

# An excess of gesture and material

## Saturation as a compositional model

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### 1. INTRODUCTION

The use of instrumental saturation gives rise to significant questions pertaining to the research on timbre and sonic-material. For more than a decade, a number of composers have reflected on the best ways to treat complex sonic phenomena: how does the composer integrate such phenomena into musical discourse, and, subsequently, how may such phenomena operate as basic compositional material? This line of questioning requires a new approach to musical listening. Over the years instrumental saturation has developed its own distinct syntax and lexicon; this essay will attempt to shed light on this musical grammar, focusing especially on the organization of new, complex timbral objects in correlation with instrumental saturation and their evolution in musical time.

Instrumental saturation may only be understood in reference to its most basic notion, *i.e.* the excess of one or more parameters within a given context. One simple example would be the distortion created by a microphone when one attempts to record an excessively loud sound. Beyond a certain point the microphone is no longer able to function correctly and to provide a faithful reproduction of the sound environment in which it is operating. Consequently, sonic artefacts are generated: an *excess* of sound causes *saturation*. As we will see, this notion is not necessarily the consequence of loudness alone; it also comes about through other forms of saturation, such as the excess of material in a given period of time (saturation by density), or by the multiplication of sound-events. This is a crucial notion, because it allows to free saturation from its origins (the electronic amplification of sound) and to bring it into the realm of purely instrumental music.

Even if already early on music seemed to display a preoccupation with the notion of excess, two twentieth century composers, due to their approach to timbre, are particularly relevant for our present discussion. Firstly, Gérard Grisey, with his work *Partiels* (1976); the passage occurs at the conclusion of the work's first structural process (Figure 1).

This passage occurs after a process of downward-transposition of overtone components of an acoustically-modelled trombone sound: in effect, it is a transition from *harmonicity* to the *inharmonic* associated with noise. At the end of this process Grisey superimposes several timbres which may be described as *complex sounds*.

First, in the trombone and horn: these two brass instruments are instructed to play using a double-reed (bassoon or oboe), a technique which radically modifies their timbre. The reed, placed directly in the mouthpiece, allows the performer to produce a complex multiphonic, a sort of timbral-hybrid, whose source is not readily identifiable. This texture is superimposed on granular sounds (in this case, "scratch" sounds, obtained by using excessive bow-pressure) in the four string instruments. Although here the composer aims for a resulting sound roughly a seventh below the written/fingered pitch, the first impression of this texture is one of chaotic granulation. A bass clarinet instructed to overblow signals the end of this short, but densely and radically orchestrated section. This is, to my knowledge, the first instance in which we find precisely notated saturation: here, it is both preconceived and orchestrated, all of it based on timbral characteristics. It is worth noting as a conclusion that saturation typically appears in the works of Gérard Grisey as the logical consequence of a process, *i.e.* for its dramatic, conclusive effect, as a point of concentrated tension, rather than as compositional material in its own right.

Iannis Xenakis is the second example of a composer who reflected on wilful, controlled and recurrent saturation. Besides his famous *Metastasis*, in which an immense cluster of *divisi* strings saturates the entire sound-spectrum, his work *Tracées* (1987) for large orchestra, lasting only five minutes, provides a most relevant case for our study. This work is virtually a study in saturation, with complex *glissandi* as well as preparations in the strings, clusters in the brass and woodwinds, rapid movement dispersed throughout the orchestra and a total abandonment of polarities. One particularly inter-

Figure 1: excerpt  
from Gérard Grisey'  
"Partiels" (1976),  
© Casa Ricordi

Figure 2: excerpt  
from Iannis Xenakis'  
"Tracées" (1987),  
© Éditions Salabert

esting passage contains this shift where pitch is abandoned in order to focus solely on timbre (Figure 2).

From bars 26-30, Xenakis, like Grisey, superimposes complex timbres: the tuba overblowing its lowest note, the trombones playing in the lowest register whilst singing a third and a fifth higher (thus producing a 'multiphonic'), clusters in the piano and the bassoons, four clarinets overblowing on their lowest pitch, and finally scratch sounds and erratic tremolo in the cellos and contrabass. These timbres are ordered in layers or used in combinations, all *fortissimo*. Once again, we find a texture in which the unifying factor is complexity/saturation. In this case however, saturation is not the result of a process as it was in *Partiels*, but rather an 'extension' or development of the preceding material.

