the entire piece and endorses the aesthetic convictions about chance and coherent choice that have often been discussed by Boulez in his writings.

Incises

In *Incises*, the system seems to be organised in order to produce the highest possible number of variations of one single and very simple idea, which is stated in the title.[52] This approach exemplifies the tendency towards virtuosity that seems to be emerging from the most recent works of Boulez, and which encompasses both the instrumental and the creative domains.

The following analysis will not expound further on the issue of the interrelation of pre-compositional elaborations with actual musical organisation. Instead, it will focus exclusively on the techniques used by Boulez to generate structural connections in the score.

Boulez has stated the primacy of pitch and duration in his organisation of musical structures.[53] This compositional attitude is made evident by an attentive scrutiny of the score; therefore, the analysis will focus essentially on those parameters. However, in the case of *Incises*, durations are used essentially to define groups of pitches. Instead, the detailed organisation of the music is based on the elaboration of the pitch material mainly through relations of identity (repetition, symmetry) and linear connection. The relevance of pitch connections is controlled through the modification of other parameters, such as dynamics and attack, or through compositional techniques such as temporal distancing and register transposition.

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[52] The choice of a title with ambiguous and multiple meanings is characteristic of Boulez, and is perfectly consistent with the aesthetic fundamentals that so strongly inform his compositional work. In this case, once again the meaning of the word *incise* entails both the notion of basic element of a musical phrase as it is defined by theory and that of parenthesis with reference to language. Furthermore, in French the term implies an etymological reference to the act of engraving. The title *Sur incises*, given to the instrumental piece composed later as a development of the formal idea of the piano piece, seems to be more meaningful if related to the notion of engraving (in this case, *Sur incises* would essentially indicate a second layer of engraving). However, the value attributed by Boulez to the notion of parenthesis is well known, since the early years of the Third Piano Sonata. In my view, the ambiguity is due to a deliberate choice, and the exact translation of the title of this piece, choosing just one of its possible meanings, would be a useless obliteration of its aesthetic value.

[53] See Boulez, 1971: 37.

The following analysis will detect within the musical organisation pitches or sets of pitches constituting the main poles of structural stability, and will highlight less immediately perceptible secondary structures.

It is possible to indicate several structuring devices used to create and calibrate the perceptual relevance of single pitches and pitch relations:

- Pitch identity: the repetition of a single pitch both enhances its perceptual relevance and creates a relation between the repeated pitches. As suggested above, these perceptual phenomena can be calibrated through register transposition and through modification of the other sound parameters. Furthermore, the perceptual relevance of a repetition can be influenced by the nature of the structure where the repeated pitches are located. Complex structures and swiftly variable textures obviously tend to cloud the perception of single pitches.
- Dominant pitches: pitches that are regularly repeated within a specific section of the piece tend to impart a harmonic character to the section, as if constituting an ideal chord in the perceptual memory. This sort of harmonic pedal can be used to both delimit a section of the piece and connect it to other sections similarly defined.
- Calibration of pitch perceptual relevance: specific pitches can be made perceptually relevant through a major diversification of one of their sound parameters with respect to the object or structure in which they are included. This can be done with dynamics, duration, timbre and register location.
- Register connection: a group of pitches can be connected by register contiguity. This can be determined by the distant location of pitch structures

within the range of register, which generates an immediate association of pitches sharing a similar register.

- Range of register: the delimitation of the range of register that includes a single structure can be made relevant to perception. This is done by conferring perceptual relevance to the pitches framing the range of register, either through one of the techniques highlighted above, or through the location of the pitches as temporal limits of the structure. Both stability and displacement of range of register can be used to connect different structures in a longer linear development.

- Whole chromatic completion: this is a structural device which is not as perceptually evident as the others. However, Boulez seems to resort to it quite often in the piece. When specific pitches are not present in a structure, they are usually displayed immediately before or after the structure itself. This may not produce a clear perceptual connection, but is nevertheless a demonstration of the attempt to attain the highest possible level of variation in the piece through a constant turnover of the pitch material.

All these compositional techniques interact with each other within the musical structure, so that their effectiveness is mutually altered. For this reason, they should not be analysed singularly, without taking into account their complex interrelation.

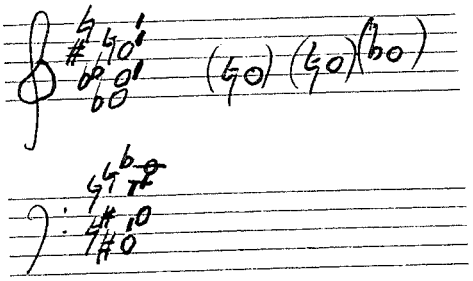
The piece is organised in two clearly distinguished episodes. This analysis will focus exclusively on objects displayed in the first episode, which corresponds essentially to the first version of the piece presented in 1994.[54]

[54] The second and definitive version of *Incises* was published in 2001. It is roughly twice the length of the 1994 version, and displays an entire new section that has clearly been inspired by the instrumental piece *Sur incises*. Therefore, it seems that in this case the inspirational influence between the two pieces has worked in both ways.

The first episode consists of three parts,[55] each displaying a precise musical and organisational character. The first part can be intended as an introduction, while the last part, which will not be analysed here, can be heard as a coda. The *incises* consist of objects which present specific rhythmic and timbral features, and are irregularly interpolated throughout the first and second parts of the piece.

These two parts are divided by a chord that again shows a clear reference to the number 3. The chord consists of twelve notes, equally distributed in the higher and lower staves (see Ex. 16). Therefore, each one of the two resulting chords consists of six pitches. Since the entire chord is based on a set of nine pitches, the overall structure of the object is completely informed by the number 3: three missing pitches (G natural, A natural, B flat); three pitches shared by the two chords (C sharp, E flat, F sharp); three pitches displayed only in the lower part (E natural, B natural, C natural); three pitches displayed only in the higher part (G sharp, D natural, F natural). There is no need to say that in this way the whole chromatic scale is implied.

Ex. 11 Incises, part 1, fermata-object 6



[55] The piece does not display a partitioning in measures, apart from the vertical lines of different length that Boulez usually uses to indicate the organisation of the serial material in the score. I will make use of these to indicate the location of the objects. I will use the term 'part' to indicate the larger sections of the piece, the term 'section' (followed by a number) to indicate the main sections of each part, and the term 'subsection' (followed by the number of the section and a letter) to indicate the subdivisions of each section. Each object within the subsections will be indicated with the timbral character that is defined at the beginning of the analysis of each part.

The centrality of the chord is also underlined by its structural features. It is the only object in the whole work which shows a symmetry easily recognisable: the two chords in the higher and lower staves are constituted by the same classes of intervals; they are played arpeggiato in opposite directions, beginning with the same note E flat (actually this alters slightly the perfect symmetry of the entire object, reasserted, though, by the symmetry of the dynamics). The two chords are in themselves almost perfectly symmetric: two minor thirds in the extreme sections, a perfect fourth in the middle, and two more seconds, minor and major. This particular object represents a clear division between the introductory part 1 and the rest of the piece.

a) Part 1

The *incises* in the first part are defined by three different musical figures: chord, fermata, melodic lines of hemidemisemiquavers. Each structure of three figures is delimited by the 'breath' sign, which will be used in this analysis to delimit the six sections constituting part 1 (see Ex. 16).

The chord objects display an overall consistent development of the pitch content:

chord object	number of pitches
1	5
2	7
3	6
4	9
5	8
6	10

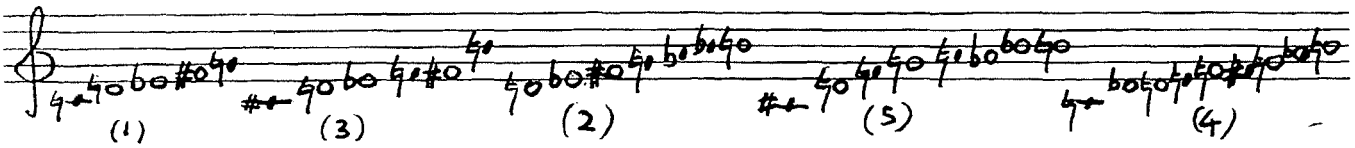
In the six subsections marked by the breaths, the number of pitches constituting these objects increases from five to ten:

However, this does not happen in a regular sequence. Starting with the first one, the chord objects consist of sets of, respectively, five, seven, six, nine, eight and ten pitches

All the chord objects consist of sets of unrepeated pitches. An exception is made for chord object 6, which has two repeated pitches (D flat, B flat), and which displays many other inconsistencies if compared to the rest of the chord objects. The latter show instead a conspicuous connection. Considering them in order based on the number of pitches (which means subsections 1, 3, 2, 5, 4), the set of identical pitches increases regularly:

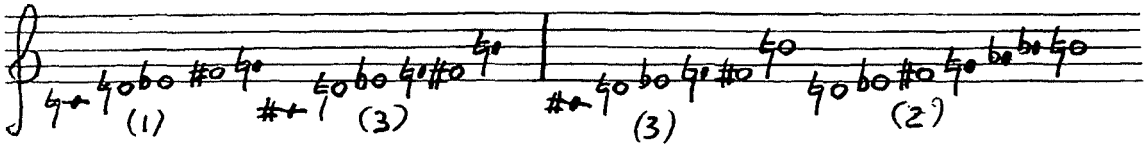
chord object	no. of pitches	no. pitches identical to the previous object
1	5	
3	6	3
2	7	4
5	8	5
4	9	6
6	10	6

Ex. 12 *Incises*, part 1, pitch content of chord objects 1-5



Each passage from one section to the other abolishes two pitches from the former section, and adds three new pitches to the following. In the passage from sections 1 to 3, for instance, three pitches are maintained (the shared pitches D natural, E flat, F sharp), three are specific to section 3 (C sharp, F natural, B natural), two are specific to section 1 (C natural, G natural).

Ex. 13 *Incises*, part 1, pitch identities of chord objects 1,2 and 3



The increasing homogeneity in the pitch content of the chord objects is evident also considering their actual sequence in the score, even if in this case the progression lacks perfect regularity: objects 1 to 6 share respectively four, four, five, six and six pitches. This produces an increasing connective potential between the contiguous subsections of the piece. Furthermore, it is useful to remark that even if the number of pitches in the chord objects is not easily perceptible, their 'description' through

fragmentation in rhythmically organised smaller chords produces a number of beats that is proportional to the number of pitches (see Ex. 16).

Moreover, each chord object displays a different musical character, in order: 1, acciaccatura; 2, broad disposition; 3, close disposition; 4, melodic; while 5 and 6 are part of a clear larger section, and within this they can be defined as melodic ascendant and melodic descendent respectively.

chord object	no. of pitches	no. of beats
1	5	1
3	6	2
2	7	3
5	8	4
4	9	5
6	10	6

The other two types of objects do not show a similar pitch consistency. However, their specific timbral characterisation produces a clear subdivision of part 1 in two main sets of sections.

The first four fermata objects are clearly distinguished by their timbral character: 1, single note fermata; 2, tremolo staccato; 3, cluster staccato; 4, tremolo legato. The two fermata objects in sections 5 and 6 are both arpeggiato chords.

The melodic objects show the same kind of timbral alternation in the first four sections, and a timbral similarity in the last two, due to dynamics. The pitch set that constitutes this type of object varies in size, from nine to twelve pitches. It is evident

that the melodic lines of these objects are arranged in order to produce local internal articulations that fragment the general directional movement.

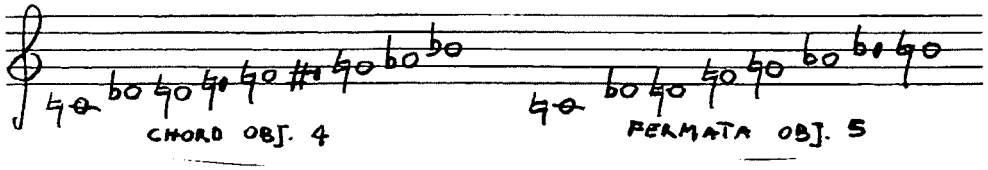
To summarise, the first section of *Incises* shows a clear consistency in the sequence of timbral structures. It is precisely this sequence that gives coherence to the page. The pitch set consistency is more difficult to perceive, and it tends to become a sort of articulated texture similar to the objects of the piano cadenza analysed in *Éclat*. The shared pitches are not sufficient to produce structural regularities. At most, they can represent a sort of 'harmonic' background, even if it is difficult to determine how much this local mnemonic harmony can be really perceived. More realistic is to consider the partial identities in the pitch set content as a set of potential links that Boulez predisposes for his musical structure.

The common pitch content, for instance, produces a connection between the two main sets of sections in the page, formed respectively by sections 1, 2, 3, 4 and sections 5, 6. This subdivision is produced by the general arrangement of the dynamics. The first set of sections has a more rhapsodic character, stressed by the dynamics in forte, while sections 5 and 6 are clearly meant to be individual phrases, with a dynamic line comprised between *piano* and mezzo forte.

As suggested above, the pitch relations do not respect completely the dynamic subdivision of part 1. Clear connections are evident in the first three chord objects: the pitch set E flat–D natural–F sharp is displayed in each of the three objects, while the interval F sharp–B natural has a predominant position in both chord objects 2 and 3.

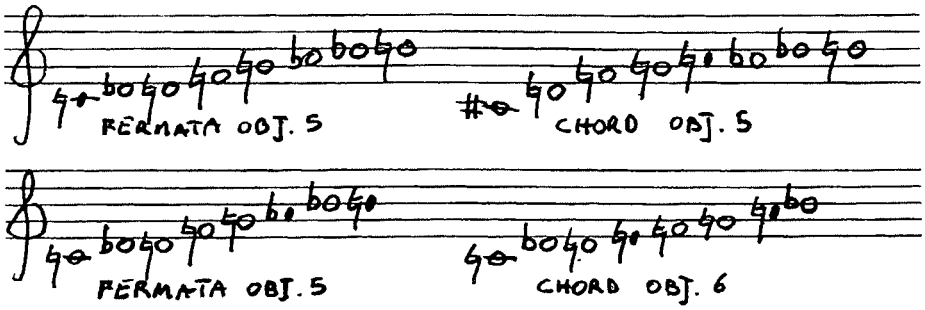
However, the fourth chord object seems rather to be related to the following two sections, and precisely to the first fermata object in section 5: the pitch connection between the first intervals of the chord object in section 4 and the fermata object in section 5 is quite evident.

Ex. 14 *Incises*, part 1, pitch content of chord object 4 and fermata object 5



In the same way, the two other chord objects in sections 5 and 6 show clearly the same pitch connection to the fermata chord in section 5.

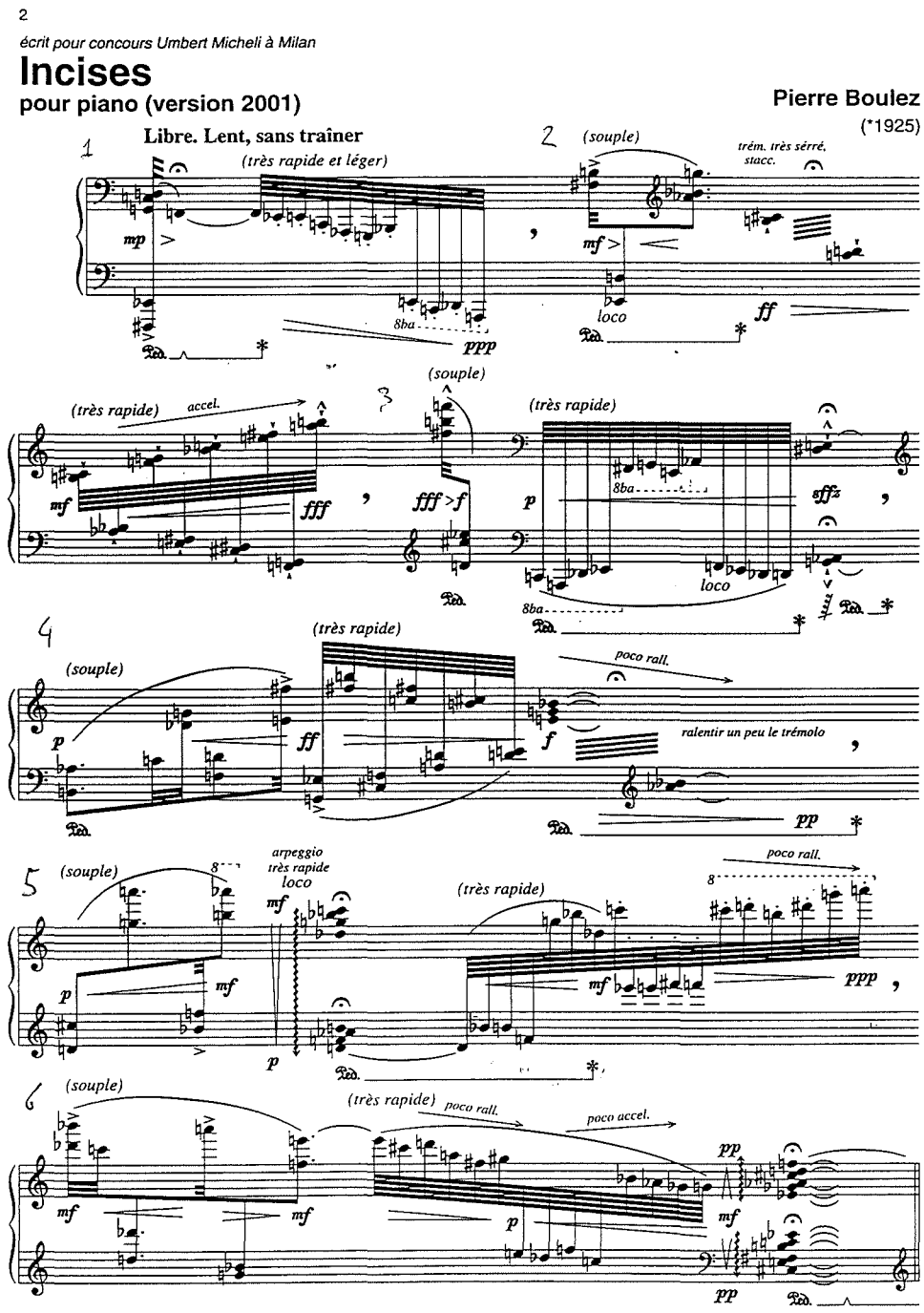
Ex. 15 *Incises*, part 1, pitch content of chord objects 5 and 6, and fermata object 5



Therefore, the music is organised on the basis of a general mnemonic harmony and individual pitch references obtained through register connections, rhythm, repetition (the D in section 5 becomes a clear reference after the repetition in the fermata object; the F natural relevant in section 1 is displayed at the beginning of part 2, and is also the last note of the piece), and even absences (the A natural which has a great musical relevance in the melodic object of section 5 and in the chord object of section 6 is missing in the chord objects of the entire first subsection[56]).

[56] However, A natural is present in the first melodic object of the piece. It is displayed in the lowest register and, with the A natural displayed in melodic object 5, sets the limits of the range of register in part 1.

Ex. 16 *Incises*, part 1

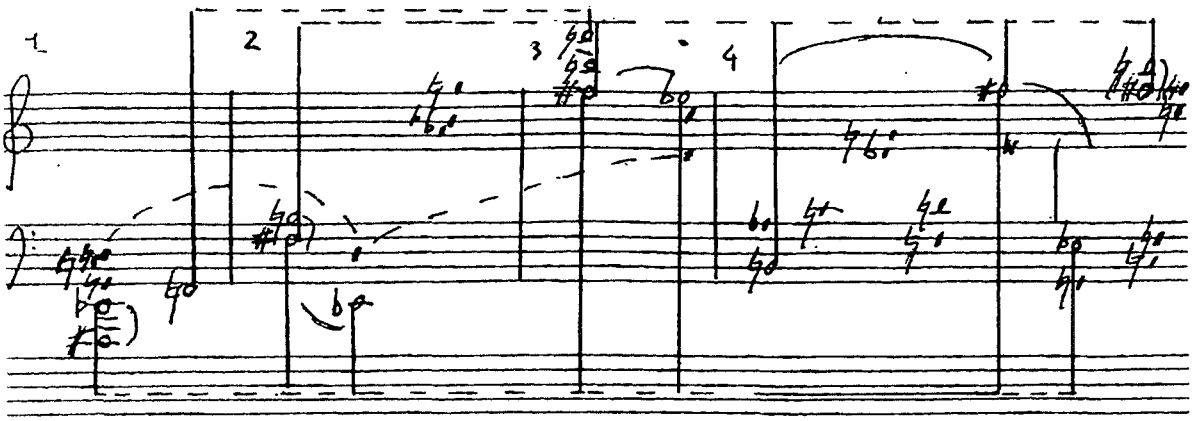


As always with Boulez's music, in *Incises* the interlocking of the objects produces a net of potential relations of sound parameters, which keep changing their functional role and importance within the local structures.

An attentive analysis of the details in the score allows us to highlight the subtlety of this musical arrangement and to identify in practice the compositional techniques described earlier.

A clear example of pitch identities elaborated through register transposition is given by the organisations of the chord objects in section 1-4. Section 1 begins with a chord object in broad disposition in the lower register of the piano. The chord object displays the interval E flat–D natural, the pitch connection E flat–F sharp, and a perfect fourth (G natural–C natural) surmounted by a major second. The chord object of section 2 opens with a perfect fourth displaying F sharp and B natural (which is the only pitch missing in the previous section), followed by the interval E flat–D natural unaltered in register with respect to the chord object in section 1. The connection E flat–F sharp is restated in chord objects 3 and 4 (in this last case the connection is between the last element of the chord object and the first hemisemiquaver of the melodic object).

Ex. 17 *Incises*, part 1, structures of dominant pitches in sections 1,2,3 and 4



The same pitches are evidently re-proposed, but in different figures and different register dispositions. In my view, in this case the repetition of pitches or intervals can hardly be seen as a type of prolongation. This latter, in fact, implies that repeated elements, although altered by register localisation or by orchestration, maintain the same function within a connective structure. In the case of Boulez, the repetition produces a hierarchical organisation of the elements (on the basis of their level of reciprocal identity), that interacts with the organisation of the local structures where they are inserted.

B natural is stated for the first time at the beginning of section 2. In section 2 it is displayed (in the same register) as first pitch of each object. Moreover, it is displayed as the last pitch in section 2, and as the first of section 3 (again in the same register), where the repetition is stressed by the dynamic climax (see Ex. 16). In chord object 3, B natural is associated with F natural (dominant pitch in structure 1), and F sharp (thus restating in the higher register the interval that opens section 2). B natural and F natural are also the last two pitches (in both the upper and lower parts) of section 2 and delimit the register range in the melodic object of the section (see Ex. 16).

Chord object 3 is the most dynamically relevant point of part 1, and the pitch connection with the other sections is evident. We should also remember the importance of the interval E flat–D natural (sections 1 and 2), and the connection of the lower interval D natural–C sharp with the chord object of section 5. Moreover, the interval F sharp–B natural is once again present in section 4, where it connects the first and the last pitches of the chord object (in reversed position), and where it is clearly stated in the highest register of the melodic object. All the pitches of the chord object in section 3 (which, let us remember, is dynamically relevant) seem to have a logical connection with other dominant pitches in the other sections of part 1.

A similar use of pitch identity relation elaborated with register displacement is given in sections 5 and 6. However, the development of section 5 is further complicated by the organisation of secondary structures defined by a subtle elaboration of the whole chromatic set.

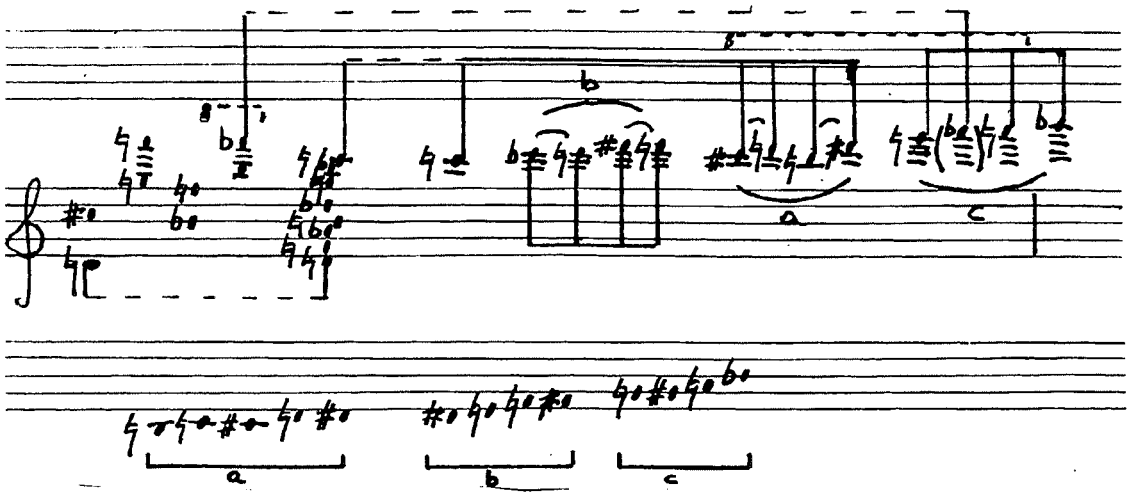
Each section is framed by the pitches defining its range of register: section 5 begins with the lower pitch D natural and ends with the higher pitch A natural. This arrangement is mirrored in section 6, so that a clear ascending-descending line is created. In section 5 the fermata object is clearly connected to the following melodic object by a pitch set correspondence. The pitches in melodic object 5 are played either legato or staccato. This split the object in two sections. The staccato section of the object starts with C natural, which is still ideally connected to the previous fermata object since it belongs to the pitch set that is common to the two objects, fermata and melodic. The C natural in the melodic object is followed by eleven pitches to be played staccato. This represents the entire chromatic set except for A flat and B flat (E flat is repeated). When pitches are temporarily excluded from specific sections of the music, they are displayed in relevant positions immediately before or after. It seems that Boulez's effort to create a continuous variation of the musical development needs to be sustained by the use of the entire chromatic set. In this way, no pitch acquires an excess of relevance through repetition, which is arguably the most effective among the connective devices used in this kind of music.

