Spectral Morphology and Space in Fausto Romitelli's *Natura morta con fiamme*

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I

Natura morta con fiamme (1991–1992) for amplified string quartet and electronics is a work that still gives rise to a number of issues regarding both performance — in particular the question of spatialisation — and the reconstruction of the compositional process of the electronics and instrumental parts according to the preparatory materials. The work was conceived at a kernel moment on Fausto Romitelli's creative path, when his participation in the Cursus de Composition et Informatique Musicale / Cursus Program for Composition and Computer Music at Ircam in 1990–1991 brought him into contact for the first time with the scientific research that he came to consider as inseparable from creation, in particular with 'settori quali l'acustica e la psicoacustica, […] l'analisi del suono e l'elaborazione informatica dei dati [areas such as acoustics and psychoacoustics, […] sound analysis and computer data processing]'.[1] Indeed, right from the start, Romitelli's research was oriented towards a world of complex sounds in which, even before electronics, the fundamental role is occupied by electrical instruments. A constant concern in Romitelli's works is the tendency to unify traditional instrumental ensembles with electrical devices such as electric guitar or keyboard,

which can considerably modify the ensemble's global timbre and also act as a synthesizer.[2] With the string quartet *Natura morta con fiamme* the composer deals for the first time with mixed music which includes a proper electronic part.[3] The experience with electronics is one of the Cursus' goals and forces the composer to make a number of decisions according to his aesthetical horizon. Such choices also necessarily depend on the concrete possibility of the creation of sounds which fit into a whole, made up of three dimensions: acoustical sound, the amplified sound of the string quartet, and electronics. All the sonic material is processed through a spatialised system of amplification.[4]

In the final version of the score published in 2004 by Ricordi, the information regarding the sounds of the synthesis sequences indicates that they were 'realizzati dal programma CSound controllato da un linguaggio LISP (su computer NeXT) all'IRCAM di Parigi [produced by the CSound computing system controlled by LISP language (on a NeXT computer) at Ircam in Paris]'.[5] The sounds were originally recorded on a DAT tape in 1991 at Ircam. In 2005 they were transferred to a CD in the form of six separate audio-traces controlled by a Max/MSP Patch and are now available on a DVD, after restoration work carried out in 2014 by the Laboratorio Mirage at the Università di Udine; in addition to the documentation on the restoration work, the DVD contains the six separate audio-traces controlled by a Max/MSP Patch updated to the 6.1 version.[6] Unfortunately, this material gives no information about the composition of the electronics but could be enlightened by the study of the original CSound codes and the WORKLISP program developed by Romitelli in order to control the amount of sound synthesis data.[7] At the moment, it may be assumed that these libraries are saved on the composer's personal computer housed in the Fondo Fausto Romitelli (henceforth FFR), acquired in 2016 by the Fondazione Giorgio Cini in Venice; a copy is presumably conserved in the Ircam archives and quite possibly the technicians who co-operated in its realisation may have preserved other versions. Laurent Pottier, for example, was the computer technician who assisted Romitelli during the composition of *EnTrance* in 1995, a work for which the composer decided to reutilise some of the codes previously written for *Natura morta*.[8] Partial data for some libraries have been studied by Eric Maestri and Alessandro Olto. However, source conditions do not currently allow an exhaustive systematic comparison to be made between the compositional principles on which the electronics is based and those for the instrumental part for six of the seven sessions that make up the string quartet (the last session does not involve any electronics).

For this research, a first survey on just the hard copy of the preparatory materials dating from the 1990s was enlightening in providing a deeper understanding of various non-investigated aspects of the work.[9] The sources housed at the FFR

include music- and simple sheets directly connected to *Natura morta con fiamme*, verbal texts (annotations, introductions, presentations), several notebooks with notes taken at the Cursus with reference to the study of programming languages (LISP and CSound), and copies of articles presumably discussed during the study.[10]

A first question emerges from the reading of the notes that preceded the published presentation of the first performance of the work which took place in Paris, at Ircam's Espace de Projection on 19 March 1992, during the concerts by Cursus students. Examination of the various documents suggests that Romitelli conceives the presentation text first in Italian (a practice which is confirmed for many other texts written during his stay in France), with more discursive formulations than the final French version.[11] However, the kernel aspects of his thought are present right from the start, including the quotations from the original French version of *Le Degré zéro de l'écriture* (1953) by Roland Barthes and excluding those by Ludwig Wittgenstein, presumably added at some later stage than the one indicated in the document. The reference to the two authors, along with other evidence present in the preparatory material that will also be mentioned here, bears witness to Romitelli's tendency for theoretical reflection that goes hand in hand with the compositional practice which opens to new horizons in those crucial years. Even before his stay in Paris, Romitelli is clearly fully aware of the importance of the 'rivoluzione tecnologica, che crea nuove forme di sensibilità e parallelamente fa nascere un nuovo stile di pensiero [technological revolution, which creates new forms of sensibility and also generates a new style of thinking]'.[12] In the relationship with technology (i.e. digital sound synthesis and its computer-based control), the composer sees the path toward the renewal of the compositional paradigm that, in those years, is reflected by a fervent theoretical discussion on the concept of timbre. And while, on the one hand, the main stimulus comes from the experience with the digital and instrumental sound synthesis acquired by the spectral music composers, the real challenge for second generation composers[13] is the question of 'spectral morphology',[14] namely the possibility of structural relations within the organisation of timbre, advocated by Pierre Boulez at a timbre conference in Paris from 13 to 17 April 1985. The question of the formal organisation of works based on the composition of sound was one of the conference's central issues. Boulez's considerably critical paper focuses on what had already become, and would continue to be, an extremely important conceptual and technical nexus point for the other participants at the conference who used different approaches to address the topic in their theoretical writings and compositions. Romitelli fits into this discussion through the presentation texts for works from this period, such as *Nell'alto dei giorni immobili* (1990) and *La sabbia del tempo* (1991), and above all with the theoretical text entitled 'Pertinence du timbre', mentioned by Alessandro Olto in

his study on *En Trance*.[15] This still unpublished text was presumably conceived at the beginning of the 1990s and is of vital importance in the reconstruction of the multiplicity of questions that the 1985 conference placed before the composers of sound. In particular, it focuses on the possibility of scalar organisation or at least a timbre hierarchy with the purpose of allowing the organisation of the musical discourse on both the micro and macro-formal levels. Romitelli starts with an emblematic, long and articulated sentence:

> I'd like to demonstrate, by establishing a comparison with the linguistic model, that the **coordination** between the **coexistence of simultaneous entities**
> – namely the totality of features of spectral morphology that determines the perception of timbre starting from a process of **categorisation** and from the **projection into acoustical space** –
> – namely the articulation of objects and their combination on different hierarchical levels on the basis of the process of **discretisation** and **projection into space** –
> are not only the very foundation of linguistic communication, but also a powerful tool for the control of the formalisation of musical structures.[16]

From the very first pages of the text, the composer refers explicitly to linguistics and to the two levels of phonology and syntax that allow a process of communication to be initiated. A further even more important aspect concerns the fact that the articulation based on the combination of discrete elements enables the formalisation of musical structures. As Olto has already pointed out, Romitelli's encounter with the spectral technique gave new meaning to the attitude towards combinatoriality he had acquired during his studies with Franco Donatoni.[17] He now considers the functionality and hierarchy of elements as not, or no longer being, *relative* but *necessary*. This is determined by the perceptive process of categorisation, which 'defines the "consonance-curve" of a sonic space through the "hierarchisation and functionalisation" of the objects and aggregates, individualised by a process of discretisation'.[18] The need stems from the reference frame of spectral morphology, which provides a *natural* hierarchical basis for the musical discourse. Therefore the composition of timbre itself can be perceived as 'necessary' making the syntactical organisation *pertinent* to the listening and not merely a result of arbitrary decisions.

Similar statements can be found in the presentation text for the first performance of *La sabbia del tempo* on 9 December 1992 at Ircam.[19] Here the composer is intent on explaining to his audience how the timbre can contribute not only to the recognisability and memorisation of musical structures, but also to the constitution of a syntactic-like logic:

> In this work, I've tried to sculpture the spectral morphology of sonic objects in function

of the syntactic articulation, in order to build a system of oppositions able to differentiate, cement, separate, or bring into evidence the various combination units. As in the language, the simultaneous coexistence of the spectral characteristics, which determine the identification of phonemes, has a differential and non-significant value; it is the concatenation of the phonemes which determines the constitution of units of signification. Hence, in musical discourse, the operations on timbre have to accomplish a distinctive, differential function: they have to define the object in a syntactical context, not only by dividing the other objects allowing for its *recognisability* and memorization but also by defining the logic of its presence in the context. Spectral characteristics have to define the hierarchical levels, the functionalities of the syntactical components on different levels of combination, of both local and global contexts.[20]

Linguistics, in particular Roman Jakobson's theory, and the relationship between the combination and selection axis in the process of creation of meaning, play a key role for Romitelli, above all for the purpose of formal organisation: the linguistic model permits him to assume the possible relations between the features of spectral morphology, on whose basis one can build a system of oppositions relevant for the construction of the musical discourse. With the support of music informatics, the correlation between the phonological and syntactical dimension turns into an operative space, which can be explored through three production systems: 1) an acoustical instrument; 2) an ensemble of acoustical instruments; 3) synthetic sounds. The third category is the only one that allows the creation and absolute control of spectral morphology but, as already pointed out, in almost all his works Romitelli prefers to combine the two last points (in fact, his works for solo instruments are few and far between).

On the basis of specific cases, in order to illustrate the theory mentioned in the first part of 'Pertinence du timbre' and the role that informatics plays in his compositional process, Romitelli examines some highlights from two of his works: as a first example, *Les idoles du soleil*, the first part of *Mediterraneo*, composed in 1992 for ensemble without electronics;[21] as a second example *Natura morta con fiamme*, whose salient aspects will be shown in the next paragraph.

II

In his writing 'Pertinence du timbre', Romitelli focuses exclusively on section F, the only one without electronics among the seven sections of *Natura morta con fiamme*. Considering that from the compositional point of view section F is strongly connected to section E, let us start by illustrating the organisation and the distinctive elements of the latter. According to statements made by the composer

during the previously mentioned presentation at the 2000 Agora Festival in Paris, both sections arise from the idea of the projection of instruments into space. However, the aim is not to simulate movement in space. According to Romitelli, our concept of time and of space has changed; they are no longer conceived as a continuum, but rather they are fragmented, exploded, distorted.[22] No wonder then that this new view is no longer reflected by a simple movement of sound objects in space (through instrumental voicing and amplification). The complexity of the time-space relationship emerges through the complexity of instrumental texture and through the relationship with electronics.

