Metabolos: Composing through a Spectral Scope

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In this article I will explain the compositional procedures of my spectral composition, *Metabolos* for string quartet (2011).[1] As the name suggests, *Metabolos* (from the Greek *μεταβολή*, or change) is based on a constant change of its constituent elements, especially its frequency-based material, to create its micro- and macrostructures. *Metabolos* is in continuous mimesis of a living organism. Just as a body needs a set of chemical reactions to sustain life and maintain its structure, so does *Metabolos* attempt to conflate its musical materials into a direct discourse with the listener by sustaining a process of metabolizing its material.

Spectral Compositional Techniques: Past, Present and Future

In the 1970s, *spectral music* was associated with the French Itinéraire Ensemble, founded by in France by Hugues Dufourt, Michael Lévinas, Tristan Murail, Gérard Grisey, and Roger Tessier.[2] In fact, it was Dufourt's 1979 article, 'Musique Spectrale', that defined the term.[3] As Grisey points out, 'spectralism is not a system, it's an attitude' that considers sounds 'not as dead objects that you can easily and arbitrarily permutate in all directions, but as being like living objects with a birth, lifetime, and death'.[4] Infused with the spirit of the 1968 French Cultural Revolution, a new musical manifesto was to resist the musical establishment of the time, which offered only the parameterization of integral serialism. Grisey clearly explains the harmonic, timbral, temporal, and formal consequences of writing spectral music. For him, a spectral composer must have 'a more "ecological" approach to timbres, noises, and intervals' with an 'integration of all sounds' in their repertoire' (from white noise to sinusoidal sounds), 'breaking out of the tempered system' with a 're-establishment of the ideas of consonance and dissonance as well as modulations'.[5] He must have an 'attentive attitude towards the phenomenology of perception', and he must integrate time as the very object of form with an exploration of 'stretched' and 'contracted' time.[6] Regarding form, Grisey explains that a spectral composer must explore 'all forms of fusion and the thresholds between different parameters' and employ the use of 'invention of processes, as opposed to traditional development', with the 'use of supple, neutral sonic archetypes which facilitate the perception and memorization of processes'.[7]

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[1] The full score and a recording are provided as separate files appended to this article. Score: < http://m-logos.gr/downloads/articles/i0002/m-logos-i0002-a0018.pdf>.
Recording: <http://m-logos.gr/downloads/audio/audio_18.mp3>.

[2] Bob Gilmore, 'On Claude Vivier's Lonely Child', in *Contemporary Compositional Techniques and* OpenMusic, ed. Rosalie Hirs and Bob Gilmore (Paris: IRCAM/ Delatour, 2009), 16.

[3] Gilmore, 'On Claude Vivier's Lonely Child', 16.

[4] Gérard Grisey, 'Interview with David Bundler', *20th-Century Music* (1996). <http://www.angelfire.com/music2/davidbundler/grisey.html> (accessed 15 September 2010).

[5] Gérard Grisey and Joshua Fineberg, 'Did You Say Spectral?', *Contemporary Music Review* 19/3 (2000), 2.

[6] Grisey and Fineberg, 'Did you say Spectral?', 2.

[7] Grisey and Fineberg, 'Did you say Spectral?', 3.

While this first generation of spectral composers laid the foundations of spectral ideals, a historical detachment from the original movement has allowed post-spectral composers to develop an amalgam of techniques that is truly personal for each individual composer. For example, Philippe Hurel incorporates rigorous polyphonic textures based on multiple simultaneous rhythmic streams and homophonic textures with rapid rhythmic variations that break from the 'hypnosis of slowness' that their elders had created with their early spectral compositions (such as *Leçon de choses* and *Pour l'image*).[8] By contrast, in a piece like *Das Andere*, Horatiu Radulescu takes a teleological approach to composition at the border between score and sound phenomenon, attempting to create a state of trance.[9] A more recent third generation of spectral composers incorporates programmatic elements, extreme extended techniques, and 'total saturation', as exemplified by Yann Robin's *Vulcano* or Raphaël Cendo's *In Vivo*.[10]

I have conceived of *Metabolos* as a hybrid between the old and new approaches to spectral composition. In fact, equilibrium of dissimilar powers is crucial to my work: tradition vs. modernity, closed vs. open form, pulse vs. free flow, microtones vs. equal-temperament, harmonicity vs. inharmonicity, and uncertainty vs. certainty of time.[11] My work also reflects consideration of issues related to technology and psychoacoustics, the use of software to create pre-compositional material by adapting electronic techniques in the acoustical domain (interpolation of material, frequency, and ring modulation), and the psychoacoustic principles of pitch and timbre.[12]

Form of *Metabolos*: Macrostructure

The overall macrostructure of *Metabolos* is based on the interplay of its harmonic and inharmonic partials, which can be reduced down to a double arch pattern of ascending inharmonicity and descending harmonicity (Figure 1). In Figure 1, p.1 to p.21 correspond to the page numbers of the *Metabolos* score and capital letters to the rehearsal numbers. The G2 harmonic series of the first four pages is transformed into a G2 compressed/distorted series by p.9 (with eight non-linear interpolations in between). The same technique is used extensively, transforming the G2 compressed series into a ring modulated (RM) series, then into an F♯ harmonic series, a frequency modulated (FM) series, and finishing up with a high-pitched amalgam of natural harmonics on the G string of each instrument. Figure 1 is a 'virtual' harmonic/inharmonic chart as the actual levels of harmonicity and inharmonicity micro fluctuate based on various 'noisy' instrumental techniques (see also Figure 2a).

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[8] Philippe Hurel, 'Spectral Music: Long-Term Perspectives'. <http://www.philippe-hurel.fr/en/musique_spectrale.html> (accessed 16 July 2009).