In this case, B flat is stated as the first pitch in the following section (but in the lower register with respect to the previous A natural, so that the connection remains partially hidden). The A flat is displayed in chord object 5. However, the reasons for this connection become clearer after an analysis of the melodic object.

The arrangement of the section to be played staccato in melodic object 5 is extremely elaborated. The pitch set consists of an almost entirely chromatic scale of ten

pitches, which is sectioned in three parts (B natural/D sharp; D sharp/F sharp; G natural/A natural) that are interpolated in the score. The subdivision is clearly marked by the distribution of the pitches between the two hands. The section D sharp (E flat)/F sharp is rearranged in a symmetric form (ascending and descending semitone) and is interpolated (as an *incise*) within the section B natural/D sharp, which is also rearranged in order to connect C natural and C sharp and the repetition of E flat (already present in the previous section E natural/F sharp) in the higher octave.

Ex. 18 *Incises*, part 1, section 5

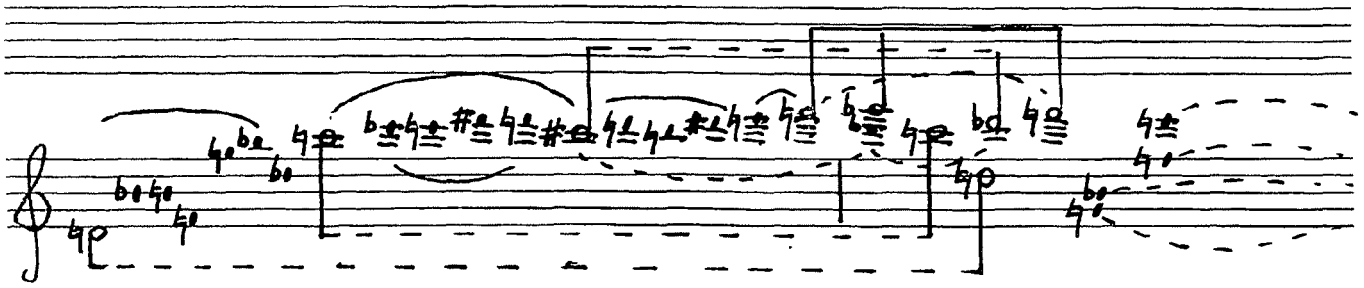


This produces, besides all the pitch connections that I have pinpointed, a clear isolation of the last two staccato pitches, which are located in the highest register within the section. The only other pitch located in the same register is A flat in the last beat of the chord object, which would complete the chromatic set G natural–A flat–A natural–B flat, implied by the general organisation of the melodic object. Therefore, the pitches in the higher register connect two objects of section 5 with section 6, due to an identity of register and to the specific arrangement of the melodic line. This procedure creates hierarchical connections among the pitches in the same way as has been shown in the

piano cadenza of *Éclat*. I have not highlighted all the displacements of register of the different sections of the scale. The chromatic connection of the pitch content of the scale is obviously weakened by the change of register of fragments of the melodic line. This is part of the subtlety of the musical organisation, and is partially counterbalanced by the rearrangement of the smaller sections of the scale in clearly organised motives.

Boulez exploits the pitch set identity between chord object 6 and the previous section in order to create a link between sections 5 and 6. The set constituting chord object 6 clearly recalls the dominant pitches in melodic object 5: B flat represents the peak (I am referring to absolute values once again and not considering the location in register) of the two sections, a sort of pivot that defines the turning point of the ascending–descending line.

Ex. 19 *Incises*, part 1, pitch connections of sections 5 and 6

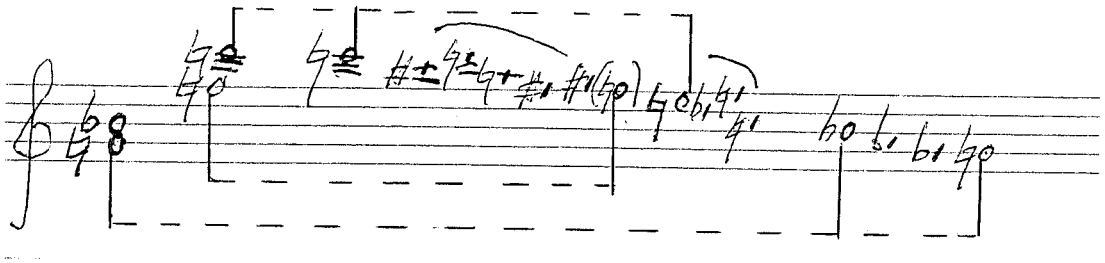


The D flat that constitutes the other element of the first dyad in object 6 corresponds to C sharp in melodic object 5, and is followed by C natural, D flat and D natural, the pitches that in melodic object 5 define the change of register and the subdivisions of the melodic line. Moreover, the A natural in chord object 6 recalls the final pitch of section 5 and it is made relevant by being isolated from all the other

elements of the object. The last dyads of chord object 6 delimit the range of register of the first and last section of melodic object 6.

More connections can obviously be found between the elements of chord object 6, but the ordering of the dyads is clearly meant to create a connection to the surrounding objects by placing the pitches in a position as close as possible to the relevant links, thus endorsing their function.

Ex. 20 *Incises*, part 1, section 6

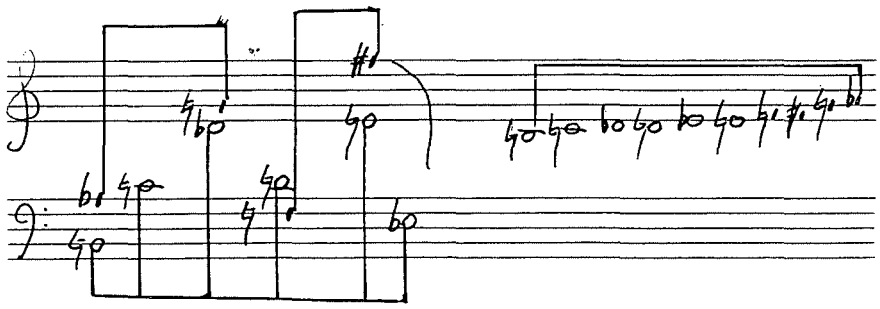


The melodic object in section 6 is divided into two parts by dynamics and indications of tempi. In this case, the role of central pitch that was held in section 5 by C natural, is undertaken by E natural, which connects the two parts of the object.

It has been shown that the pivot pitch B flat in section 6 is made relevant by a relation of whole chromatic connection with the previous object. Another example of this compositional technique is given by the chord object of section 4. This is also a good example for demonstrating that the notation of the objects does not always clearly shows the connective relations between their constitutive elements. The object has a clear melodic trait which is owing to an internal line much more than to the intervallic connection of the dyads. As usual, the structure of the melodic line is not to be intended as univocal. The line is based on a chromatic set B natural/E natural, which, however,

has to be intended as a set of 'absolute values' that in the score are not located within the same octave. The E flat in the set is given by the first element in melodic object 4. The line starts with B natural, included in the first element of chord object 4, and proceeds through C natural, D flat, D natural, E natural, and, finally, E flat.

Ex. 21 *Incises*, part 1, chord object 4



The other pitches constituting the dyads of chord object 4 can be arranged in a chromatic set F natural/A flat, once again considering them as absolute values. This would create a hierarchy between the two lines, where one is intended as primary and the other as an ornamental line. The two lines are actually two sections of the chromatic set B natural/A flat. The dyad B natural–A flat is the first element of the entire chord object.

Boulez's compositional technique clearly relies heavily on the multiple interpretative possibilities offered by the open objects. His compositional creativity is sparked in the same measure by the *oeil* and the *oreille*. The arrangement of the secondary elements in the score is determined by a logic so subtle as to be almost undetectable, but the many possible connections between the elements do create a safety net, and the possibility of attributing a function to every single pitch in the piece.

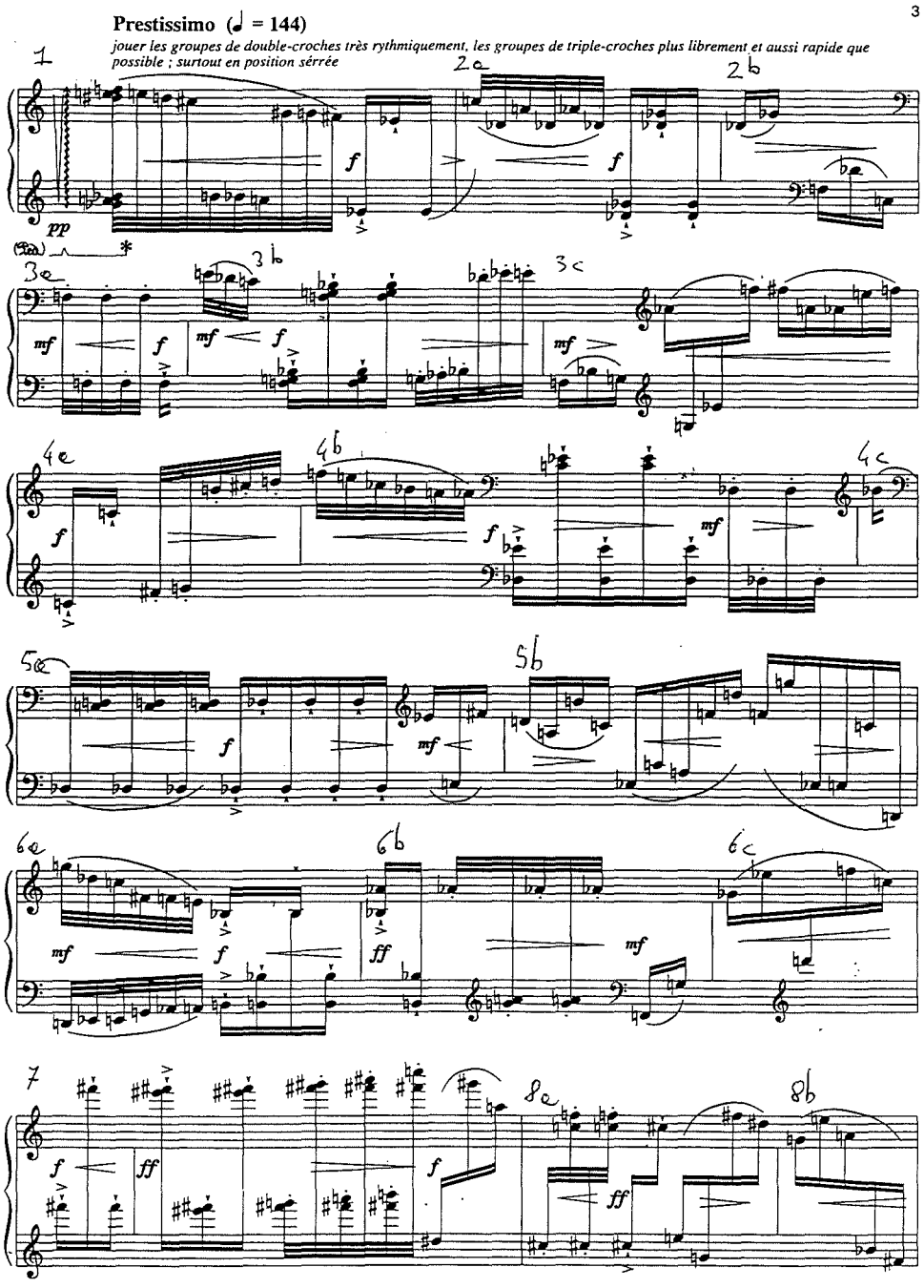
b) Part 2

The second part of *Incises* is also based on the interrelation of three kinds of objects: repetitive staccato, scales of demisemiquavers, melodic semiquavers (see Ex. 22). In this case, the alternation of the objects is not regular and all three figures do not always appear in a section. However, there are manifest rules that regulate the sequence of the objects: the staccato object is introduced by a legato demisemiquaver object in crescendo or followed by a staccato demisemiquaver object in diminuendo or both, with the result of becoming a centre of temporary stability matching the uniformity of the melodic objects (see Ex. 22). The different objects within the two structures (demisemiquaver–staccato objects and melodic objects) change in length and inner organisation. The melodic objects are fragmented in motives that regularly increase by pitch number: 3–4–5, 4–5–6, and so on.

Therefore, this part of the piece is organised on the basis of the interconnection of different kinds of objects that change by size and order, but that are related through repeated pitches, or clear directional lines. The formal concept of 'open object' pervades the piece, with a sequence of sonic objects apparently unrelated, but actually connected by local centres. The listener is forced into the same imaginative approach as the composer. The risk of producing a musical object that returns to the listener his own image, allowing him structurally to reinvent the piece, seems to be a part of the aesthetic implications of this composition and it adds to the overall virtuosic character of the piece. The sonic objects become open to reinterpretation in continuously renewed connections.

It is possible to divide this part of the piece into sections defined by dominant pitches. These sections can be considered as structures not explicitly delimited by signs in the score. F natural, E flat and C natural represent the dominant pitches of the first

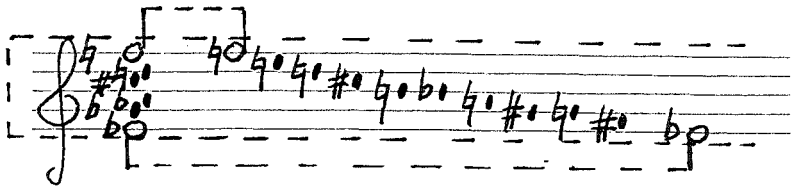
Ex. 22 *Incises*, part 2, sections 1-8



three sections of part 2. Their occurrence is almost regularly in key positions: 2b displays F natural and C natural connected by linear motion and register, the descending fourth formed by their connection matches the ascending fourth of D flat–G flat. F natural introduces section 3 where it will become the new reference point for the staccato object and the melodic object (F natural begins and closes 3c). C natural once again follows F natural in 4a, while E flat is again an element of the staccato object along with D flat in 4b. These last two pitches will be linked once again in 5a as they connect the staccato object with the melodic object.

Section 1 is connected to the last chord of part 1 by pitch identity and register range, while it connects to section 2 through completion of the whole chromatic. F natural and E flat delimit the same range of register that was previously occupied by the final chord of part 1 (higher part).

Ex. 23 *Incises*, part 2, section 1. Register connection with part 1



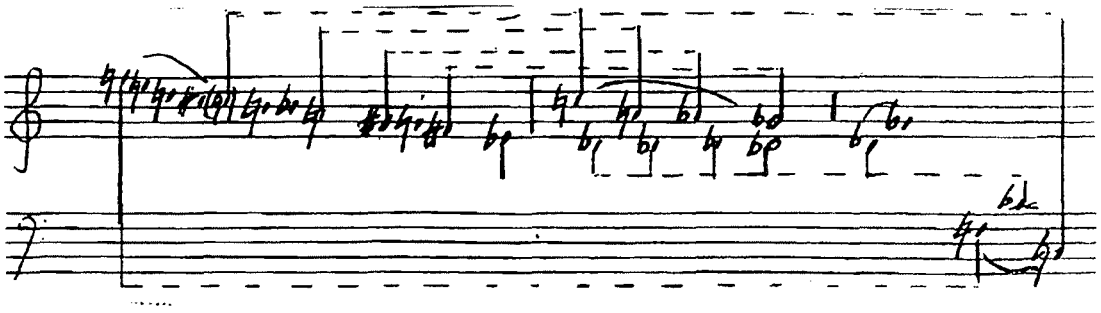
On the other hand, the set of eleven pitches displayed in the legato demisemiquaver and in the staccato semiquavers is completed by the C natural that opens 2a (the slur is a clear sign of this not being a mere coincidence).

In section 1 it is possible to divide the descending demisemiquaver object into two sections: the first four pitches are symmetrically organised along a semitone–tone–semitone line, while the six remaining pitches consist of a chromatic descending scale B

natural–F sharp. The overall organisation of the object produces at least two audible effects: it gives a sensation of acceleration owing to the reduction of the gaps within the notes in the second section of the scale, and it especially stresses specific pitches that will be echoed in the following sonic objects. This last effect is obtained also with the distribution of the scale between the two hands. This is not only a practical device, but as is often the case even in more traditional examples, it is a means to outline the musical structure. In this specific case, the shift from left hand to right hand for the pitches A natural–G sharp is echoed by A natural–A flat in the first object of 2a, while the shift of right hand and left hand for pitches C sharp–B natural underlines the gap of a tone due to the only missing pitch in section 1: C natural. As it is, C natural happens to be the first pitch of 2a, which means that the descending line C natural–A natural–A flat–G flat alternating with D flat in the first demisemiquaver object of 2a echoes essential pitches of the demisemiquaver object in section 1, mixing what is actually heard with what is only virtually suggested. It has been already shown in this analysis that this is an essential characteristic of Boulez's serial thinking. Pitches that have a relevance from a combinatorial point of view are also made relevant to perception.

To complete the analysis of section 1, it must be said that the only other pitch missing from the scale is E flat, which is displayed at the end of the section, in the staccato object. Furthermore, C sharp and F sharp, made audibly relevant by their positioning at the end of the two sections of the scale, are going to be exploited as staccato objects in 2a. It must also be noticed that F natural and C natural in the final motive of 2b recall the initial pitches of sections 1 and 2. It could also be important that both the occurrences of C natural in 2a and 2b are at the lowest dynamic level, hence recalling the absence of the pitch in section 1 (see Ex. 22).

Ex. 24 *Incises*, part 2, sections 1 and 2



It is evident that the delimitation of subsections as distinct structures is abstract and purely functional to the organisation of the analysis. Sections 1 and 2 as a whole could be interpreted as a structure, since they are organised around the same three pitches: F natural, which starts section 1, E flat and D flat. The three pitches happen to be located in relevant positions in the final fermata object of part 1 (they occupy respectively the lower, upper and middle register). Subsections 2a and 2b consist of a demisemiquaver object strongly linked to section 1 (as it has been outlined above) and of two fourths revolving around the central pitch D flat. The fundamental position of the latter is underlined by the dynamic organisation of the subsections. The swift percussive repetitions of the demisemiquaver object at the beginning of 2a are matched by the steady forte of the staccato object, while the gradual and irregular disappearance of D flat in 2b is marked by a fading dynamic intensity. The weakening relevance of D flat in 2b is stressed by the introduction of new strong links between different elements: the symmetrically disposed fourths (ascending and descending, and connected by semitone relation), the pitches F natural and C natural that recall at a lower register the starting pitches of sections 1 and 2.

Subsections 2a and 2b are actually organised following a hierarchy of three different associative strategies: the echo effect of the demisemiquaver object constituted

of C natural–A natural–A flat–G flat, the progressive strengthening and then fading of the pitch D flat, and the interval of fourths displayed with two different attacks (staccato chord, legato melodic). The structures are variously elaborated using different rhythmic figures, but they are always connected through the common reference to D flat.

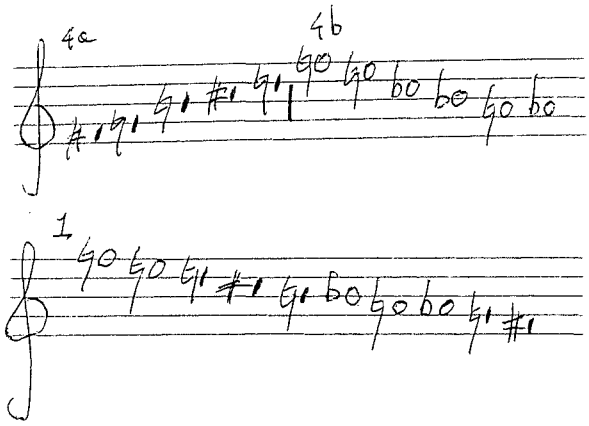
The exact value to be attributed to each structure within a hierarchical organisation is subject to interpretation. It is probably going to be more acceptable to consider the repetition of D flat as the most relevant element, while the register uniformity and linear development of the echo-line in the demisemiquaver object could be perceived as clouded by the speed, which is on the contrary a lesser problem in the structure of fourths.

Furthermore, D flat is often associated with other pitches: the dominant pitches C natural and E flat, but also the major second C natural–D natural at the beginning of 5a which is connected to the end of the line (subsection 5b) by repetition of the same pitches, although in different registers. Although the connections may appear excessively loose, it must not be forgotten that the tempo of the piece is very rapid, and references that appear distant on paper are actually much closer during the real time of performance. It is therefore necessary to create connections on various levels, so that the musical discourse is articulated within the local structure and connected within the general development.

Another example of long distance connection, this time through a less perceivable common set of pitches, is represented by subsections 4a and 4b. The demisemiquaver objects display a chromatic set included within F sharp and F natural (once again in a key position in the higher register of the section). The intervals of the scales are irregular, but their sequence maintains a clear ascending and descending line. The only missing pitches in the two objects are C natural and E flat, which, according to a procedure that has been already highlighted, are displayed in both the previous and the

following staccato object. However, in addition to this organisation, these two subsections also represent a clear variation of subsection 1. The demisemiquaver object of section 1 is replaced here by two scales, ascending and descending, which are constituted of exactly the same pitch content than the scale in section 1, although in 4a there is one repetition of B natural. As it is, B natural was the pitch positioned at the beginning of the second part of the scale in sections 1, and has never been heard again in sections 2 and 3. In this case, the relevance of the pitch is made clear by its occurrence immediately after the gaps in both the demisemiquaver objects. The latter consist of an interpolation of fragments of the demisemiquaver object in section 1: the ascending object in 4a begins with the two last notes of the object in section 1, while the descending object begins with the first two notes of the object in sections 1.

Ex. 25 *Incises*, part 2, subsections 4a and 4b. Pitch connection with section 1

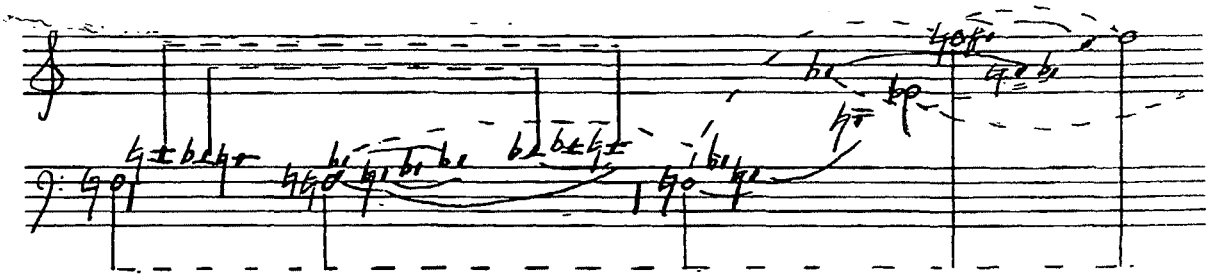


It is obvious that the two demisemiquavers objects in 4a produce a sense of reciprocal fulfilment, the last three pitches of the descending object, for instance, filling the gap between G natural and B natural in the ascending object. This is a sort of cadence effect restored not through the completion of the whole chromatic scale, but through a more audible completion of smaller subsections of it. Once again it is a procedure that entails the *oeil* and the *oreille* at the same time, as is the case for the

pitches that complete the section (and the whole chromatic): C natural, E flat and D flat, which are also fundamental pitches in sections 1 and 2.

Section 3 revolves essentially around the dominant pitch F natural, usually connected to E natural. The organisation of the objects in 3a and b is transparent. The disposition of the objects in section 3b clearly suggests symmetry. The E natural displayed at the beginning and end of the section is an evident connection to F natural, which represents the starting and ending points of both 3a and 3c.

Ex. 26 *Incises*, part 2, section 3



The organisation of the third object in 3b (the staccato demisemiquaver object) is very elaborated, and it is formed by adding A flat and E flat respectively to a pair of pitches already heard within the section. E natural–D flat are presented at the beginning, while G natural–B flat are part of the staccato object. C natural and F natural, once again virtually connected, are left aside in this case. The two new pitches are inserted within the minor thirds, forming a perfectly palindrome, semitone–tone–minor third–tone–semitone. Interestingly the two added pitches and the pitches of the staccato object are the only ones to be displayed in the first two motives of subsection 3c.

A polyphony of structures is created in subsection 3c through register disposition. As already stated, the first motives of the melodic object display the same

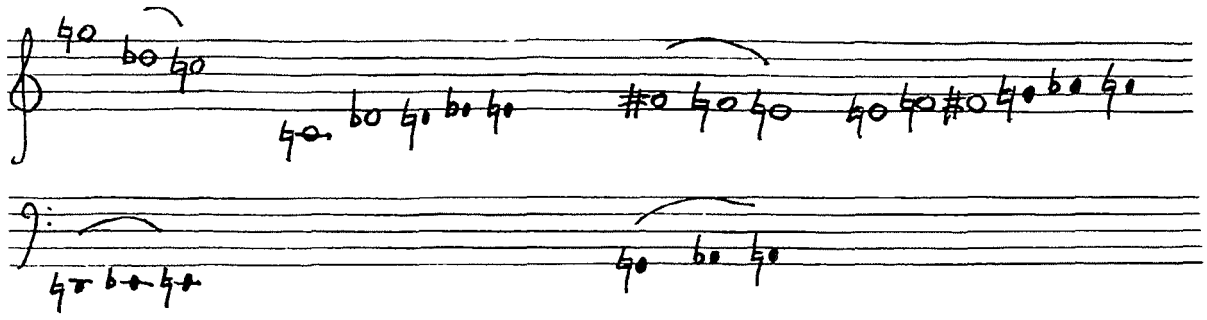
pitches of subsection 3b in the lowest of the three registers in which the subsection is articulated. The two pitches added in the last part of subsection 3b are repeated here, E flat in the same register (which is going to be the fixed register of this pitch until subsection 5b), while A flat is transferred to the medium register. This connects it to the line A natural–A flat which is heard later in the section, and more broadly to the same pitches displayed in sections 1 and 2.

