

Numéros / n° 10 - Informatique et musique : recherches en cours

« The electroacoustic music of Horacio Vaggione »

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Introduction

Figure 1. Vaggione and Roads, Porto, 2001.



I came to know Horacio Vaggione in 1994, but my ties to the Université Paris 8 go back to the 1970s. As editor of *Computer Music Journal*, I was aware of the Groupe d'Art et Informatique de Vincennes (GAIV) in the 1970s (GAIV 1969). I was in contact with several members of this group, including Vaggione's predecessor Professor Giuseppe Englert. When I moved to Paris in 1991, Prof. Englert showed me around the campus ⁽¹⁾.

I knew that Horacio Vaggione's *Schall* was a landmark when I first heard it in a concert of the Bourges Académie Internationale de Musique Electroacoustique in 1994. It was on a train ride from Bourges to Paris that I came to know the maestro personally. We discussed my departure from IRCAM and he invited me to teach at Paris 8.

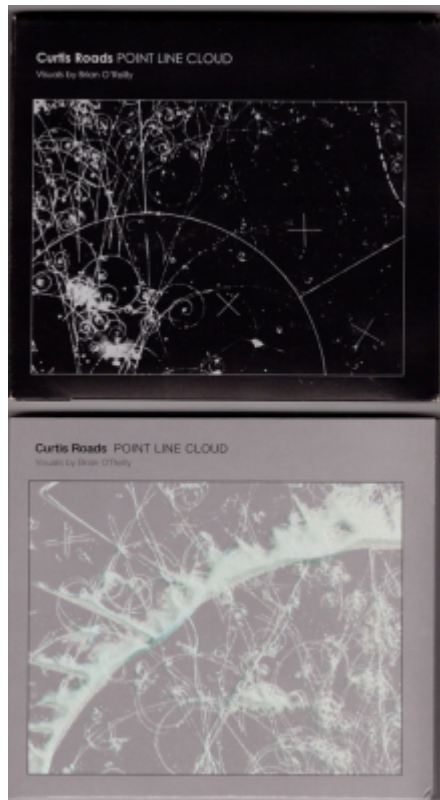
Later he pointed out to me that granular synthesis, in which I had done pioneering research in the 1970s, was important. He suggested that I write a doctoral thesis on it. This is a classic example of the power of mentoring, as the conversation was life-changing. It led to the research documented in my thesis in 1999 and eventually published in my book *Microsound* (Roads 2001). The thesis and book would never have been written were it not for the encouragement of Professor Vaggione.

Prior to this, I had always thought of granular synthesis as a technique with much potential, but I did not

have a clear concept of how to compose with granular materials.

After I heard *Schall* and *Life in the Universe* (1997) by my student Ken Fields, it became clear that I could combine techniques of phrase construction developed in *Clang-tint* (which already used pulsar synthesis) with granulation and micromontage. So 24 years after my initial experiments with granular synthesis, I finally had a clear idea of how to proceed. This epiphany led to the realization of *Half-life* (1998-1999) and the other works in my album *POINT LINE CLOUD* (2004, 2019).

Figure 2. *POINT LINE CLOUD* cover. (top) 2004 edition published by Asphodel. (bottom) 2019 version on Presto!?! label.



Algorithms and interventions: early encounters with technology

At an early stage, Vaggione recognized the pertinence to composition of emerging computer technology. In the 1960s, computer music facilities were rare and it required unusual determination to gain access. At the age of 23, Vaggione had the opportunity to visit the University of Illinois. Illinois was a highly active center for computer music in this period, with multiple faculty and researchers developing hardware and software. Lejaren Hiller and Herbert Brün first showed him how computers could be applied to music composition (Vaggione 1967). He studied the stochastic composition algorithms used by Hiller as well as the coding language of the CSX-1 Music Machine, the first program to produce digital sound at Illinois. Hiller gave Vaggione the source code of these programs (written in the Fortran language), and introduced him to the Music N series of sound synthesis programs written by Max Mathews and his colleagues. As it happens, I was also introduced to computer music at Illinois in 1971.

Vaggione began his experiments with computer-generated sound in 1970 at the University of Madrid (Budon 2000). From the start, he explored a musical aesthetic based on a fabric of short duration events scattered in time. In the compositions *Modelos de Universo* (1971) and *Movimiento continuo* (1972) the composer used a sound synthesis program running on a large IBM mainframe computer to generate up to 20 sounds per second in each of four voices (Briones 1970; Vaggione 1971). The score of *Modelos de*

Universo IV provides an early example of the principle of *micromontage*?the assembly of many short sounds in high densities.

Vaggione's output in the 1980s can be seen as a consistent development of these initial explorations. Examples from the 1980s involving microsonic techniques include several pieces realized at IRCAM: *Octuor* (1982), *Fractal A* (1983), *Fractal C* (1984), *Thema* (1985), at the Technische Universität Berlin (TUB): *Tar* (1987) and *Scir* (1988), and *Ash* (1989), realized at the GRM using the SYTER sound processor.

Formal/informal

Mediating interaction between formal algorithmic control and direct intervention is a hallmark of Vaggione's compositional strategy. Specifically, he combines both algorithmic procedures and purely manual, interactive operations.

In describing these interventions, the composer speaks not of "intuition" but of "non-formalizable craftsmanship" (Vaggione 1996).