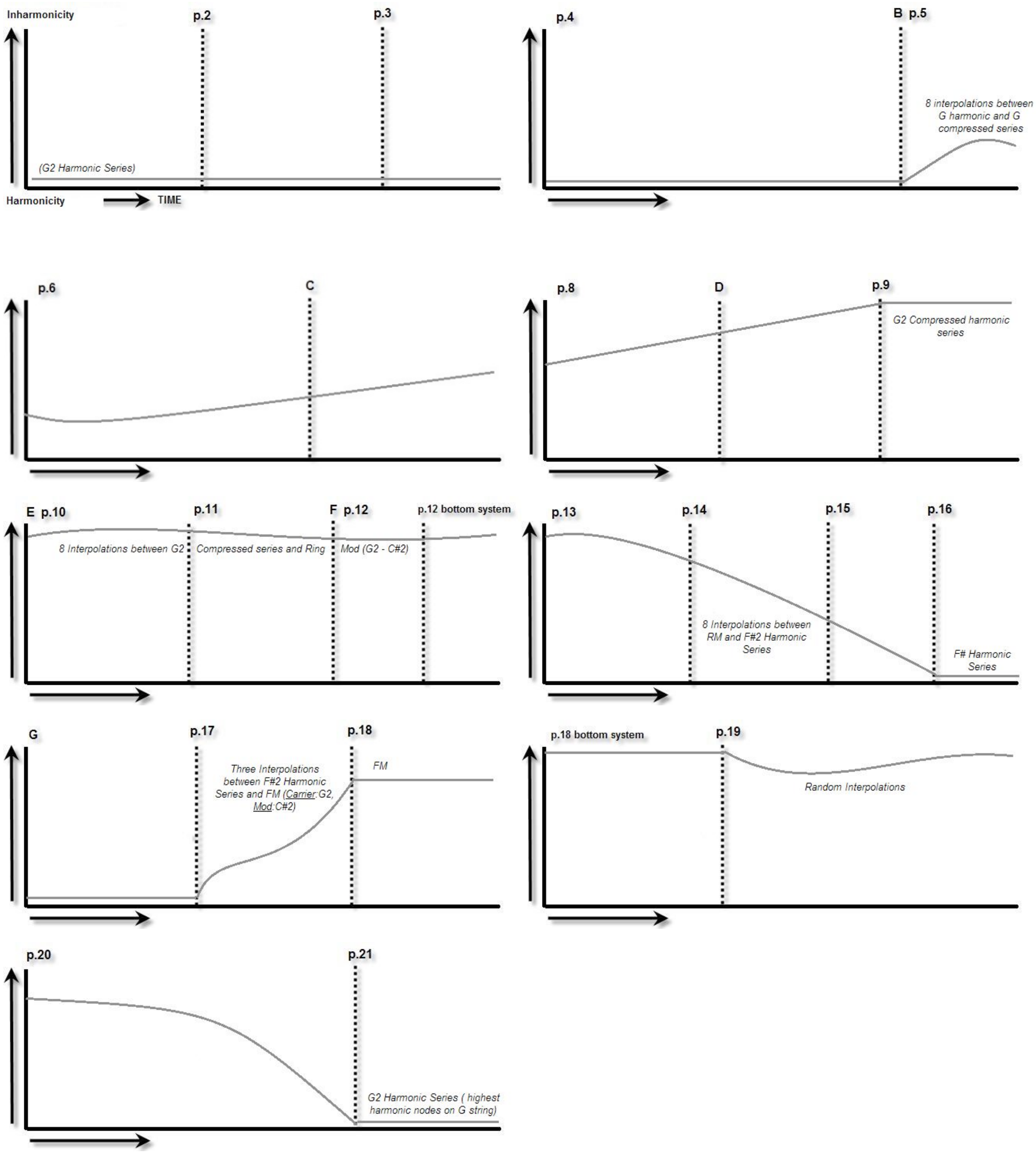
[9] Horatiu Radulescu, programme notes for *Das Andere* (Paris: Lucero Print, 1984).

[10] Raphaël Cendo. '"An Excess of Gesture and Material": Saturation as a Compositional Model', *Dissonance* 125 (2014), 4–7. <http://www.dissonance.ch/upload/pdf/125_21_hb_cen_saturation_engl_def.pdf> (accessed 1 May 2015).

[11] Inharmonicity is a term associated with the spectral school of composition that explains the degree to which the partials (harmonics) of a spectral analysis depart from the natural harmonic series (the fundamental and its multiplications).

[12] For a thorough guide to spectral techniques (FM, RM, interpolations, harmonic/compressed spectra, etc.), see Joshua Fineberg, 'Guide to the Basic Concepts and Techniques of Spectral Music', *Contemporary Music Review* 19/2, (2000), 81–113.

Figure 1: Macrostructure of *Metabolos* based on Harmonicity and Inharmonicity Levels.



On the micro level the actual harmonicity and inharmonicity levels are constantly varied, depending on the purity or non-purity of sounds created by manipulating different instrumental techniques. Technical details such as bowing pressure (normal/exaggerated), position changes (sul pont/tasto), pizzicato, and scratch tones, to name just a few, significantly affect the overall spectral fusion or fission (Figure 2a).

Figure 2a: Tone-Noise Axis in *Metabolos*

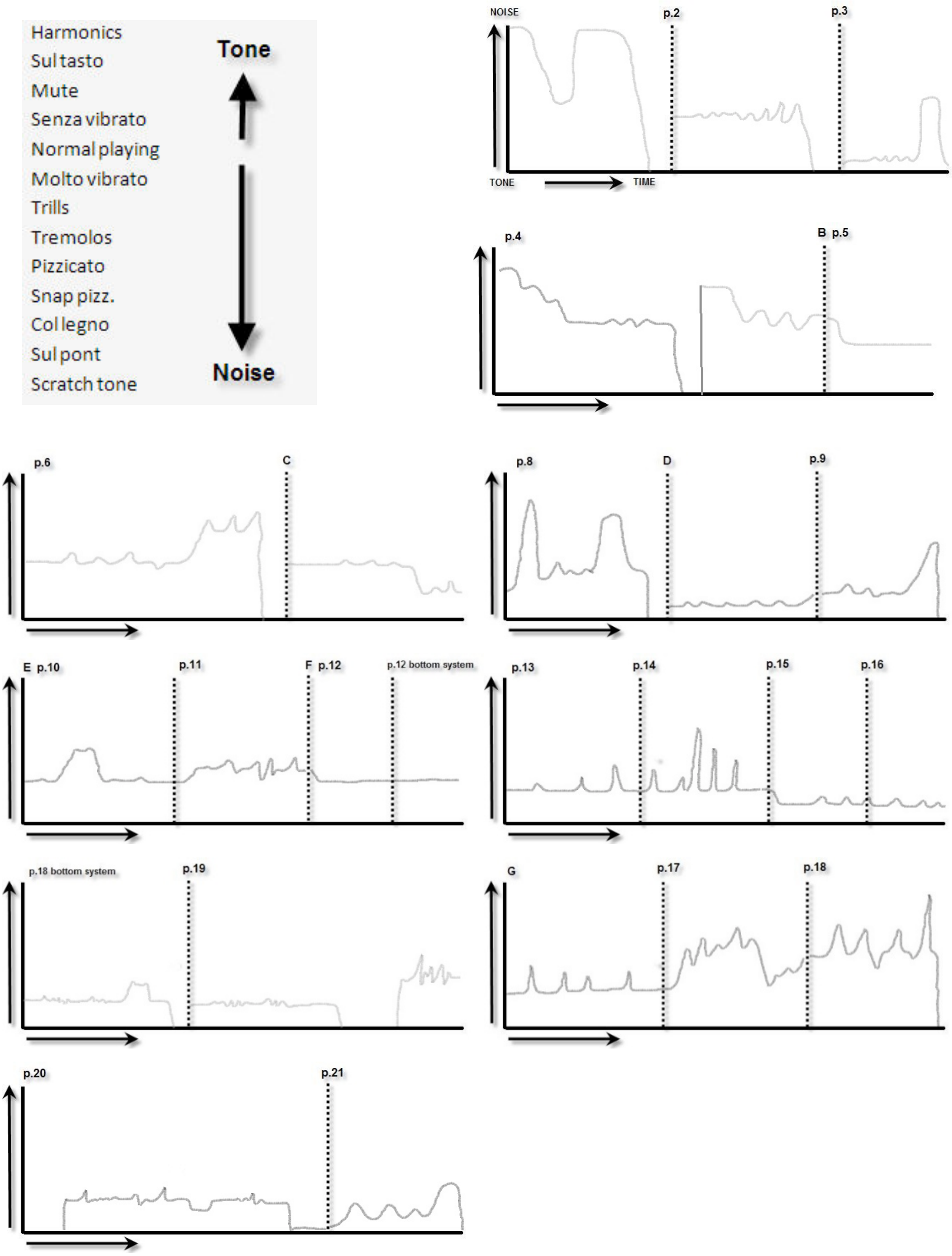
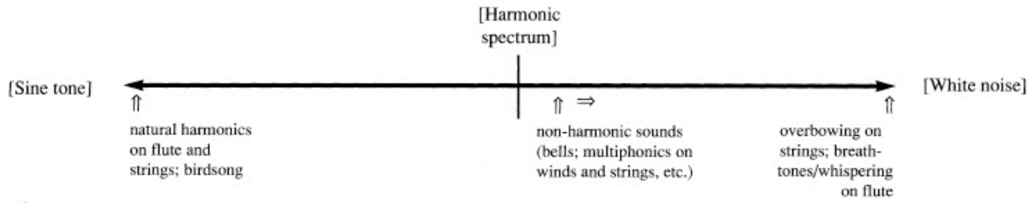


Figure 2b: Saariaho's Tone-Noise Axis



James O'Callaghan and Arne Eigenfeldt utilised the same technique of focusing on the gestural development in Kaija Saariaho's *Verblendungen* and *Lichtbogen* by mapping parametric changes over time.[13] Saariaho's music is always based on the 'stability vs. instability' axis. For her the spectrum is always articulated by the various extended techniques of the instrument. Consider, for example, the strings. Sul tasto and senza vibrato always operate on the 'sine tone' axis (Figure 2b), whereas the sul pont and overpressure techniques, which excite higher partials that mask the fundamental, operate on the opposite end of the axis (white noise). The same happens with the flute sound: a low, breathy tone reinforces noisier spectrums, whereas a high, bright tone has a characteristic 'sinusoid-like' character.

