



art, science and technology

the revue of
Foundation Destellos
Mar del Plata
Argentina
www.fundestellos.org

2 – Editorial
3 -Festival Son MiRé - Journées Haut-Parlantes
4- Space As Structural Function In Electroacoustic Music by Elsa Justel
13 -Une nuit blanche pour savourer le son pur de
l'acousmatique – Le Monde 09/07/08



ACT is the revue on-line of communication and exchange between the members of the artistic, scientific and technologic community. Therevue is concerned with the diffusion of activities, publication of articles and news.

ACT is nourished by the contribution of the community actors themselves, whom will be interested to inform about their creations and researches.

Editorial

The recent creation of the Foundation Destellos means an important engagement on behalf of the Argentine cultural community. Its achievements reflect yearning tending to the evolution of culture in its multiple aspects and opening breaches between the country and abroad.

The foundation objectives and activities are oriented to promote the intrinsic values of the arts, in its contemporary forms. That implicates an intensive labor comprehending esthetic, technologic and scientific axes, in their theoretical and practical aspects.

The civic responsibility is incumbency of the artist. As a counterpart, the community stimulus is a necessary requisite to develop the creative task of the individual artist. The idea of this foundation is based in that necessity of interrelation. Its purpose is to stimulate, collaborate and participate in all initiative of cultural, artistic, intellectual, educational, social and scientific characters, tending to the development of human activity into the community.

Nowadays the music, the video art and other multimedia expressions, confront the public to perceptive and esthetic conflicts. The preoccupation for scientific research shown today into the artistic field, responds to the need to integrate the different areas that constitute the creative process. The knowledge of the scientific disciplines related with sound, image and perception (as neurophysiology, psychology, sociology, physics and acoustic), will favor the esthetic appreciation and the intellectual development. There is the importance of the multi-disciplinary activities, to achieve a better comprehension of arts and at the same time to contribute to development of human knowledge.

Besides, the scientific knowledge is complementary with the digital technology that constitutes at the same time a tool for research and for creation. So, to favor technologic research for the development of new software is also an important objective.

Simultaneously to the theoretical studies, it is indispensable a deep reflection about esthetics signification of contemporary arts. That reflection will depend on the own conscience of creators about the scope of their production and of the responsibility that they have to guide the foundations of their activity. By those reasons, one of the principal purposes of the Foundation is to incentive creator to reconsider all those aspects, in order to establish the theoretical basis that will constitute the pedagogic elements of the artistic education of our days.

We believe that the synergism included between arts, sciences and technology, will contribute to develop all aspects of culture, improving the human condition.

Nut

If you wish to make an announcement of your artistic event or to publish an article, you can send your proposition here.

[http://www.fundestellos.org/ACT-](http://www.fundestellos.org/ACT-collaborations.htm)

[collaborations.htm](mailto:info@fundestellos.org)contact : info@fundestellos.org



Festival Son MiRé -Journées Haut-Parlantes

**Pascale Criton & Didier
Aschour « à propos de la
Ritournelle »**

Samedi 23 août 2008

A 18 h - Chapelle de Notre Dame de Fabrezan

La ritournelle et le galop pour guitare en 16e de ton Plis pour guitare en 1/12e de ton

Didier Aschour :
guitare
Lecture : Pascale Criton

**Ecoute Gilles Deleuze : Le temps non chronologique (Le bruit du temps -
Chimères n°40)**

19 h repas à la pinède de la Chapelle de Notre-Dame

Journées Haut-Parlantes à Fabrezan
les 22, 23 et 24 août 2008

www.sonmire.or

Tel : 06 78 77 12 44 & 04 68 27 14 52



Space As Structural Function In Electroacoustic Music

Elsa Justel¹ Composer, Doctor in Aesthetics, Sciences and Technology of Arts, University of Paris 8

Abstract

This paper tries to demonstrate some of the strategies used by different composers to create their compositional spatial models. Throughout our lecture, we will hear some examples of space organization and demonstrate their physical parameters by means of Fourier analysis. We will see different methods of spatialization by temporal pitch changes, amplitude panning changes, spectral transformations, re-synthesis by convolution and transposition, expansion, granulation etc) on works by the composers J.C. Risset, H. Vaggione, B. Truax and others.

Introduction

The use of space as an element of organization is one of the new preoccupations for composers of electroacoustic music. This spatial dialectic is the most relevant topic in electroacoustic music. Space has acquired a structural role that was absent in instrumental music. However, the morphological analysis of this aspect is difficult, not only because we have not the appropriate tools to measure it, but also because we are confronted by multiple spaces.

This new alternative of considering space as a musical and structural phenomenon requires a different kind of hearing, more demanding from a physiological and psychological point of view.

It is useful to look at the works themselves and to try to extract descriptions of the different behavior of materials in relation to space in electroacoustic music. We can perhaps determine a kind of syntax of space.