Micromontage and granulation

In traditional music, the note is the basic building block. A note at a given pitch, timbre, and amplitude is functionally equivalent to a note with the same properties. The world of notes is a closed system, in which the surface homogeneity of the note masks internal heterogeneity at the micro time scale. By contrast, techniques such as micromontage and granulation reveal this internal heterogeneity.

In micromontage, the composer extracts short segments from sound files and rearranges them in time and space. The term "montage" derives from the world of cinema where it refers to cutting, splicing, dissolving, and other film editing operations. The term "micro" refers to the precision time scale on which a composer can position each sound on the canvas of time.

Vaggione is a pioneer of micromontage and its most faithful practitioner (Solomos 2007). As I explained in my book *Microsound* (Roads 2001), Gabor and Xenakis pioneered the closely related method of granular synthesis in the 1940s and 1950s. We should also mention Bernard Parmegiani's composition *Capture éphémère* (1967), a remarkable example of pioneering and virtuoso micromontage.

In Vaggione's music we often hear a contrast between a background layer consisting of a constantly changing bed of microsound, and foreground elements that are much louder.

It is important to understand that the background layer is not random in its organization. Rather it is composed of what Vaggione calls *micro-figures*, i.e., sequential patterns of sounds on a granular time scale that repeat, alternate, play backwards, stutter, sweep up, sweep down, etc.

A main contribution of Vaggione's music is that it organizes and articulates a new syntax of the micro time scale (Vaggione 2003). One of the hallmarks of this technique is obsessive repetition at the micro time scale, a kind of synchronous looping. In a sound editor this is achieved by pasting a sound repeatedly. This repeating texture is inevitably punctuated by asynchronous micro-events that give the texture a quasi-stochastic quality. Listen to the repeating particles in this excerpt of *Agon* (1998).

Audio 1. Extract of *Agon* (1998).

<https://nakala.fr/10.34847/nkl.cd2e0602#e304627de751b86cd82309c5a464f437aee9001f>

In this detailed manner of working, we have the musical equivalent of the Pointillist painter. It is notable

that in music, the term "Pointillism" has long been associated with the sparse serial style of Webern and his followers. Ironically, the technique of the Pointillist master Georges Seurat was anything but sparse. His canvases present a dense sea of thousands of meticulously organized brush strokes (Homer 1964).

Granulation techniques share many similarities with micromontage (Roads 2001). Perhaps the best way to draw a distinction between granulation and micromontage is to observe that granulation is inevitably an automatic process: the composer's brush becomes a refined spray jet of sound color. By contrast, a sound artist can realize micromontage by working directly in the manner of a Pointillist painter: particle by particle. It therefore demands unusual patience. Of course, micromontage and granulation techniques can be seamlessly intermingled, as in my music, for example.

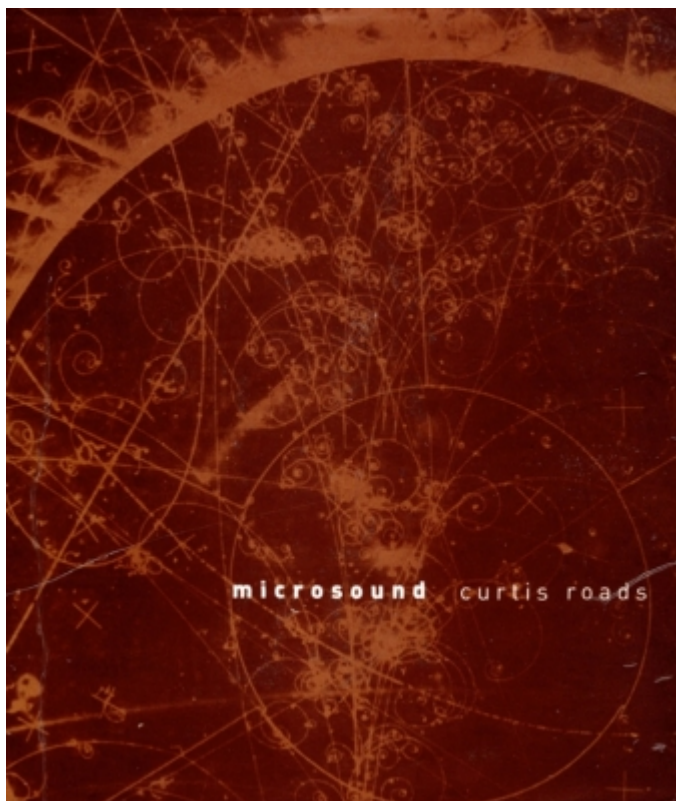
Thema and Tar

Thema (1985) and *Tar* (1987), are early examples of micromontage. *Thema* features streams of microsounds, such as resonant bass saxophone breath-bursts, scattered in both synchronous and asynchronous patterns along the time line. For both pieces, the composer used the CARL software from UCSD, writing Cmusic instruments and scores in the form of alphanumerical texts. Construction by script meant that the material could be organized on an unprecedented level of micro detail (Vaggione 1991).

Emergence of a new direction

An important transition took place with the spread of personal computers in the 1980s. By 1988, inexpensive personal computers had become powerful enough to support high-quality audio recording and synthesis. Synthesis experiments on the microtime scale?granular and particle synthesis?became more feasible (Roads 1978, 1985a, 1985b; Truax 1990a, 1990b). My book *Microsound* (Roads 2001) traces the history of particle synthesis from the theories of Gabor (1946) and Xenakis (1960) to the first implementations on digital computers.