To make the projection of instruments into space perceivable, the composer conceives modules based on sound objects, called figures. Section E has four typologies of different figures (FIGURE 1) that move from one instrument to the other, according to an increasing, decreasing or constant velocity (calculated with a computer, as Romitelli pointed out in his presentation; FIGURE 2). The velocity is subordinated to the necessity of building a global texture, rather than perceiving the single figures in space. The complexity of the whole should suggest the idea of an exploded space and this procedure has been defined with the term of 'variation modulaire [modular variation]'.[23]

FIGURE 1. Fausto Romitelli, *Natura morta con fiamme*: four figures for part E. Transcription from a sketch. Fondazione Giorgio Cini (Venezia), Fondo Fausto Romitelli
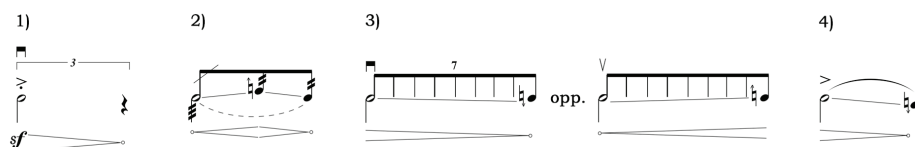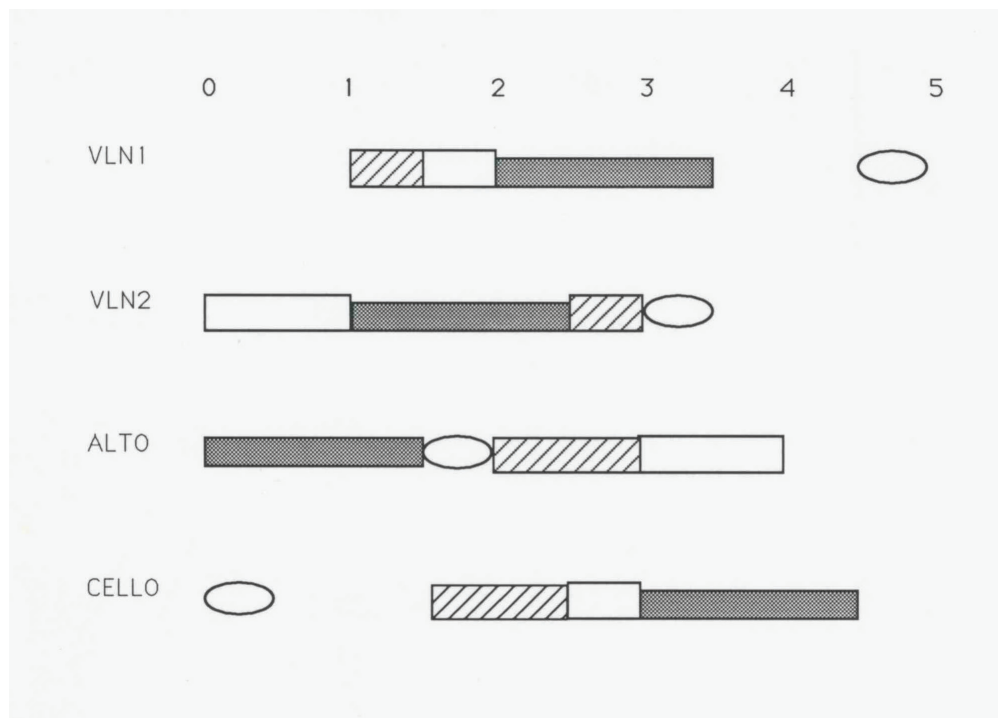
FIGURE 2. Scheme of a module for *Natura morta con fiamme***, from Fausto Romitelli, 'Pertinence du timbre'. Fondazione Giorgio Cini (Venezia), Fondo Fausto Romitelli**

In both section E and F, further new figures or their variants have been added to the four figures of FIGURE 1. Various synchronic movements make the figures and their derived modules easily recognizable in section E since the shift of a figure from one instrument to another is very close, as can be observed in the sketch in FIGURE 3. The upper system of the sketch shows some elements of a distorted spectrum (on the left), as well as a group of five vertical aggregates indicated by the Arabic numbers 1–4 and by arrows that indicate the counter-clockwise order, from the right lowest one (1) up to the fifth aggregate (unnumbered). A comparison with the score indicates that the elements are included in the harmonic trajectory of section E (integrally transcribed in FIGURE 4); the aggregates match starting from the last quarter note of b. 107 up to and including b. 110. In the lower system of the sketch, we can recognise, *in nuce*, bb. 104–106 (including the first aggregate of b. 107) which attest the last three expositions of the complete module with all the figures. From here onwards, the jeté-figure is incorporated into those of tremolo and glissato. The movement into space blends more and more in a texture of synchronic gestures of spectral features; the movement from external becomes

internal; we move from a 'spazio reale della sala a quello metaforico del timbro [real room space to the metaphoric space of timbre]'.[24] Indeed, from b. 110 onwards, the composer re-establishes the initial C-spectrum whose gradual transformation in the next bars will prepare for the arrival of the minor third B–D which represents the core of section F.