1. Internal and external spaces

To begin with, we must consider two principal aspects: the internal and the external spaces. Both phases of space operate on our perception in a way that is at the same time both centrifugal and centripetal. There is a diversity of criteria about the importance of space and its role of articulation in electroacoustic music, but in any case the interaction between time, space and timbre constitutes the crux of a new conception of musical structure. This most ancient tendency is intended to give different types of expressive relief to music by manipulating the sound parameters. They were inspired on the instrumental music concept that space amplitude is a result of the combination of frequency, intensity and harmonic spectra. In fact, the differences in spectral field between low and high sounds (that is the consequence of absorption rate of partials), as well as relationships between duration and registers, are determining agents of space in instrumental music.

Most acousmatic composers talk to us about virtual and real space, that is: the space created during the composition, and the space of performance. In the first case, the internal space will be incorporated to the material and stay fixed in the support. The external space will enter into action at the moment of projection, during the concert. This space is then a composition act, as well as an interpretation one. In this way both spaces become complementary. The audience will have the sensation of an imaginary space emerging from the environment all around. The composer, however, is conscious of the physical reality of space, in both forms, even if he applies his own flow of imagination to the composition. In fact, it is by means of perception that space acquires a symbolic sense, because brain mechanisms award it subjacent signification.

1.1 Models of internal space

There are numerous resources, but even by means of spectral analysis, we cannot determine which techniques were employed to obtain these effects. Nevertheless our experience with computer treatments can help us, by simple hearing, to know how composers achieved such results.

We have several very simple procedures, applied in the mixing of tracks. For example to slide elements in both stereo tracks, or to give different amplitude panning to each track in order to get larger or narrow perceptive spaces.



Figure 1 - Savouret : "Scène d'intérieur" [1]

The design of both stereo tracks makes evident the manipulations with the mixing table. We can observe that the evolution of amplitude curves represents objects and voice displacements in the space. The first two segments show a movement from right to left and the third segment represents a vocal sound fixed clearly at left.

We detected a similar mixing situation in "Petit Poucet Magazine" de B. Ferreyra [2]. In figure 2 we can observe a shifting at the same time temporal and of amplitude, between both stereo tracks.

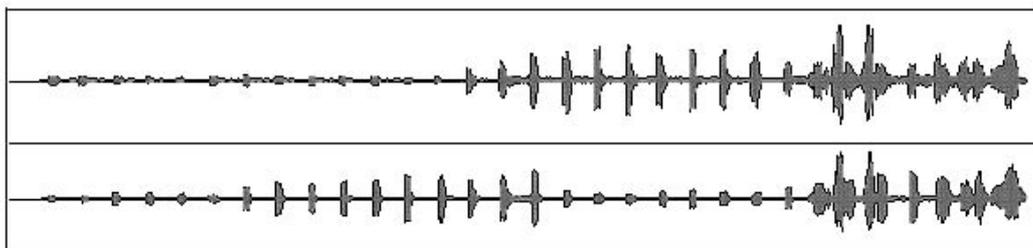


Figure 2 - Ferreyra : "Petit Poucet Magazine"

Besides, in spite of the similarity between both voices, we can see that there is still another additional shifting: this of pitches. I mean, both melodic lines have the same common elements but they are not identical. Melodic lines have an oblique trajectory: they begin at the same pitch and then they cross to go in opposite directions.

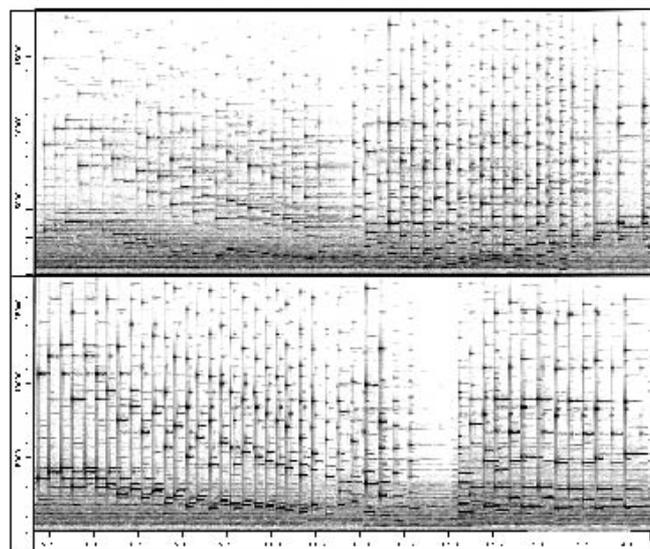


Figure 3 [3]

Another way to produce sensations of virtual space is by using temporal pitch changes. The classical examples are Little Boy and Mutations of J. C. Risset [4-5], based on Shepard's [6] experience with the illusion of indefinite glissando. Using an additive synthesis program, Risset produced an ascendant one octave scale in which each partial is doubled one octave higher. So that in a loop we have a sensation of infinitely descending pitch because when one component reaches the end of the curve a new component appears at the beginning.

Other more complex procedures are those which apply transformations into the spectral components. We

know that perceptual magnitude of sound depends on its spectral richness, its duration and non-synchronized temporal partials.

We will now see an example of composer H.Vaggione [7]. In this figure we can see three instrumental sounds spectra. Sounds 1 and 2 belong to Double bass and sound 3 is a pizzicato of cello.