Figure 3. *Microsound* (2001) cover.



In addition, two essential software tools became available in this period: the graphical sound editor, and the graphical timeline audio mixing program. It is difficult to overestimate the significance of these advances, which are so commonplace today. The simple ability to align multiple sounds along a timeline, to zoom in and out, and jump across time scales interactively with the click of a button, changed the nature of electroacoustic composition.

As Vaggione has observed, composition on multiple time scales involves no distinction between music structure and sound materials:

I assume that there is no difference of nature between structure and sound materials; we are just confronting different operating levels, corresponding to different time scales to compose (Vaggione, in Budon 2000).

With the new interactive sound tools, suddenly it was possible to apply directly any kind of sound transformation, on any time scale. Sound material itself became a composed structure. Of course, this was always part of the potential of the electronic medium, but interactive power tools took this practice to another level.

Till (1991) for piano and tape, signals the emergence of a new direction. As personal computers became common, Vaggione and others began to use graphical sound editors, furthering the dialectic between algorithmic and direct operations, which in turn influenced his way of dealing with the microtime domain. In *Till*, what begins as an angular piano etude, by 8 minutes and 21 seconds melts into a dense cloud of sound energy, driven by the torrential flow of thousands of tiny sound particles.

Audio 2. Extracts from *Till* (1991).

<https://nakala.fr/10.34847/nkl.cd2e0602#ae97ac63900f2288e1211518c449fb325d806f1e>

This new direction crystallized in his 1994 electroacoustic composition *Schall*. This middle period included his subsequent compositions *Nodal* (1997), *Agon* (1998), *Préludes Suspendus* (2000), and *24 Variations* (2001).

***Schall* and the organization of microsound**

Figure 4. Cover of Horacio Vaggione CD with *Schall*.

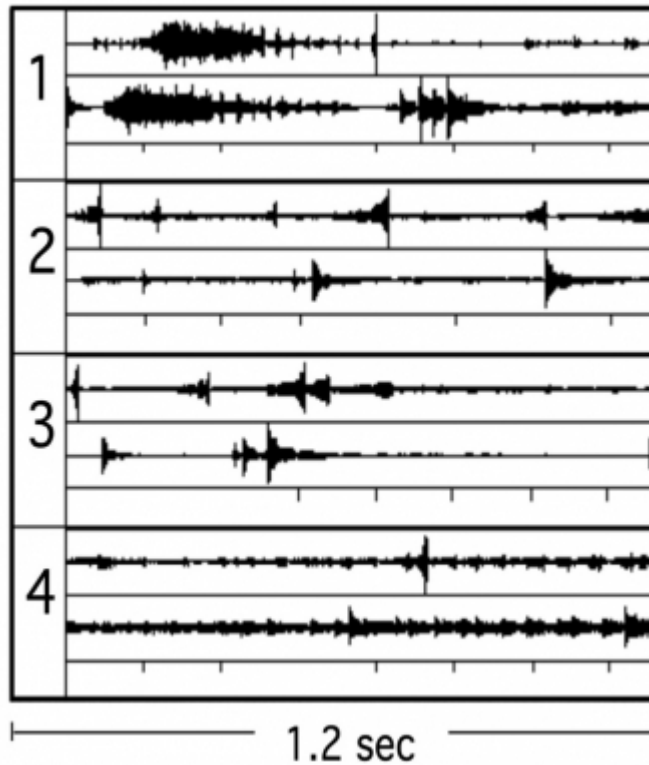


The raw material of *Schall* (1994) consists of thousands of sound particles derived from sampled piano, which are granulated and transformed by such operations as convolution, waveshaping, and the phase vocoder.

A fascinating aspect of style in *Schall*, *Nodal*, *Agon*, *Préludes suspendus*, and *24 Variations* is the use of continuously scintillating "background" textures. These are composed of more or less dense sequences and agglomerations of short-duration grains. These sometimes crackling, frying, or creaking textures function as a stationary background element in the mesostructure of the pieces, holding the listener's attention. By keeping these textures low in amplitude (from 10 dB to 23 dB down from the foreground peaks and resonances), their background (or "far") role is evident. The composer sustains these low-level textures for up to 20 seconds or more at a time, keeping the listener engaged while he prepares the next explosive release (the "near").

Again, this background texture is not random in its organization. Rather it is composed of micro-figures, that is, sequential patterns of manually-assembled grains. As we discuss later, this scheme for micro-organization was later incorporated into Carlos Caires's IRIN software—a power tool for micromontage.

Figure 5. By zooming in to a 1.2 second excerpt of *Schall*, we can see the articulation of various layers and amplitudes. This example shows four stereo tracks labeled 1-4. We see about 20 articulations within this brief span of time. (After an image provided by the composer.)



Schall is an outstanding example of the use of creative micromontage. The sound material consists of thousands of sound particles distributed on multiple layers of time (figure 1). According to the composer:

The music is focused on a limited collection of objects of different sizes, which appear in diverse perspectives. The work plays essentially with contrasts between textures composed of multiple strata, as an expression of a concern with a detailed articulation of sound objects at different time scales (Vaggione 1999).

