

THE ACOUSTIC ENSEMBLE AS SPECTRAL SYNTHESIZER:
GERARD GRISEY'S *JOUR, CONTRE-JOUR*

Ben Taylor
November 11, 2013

"Electronic music does not breathe"
Thom Holmes

In 1972, 26-year-old composer Gerard Grisey travelled from his native France to Darmstadt to participate in Darmstadt's Summer Course in music. Headlining the course was Karlheinz Stockhausen, who performed and lectured on his 1968 piece, *Stimmung (Tuning)*, in which six amplified vocalists collaboratively synthesize timbres and melodies with the organic subtractive synthesizer of the mouth.¹ No doubt Stockhausen's unification of timbre and harmony – deriving melodies from inside the sounds themselves – resonated with Grisey, whose mentor, Olivier Messiaen, was pursuing similar goals with chords built of equal-tempered spectra.² After Darmstadt, Grisey settled into a two-year residency at the Villa Medici after winning the prestigious Prix de Rome. What followed was a transformation in his creative voice and compositional practice, articulated in his seminal *Les Espaces Acoustiques (The Acoustic Field, 1974-85)*, and codified in his founding of *L'Itineraire*, a group of composers who wrote music that acoustically resynthesized and transformed sound spectra.

Composed amid his writing of *Les Espaces Acoustiques* and seven years after his visit to Darmstadt, Grisey's gorgeous *Jour, contre-jour* (1979) is a smaller but no less magnificent work and represents his first use of magnetic tape to augment his acoustic ensemble. But Grisey's engagement with electronic music goes further than including fixed media. That one of his custom notations is a sign to "hold the sound" indefinitely – even on wind instruments – is just the beginning of an unapologetically electronic and sometimes mechanized approach to his ensemble.³

Jour, contre-jour variously translates as "Daylight, against daylight," "Light, silhouette," or "Light, shadow," and plays with binaries of light and dark, organic and electronic, purity and difference. The work is a response to Grisey's reading of the ancient Egyptian *The Book of The Dead*, concerning the voyage of life into the underworld, and that the voyage is central to the work; what is fascinating about Grisey's music is that binaries are not discrete and opposed, but distorted and

1 Francois-Xavier Féron, "The Emergence of Spectra in Gérard Grisey's Compositional Process: From *Dérives* (1973–74) to *Les Espaces Acoustiques* (1974–85)," *Contemporary Music Review* 30 No. 5 (October 2011): 347.

2 Ibid., 351.

3 Gérard Grisey, *Jour, contre-jour*, (Paris: Ricordi Editions, 1980), IV.

traversed, like the way his composition *Partiels* (1975) dwells in a transition from harmonic to inharmonic spectra.⁴

In *Jour, contre-jour*, the moment of transformation and integration of life and death, humanity and disembodied electrical energy, is at the heart of the work. This integration extends to the ensemble, which is caught somewhere between acoustic and electronic paradigms. While acoustic instrumentation dominates the work, *Jour's* compositional strategy, orchestration, and execution in performance identify with contemporary developments in electronic music, synthesis, and digital audio analysis, and root the work firmly in the tradition of electronic and electroacoustic music.

Compositional Sources: Origins of "Synthetic Writing"

In his 1990 essay "Did You Say Spectral?" Grisey recalls being motivated in the early days of spectralism by "the utopic desire for a musical language articulated on scientific facts, the recurring dream of an art-science."⁵ In the mid-1970s, Grisey is documented to have had two prominent books on musical acoustics in his possession, and in 1975 he began studying with the author of one, Emile Leipp.⁶ Grisey's contemporary Tristan Murail was reaching into the sciences as well, becoming an early contributor to IRCAM's software PatchWork for computer-assisted composition, generating acoustic scores with digital data and algorithms.⁷ Broader, extra-musical scientific currents may have been informing Grisey as well, including breakthroughs in our popular understanding of physics and time. Albert Einstein's relativity theory shares several concepts with Grisey's music: that time is not an absolute phenomenon, but a relative one depending on the perceiver's location and trajectory; that time is not, strictly speaking, measurable; and that there could exist a simultaneity of times.⁸

4 Clifton Callender, "Continuous Harmonic Spaces," *Journal of Music Theory* 51 No. 2 (Fall 2007): 322.

5 Gérard Grisey, "Did You Say Spectral?" Trans. Joshua Fineberg, *Contemporary Music Review* 19 Part 3 (2000): 2.

6 Féron, 351.

7 Carlos Agon et al, "Computer-Assisted Composition at IRCAM: From PatchWork to OpenMusic," *Computer Music Journal* 23 No. 3 (Autumn, 1999): 64.