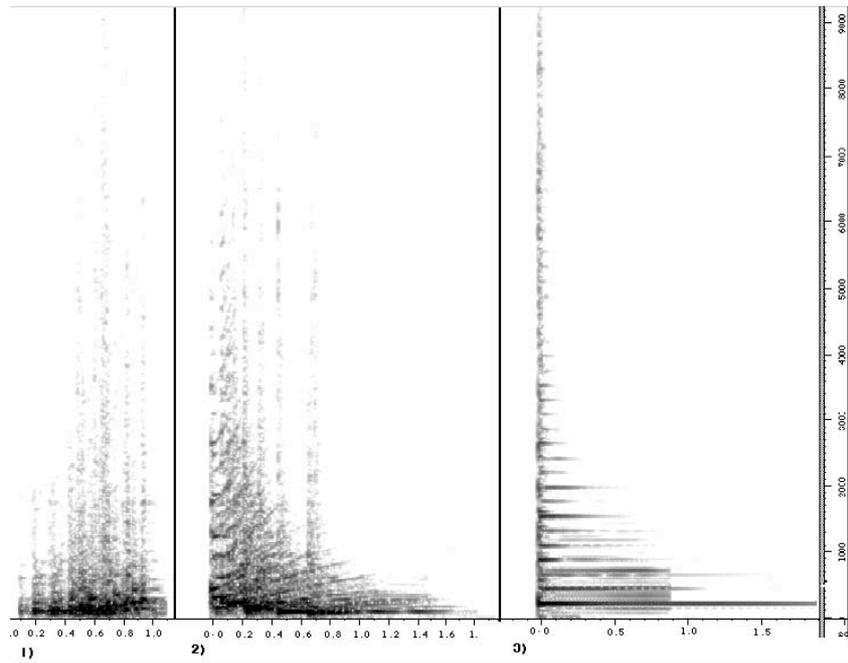


Figure 4

Let's see how the composer transforms sound 2. By means of re-synthesis by convolution the composer obtains a kind of filter that raises higher partials of spectra. (5a) We can see the doubled vertical lines after the attack, these are the higher harmonics. As high frequencies are more piercing as far as perception is concerned, we have the sensation that the Double bass sound is nearer in this example, even if it has still the same qualities of timbre and duration, as the original.

The example that shows fig. 5b corresponds to the same sound, in this case with a slight panoramic shifting. We can see a kind of "out of phase" spectra in the attack transient and in the first partials. On the other hand we also observe that superior harmonics fall down faster than in example a.). Besides, the design seems to be flattened and the whole ensemble of the object seems larger. However its duration is still the same (1s750ms). The perceptual sensation is of a trajectory going from right to left.

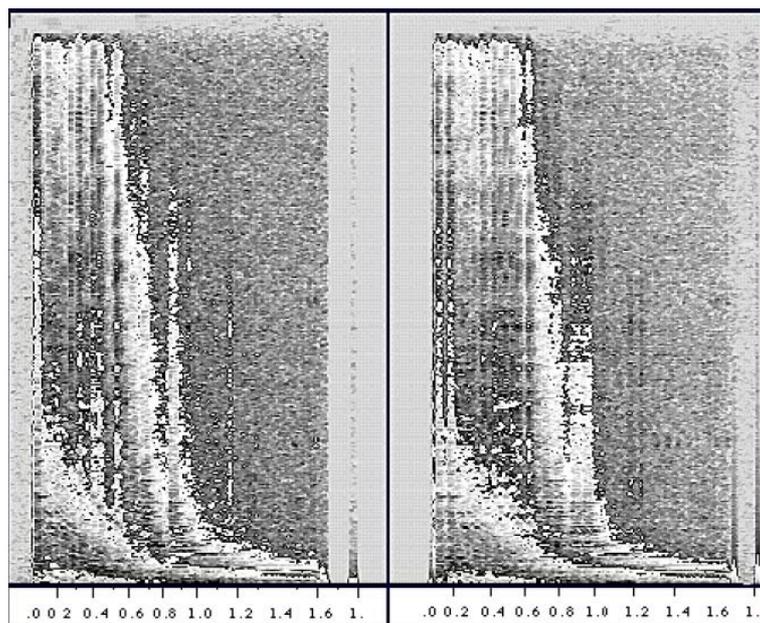
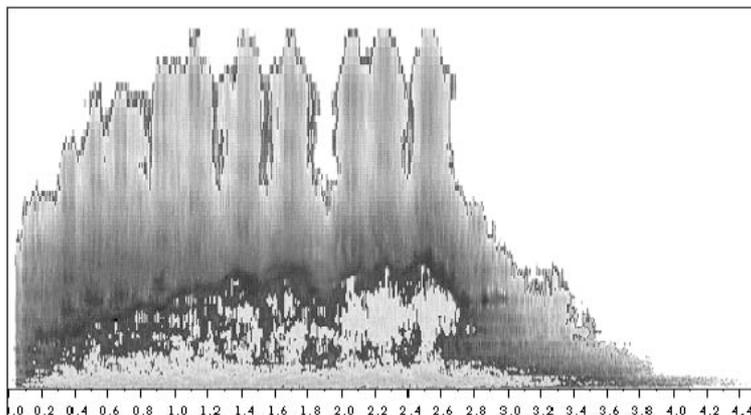


Figure 5.a Figure 5.b

The expansion process is also interesting, because in special conditions it can produce a sensation of being far away. Figure 6 shows sound 1) transformed by expansion. This kind of process sometimes produces little deformations in signal. Comparing this spectra with its original, we can see that both have the same

morphodynamic aspect. In fact, frequencies are the same but the object format is larger and we perceive it as being far away.