What makes *Schall* unique is its brilliant use of the notion of switching between different time scales: from the micro (< 100 ms duration) up to the sound object level (> 100 ms) and down again into the micro. The laws of physics dictate that the shorter the particles, the more broadband their spectrum, as in the noisy section between 2:10 and 2:28, or the final 30 seconds of the work. Thus the interplay is not just between durations, but also between pitch and noise.

In *Schall*, the micromontage was mediated through interactive sound editing and mixing software. As the composer has stated:

Considering the hand-crafted side, this is the way I worked on Schall (along with algorithmic generation and manipulation of sound materials): making a frame of 7 minutes and 30 seconds and filling it by "replacing" silence with objects, progressively enriching the texture by adding here and there different instances (copies as well as transformations of diverse order) of the same basic material (Vaggione 1999).

Here each microsound is a kind of sonic brush stroke. As in a painting, it may take thousands of strokes to fill out the piece. Graphical sound editing and mixing programs offer a multiscale perspective. One can view the intimate details of sonic material, permitting microsurgery on individual sample points. Zooming out one can shape large sound blocks and rearrange macrostructure. The availability of dozens of tracks lets the composer work extremely precisely on every time scale.

In 1997, at his studio on the Île-Saint-Louis in Paris, Maestro Vaggione demonstrated to me some of the micromontage techniques used to make *Schall*. These involved arranging microsounds using a sound mixing program with a graphical time-line interface. He loaded a catalog of previously edited microsounds into the program's library. Then he would select items in the library and paste them onto a track at specific points on the time line running from left to right across the screen. By pasting a single

particle multiple times in succession, the particles fused into a sound object on a higher temporal order. Each paste operation was like a stroke of a brush in a painting, adding a touch more color. The collection of microsounds in the library was the palette of colors. Since the program allowed the user to zoom in time, the composer could paste and edit on different time scales. The number of simultaneous tracks was essentially unlimited, which permitted a rich interplay of events.

Nodal

With *Nodal* (1997), the composer elaborated the materials used in *Schall* several steps further, while also opening up the sound palette to a range of sampled percussion instruments. The identity of the instruments is not always clear, however, since they articulate in tiny particles. The composition lasts 13:06. For the purpose of this discussion, I divide it into three parts: part I [0:00 to 5:46], part II [5:49 to 9:20], part III [9:21 to 13:06]. These three sections are separated by silences that are clearly visible in a sound editor.

The strong opening attack establishes immediately the potential force of the sound energy and sets up a dramatic tension. Although the continuously granulating texture that follows is often quiet in amplitude, one realizes that the floodgates could burst at any moment. This effect is highly enhanced by "creaking" sounds that give the impression of reins being strained.

Part II begins with a warm fluttering texture that turns into a chaotic noise. This part cadences on an incongruous major chord from what sounds like a toy piano. According to the composer, this sound was the product of a variable time-stretching function applied to a short percussive sound, manipulated in time and frequency with a phase vocoder algorithm (Vaggione 2004).

Part III introduces a "drum-gong" sound deformed by means of a waveshaping technique (Roads 2023). (See Vaggione 1998 for an explanation of the composer's application of this technique to sampled sounds.)

Audio 3. Extract from *Nodal* (1997).

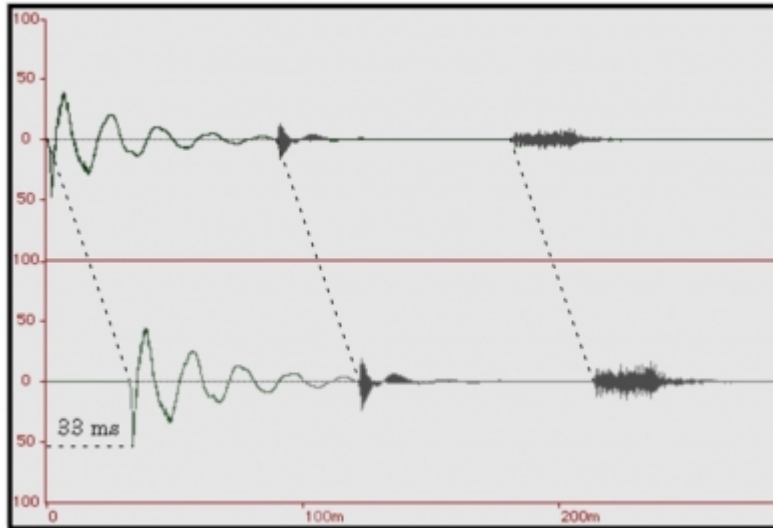
<https://nakala.fr/10.34847/nkl.cd2e0602#8797e09dcb30c0cf4702d2e9d4bdae4729422428>

Agon

Agon (1998) refines the processes and materials heard in *Nodal*. This virtuoso composition opens with a continuously fluttering band of sound in the range between 6 kHz and 16 kHz. The rate of the fluttering modulation is between 10 Hz and 20 Hz. The continuity of the high-frequency band is broken up by various and sundry colored explosions at key moments. It is as if different percussive sounds are being dropped into a gigantic granulator, to be mulched into bits of microsound.