## 2. 'ABSOLUTE' SATURATION

Absolute saturation denotes a dense writing style, played very loudly, which seeks to achieve a fusion between various complex timbres. In my first string quartet, *In Vivo*, the three movements explore a single gesture: the granular sound produced with excessive bow-pressure. It is notated thus:



The crossed notehead indicates that this is merely a representation of fingering (and does not correspond to any 'sounding' pitch). The symbol above the staff (a 'triple *tiré*') is taken from other scores dating from the 1970s which use this technique. The timbre changes depending on the fingered pitch, bow-position (*sul ponticello*, *sul tasto*; in front of or behind the bridge), the presence or absence of a mute, or any combination of these variables. In *In Vivo* I often use the following notation (Figure 3).

Four gestures are represented in the above notation:

1. Quick repetition of a micro-*glissando* between two strings (*i.e.* a written *vibrato*);
2. Broad *glissandos*;
3. Accents;
4. 'Granulation'.

The result is a subtle variation of granulation and a blurring of the global musical information due to all the complex internal movement. One no longer perceives pitch; rather, the movement seems to transform into a distant 'halo' of sound. I describe the aura resulting from such an accumulation and mixture of frequencies, each with its own intensity and granulation, as the '*meta-sound*'; the effect grows exponentially when four instruments are playing the same type of material (Figure 4).

The opening of the first movement (specifically, the first seven bars) juxtaposes identical gestures played with varying ranges. Several types of saturation are in use here:

1. saturation of the instrument-body: each instrument is prepared with a sheet of aluminium foil which, when

wrapped like a mute around the bridge, adds a constant metallic timbre;

2. saturation through density: these opening measures are a "division" of gestures and accents the sum of which is a complex polyphony. For example, the second bar alone contains 13 non-synchronised accents within only 2½ seconds of music;
3. saturation through granulation: in this case, the saturation of the instrumental sound source through the use of excessive bow-pressure. This is achieved by:
  - a. varying the degree of pressure (*semi-écrasé*, *écrasé*, changing of bowing from *tiré* to *poussé*); these quick changes of pressure add a constant instability to the texture and the duration of individual sound-grains;
  - b. bowing in front of or behind the bridge, or varying register, both of which modify the colour and the characteristics of granulation;
  - c. varying the rate of movement within a register (*e.g.* "as fast as possible with vibrato", "slowing down", "speeding up" or with *tremolo*).

Dynamics also play a primordial role in the movement of this complex sound mass: along with accents, they sculpt the temporal evolution of the material. The relationship between speed and grain is also important: it determines the degree and quality of saturation and, one might say, the global vibration of the sonic mass.

In the third and final movement of my quartet we once again find these main elements, but in a fragmented form, as if the initial material had been broken down to its constituent components (Figure 5).

The opening eight bars make use of new timbres in rapid succession and/or juxtaposition. These 'micro-elements' sculpt the sonic material; some are the object of subsequent development (and, as a consequence, integration into the macro-structure), as we will see. In this example we may observe a veritable polyphony of saturation.

Saturation acts on two levels:

1. Saturation of the frequency space by division of timbre: extended techniques are juxtaposed (*col legno battuto*, *pizzicato étouffé*, 'scratch' sounds, 'cracking' of bow-hair, 'pure' sounds, *vibrato* on harmonics, tapping the instrument body, etc); sequences of these effects occur rapidly and are invariably distributed among the four instruments;
2. Saturation of note-attacks: one paradigmatic motif is the use of 'cracking' of the bow hair (*cf.* violin I, bars 1-2 for example)(Figure 6). The effect is a sort of fragmentation of scratch-sound, as if a granular process were in use. The note tails on the upper staff indicate the speed at which these 'cracking' sounds should occur. We find this micro-element later in the work, integrated into the macro-structure, and played by all four musicians (Figure 7).