Figure

By granular methods we can obtain effects of polyphonic space. Spectra in Figure 7, correspond to a countertenor voice sound (belonging to the piece of B. Truax [8] "Powers of two"). Over those spectra, the composer used effects of granulation, expansion and transposition. (Figure 8) As a result of these treatments Truax obtained a thick mass that evolves very slowly. This mass shows a remarkable contrast with the original sound whose spectral quality is mostly pure. In that way, the composer got a perceptual illusion that embraces a large spatial field. We can verify that enlargement of spatial field in the extension of signal as well as in thickness of spectral lines. That means that we perceive a larger space both in field depth and in density of material.

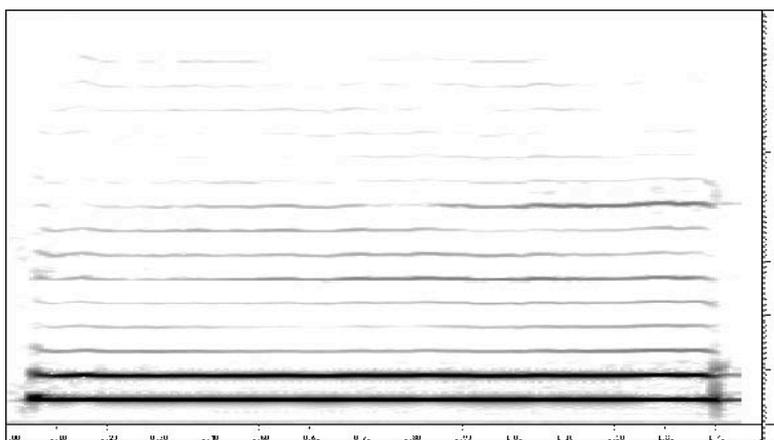
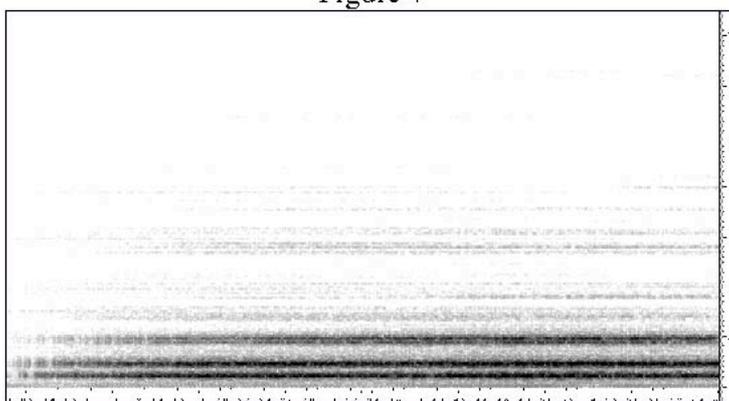
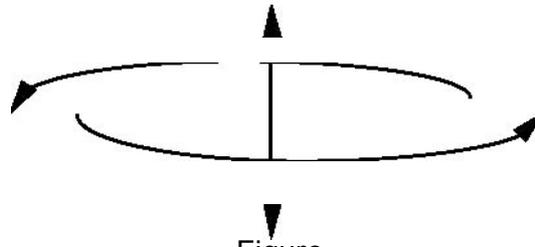


Figure 7



Figure

These and many other models of sound space can be integrated with music in a functional way. We can hear the example of C. Zanési in Arkheion [9], who uses a characteristic spatial scheme as a kind of "leit-motiv". This scheme is constituted by lateral trajectories and fixed points in different plans of space. The composer always uses the same scheme to delimitate sequences and to create a good balance between different articulations. Thus it is evident that the composer thinks in terms of a structural element. (Figure 9)