Upon first hearing, *Agon* appears to present a continuous stream of new material. Repeated listening reveals that the work recycles sound material in an efficient manner. For example, the penultimate gesture of the work—a turgid swirling mid-low frequency band—is already heard in the first 35 seconds. The final gesture of the work, a triple stroke "tom-click-hiss," appears first at 2:59 and again at 3:08 (figure 6).

Figure 6. A time-domain view of the final gesture in *Agon*: a 256 ms triple-stroke "tom-click-hiss" decorrelated by 33 ms between channels so as to create a movement from left to right. The left channel is at the top and the right channel is at the bottom. See Vaggione (2001) for more on his use of micro decorrelation to articulate spatial displacements.



Certain of the recycled sounds in *Agon* are strange mutations of other sounds, while others are drawn by hand in a graphical sound editor deriving from no original source. Consider the sound first heard 40 seconds into the piece, which seems like a small metal bell. According to the composer, the origin of this sound was not a bell, but was the result of a convolution cross-synthesis procedure.

Audio 4. Extract from *Agon* (1991).

<https://nakala.fr/10.34847/nkl.cd2e0602#e8dc2667ff0fb3415eb48295fc8179456eb64f3a>

Another frequently recycled sound is like a tom-tom stroke. According to the composer, it was actually a hand-drawn waveform. The tom-tom-like sound is first heard in a burst of strokes at 34 seconds. Both the "bell" and the "tom-tom" reappear at many points in *Agon*. A shimmering cymbal-like sound interweaves throughout the work a component of the high-frequency band that streams through most of the piece. A "piano tone cluster" (which originated according to the composer as a mutation of a percussion sound) first appears at 2:01. It then signals the end of a quiet zone at 5:54, and marks a turning point of the finale at 8:10.

Préludes suspendus

Préludes Suspendus (2000) dedicated to Jean-Claude Risset, is well worth analysis. In concert (especially when diffused by the composer), its impression is one of almost overwhelming power and dynamic energy. By contrast, in the controlled environment of the studio, we can carefully study the pattern of its intricately embroidered design. Beneath the dramatic rhetorical flourishes is a delicate arrangement of elements.

Whilst *Schall* was limited to highly processed sampled piano tones, *Préludes Suspendus* incorporates coloristic resources from *Nodal* and *Agon* (such as percussion samples), as well as adding new ensemble samples of brass instruments, sometimes used in sweeping arpeggiated figures. At other times these samples are radically mutated by analysis-resynthesis techniques. It is not surprising that certain sounds in the *Préludes* are detached from any perceivable source.

The work opens violently with a series of 21 forceful attacks some of which smear together in the first 22 seconds. The characteristic mesostructural syntax of *Préludes* is based on long sections of background scintillation interjected with swells of low frequency energy that emerge from the background. A prime example is the swell that begins at 46 seconds and lasts until the climax at 59 seconds. Another example is the relentless series of eight successive swells that carry the energy through the peak of the piece, which transpires in the section between 6 minutes and 7 minutes 35 seconds.

Audio 5. Opening of *Préludes suspendus* (2000).

<https://nakala.fr/10.34847/nkl.cd2e0602#d70d947519f8a69a19460b1584a789c58fa3a63d>

The articulation of two specific sound objects stand out in *Préludes*, and deserve further commentary for their symbolic and structural roles. One is a deep resonant sound, like a cross between a bass drum and a gong, with a slight downward pitch bend. It is one of Vaggione's signature sounds, appearing for example in the opening of part III of *Nodal*.

When this drum-gong sound first appears at 6:34 (the piece is already half over), it comes as a foreboding surprise, like the unexpected toll of a funeral bell. It tolls four more times in the next minute. It only reappears once more: as the final sound in the piece at 9:40.

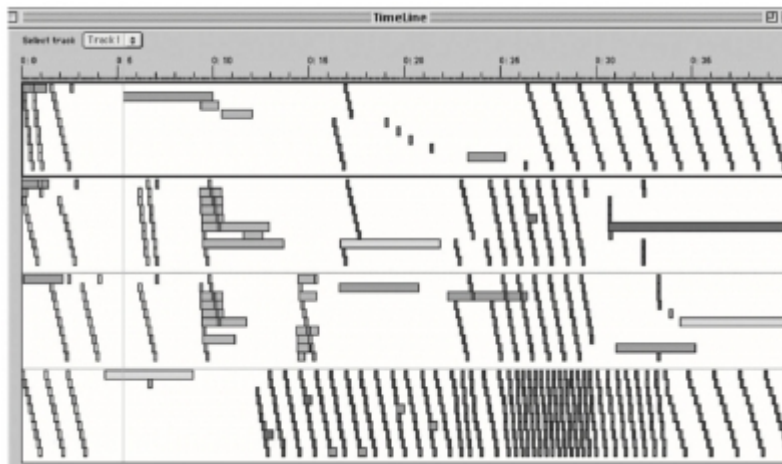
The other object is a brass flourish ascending melodically, reaching a peak, and then either sustaining, trilling, or arpeggiating downward. It first appears 11 seconds into the piece, and reappears many times, never quite the same.

24 variations

24 variations was composed in 2001. If *Préludes suspendus* is Dionysian in its raucous energy, *24 variations* is the cool and restrained Apollonian. This is, to me, the most gracefully poetic of Vaggione's electroacoustic compositions. One is drawn in not by the expectation of spectacular climaxes, but by the originality and virtuosity of the articulations as they pass by. The composer used IRIN, a micromontage and sound file manipulation program developed by Carlos Caires at the University of Paris 8 (Caires 2003, 2004).