From Figures 1 and 2a, we notice that the tone-noise axis runs in conjunction with the harmonic-inharmonic axis, fusing together the two maps, and so creating what Grisey describes as liminal music, or music at the threshold of perception.[14] Harmonicity and inharmonicity levels are disturbed by these micro fluctuations of noisy textures. As can be observed from the first four pages of the work, even though its overall macro structure is based on a G2 harmonic series, which is highly harmonic, the 'noisier' micro fluctuations created by the instrumental techniques disturb its harmonic fusion.

Another axis that defines how a musical work is apprehended, again proposed by Grisey, is a scale that spans from periodicity to the white noise of durations.[15] In other words, it shows the degree of predictability in the basic time structure of a work.[16] Cognitive memory also plays a significant role in how we respond to a composition. 'The repetition of an event helps and sometimes forces it to be memorized'.[17] Our ears are only able to grasp the outline of a complex texture, the macrostructure, whereas in a simpler texture the details of the texture become apparent. As discussed below, *Metabolos* exhibits a constant shift between periodic and aperiodic events and simple and complex textures.

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[13] James O'Callaghan and Arne Eigenfeldt, 'Gesture Transformation through Electronics in the Music of Kaija Saariaho', Electroacoustic Music Studies Network Conference, 2010, Shanghai. <http://www.emsnetwork.org/IMG/pdf_EMS10_OCallaghan_Eigenfeldt.pdf> (accessed 20 August 2011).

[14] Jean-Luc Hervé, 'Quatre chants pour franchir le seuil', in *Contemporary Compositional Techniques and* OpenMusic, ed. Rosalie Hirs and Bob Gilmore (Paris: IRCAM/ Delatour, 2009), 31.

[15] Gérard Grisey, 'Tempus ex Machina: A Composer's Reflections on Musical Time', *Contemporary Music Review* 2/1 (1987), 244.

[16] Orjan Sandred, 'Temporal Structures and Time Perception in the Music of Gérard Grisey', 1994. <http://www.sandred.com/texts/Temporal_Structures.pdf > (accessed 23 September 2010).

[17] Grisey, 'Tempus ex Machina', 273.

Analysis of *Metabolos*: Microstructure

Metabolos starts with a scratch tone drone that gradually reveals its G2 fundamental frequency that lasts approximately twenty seconds.[18] It is as if the whole macrostructure of the work (Figure 1) is reduced to this very element that shifts from inharmonicity to harmonicity: an incubation of the fundamental frequency that creates the birth of the whole work. From that point, there is a constant process of instrumental additive synthesis fusing the partials of harmonic series into various timbral aggregates. But there is also a splitting of these into independent textures, as there is an interplay between interpolated, compressed, and FM/RM spectra.

Througout the work, no vibrato is used, except when specifically indicated with 'vibrato beats per second'; and it is always linked with the numbers 1, 2, 3 and 4. For example, having one instrument play a note with three vibrato beats per second while the other plays two, creates a 3:2 ratio which enhances and supports the lower partials of the harmonic series, in this case the G3-D4 perfect fifth (see for example top of p.2). These rhythmic pulsations are proportionally related in the same way that the fundamental is related to its partials. This is what Henry Cowell describes in his *New Musical Resources,* offering, for the first time, a theory relating rhythm and tone through overtone ratios.[19]

Microtones are used in two ways. They are either written with the exact cent deviation from the equal tempered scale (as in James Tenney's 1984 string quartet, *KOAN*), or they are approximated to the quarter-tone equivalent.[20] Sections that must be in exact intonation (RM, FM sections) are written in the first manner, whereas interpolated sections that do not require high resolution render their endings audible are written in the second manner.

The pitch material of the first four pages of the work – including the upper system in p.5 – is based on chord No.1 (Figure 3a), a natural harmonic series with odd partials on a G2 fundamental. Figure 3b shows one of the many spatial arrangements of these partials. Notice that there are additional even partials in this arrangement (2nd partial G3, 10th partial B5, 12th partial D6, and 14th partial F6).

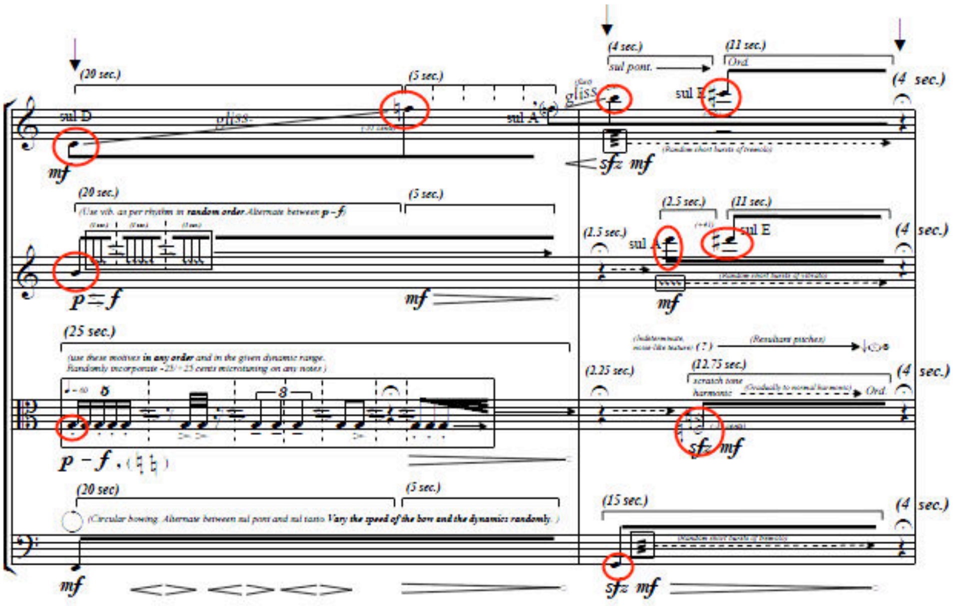
Figure 3a: Chord No.1 (Natural Harmonic Series on G2 – Odd Partials) and No.10 (Distorted Compressed Series on G2 – 0.7 Exponent) with Eight Nonlinear Interpolations

[18] Notice that not all of the harmonic series in this composition are derived from a spectral analysis of a sound – which is a common spectral technique – but are instead based on a *theoretical* natural harmonic series and its transformational process in the *OpenMusic* software. *OpenMusic* is a visual programming language based on the Lisp programming language designed and developed by IRCAM. By *theoretical*, I am referring to the fact that, since every instrument has an inherent natural distortion in its spectrum (e.g. a bell sound), the process of compressing and expanding this initial spectrum simulates the spectrum of real instruments.