The upper register is occupied by F natural enclosed within its upper and lower semitone, E natural and F sharp. Once again dynamics give a clear idea of the subdivision of the subsection into two parts, without this matching the distribution of the structures in the various registers. For this reason the developmental lines of the subsection are multiple. The three structures, each one in its own register, seem to revolve on themselves starting and ending at the same point: G natural for the first structure, A flat for the second and F natural for the third.

The progressive displacement of registers actually matches the crescendo of the second part of the subsection, but the interlocking of the structures clouds the linearity of the process. Interestingly enough, E flat, which does not seem to belong to any of the polyphonic structures, is positioned in the central part of the subsection, in a central register, and connects the two dynamic lines of the object.

Subsection 6a shows the interaction of several compositional techniques such as whole chromatic completion, pitch repetition, range of register delimitation. The two demisemiquaver objects are articulated in two chromatic fragments of three pitches each, with the exception of the first G natural. Each fragment is paired with the matching fragment in the opposite scale, so that they display a section of the whole chromatic set: the first six pitches of the two scales, excluding G natural, display the whole chromatic set from C natural to E natural, while the last six pitches display the whole chromatic from E natural to A flat.

Ex. 27 *Incises*, part 2, subsection 6a

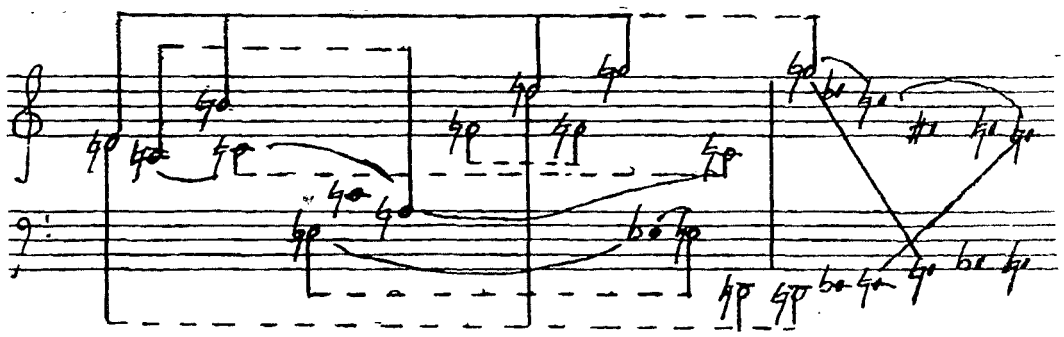


The repeated pitch (G natural) is the connecting note of the two sets, and the only two missing pitches, B natural and B flat, are presented in the second part of the section as elements of the staccato object. Besides these subtle relationships of pitch-sets, the demisemiquaver objects are also organised on the basis of more audible reference points. The descending object in the upper stave displays two occurrences of the same melodic pattern: augmented fourth followed by a chromatic line of two or three pitches, while the object in the lower stave displays two chromatic lines interrupted by a gap, which is delimited by the first and last pitch of the object in the upper stave. Furthermore, the two initial pitches of the objects (D natural–G natural) delimit a range of register which corresponds to the range occupied by the melodic object in 5b. This creates an evident connection, especially because the pitches have been given a particular relevance through register, repetition and dynamics throughout subsection 5b.

The melodic object in 5b displays the same polyphony of structures that has been seen in the previous melodic objects: the lower register revolves around E natural–E flat, the middle register around C natural–A natural–F natural. In addition to this, the ordering and register location of specific pitches gives them a relevance and determines their connection to the following sections. D natural, the starting point of the

demisemiquavers in the lower stave in 6a, is repeated three times in 5b in three different registers.

Ex. 28 *Incises*, part 2, subsection 5b



Dynamics give relevance to the pitch in the first two occurrences, while the last repetition is most evidently linked to the beginning of section 6a through register and immediate repetition. The D natural displayed in the higher register is connected to the only occurrence of G natural by register and dynamics. The higher register connects more broadly the line B natural–D natural–G natural. B flat, the staccato object in 6a, is missing in subsections 5a and b along with A flat. These two pitches are given particular relevance and are clearly connected in subsections 6a and b, according to a compositional practice that has been frequently highlighted in the previous pages.

Conclusions

As a result of this analysis, it is clear that Boulez's compositional procedure is based on the formal category of identity. The connections, and the hierarchy of connections, are always produced through repetition of single pitches and intervals, disguised and

articulated by both the superimposition of secondary pitch-structures and the influence exerted by the secondary parameters. Although derived from serial tradition, Boulez's compositional technique substantially relies on pitches, since the precision of the control of this parameter is not matched by any of the others. As has been suggested above, the aesthetic value of perpetual variation is at the reason for the generation of a complexity in the net of relations that is often beyond the limit of what is actually perceptible. The envelopes created by secondary parameters can be the only reference points when the complexity of the music becomes excessive. However, the subtle arrangement of the details in this music should not be seen as a simple speculative process, but should be intended as a challenge for perception and as the result of an extremely sophisticated creative process, whose difficult accessibility is clearly considered an aesthetic value.

Chapter 3

Gérard Grisey: object and process

The confrontation of spectral musicians with traditional heritage presents characteristics necessarily new with respect to the debates of the 1950s. For both Boulez and Schaeffer the notions of cultural tradition and linguistic convention, although delineated differently, were substantially unambiguous. For the composers of the 1970s the notion of tradition was far less clearly defined, since at the time serial conventions were established without this having produced a definitive obliteration of tonal heritage, as was clear starting precisely with spectralism.

As a matter of fact, spectral composers did not produce a theoretical work of weight comparable to those by Boulez and Schaeffer. This is owing to the fact that spectral music was in many ways a reaction to what was felt as an excess of theoretical discussion, oblivious to the concrete limits of sonic and formal perception. The development of spectral techniques of composition is meant to be utterly pragmatic, not systematic, and it also involves composers who are not directly connected to the group *Itinéraire*. Consequently, the aesthetic issues of historical positioning and theoretical justification appear to be more superficially confronted by spectral composers. However, the actual historical position of spectralism is complex, since at the time the strong influence of the avant-garde was matched by an emerging awareness of its technical and aesthetic limitations.

Spectralism has undoubtedly reintroduced elements of the musical discourse that held a significant role in tonal language and that serialism had tended to disguise, if not eliminate altogether. The structural categories tension/relaxation that underpin the tonal

notions of consonance/dissonance, for example, can be recognised in the spectral opposition of harmonic and non-harmonic sonic objects (although a similar, if less evident, effect is obtained in serial music through the opposition identity-variation). Yet, this formal element is not functional to a narrative discourse in spectral music. The influence of structuralism and modernism is still present, clearly noticeable in the attention paid to the correlation of physical and perceptual phenomena, and in the trust accorded to the ever improving accuracy of sound analysis.

Therefore, although it has not been extensively discussed, the aesthetic and technical status of spectralism appears at the moment to be ambiguous. It has probably been more influenced by the heritage of the avant-garde, especially serialism, than what has been admitted directly by the composers, but it has also been capable of rethinking fundamental formal schemes that belonged to tonal language. In many ways the approach of spectralism to linguistic convention is similar to Schaeffer's approach, who rethinks the traditional language within a system of general formal categories.[1]

Grisey and modernism

Grisey's approach to the problem of traditional heritage is paradigmatic of an attitude common to other spectral composers.[2] He proves to be clearly polemical towards serialism, and almost unconcerned about tonal tradition. The latter is no longer seen as a problem to confront, rather it represents an example of a musical system capable of

[1] 'As for me, I make an effort to detect in tonal music the invariants due to perceptual limits that are applicable to contemporary music. Notions such as modulation, the dialectic of consonance and dissonance, and harmonic complementarity – to mention only these – look to me as modern as ever' ['Je m'efforce quant à moi de dépister dans la musique tonal les invariants liés aux limites perceptives applicables aux musiques d'aujourd'hui. Des notions telles que la modulation, la dialectique consonance-dissonance et la complémentarité harmonique – pour ne citer qu'elles – me semblent plus actuelles que jamai'] (Cohen-Levinas, 1999b: 266).

[2] See Murail, 2000: 6.

respecting perceptual categories without this preventing the articulation of a significant discourse.

This approach has obviously undergone a gradual evolution over the years, since the development of musical postmodernism has altered the definition of the aesthetic polarities of the 1970s.[3] However, it would be simplistic to associate late spectralism with postmodern music, intended here as contamination of musical languages. All spectral musicians have maintained a strong connection to their aesthetic fundamentals, among them especially Grisey, who was probably the most uncompromising in searching for an association of models for musical forms derived from physical phenomena. As has been the case for both Schaeffer and Boulez, the notion of basic formal categories and the faith in scientific progress tend to become aesthetic elements that are impossible to abandon completely. Apparently, the idea of linear progress seems to be overcome by Grisey in favour of a more generic understanding of progress as an increase in information:

> Similar to many of my contemporaries, I lost the illusion of a better future, and the notion of the enlargement in concentric circles of the field of our knowledge, looks to me preferable to that of progress.[4]

As a matter of fact, it is arguable that incrementing information does not entail improvement, and therefore progress. The image of concentric circles does not exclude progress in itself, it simply excludes the teleological ideal of directional evolution. In a certain way, it seems that Grisey's attempt in these words is to embrace the postmodern

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[3] 'The stances of "spectral" music, radical, partial and somewhat aggressive, were necessary in the 1970s in order to put an end to the serial terrorism and to the ghettos of the avant-garde. Today, to hear a consonance no longer provokes the embarassed smile that I used to see rising on the lips of the critics at the time' ['Les prises de position de la musique "spectrale" radicales, partiales et quelques agressives étaient nécessaires dans les années 70 pour en finir avec le terrorisme sériel et les ghettos de l'avant-garde. Aujourd'hui l'écoute d'une consonance ne provoque plus ce sourire gêné que je voyais pointer sur les lèvres des critiques d'alors'] (Cohen-Levinas, 1999b: 267).

[4] 'Comme beaucoup de contemporains, j'ai perdu l'illusion des lendemains meilleurs et la notion d'élargissement en cercle concentrique du champ de nos consciences me semble préférable à celle du progrès' (Cohen-Levinas, 1999b: 266).

concept of progress intended as displacement of knowledge,[5] rather than accumulation of knowledge. However, the image of concentric circles betrays a trust in an objective expansion of information that is not completely congruent with the idea of 'progress' presented by postmodernism.

Furthermore, even if it is possible that the ideal of the association of art and science has been partially overcome by Grisey,[6] the issue of the complex interrelation of means of analysis and scientific results does not seem to be fully acknowledged. The problem of the reliability of science is not tackled, and the results of the research are accepted altogether as objective. Consequently, musical research is considered as an unquestionable reference point in order to elaborate an effective compositional technique.[7] It supposedly provides the fundamental parameters that need to be continuously rediscovered in order to keep creative thought connected to its natural bases.[8] The notion of language intended as a development of formal conventions is still foreign to Grisey's aesthetic thought, which for this reason appears to be still well rooted in its ideological origins. It seems that cultural tradition is still felt by Grisey as a misleading redundancy, in a way similar to the early Boulez and Schaeffer. The significance of a musical discourse can be reached simply through conformity with physical and perceptual laws.

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[5] 'Every civilisation, like every artist, explores a unique register of human thought and I think that our civilisation, rational and scientific, is in no way superior to the others' ['Chaque civilisation comme chaque artiste explore un registre unique de la pensée et je ne crois pas que notre civilisation rationnelle et scientifique soit en tout point supérieure aux autres'] (Cohen-Levinas, 1999b: 266).

[6] 'It seems to me that I am slowly moving away from that unperturbed faith in science that was offered to us in the 1970s and 1980s, and that lulled us in the utopia of an Art-Science finally retrieved' ['Il me semble que je m'éloigne lentement de cette confiance sereine en la science que nous offraient les années 70 et 80 et qui nous berçait dans l'utopie d'un Art-Science enfin retrouvé'] (Cohen-Levinas, 1999b: 267).

[7] 'It is necessary to be able to outline new harmonic, timbral and rhythmic functions, that have their origin in the acoustic acquisitions of the twentieth century' ['Il est nécessaire de savoir articuler de nouvelles fonctions harmoniques, timbriques ou rythmiques qui trouvent leur origine dans les acquis acoustiques du XXème siècle'] (*Ibid.*).

[8] 'It is necessary for us continuously to go back to the school of the "almost nothing", in order to escape the ornamental and redundant character of the majority of contemporary music' ['Il nous faut régulièrement revenir à l'école du presque rien pour échapper à l'aspect décoratif et redondant de la plupart des musiques d'aujourd'hui'] (Cohen-Levinas, 1999b: 268).

As has already been shown, for all three musicians analysed in this work the notion of universal structures is ambiguous, and often extremely contradictory. Generally speaking, it seems that the attempt to organise language on the basis of natural models is often disguised behind an apparently more realistic facade, mindful of the evolution of contemporary aesthetics.[9] The ideal of art-science does not seem to be completely overcome by Grisey; rather, it implicitly underpins his aesthetic thought and compositional techniques.

As a result, tonal tradition and serialism are not confronted by Grisey from the point of view of aesthetics. The aesthetic issues of music are ignored, since the only interest is represented by those formal categories underpinning the musical discourse that can represent a general reference for perception. In a similar way, Grisey's music does not seem to be rooted in a strong aesthetic belief. All the aesthetic discussions are derived from technical issues. Grisey's main concern is to regain a clear and direct connection between *faire* and *entendre*. In his view, this can be guaranteed by the better understanding of acoustic and formal phenomena. The concept of tradition in itself is not confronted, since the influence of cultural tradition on the definition and discussion of *any* cultural tradition is not acknowledged, as, on the contrary, was partially acknowledged by Schaeffer and Boulez. There is, more simply, the urge for a liberation from the constraints of a compositional technique scarcely aware of perceptual and physical limitations. The process of cultural de-conditioning is not produced by *écoute reduite*, or by the disruptive clash with an un-conventional language, rather it is obtained through the analysis made possible by technological progress.

On the other hand, the evaluation of serialism is not carried out in a systematic way, rather it is revealed through fragmentary references in Grisey's articles devoted to

[9] Grisey was aware of these ambiguities: 'However, does not this idea of History [the idea of progress exemplified by the image of the concentric circles] actually contradict the obsession about directional time in my musical composition?' ['Mais cette conception de l'histoire ne serait-elle pas en contradiction avec mon obsession d'un temps directionnel dans mon écriture musicale?'] (Cohen-Levinas, 1999b: 266).

the discussion of the models of his compositional technique. Grisey's criticism recalls in many aspects the analysis of serialism made by Schaeffer. For both the musicians, serialism has the incontestable merit of having freed music from the constraints of linguistic conventions, which relied almost exclusively on pitch and duration as reference points for formal organisation. Notwithstanding Boulez's doubts about the real functional potential of sound parameters such as dynamics and timbre, his notion of multi-parametrical object is clearly similar to that of both Schaeffer and Grisey. However, their criticism of serialism is focused on the very notion of parameter.[10] The fragmentation of sonic phenomena in constitutive elements is considered nothing more than an analytical device with only practical functions. Since both Schaeffer and Grisey stress the importance of perceptual categories in the elaboration of a musical system, it is inevitable that their theoretical understanding of musical phenomena overlaps in many points. The basic parameters used to describe sound by the early serialists are

[10] This is the idea of many spectral musicians, as is clear from the words of Tristan Murail: 'Besides, this is precisely what opposes us to serial composers: it seems to us that everything works in a correlated way, and that it is not possible to treat separately the different musical "parameters". This idea is fully confirmed by contemporary research about perception and cognition' ['Du reste, c'est justement ce qui nous oppose aux compositeurs sériels: il nous semble que tout fonctionne de façon corrélée, et qu'on ne peut traiter le différents "paramètres" musicaux isolément. Cette idée est bien confirmée par les recherches actuelles sur la perception et sur la cognition.'] (Michel, 2002: 40). It is arguable that serial composers really intended the disjunction of sound in parameters as something more than a notational tool. Referring to the compositional model given by Xenakis, Murail spoke precisely of the particularity of *écriture* (intended as notation, but also as the rational elaboration of parameters that have been consciously recognised as structurally significant): 'In his [Xenakis's] music the idea becomes apparent of an *architecture of sound* and of an *architecture of time*; this has interested me. In the same way I am interested in the idea of a complete breaking off with counterpoint (in the traditional sense of superposition of lines) [...]. It was really a new way to approach the writing of music: instead of composing it as a piling up of basic components, notably melodic, Xenakis was starting with a totality to be *detailed* only afterwards, until lines, or even points, were obtained' ['L'idée si présente dans sa [Xenakis's] musique, d'une *architecture du son* et d'une *architecture du temps*, cette idée m'a intéressé. De même que la rupture totale avec le contrepoint (au sens traditionnel d'une superposition de lignes) [...]. C'était vraiment une nouvelle façon d'envisager l'écriture de la musique: au lieu de la construire comme un empilement de composantes élémentaires, notamment mélodiques, Xenakis partait d'une globalité pour ensuite la *détailler* jusqu'à obtenir éventuellement des lignes, ou d'ailleurs des points'] (*Ivi*, 30–31). Although the description implicit in Murail's words refers to a model of serialism very soon abandoned by the most significant serial musicians, from the point of view of theoretical discussion this description of the compositional process of spectralism entails an aesthetic position and a precise view about historical development: 'I keep working in this way: I start with the whole to arrive at the part, instead of going from the part to the whole. This is exactly the opposite of the forms obtained through proliferation; these, to my eyes, remain traditional' ['C'est ainsi que je continue de travailler: en partant du tout pour arriver à la partie, au lieu d'aller de la partie au tout. C'est exactement le contraire des formes par prolifération, qui restent à mes yeux traditionnelles'] (*Ibid.*).

derived from an elementary description of physical phenomena. But the analysis of perception shows immediately the inadequacy of those elements to describe accurately the process of listening. Schaeffer has obviously gone much more into the details of the problem. Grisey's analysis is less systematic, and also very much informed by the analytical tools used to research the physical phenomenon of sound. However, both musicians agree on the fact that the elements independently described by serialists are actually an abstraction, since the perception of sound tends inextricably to associate them. It is arguable whether or not Boulez was aware of this fundamental problem. However, the loss of individuality of sound parameters owing to their complex interrelation is left in his early writings to a secondary position, since it clearly undermines the quest for an explicit coherence of his serial system. Once again, it seems that many of the theoretical divergences of these composers are a matter of terminology and explicit acknowledgement more than of real content.

In conclusion, the position of Grisey and spectral musicians in general emerges as ambiguous. Many of the issues already tackled by Boulez and Schaeffer still hold a fundamental role in spectralists' theoretical discussions and compositional techniques. The notion of *objet sonore* still emerges as the most suitable to be used as a connective element of otherwise very different musical attitudes. The theoretical references, the methodology of the generative process and the terminology used to describe it are very variable, but still the idea of a compositional process based on structured multi-parametrical objects is the target of musical research.[11]

[11] Again in the words of Murail: 'In the way I conceive it, a harmony is never neutral. It is an object that has inner tensions, that bears a sort of "meaning" – it is an object musically powerful. Therefore, the stake now is to attain to a continuity, a syntax, with objects that are powerful, complex and rich in themselves: whether they are harmonies, re-synthesised natural sounds or products of pure synthesis, the problem is actually the same' ['Une harmonie n'est jamais neutre, telle que je la conçois. C'est un objet qui a des tensions internes, qui porte en soi une sorte de "signification" – c'est un objet musicalement forte. Donc, l'enjeu actuel est d'arriver à créer une continuité, une syntaxe avec des objets qui en eux-mêmes sont forts, complexes, riches: qu'il s'agisse d'harmonies, de sons naturels resynthétisés ou de produits de pure synthèse, le problème est en fait le même'] (*Ivi*, 42).

Natural models

The term 'spectral' does not do justice to both the technical and the aesthetic features of the music that it identifies. The idea of using a natural model in order to find a reference both theoretical and practical for the compositional process, has been highlighted already in Boulez and Schaeffer. It is obviously a tendency not limited to the three composers taken into account in this research work. On the contrary, it can be considered a typical trait of this historical period.

However, if Boulez tends to focus mainly on the parameters of sound, Grisey attempts to find in natural models a reference for the organisation of the entire musical form. The natural references do not necessarily have to be found in acoustic phenomena. The biological cycles of an organism can be used as natural models for the organisation of musical time or harmonic schemes of tension–relaxation. The cycle of *Les Espaces acoustiques*[12] is based mainly on models of acoustic phenomena, with a sort of didactic rigour. However, over the years the music of Grisey became more open to a wider range of references. The coherence of the models referred to in a single piece became less evident and left space for an increased creative freedom, even if the value accorded to natural references remained fundamental, as has been shown above. It seems that over the years, similar to what has happened to Boulez, Grisey's theoretical coherence needed less of an explicit demonstration.

The distinction between the function of creative stimulus and formal model is not always easy to trace when considering Grisey's use of models. It has been stated that, eventually, the models do not prove to be of great importance in Grisey's

[12] This musical cycle is formed by six compositions (*Prologue*, *Périodes*, *Partiels*, *Modulations*, *Transitoires*, *Épilogue*) written in the space of almost ten years, between 1976 and 1985. Each composition is based on a specific acoustic phenomenon, although there are also references to natural models derived from human biological cycles (see Baillet 2000: 41).

compositional procedures.[13] In fact, in his music there is no sort of automatic writing nor any attempt at a precise transcription of physical phenomena. The models always need to be transformed and adapted in order to be used for the creation of musical forms. However, the allusion to the ideal of art-science highlighted above seems to be theoretically inconsistent with this procedure.

The solution to the apparent contradiction appears to a closer scrutiny of the fundamental characters of Grisey's models. In fact, although none of them seems to be capable of generating a musical form, they can all provide a scheme of a process, more or less repetitive, but generally not reversible. As has already been pointed out, the notion of process is the fundamental element of Grisey's compositional technique.[14] This is also the structural scheme that Grisey tends to highlight in all natural phenomena. From this perspective, there cannot be a musical process lacking external references. It is not the model that produces the process, but on the contrary, the process is implicit in natural events. In this perspective, Grisey's music is faithful to the ideal of art-science, since it becomes a kind of tool to highlight the evolutionary process implicit in natural phenomena.[15]

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[13] 'Naturalism is not a determinant feature of spectral music [...]. Whether they are drawn from the domain of organic life or of acoustic sounds, the models are generally metaphoric (as the theoretical analogy of sound and process); at best, they serve as alibis for the choice of a starting material (a "respiratory" melodic line, a chord drawn from the harmonic spectrum). They are never the driving force of the temporal development since this cannot be modelled on an external principle, but, on the contrary, has to proceed by inner necessity' ['Le naturalisme n'est pas une qualité déterminante de la musique spectrale [...]. Qu'ils soient issus du domaine du vivant ou de l'acoustique des sons, les modèles sont généralement métaphoriques (comme l'analogie théorique entre son et processus), au mieux ils servent d'alibi au choix d'un matériau initial (une ligne mélodique respiratoire, un accord issu du spectre harmonique). Ils ne sont jamais le moteur du déploiement temporel car celui-ci ne peut se calquer sur un principe extérieur à lui-même mais doit au contraire procéder par nécessité interne'] (Baillet, 2000: 42).

[14] 'Therefore, neither natural nor technological models provide Grisey's music with the principles of its temporal organisation. It is through the technique of the process that Grisey attains the formal self-engenderment that he is seeking' ['Ni les modèles naturels, ni les modèles technologiques ne fournissent donc à la musique de Grisey les principes de son organisation temporelle. C'est par la technique du processus que Grisey parvient à l'auto – engendrement formel qu'il recherche'] (Baillet, 2000: 45).

[15] 'The composition of process springs from everyday gestures and, even by that, frightens us. It is inhuman, cosmic and provokes a fascination with the Sacred and the Unknown, reaching out to what Gilles Deleuze defined as the splendour of *ON*: a world of impersonal individuations and pre-individual singularities' (Grisey, 1987: 269).

The process does not represent just a metamorphosis of a sonic object; it is also, and before anything else, an irreversible event. This is the most important character of natural phenomena as seen by Grisey, and the coincidence of this perspective with Schaeffer's considerations about the same subject is evident.

Musical perception

From the point of view of compositional technique, the influence of serial tradition on spectral music is evident in the fact that in the latter the issue of the structural potential of secondary sound parameters is no longer present. For both Boulez and Schaeffer the fragmentation of sound into constitutive elements is a fundamental step in the theoretical debate. Notwithstanding Schaeffer's attempt to overcome the abstract serial partitioning of sound in individual parameters, his morphological description of sound is based on the same procedure.

Spectralists inherit the concept of multi-parametrical sonic object from serialism and therefore their theoretical debates are immediately diverted towards the process of transformation of sound. From a theoretical point of view, the notion of parameter in itself becomes less important. The focus of the few theoretical discussions is concentrated on the perception of transformation and interrelation of parameters in time, which can be analysed by spectralists with better precision with respect to Schaeffer or Boulez.[16] The sonic objects and musical structures are seen as mutating entities, no longer reducible to the confrontation of discreet elements defined by traditional

[16] 'Our main contribution consists of, on one hand, the obliteration of the fixed categories to the benefit of Synthesis and Interaction; on the other hand, the attempt to an optimum adjustment of Conceptual and Perceptual' ['Notre principal apport consiste en la liquidation des catégories figées au profit de la Synthèse et de l'Interaction d'une part, et en l'approche d'une adéquation optimale entre le Conceptuel et le Perceptuel d'autre part'] (Grisey, 1998: 291).

notation.[17] The latter becomes an operative tool much more than a system defining a hierarchy between sound parameters abstractly conceived. This attitude is a further endorsement of the quest for a linear development of the musical discourse to oppose open serial works, since it enhances the temporal directionality of musical development. The scheme of reference for formal organisation is derived from the model of sound itself. This implies a difference from serial music which is both technical and aesthetic.