FIGURE 3. Fausto Romitelli, *Natura morta con fiamme*: sketch for part E. Fondazione Giorgio Cini (Venezia), Fondo Fausto Romitelli
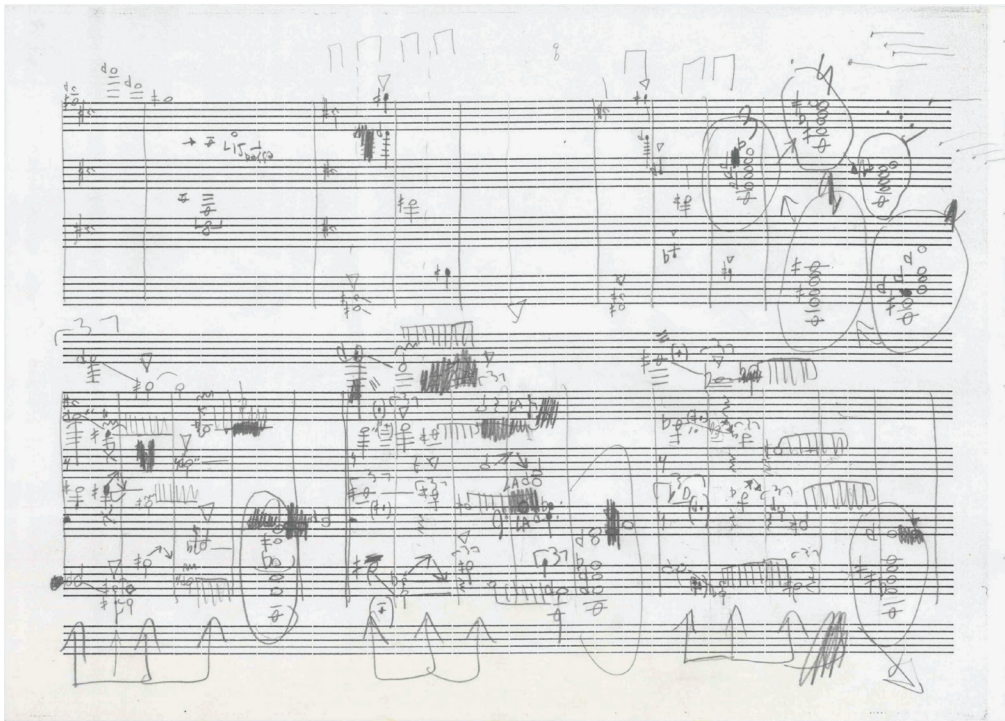

FIGURE 4. Fausto Romitelli, *Natura morta con fiamme*: harmonic progression of part E, transcription from the score with references to the sketch

Section F, as we have already pointed out, is only instrumental, without electronics. The section is formed from a sequence of thirteen patterns:

> Each pattern is determined by a texture of 4 different figures: three of these are also present in the next pattern, one is replaced by a new figure; in the totality of the section, 10 figures appear in rotation. In every pattern, each figure is played consecutively by each instrument, i.e. it is repeated 4 times. All the figures move from one instrument to another, they go through frequency, amplitude, duration, timbre, internal articulation transformations.[25]

The analysis of the score has allowed us to identify the thirteen patterns, namely:[26]

4/118
3/120
2*/122
4*/123
4*/125
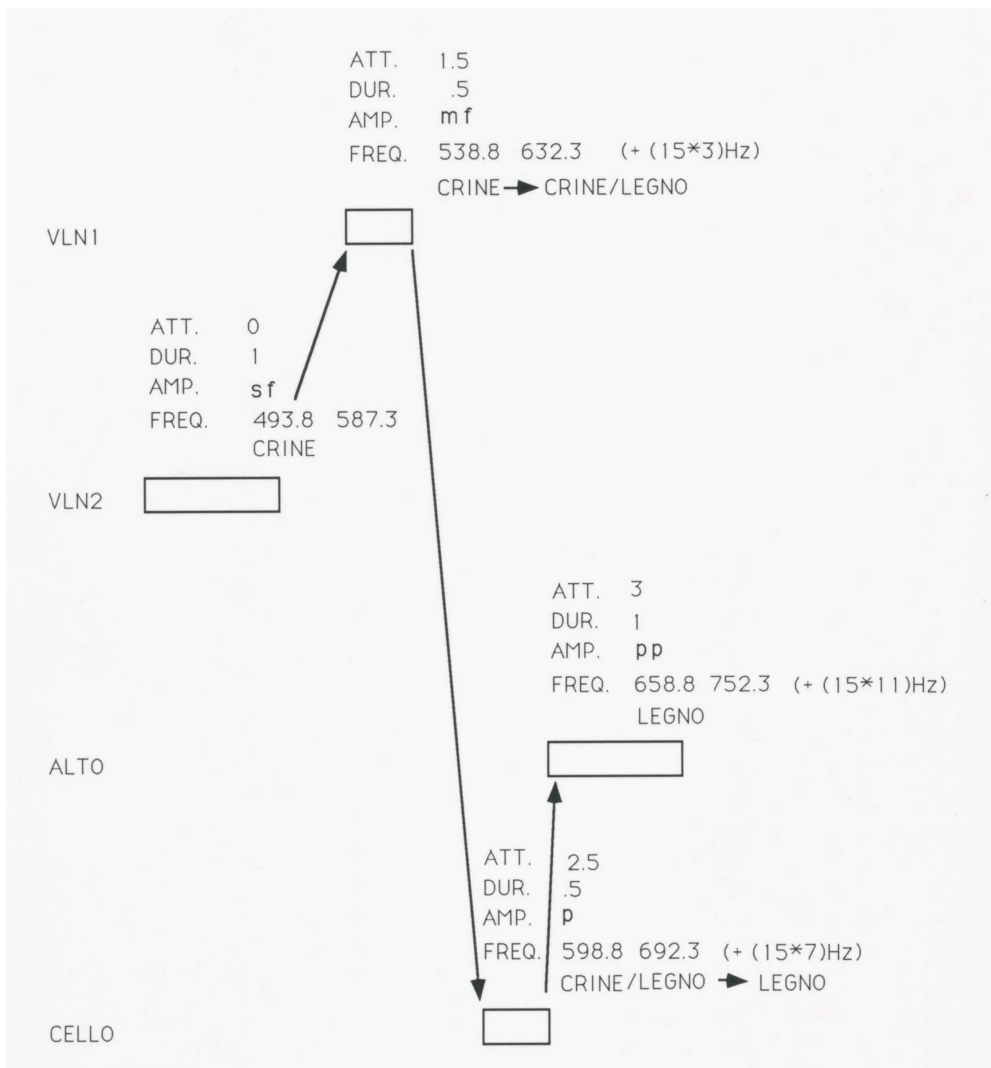3/127
2*/129
4*/130
1/133
4*/134
3*/136
1/138
3/140