Here, the sonic space has literally become a granular one in which the global colour is constantly changing due to rapid alternating between open strings while using this technique. Control of the granular density (between maximal, medium and

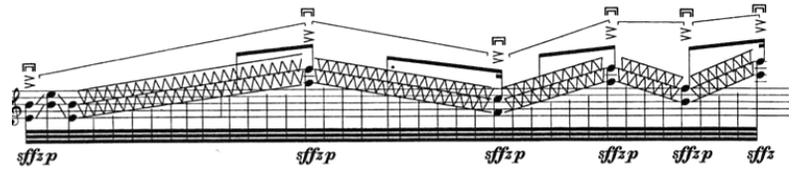


Figure 3: gestural notation in "In Vivo" (2011), © Billaudot

**IN VIVO**  
pour quatuor a cordes  
for string quartet

Raphael CENDO

Deuxième partie / Total length:  $\text{♩} = 92$

$\text{♩} = 92$

Violon 1 (Violin I)

Violon 2 (Violin II)

Alto (Viola)

Violoncelle (Violoncello)

$\text{♩} = 126$   $\text{♩} = 92$

VI.1

VI.2

AL

VI.

The image displays a full page of a musical score for a string quartet. It features four staves for Violin I, Violin II, Viola, and Cello. The score is filled with complex rhythmic patterns, including many sixteenth and thirty-second notes, and rests. Above the staves, there are numerous dynamic markings such as 'sfz p', 'pp', 'p', 'f', and 'ff'. The tempo is indicated as  $\text{♩} = 92$  at the beginning and  $\text{♩} = 126$  in the middle section. The score is titled 'IN VIVO pour quatuor a cordes' by Raphael CENDO. The page is divided into two systems, with the second system starting at measure 6.

Figure 4: excerpt from "In Vivo" (2011), © Billaudot

minimal) implies a lack of control of periodicity (except when the density is very low). As such, the rhythm of these 'cracking' sounds is indeterminate. A 'scratched' gesture (a scratch sound with a fast to-and-fro *glissando*, figure 10) signals the beginning of a new section (bar 56); this *tutti* attack rapidly contaminates the granular texture and saturation occurs

through both an intensification of granulation and an *accelerando* of the aforementioned 'scratched' gesture.

In *Charge* (2009) we find the same idea of absolute saturation; here, however, it is distributed among more contrasting instruments. Gestures are more independent and timbres undergo their own transformational trajectory. (Figure 8)

III.

Figure 5: excerpt from the third movement of "In Vivo" (2011), © Billaudot

Figure 6: 'note cracking' saturation in "In Vivo" (2011), © Billaudot

Figure 7: 'note cracking' saturated polyphony in "In Vivo" (2011), © Billaudot

Raphaël Cerdo

L=108

The score is a handwritten manuscript for a full orchestra. It is divided into two systems. The first system includes parts for C.B. (Cello/Bass), Flute, Clarinet Bassoon, Trumpet, Percussion, Violin, and Cello. The second system includes parts for C.B., Flute, Clarinet Bassoon, Trumpet, Percussion, and Violin. The music is characterized by extreme dynamics, with frequent markings for fortissimo (fff) and sforzando (sfz), and a complex, dense texture. The notation includes various articulations, slurs, and dynamic markings throughout.

Figure 8: absolute saturation in "Charge" (2009), © Billaudot

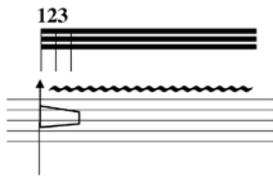
In this example each timbre is precisely notated, as we may see in the trumpet:



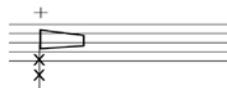
The player places an oboe reed into the mouthpiece to produce a multiphonic. The notation is a precise representation of the shape of the oboe reed itself and the resulting complex sound (represented by the crosses on the stem). Pitch is varied, along with timbre, by means of a *bisbigliando* (i.e. a rapid and random fluttering of valves, indicated 1, 2 and 3 above the note-beam):



It is also possible to produce a high-pitched sound alone by subtly varying the pitch with the valves (again, as indicated by fingering numbers above the beams):



This technique is applied to all brass instruments (except the tuba). The results vary depending on the instrument. Later in the work, the notation in figure 15 is used for the horn:



This notation describes a complex sound which may be obtained by blocking the bell of the instrument with the hand (*bouché*). The resulting sound is a very strange and transparent multiphonic which sounds *pianissimo* and is decidedly different from that performed with an open bell.

These examples of sounds created by using an oboe reed illustrate the following key point: extended techniques (regardless of the instrument/instrument family on which they are played) must never be limited to a single sound; rather, they *must* be variable. This allows for acoustic and stylistic coherence, as well as a genuine integration within a compositional procedure, as opposed to the simple addition of 'effects' to a long list of peripheral sounds.