If a view excessively schematic can be too simplistic,[18] it is true that, in ideal terms, the tendency of spectralism is to create a musical development so perceptually clear that no multiple interpretative choices are possible. In serial music the elaboration of very complex structures was always meant to function as a challenge to conventional listening. Spectralism, perhaps owing to less stress put on the problem of overcoming tradition, does not produce the same complexity and does not need to revise habits and expectations derived from conventional language. The lack of interest in historical development is counterbalanced by a sort of faith in natural laws of perception.

However, as suggested above, the analysis of perception in Grisey's theoretical work is not organised in a systematic way, and it is not possible to infer a cohesive definition of a musical system from Grisey's articles, in contrast to what happens for Schaeffer and partially for Boulez. The real research work is carried on in the actual compositional process, whereas theoretical coherence remains implicit. The discussion about perception is linked more to the opposition to serial music than to a deep analysis

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[17] 'From now on it is impossible to think of sounds as defined objects which are mutually interchangeable. They strike me rather as force fields given direction in time. Theses *forces* – I purposely use this word and not the word *form* – are infinitely mobile and fluctuating; they are alive like cells, with a birth, life and death, and above all tend towards a continual transformation of their own energy' (Grisey, 1987: 269).

[18] 'While in the 1950s and 1960s science defined the organisations of structure and gave indications *a posteriori* about the practical realisation of the work, in the 1970s it was rather used to analyse and understand *a priori* perceptual reality, and eventually formally to draw a structure from it. Therefore, we have gone *from a perception induced by structure to a structure deduced from perception*' ['Alors que dans les années 50 et 60, la science formalise les organisations de la structure et donne des indications *a posteriori* sur la réalisation pratique de l'œuvre, celle des années 70 est plutôt employée pour recenser et comprendre *a priori* la réalité perceptive, et en déduire formellement, éventuellement, une structure. On est donc passé *d'une perception induite par la structure à une structure déduite de la perception*'] (Levy, 2004: 121).

of the phenomenon *per se*. Perception and perceptibility tend to overlap, and much attention is paid to the definition of perceptual limits in the identification of both sonic object and process. The issue of the alleged excess of complexity characteristic of serial music is confronted by reversing the terms of the problem. It is not the structure that reshapes perception pushing forward its limits: rather, it is perception itself that sets boundaries to the creative process. Therefore, the musical result produced for the listener is meant to be accurately controlled at the compositional stage.

Terms such as *différentielle*, *liminale*, *transitoire*,[19] chosen by Grisey to define the main characteristics of his music, convey the impression of a quest for subtle control of the structural and perceptual flow.

Pre-audibility

Grisey's theoretical discussions about perception focus less on qualification than on identification of the sonic object and, consequently, on the determination of its functional role within the musical discourse. The qualification process, which is an obvious step to allow functional determination, is left to the synthetic judgement of the composer, and the issue of perception tends to be limited to the issue of complexity. Pitch, timbre and duration are reinstated in the theoretical discourse not as sound parameters, but as perceptual fields delimited by opposite polarities:

> To the pair consonance–dissonance are added, on one hand, that constituted *by the harmonic spectrum and white noise*, on the other hand *periodic and a-periodic durations* (Grisey, 1998: 293)[20]

[19] See Grisey, 1987: 291.

[20] 'Aux couples consonance-dissonance s'ajoutent ceux constitués *par le spectre d'harmoniques et le bruit blanc* d'une part et *les durées périodiques et apériodiques* d'autre part'.

The complexity of a sonic object determines its level of perceptual tension and, therefore, its structural function.[21] The analysis of both timbre and musical time rely on this fundamental notion. While the notion of timbre is linked to the opposition harmonic/non-harmonic, musical time is based on the oppositional pair periodic/statistical.[22] Ideally, a scale of increasing complexity links the two polarities, allowing for a rich source of structural possibilities. Perceptibility of both time and timbre is clearly affected by their mutual interaction, so that further elements of complexity are added to the musical structure.

This is evidently not a feature that can be considered typical of only spectral music. Tension and relaxation are the oppositional poles on which hinges any formal, and therefore any musical, structure. However, the fact that Grisey has felt the need to refer to them explicitly is further evidence of his intention to oppose the lack of a clear and univocal hierarchical structure in serial music. The same attention is paid to the determination of a threshold of perceptibility in the structural process:

> By including not only sound but, moreover, the differences perceived *between* sounds, the real material of the composer becomes the degree of predictability, or better, the degree of "pre-audibility". So, to influence the degree of pre-audibility we come back to composing musical time directly – that is to say perceptible time, as opposed to chronometric time (Grisey, 1987: 258).[23]

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[21] 'Dissonance is not cultural, it is a self-sufficient phenomenon: cultural are the qualifications that are given to it and the resulting practical application. [...] If we deduce from this the permanence of the two polarities, whatever the value that the practical application assigns them, still the fundamental principle remains: to organise tensions' ['La dissonance n'est pas culturelle, c'est un phénomène en soi : ce qui est culturel, ce sont les attributs qu'on lui confère et l'usage qui s'en suit. [...] Si on en déduit la permanence de deux pôles quelles que soient les valeurs que l'usage leur affecte, l'essentiel demeure : *organiser des tensions*'] (Grisey, 1998: 292).

[22] See Grisey, 1987: 244.

[23] The implicit reference of the notion of 'pre-audibility' to the information theory is made more explicit later in the same article: 'I believe that the composer who wants to give time a musical value must focus on this point. It is no longer the single sound whose density will embody time, but rather the difference or lack of difference between one sound and its neighbour; in other words, the transition from the known to the unknown and the amount of information that each sound event introduces' (Grisey, 1987: 258). The lack of consideration in this quotation for the complexity of the event in the determination of the level of pre-audibility is corrected in the following section of the article, when Grisey refers to what he defines as 'flesh of time', the perception of musical development as it is influenced by sound parameters other than duration.

Given the importance accorded to the notion of pre-audibility, it is obviously left to the synthetic intuition of the composer to evaluate the concrete application case by case. The limited theoretical output of Grisey does not expound on a detailed analysis of psycho-acoustic issues; rather, it tends to elaborate the formal concept of polarities distinguished by the level of complexity and, therefore, predictability.

Generally speaking, the notion of pre-audibility connects to what in Schaeffer's theory has been defined as *genre*, substituting the parameter of timbre in the traditional system. Pre-audibility, in Grisey's system, represents the level of 'timbral' similarity, a consistent background that allows specific elements in the musical texture to emerge as reference points with a developmental structural function.

Some considerations about the structural relevance of the phenomenon of pre-audibility are present also in Boulez's writings. However, it is obvious that the aesthetic fundamentals of serial music will substantially affect the way pre-audibility is generated within the musical pieces. If Schaeffer and Grisey share the aesthetic ideal of a clear and linear musical development, the aesthetic of the open work goes in exactly the opposite direction.[24] From this point of view, the different level of perceptual pre-audibility, that

[24] 'Umberto Eco shows that serial and structural thinking have gone down opposite routes: since the 1950s, linguistics and anthropology have tried to determine invariant structures [...]. On the contrary, serial music is based on the conviction that tonality is not a universal invariant [...]. Therefore, serial thinking tries to make history, whereas structuralist methodologies try to study the object and to deduce from it universal invariants. [...] If structural thinking is drawn from the principles of linguistics (the code is common to receiver and emitter), the message of serial thinking tries, in contrast to a language of communication, to destabilise the existing code: the œuvre is meant to question the fundamentals of its own language, and serial thinking is more of a challenger of its origins than structural thinking' ['Umberto Eco montre que les pensées sérielle et structurale ont connus des cheminements opposés : la linguistique ou l'anthropologie on tenté de déterminer à partir des années 50 des structures invariantes [...] Au contraire, la musique sérielle c'est construite sur la conviction que la tonalité n'était pas un invariant universel [...] La pensée sérielle cherche donc à faire l'histoire alors que les méthodes structurales cherchent à étudier l'objet et à en tirer des constants universelles. [...] Si la pensée structurale est issue des concepts de linguistique (le code est commun au destinataire et à l'émetteur), le message de la pensée sérielle cherche, au contraire d'un langage de communication, à déstabiliser le code existant: l'œuvre est une remise en cause des fondements de son langage, et la pensée sérielle est plus contestataire de ses origines que ne l'est la pensée structuraliste'] (Lévy, 2004: 111). Although these considerations are generally acceptable and effectively describe the idealistic subversive trait of serialism, at least two points have to be clarified. First of all, in my view, serialism should not be seen as being 'in contrast to a language of communication'. In fact, serialism generates the destabilisation of the existing code through the clash with another, unfamiliar musical language. Furthermore, its subversive attitude is not only toward traditional language, but also toward any form of established code. The aesthetic tension of

is, of complexity, becomes one of the most evident aesthetic differences between the music of Boulez and Grisey.

Object and process

The question of a possible mimesis of material and form in spectral music is a complex issue, where theoretical coherence is not necessarily matched by practical effectiveness:

> Since sound is transitory [...] *object and process are analogous. The sound object is only a process which has been contracted, the process nothing more than a dilated sound object.* Time is like the air that these two living organisms breathe at different altitudes. It is the scale which creates the phenomenon and the difference resides in our faculties of perception. The process makes perceptible what the rapidity of the object hides from us: its internal dynamism (Grisey, 1987: 269).

The ideal of creating music displaying a perfect correspondence of micro and macro form is obviously not exclusive to Grisey. In fact, it is one of the most popular formal archetypes in musical theory. In the case of spectral music, this idea was sustained by the acknowledgement of the results of analysis of sound, which showed how the inner organisation of the sound components (partials) was extremely complex and variable over time.[25] It is well known by now that the constituting partials appear only gradually within a sound, and that their amplitude also fluctuates over time.[26] On the basis of these phenomena, the evolution of the partials within sound could be considered a developmental structure. As is implied in the words of Grisey, spectral musicians proposed the idea of attaining a complete correspondence of micro and macro form by

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serialism should, ideally, generate a language that never settles on a stabilised code, but perpetually seeks destabilisation, generally through complexity and statistically generated material.

[25] See Doufurt, 1991: 289-294.

[26] See Fineberg, 2000b: 81-107.

creating musical structures based on the organisation of the partials analysed in a sound. In order to do so, a correspondence between partial and note was considered acceptable.

However, the temporal expansion of a sound structure on a larger scale would not only prove a very poor and repetitive formal model, lacking the complex articulation needed for a communicative language. It also would not be intended necessarily as a structure. In fact, the variation of temporal scale can generate perceptual associations that tend to fragment the unity of the structure. Partials with higher amplitude within a sound would become perceptually relevant notes in a musical structure, thus undermining the perception of the structure as a homogenous unit and creating connections with other perceptually relevant pitches. The single pitch can be 'intentionally' heard as part of a structure or as an individual element, while this possibility is obviously denied at the smaller temporal scale where real partials are developing.

A similar kind of abstraction is generated by ignoring the effect of the timbral characters of the instruments in correspondence to the partial-note.[27] Each note played by an instrument is obviously constituted of partials, and therefore is much more complex than a single sound partial. Hence, it is not possible to state safely that a musical structure based on a model obtained from sound analysis will be perceived as a unit, and, even if that is the case, that the effect of unity will be generated by the correspondence to the model. The generation of a timbral effect, that is, of a structure which is immediately perceived as a unit, is a complex procedure, which cannot be reduced to the transposition of partials into pitches played by traditional instruments, while Grisey often seems to imply that phenomena such as resultant tones or attack

[27] For a critique of the scientific references of spectral composers, see Fichet, 1996: 313–328.

transients are going to be perceived as a unit when they are transposed into different temporal scales.[28]

Consequently, the role of scientific analysis in spectral music seems to be far less fundamental than the quest for theoretical consistency has tried to prove. To be effective as a reference for compositional strategies, the acknowledgement of the inner structure of sound has to be constantly supported by research about perception. It seems that the physical models derived from analysis of sound are nothing more than a starting point for further creative elaboration of musical form, based on rather more empirical perceptual references. In fact, an analysis of Grisey's compositions reveals that often objects are determined and connected in structures using compositional strategies far more traditional than what is theoretically admitted, such as pitch association and interval connections.

In conclusion, the sonic object of spectral music does not appear less determined by intentional listening than the ones produced by compositional techniques that are less concerned about the scientific justification of their procedures.

Prologue

Prologue is the first piece of the cycle *Les Espaces acoustiques*. The introductory function indicated in the title of the piece is enhanced both by the instrumental choice (viola solo, while the following pieces in the cycle display a gradual enlargement of the organic, to reach the 84 parts of *Transitoires*), and by the reference to the natural model

[28] See Grisey, 1991: 368.

of human biological cycles, which is intended to be fundamental for the formal organisation of the entire oeuvre.[29]

The simple musical setting in *Prologue* allows us to clearly see the formal unfolding of the music. Process and objects are evident and less complex than in an orchestral score, and they lack any redundant component.

a) process

The analysis by Jérôme Baillet[30] gives an accurate description of the technical procedures used by Grisey in order to organise the general plan of the piece. This analysis shows that in many cases the results of the combinatorial process are directly transcribed in the musical score.[31] In my view, and with reference to the analysis that will follow, this interpretation is not completely accurate. Grisey does control many of the details of the music, sometimes, as in the case of *Prologue*, thanks to extremely subtle compositional strategies. However, in comparison to Boulez, the general developmental plan of the piece is much more clear. In this way, the details controlled by the composer carry out the function of endorsing or contrasting the general development of the piece, which is strictly determined by the system.

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[29] 'Furthermore, the *neumas* [the basic units on which *Prologue* is organised] display a dynamic curve, of which the number and intensity of stresses grow progressively. This curve would be associated with the alternation inspiration–expiration of human breathing. [...] *Espaces acoustiques* can therefore start with what is considered the model for their rhythmic and formal articulation' ['Les neumes possèdent par ailleurs une courbe dynamique, dont le nombre et l'intensité des accents croît progressivement. Cette courbe veut se rapprocher de l'alternance inspiration-expiration de la respiration humaine. [...] Les *Espaces acoustiques* peuvent ainsi débuter par ce qui est revendiqué comme modèle de leur articulation rythmique et formelle'] (Baillet, 2000: 108).

[30] See Baillet, 2000: 99–112.

[31] 'It is worth noting that the order of deduction of the *neumas* generated by the combinatorial table [...], corresponds exactly to the order in which the *neumas* will be played. The material is not pre-compositional, it is produced following the development of the work in time: it is the principle of the spectral process' ['Il n'est pas inutile de noter que l'ordre de déduction des neumes engendré par les tableaux [...] correspond ni plus nu moins à l'ordre dans lequel les neumes seront joués. Le matériau n'est pas pré-compositionnel mais se crée au fur et à mesure du déroulement de l'œuvre dans le temps : c'est le principe du processus spectral'] (Baillet, 2000: 105).

Notwithstanding the fact that there is a melodic element playing a significant role in this piece (contrary to what happens in the rest of the cycle), in the melodic objects the pitch set content is structurally less relevant than the inner complexity and the general contour.

This, at least, is Grisey's idea as it emerges from the way the compositional process has been carried on. The way in which musical objects and processes actually function is obviously more complex, and perception encompasses details which not necessarily produce effects in accordance with the general evolution of the process. In many ways, this opposition of object and process reminds us of the dualism envelope/object in Boulez. The main difference relates to the substantial lack of directionality in Boulez's music. Notwithstanding a certain degree of abstraction present in this evaluation, it could be said that the open work and the idea of multiple interpretation entail the obliteration of a clear direction in the musical discourse. To put it more simply, very often there seems to be no evident difference between the beginning and end of Boulez's envelopes. The apparent stasis of his musical episodes is contradicted by a multitude of micro structures generating an overall tension. Often, the same musical element can be part of two or three structural lines, the resulting ambiguity being a fundamental part of serial language in general. Grisey's structures have a much more evident polarity, and they show an increasing or decreasing of tension distributed along the process. This development can obviously be contradicted by details less immediately relevant to perception, but linear evolution cannot be affected beyond a certain limit.

The plan of the piece outlined in Baillet's description is produced using combinatorial techniques clearly inherited from serialism. Baillet finds also connections

to Messiaen's rhythmic characters.[32] Messiaen's influence, although not necessarily convincing for what concerns this last feature, must be assumed as credible, considering Grisey's links to his former master.

However, the results of the combinatorial procedures do not account for the entire musical result. Further compositional elaboration is required in order to organise satisfactorily the musical development. Moreover, the pre-compositional elaboration lacks, as it should be expected, a strict logical coherence, when this is not likely to be detectable in the actual musical setting. The combinatorial process has evidently the only aim to produce both a carefully planned evolution of the discourse and statistical discrepancies to the general flow of the process.

The piece is organised as a process evolving from stability to instability. The polarities are represented by, respectively, the repetition and development of a melodic cell (which Grisey refers to as *neuma*[33]) derived from spectral material,[34] and glissandi gradually deteriorating the purity of sound into noise. The main process is interpolated with the development of two other elements: an iambic rhythmic figure on the note B natural, and a tremolo which occasionally prolongs the last two pitches of the *neumas*. Baillet refers to the last element as an echo,[35] which is arguably intended to be an unstable counterpart opposing the repetitiveness and stability of the iambic rhythmic cell.[36] This interpretation is endorsed by the development of the two elements, which mirrors the overall unfolding of the process: while the iambic rhythmic cell tends to

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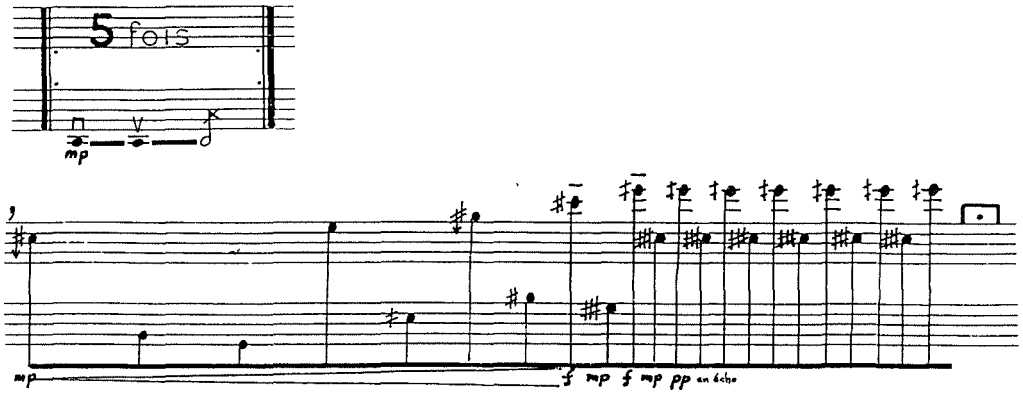
[32] See Baillet, 2000: 112.
[33] This is in order to stress the dominant value given to the general contour of the motive.
[34] The E of a trombone. This spectrum is the source of harmonic material for the entire cycle (see Baillet, 2000: 109).
[35] Grisey actually introduces the term in the footnotes to the score.
[36] Again in the footnotes to the score, referring to the iambic cell, Grisey gives the indication 'comme un battement de coeur' [like a heartbeat], which actually endorses the idea of natural periodicity associated by Baillet to this rhythmic element.

gradually disappear, the tremolos are increasingly present in the last sections, to the point of becoming an integral part of all the *neumas* by the end of the piece.[37]

Ex. 1 *Prologue*, iambic rhythmic cell and tremolo



As mentioned above, the pitch material of the *neumas* is derived from one single sonic spectrum. The number of pitches in the *neumas*, however, is variable, and contributes to delimiting sections of the piece in accordance with the subdivision outlined in the pre-compositional plan. The sections are clearly perceptible to the listener since all the *neumas* that they include have a common trait, given by the parameter of density. In fact, the duration in time of the *neumas* remains constant over the entire piece, thus producing an acceleration of the internal development of each object, which is proportional to the increase in the number of pitches.[38] A greater number of pitches produces therefore a higher perceivable tension.

However, the sections are not organised in a linear succession. On the contrary, they are distributed so that the progression distension–tension of the overall process is partially confused.[39]

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[37] See Baillet, 2000: 112.

[38] The *neumas* can be formed by sets of 3, 5, 7, 9, 11 and 13 pitches. Every *neuma* also undergoes an acceleration precisely defined by metronome values. However, the metronome values increase constantly along with the number of pitches; in this way each *neuma* maintains the same overall duration notwithstanding the greater amount of pitches (see Baillet, 2000: 106).

[39] The sections, defined by the size of *neumas*, are distributed in the following order: 5, 3, 7, 11, 9, 13 (see Baillet, 2000: 105).

Similar inconsistencies in the details, within a clear and linear general process, are shown in the distribution of the two secondary elements: iambic rhythmic cells and tremolos. These secondary processes are organised following a combinatorial procedure based on numeric series. This produces a statistical amount of unpredictability in their precise distribution within the entire piece, although their development follows a clear direction which has been described above.

The permutation of pitch material within the *neumas* of each section is controlled by a combinatorial technique derived from the one used by Messiaen in *Modes à transpositions limitées*. This procedure produces a subdivision of each section through the regular repetition of the original *neuma* after a number of permutations, which is variable (see Ex. 2).[40] However, the exact repetition of the *neumas* concerns exclusively the general contour of the melodic line (*gestalt*, but also envelope), while the constitutive pitches can be altered[41]. As will be shown in the detailed analysis of the objects, within repeated *neumas* the pitches undergo variation in both order and frequency, thus endorsing the idea that the primary reference point of perception is meant to be the general contour of each *neuma* rather than its pitch content. The value accorded to the *gestalt* of the motive could be seen as a reinstatement of a traditional melodic trait, but it is probably more consistent with Grisey's musical thought to consider it as a mnemonic device, which realistically diverts structural functionality from the extreme subtlety of harmonic development, to a much more perceptible melodic shape.

Baillet's analysis, which is based on sketch material from Grisey's own archive, does not offer any other element that can be traced back to a pre-compositional system. At the same time, as is the case for any compositional process based on combinatorial

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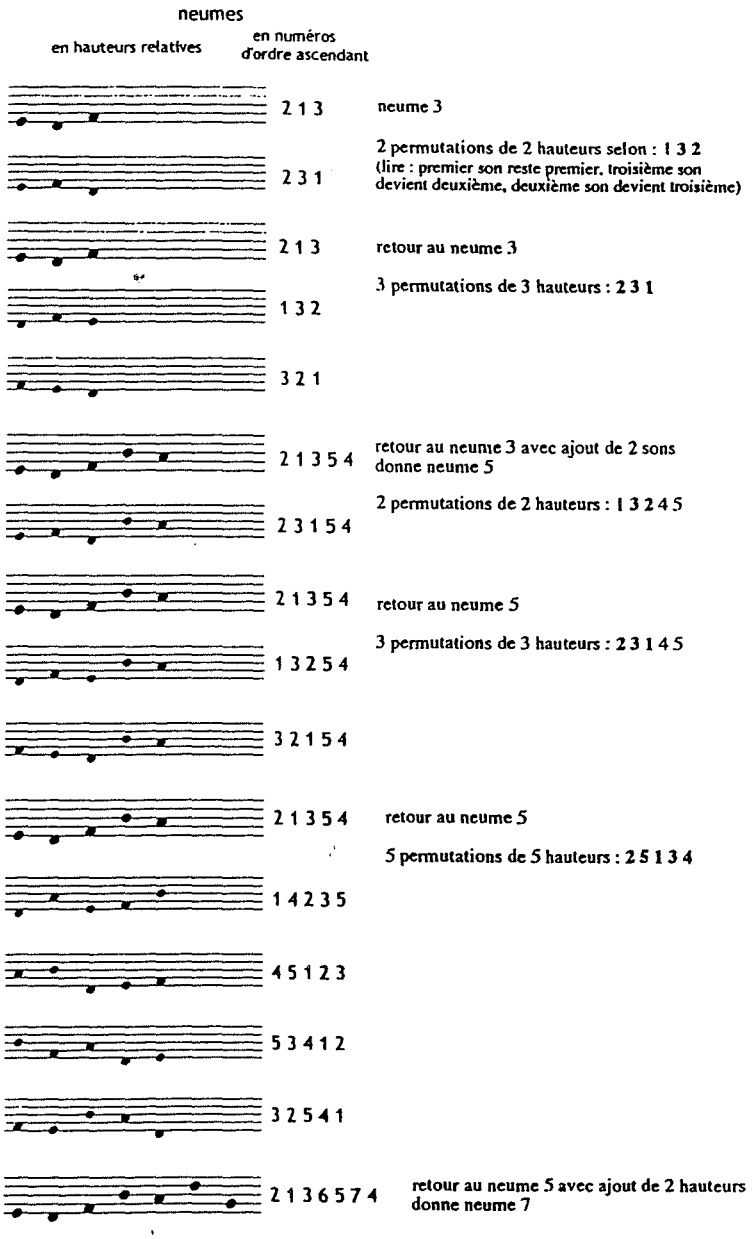
[40] See Baillet, 2000: 100.

[41] In fact, Ex. 2 shows only the abstract scheme of the melodic line of each *neuma*. It displays the position (higher or lower) of each pitch relative to the others.

procedures, it is not possible to assume that the system has been unveiled in every detail. In this specific case, it is not possible safely to affirm that the transformation of the pitch content of the *neumas* is not controlled by a not yet unveiled combinatorial system. The same can be said for other elements of the score, such as attacks and dynamic stresses within the *neumas*. However, Grisey's pre-compositional procedures have characteristics which make them in many ways less relevant when compared, for instance, to Boulez's. As suggested above, the combinatorial process does not appear to have any relevant aesthetic value for Grisey. In contrast to what happens for Boulez, Grisey does not seek musical consistency starting with the logical coherence of combinatorial procedures. Although the numeric series used to create permutations of the material are often coherently deduced from an identical source, this does not appear to be anything more than a mere quest for order and consistency. Any other numeric series would be equally valuable, as long as it provides a satisfactory balance of variation and repetition in the material. In this music, there is no need for the meaningful abstract elaboration of Boulez. As mentioned above, it has been suggested that Grisey's system cannot be defined as 'pre-compositional', since it is not a procedure adopted in order to generate material that will be rearranged in the score, following the creative logic of the composer. The line that distinguishes the two kinds of combinatorial procedures is a fine one. In fact, Boulez's compositional procedures use both techniques, and it would be difficult in many cases to make a clear distinction. Many of his serial systems, even in the later period, produce material which is accurately transcribed in the score, leaving almost no choice to the composer. In the case of Grisey's *Prologue*, little choice is left to the composer once the system has been set into motion, except for what concerns the subtle harmonic development. Therefore, the only difference between the two techniques seems to be the number of parameters left to the composer's control. It seems that the distinction between Boulez's and

Ex. 2 *Prologue*, scheme of permutations of *neumas* in sections 1 and 2 (from Baillet, 2000: 101)



Grisey's compositional procedures can often be reduced to a matter of complexity. Perceptually speaking, the overall greater linearity of Grisey's music may allow for less attention paid to the arrangement of the details. In contrast, Boulez's music finds in the details a vitality otherwise lost in the general stasis of the juxtaposition of envelopes.