8 Nicola Davico, "Gérard Grisey: Time and Process." *Proceedings of the International Conference Beyond the*

Pursuing his "dream of an art-science," Grisey zoomed in on Fast Fourier Transform (FFT) spectrographs of sounds to find the acoustic activity at their core, then composed with that data through acoustic ensembles, placing the audience within a different timeframe or sometimes multiple timeframes.⁹ This type of sonic relativity was made possible, Grisey says, "through science and microphonal access," the microphone and its scientific perception being at the center of his composition process.¹⁰ These complex concepts of time are described by Grisey in his artistic thesis *Tempus ex Machina (Time of the Machine)*, where he describes spectralism as the traversal of three layers of musical time, made possible with analytical technology.

In these analyses, Grisey found not only the activity of notes, but the activity of their timbres – the harmonic spectrum or overtone series – and the spectrum became a central tenant of Grisey's compositions. François-Xavier Féron explains that "a spectral chord could be described as a chord in which the pitches are selected such that their combination begins to match the spectral structure of a sound."¹¹ Similar to what Messiaen and Stockhausen explored before him, Grisey describes his goal to be the "integration of harmony and timbre within a single entity"¹²

In documents sketched while making his early spectral breakthrough *Derives*, Grisey draws the overtone series that became the source for the work. Drawn in color, he called this chord the *prisme harmonique* or "harmonic prism" for the work.¹³ One year later in *Partiels* (1975) from *Les Espaces*, he makes his harmonic prism more dynamic by using details from an FFT analysis of a low E1 on a trombone.¹⁴ In *Les Espaces*, the FFT is not only resynthesized through the ensemble in slow-motion, but governs larger formal aspects of the work, uniting timbre, harmony, and form.¹⁵ Indeed, Féron's

Centers: Musical Avant-Gardes Since 1950, Thessaloniki, Greece (July 2010): 2.

9 Davico, 4.

10 Grisey, "Did You Say Spectral?" 1.

11 Féron, 348.

12 Grisey, "Did You Say Spectral?" 2.

13 Féron, 350.

14 François Rose, "Introduction to the Pitch Organization of French Spectral Music," *Perspectives of New Music* 34 No. 2 (Summer 1996): 8.

15 Féron, 349.

graphical waveform of *Périodes*'s ten minutes looks like it could be the waveform of only a few seconds of sound.¹⁶

In 1974, Grisey described that "after an era of analysis, we are finally heading towards more synthetic writing," with the computer as the compositional enabler.¹⁷ His practice of acoustic re-synthesis finds musical complexity within sound itself, not within constructed formal strategies like motives or tone rows.¹⁸ Grisey explains, "The material derives from the natural growth of sonority, from the macrostructure and not the other way round. In other words there is no basic material (no melodic cell, no complex of notes or note-values)."¹⁹ Similarly, as we will see in *Jour, contre-jour*, musical development occurs by exploring the space of a sound and its perception, shining light through different areas of the spectrograph and often involving physical properties and techniques rooted in electronic music of the previous thirty years.

Compositional Sources: Electronic Forms in *Jour, contre-jour*

Jour, contre-jour is not an exposition of spectralist ideas, as Grisey had already done that in *Dérives* and the first two movements of *Les Espaces Acoustiques: Périodes* and *Partiels*. Instead, it is a development of spectralism with secondary concepts which continue to draw material from electronic music, including additive synthesis, amplitude modulation and heterodyning, time-stretching, and non-chromatic tuning. All the while, Grisey continues to use the spectral data of sounds as a prism through which to develop architectures and illuminate sonorities.

Additive Synthesis

Jour, contre-jour uses additive synthesis as its basis of harmony. As in *Dérives*, the protagonist

16 Féron, 362.

17 Grisey, Gérard. "Vers une écriture synthétique [Interview regarding *Dérives*]." Trans. François-Xavier Féron. In *Gérard Grisey—Écrits ou l'invention de la musique spectrale*. Ed. G. Lelong and A. M. Re: 225.