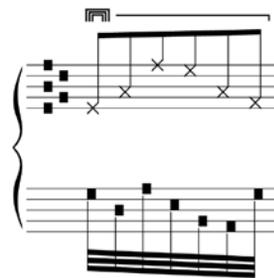
As with the aforementioned quartet, the opening bars of *Charge* are strikingly polyphonic. Here, however, individual lines are considerably more distinct and diverse in their treatments of timbre; lines and articulations for each instrument are independent. The material is complex and therefore, the level of 'disorientation' is maximal; it is impossible to determine with

any degree of precision which instrument is playing and in which register. Sound events respond to one another in an anarchic fashion: there is a constant evolution but no definite perceptible trajectory.

The first important line appears in the snare drum whose salient rolls are a point of reference in the temporal organisation of sound events. This gesture/timbre – seemingly anachronistic within this context – acts as a 'stabiliser' for the listener (despite the fact that it is, by nature, essentially aleatory). The atmosphere is hyper-reactive; instruments respond to the least stimulus which might act as a catalyst for timbral transformation.

The texture is composed of the following elements:

1. Attack division: rimshot strikes on the snare drum are imitated by the cello and contrabass tapping strings op using Bartók *pizzicato*.



Upper staff: scratch-sound behind the bridge.

Lower staff: tapping on the entire length of the instrument with the left hand as quickly and as loudly as possible.

This is an imitative-timbre: the sound of the wood of the string instruments being struck is highly evocative of the sound of a wooden drumstick striking the rim or the membrane of a snare drum.

2. Saturated gestures: a constant to-and-fro movement of complex sounds between the flute, bass clarinet (playing without a mouthpiece, as with a 'tuba' embouchure) and the trumpet (playing with an oboe reed). The flute and clarinet sounds are saturated by the addition of the voice of the performer to an ascending fingered line.

The most important gestures move throughout the texture in an anarchistic manner; movements of a sufficient importance (that is to say, those which affects perception) echoes throughout the ensemble by means timbral imitation. The material is constantly evolving – the totality is unstable and reactive. Each line seeks its own limitations, both in terms of gesture and intensity.

Total saturation necessitates a distinct compositional approach: the use of 'blocks of common sounds' (as we have seen in the examples from *Partiels* and *Tracées*). Blocks are often delineated by a common texture, sound quality, coherence of range, or by repetitions of random rhythmic gestures. Figure 9 shows such treatment of 'blocks' of saturated sounds from *In Vivo*, and Figure 10 a similar example from *Tract* (2007), for seven musicians.

The image shows a musical score for four staves, likely representing bass clarinet and tubax. Each staff contains sustained notes with dynamic markings such as *ppp* and *ppp* with a scratch symbol. The notes are held for long durations, creating a dense, saturated sound texture. The score is divided into four measures, with a measure number '15' at the top of each staff.

Figure 9: blocks of saturated sounds in “In Vivo” (2011), © Billaudot

The example below illustrates a texture of multiple chords/ sound-masses in which one or more timbres predominate. Here, the bass clarinet and the tubax play this role (both instruments are instructed to overblow), dominating the texture and thus creating a strong perceptual polarity.

Composing in blocks also gives rise to a texture which is subject to micro-movements/variations in *Tract* (Figure 11).

The bass clarinet and tubax overblow using random fingering in the lowest register (indicated here by the crossed noteheads with *tremolo*) whilst shouting into their instruments (indicated by the scratch sound symbol), perturbing the harmonics contained in the overblown sound. Whilst *timbre* remains consistent, the act of screaming, the use of *smorzando* and random fingering dramatically influences the texture.

The image shows a musical score for multiple instruments: Cl. B., Tbc., Pno., Vn., Alt., and Vc. The score is divided into four measures with measure numbers 7/8, 2/4, 5/8, and 4/4. The Cl. B. and Tbc. staves feature sustained notes with dynamic markings like *ppp* and *ppp* with a scratch symbol. The Pno. staff has a complex rhythmic pattern with dynamic markings like *ppp* and *ppp* with a scratch symbol. The Vn., Alt., and Vc. staves have sustained notes with dynamic markings like *ppp* and *ppp* with a scratch symbol. The score includes various musical notations such as slurs, accents, and dynamic markings.

Figure 10: blocks of saturated sounds in “Tract” (2007), © Raphaël Cendo



The harp plays a type of tremolo in the low register with an iron bar. Worthy of mention is the fact that throughout the work the lowest strings of the harp are prepared with metal wire, and the part is played 'half-pedalled', in order to ensure a constant buzzing of the strings.