But even at a first glance it is clear that the structure of each pattern is actually more complex, based on a first part which is actually built from four figures: 1) the sustained B–D minor third interval figure, with a dynamics movement *crescendo–sff–decrescendo* combined with a bow movement (T→mp→T); 2) a two-note tremolo figure with the shift towards the fingerboard combined with an increase in pressure; 3) a *balzato*-figure with the shift from horsehair/stick to stick only; 4) a sustained one-note tremolo figure with the regular introduction of a second pitch (see the transcription in EXAMPLE 1A). However, it can also be observed how one of the main figures does not immediately appear in one instrument at a time, but rather can be found in the second part of the pattern. The figure is always based on the same three gestures, which are themselves subjected to a process of gradual transformation: a violent crescendo with the shift from the natural position to a molto ponticello position (N→mP), a sixth-harmonic tremolo indicated as 'violento' to a tremolo indicated as 'sporco [nasty]' combined with

a shift from fingerboard to a regular position, with strong distortion (mT→N, mD) (EXAMPLE 1B).

EXAMPLES 1A AND B. A) Four main figures in the first part of the pattern; B) three figures in the second part of the pattern

Such a way of organising the figures is thus functional to the idea of the sound projected into space according to different trajectories which modifies the figures in all their parameters (pitch, intensity, duration, timbre, internal articulation), as Romitelli had already indicated for section E. Let us take a closer look at the process of the progressive distortion of the initial intervallic content expressed by minor third B–D (493.8 Hz – 587.3 Hz). As Romitelli stressed in 'Pertinence du timbre', and as illustrated by the last example inserted in the text (FIGURE 5), in each shift of the figure from one instrument to the other, the interval frequencies are lowered or raised by 15 Hz*n (where n is the progressively increased integer). The process ends when the pitches of the initial interval fit as two harmonic partials of a low C (32.7 Hz), i.e. a rising F♯ (such as the 23rd harmonic, 752.174 Hz) and the other a rising A♭ (13th harmonic, 425.142 Hz).[27] The scheme in FIGURE 5 shows the control typologies the composer sets for each figure of the module; here it regards the jeté gesture which shifts from the second violin to the first and is subjected to a first distortion (*3 = 538.8/632.3), the violoncello follows (*7), and finally the viola (*11). Each figure gives the ratios for the attack (the distance between the later entrances in relation to the beginning; 1,5–2,5–3 temporal units); for the duration (a whole note (1), and a half note (0.5)); the intensity (sf, mf, p, pp), and for the articulation (hair; hair→hair/stick; hair/stick→stick, stick). The scheme actually matches the last two beats of b. 140 and the first two beats of b. 141 and there are some discrepancies with the score, first of all, as far the dynamics are concerned (sf > for violins, sff > for violoncello and viola). The place of sound production (*sul ponticello* [on the bridge]) is a constitutive part of the figure and is therefore not indicated.