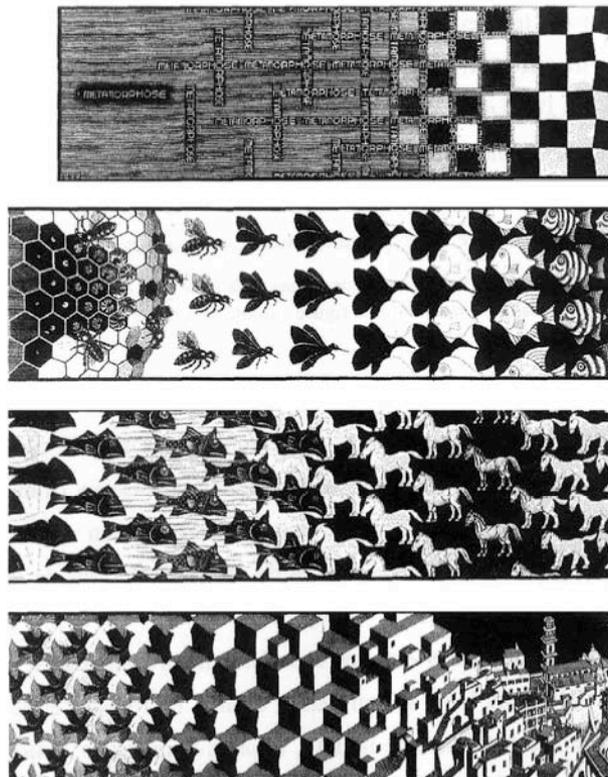


Figure

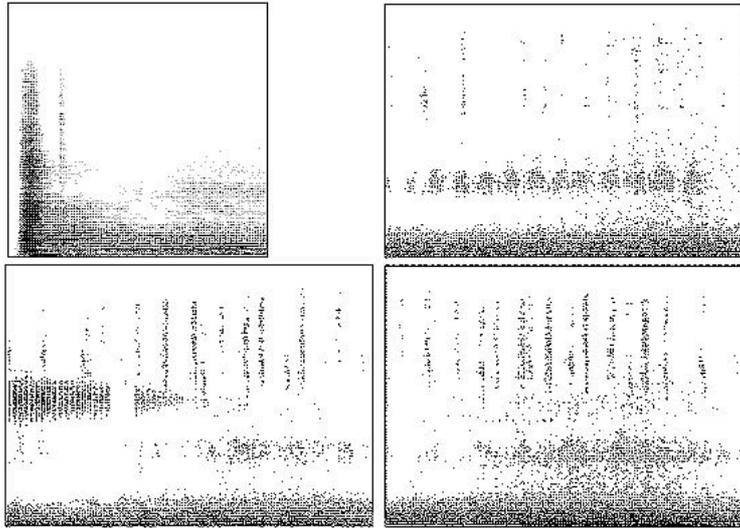
The gradual temporal transformation is one of the preferred resources of electroacoustic music composers. This aspect, as polyphonic structure, is closely connected with spatial sensations. We will analyze two examples of the piece “Elementa” of J. C. Risset [10], in which the composer uses instrumental and natural sounds to create a material that mutates permanently. In this way, he creates a floating atmosphere in which material evolves in an infinite space.

.....

In the third movement of *Aer*, the composer develops a complex structure, using a great number of different materials: flute sounds (slaps, aeolian sounds, melodies etc), wind sound, insects and little animal voices. The whole movement is a long series of metamorphosis. This movement can be compared to Maurits Escher [11] “Metamorphosis” (Figure 10). This Dutch graphic artist was also preoccupied by notions of space and time emerging from bi-dimensional figures; in this case, engravings. We can observe how bees go out of hives towards the birds that become fishes and then horses, and so on. In *Aer* we find similar transformations, when wind sound changes the register and then becomes the melody of a flute which gradually disintegrates to become cricket songs... then, all is again transformed to become a complex mass.



Figure



Figure

In Figure 11 we can observe: in the top left square, the characteristic spectra of a flute slap. The figure on the right shows us two layers that represent the sounds of wind and flute respectively. In the lower squares we have: on the left: the same elements superposed to a new object that represents the cricket sound. In the final square on the right we can observe an heterogeneous group of elements of different classes. The most important characteristic of this movement is the fusion of surfaces, particularly those of wind and flute. This complex surface is present during the entire fragment describing a continuum of streamer figures. This is, in fact, another good example of the phenomenon linking material and space.

As in Escher's "Moebius band" (Figure 12) the external and internal surfaces of the band, are blurred. So our perception catches alternatively the harmonic sound and the white noise, without realizing when they are muted.

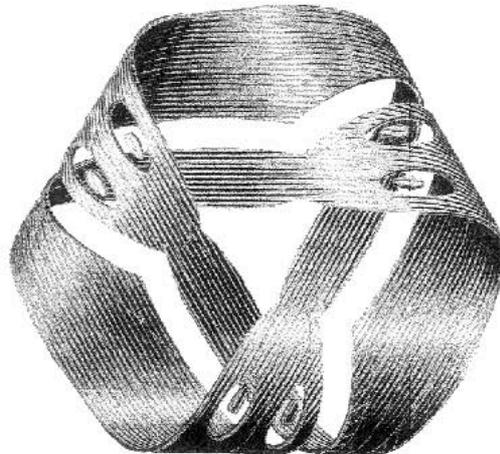


Figure 12

In these visual labyrinths the observer cannot establish whether he/she is seeing the internal or external face of the figure. In Risset's piece this notion of virtual space also leads to a reversing of perceptive phenomenon and at the same time it suggests a reflection on the symbolic sense of music. This notion of spatial architecture is present all throughout the piece *Elementa*. The whole piece is recorded in four tracks. This aspect, evidently contributes to enhance polyphonic structures and consequently also spatial aspect.

We will analyze two fragments of the first movement: *Aqua*. In the following scheme we can observe the first segment of 1'30, in which there are four levels of spatial depth, that we numbered from forward to backwards from 1 to 4. Events of different density are superposed and interwoven. Some of these events are in six plans of space, others move into right/left and forward to backward trajectories, simultaneously.