The piano is an amplification of the harp: the performer plays the lowest register inside the piano, manipulating a harp string which is wrapped around the piano strings. The result is an extreme granulation (the harp string has a wound metal outer-layer which provides a more striking, rougher granulation). Strings remain in a texture of extreme granulation.

### 3. INFRA-SATURATION

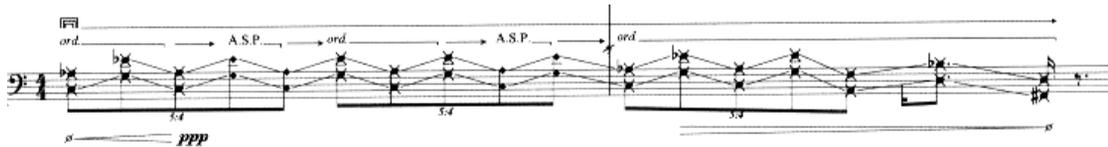
Infra-saturation is, in a sense, the dark matter of absolute saturation. In this sonic universe it is the distant movement, the phantom vestige of a once intense energy. It is characterised by an extreme reduction in intensity and can come about in one of two ways: either by an extreme slowing down of the gesture, or through the suppression of all 'pressure' and processes of multiplication of gesture/timbre. Strangely, this drop in intensity, within the context of total-saturation, affects our perception of saturated materials; it establishes a new sound world (Figure 12).

**II.**  
(4 mn 45 s)

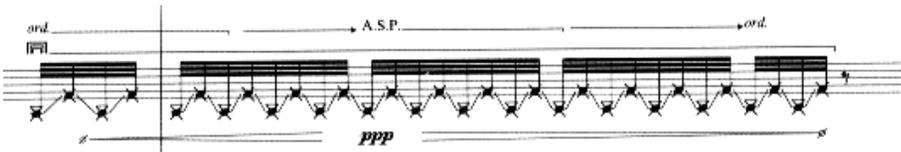
The musical score is presented in a multi-stem format. The top system includes staves for Violin I, Violin II, Alto, and Cello. The middle system includes staves for Violin I, Violin II, and Cello. The bottom system includes staves for Violin I, Violin II, and Cello. The score is marked with various dynamics (ppp, pp, p) and includes tempo markings such as 'Retenir' and 'a Tempo'. The tempo is indicated as  $\text{♩} = 48$  and  $\text{♩} = 100$ . The score is titled 'II. (4 mn 45 s)' and includes the instruction 'Over paper alla.' at the beginning.

Figure 12: opening of the second movement of "In Vivo" (2011), © Billaudot

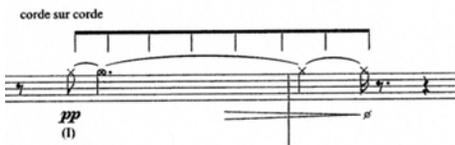
Above is reproduced the entire second movement of my string quartet. We should focus here on the beginning and ending of this example (the central section is merely a repetition of two measures from the first movement, slowed down to the extreme). From bars 1-8 there is a series of textures, like colour-panels, superimposed and in sequence. The movement develops from this gesture in the cello:



There is a regularity of movement (quintuplets) and a gentle perturbation of the bowing technique; the effect is a 'filtered' granulation. Owing to the extreme slowness of movement (the tempo is quaver = 40), one clearly perceives subtle changes in bowing, and thus in granulation. This gesture is repeated many times, also with rhythmic diminution which itself influences the granular quality:



Later, there is an extreme slowing down in granulation (violin I, bars 7-8):



The instruction *corde sur corde* is misleading. I used this technique when the musician was playing on the lowest string; now however I ask musicians to use the metal sleeve on the bow.

The resulting sound is metallic and with a slow granular quality (the precise rhythm is indicated above the staff). This example is played on the first string. Once again it is worth mentioning that this timbre may develop in a number of ways: it may move to another string, transition to *battuto*, *tremolo*, it may change pitch, or the rate of granulation may change (the latter is easily controlled). This sequence of 'colour panels' is made up of three important elements:

1. fixed granular sounds (viola, bars 1, 2 and 3; cello, bars 4 and 5; violin I, bars 5 and 6, for example; all are essentially played *behind* the bridge): these are sequential materials whose function is to establish a 'stable' continuum with micro-variations in colour (dependant on the instrument playing and the string being used);
2. dynamic granular sounds: the gesture discussed above. Here, one perceives a more-or-less dense granulation

(the degree of density is determined by the speed of the gesture) with 'filtering' movements (the consequence of 'sweeping' the bow between *ordinario* and *sul ponticello*);  
3. harmonic, half-crushed sounds (cello, bar 3; viola, bars 6-7): a contrasting texture which adds a 'luminous' quality to the sound mass.