Figure 7 shows a 40-second fragment of the score for *24 variations*.

Figure 7. Excerpt of the score of *24 variations* (version 2), showing the timeline designed with the IRIN program. Each rectangle represents a sound clip or sample. The vertical position of a sample within a track is not significant (i.e., it does not correspond to pitch). IRIN lets one encapsulate micro-figures within tracks and represent them as a single fragment, permitting a hierarchical building up of mesostructure.



The narrative of *24 variations* unfolds deliberately, as the composer parsimoniously scatters dabs of energy over an ubiquitous background stream. Much of the sonic material has been distilled down to timbral residues: residue of piano, cymbal, tom-tom, maracas, and so on. The raucous horns of *Préludes* are absent. Other objects stand out as electronic artefacts: jagged clicks and sinusoid-infused residues of radical spectral mutations. The odd percussive resonance at 1 minute 52 seconds is an example of the latter. This is a hollow shell of a concrète sound, perhaps the remains of a convolution.

The rhetoric of *24 variations* is dominated by interjection. Instead of grand swells and accumulations, the foreground and background dance together. Each foreground gesture eventually dissolves into the background, while the masked background emerges into the foreground. It is in the arrangement of the

carefully chosen elements, repeating at just the right moments, that this work stands out. A prime example is the triple dose of silent intervals inserted between 6 minutes 30 seconds and 6 minutes 55 seconds.

Audio 6. Extract of *24 variations* (2001).

<https://nakala.fr/10.34847/nkl.cd2e0602#969b3a4f8f1db0ee076423001fa84343930f921c>

As in all of Vaggione's electroacoustic compositions considered here, the work concludes with a characteristic ending tag, as if the composer were closing the door on a virtual world.

Works since 2002

Maestro Vaggione has been quite productive since 2002, when I last reviewed his work. In this final part of this paper I would like to focus briefly on two works: *Préludes suspendus III* (2009), and *Mécanique des fluids* (2014).

Préludes suspendus III (2009) is an example of the acousmatic aspect of Vaggione's approach. The acousmatic school emerged out of the practice of musique concrète. Acousmatic works play with the recognizability of sounds?what is their source? This question immediately comes to mind as the sound palette of this piece is colored by the timbres of orchestral brass. But are they brass samples, or derivatives thereof? Timbres inbetween flute, clarinet, and bassoon are also prominent. Listen to the repeating ?flute? arpeggios in the next sound example. This is a rich example in that it shows many aspects of his later technique: the sound palette, the use of repetition, timbral contrasts, employment of tonal and melodic elements, etc.

Audio 7. Extract from *Préludes suspendus III* (2009). Répétition d'arpèges de similiflu?te.

<https://nakala.fr/10.34847/nkl.cd2e0602#5d738fcdc091b0e2dbbdeecf27754f78f8424ac9>

At 20 minutes, *Mécanique des fluids* (2014) is one of the composers longest works. It is also one of the most sonically varied. Here is a sound example that opens with sul ponticello string attacks. The sound timbres quickly change but the gesture is one of echoing and obsessive repetition.

Audio 8. Extract from *Mécanique des fluides* (2014).

<https://nakala.fr/10.34847/nkl.cd2e0602#33f98d34608c62b48aced8a7c74863d83bc49a60>

Vaggione and form

Vaggione's music unfolds simultaneously on several time scales, from the macro-scale of form to the meso-scale of sections and phrases, to the scale of sound objects or notes, and to the micro-scale of grains. Vaggione's conceptual approach to the macroform of composition is the same as his approach to other scales of time. According to the composer:

For me, the macroform is a "time scale", you could say the largest. It must be treated (articulated) like all the other scales, all the myriads of meso and micro. For me, all kinds of operations and ideas in the composition of a piece can be applied to any (or all) time scale(s). Not only to increase or decrease their size, but also to do different things, create different figures, different contexts, within the relative temporal zone defined for a particular scale. This is how I proceed. Macro-organization is a case of multi-scale organization. Defining micro and macro figures, of all sizes, is a question of scale. This means, I repeat, that I try to compose on the "macro level" with the same musical approach and feeling, as figures and details, as on the other levels. These figures and details are specific to a given scale, or group of scales, and they interact strongly with each other (Vaggione 2023).

On closer examination, it is clear that this does not mean that he applies the same procedures to every time scale. The composer concentrates mainly on four time scales: microfigures (sequences of grains),

sound objects (on the time scale of notes), figures (short phrases or mesostructures lasting a few seconds), and sections (mesostructures lasting up to three minutes).

Microfigures are often repeated or played backwards. Points of sound, such as the staccato sounds of flute and piano, are always repeated and thus serve as themes in a mesostructure.

However, this is not Mozart. The sections do not repeat. Vaggione has stated that, in his youth, he was strongly influenced by the music of Debussy, one of whose characteristics is the continuous flow of time.

Form of *Préludes suspendus III*

As an example, let's look at the macroform of the composition *Préludes suspendus III* (2009) original version, not the version available on the CD ⁽²⁾. Table 1 presents my analysis of the piece's architecture in nine sections.