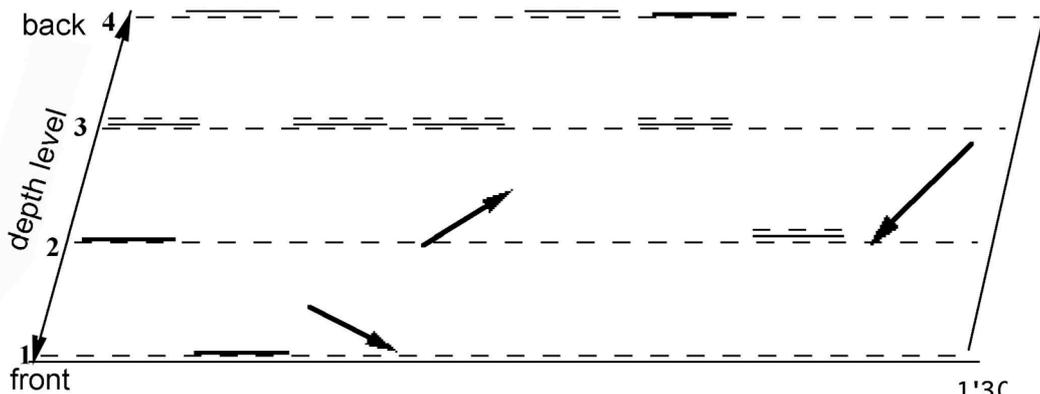


Figure 13 After one region of great activity there is a release and then a new moment of shaking (between 2' and 3'30)

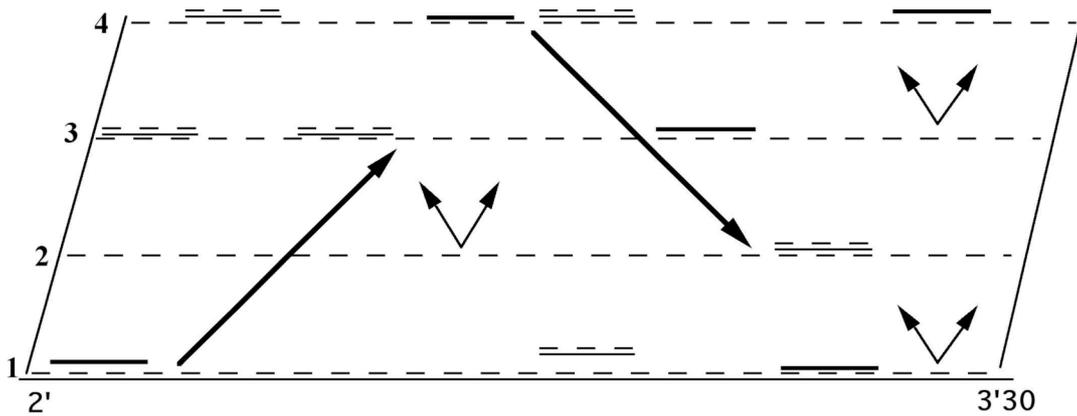
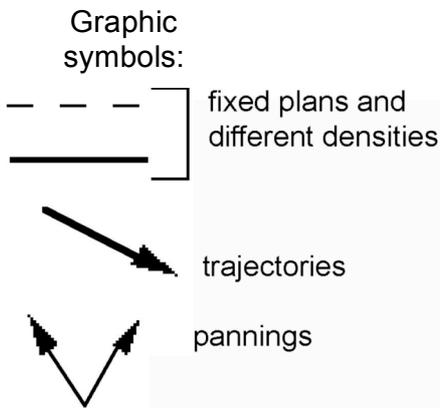


Figure 14



The diagram shows the complexity of the fragment where long trajectories cross events at different levels. At the same time, events on fixed plans placed in the center of the scene, are juxtaposed to textures embracing a larger panoramic field. All these elements added to material diversity of the fragment, let us imagine the richness of texture and movement of the piece. The moving character of both space and material, interwoven, can be compared again with functions of figures and backgrounds in Escher's engravings. The ear, as the eye, has a tendency to fix on a precise object, leaving in the background all of the surrounding.

Figure 15 can be an example of graphic representation for the movement Aqua.

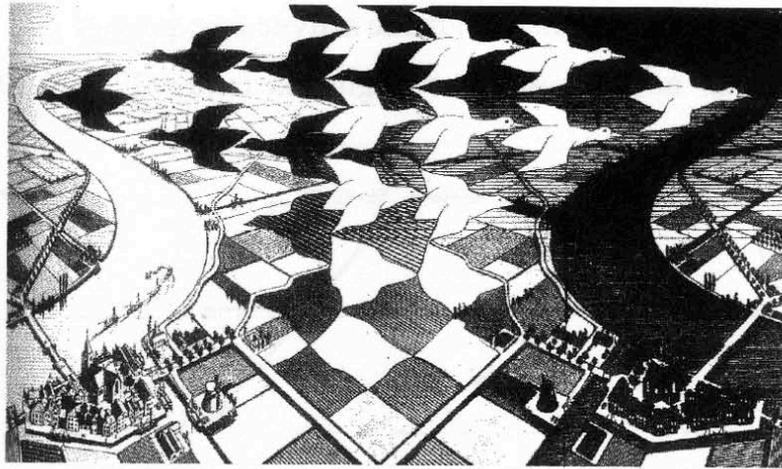


Figure 15

Day and Night: (1938) "At the top of the image, the gray rectangular fields become figures of black and white birds. Black birds fly to the left and white ones to the right in two opposed rows. On the left of the image, white birds fusion to become the light of the day and at the same time a landscape. On the right, the black birds become the night. The clear and dark landscapes constitutes the inverse of the other and they are linked by the gray field that become again birds."