These first seven bars were conceived as a sequence of colours of the same 'type': a variation of timbre of the *same* material moving between registers.

In the closing section of this movement (bar 21 to the end), granular sounds return albeit in a drastically altered form. Here, metal practice mutes are used (on all instruments except the cello), creating a contrasting, metallic tone; individual grains are highly perceptible. The cello is prepared with paper clips on the strings at the sixth harmonic; the resulting sound is rather like a harmonic but one in which the fundamental remains clearly audible.

We see a return of some material from the opening measures, albeit with considerable transformation: fixed granular sounds are now played on two strings and no longer behind the

bridge (violin I, bars 21-23; viola, bars 22-23, etc); dynamic granular sounds (violin II, bars 22-23; viola, bars 25-26, etc). In this state, as mentioned earlier, the change in the nature of this material is one of scale, owing to the use of metal practice mutes. This mute attenuates the volume by roughly 80%, allowing more powerful bow strokes, and thus, greater continuity in the sequence of grains; it nuances the granulation, renders the tone more metallic and, in the abstract, more dream-like. To those two we should add harmonic sounds: they are played by the cello, first on the fourth string, both by moving the bow slowly from *ordinario* to *sul ponticello* (bars 22 and 29 – allowing individual overtones to sound) and, with the aforementioned preparation (the resulting sound of which is that of an ‘altered’ harmonic).

Written as an ‘altered’ reprise of the opening, this section concludes (in the three final measures) with an abrupt shift of focus toward harmonic sounds. Both violins and the viola bow ‘half-crushed’ and finger ‘flageolet’ (i.e. with the pressure required to produce a harmonic) whilst the cello plays the first (prepared) string. They conclude with extremely exaggerated bow pressure which fades *al niente*. Throughout this second movement we are at the core of the quartet, inside its essence, where the initial material is heard in its rawest state; we are no longer on the surface of a complex sound, but rather, inside it.

A second possibility within the realm of infra-saturation and one that remains largely unexplored is the removal of all ‘pressure’ from a given sound-material; in other words, retaining the dominant sounds but at a *low* intensity whilst maintaining extreme speed, as well as an excess of density and event multiplication, be it, to give two examples, in the array of timbres used or in the profiling of sound masses based on accents.

instrumental gesture: at the limit of saturation one may discover many hitherto unexplored possibilities (Figure 13).

The short extract is taken from *Foris*, my piece for cello and electronics. Its focus is an infra-saturation through the subtraction of pressure and the multiplication/superimposition of gesture/extended techniques. Such constraints forced me to explore the timbral possibilities of all the instruments. Without going too much into detail, four gestures/timbres are of importance here. The first involves the movement of the bow on the strings, here in a quick sweeping movement of the bow on one or more strings in either a lateral (up and down) or a circular motion:



These movements, often associated with harmonic sounds, may be varied by altering bow pressure, from *flautando* (virtually without pressure), whereby a rapid, airy sound is produced, to scratch-sound, with which a precise granular tremolo may be obtained.

The second timbre is a tremolo played with the fingernail directly on the string, in this case on the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> strings.

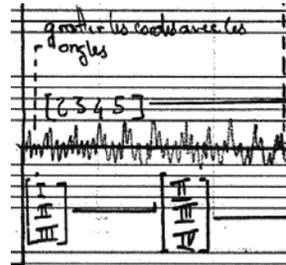
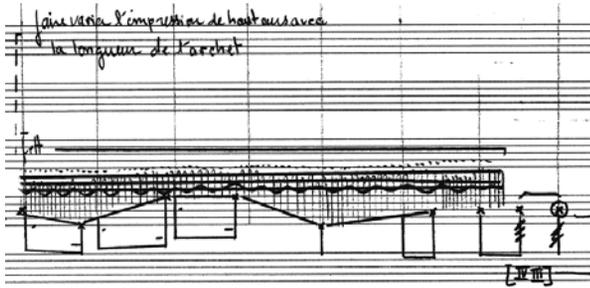