[19] Henry Cowell, *New Musical Resources*, ed. David Nicholls (Cambridge: Cambridge University, (1996).

[20] Patricia Strange and Allen Strange, *The Contemporary Violin: Extended Performance Techniques* (Berkeley: University of California, 2001), 162.

Figure 3b: Chord No.1 and Its Related Partials



Some other sections fuse two harmonic series together, as in Figure 4a. Here, partials from the G2 and C♯2 harmonic series are used. The first note of Violin I is the 22nd partial of the G2 series and the second is the 14th partial of the C♯2 series; the first note of Violin II is the 23rd partial of the G2 series and the second is the 31st partial of the C♯ series. The first and second notes on the Viola are the 4th and 3rd partials of the G2 and C♯2 series, respectively. The C♯2 fundamental appears in the cello as a C♯1 pitch (one octave lower), which is outside the normal range of the cello. The player must detune the lowest string from the peg until it reaches that pitch. The random ***sff*** dynamic marking on this loose string shifts its timbral characteristics by conflating more inharmonic partials in the sound with a perceptual result of a 'quasi-electronic timbre' (similar to an electronic ring modulated sound). This resulting timbre is more obvious at a later stage, as this low pitch is treated with various instrumental techniques. (Two that are especially important are the sul pont with bowing overpressure and left hand fingernail pizzicato as close to the nut as possible, Figure 4b). The detuning of the C string pays homage to Xenakis's *Charisma* for cello and clarinet and *Nomos Alpha* for cello.

From p.5 to p.9, the composition makes a temporal as well as a harmonic shift. The G2 natural harmonic series (see chord no.1 Figure 3a) is subjected to a distortion process moving from harmonic to inharmonic (see chord no.10 in Figure 3a) and then interpolated eight times using the *OpenMusic* interpolation function.[21] The following equation is used to calculate the compressed partials of chord no.10[22]

[21] See *OpenMusic* Tutorial 18 (Interpolation) at: <http://recherche.ircam.fr/equipes/repmus/OpenMusic/user-doc/DocFiles/Tutorial/ > (accessed 23 September 2010).

[22] For further reading on calculating distorted spectra using this equation, see Rozalie Hirs, 'Frequency-Based Compositional Techniques in the Music of Tristan Murail' in *Contemporary Compositional Techniques and* OpenMusic, ed. Rosalie Hirs and Bob Gilmore (Paris: IRCAM/ Delatour, 2009), 93-196.

$$f(r) = f_0 \ x \ r^d$$

Where f(r) = the distorted frequency with partial rank r

f_0 = the fundamental frequency

r = the partial rank (an integer)

d = the distortion coefficient, (i.e., an indicator of the amount of distortion. If d < 1 the spectrum is compressed. In our case d=0.7)

As stated earlier, pp. 5–9 presents a dynamic, temporal, and gestural shift. Inspired by the idiosyncratic notation of Murail's *Territoires de l'Oubli* and Grisey's *Modulations* (especially at rehearsal number 37), this section conveys descriptive and prescriptive information regarding the desired effects and how they might be achieved by the performers.[23] This descriptive and prescriptive information is given to the players as a written set of defined rules (Figure 6).

Figure 4a.

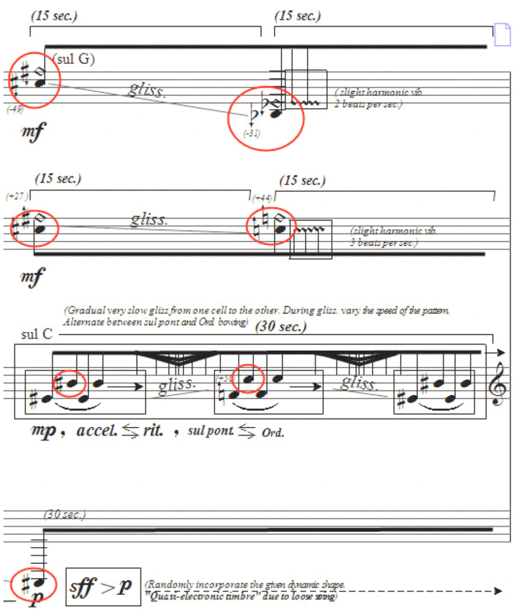


Figure 4b.

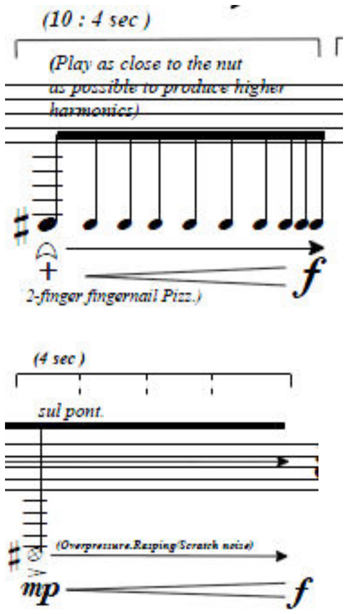
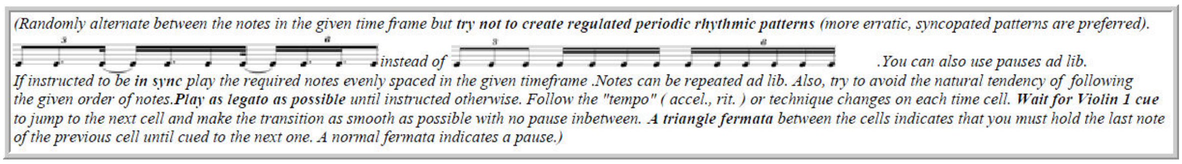


Figure 5: First Sixteen Partials of the G2 Compressed Series (d=0.7).

[23] Gérard Grisey, *Modulations* (Paris: Ricordi, 1978); Marilyn Nonken "'La notation ne peut render compte du fait": Performing Murail's *Territoires de l'Oubli' Tempo* 62 (2008), 4.

Figure 6: Set of Performance Rules for pp. 5–9.



The players' focus centres on the physical gesture and its acoustic consequence. Using limited aleatoricism, there is a 'disciplined freedom, ordered chaos and controlled spontaneity'.[24] Also, the directional and predictable temporal plane of the previous section is now shifted, reintroducing 'surprise, contrast and rupture'.[25]

This section also highlights Grisey's scale of complexity. One of many examples of this would be the first system of p.5. Here the players have to follow the time cells and perform the given pitches (partials of a G2 harmonic series) in various temporal complexities. Mini pockets of accelerando and decelerando appear as well. In our example (Figure 7), periodic time cells of two seconds each become expanded into accelerated and decelerated events of six and ten seconds respectively. By contrast, other sections are totally predictable and periodic as each instrument is in sync with the others (end of Figure 7). This once again supports the notion of thresholds as described by Grisey and the exploration of 'stretched' and 'contracted' time.[26] At the same time it differs from Grisey's idea because of the idiosyncratic notation used.

After a clear statement of the G2 compressed series at the second system of p.9, the series reappears on the first system of p.10 with a mirroring up-and-down triplet movement on Violin I and Cello, starting from the 10^{th} partial of the series (Figure 8a). In this section, we also have a gradual periodic contraction of our pitch bandwidth (Figure 8b).