18 Rose, 7.

19 Gérard Grisey, *Partiels*, In the record liner notes for Erato STU71157 (1981).

of *Jour, contre-jour* is a pure harmonic spectrum that is resynthesized through an acoustic chamber ensemble. In program notes for the work, Grisey describes the spectrum as light (*jour*), which is altered towards, and interacts with, impurity and inharmonicity (*contre-jour*) through different mechanisms.²⁰ Francois Rose, a student of Grisey and Murail, notes the importance of the computer's ability to show "the resolution of partials and their relative amplitudes" for Grisey's early works, and this shines through in Grisey assigning FFT bins to different instruments and using their amplitudes over time to create a dynamic and evolving texture.²¹ Francois Rose describes this technique as "instrumental additive synthesis."²²

Amplitude Modulation and Difference Tones

Amplitude modulation, and specifically the resulting sidebands, are additional artifacts of electronic music that play an important structural role in the work. From the early heterodyning of the Theramin, to Pauline Oliveros first using difference tones structurally in her compositions *Mnemonics I-V*, the difference tone has a legacy in music made with electricity.²³ In the original program notes for the *Jour, contre-jour*, Grisey explains how difference tones are involved in the work:

"Intrigued by the similarity between the phenomena of shadows and the sounds called difference tones, I have composed a piece in which all is generated by the course of an imaginary sun: an inharmonic specter in constant change around a harmonic spectrum."²⁴

Grisey uses a purely harmonic spectrum as a stable pillar, around which he shines metaphorical lights that cast shadows (difference tones) in different patterns, volumes, and densities. By orbiting his original harmonic spectrum with an "imaginary sun," he casts a second, inharmonic spectrum (a

20 Gérard Grisey, "Jour, contre-jour: Note de Programme," Trans. Trey Duplantis, *IRCAM Resources*, IRCAM, Accessed 5 November, 2013.

21 Rose, 8.

22 Ibid., 8.

23 David Bernstein, *The San Francisco Tape Music Center: 1960s Counterculture and the Avant-Garde*, Berkeley: University of California Press (2008): 89.

24 Grisey, "Jour, contre-jour: Note de Programme."

"specter" by his wordplay) of difference tones that interact with the first. The *jour* (light) is cast on the harmonic spectrum, the *contre-jour* a silhouette or shadow of difference tones on the stone Egyptian ground.

Grisey separates his ensemble into spectrum (winds and brass) and difference tones (played on string instruments). Grisey referred to these tones as "shadow-tones," and had used them before in *Partiels*, but not with this degree of conceptual clarity.²⁵ These shadow-tones are generative in that they can beget more of themselves (e.g. difference tones of difference tones), and are a method of harmonic development for Grisey as well as rhythmic development; Rose points out an instance in *Partiels* where a low difference tone is close in frequency to an existing spectrum tone, causing audible beating at an irrational rhythm of $11/4$.²⁶ *Jour, contre-jour*'s two-spectra approach is also similar to *Derives*, in the way secondary spectra (in *Derives* Grisey called these "antiprisms") revolve around the original pure spectra.²⁷ But now Grisey is using the modulation artifacts of difference tones to produce these secondary prisms, more closely tying his compositions to electronic techniques.

Pitch Content

During this period, *L'Itineraire* member Tristan Murail also experimented with acoustic performance of electronic sidebands, most prominently in his work *Gondwana* (1980) derived from FM Synthesis.²⁸ Murail's chords, though, were equal-tempered, and Grisey's embrace of precise tuning and quarter-tones in *Jour, contre-jour* is one of its most salient features. Performance notes in the score state "As justness of intonation is essential(!) in this piece, tune the instruments with great precision before each performance."²⁹ Even Grisey's previous *Derives* did not request this precision, Féron noting that "given that pitches fail to stray from an equal temperament, these chords are only a crude

²⁵ Rose, 21.

²⁶ *Ibid.*, 28.

²⁷ Féron, 355.

²⁸ Rose, 30.

²⁹ Grisey, *Jour* score, VIII.

reconstruction of the harmonic spectrum."³⁰ *Jour's* just intonation proves a major departure from his teacher Messiaen's own spectral chords, which were also equal-tempered, and moves his work closer to the electronic spectral reconstructions of Stockhausen's early *Studie I* and *Studie II* made with mathematically-tuned synthesizers.