Furthermore, the polarity tension–relaxation proves to be unstable in Boulez's music, due to the quamtity of linear details and to the lack of unequivocal reference points.

Moreover, for Boulez the definition of stability through pitch content is necessarily derived only from repetition, whereas Grisey can count both on repetition and on spectral harmony, which is assumed to be perceptible notwithstanding any previous occurrence in the piece. Both composers make use of all the other elements of sound characterisation in order to control the balance of tension and relaxation within the objects. However, Grisey can rely on connective elements that are assumed to be perceptible beyond the single composition, in contrast to what happens for Boulez's harmonic sets. This adds up to the ambiguity in Boulez's definition of structural polarities. One of the clear aims of spectral music is precisely to obliterate this ambiguity, which is considered excessive.

b) objects

The previous description has provided an idea of the overall plan of *Prologue*. The main process of the piece has been outlined, along with its internal articulation produced by the permutation of sections. The two processes of the secondary elements have also been described, along with the procedure of their interpolation with the main process.

The resulting musical development can be described analysing some of the sound objects and the way they function within the larger structure of the piece.

Considering the *neuma* as the unit of perception and analysis (i.e. sonic object) of *Prologue*, the parameters used to define its structural function can be defined as follows:

- Number of pitches
- Harmonic content
- Pitch pre-audibility (i.e. repetition of pitches within the object and among the connected objects; interval connections within the objects)
- Melodic *gestalt* (this includes not only the shape of the melodic line, but also the range of register occupied by the *neuma* and the size of the intervals within the *neuma*, which can produce a more or less effective identification of the *gestalt*)
- Dynamic contour (owing to the position of the pitch stress, which is present in every *neuma* and defines the dynamic peak of the object)
- Timbral clarity

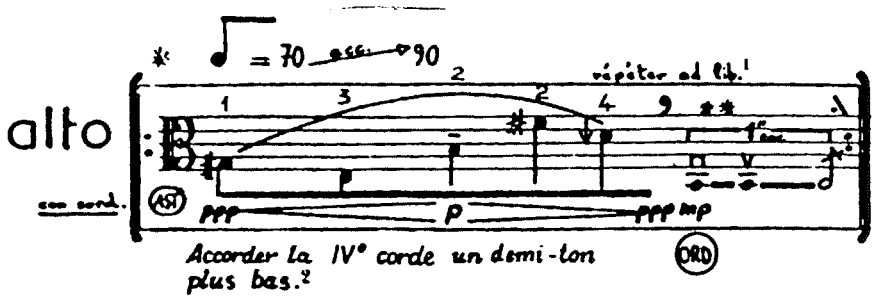
Parameters such as rhythmic acceleration and length of breaths between the structures can be considered as secondary from the point of view of the analysis of sonic objects, since they both follow a quite regular organisation in the piece. Rhythmic acceleration is identical for all the *neumas* within a section, so that its functional value is perceptible only within the overall process. The length of breaths also generally defines the longer structural sections and subsections of the process.

The sense of stability given by the first object is produced using all disposable means.

First of all, the range of the pitch set is the smallest within the whole piece, with the exception of the three-pitch *neumas*. However, the latter are organised in a section that becomes very peculiar, and interrupts the flow of the linear process instead of creating stability. The excess of stasis that would have been produced by this section if it had to be transcribed on the score directly from the systematic tables, has evidently been considered unsatisfactory by Grisey (the rearrangement of this section has been described by Baillet,[42] and therefore will not be discussed here).

Consequently the five-pitch *neumas* become the most stable objects in the entire piece. Stability is owing to the fact that both speed and acceleration of the pitches within the objects are inferior to that of all the other pitch combinations. (It should be remembered that all the *neumas* are supposed to have the same overall duration, so that *neumas* with a larger pitch content are obviously played faster. Moreover, the metronomic acceleration within the object increases along with the range of the object itself.[43]) As a result perceptual complexity is also inferior.

Ex. 3 *Prologue*, section 1, object 1

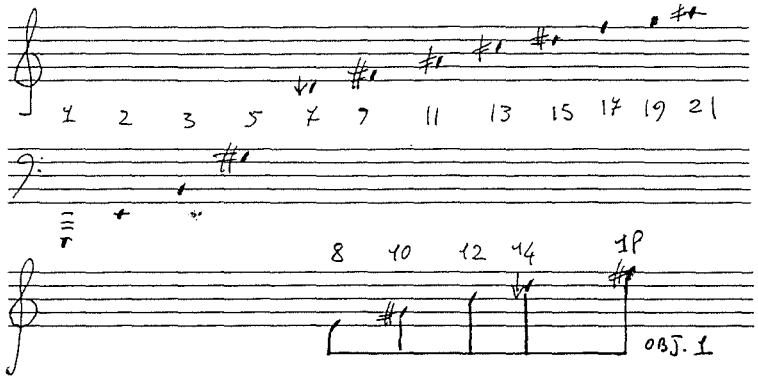


The harmonic content of the first object is also meant to produce the maximum degree of stability: the five pitches correspond to the first five overtones of the spectrum which is taken as the reference point for the entire cycle. The pitches correspond to a

[42] See Baillet, 2000: 108–109.
[43] See note 39. 1

specific section of even overtones in the spectrum. The choice of this precise pitch material is functional to the creation of a smooth melodic line, without leaps or clusters.

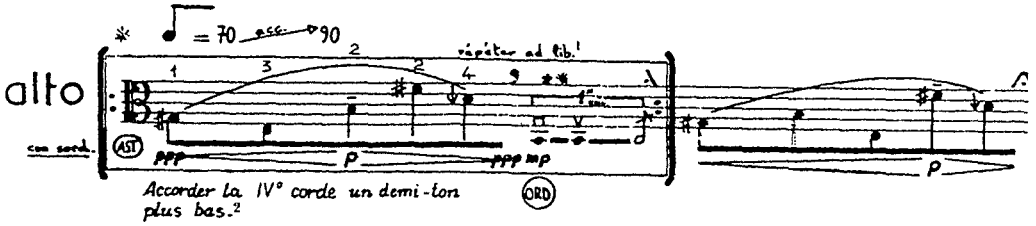
Ex. 4 *Prologue*, spectrum of E natural and pitch material of object 1



The *gestalt* of the object is evidently extremely balanced, with a descending–ascending line, symmetrical in the intervals and hinged on B natural, the third overtone of the spectrum, underlined by both the dynamic line and the repetition of the pitch at the lower octave in the following iambic rhythmic cell. The sense of stasis reached through all these devices is increased by the repetition *ad libitum* of both the *neuma* and the rhythmic cell.

As mentioned before, the sections of the piece that display *neumas* with an identical number of pitches can also be divided into subsections defined by the repetition of the original *neuma* after a certain number of permutations.

Ex. 5 *Prologue*, subsection 1a



The first subsection of the piece consists of two *neumas*, followed by a long breath that stresses the end of the subsection itself. The second object of subsection 1a consists of a very small variation of the first one. The pitch content is the same, and this very seldom is the case. In fact the subtle manipulation of pitch is one of the most effective devices to assure the development of the process. It should be remembered that only the *gestalt* of the *neumas* is determined systematically, while the alteration of pitch content is tolerated. Since the aim of this initial subsection is to convey a sense of stability, the pitch content of the two objects remains identical.

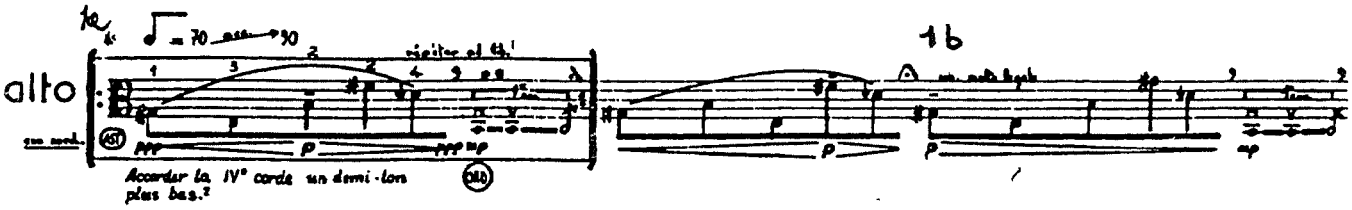
The only differences between the two objects are given by one single permutation of two pitches and, in the second object, by the displacement of the dynamic climax to the fourth pitch, which is also the highest pitch within the *neuma*. As a result of these small variations, the intervallic complexity of the object is increased through the leap formed between E natural and F sharp, which is also underlined by the dynamic curve.

The dynamic curve and the leaps unsettle the perfect balance that was present in the first object by displacing the pivotal pitch towards the end of the object, in this way obliterating the sensation of a clear centre (this is in part corrected by the central position assumed by the fundamental E). They also stress the highest pitch of the object (which is also the overtone more distant from the fundamental among the ones used in this subsection), thus starting the ascending process that, over the entire piece, gradually displaces the objects towards the higher register.

As could be expected, the third object, which is the first in subsection 1b and repeats the *gestalt* of the original *neuma*, although separated from the previous two objects by a long breath, is clearly connected to them and brings the musical 'phrase' to an end.

This is done through the dynamic line, which is a diminuendo starting with the first pitch. The dynamic stress clearly underlines the connective pitch of the three objects, since they all start with G sharp, which will be displayed at the beginning of an object only once more in the section, when the gestalt of the original *neuma* will be presented for the last time. Furthermore, this introduces the substitution of F sharp with G sharp in the fourth pitch of the object.

Ex. 6 *Prologue*, subsections 1a and 1b (object 1)

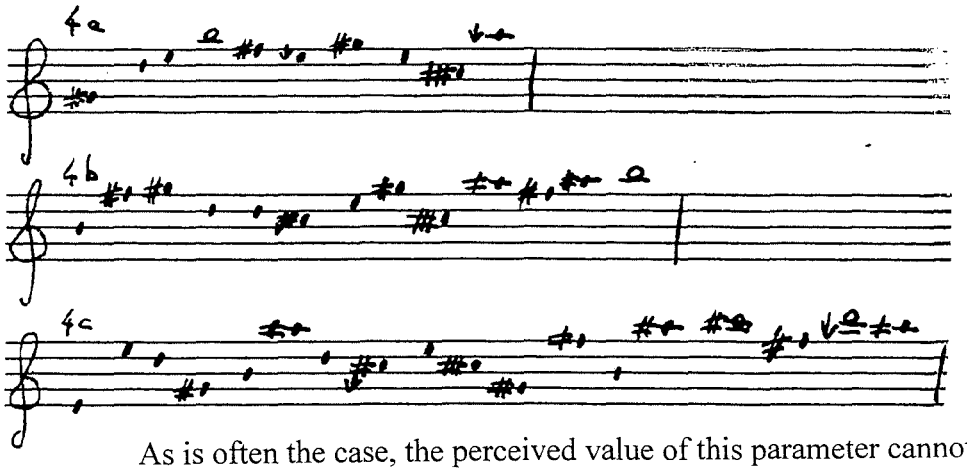


This last variation maintains the tension towards the higher register already present in the second object, although the descending dynamic line renders milder the introduction of a new pitch for the first time since the beginning of the piece (let us remember that the first object has been repeated several times). The only elements of the musical setting for which a systematic organisation has not been imposed by the system, seem to be here deliberately and subtly organised in order to endorse the directionality of the overall process.

The musical phrase constituted by the first three objects is ended by the iambic cell. The interpolation of secondary processes creates further segmentations in the perceptible musical development, which often contradict the systematic subdivision of the main process in sections and subsections.

However, other parameters evidently outline a different logic in the musical discourse. According to Baillet,[44] there seems to be a structural connection in each section and subsection among the pitches dynamically stressed. His analysis shows that, in each section, the stressed pitches tend to create an ascending line that gradually expands the range of register covered. The description is neat and consistent in the example shown by Baillet (which refers to section 3 of the piece, consisting of *neumas* of seven pitches), but does not maintain the same features in many other cases. The overall ascending movement and register expansion are common to all the sections in the piece, but their development is generally far less linear than in section 3. Minor inaccuracies occur already in section 1 (the line of ascending pitches in subsection 1c is interrupted in the fourth *neuma*), but especially in section 4 a detailed analysis of stressed pitches reveals that the structure of the resulting line can become very complex and can create further segmentations of the musical discourse, which overlap and interpolate the existing ones derived from the combinatorial system.

Ex. 7 *Prologue*, subsections 4a, 4b and 4c, melodic lines of stressed pitches



As is often the case, the perceived value of this parameter cannot be defined in general, since its function is different through the piece, depending on the influence of other, interrelating elements.

[44] See Baillet, 2000: 109.

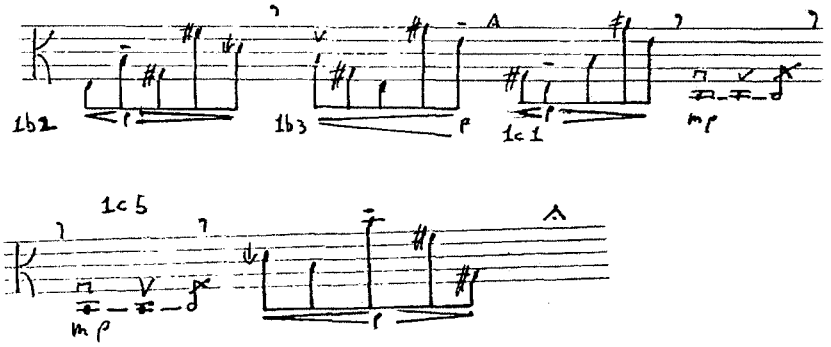
Generally speaking, the articulation of the piece is clearly defined by the length of the breaths, which increases respectively between *neumas*, subsections and sections. An intermediate breath length is used regularly after each tremolo event, whenever it occurs, while the iambic rhythmic cell represents an interruption to the general flow, which is evident enough. All the other means of articulation appear to be less relevant from a perceptual point of view. Usually melodic lines emerge as connective structures of *neumas* or single pitches, owing to their similarity in register or, as is the case of stressed pitches, in dynamics. The general dynamic shape of the *neumas* also represents a subtle means of articulation, both by generating similarities that allow the connection of two or more *neumas*, and by creating opening or closing lines, as has been suggested for the third *neuma* of section 1.

Further evidence of this secondary formal articulation is given in the part of section 1 not yet analysed. As already mentioned, the section is divided into three subsections clearly marked by the three medium-long breaths. It has been suggested that subsection 1a could be perceptually overlapped by a phrase extended to include the first *neuma* of subsection 1b. A similar situation is presented by subsection 1b itself which, from a perceptual point of view, is displaced, starting with the second *neuma* and ending with the first *neuma* of subsection 1c. It has to be remarked that both these perceptual phrases, although not corresponding to the marking breaths determined by the combinatorial system, are clearly evidenced by the iambic figure, which here takes over the function usually carried on by the breaths derived systematically.

The link among the *neumas* is also determined by inner structures, not only by the limits imposed by evident segmentations. Through their pitch content, the three *neumas* included in this perceptual subsection are connected in a longer phrase to the three starting the piece. The first three pitches (that is E natural, B natural and G sharp)

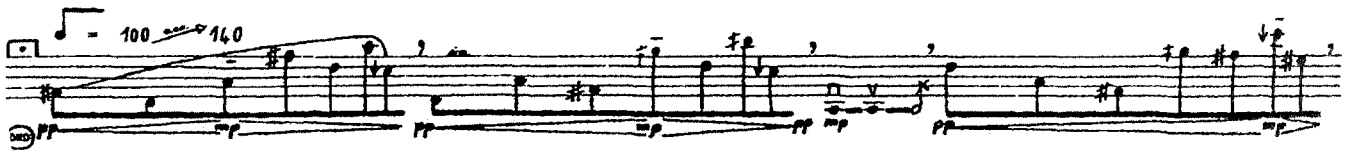
are common to the entire set of six *neumas*, thus creating a further element of stability for this initial section.

Ex. 8 *Prologue*, subsections 1b (objects 2,3) and 1c (objects 1, 5)



In the development of the piece immediately following, the first section of each *neuma* tends to display part of this three-pitch set, but never again are the repetitions identical for such a long period of time. When there is repetition of the incipit, it usually undergoes variation in register, which contributes to make similarities much less evident (see Ex. 9).

Ex. 9 *Prologue*, subsection 3a, objects 1,2 and 3



Although linked by the pitch content of the *neuma*'s incipit, the two perceptual subsections described above differ greatly in the way the process of systematic permutation affects their final structure. While the first three *neumas* start with the same pitch G sharp, the initial pitch of the following three is permutated each time, so that all three pitches of the incipit are displayed in the first position. This obviously tends to

undermine the immediate sense of stability conveyed by the initial subsection. However, it also allows elements of the pitch content that are fundamental in the harmonic spectrum used as source for the pitch material to be displayed in dominant position.

E natural and B natural are continuously reasserted as the fundamental reference points of the subsection. Not only do they start and end most of the *neumas*, but they also are the only stressed pitches in the subsection. Furthermore, E natural, besides being repeated in two of the three *neumas*, starts and ends the subsection. Looking at the score, the structural potential of this section is evident. The balance between stability and instability can be shifted by giving more or less attention to some of the parameters. The interrelation of the different elements creates various possibilities for organising the entire subsection that has, however, an evident function in the overall development of the musical discourse from absolute stability to instability and noise. The breath, determined by the combinatorial system, that separates the second and third *neumas* of this perceptual subsection, holds the function of stressing the re-presentation of the *gestalt* of the original *neuma*, which ends up being locked between the breath marking the beginning of subsection 1c, and the breath represented by the iambic rhythmic cell. This emphasises both the link between the two perceptual subsections (that in this way start and end, respectively, on the same *gestalt*) and the evolution of the original *neuma*, which maintains its general melodic line, but presents a less symmetric disposition of the intervals and a displacement of the melodic peak to a higher register.

The ascending line of the *neuma*'s highest pitches is a further connective link in this second perceptual subsection.. This process of gradual displacement towards the upper register is later reasserted by object 5 in subsection 1c, the final *neuma* of section 1. This object, recalling the first *neuma* of the section, presents B natural as stressed,

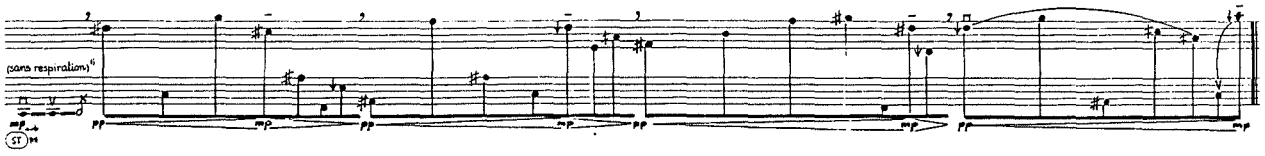
central (the only one in this section, along with the first *neuma*) and dynamically relevant pitch, but an octave higher (see Ex. 8).

As suggested above, the structural connections that can be highlighted within sections and subsections are different depending on the parameter that is considered predominant. The degree of ambiguity of the primary connective parameters is variable, but on occasions the interpretative patterns can become practically univocal.

That is the case of section 2 of the piece, consisting of 5 *neumas* of three pitches, all arranged in a linear descending scale, whose regularity is only disturbed by the permutations imposed by the pre-compositional system.

Another clear instance of a perceived structure being firmly determined is given by an episode in section 3 of the piece. Once again, the perceived structure overlaps the segmentation due to the system, by isolating four *neumas* in subsection 3c.

Ex. 10 *Prologue*, subsection 3c, objects 4-7



This time, the connective link is determined evidently by the dynamic contour of the *neumas*: the position of the dynamic peak within each one of them is progressively displaced, so that the crescendo in each *neuma* is gradually lengthened. The first three *neumas* of this perceived subsection also display a connective link through the stressed pitch, so that the lengthening of the crescendo corresponds to an ascending line in register. The overall process that underpins the piece is represented here in a microform. Even in this case, however, although the dominant perceptual line is clearly evidenced,

other elements could be highlighted in order to create a more complex and contradictory structure.

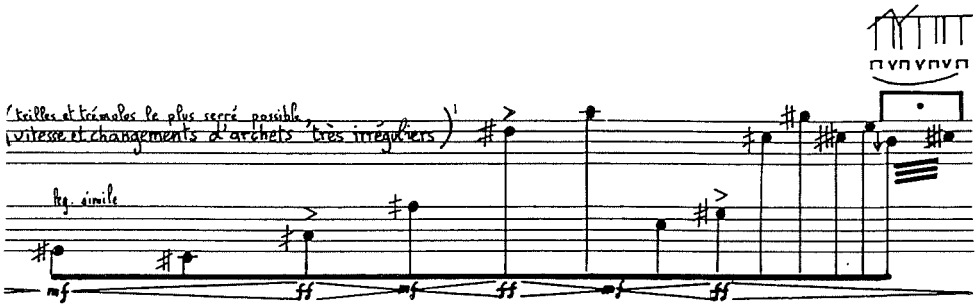
As mentioned before, the level of 'local indiscipline' can never be safely determined in a piece conceived systematically. In my view, the two musical episodes just described should make it clear that Grisey's intervention at a local scale is often determinant. The definition of the pitch content of each *neuma*, and the determination of the dynamic peaks within the *neumas* are often used by Grisey to produce more or less evident distortions to the general development of the sections. The analysis of the results of this interaction of systematic predetermination and local manipulation gives a clear idea of the structural parameters that Grisey is playing with, which have been listed at the beginning of this section of the analysis. As has been shown, the hierarchy between the parameters undergoes a continuous and often subtle fluctuation, which also allows for different interpretative choices.

The overall development of the piece consists in a gradual evolution from stability to instability and noise, which is also obtained through a progressive implementation of the two secondary figures (iambic rhythmic cell and tremolos) in the main process. The instability creeping into the *neumas* through the use of the parameters that have been analysed above, gradually involves the iambic cell, which until a certain stage reappears identical in long sequences, as if it were a barrier to the chaos spreading into the melodic lines and in the tremolos. It has been mentioned above that *neumas* and iambic cell are meant to represent the biological cycle of, respectively, respiration and heartbeat. The breathing, symbolised by the dynamic curve and symmetric *gestalt* of the melodic line, becomes increasingly laboured, an effect obtained both by augmenting the number of stressed pitches in the longer *neumas* (thus increasing the amount of crescendo–diminuendo lines, and making them less

symmetric), and by distorting the regularity in the *gestalt* of the melodic lines (see Ex. 11).

The greater number of dynamic stresses added to the ever increasing speed of the *neumas* gradually assimilates the crescendo–diminuendo lines to an iambic pulse. Even when it has almost disappeared in its original forms, the iambic rhythm can still be heard in the accentuation within the *neumas*. The result of this gradual process of assimilation, far from producing an effect of new stability in the melodic development, is on the contrary that of distorting the sensation of regularity that was conveyed by the iambic figure.

Ex. 11 *Prologue*, section 6, object 3



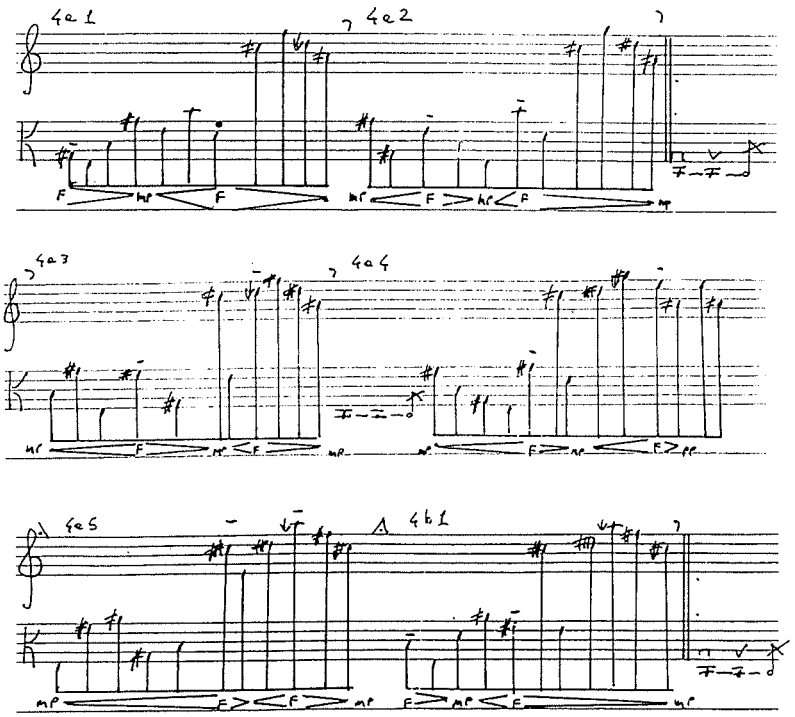
The iambic rhythm from regularly repetitive becomes obsessive, thus adding a further element of tension to the already chaotic melodic development (see Ex. 14). The melodic line of the *neumas* is affected by the obsessive rhythm to the point of being broken into pulsating fragments. The speed of the accentuation keeps increasing until the distinction between the upbeats and downbeats is made impossible, and the melodic line becomes a glissando.