FIGURE 5. Scheme for a modular variation,[28] from Fausto Romitelli, 'Pertinence du timbre'. Fondazione Giorgio Cini (Venezia), Fondo Fausto Romitelli

```
                              ATT.   1.5
                              DUR.    .5
                              AMP.   m f
                              FREQ.  538.8  632.3   (+ (15*3)Hz)
                              CRINE � CRINE/LEGNO

VLN1                    ┌──────┐

            ATT.   0
            DUR.   1
            AMP.   s f
            FREQ.  493.8  587.3
                   CRINE

VLN2              ┌──────┐

                                        ATT.   3
                                        DUR.   1
                                        AMP.   p p
                                        FREQ.  658.8  752.3   (+ (15*11)Hz)
                                               LEGNO

ALTO                                 ┌──────┐

                          ATT.   2.5
                          DUR.    .5
                          AMP.   p
                          FREQ.  598.8  692.3   (+ (15*7)Hz)
                                 CRINE/LEGNO � LEGNO

CELLO                    ┌──────┐
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The large amount of information that the composer has to deal with during the composition of this last section of the string quartet leads us to assume that a great number of schemes were certainly drawn up. Unfortunately, at the moment, we could only identify two sketches referring to section F (FIGURE 6) amongst the Romitelli materials. These diagrams reveal an operational phase that allows us to trace the articulation of the four figures of the module in their rhythmic profile,

as well as the distortion rank of the fundamental frequency indicated by circled numbers (–2, –3, –4). The first pattern in the reproduced sketch corresponds to n. 9, which starts at b. 133.[29]

FIGURE 6. Fausto Romitelli, *Natura morta con fiamme***: sketch for part F. Fondazione Giorgio Cini (Venezia), Fondo Fausto Romitelli**
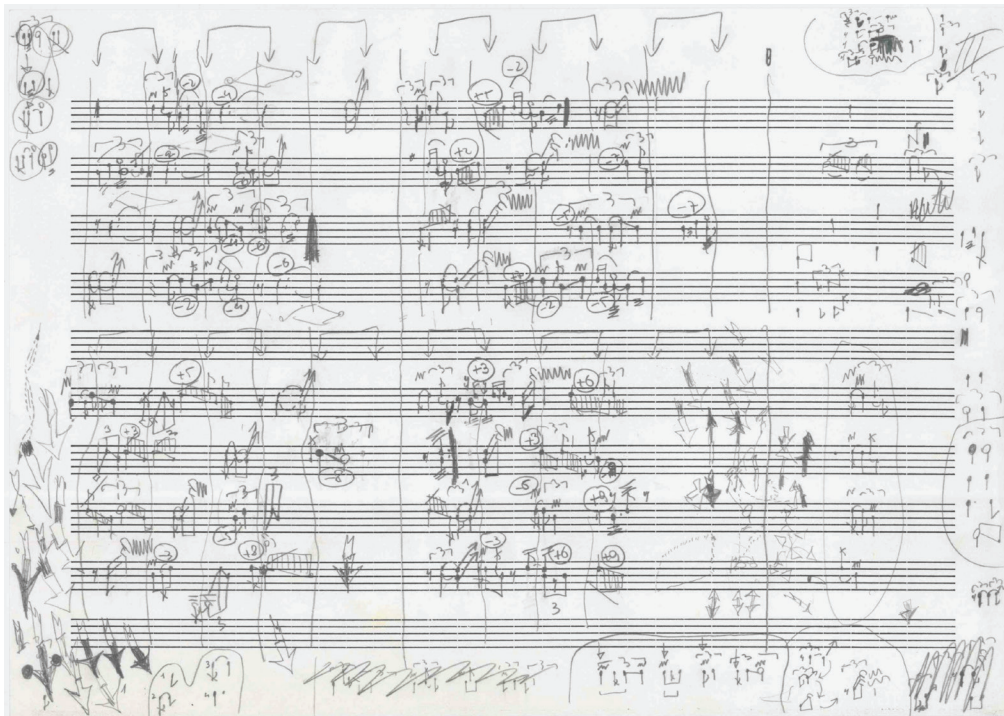
The indications contained in the first pattern of the first system are: first violin –2 for the second figure and –4 for the third, with –2 and –6 for the second violin, –4, –6 for the viola and –2, –4, –6 for the violoncello. The following pitches in the score correspond to the figures in the sketch: A♯–C♯ for the –2 distortion, lowered A and C for –4, G half-sharp-H for –6. If we also include the indications for pattern n. 10 which contains ranks such as +5 or –7, a lowered D♭ (+5 starting from B) or lowered B♭ – lowered G♭ (for –7) appear. Sorting the data allows us to hypothesise a precise system of alterations (corresponding respectively to the minor third interval frequency distortion) as shown in FIGURE 7. The scheme also includes eight-tones because they effectively appear in the first modules of the preserved sketch (it may also be assumed that they occurred frequently in the first part of the process but the preparatory material for this part is missing); the

application of the system shows that the first patterns include minimal distortions which contain the eight-tones (½, 1 and ½, 2 and ½). They make way for more significant shifts as the process continues, as long as the two frequencies (B–D) do not reach the already mentioned harmonic partials of the C-spectrum (32.7 Hz): a rising F♯ (as such corresponding to the 23rd partial, 752.174 Hz) and a rising A♭ (13th partial, 425.142 Hz).[30]

FIGURE 7. **Writing of frequential distortion degrees**

½ = slightly lower/higher (eighth of tone?)
1 = a quarter of a tone
1 ½ = almost a half tone
2 = a half tone (minor second)
2 ½ = slightly lower/higher half tone
3 = three quarters of a tone
4 = tone (major second)
5 = tone and a quarter
6 = tone and a half (minor third)
7 = tone and three quarters of a tone
8 = two tones (major third)
9 = two tones and a quarter of a tone
10 = two tones and a half (fourth)
11 = two tones and three quarters of a tone

Section F is one of the clearest examples of the relationship that holds between instrumental writing and knowledge in the field of spectral morphology in Romitelli's compositional thought. An enlightening phrase on this topic appears on a sheet of annotations for the 'Pertinence du timbre' (FFR; the sentence does not appear in the final version): 'L'image sonore redevient consonante, le mouvement spatial s'arrête: l'interval, c'est à dire une variable discrète, […] s'est transformé en région formantique [The sound image returns consonant, the movement in space comes to a halt: the interval, i.e. a discrete variable, […] has been transformed into a formant region]'. The coordination between the composition of space and the composition of timbre builds a personal path, an encounter between surfaces and volumes that are capable of generating new syntactical relations.

Going backwards through the remaining sections of the string quartet, we can find several new solutions in the articulation of the relationship between space and spectral morphology. For instance, in section D, which is characterised by an electronic sound that is timbrically among the most synthetic and least instrumental

of all six traces, Romitelli experiments with the idea of the formal frame and interruptions of trajectories inspired by the already mentioned discontinuity of time and space. Every time that a model is introduced (for instance, a glissato, a tremolo, etc.) it is interrupted by another model, in a trajectory that is directionally oriented toward the high register. The impulses and the arpeggios of the electronics (whose interventions are marked on an annotated copy of the score with Csound symbols that reveal their different features) contribute to the discontinuous nature of the articulation of the discourse. The two C sections, instead, explore the various modalities of the distortion of the harmonic spectrum (the composer mentions the linear and exponential interpolation); the B section experiments with the transition of the formants of a single spectrum which occasionally makes arpeggios and melodies emerge (in relation to the bandwidth); section A explores the issue of vowels qualities through the relationship with electronics, which represents the sound shadow on whose surface the instruments play crescendo-decrescendo figures corresponding to the specific vowel formant zone.