Space of performance

The French school of acousmatic music has given one of the first models in real time spatialization, with the systems Cybernophone and Acousmonium. This type of system, composed of multiple loudspeakers, allows the composer/performer to "color" and spatialize the diffusion of electroacoustic music. In this way, the disposition contributes not only to ornament to the music but also to go deeply in the sense of the work. Nevertheless, this type of system is not convenient for all kinds of music. For example, in the piece "Turenas" de J. Chowning [12] needs four identical sound sources, with flat phase response and a minimum of intermodulation distortion.

In any case it is necessary to consider several conditions, such as; the quality of loud speakers, the form and size of the hall, the absorptive surfaces and the regulation of diffusion mechanisms. If all these conditions are adequate, the diffusion can enable the realization of spatial figures, and produce important changes into the musical texture.

It is important to note that the reverberation is a very important element in the structure of electroacoustic music. So, the composer must take care of the influence of hall reverberation at the moment of using it. The combination of both reverberations can be a disconcerting element for perception. It would be interesting if the composer could study the hall characteristics before beginning the composition.

Readingness of space

All these reflections give us an idea of the interrelation between internal and external spaces. If we can say that the projection contributes to a better "reading" of musical structure, it is important to know that this "reading" is related to the perception phenomenon and to the acoustic conditions.

As an example of these interrelations we can mention the studies on timbre by Risset and Wessel. The phase difference between two spectrally identical sounds, for example, is one of the problems for the "reading" of projected sound. It is very well known that two sounds of the same timbre and harmonic amplitude, may have a phase difference from the acoustic point of view, that is not perceivable by the ear.

The research by Mathews, MacAdams and Deutsch [13-14], among others, on separation of auditive flux, had allowed us to establish models of perception behavior, which enables us to clarify some aspects of musical prosody.

The composer should be able to govern this type of phenomenon such that a discourse is perceptible. The tools of analysis and synthesis can help, even if they are not absolutely perfect.

We believe that a collaborative and interdisciplinary work between scientists and artists will be important to resolve these conflicts.

Aesthetics of space

The last point, but not the less important, is the esthetic of space. All throughout our paper we have mentioned

the word structure. It means that we have penetrated the esthetic domain. In fact, in the spatial conception there are two dimensions: the acoustical and the musical. Between both of them it must exist a transmutation able to create a consolidation of musical discourse. It means that we must consider two correlation factors:

a) the interaction between the components of emission, that is source parameters (such as timbre, duration, amplitude), and the propagation conditions (the hall characteristics such as reflection, distance, reverberation etc).

b) the implication of these factors for the structural organization of music. That is; the awareness of these external interactions in musical project. On the other hand, spatialization can be used as:

1) An esthetical ornament; we can mention the examples of circular trajectories and revolving effects in Little Boy of Risset or in Gesang der Jungling of Stockhausen.

2) Or as a construction element; in this sense the knowledge of physical reality of sound material is important to obtain the most interesting spatial effects.

3) Or still as metaphor in order to create sound images, as in anecdotal music tendency. We can add to those conceptions the criteria of those who attribute to diffusion an aesthetic function. They consider that it is during the performance that the work takes its real sense because it is re-composed and loaded of sense by means of interpretation.

Conclusion

We have shown, by all these assertions, that composers, in spite of their conceptual divergences, stay loyal to the final objective: the musical work. The different points of view in relation to space or to its operational form or even to its aesthetic function, are only theoretical deviations over one single plan.

Acknowledgments

Thanks to all composers mentioned in this paper who authorised us to publish the analysis of their pieces.

References

- [1] Savouret, Alain: "Sonate Baroque" - Chrysopée électronique-Bourges, Harmonia mundi, LDC 278 1101 - 1993
- [2] Ferreyra, Beatriz: "Petit Poucet Magazine" - Chrysopée électronique - Bourges, LDC 278 1109-1998
- [3] We have used mostly FFT analysis by sliding windows, in 2048 window size and 256.000 steps.
- [4] Risset, Jean-Claude: "Computer suite from Little Boy" - "Music with computers" Wergo 2013-50 - 1988
- [5] Risset, Jean-Claude: "Extraits de Little Boy et Mutations" - CD in Actes de l'Académie de Bourges, Edition: Mnemosyne - 1996
- [6] Shepard, Roger: "Le son musical" Ed. Pour la Science, Paris, 1984, et in Richard Moore "Elements of computer music" Prentice Hall, New Jersey, pp.221-226, 1990.
- [7] Vaggione, Horacio: "Transformations morphologiques para analyse/resynthèse" in Actes II de l'Académie de Bourges, 1996.
- [8] Truax, Barry: "Le symbolisme électroacoustique dans Powers of Two: The artist", in Actes de l'Académie de Bourges, 1996
- [9] Zanési, Christian: "Arkheion, INA-GRM (INA e 5001), 1996
- [10] Risset, Jean-Claude: "Elementa", recording given by the composer himself, 1998
- [11] Escher, Maurits: "L'œuvre graphique", Benedikt Taschen Verlag Berlin GmbH, 1990
- [12] Chowning, John (Turenas)
- [13] MacAdams et al.: "La musique et les sciences cognitives" Pierre Mardaga éditeur-Bruxelles, 1989
- [14] Deutsch, Diana: "Grouping Mechanisms in Music", The Psychology of music, Academy Press Inc., 1980