This overall process is endorsed by a gradual introduction of pitches not present in the spectrum used as a source of harmonic material. The concept of non-harmonic

pitch[45] is not as simple as it may superficially appear. The approximation determined by notation and instrumental constraints tends to blur the distinction between non-harmonic pitches and distant overtones. The harmonic/non-harmonic opposition is often more conceptually than perceptually relevant. For this reason, the use of a subtle notation which reaches the octave of tone has not been maintained in many recent spectral works.

For what concerns the harmonic content, in *Prologue* the process of destabilisation of the original regularity is carried on with a strategy similar to the one used for the other elements of the piece: the introduction of non-harmonic pitches is slow and tends to be counterbalanced by strong reassertions of harmonic fundamentals. The first non-harmonic pitch appears in the first *neuma* of section 4.

Ex. 12 *Prologue*, subsection 4a and 4b (object 1)



[45] It is perhaps useful to recall that the term 'non-harmonic' refers to pitch material which is not part of the spectrum used in a specific episode.

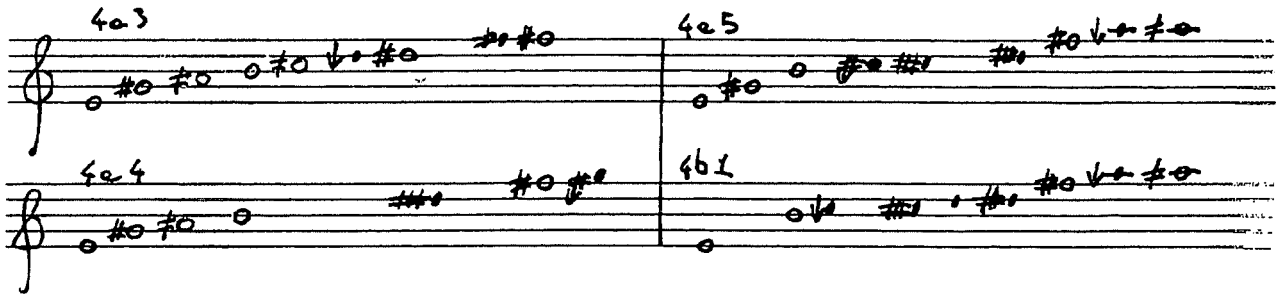
From the harmonic point of view, the *neuma* is organised into two clearly distinguished sections. The first section consists of the six initial pitches, that correspond to the three overtones closer to the fundamental. They are disposed in two identical successions G sharp–E natural–B natural, in order to enhance the sense of stability counterbalancing the destabilisation of the first non-harmonic pitch D natural. The positioning of G sharp at both extremes of the dynamic curve of this section of the *neuma* adds a further element of symmetry, and reasserts a strong connective link between the harmonic pitches. The non-harmonic D natural is displayed as stressed pitch, and followed by distant harmonic overtones in a very regular closing line. Exactly the same harmonic material is used in the initial section of the following *neuma*. However, in this case the harmonic fundamentals E natural–B natural are displayed as stressed pitches of the object. The initial repetition of G sharp represents a connection to the previous *neuma*, which starts with the same pitch. The non-harmonic D natural is displaced in a dynamic position less relevant than the one in the previous object, and is followed by a similar choice of distant overtones.

The two objects are strongly linked by a substantial similarity of the general pitch content, which is identical for what concerns the first seven pitches, and presents a variation of only two pitches out of the total of eleven for each *neuma*. As a matter of fact, the main variations of the perceptual structure of the two objects are given by the displacement of the dynamic curve, which leads to an alteration of the stressed pitches.

Similar connections between the *neumas* owing to pitch content can be pinpointed in the two following pairs of objects. The substantial difference is that *neumas* 3 and 4 of this subsection are linked by the harmonic content, whereas *neumas* 5 of subsection 4a and 1 of subsection 4b are linked also by their non-harmonic content.

Moreover, in this last pair, the identity of pitch content is extended to pitch order and register, so that the beginning of subsection 4b really marks the non-harmonic material as structurally fundamental for the first time in the piece.

Ex. 13 *Prologue*, pitch identities in subsections 4a and 4b



This, as suggested above, happens at the beginning of a subsection (that is, after a medium-long breath), but well in the middle of the development of the section, so that the contradiction to the general system and to the clearly identifiable organisation produced by it is evident, and adds richness to the formal articulation. In the last two objects, the dynamics contribute greatly to render milder the transformation of the material, by clouding the relevance of the identical line of non-harmonic pitches through a decrescendo with no stresses, whereas the last *neuma* of subsection 4a displayed two dynamic peaks of non-harmonic material.

The complete disruption of the initial stability of the piece is obtained gradually. For this reason, the piece presents two climactic points, the first one at the end of section 4, the second at the end of section 6, when the process of destabilisation is completed and noise has replaced clearly analysable sounds.

The first peak of tension and instability is reached by means of mainly three techniques

- Introduction of non-harmonic material
- Displacement of the objects towards higher registers, thus increasing the span of register occupied by the melodic lines and producing more fragmentary curves owing to the wider intervallic leaps
- Increase in the dynamic level (from pianissimo to forte)

All these elements, which have already been analysed in the details of the single objects and structures, reach a first climactic stage at the end of section 4. However, none of them has attained here the maximum of its destabilising potential, which will be exploited later in the piece, after the introduction of three further devices that have been holding a secondary role until the end of section 4. They can be summarised as:

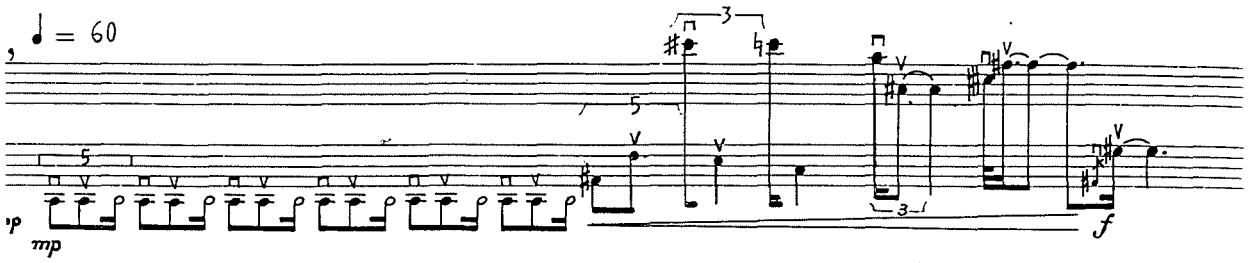
- Gradual disappearance of the iambic rhythmic cell
- Proliferation of the tremolo structure
- Introduction of timbral effects aimed to disrupt the clarity of sound

These elements obviously interact with the ones already set in motion in the previous part of the piece. The final subsection of section 4 shows some clear instances of this interaction. The fourth *neuma*, which follows five repetitions of the iambic cell, is presented in an extremely peculiar form, since it displays a complex rhythmic structure that is absent in the normal exposition of the melodic lines.

The rhythmic structure has two fundamental and contrasting features: a) each component is of different duration, so that any precise regularity is banned; and b) it is most clearly divided into duplets, each displaying a short–long rhythm that recalls

evidently the iambic cell. This reference is also stressed by the up beat–down beat scheme of each duplet.

Ex. 14 *Prologue*, subsection 4d, objects 4-5



This superimposition of the rhythmic iambic cell on the extremely fragmented melodic line of the *neuma* produces the effect of disrupting the sense of regularity conveyed by the repetitive rhythm. The iambic cell is still present in the piece in its original form, but it starts to appear also in different forms that undermine its function of solid reference point.

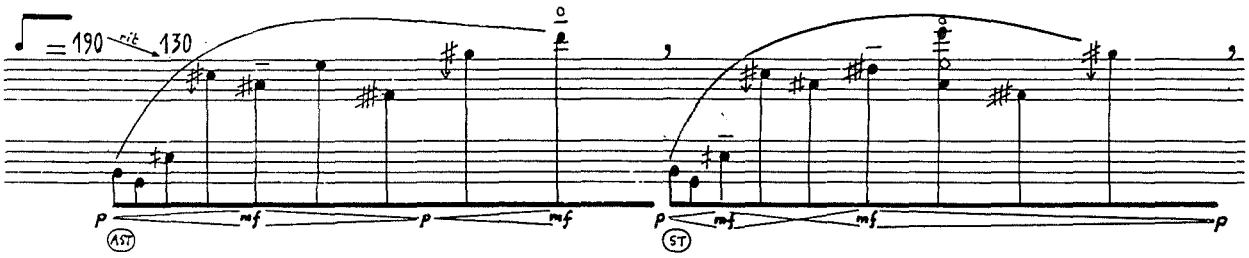
The last appearance of the iambic cell in its regular form is at the beginning of section 5. Thereafter its role is undermined either by curtailing the number of repetitions, or by increasing the speed of each cell,[46] or again, by blurring the difference with the non-harmonic and irregular melodic lines.

Section 5 appears to play the role of completing the obliteration of all the elements of stability, in order to introduce the final development towards noise carried on in section 6 through faster tremolos and glissandi. In section 5 the transition from harmonic to non-harmonic is completed: the initial *neumas* of this section are actually

[46] See also the end of the third subsection of section 5, when the iambic cells are repeated in a faster diminuendo that ends a melodic phrase, thus assimilating the cell to the melodic line.

completely non-harmonic with the exception of pitches E natural and B natural, which are irregularly inserted at least once in each object in order to recall the roots of the fundamental spectrum.

Ex. 15 *Prologue*, section 5a, objects 1-2



The iambic cell is obliterated during this section, in the way that has been described, while the tremolos start to pervade the music. Here, the pitch content of the tremolos often consists of a set of more than two pitches arranged in descending scales, thus adding irregularity to the structure.

The gradual introduction of more perceptually powerful destabilising elements is counterbalanced by both dynamics and speed. This section is the only one in the piece where *neumas* are played *rallentando*,[47] while the dynamic peak has decreased to mezzo forte. This means that the tremolos at the end of many *neumas* are played as if in slow motion, thus counterbalancing the increasing irregularity of the pitch content.

The analysis of the piece clearly highlights how the notion of sonic object is fundamental to Grisey's compositional technique. The interrelation of the parameters within the individual objects is complex and based on elements that are extremely variable in structural relevance. At a local level, however, the compositional strategies of Boulez and Grisey do not seem to display a substantial difference, other than the

[47] From 190 to 130 in each *neuma*.

choice of primary sound parameters and, especially, the amount and complexity of their interrelations. The distance between the two composers is due less to the technical means used in the compositional process than to aesthetic convictions.

Vortex temporum

The twenty-year gap that divides *Prologue* and *Vortex temporum* does not appear to have made a substantial change to Grisey's compositional technique. The notion of process still represents the hinge of the formal organisation of the piece. In the case of *Vortex temporum* the processes displayed are in certain cases less immediately discernible than in *Prologue*. This might be due to the greater complexity of the instrumentation, but it is also the result of an attempt to produce a more varied musical discourse, an attitude that has become increasingly common among spectral musicians over the last two decades.

a) Part 1 – process

The formal model of the piece is expressed clearly in the title. The idea is to follow the gradual metamorphosis of an original melodic cell passing through a sort of temporal vortex.[48] The distortions of the cell affect not only the perception of time, but also that of all the other parameters so that temporal modification becomes the fundamental element of the musical discourse, in a way which is consistent with the theoretical ideas expressed by Grisey in his writings.

[48] In the words of Grisey: '[...] the emergence of a figure of swirling and repeating arpeggios, and its metamorphosis in different temporal fields' ['[...] la naissance d'une formule d'arpèges tournoyants et répétés et sa metamorphose dans différents champs temporels'] (in Hervé, 2001: 15).

As in *Prologue*, Grisey defines some basic formal figures that can be an effective reference for perception and therefore can clearly articulate the sections of the piece. In the case of *Vortex temporum* the most important of these figures is the melodic cell displayed at the beginning of the piece, which is derived from a melodic figure in Ravel's *Daphnis et Chloé*. Once again, only the general shape of the melodic line is maintained as perceptual reference, a *gestalt* which recalls the conventional image of a sinusoidal wave.[49] The same *gestalt* underpins the entire first part of the first movement, which is conceived as a sonic representation of the sinusoidal line on a larger temporal scale.[50]This effect is obtained through a subtly elaborated interpolation of different processes, each developing in a precise register and subdivided in sections which are rhythmically transformed at a constant rate. The result of the interpolative elaboration of the processes is that the original melodic cell, gradually distorted and finally obliterated in the unfolding of the individual processes, tends to reappear slowly in the overall formal organisation of the piece, and is therefore displayed in a different time scale (see Ex. 16). A similar compositional technique is used throughout the rest of the piece. Models of formal organisation are found in schematic representations of sonic waves and presented in the score through the same kind of interpolation of processes. However, as already mentioned in the case of *Prologue*, in Grisey the reference to external models and the elaboration of the combinatorial procedures do not generally appear to be relying on a strict logical consistency. The choice of the visual representation of sonic waves as a formal model is simply aimed to find a clear and easily detectable reference for the organisation of a continuous and gradual evolution. A similar result is obtained with the use of Fibonacci series, which are present in many of Grisey's works, and also regulate some sections of *Vortex temporum*. Although the musical setting of the model is not always clearly perceptible, its aim is ultimately to

[49] See Baillet, 2000: 215.
[50] See Hervé, 2001: 25.

create a pattern that organises the development of the process, and therefore of perception. Grisey's approach is clearly devoid of abstraction, and the entire pre-compositional work appears to be far less complex with respect to that seen in Boulez. Although the organisation derived from Grisey's pre-compositional work is not less limiting than Boulez's, Grisey is not looking for strict theoretical consistency in the material he is using in the music. In a way, the choice of a model that is simple and easily perceptible does not need, in Grisey's view, any logical justification. The coherence of the system is assured by the reference to allegedly natural fundamentals and especially to the perceived outcome.

Vortex temporum consists of three movements. The first movement is divided into three parts, each defined by the reference to a different model of sinusoidal wave.

Each part of the first movement displays a process of transformation from a status of regularity and stability to an increasingly chaotic condition.[51]

The first part, as mentioned above, refers to the sinusoidal wave as model for the general formal organisation. In this case, since processes unfold within a specific register which is a clearly perceptible sound parameter, the abstract model is almost audible in the actual musical setting. On other occasions, the interpolated processes are characterised by elements that are far less perceivable, so that the abstract model becomes a mere device for creating a progressive fragmentation of the musical discourse.

The first part of the movement features elements that in many aspects resemble *Prologue*. The process is based on a melodic cell repeated regularly at the beginning and undergoing a progressive distortion through the displacement of rhythmic accents. This is obtained by systematically subtracting elements from the set of eight initial pitches (see Ex. 17).

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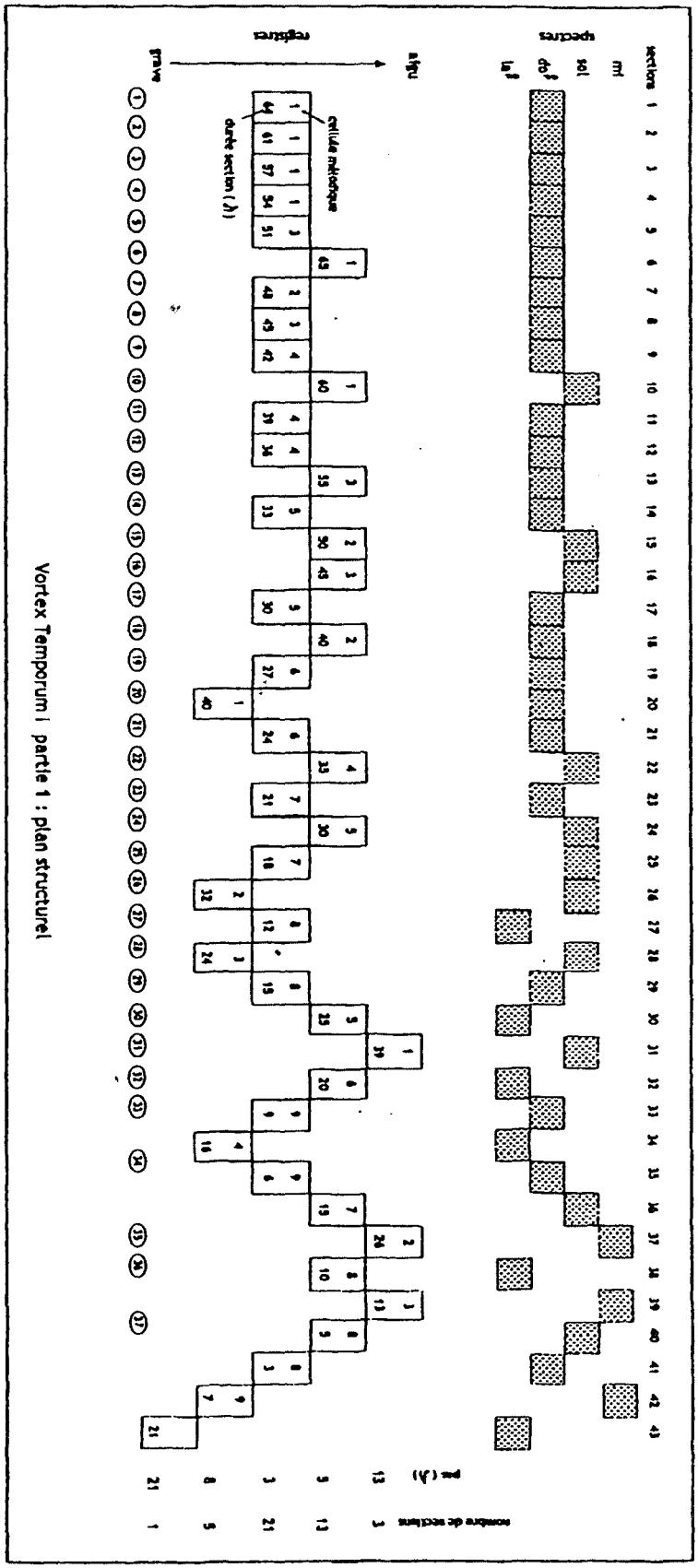
[51] See Hervé, 2001: 22.

Ex. 16 *Vortex temporum*, part 1, interpolation of processes (from Baillet, 2000: 214)



Furthermore, silences are inserted irregularly into the melodic cells, obliterating even more pitches and increasing the complexity of the music's inner articulation.

The line of the melodic cell holds a primary role and, with respect to *Prologue*, rhythmic articulation has a clear predominance among the organisational elements. On the other hand, the harmonic content of the pitch sets is limited to a number of identical sets, which follow an alternating pattern independent of the one of the four interpolated processes (see Ex. 16).[52] This creates a potentially complex system of connections between pitch sets that reappear as refrains within this part of the piece. The effect of stability given by these repetitions is undermined progressively both by the increased number of alternations of different pitch sets and the evolution of the processes, which determines a gradual diminution of the pitches in the set, and therefore an ever increasing difficulty in identifying the repetitions.

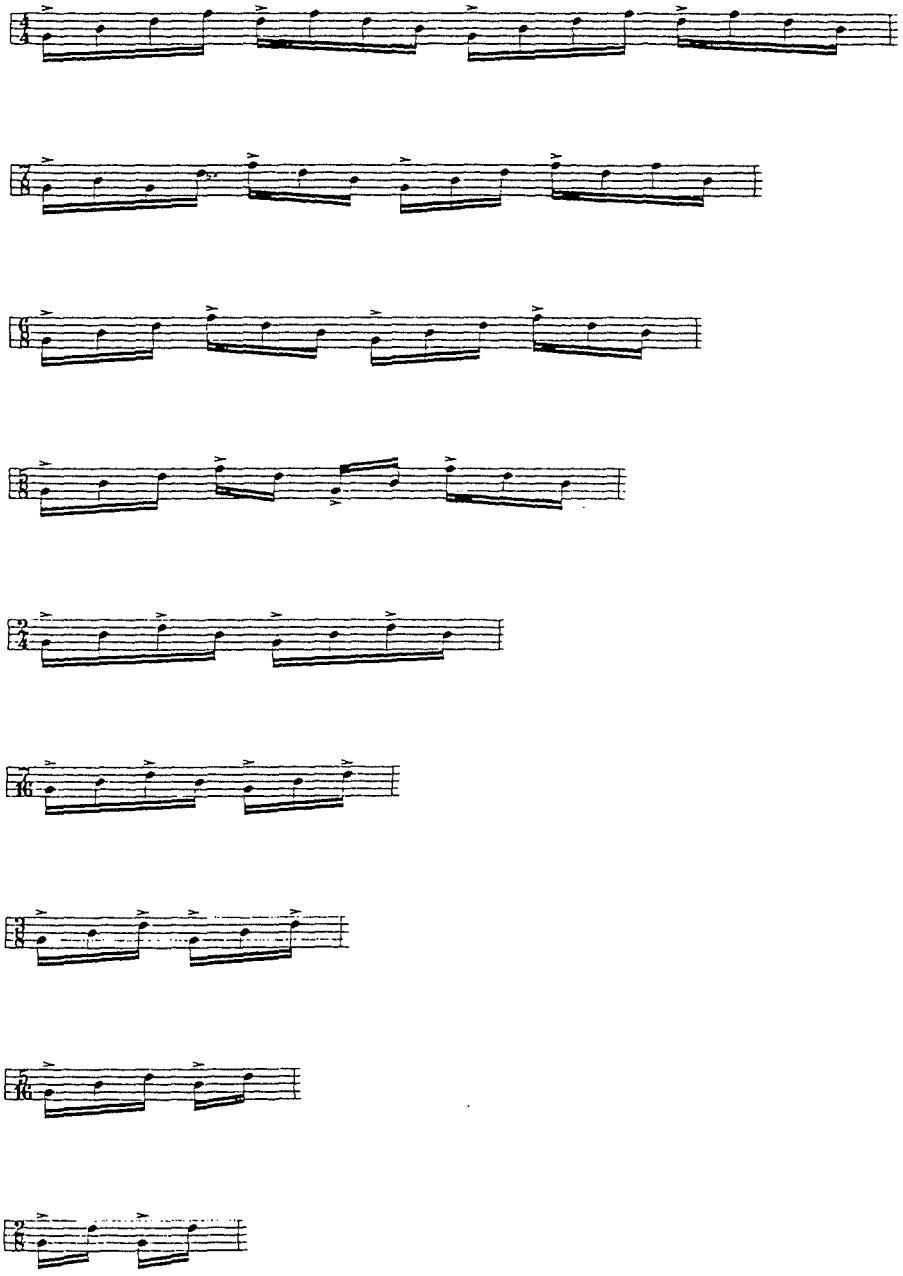
Furthermore, the harmonic development is influenced by the rhythmic shaping of the phrases produced by stresses and silences. This gives perceptual dominance to specific pitches and creates temporary harmonic hierarchies within the melodic cells.

As mentioned above, the processes are subdivided into sections, which are most clearly outlined in the music by the dynamics: each section is played diminuendo, from fortissimo to pianissimo. However, as it will be shown later, within each section the melodic cells are also organised in phrases delimited by silences, thus creating a contrast with the apparent unity of each individual section.

The harmonic material of the melodic cells in this part of the piece is entirely derived from the spectra of the pitches C sharp, E natural, G natural, A sharp.[53] The four pitches form a diminished seventh, which is often present in the piece as a reference model for the choice of sets of spectral fundamentals. The 'rotational' attitude of this chord suits the general idea of the piece and adds to the circular character of the musical

[52] See Baillet, 2000: 217.
[53] See Baillet, 2000: 217.

Ex. 17 *Vortex temporum*, temporal distortion of the original cell (from Harvé, 2001: 24)

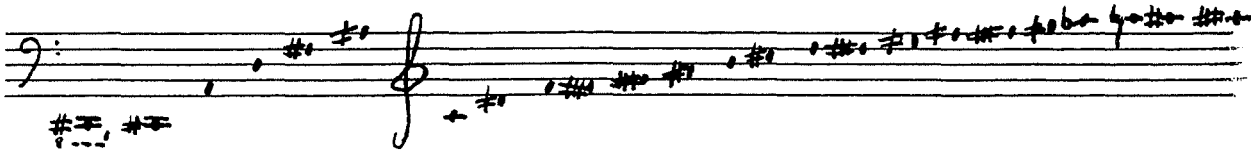


material in this part[54], where pitch sets derived from different spectra are often linked by a partial identity of the content.

However, the spectra are not presented in the harmonic form, but they are all distorted so that the second overtone is a quarter of a tone higher than its harmonic version.

The stretched spectra have the obvious characteristic of maintaining a connective link among the partials while blurring their inner hierarchy, since perceptually the fundamental sounds as if it were displaced to a higher frequency.[55]

Ex. 18 Stretched spectrum of C sharp



b) Part 1 – objects

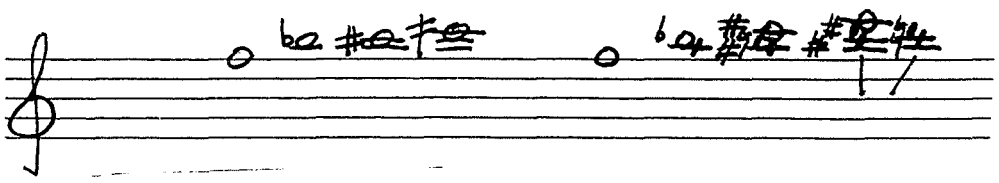
The choice of the harmonic material for the melodic cells does not seem to have an evident consistency. The melodic material that opens the piece consists of three tetra-chords formed by the superimposition of thirds and fourths. Each tetra-chord is played by a single instrument (flute, clarinet and piano), and incessantly repeated, producing a constant flow of circular recurrence of the same motive. The pitch material is derived

[54] *Ibid.*
[55] See Fineberg, 2000c: 125.

from the stretched spectrum of C sharp, in a way that seems consistent with a technique already described by Fineberg.[56]

The organisation of the melodic cells seems to be especially aimed to produce a line consistent with the circular character of the section. In any repeated pattern, the extremes acquire an immediate relevance. In this case the regularity of the incipit is stressed by a close similarity in the intervals (perfect and augmented fourth) produced by the first and last pitch of each repeated cell. The perceptual result is that of a superimposition of three melodic lines that interact randomly in their inner structure, but substantially match in the intervallic span that encloses them. The predominance of the flute line is highlighted both by the register (the raised E is the highest pitch of all the sets), and by the cluster figure played by the piano, which displays the pitches of the flute line embedded in intervals and chords including almost entirely the whole chromatic scale.