With *Natura morta con fiamme* for string quartet and electronics, Romitelli explores different possibilities in the internal articulation of sound, so as to concretise his intuition of the linguistic possibilities of the composition of timbre, a purpose for which each successive work will try to provide new answers.

Notes

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1   The quotation is taken from the document 'FAUSTO ROMITELLI–PROGRAMMA DI STUDIO/RICERCA [Fausto Romitelli–Study/Research Programm]', a two-page, undated typescript which contains his application for the Ircam fellowship. The document is housed in Venice at the Fondazione Giorgio Cini, Fondo Fausto Romitelli (henceforth FFR).

2   Works composed before the string quartet, which also include electronic keyboard, are: *Kû*, for 14 performers (1989), *Nell'alto dei giorni immobili*, for six musicians (1990), *La sabbia del tempo*, for six musicians (1991).

3   Only a few of the next works include electronics: *EnTrance* (1995), *Professor Bad Trip: Lesson I* (1998) and *Amok Koma* (2001). For the definition of mixed music see *Musique et technologie. Regards sur la musiques mixtes*, textes réunis par Marc Battier, Paris: Institut national de l'audiovisuel, 2017.

4   The question of spatialisation underwent significant modifications. Initially, Romitelli imagines an 8-loudspeaker system. This is one of the facts that can be learned from two handwritten square-sheets containing six different schemes of spatialisation (one for each of the 6 sections; C has not yet been subdivided into C1 and C2). Traces of this initial idea can be found in some other sources, such as the theoretical text 'Pertinence du timbre' (see *infra*) or the conference on 24 June 2000 (see *infra*). The transcription of one of the original schemes for the spatialisation is published in: Alessandro Olto, EnTrance. *Spettralismo e composizione assistita all'elaboratore*

in Fausto Romitelli, Doctoral Dissertation in Historical, Artistic and Audiovisual Studies, University of Udine, 2017, p. 69. I wish to thank the author for sharing his research with me. However, in the explanatory notes for the latest version of the score only four loudspeakers are requested with a fixed placement (violin 1 back right, violin 2 front left, viola front right, violoncello back left). See Fausto Romitelli, *Natura morta con fiamme*, for amplified string quartet and electronics, Milano: Ricordi, 2004, n. 139326.

5   Romitelli, *Natura morta con fiamme*, [p. i].

6   For the technical details of the restoration and the relationship between sources, see Luca Cossettini, *Conservazione, restauro ed edizione critica delle opere elettroniche di Fausto Romitelli. Il restauro audio di* Natura morta con fiamme, Udine: Mirage, 2014.

7   A detailed description of the choices concerning the relationship between electronics and instruments was formulated by the composer himself during the presentation of the work at the Agora Festival in Paris on 24 June 2000. The undoubtedly precious recording of the presentation is available online at https://medias.ircam.fr/x28b1e0_natura-morta-con-fiamme-presentation (last accessed 20 May 2018).

8   The information is taken from Alessandro Olto, 'Between Spectrum and Musical Discourse. Computer Assisted Composition and New Musical Thoughts in *EnTrance* by Fausto Romitelli', in: *Sounds, Voices and Codes from the Twentieth Century. The Critical Editing of Music at Mirage*, ed. by Luca Cossettini and Angelo Orcalli, Udine: Mirage, 2017, pp. 419–452.

9   Considering the fact that the collection has only been recently acquired (2016) and that reordering is still in progress, we certainly cannot exclude the possibility that new documents may emerge that can shed further light on these aspects.

10 Particularly significant in our opinion is the presence of texts such as York Höller, 'Resonance: Composition Today', *Contemporary Music Review*, I, 1984, pp. 67–76; Pierre Boulez and Andrew Gerzso, 'Computers in Music', *Scientific American*, CCLVIII/4, April 1988, pp. 44–50, and a number of references to *Le Degré zéro de l'écriture* and *Proust et les noms* by Roland Barthes.

11 http://brahms.ircam.fr/works/work/11521/ (last accessed 21 May 2018).

12 Quotation taken from 'FAUSTO ROMITELLI – PROGRAMMA DI STUDIO/RICERCA'. FFR.

13 Pierre Boulez, 'Timbre and composition – timbre and language', *Contemporary Music Review*, II/1, 1987, pp. 161–171. French version in: *Le timbre, métaphore pour la composition*, éd. par Jean-Baptiste Barrière, Paris: Christian Burgois, 1991, pp. 541–549.

14 The term is used by Romitelli in the Italian version of the presentation text for *Natura morta*, but was not maintained in the French version: 'Se il concetto di sintesi implica, per definizione, quello di fusione degli elementi in un'immagine sonora *unica*, per quanto complessa ed articolata al suo interno, allora la lingua della sintesi è una lingua di Nomi: il pensiero compositivo, abbandonata la tripartizione tradizionale di altezza, durata e timbro e la loro sostanziale separazione, si apre all'idea più generale di spazio acustico e di interazione; l'articolazione di variabili discrete e l'algebra vengono sostituite dalla trasformazione di insieme e dalle leggi della coesistenza; la nozione di morfologia spettrale integra le nozioni tradizionali d'armonia e ritmo [If the very definition of the concept of synthesis implies the fusion of elements in a *unique* sound image, then whatever its internal complexity and articulation, the language of synthesis is a language of Nouns: compositional thought, once the traditional tripartition of pitch, duration and timbre and their substantial separation has been abandoned, opens up to the more general idea of acoustic space and interaction; the articulation of discrete variables

and algebra are replaced by the transformation of the whole and by the laws of co-existence; the notion of spectral morphology integrates the traditional concepts of harmony and rhythm]'. FFR, fasc. *Natura morta*.

15 Olto, 'Between Spectrum and Musical Discourse', p. 420.