Table 1. The sections of *Préludes suspendus III*.

Section	Time span	Duration	Comments
1	0-0:46	46 s	Ends with a tag gesture (a common Vaggione ending device); 1 second silence at the end
2	0:47-1:37	50 s	Introduces a new timbre/gesture: horns. 1 second silence at the end
3	1:38-2:56	78 s	No horns; 2 second silence at end;
4	2:58-3:32	34 s	Features piano and flute timbres; 1 second silence at the end;
5	3:34-4:27	53 s	Downward gesture repeated; 1second silence at the end
6	4:28-6:15	107 s	Long continuous section; features pizzicati string tones; quiet section between 6:06 and
7	6:16-9:05	169 s	No silence between sections 6 and 7 but the quiet section mentioned above separates the horn trills in the beginning; long continuous section that brings in all the figures (themes) from previous sections, while continuously building energy and tension. The peak of energy is at 8:39 and 9:01.
8	9:05-10:02	57 s	Again no silence between sections 7 and 8; dominated by continuous low-level dithering frequencies above 5 kHz; includes 2-seconds of silence at the end. The section functions as a release of energy.
9	10:04-10:11	7 s	Final gesture? a thunderous tag

Some sections are easy to delineate, as they end with a cadence of silence or, in the case of the first section, with a final "tag" gesture (the piece also ends with a tag in section 9). Other sections (5, 6, 7, 8) run continuously, without a silent pause, but there are hints that the context has changed, in the form of new instruments, pitches and figures, articulating boundaries between sections.

The duration of the sections varies from 7 seconds (section 9, the final gesture) to 169 seconds in section 7, which begins at 6 min 16 sec.

Vaggione's style in *Préludes suspendus III*

Préludes suspendus III clearly demonstrates several aspects of Vaggione's style, which is constant

throughout his work. I refer in particular to his acousmatic approach to sound material, the central role of micromontage, the role of pitch elements, and the incessant repetition of material.

As already mentioned, Vaggione deploys an acousmatic approach to sound material. As in all his electroacoustic works, the sound palette is derived from classical orchestral acoustic instruments. The composer cleverly plays with timbre contrasts in his acousmatic orchestra.

Very often, sounds are processed by techniques such as convolution, so that they sound like hybrids, for example wind and reed sounds that lie somewhere between bass flute, clarinet and bass clarinet. He introduces percussion and plucked string sounds of indistinct origin between 5 min 8 sec and 5 min 12 sec. The source of many other sounds is obscure.

By contrast, one instrument is privileged throughout Vaggione's work: the piano. It appears pure and unadorned in all his compositions from *Schall* onwards. Of course, Vaggione was a trained pianist. In any case, piano sonorities are omnipresent and fundamental in Vaggione's music. For example, the deep piano bass on D1 at 8 min 24 sec and 8 min 36 sec function as "phrase beginning" events.

Another aspect of his style is the intensive deployment of sequential microfigures as part of the micromontage technique (see previous discussion of *Schall*).

As is typically the case with Vaggione, *Préludes suspendus III* plays with oppositions between pitched and unpitched material, with half the piece featuring no pitched elements at all. It also plays with oppositions between clearly articulated, tempered pitches (like piano sounds) and sounds with variable morphology, as in the metallic meandering tones at 3 min 49 sec followed by "horns" that sound like a melody played out of tune whose pitch is unstable.

Table 2 lists the tempered pitches from the beginning of the piece to 5 min 5 sec. Notice how few notes there are. Many pitches are isolated staccato notes, although they inevitably repeat after several seconds. There are also sustained pitches, as in the passage between 0 min 50 s and 1 min 34 s.

The pitch classes are chromatic. I cannot discern any tonal pattern in the choice of pitches, which seem to have been chosen to articulate the extreme low and high registers rather than because they belong to a particular pitch class. Indeed, the middle octaves (C3 to C5) are rarely heard.

Table 2. Pitch elements in the first 5:05 of *Préludes suspendus III*.

Time	Pitch class and octave	Commentary
0:03	E2	Two pitch bends end with three rapid notes of "plucked bass"
0:27	G2	Bowed bass note
0:50-0:59	G4	Group of sustained horns. They repeat as in Gagaku music.
1:28-1:34	D#7	Sequence of piano grains forming a sustained tone
1:44-1:55	D7	Descending piano arpeggio repeating, beginning at D7.
2:07	A#6	"Flute" note
2:17-2:18	C6	Ascending piano arpeggio on the whole tone scale (C E F# A#)
2:22	C6	Descending piano arpeggio on the whole tone scale.
2:28		

"Flute" note

2:47-2:57	F#6	Piano note sustained at soft level
2:52	A#6	"Flute" note
2:59	F7	Piano note
3:02	F#/G6	Piano cluster
3:03	F#6	Piano note
3:05	F#6, F#7	Piano two notes in rapid sequence
3:07	F#6, F#7	Piano two notes in rapid sequence
3:09	F#6	Piano note
3:10	A#6	"Flute" note
3:11	A#6	"Flute" note
3:11	F#7	Piano note
3:12	F#7	Piano note
3:15	B, D#, F#2	Bowed bass melody
3:17	F#6	Piano note
3:20	F#6	Piano note but echoes at 3:22
3:29-3:31	F#/G6	Piano cluster
4:00	F/F#6	Piano cluster
4:03	F/F#6	Piano cluster
4:18	F6	Piano note
4:32	F6	Piano note
4:35-4:43	A4	Piano four notes repeated
4:36	F6	Piano note
4:39	F6	Piano note
4:44	F6	Piano note
4:47	F6	Piano note
4:57	E4	Event of source unknown with reverberation
5:05	E4	Event of source unknown with reverberation