Ex. 19 *Vortex temporum*, part 1, section 1: pitch material of flute and piano cluster



[56] 'Besides building harmony/timbres from the acoustically-based models provided by spectra, many spectral composers use these models as reservoirs. They sometimes treat these reservoirs as modes, from which lines and harmonies can be constructed: the power of this system comes from the fact that acoustic models can generate very large numbers of frequencies (and through approximation, pitches) which can be combined with each other while still guaranteeing an overall coherence. This allows a single underlying structural entity and colour to create a proliferation of surface manifestations which are coherently related' (Fineberg, 2000b: 99).

All the pitches of this figure are obviously part of the basic spectrum of the section, but the tempered tuning of the piano does not allow for a higher level of compression of the cluster. This is also the reason why the E, which is raised in the melodic line of the flute, is substituted with E natural in the piano part.

The piano cluster has the precise function of highlighting the beginning of every section based on the spectrum of C sharp. While the different sections of the processes are defined by dynamics, as indicated above, the alternation of different spectra in the piece is stressed by the intervention of either the piano or, for the three spectra different to C sharp, by the strings, usually playing pizzicato chords. The perceptual result is that of stressing the function of the C sharp spectrum as fundamental source of pitch material, and also to enhance the function of stabilising refrain carried out by the original melodic cell and its harmonic material. As a matter of fact, in the first sections of part 1 the spectrum of C sharp is used in more than one process, so that different material has to be deduced from it in order to ensure the change of register. Also, in those cases, the resulting melodic line undergoes only minimal variation, so that the original cell remains detectable. In the second part of the section, when the evolution towards chaotic fragmentation is well on its way, the C sharp spectrum and the first, longer process are always associated, so that a regular reappearance of the original cell is guaranteed (see Ex. 16). The cluster in the piano part is an effective device for endorsing the perceptual identification of this stabilising repetition. As in *Prologue*, stabilising elements and unsettling elements interact to create an inner articulation of the music, which is much more complex than the linear organisation of the processes outlined in the formal plan.

The repetitive pattern of the melodic line is articulated by: a) silences, b) pitch set variation in both size and harmonic content, and c) stresses giving perceptual relevance and structural dominance to specific pitches. Whether the composer has

individually inserted the silences within the melodic cells or this is a process controlled by a yet unveiled system, the result is an often strikingly organised polyphonic structure formed by flute and clarinet. The piano melodic cells are unaffected by silences, and represent a sort of continuo sustaining the upper lines (this organisation could somehow recall the formal categories of accompaniment/melody in traditional musical language). Grisey's attitude towards tradition, which has been discussed at the beginning of the chapter, is well exemplified by this instance of coexistence of melody and spectral compositional techniques. The distinction of melody and harmony is blurred here by the notion of spectrum, which supposedly should produce a stronger cohesion between the individual pitches, to the point of obliterating their perception as singularities. But this is not always the case, even because pitches are generally an approximation of the partials constituting a spectrum, from the point of view of frequency, duration and amplitude. The resulting perceptual sensation is an harmonic colour more than an homogeneous timbre. In the case of a stretched spectrum, the lack of a clear fundamental enhances this sensation and confers more importance to the pitches in relevant position.

The continuo of the piano displays two elements to which it is possible to confer some kind of functional value: the F sharp, which is the lowest pitch in the initial sections and therefore can be perceived as a sort of fundamental, and the repetition of the interval F natural– B flat, which is the interval enclosing the dominant melodic cell of the flute (see Ex. 20).

A similar function of basic sustain is fulfilled by the long notes played on occasions by the string section. They last for the entire length of the section and usually consist of one of the first partials of the spectrum. The first appearance of such an element is the A natural, third partial of the stretched spectrum of C sharp, in section 3 (see Ex. 20).

The regularity of the melodic pattern is already undermined in section 1 through the use of silences. However, the final perceptual result is that of highlighting fundamental pitches of the cell, so that a sense of stability is maintained notwithstanding the interruption of the repetitive flow. The section is divided into two phrases by the interruption at the end of bar 3.

The silence produces a clear cadence effect from B flat to F natural. This is owing to the stress put on the descending line raised E–C sharp–B flat–F natural by the silence between C sharp and B natural. Since it rests on the downbeat of the last tetra-chord and it is immediately followed by a silence, C sharp acquires a dominant position. The tension accumulated is naturally, or conventionally, resolved by the B natural on the last upbeat of the tetra-chord descending on F natural. The normal resolution of the melodic line is simply stretched in time and interrupted by the silence, with the obvious result of creating tension through rhythmic hierarchies. Paradoxically, C sharp is actually the fundamental of the spectrum used in this section, but its function resembles here that of a dominant. It is possible that Grisey has tried to avoid an excess of hierarchy precisely by using this technique. The second phrase of the section ends up being a sort of liquidation: the tension accumulated in the previous bar has been resolved, and the entire phrase is nothing else than a repetitive prolongation of the previous melodic pattern in the last section of the diminuendo process.

The sense of conclusion of the phrase in the dominant line of the flute is further enhanced by the clarinet, which presents a similar interruption given by a silence at the beginning of bar 4. This does not seem to produce cadence effects, since there is no linear descent. On the contrary, the leap between the downbeat raised A and the upbeat raised B produces the effect of an anacrusis starting a new phrase. Only, the rapid conclusion of the second phrase exactly on the same note of the previous one produces a

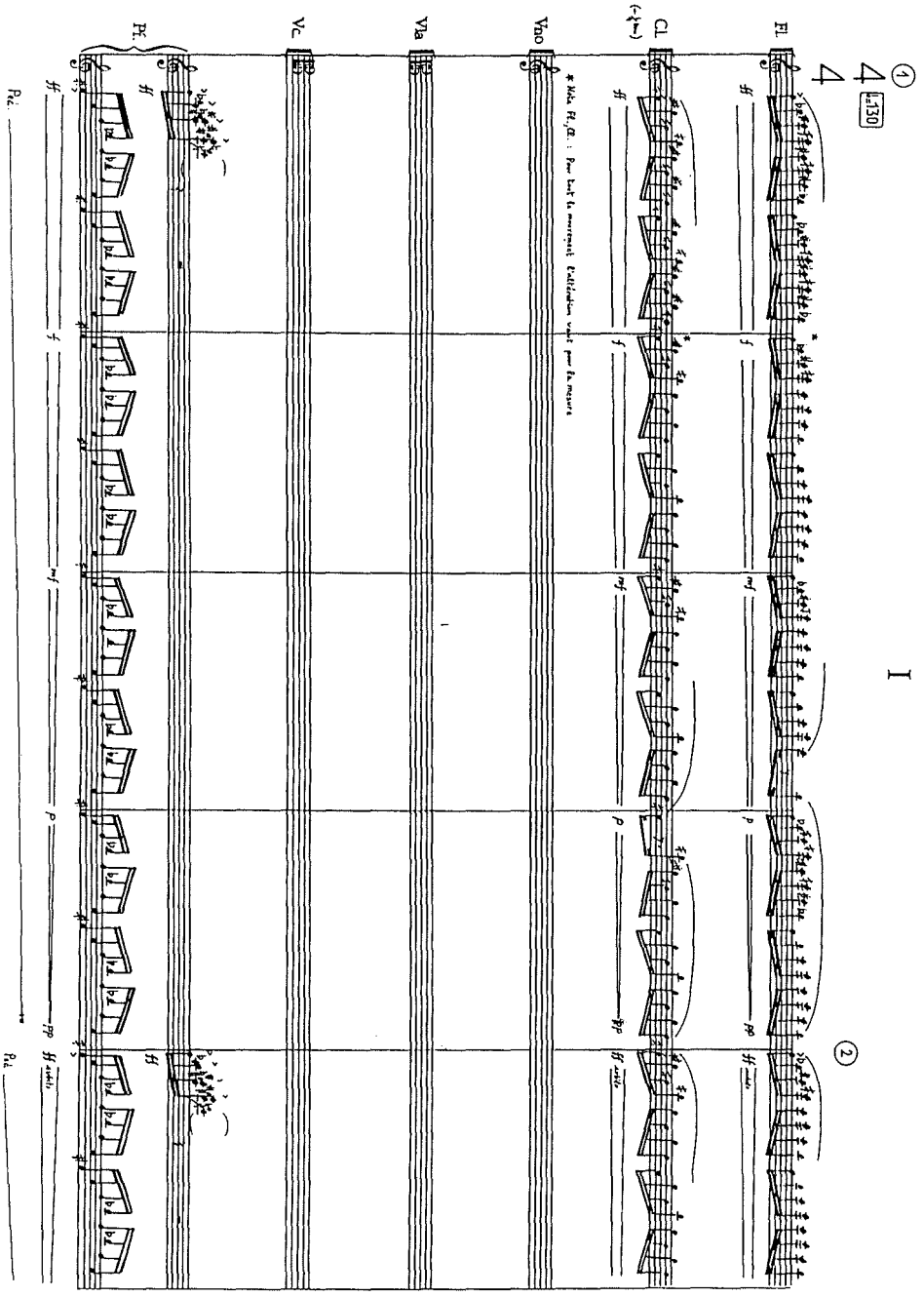
sense of repetition, stressed by the dynamic descent. The second phrase becomes a fading echo of the previous melodic pattern.

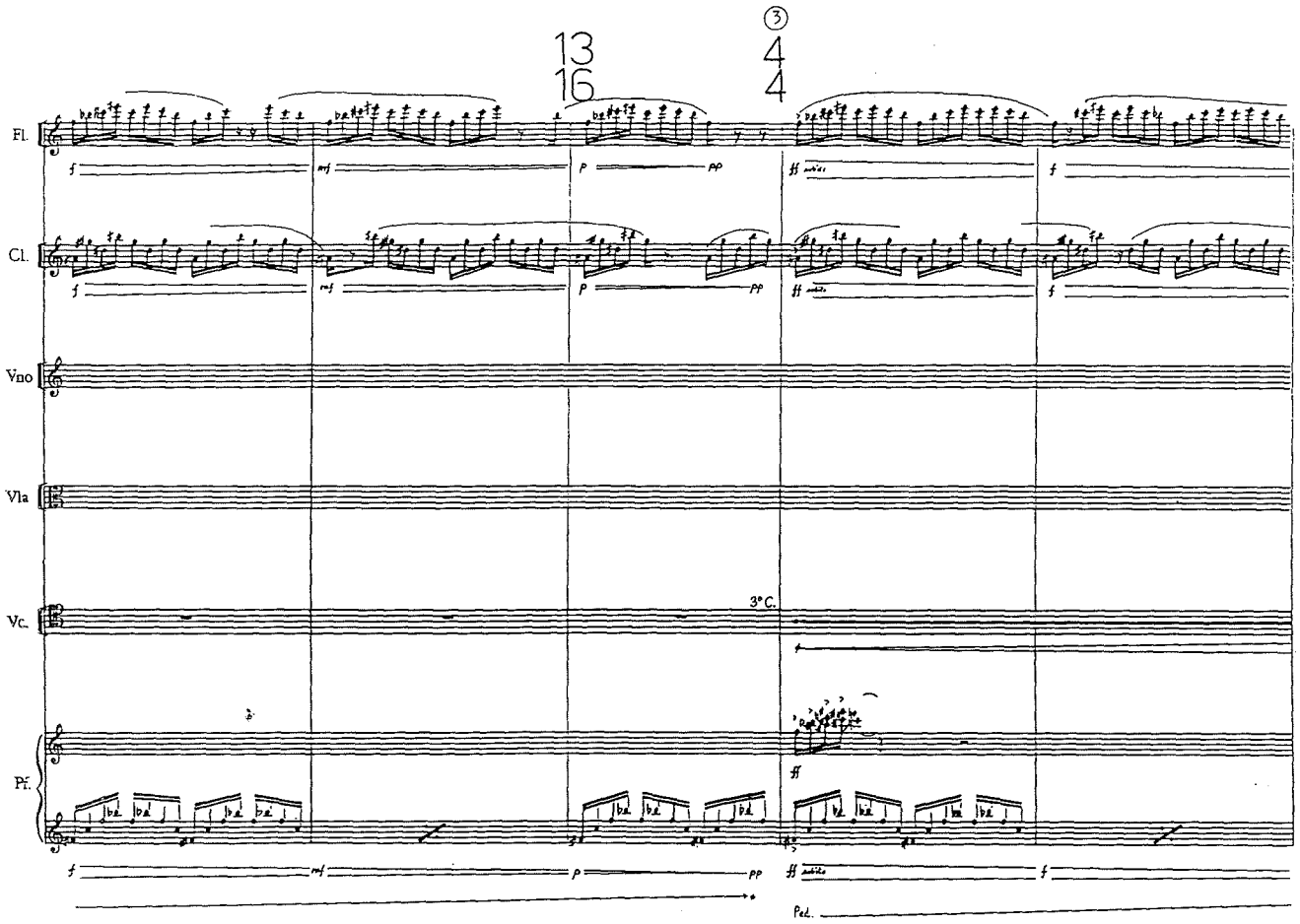
A similar effect is achieved in the following section, where the two dynamic lines are slightly displaced so that the melodic line of the flute disappears on the first pitch of the last figure in the line of the clarinet.

The latter is divided into three phrases, which end respectively on raised A, G natural and G natural followed by raised A in the following section, so that a cadence effect is produced. However, in this case the last phrase does not appear as a mere fading echo of the preceding one. On the contrary, the disposition of the previous phrases makes it sound like a conclusion of the first phrase in the section, after the interruption produced by the second phrase. In fact, the latter is delimited by two silences, and generates an effect of suspension by dislocating the stress from the pitch with which this section is usually associated (raised A), to the raised G sharp, which bears the secondary accent in the original cell of the clarinet. This produces an effect similar to an incomplete cadence in tonal music, where raised G sharp functions as a dominant and raised A has the role of a stabilising tonic (this is also owing to the register position of the two pitches, that generates a descending progression on the 'tonic'). This is further evidence of the primary role in the definition of tonal functions of parameters considered secondary by the theory. Effects of tension dominant–tonic can be produced without a specific connection of pitches.

A similar effect of suspension is obtained in the line of the flute. The raised E, rhythmically weak in the original cell, is brought to a perceptually prominent position by making it the delimiting pitch of the second phrase. Furthermore, it is part of the ascending line C sharp–raised E which is made perceptually evident by the conclusive role attributed to each pitch for, respectively, phrases 1 and 2. The silence following each pitch at the end of the phrase has the effect, among others, of implicitly prolonging

Ex. 20 *Vortex temporum*, part 1, sections 1-3

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16
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4
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Fl.
Cl.
Vno
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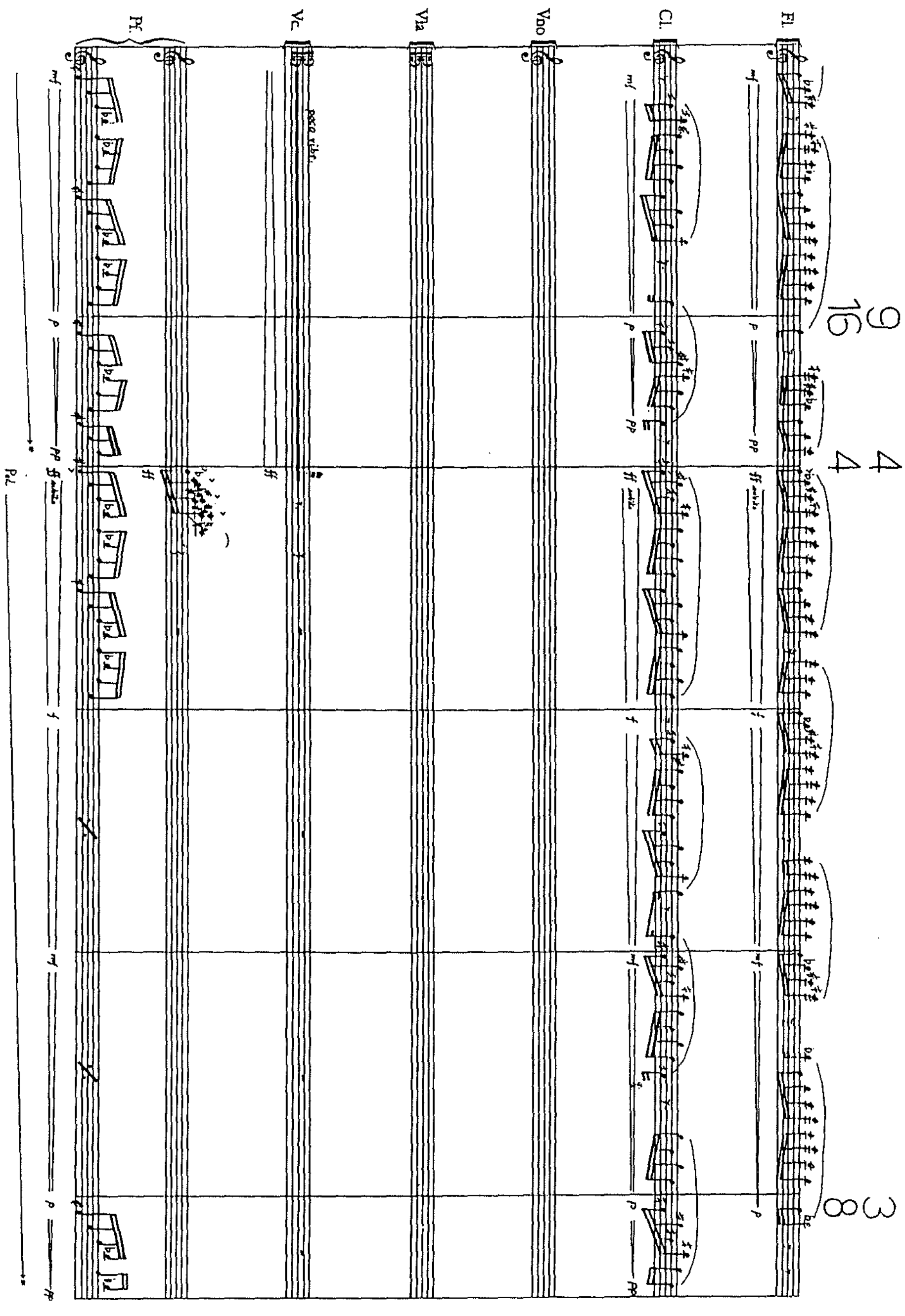


Fl.
Cl.
Vno
Vla
Vc.
Pf.
9
16
④
4
4
3
8
poco vibr.
mf
p
pp
ff
f
Ped.

its duration while the ear waits for the following pitch. The last phrase of the flute's line is another instance of the cadence effect produced by the succession B flat–F natural. In this case the effect is milder owing to the displacement of the phrase in the section. The last four beats of the section are silent for the flute, while the clarinet takes over with the last figure. The overlapping of flute and clarinet on the first pitch of this last figure partially softens the unsettling effect of its awkward rhythmic subdivision in five beats, which is inconsistent with the rhythmic organisation in tetra-chords of the entire section.

It must be remembered that the subdivision of the sections in phrases is clearly outlined by Grisey in the score through slurs. Consequently, the articulation of the phrases as self-contained units interacting with one another is clearly determined by the composer, without possible ambiguity.

The entire first part of this movement unfolds in a similar way, and its organisational structure is enriched by the introduction of different rhythmic figures (which are necessary in order to reorganise the diminishing pitch sets, owing to the development of the processes), and of different harmonic sets that can obviously create connections through repetition.

An instance of the exploitation of this possibility occurs in sections 29–30 (see Ex. 21). Section 29 is based on the spectrum of C sharp, while section 30 derives the harmonic material from the spectrum of raised A.

The two sections belong to different processes, therefore their register should be different. As a matter of fact the shift in register consists of a minimal displacement of the highest and lowest pitches of the flute and clarinet, whereas the piano register is more substantially altered.

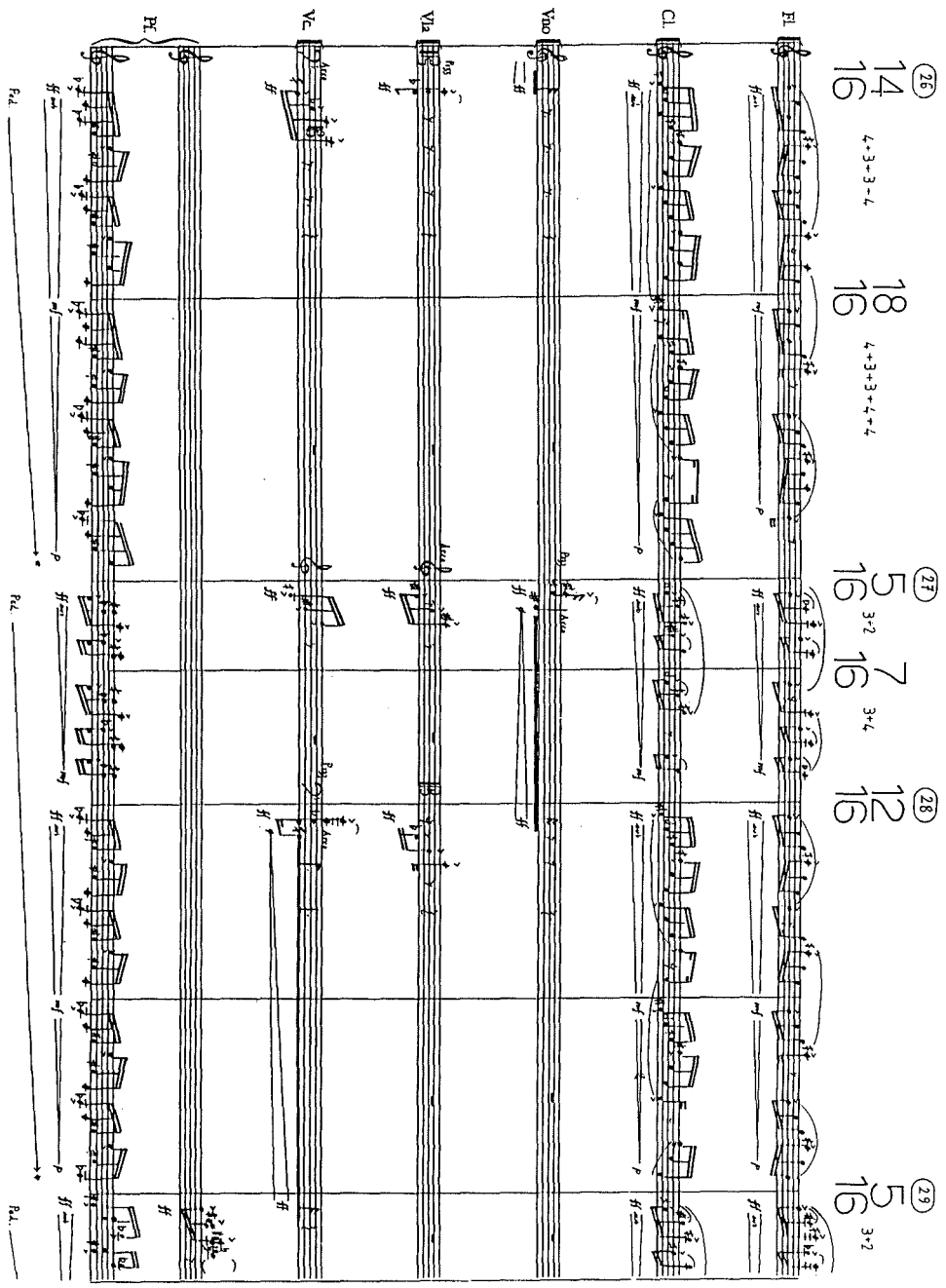
The two sections present a completely different structure, much more articulated in section 29 than in section 30. At this point the development of the processes has reached a stage where the number of pitches in the melodic cell has substantially

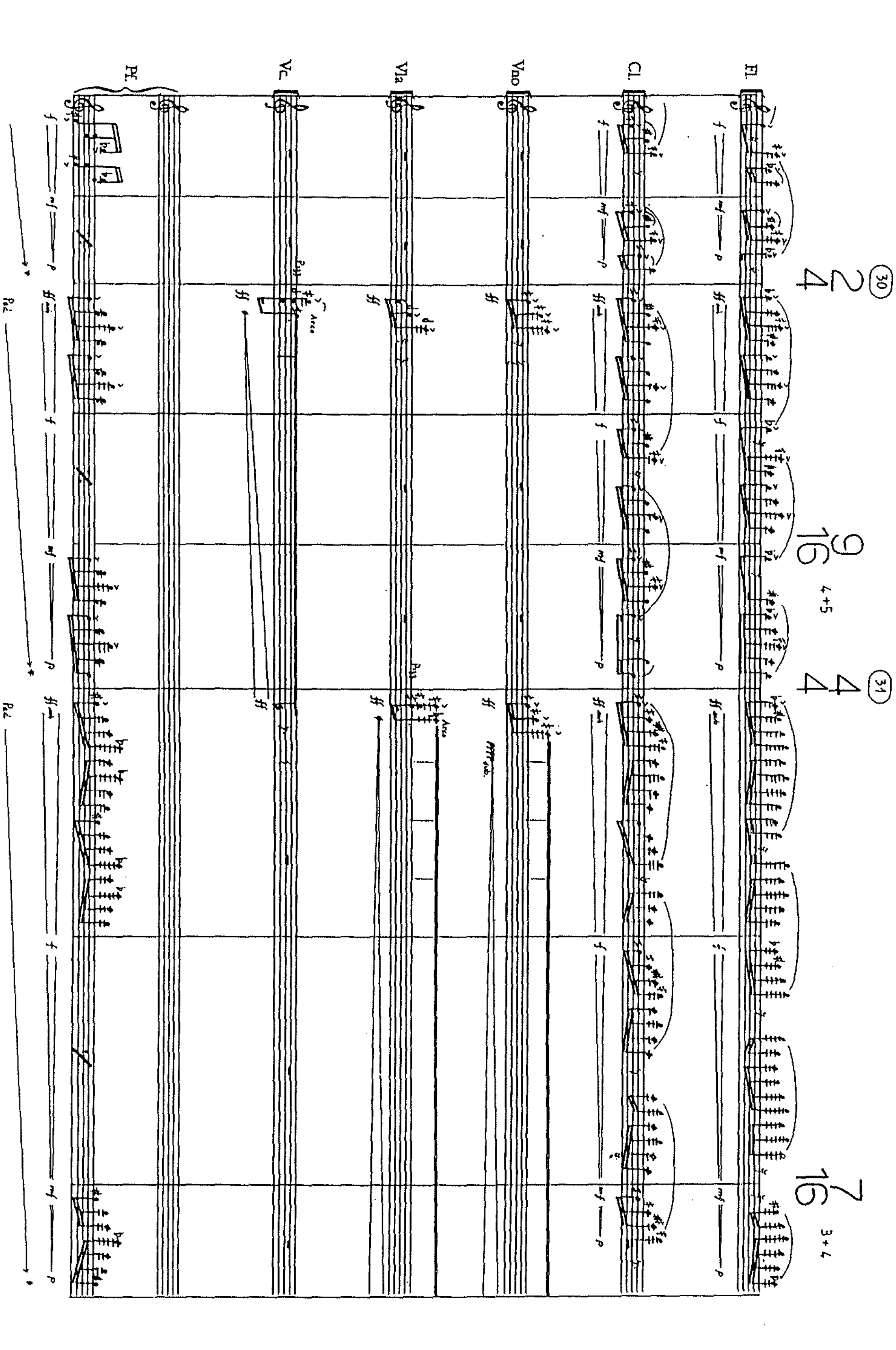
diminished, and consequently the rhythm of quadruplets has been substituted by figures of triplets and duplets in the flute and clarinet parts. Section 29 is rhythmically complex and not completely fluent. The section is divided into two phrases, of which the last one provides a smooth introduction to the rising register of section 30. The first flute phrase of section 29 presents the typical circular structure, starting and finishing with the same F natural. However, F natural does not seem to be the dominant pitch of the section, since its relevance is overshadowed by the duplet raised B–E flat. The consequent dynamic stressing of this duplet breaks the natural flow of the phrase, creating the effect of a descending line raised E–B flat–F natural more than a tense cadence effect. The following phrase further enhance the dominance of the duplet by concluding exactly on its last element: B flat. This procedure generates a sense of suspension, accentuated by the silence that follows the last B flat. Section 30 refers to a different spectrum, but the pitch B flat is common to the harmonic material of both sections. B flat is constantly repeated in section 30 as the centre of the circular movement of the melodic cell, and its relevance is stressed by the positioning of the silences that always follow it. Section 30 seems to be a prolongation and reassessment of the B flat as dominant pitch.