Furthermore, from this moment until the top system on p.12, there is a gradual transformation of the G2 compressed series into a ring modulated timbre with an f1=98Hz (G2 carrier) and an f2=69.3Hz (C♯2 modulator) with their multiplications 2a, 3a, 2b, 3b, 4b (see Figure 9). The formula to achieve the resulting ring mod timbre is:

> a+b (ff), a-b(ff), a+2b(f), a-2b(f), a+3b(mf), a-3b(mf), a+4b(mp), a-4b(mp),2a+b(f), 2a-b(f), …

Eight nonlinear interpolations are created in between with the help of *OpenMusic* (Figure 12) and only nos. 1, 3, 5, 7 and 8 are used in this section. Also, the dynamic markings of Violin I and Cello are taken from the ring modulated series, and they are used on the interpolated series as well. Furthermore, sudden dynamic fluctuations also define note accents and melodic phrases (Figure 10).

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24 Nonken, '"La notation"', 10.

25 Tristan Murail, 'After-Thoughts', *Contemporary Music Review* 24/2 (2005), 271.

26 Grisey and Fineberg, 'Did You Say Spectral?', 2.

Figure 7: Stretched and Contracted Time

Figure 8a: Mirroring Movement on Violin I and Cello.

Figure 8b: Pitch Bandwidth Contraction.

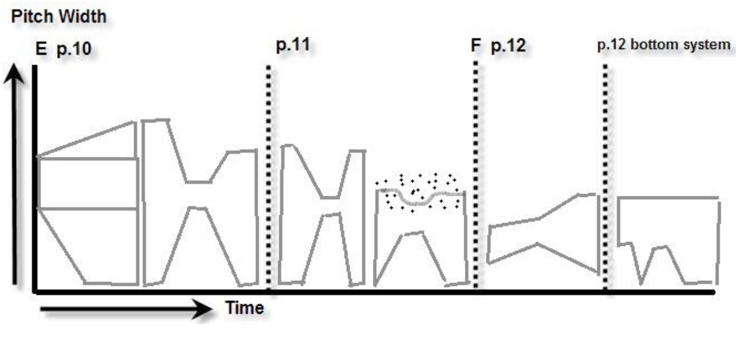


Figure 9: Ring Modulation with a G2 Carrier and C♯2 Modulator.

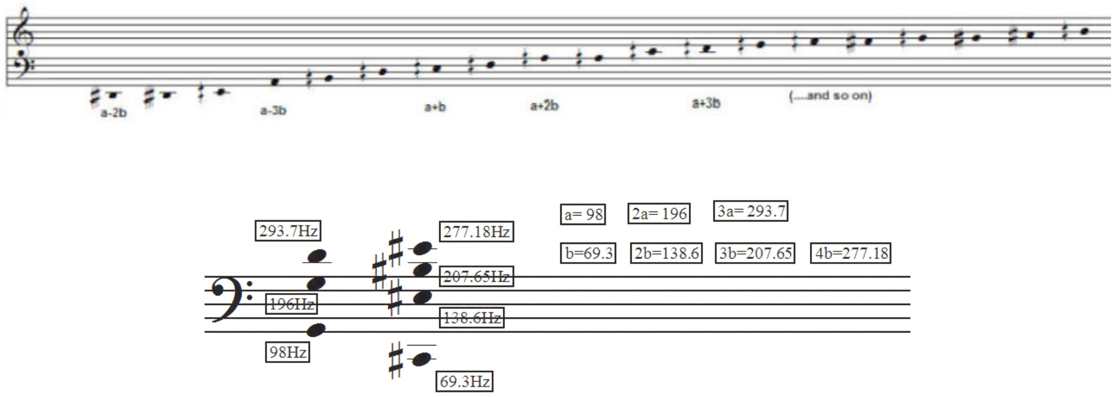
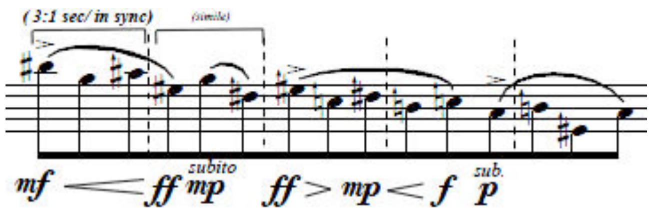


Figure 10: Dynamic Fluctuations on the Cello and Violin I Taken from the Ring Modulation Series.



This section also raises the issue of entropy as Violin II and Viola perform a finger tremolo between a normal pitch or a microtone and a microtonal natural harmonic that fluctuates in speed, dynamics, and bowing technique (sul pont also changes the resultant harmonics into higher ones), and which is not at all in the realm of conventional techniques. This creates randomness and disorder with no predictable harmonic results, and can also be found at the ending section of the work (Figure 11).

Figure 11: High Entropy Levels in *Metabolos.*

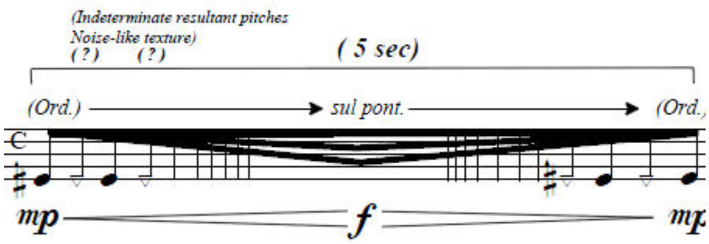
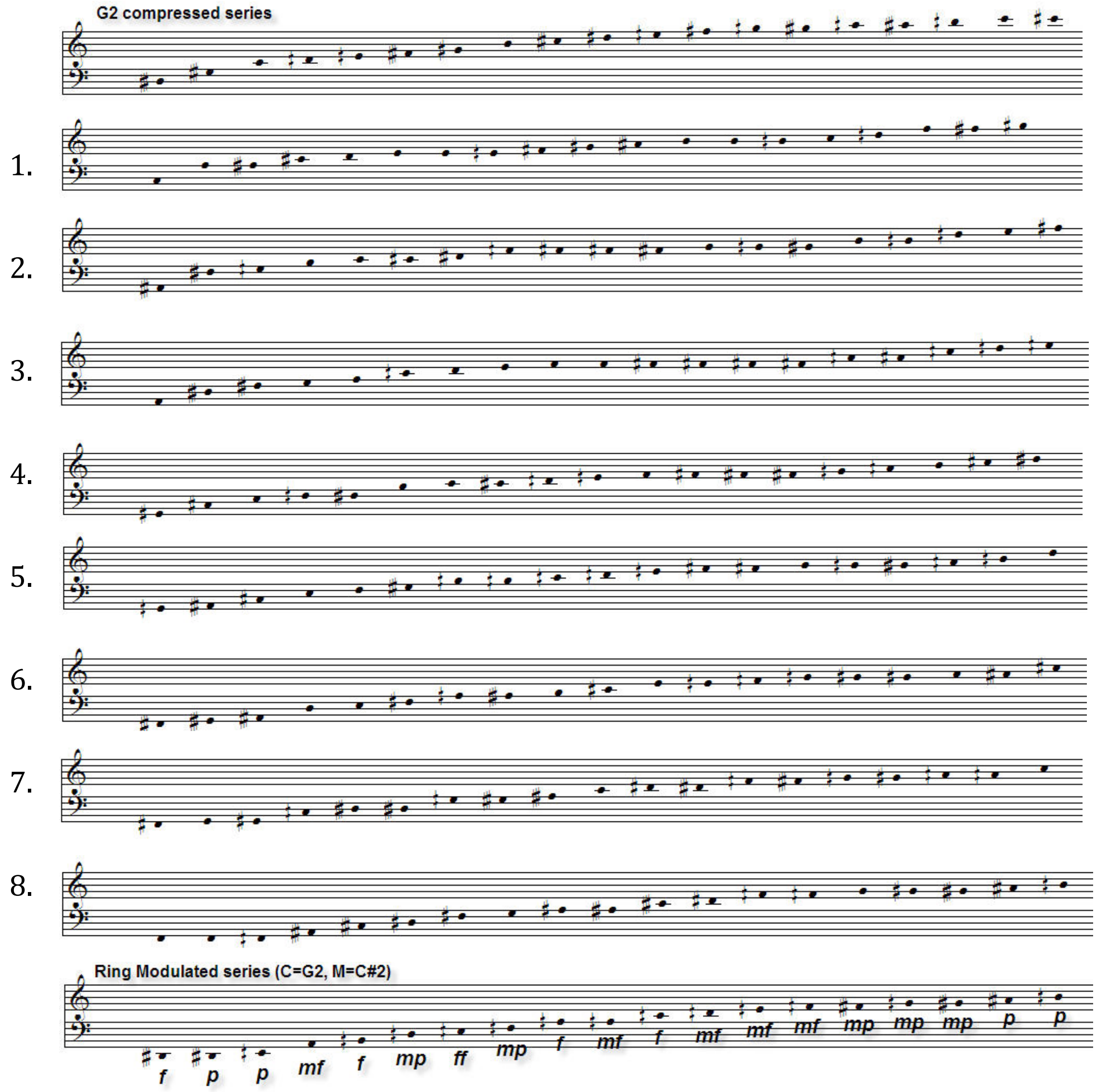