Space, Time, and Perception through Differences

A subtler influence of electronics on Grisey is his use of space, the physicality of sound in space and time, and the realities of perception of sound. In a 1990 interview, John Cage relayed the source of his and Marcel Duchamp's often-electronic *Sculptures Musicales*, saying "We don't see much difference between time and space. We don't know where one begins and the other ends. [Laughs] ... Marcel Duchamp began thinking of music as being not a time art, but a space art."³¹ Grisey's fascination with spectrograms direct him to a similar mindset as Duchamp, Pierre Schaeffer and John Cage working with magnetic tape (and possibly Grisey's own use of tape), or the early drones of La Monte Young in his *Dream House* which made sound you could walk through. Grisey has an awareness of sound as a physical and not abstract process, an *objet sonore* for compositional form.

In this physical object of sound, the spectrogram, Grisey sees a window into perception. Of perception, Grisey writes that "we are unable to measure the pitch, the duration or the intensity of a given sound, however we immediately sense the difference in between one sound and the previous one. I no longer seek to compose an entity, but instead the transition from one to another."³² This contains echoes of a contemporary of Grisey, the French philosopher Gilles Deleuze, who wrote that the world is understood through differences, which are the root of perception. It is likely that Grisey was aware of Deleuze's ideas, and that they are part of what encouraged him to compose "the gap, with the distance separating a sound from another."³³ Grisey used the computer as a way to zoom in on and see these

30 Féron, 348.

31 John Cage, "John Cage about Silence," YouTube, April 2, 1991. Web. Accessed 10 November, 2013.

32 Gérard Grisey, "Vers une écriture synthétique," 224.

33 Gérard Grisey, *Écrits ou l'invention de la musique spectrale*, Trans. Nicola Davico, (Paris: Éditions MF, 2008): 29.

differences, and, as a composer who heralded perceptual qualities above all others, he points out that "the difference or the lack of difference qualifies the perception as a whole."³⁴

Deleuze's ideas are important because I suspect that these differences are at the root of Grisey's use of an acoustic ensemble for this piece.

Our heartbeats, our breathing, the beat of our steps and so many other unknown rhythms (nerve impulses, for example) are never as precisely periodic as a clock. They fluctuate ever so slightly. [. . .] So it is with these periods, as they stray from the strict and the automatic. Thus, periodicity is infused with a life it was previously lacking.³⁵

With Grisey's "more attentive attitude towards the phenomenology of perception," he composes the work with the imperfections and differences of periodicity sent through space and perceived. This is signified by the irregular heartbeat that starts the piece, and is the real weight of the FFT: the revelation of subtle differences within the spectrum, and of data that allowed Grisey to compose not just with space and time, but with perceptual qualities and the small differences of sounds.³⁶ To end his program notes for the piece, Grisey writes:

Without beginning or real end, this sort of water clock aims to make a particular temporal experience. Each duration and each sound, be it instrumental or electronic, is written in a unique process, fluid and continuous, without aspirations of fueling our memory. Thus, the barge of Ra, and its course from day to night.³⁷

Sound Sources: The Chamber Ensemble as Dynamic Synthesizer

Jour, contre-jour premiered at Radio France's Maison de Radio on March 9, 1979, performed by the *Ensemble L'Itineraire*, a group dedicated to performing works by the *L'Itineraire* composers.³⁸ It

34 Gérard Grisey, *Écrits*, 48.

35 Gerard Grisey, *Périodes* (Milan: Ricordi Editions, 1974).

36 Grisey, "Did You Say Spectral?" 2.

37 Grisey, "*Jour, contre-jour*: Note de Programme."

38 Grisey, "*Jour, contre-jour*: Note de Programme."

was Grisey's first work using a magnetic tape accompaniment, and his performance instructions and unique notation demonstrate that ideas of electronic music are deeply embedded in the acoustic ensemble as well. In the acoustic reproduction of the compositional concepts described above, Grisey not only continues to use devices of electronic music, but uses them to an even greater degree.

Frequency and Shape

In *Jour, contre-jour*, Grisey breaks with traditional classical orchestration by writing a C score, notating the real sounds that each instrument will make: "All the instruments except the electronic organ are written in actual sounds"³⁹ Grisey is working with sound itself, not traditional orchestral paradigms. The unusual chamber ensemble of winds, brass, organ, and percussion is hand-picked to be an additive synthesizer – to recreate the spectrum – and Grisey notates it as one.