The clarinet part presents a similar development. In section 30 it displays in dominant position (beginning of the phrase, lowest pitch, rhythmic conclusion of the phrase) the raised B which is a dominant pitch of the complex structure in section 29. The general effect is to endorse the sense of prolonged conclusion already described in the flute part. Sections 29 and 30 result in being connected using the structural potential of repeated pitches.

The structure of part 1 of the movement is entirely organised with the compositional strategies described above. However, some considerations about the actual perceptual results must be made. The instrumental organisation of the section is clearly meant to create two well defined layers, which I have defined above as harmony

Ex. 21 *Vortex temporum*, part 1, sections 29-30




Fl.
Cl.
Vno
Vla
Vc.
Pf.
30
31

and polyphonic melody. The choice to associate clarinet and flute is done not only for practical reasons of feasibility (both instruments actually do need breaths, so the piano was the obvious choice for a steady continuo), but also because of the timbral similarity of the two instruments that can be obtained when playing in the high registers. This and the high speed at which the section has to be performed produce an extremely homogeneous timbral texture. The individuality of the two parts is clouded, notwithstanding their rhythmic and melodic independence. This is one of the characteristics of any kind of polyphony, but in this case the similarity of timbre, register and dynamics creates the effect of an articulated texture. The role held by the identity of spectra in generating this perceptual result cannot be overlooked, but it must be said that similar outcomes are produced in the music of composers that do not make use of spectral techniques (for example the initial piano cadenza of Boulez's *Éclat*). The tension and distensions rhythmically produced that have been described above, tend to sink in the ceaseless stream of sound, allowing for the perception of only a general articulation of the texture and a fragmentary identification of reference points. As mentioned before, this should not be intended as an obliteration of the musical details, but as a particular compositional style that subtly conveys the synthetic sensation of a sophisticated organisation.

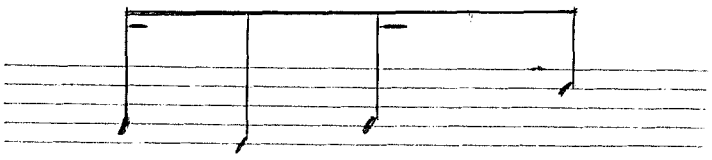
The music of the remaining two parts of the first movement is based on similar compositional techniques, although the final outcome appears extremely different. Grisey keeps using spectra as reservoirs for the creation of harmonic groups to be further organised through rhythmic and melodic figures. The objects are part of processes that gradually transform the relative regularity of the beginning to reach a status of fragmentation and disarticulation of the musical discourse. The formal organisation of parts 2 and 3 is based on the same principle of part 1: the gradual development of each process is subdivided into sections that allow a precise

interpolation of each structure. The result is as usual the blurring of the linearity of the transformation, in order to create a musical discourse more complex and rich in internal structures.

c) Part 2 - process

The material in the second part of the first movement is based on the same melodic cell of the first section. In this case, the melodic cell has been shortened (three pitches instead of four),[57] and rhythmically altered in order to obtain a complex articulation without loosing the circular character (see Ex. 22). In this case the sections of the five processes undergo a gradual lengthening, in contrast to what happened in the first part.[58] However, the distinction between the processes is no longer due to register, but to a set of elements that render the sections more individualised and characteristic.

Ex. 22 *Vortex temporum*, part 2, melodic cell



The entire movement is in fact a progressive development from musical objects that are clearly meant to disappear in the general texture to more individualised objects, so that their inclusion in larger structures is less effective. This is evidently an

[57] See Hervé, 2001: 29.
[58] See Hervé, 2001: 30.

organisational device meant to restate on a smaller scale the same destabilising effect produced by the alternation of the sections in the general process. Similarly to part 1, the progressive loss of unity is also produced by spectral organisation. The material of part 2 is generated only by contracted spectra, whereas the pitch content of part 3, the most complex and fragmentary, consists of spectra of all three kinds: contracted, stretched and harmonic.[59]

The distinction between the processes in part 2 is due to a) the amount and the kind of variation in the melodic line, b) the rhythmic organisation of the bars, and c) the number of instruments playing simultaneously. On this pre-compositional plan, one other organisational grid is superposed, which defines the spectrum and the span of register for each section.

It is evident that the number of variables is much higher than in the previous part. Not only are the objects more complex, but many of the elements brought into play are not controlled by the main system of formal development. The melodic figures that articulate the sections are variable, as is the disposition of the objects.

The perceptual distinction of the single sections is made more difficult by the lack of a dynamic line as well defined as it was in part 1. In part 2 the objects are inscribed in much longer connective lines, which often extend over more than one section.

d) Part 2 – objects

Sections 23/25 (49 in the score) are an instance of this (see Ex. 23). They appear after a section based on a very regular repetitive pattern. Two of the three sections are part of the same process, for they share the number of voices played simultaneously, the

[59] See Baillet, 2000: 219, 221.

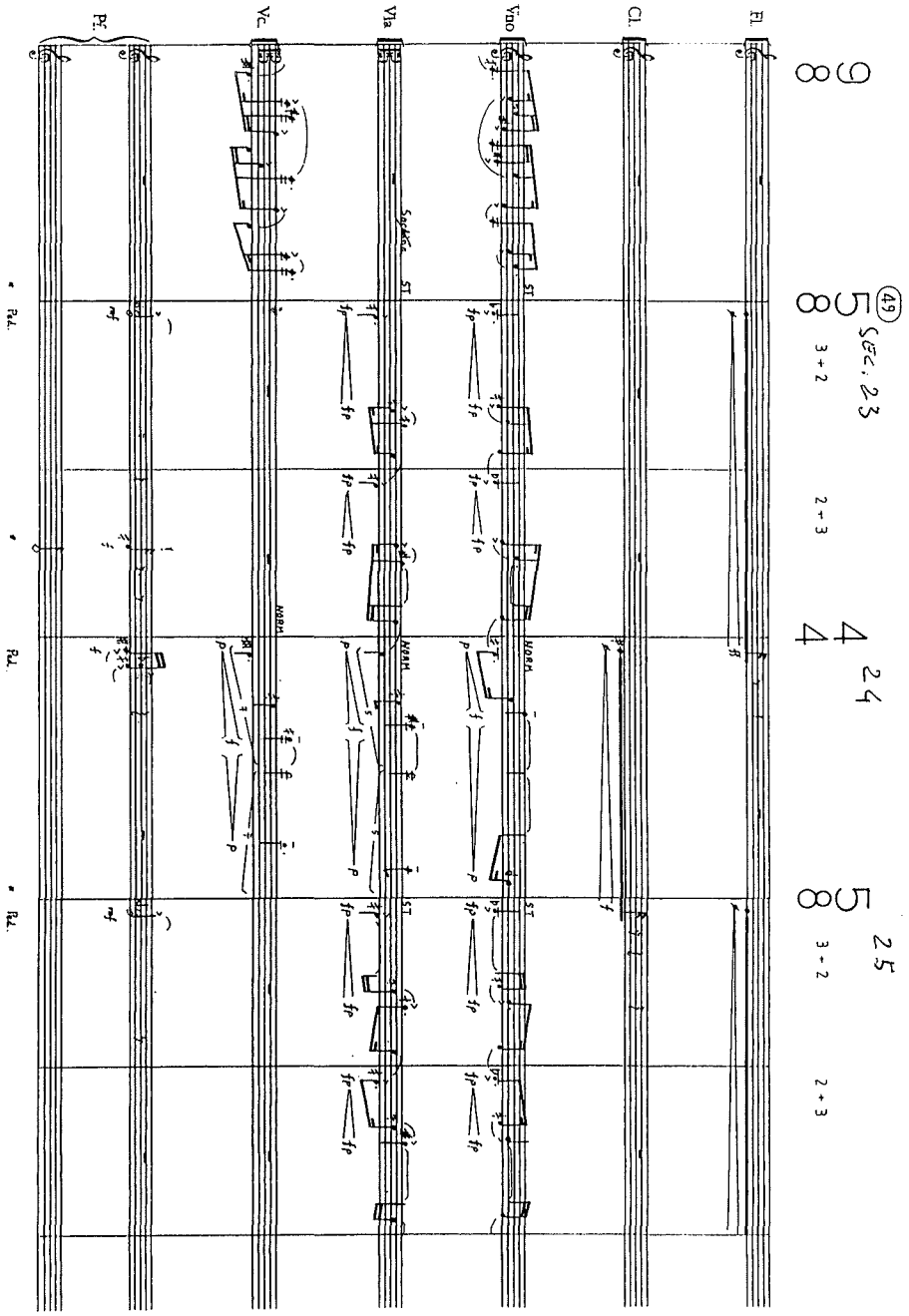
spectral source for the pitch content (D natural) and the degree of variability of the melodic line. Section 24 is part of a different process, and presents a higher number of voices and level of variability, with obviously a different spectral source (B natural). The choice of the pitches in section 23 could suggest a virtual fundamental E natural, since this is the note played both in the sustained part of the flute and in the basso of the piano. Furthermore, both B flat and G natural in the violin part (dominant for register position and pitches shared with other parts in other sections) are near overtones of E natural's contracted spectrum.

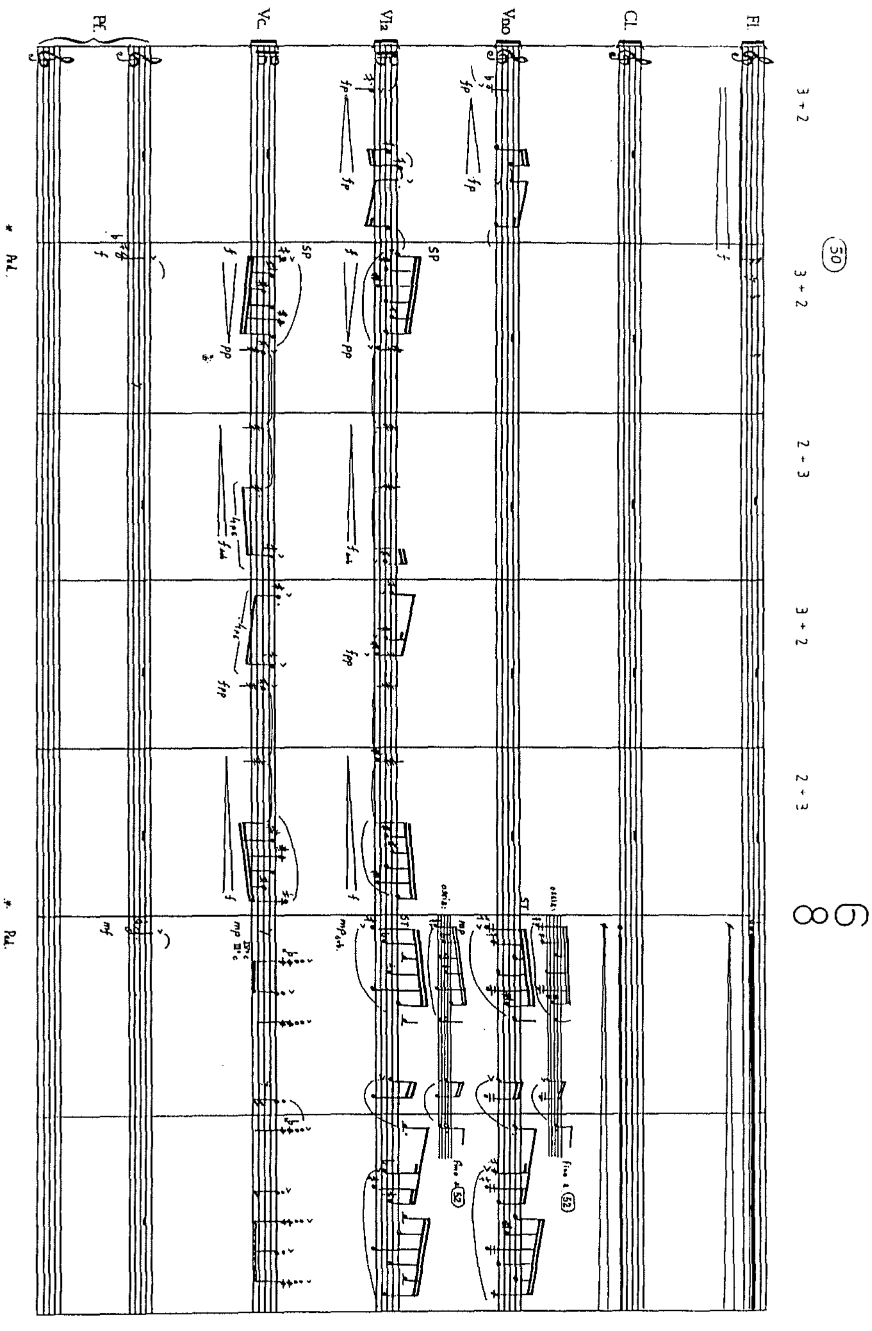
However, the approximation necessary to translate precise frequencies into a notation suitable for actual performance often renders difficult the accurate detection of spectral manipulations, especially when dealing with non-harmonic spectra, which can be altered in order to obtain specific pitches useful for the organisation of local structures.

The melodic organisation of the objects in sections 23 and 24 creates a clear connection between the sections, since the melodic interval of the two lines expands along with the span of register occupied. This development is accompanied by a rhythmical slowing down, produced through the lengthening of the melodic peak in each object. Section 24 is the climax of this development, since it displays the longest rhythmic value in all three sections. The fundamental pitch has changed, since the sustained note in the clarinet and the bass of the piano both present C sharp, which is also highlighted by surrounding frequencies played by the strings in dynamically and rhythmically dominant position. The piano bass also displays the two pitches more relevant in section 23 (raised D and B flat), so that a further connective link is created.

Section 25 presents the same material as section 23, since they are part of the same process. The difference between the two is given by the dynamic accents, which in section 23 were meant to highlight the linear progression raised D–E natural–F natural

Ex. 23 *Vortex temporum*, part 2, sections 23-25




Fl.
Cl.
Vno
Vla
Vc.
Pf.
50
51
3 + 2
2 + 3
6
8
SP
ST
Ped.

(in section 24). Section 25 presents an organisation of the dynamic accents which is consistent with the rhythmic articulation. There is no movement in this section, rather a conclusive reassessment of the familiar pattern that started the episode. The effect is of a momentary stabilisation that concludes a musical phrase in order to allow a further development.

Conclusions

The analysis of the details of Grisey's music substantially confirms what has been suggested in the theoretical discussion. The concept of pre-audibility informs the entire compositional process, since it is through a manipulation of the level of pre-audibility that the effects of tension and relaxation are obtained. However, a similar strategy, defined by a different terminology, is used by Boulez to determine his own musical structures. The concept of similarity, which is not clearly confronted in his theoretical output, but is evidently fundamental for his musical composition, corresponds substantially to Grisey's pre-audibility.

Even with regard to the means used to obtain the effects of tension and relaxation, the two composers do not seem essentially different. It has been seen that Grisey can count on the allegedly universal reference given by the sonic spectrum. However, the previous analysis makes clear that, in many cases, the pitch content of the objects is exploited less for its spectral characteristics than for the possibility to create connections of individual pitches. From this point of view, the problem of the necessary adjustment of spectral frequencies to the limits of traditional instruments becomes less

substantial.[60] In fact, the perception of the subtleties of spectral manipulation would be extremely complex even if the intonation were perfect. This does not necessarily mean that spectral references are unperceivable. However, only seldom can spectral elaboration be the primary parameter of musical organisation. The interrelation of other, more immediately perceivable elements is often necessary to ensure a significant musical structure.

Therefore, Grisey's sonic objects seem to present only minor original traits if confronted with Boulez's production. The difference in the choice of particular perceptual parameters is often simply a matter of terminology: the melodic *gestalt*, for instance, could be redefined as identity of intervallic proportion, or even as envelope.

In my view, the main technical difference between the two composers consists in the level of complexity of the objects. This, in turn, is created through a different level of assimilation of the parameters. In the objects of Grisey, the secondary parameters, such as duration, which produces density and therefore affects the level of complexity and pre-audibility, are given a value that in Boulez's music seems to be less relevant. The primary parameters do change more often in Grisey's music, and especially are supported by secondary parameters in a way that often renders it difficult to make a distinction between the two functions. On the contrary, pitch association is always the primary parameter in Boulez's music, thus producing the sensation of a more fragmentary organisation at local level and, consequently, of an excess of complexity.

Moreover, the sonic objects of Grisey are inserted within an evident larger structure, which, when perception is focused on musical rather than analytical listening,

[60] In fact, Grisey has tackled the issue and solved it by attributing to human perception the ability to adjust minor inaccuracies in the intonation of sounds. In order to enhance his hypothesis, Grisey refers to the tempered system (see Grisey, 1991: 368). However, here he is a critically assuming that a tonal system works on the basis of natural principles, whereas it could also support the opposite hypothesis that tonal patterns are substantially mnemonic.

tends to obliterate them as individual elements, with the result of further reducing the complexity of the structural organisation of his music.

Conclusion

Although the approaches to music of the three composers included in the present research are substantially different, many of the concerns of their theoretical and practical work have been shown to be similar. To sum up the previous discussion, it is possible to make at least three points.

First, the notion of 'pre-audibility' has been pinpointed as a fundamental structural device when considering the functioning of the formal categories of permanence and variation in this music. It has been suggested that the phenomenon of pre-audibility can rely both on memory and on processes of perceptual analysis. Mnemonic pre-audibility can be determined by the repetition of elements within the piece, or it can rely on conventional organisational patterns that have been assimilated at a previous stage. These latter include tonal functions and all the other structural conventions derived from a codified system.

Analytical pre-audibility, where the formal categories of permanence-variation have to be seen in the degree of homogeneity of the object, functions in a similar way: the level of analytical complexity of a sonic object can be determined by both natural and educational limits of perception that are due to the specific organisation of the piece (for instance, the analytical complexity of an object is generally diminished through repetition) and to the cultural background of the listener. Obviously, the limits between the different kinds of pre-audibility are substantially impossible to define with precision. It can be said that, in contemporary music, mnemonic pre-audibility is largely determined by references included in the specific work. This strongly affects the perception of complexity, and therefore the perception of the details of the music. The impression is that, by obliterating traditional conventions, contemporary music has not

only produced a displacement and, partially, an enlargement of the structural potential of sound. It also has discarded the structural potential determined by mnemonic pre-audibility. The creation and perception of identities in a given musical work no longer can rely on references that are previously established, through, for instance, the familiarity with structural conventions generated by a codified musical system. Therefore, the technical means at the disposal of composers are partially impoverished.

In the music of Boulez and Grisey, analysed in the previous chapters, the pre-audibility of the objects is calibrated with technical devices that are only partially different. Grisey can count on the opposition of harmonic-non harmonic in order to determine pre-audibility. However, it has been shown that often he relies on more traditional technical means, such as pitch repetition, that are probably more perceptually relevant. The main difference in the way the two composers manage pre-audibility in their music is essentially due to a distance in their aesthetic views. Grisey aims to create a musical form with a clear directional development. Therefore, pre-audibility is used to calibrate in detail the connection of the objects, so that their linear evolution is not obscured, and the level of unpredictability is kept under control. Boulez's music, on the other hand, lacks a clear directional evolution, in accordance with the aesthetic principles of open work. Furthermore, in Boulez's work, immediate perceptual tendencies are usually not supported, but challenged by a complex structural elaboration. Mnemonic pre-audibility, which is obtained through identity of sound parameters, and analytical pre-audibility, which is generated by relevance accorded to individual events in the musical structure, are a means to maintain connections among extremely variable objects, that are not organised in a clear developmental form.

Since a substantial corpus of musical compositions following the principles defined in the T.O.M. is lacking, it is not possible to give a clear account of Schaeffer's use of pre-audibility in music. The elaboration of the oppositional concept permanence-

variation through the notions of value and character seems to betray a certain simplification of the problem. However, it has to be considered that these notions do not represent the more specific issue in the T.O.M., since they are already part of a theory of musical structures. The reference in actual musical composition to the codification of sound qualities defined in the morphology would certainly have proved that a more articulated definition of the notions of value and character was necessary.

This leads to the second point highlighted by the present research. Generally speaking, the evolution of all three composers is towards a more precise definition of the sound parameters and of their structural potential. According to the considerations included in their writings, the potential of sound was not fully liberated by previous structural systems. In fact, on closer examination it seems that what was seen as a perceptual evolution is actually a matter of explicit codification. All sound parameters have always held a role in determining the structural functions of musical elements. However, although their elaboration has always been extremely complex, the codification of certain parameters in conventional musical systems has been very superficial. The three composers included in this study have searched for a precise definition of the parameters. This has been done by focussing on qualities of sound neglected by conventional codifications, especially in the theoretical reflections of Schaeffer and in the work of Grisey, and by an accurate quantification of the parameters' comparative potential. In this perspective, the difference between a music based on motives, as is the atonal production of Schoenberg, and a music based on structures, such as the work of Boulez, could be traced back to the precision of interval confrontation. In Boulez, the judgement of the level of identity among elements is not left to a synthetic intuition, but, ideally, can be perfectly determined by the quantification of the variation of every single parameter.

This urge to reach a more precise control of the structural organisation is obviously epitomised by serial thinking. However, it is also clearly evident in the approach of Schaeffer, since the codification of sound morphology implies the subdivision of the perceptual field into discreet units, so that, ideally, the interrelation of sound qualities defining a sonic object can be precisely calibrated.

Grisey's approach to the issue is less systematic, but betrays the same conceptual attitude. In his view, analysis should be able to break sounds into their constitutive elements, so that musical structure could be determined on the basis of the accurate control of its fundamental elements.

However, although apparently effective, these theoretical views do not appear to have completely considered the complexity of structural functions. In fact, as a conclusive point, the analysis of these musical researches shows that theoretical codification is generally not able to offer a complete and explicit description of the organisational process of music, since the number of variables is too high to be embraced and, consequently, to be consciously controlled. No matter how precise the analysis of the perceptual field occupied by each parameter is, the mutual interrelation of sound qualities substantially modifies their structural value. Therefore, the 'judgement of the ear', which is a recurrent expression in composers' writings of any historical period, is a no less valuable lesson for contemporary creators.

In conclusion, the gap determined by the *tabula rasa* of the 1950s is probably less wide than was intended, and not only because of the clear historical connections with previous formal experiments. The theoretical productions of different composers are based on the same formal concepts (permanence-variation, consonance-dissonance, object-structure) differently expressed. These basic notions seem to be the real fundamentals of formal elaboration, or at least they seem to be the reoccurring descriptive metaphors that analysis produces when focusing on organisational

procedures of music. On the other hand, the characteristic traits of any theoretical codification are due to a net of individual and cultural reasons that are too complex to be understood through a systematic analysis. They are probably better clarified by the critical procedures applied in this research, such as comparison, association, and contrast.

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