Une nuit blanche pour savourer le son pur de l'acousmatique

LE MONDE | 09.07.08 | 15h55 • Mis à jour le 09.07.08 | 15h55

La Saline royale d'Arc-et-Senans (Doubs) accueille le 12 juillet pour la septième année consécutive la Nuit bleue, rendez-vous important des musiques électroacoustiques. Le genre acousmatique y est particulièrement présent, avec un concert nocturne de sept heures. Le terme "acousmatique" ferait référence à Pythagore qui, au VI^e siècle av. J.-C., délivrait son enseignement derrière un drap et dans le noir afin que ses élèves se concentrent sur son discours.

Consultez les archives du journal, tous les articles parus dans "Le Monde" depuis 1987.

Abonnez-vous au Monde.fr : 6€ par mois + 30 jours offerts

SUR LE MÊME SUJET

Forum Musique

Grâce à l'acousmonium, multitude de haut-parleurs permettant au son d'envahir un espace qui en devient presque virtuel, la musique submerge l'auditeur.

Confortablement installé sur un transat ou un matelas, celui-ci peut se concentrer sur l'écoute du "son pur" tout en appréciant le cadre de la Saline royale, chef-d'oeuvre de l'architecte Claude Nicolas Ledoux (1736-1806) classé depuis 1982 au Patrimoine mondial de l'Unesco.

Car la musique acousmatique est une musique "de l'intérieur", selon l'expression d'Elsa Justel, artiste argentine invitée de la Nuit bleue. La musicienne de 64 ans parle avec passion d'un art qu'elle pratique depuis toujours. Elle a 20 ans quand elle entend pour la première fois une pièce d'Edgar Varèse, *Poème électronique*. Nous sommes en 1958, c'est la révélation. L'artiste quitte son Mar del Plata natal pour Buenos Aires, où sont dispensés les premiers cours de musique électroacoustique. Ce genre improbable, né en 1948 à la Radiodiffusion-Télévision française dans les studios de Pierre Schaeffer, le père de la musique concrète, travaille les sons, les dématérialise pour "qu'au cours des expériences, les choses se mettent à parler d'elles-mêmes, comme si elles nous apportaient le message d'un monde qui nous serait inconnu", écrivait Schaeffer en 1952.

"RÉSIDUS DE LA PAROLE"

A l'époque où Elsa Justel commence son apprentissage, les bandes magnétiques sont coupées puis collées un peu au hasard à la recherche d'un son intéressant. A la fin des années 1970, elle achète son premier synthétiseur numérique, peu avant de partir en Allemagne pour un festival. Là, on lui conseille de tenter sa chance en France, où la musique acousmatique est florissante.

En 1986, elle entre dans le Groupe de musique expérimentale de Bourges, où sa carrière décolle. Elle collectionne les récompenses, donne des conférences, compose pour des confrères. En 2007, elle crée, à Mar del Plata, la Fondation Destellos afin de favoriser les rencontres entre les artistes de cette musique. L'association a récemment organisé un concours acousmatique dont les oeuvres lauréates, sélectionnées par un jury international, seront jouées pendant la Nuit bleue.

Entre-temps, l'artiste s'est mise à l'ordinateur, qui lui permet de faire "des sons propres, des silences absolus, sans le bruit de la bande en fond". Mais l'inspiration est restée la même : "Les idées musicales sont toujours dans la tête, nous n'avons pas besoin de machines pour nous aider. Jamais la machine ne doit prendre le contrôle sur le travail", explique-t-elle. Cette inspiration, elle la tire de bruits naturels, bois qui craque ou verres qui s'entrechoquent, jusqu'aux "résidus de la parole" qu'elle puise malicieusement dans les émissions de radio.

Après avoir été analysé, le son est détourné de son contexte conventionnel, comme l'artiste le fait du bruit de cordes de guitare frottées à la lime à ongles qui sert de base à la pièce *Bastet*, qu'elle présentera à la Nuit bleue. Il y flotte une subtile sensation d'insécurité, "à l'image de la vie quotidienne".

Festival la Nuit bleue, Saline royale d'Arc-et-Senans (Doubs). Le 12 juillet de 21 heures à 7 heures. De 9 € à 14 €. Sur Internet : www.nuit-bleue.com.

A noter, par ailleurs, deux autres grands rendez-vous de la musique acousmatique, le festival Futura, à Crest (Drôme), du 21 au 24 août, et L'Espace du son, à Bruxelles (Belgique), prévu du 16 au 18 octobre.

Mélanie Bulan