His custom notation symbols are brimming with electronic ghosts. The first and most-used are two symbols to "hold the sound" and for a "peak of cresc. at the point marked, without reattacking," using instruments as tone generators.⁴⁰ Grisey's material is not metered rhythm and static dynamic, it is duration and envelope, both residual practices of early synthesis works. The peak of the envelope becomes Grisey's strongest timing mechanism, and are what he uses to synchronize the ensemble, as opposed to the beginning of notes.⁴¹

Timbre

Grisey uses special notation for timbral control as well. Some notes are signified to have "imperceptible attack or termination," and repeated later, "All the sounds indicated are absolutely without attack and terminate in the same way," removing the impulse noise that identifies the instrument.^{42,43} Again, instruments are used as tone generators, only for the register and timbre of their

39 Grisey, *Jour* score, III.

40 Ibid., IV.

41 "The 'peaks' in sound must be precisely timed, even if not attacked, just done with breath, " Ibid., VIII.

42 Ibid., IV.

43 Ibid., VIII.

tone. These timbres are broad, Grisey using multiple types of mutes on brass, multiphonics, and including textural percussion like washboards, plates, and a guiro that of over one meter in length.⁴⁴

Effects

Several audio effects are replicated through extended techniques on the winds and strings. Wind players are sometimes instructed to breathe into instruments with certain fingerings down, using the body of the instrument as a resonant filter for noise.⁴⁵ This intention is confirmed in notation for the string instruments, which have four levels of bow pressure, one of which is "maximum pressure; just a grating noise, the notes indicated are no longer heard; they merely give relative pitch to the grating"⁴⁶

Beyond filtering, Grisey also approximates a timbral convolution with the acoustic instruments. The string instruments have four notated bowing locations, or "playing modes," which produce different timbres, but Grisey also notates a "progressive passage from one playing mode to the other," leading to a timbral transformation which, while not actually convolution, results in a similar auditory effect of transforming sound.⁴⁷

Finally, Grisey orchestrates LFOs on two parameters, mimicking the ring modulator and phase shifter that he is able to have on the electric organ. Strings have a parameter for "tremolo, as rapid and close as possible," replicating a low-frequency amplitude modulation.⁴⁸ More unusual is his timbral modulation, with a sign for string players to "exert strong and light pressure in alternation as rapidly as possible."⁴⁹ He is clearly adding cyclic control parameters to his music, a style associated with electronic music and that draws directly with the cyclic physics of sound.

Mechanization

When Grisey writes in the performance instructions that "breathing on the wind instruments

44 Grisey, *Jour* score, III.

45 Ibid., IV.

46 Ibid., V.

47 Ibid.

48 Ibid.

49 Ibid.

must be imperceptible, preferable during the points of least volume," it is absolutely clear: these performers are not meant to demonstrate their humanity, but instead are a dynamic synthesizer of FFTs, creating electronic music mediated by an acoustic ensemble.⁵⁰ This is expressed also in the way the ensemble interacts with the electronic organ, the clearest connection to electronic music. The organ is given several effects that the rest of the ensemble must perform manually, including a ring modulator, phase shifter, volume pedal, and graphic equalizer.⁵¹

Gestalt

All sounds of the multi-faceted acousti-synth ensemble in *Jour, contre-jour* are mediated by technology to become one sound. All instruments are amplified, each with its own unique directional microphone, and mixed to balance with the tape and organ via a central mixing console.⁵² This turns the breathless tone-generating instruments into electronic signals. Grisey specifies the care that should be taken to mix the organ, winds, strings, and tape, and describes where in the sound each instrument should be, saying that the strings (which play difference tones of the winds) should "envelop" the other instruments, and that certain percussion should "sound dull and damped like beats emerging from inside the sound."⁵³ In addition, there are repeated notes that various instruments "must never stand out" and "must not stand out."⁵⁴ Finally, the amplified instruments, organ and tape, are spatialized in an octophonic arrangement, using stereo pairs of organ (stage back), tape (stage front), instruments (audience front), and tape (audience back) respectively, so that each group is folded into the others and emerges from between or within the magnetic tape and each other.⁵⁵ The intention is clear: this is all one sound, one synth.