A final aspect of Vaggione's style is his tendency to repeat sounds and gestures on a local (meso) time scale. In the first twenty seconds, for example, we hear several elements repeated: horn blasts, a

low-intensity piano glissando, and a fluttering sound of unknown origin. This pattern of repetition is emblematic of Vaggione. We almost never hear a sound only once. Repetition is an effective technique for weaving coherence into the listener's experience. Through repetition, individual piano notes become themes.

Conclusion

Figure 8. Horacio Vaggione in concert.



Photographer: Philippe Gontier

Horacio Vaggione's path to composition has been particularly focused. Early in his career, he recognized the pertinence of harnessing the power of computers to realize to articulate the syntax of microsounds through micromontage.

Like Xenakis, he recognized the need for a balance between algorithmic composition and direct intervention. As he said:

To articulate a highly stratified musical flux by statistical means is unthinkable. On the contrary, it depends on singularities: discontinuities, figures, contrasts, and details. (Vaggione 2003).

The compositions of Vaggione derive from a consistent aesthetic philosophy. This has resulted, not surprisingly, in a consistent body of work. It is not difficult to hear a similarity between *Schall* and *Préludes suspendus IV* (2017), a work composed 23 years later.

Audio 9. Extracts from *Schall* (1994) and *Préludes suspendus IV* (2017).

<https://nakala.fr/10.34847/nkl.cd2e0602#1b4652c822ddf1166fe2bdc9e25d1a0020ce2568>

As an American living in Paris in the 1990s, I recognized that 'coherence' is an extremely important concept in French culture. In the arts, this means maintaining a consistent artistic line. In this view, artistic development consists of refining one's technique over time, usually in the direction of more abstraction.

This tendency is ubiquitous in French culture. I go back to the paintings of Claude Monet, who painted the same subjects repeatedly over a period of many years, refining his craft.

The recent music of Horacio Vaggione continues this tradition. It further elaborates and refines his technique, while expanding the sonic vocabulary with new synthetically-derived sounds.

I am convinced that what we call "talent" is a combination of aptitude with an intuitive sense of choosing the right problems to solve. Horacio Vaggione consistently chooses the most pertinent problems. In so doing, he sets the standard for the electroacoustic music of today.

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1. Certain parts of this manuscript derive from a previous paper (2004). In this version I made many small changes and added new sections, new figures, and sound examples that were not in the earlier paper.

2. I begin with a disclaimer about this analysis. As I wrote in my book *Composing Electronic Music* (Roads 2015), analyzing electronic music is difficult, for many reasons. While analysis based on a traditional score of notes is straightforward enough, it is not a science. The starting point? a score in music notation? is already a simplified, high-level symbolic representation of a more complex phenomenon: a model of air vibrations. In the analysis of electronic music, on the other hand, one of the main objectives is precisely to try and find a score (a repertoire of symbols) in the waveforms. In practice, this proves difficult, as there are often no standardized, homogeneous units such as notes in electronic music (Bossis 2006).

What's more, the analysis of individual events on the time scale of the sound object can prove difficult, due to fundamental ontological questions. The instant of onset, duration and even existence of a sound are not always clearly defined. Consider the following factors:

- A sound's attack may appear slowly, obscuring its perceptible attack time (Wright 2008). Similarly, its release may fade slowly, obscuring its perceptible end.
- Sounds can unite and disintegrate through progressive changes in grain density (adding and removing grains) or spectral components (adding and removing sinusoids or other basis functions).
- As Stockhausen demonstrated in *Kontakte* (1960), a sound can split into several distinct parts, or several sounds can converge into a single composite sound (Stockhausen 1971).
- A sound can mask or reveal the presence of another sound.
- Ripples and modulations can mask the duration of events.
- In the middle of a transmuting sound, when does one sound end and another begin?

As we move from the temporal scale of sound objects to the temporal scale of mesostructure or analyzable sentences, similar ontological problems arise. In general, two sentences can be unambiguously distinguished by a long pause of N seconds between them. But the duration of N cannot be defined outside a specific musical context. If an antecedent phrase A is significantly different from a successive phrase B after a pause of N seconds, we call this a mesostructural boundary. By "significantly different", we mean a change in melody, harmony, timbre, rhythm, spatial projection, amplitude or process, and so on.

In the absence of a detailed score and structural description provided by the composer, any analysis of the score of an electroacoustic piece must ultimately rely on the listener's ears. We thus encounter the common problem of a contradiction between the listening grammar and the composing grammar. In other words, the composer's structural organization may not be heard as such by the listener. Frequently, a composer will superimpose in time two or more structures composed separately, so that there is a significant temporal overlap. For the listener, who has no idea of the composer's thinking, these structures are not necessarily heard as distinct. I therefore present this breakdown of *Préludes suspendus III* into nine sections not as a definitive scientific analysis, but rather as a plausible score for the purposes of this article.

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