Figure 12: G2 Compressed Series to Ring Modulation Timbre with Eight Nonlinear Interpolations.



At the end of p.12 (Figure 13), there is an RM aggregate section that uses all of the pitches of the RM series in a span of six seconds (Figure 14, RM series). After this section another process begins, transforming the RM series to an F♯ harmonic series with odd partials. Once again, eight nonlinear interpolations are calculated with an exponent of 0.6 (Figure 14a). Modifying the distortion exponent from 0.7 to 0.6 results in a different convex curve.

Figure 13: Ring Modulation Section

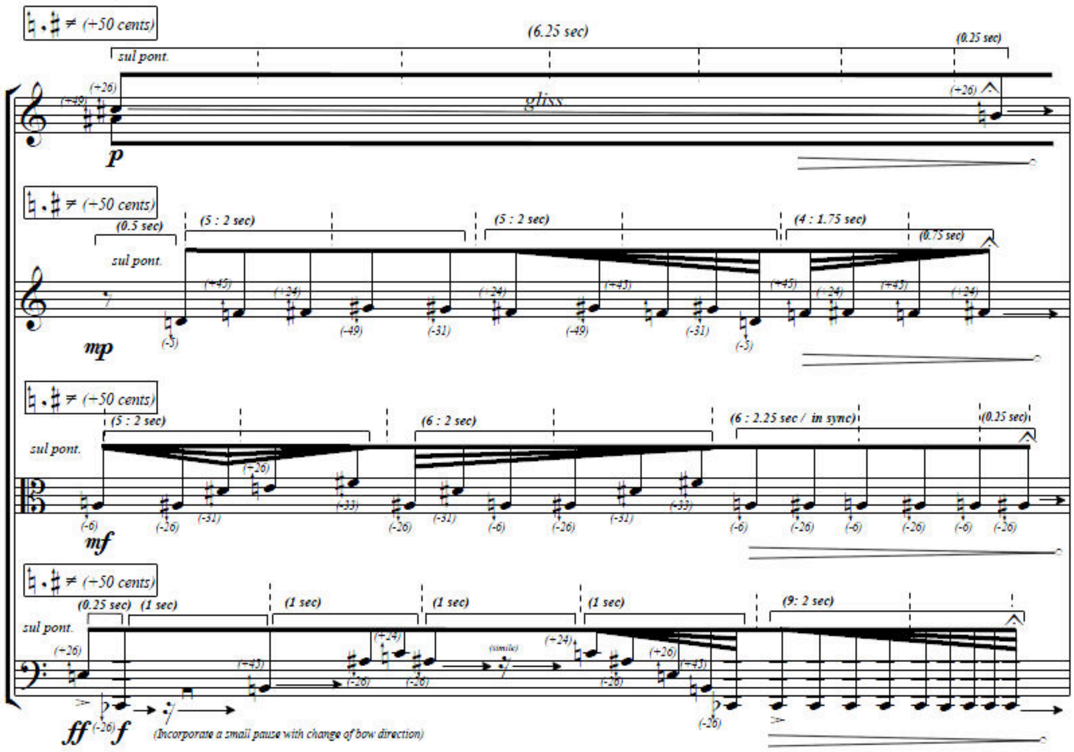


Figure 14a: RM to F♯ Harmonic Series with Eight Interpolations

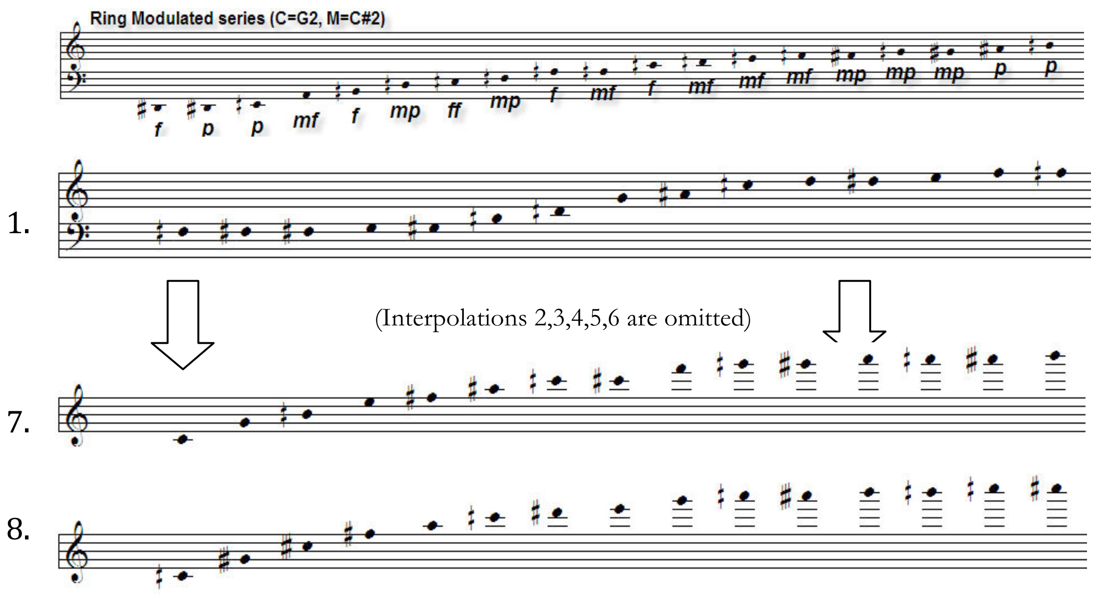
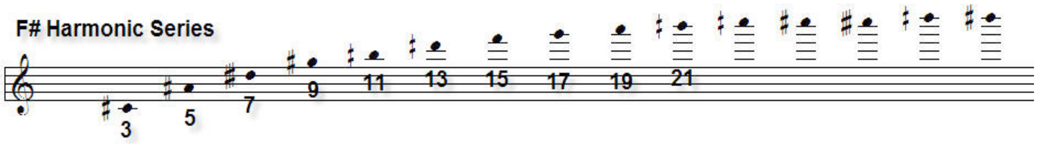


Figure 14b: Pitch Bandwidth of RM to the F♯ Harmonic Series.