50 Grisey, *Jour* score, VIII.

51 Ibid., VI.

52 Ibid., III.

53 Ibid., VIII.

54 Ibid.

55 Ibid., VII.

Summary

The reasoning behind Grisey's decision to recreate spectrograms with acoustic instruments as opposed to electronic ones is not often discussed. The contradictions in his approach – hiding the breath of wind instruments, for example – can be perplexing. But Grisey appears concerned first and foremost with perception, taking concepts only as far as they don't burden him. It may be his attention to perception that led him to use the acoustic ensemble, the option with the richer and livelier sound. Considering his reflexive approach to composing with perception – bringing aspects of space and difference into his notated compositions – the human performer could be seen as a kind of filter, similar to the way space acts as a filter by breaking sound apart, affecting it, and imperfecting it.

In *Jour, contre-jour*, Grisey explores this threshold between embodied and disembodied sound, perfect and imperfect spectrum, and there is a resonance in the end result. The music gains interest from the way electronic concepts are passed through the acoustics of the ensemble, and the way the acoustics of the ensemble are passed back through electronics. Two years later, Grisey composed a work using his essay *Time of the Machine* as its namesake, and *Jour* is a step on the path toward that work: embodying a machine in order to access subtle differences in sound and time.

Bibliography

- Agon, Carlos, Gérard Assayag, Olivier Delerue, Mikael Laurson and Camilo Rueda. "Computer-Assisted Composition at IRCAM: From PatchWork to OpenMusic" *Computer Music Journal* 23, No. 3 (Autumn, 1999): 59-72.
- Anderson, Julian and Tristan Murail. "In Harmony: Julian Anderson Introduces the Music and Ideas of Tristan Murail." *The Musical Times* 134, No. 1804 (June, 1993): 321-323.
- Berstein, David. *The San Francisco Tape Music Center: 1960s Counterculture and the Avant-Garde*. Berkeley: University of California Press, 2008.
- Cage, John. "John Cage about Silence." YouTube. 02 April, 1991. Web. 10 November, 2013.
- Callender, Clifton. "Continuous Harmonic Spaces." *Journal of Music Theory* 51, No. 2 (Fall, 2007): 277-332.
- Castanet, P. A. "Gerard Grisey and the Foliation of Time." Trans. Joshua Fineberg. *Contemporary Music Review* 19, Part 3 (2000): 29-40.
- Davico, Nicola. "Gérard Grisey: Time and Process." *Proceedings of the International Conference Beyond the Centers: Musical Avant-Gardes Since 1950*, Thessaloniki, Greece, 1-3 July 2010.
- Féron, Francois-Xavier. "The Emergence of Spectra in Gérard Grisey's Compositional Process: From Dérives (1973–74) to Les Espaces Acoustiques (1974–85)." *Contemporary Music Review* 30, No. 5 (October, 2011): 343–375.
- Grisey, Gérard. "Did You Say Spectral?" Trans. Joshua Fineberg. *Contemporary Music Review* 19, Part 3 (2000): 1-3.
- Jour, contre-jour*. Paris: Ricordi Editions, 1980.
- "Jour, contre-jour: Note de Programme." Trans. Trey Duplantis. *IRCAM Resources*. IRCAM. Web. 5 November, 2013.
- Périodes*. Milan: Ricordi Editions, 1974.
- Partiels*. In the record liner notes for Erato STU71157 (1981).
- "Tempus Ex Machina: A Composer's Reflections on Musical Time." *Contemporary Music Review* 2, Part 1 (1987).
- "Vers une écriture synthétique [Interview regarding Dérives]." Trans. Francois-Xavier Féron. In *Écrits ou l'invention de la musique spectrale*. Eds. G. Lelong and A. M. Re: 223–225.

"La Musique: Le Devenir Des Sons." Trans. Nicola Davico. In *Écrits ou l'invention de la musique spectrale*. (Paris: Éditions MF, 2008).

Moscovich, Viviana. "French Spectral Music: An Introduction." *Tempo* New Series 200 (April 1997): 21-27.

Rose, François. "Introduction to the Pitch Organization of French Spectral Music." *Perspectives of New Music* 34, No. 2 (Summer, 1996): pp. 6-39.