16 'Je voudrais démontrer, en définissant une comparaison avec le modèle linguistique, que la coordination entre la **concurrence d'entités simultanées** – c'est à dire l'ensemble des caractéristiques de la morphologie spectrale qui déterminent la perception du timbre à partir d'un processus de **catégorisation** et de **projection dans l'espace acoustique** – et la **concaténation d'entités successives** – c'est à dire l'articulation d'objets et leur combinaison à différentes niveaux hiérarchiques à partir d'un processus de **discrétisation** et de **projection** dans le temps – n'est pas seulement la base de la communication linguistique, mais aussi un outil puissant pour controler [*sic*] la formalisation des structures musicales'. Fausto Romitelli, 'Pertinence du timbre', inedit typoscript, [c. 1]. FFR. Romitelli uses the bold in the quoted text. My thanks to Laurent Pottier for sharing a copy of the text with me, since it helped me work my way through the annotations housed at the FFR and in the reconstruction of the sheet order.

17 Olto, 'Between Spectrum and Musical Discourse', p. 420. Here the author is presumably not referring to the concept in terms of set-theory (see Jospeh N. Straus, *Introduction to Post-Tonal Theory*, New Jersey: Prentice Hall, 2000²) but rather according to linguistics, as the combinatorial possibility of elements. See Ray Jackendoff, *Foundations of Language: Brain, Meaning, Grammar, Evolution*, New York: Oxford University Press, 2002.

18 'C'est donc le processus perceptive de catégorisation que définit la "courbe consonantique" de l'espace sonore en "hiérarchisant et fonctionnalisant" les objets et les agrégats individualisés par un processus de discrétisation'. Romitelli, 'Pertinence du timbre', [c. 3]. Romitelli uses both bold and italic font to emphasise some concepts, as for example the words *relative* and *necessary*.

19 Along with *La sabbia del tempo*, the programme (held in the FFR) includes works by Jesus Rueda, Francisco Luque, Pietro Boradori, Stefano Gervasoni, Riccardo Nova, José Manuel López López conducted by Philippe de Chalendar.

20 'Dans cette oeuvre j'ai essayé de sculpter la morphologie spectrale des objets sonores en fonction de l'articulation syntaxique, afin de créer un système d'oppositions capables de différencier, cimenter, compartimenter, ou de mettre en relief les diverses unités de combinaison. Comme, dans le langage, la coexistence de caractéristiques spectrales simultanées, qui déterminent l'identification des phonèmes, a une valeur différentielle et non-signifiante et c'est l'enchaînement des phonèmes qui détermine la constitution des unités significatives. Ainsi, dans le discours musical, les opérations sur le timbre doivent accomplir une fonction distinctive, différentielle: elles doivent définir l'objet dans un contexte syntaxique, non seulement en le séparant des autres objets et ainsi permettant sa *reconnaissabilité* et mémorisation, mais aussi en déterminant la logique de sa présence dans le contexte. Les caractéristiques spectrales doivent définir les niveaux hiérarchiques, les fonctionnalités des composantes syntaxiques à différents niveaux de combinaison, des contextes locaux aux contextes généraux'. Quotation from the Ircam concert programme, 9 December 1992 (see footnote 19).

21 Significant sections of 'Pertinence du timbre', including the examples relating to *Les idoles du soleil*, have been published in Olto, 'Between Spectrum and Musical Discourse'.

22 https://medias.ircam.fr/x28b1e0_natura-morta-con-fiamme-presentation (last accessed 20 May 2018).

23 'Toute fois les figures bougent d'un instrument à l'autre avec une vitesse croissante, décroissante ou constante, selon un schéma d'accélération/décélération des trajectoires, elles bougent d'une

configuration d'haut-parleurs à l'autre en donant [*sic*] l'illusion d'un même son qui rebondit dans la salle et, en traversant l'espace, il modifie ses propriétés constitutives [Each time the figures move from one instrument to the other with an increasing, decreasing or constant velocity, according to a scheme of acceleration/deceleration of trajectories, they move from one set of loudspeakers to the other, giving the illusion of the same sound bouncing around the room, and, in crossing the space, it modifies its constitutive proprieties]'. Transcription from a sheet of annotations housed at the FFR. The present paragraph matches the third paragraph of point 1.3 referring to *Natura morta con fiamme* in 'Pertinence du timbre'.

24 The quotation is taken from a sheet of annotations in Italian, held at the FFR and presumably preparatory for the final version of 'Pertinence du timbre'.

25 'Chaque pattern est déterminée par une texture de 4 différentes figures: troix entr'elles sont présentes aussi dans le pattern successifs, une est remplacée par une nouvelle figure; dans l'ensemble de la section, 10 figures apparaîtrent à rotation. Dans chaque pattern, chaque figure est jouée successivement par chaqu'instrument, c'est à dire ell'est répété 4 fois. Toute fois une figure passe d'un instrument à l'autre, elle subit des transformations dans la fréquence, l'amplitude, la durée, le timbre, l'articulation interne, etc.'. Romitelli, 'Pertinence du timbre', [cc. 3–4].

26 The first number indicates the four beats of the 4/1-measure on which the pattern starts, the second number indicates the measure. One should bear in mind that for ease of schematisation, the asterisk shows the beats at which the figures start upbeat.

27 See Romitelli, 'Pertinence du timbre'.

28 A transcription is published in Olto, Entrance. *Spettralismo e composizione assistita all'elaboratore in Fausto Romitelli*, p. 69.

29 At the present time, the preparatory material for *Natura morta con fiamme* includes 16 sheets of continuity draft referring to various sections. For section F, along with the sketch reproduced as FIGURE 2, there is another sheet with patterns 5–8. It may be assumed that an initial sheet of this scheme containing patterns 1–4 is missing.

30 There are some discrepancies between the sketch and the score, concerning the points at which the composer only seems to apply the distortion to a single pitch of the interval.