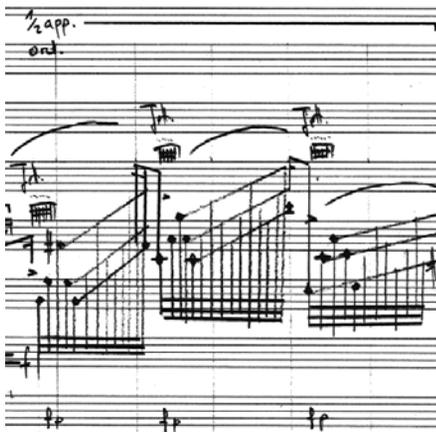
Figure 13: infrasaturation in “Foris” for cello and electronics (2011), © Raphaël Cendo

The result is a 'scratchy' sound with a clear, high-pitched quality:



The third timbre is played between the wooden joints on the sides of the instrument. The sound produced is airy but allows for variations in 'pitch', depending on the position of the bow, the bowing technique (*jeté*, *tremolo*, etc) and the nature of the movement between the two wooden slats.

The final timbre is especially representative of infra-saturation: it is a sequence of notes played extremely rapidly with almost no bow pressure (and, here articulated by 'tapping' certain notes) and a clearly perceptible pitch:



Particular to this approach (*i.e.* the suppression of pressure and the multiplication/superimposition of extended techniques) is the possibility to explore a given instrument's timbral possibilities in great detail and to exploit precise developments of gesture. In the example of figure 29, gestures/timbres are appearing and/or are superimposed in rapid succession (the tempo here is crotchet = 112). This is a development of saturation by density of sound events and gestural density. As was pointed out in the introduction to this article, saturation is first and foremost a study in excess – an excess of material *and* energy; modification of timbre is a secondary consideration.

These two sides of absolute saturation light the way for an exploration of timbre which, firstly, retains the sound palette of complex sounds at a low intensity, and, secondly, is conceived through processes of either sound event saturation or by subtraction of pressure. These two avatars of total saturation allow for a broadening of the sonic palette without neces-

sarily going for extremes in intensity (volume), and thus, are apt to reveal new sonic possibilities.

### 3. CONCLUSION

Although the groundwork for instrumental saturation has been firmly established, there remains considerable work to be done regarding multiple articulations of complex sounds and the development of infra saturation through subtraction of pressure. Musicians who have brought their talent and enthusiasm to this field of research/development have played a key role in the comprehension and emancipation of these timbres and their instruments in general. Considerable advances remain to be made regarding a broad diffusion of this repertoire, an essential factor in standardising certain extended techniques and in the discovery of new ones. As I pointed out earlier, the latest developments in this style incites us to reflect on the qualities and capacity for evolution of a given instrument. If the numerous attempts throughout the twentieth century to develop new musical instruments have largely failed, it is surely because those instrumental paradigms which have persisted over the centuries have never been surpassed, even in this digital age, in terms of quality and flexibility. Nevertheless, a musical instrument demands constant transformation: in terms of playing-techniques, this has been the case for several centuries. From the addition by Berlioz of cotton to the ends of wooden mallets used to play a bass drum or timpani, to Cage's preparations for piano, or Lachenmann's use of the piano keyboard as a guiro, playing technique must remain always at the core of instrumental research. As we have seen in this article, saturation has already been surveyed by its proponents: the use of oboe reeds or clarinet embouchures on brass instruments, playing bass or contrabass clarinet without a mouthpiece, the invention of a balloon embouchure for horn, use of paper in the strings of a contrabass etc. Nonetheless, this research must not limit itself to a simple catalogue of effects; rather, a veritable compositional dialectic must be sought. If saturation was proved able to modify the sound source of an instrument (as it does in the case of shouting into a wind instrument, or using aluminium foil on the bridge of a string, brass or percussion instrument, to give but a handful of examples) then in a sense it has already reached a limit in terms of research of timbre. Therefore, the need to resist these limitations, while maintaining a connection with the advances of the past, is greater than ever; research must focus on the creation of a radical system of gestural composition. At its conception, instrumental saturation was strongly associated with an abstract notion of electronically amplified sound; today, it has instrumental gesture at its core, which can no longer be considered distinct and separate from timbre.

Berlin, November/December 2011