Starting from the top system of p.13, a meta-process begins to appear: a superposition of two layers, one that is purely periodic (Viola and Cello), slowly highlighting moments of rhythmic 'arrhythmias'; and the top layer (Violin I and II) that has a limited aleatoric context. All instruments are using material from Figure 14a, starting from interpolation no.1 and finishing on the bottom system of p.16 with an amalgamation of partials from interpolation no.8 and the F♯ harmonic series. Figure 15 shows vestiges of the F♯ fundamental in the cello part (that slowly increase in number) as well as rhythmic 'arrhythmias'. There is also a change on the 'pitch bandwidth' (lowest and highest frequency points) as this section started from low RM frequencies and ended up at the highest partials of the F♯ harmonic series (Figure 14b).

Figure 15: Vestiges of the F♯ Fundamental and Rhythmic 'Arrhythmia' on the Cello.

P.17 and p.18 go through three interpolated series between an F♯ harmonic series and a frequency modulation spectrum (G2=carrier, C♯2 modulator) with a modulator index of 10 (Figure 16a). Dynamics are calculated through Bessel functions (Figure 16b). Sidebands are calculated with the following equation:[27]

Frequency = carrier + and – (index x modulator)

(c-m and c-2m are omitted as they are outside of the cello range)

[27] For more on calculating FM sidebands using this equation, see Hirs, 'Frequency-Based Compositional Techniques', 93-196.

Figure 16a: F♯ Series to FM Spectrum with Three Interpolations (0.6 exponent).

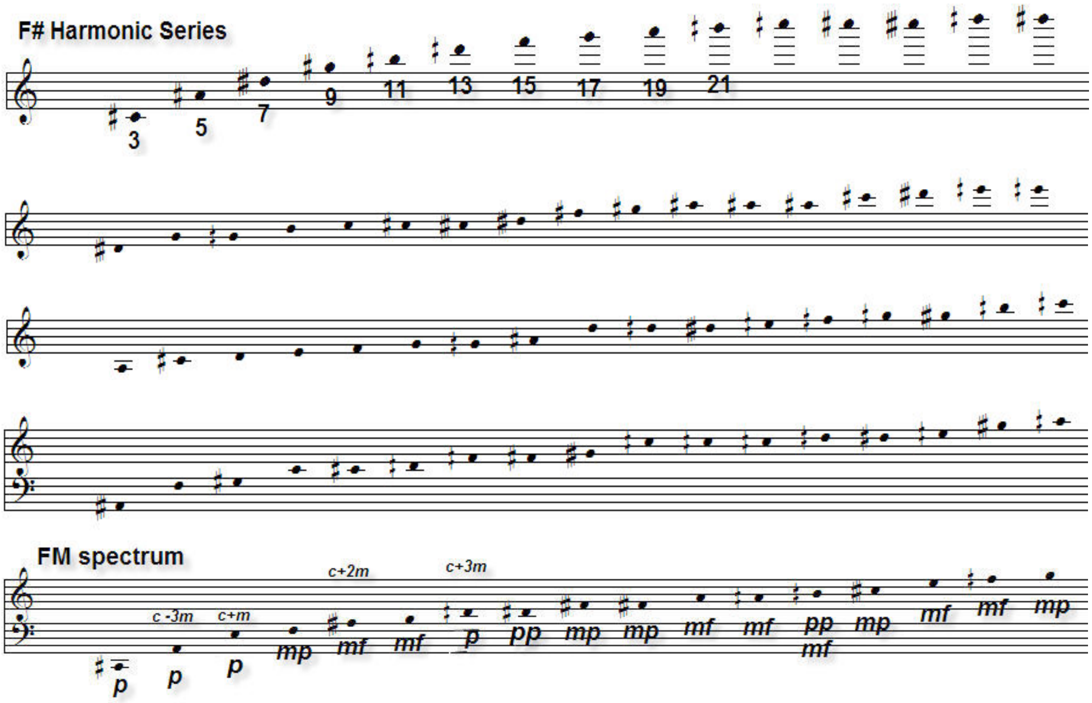
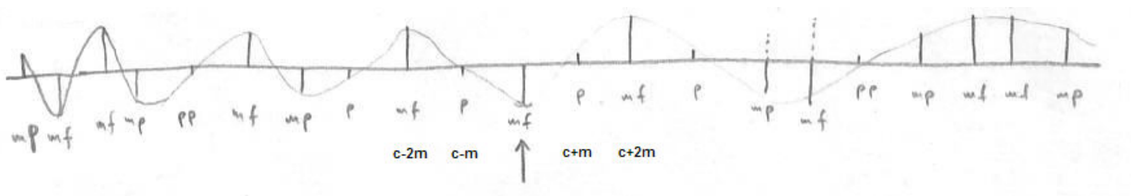


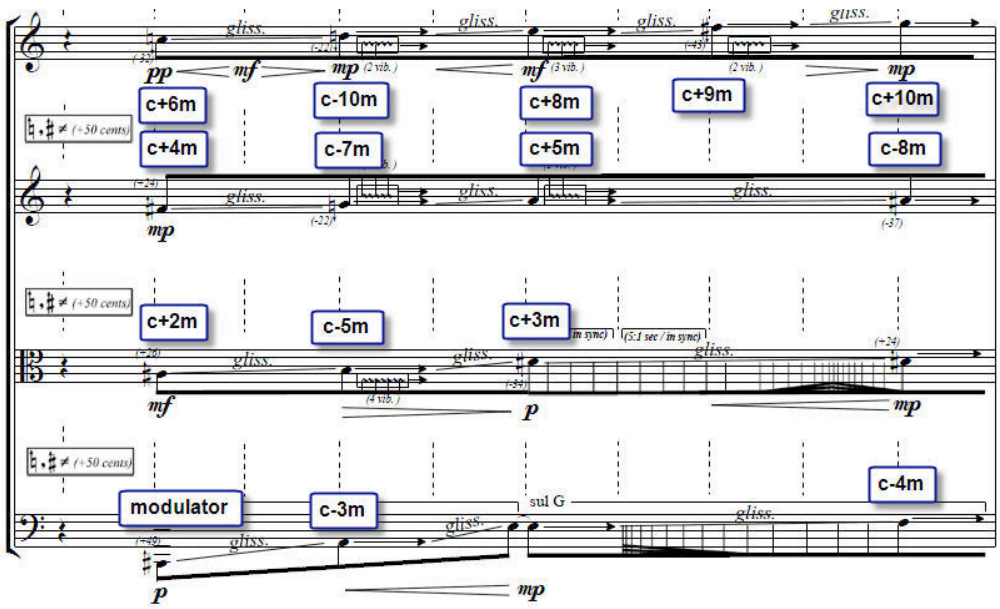
Figure 16b: Dynamics Calculated through Bessel Functions.



For example, one of the many realizations of the FM spectrum is given in Figure 17. Here, the microtones are written at the exact frequency of the FM sidebands with a plus-or-minus cent deviation from the equal tempered tuning. Additionally, the dynamics used are those calculated through Bessel functions as shown in Figure 16b. On some of the notes of this section, a three-against-two vibrato is called for, metaphorically 'conflicting' with the non-integer ratio of the modulator and carrier that created this FM spectrum

The spectra used on p.19 and p.20 are randomly selected through all the calculated harmonic and inharmonic series. Some are taken from RM spectra and some from random interpolated series. Specifically, the top system of p.19 is based on the RM spectrum; the bottom system on the 7th interpolated series of the G distorted-RM spectrum (Figure 12); the top system of p.20 on the 3rd interpolated series (Figure 12) and the bottom system on the G distorted series. P.20 finishes on a B – C♯ high register harmonic texture that prepares the listener for the next section.

Figure 17: Realization of the FM Spectrum.



For the section from p.21 until the end of the work, there is another long descriptive instruction of how the players should respond. They are required to alternate between the given high register harmonic nodes on a single G string and follow the changes of the speed of the tremolo. Some of the harmonic nodes are not conventional, and some even produce microtonal natural harmonics (for example, the no.7 B♭ harmonic node produces a microtonal D). The chart and its resulting sound are quoted from Enzo Porta's *The Violin: Harmonics-Classification and New Techniques*.[28]

Throughout this section, bowing should be sul pont. The final effect is a chaotic amalgam of high-register harmonics and noise-like textures as the resulting sound of these higher harmonics will fluctuate vastly depending on variables such as bow speed and position, bowing pressure, tremolo speed, and so on (Figure 18a). The players are specifically instructed to let the variables cause the resultant sound to fluctuate and not try to produce the specified sound and that sound only. The work ends in a manner directly opposite of the beginning. The slow directional spectral incubating period of the G2 fundamental becomes a spectral 'granular' synthesis of the string's constituent elements, including its harmonic and noisy textures. Furthermore, this section is on par with Radulescu's notion of the 'preferential phenomenology' of sound spectra.[29] Since all the partials belong to the same fundamental, there is a favourable chance of hearing a low G virtual fundamental, despite the players being instructed to instigate random parameters. A similar example that uses the same technique would be Radulescu's *Das Andere*. For example, in Figure 18b the nodes touched on the two adjacent strings produce harmonics that are part of the same D spectrum. As mentioned earlier, Radulescu regards his music as existing at the border between score and sound phenomenon. But he also wanted to create a trance state, having in mind the effect of a séance.[30] In my example, supernatural

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[28] Enzo Porta, *The Violin: Harmonics-Classification and New Techniques* (Milano: Ricordi, 1985), cited in Strange and Strange, *The Contemporary Violin,* 118.

[29] Horatiu Radulescu, 'The World of Self-Generative Functions as a Basis of the Spectral Language of Music', *Annals of the New York Academy of Science* 999 (2003), 322-363.

[30] Horatiu Radulescu, programme notes for *Das Andere*

significance is absent; it is purely a textural game between the two opposed phenomena of pure harmonics and noise.

Figure 18a: Ending Section of *Metabolos*.

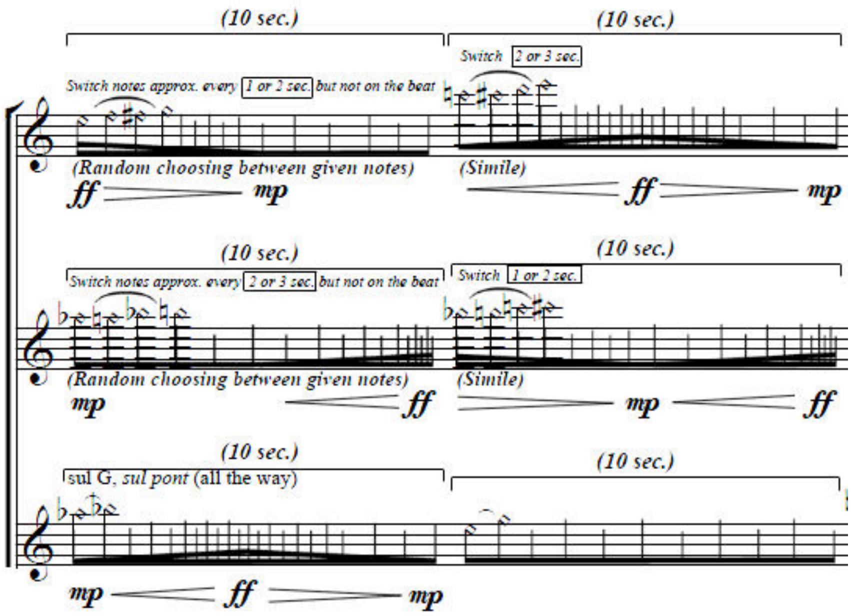
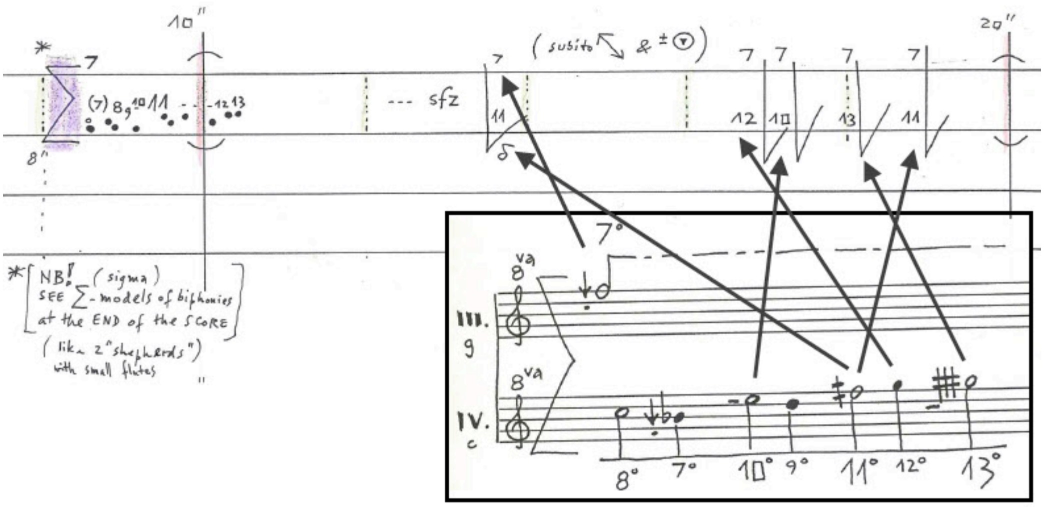


Figure 18b: (Σ) Module in the Beginning of *Das Andere*.



Conclusion

In *Metabolos*, the constant change of frequency-based material creates its formal structure. As Varèse asserts, 'form is a result – a result of process', and this process of transforming its spectral elements into harmonic and inharmonic timbres is how *Metabolos* establishes its form.[31] The 'integration of all sounds' from scratch tones to harmonic aggregates and the use of 'thresholds between different parameters' are among the many characteristics of *Metabolos*. As Grisey concludes, 'the spectral adventure has allowed the renovation, without imitation of the foundations of occidental music, because it is not a closed technique but an attitude'.[32] This inclusiveness has enabled me to shift away from the orthodox spectral attitude. The entropic/idiomorphic 'open' writing of this work also impinges the textural images projected, sometimes reminiscent of improvisatory paradigms. It even touches upon parametrization of its materials, a technique most often associated with the serial composition, an idea that would otherwise be loathed by the founding fathers of spectral music.

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[31] Edgard Varèse, 'The Liberation of Sound', *Perspectives of New Music* 5/1 (1966), 16.

[32] Grisey and Fineberg, 'Did You Say Spectral?', 3

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Abstract

The composer analyses one of his recent compositions, *Metabolos*, for string quartet. (2011). The work is based on the constant change of its constituent elements and especially of its frequency-based material to create its micro and macrostructures. The work establishes an interplay between the partials of a harmonic series and its dilation and compression, as well as borrowing and adapting electronic techniques (FM and RM synthesis) into the acoustical domain; all characteristics of the French spectral school of composition. The score also constructs an 'entropic variation' that produces randomness and disorder, creating a 'tone-noise' axis which permeates throughout the composition. The work uses IRCAM's OpenMusic functions for its calculations.

About the Author

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