مجلة أنساق

Middle East Institution of scientific Publishing

Ansaq Journal for arts, literature and humanities
Artistic Media and Musical Discourse: Toward Defining the Relationship between Technical, Symbolic, Artistic, and Aesthetic Dimensions
2025 (233-253)

Acousmatic music face to artistic media and musical discourse

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Published on: 28 March 2025

ABSTRACT

For years, sound art has felt an innovative axis of research and experimentation, the aim of which is to perfectly reproduce the sound reality and enrich the listener's auditory experience. This was marked by the emergence of new technologies in the field of sound, and subsequently the emergence of new profiles and new playing techniques. In this article, we combine interdisciplinary work merging new technologies, sound immersion and human sensitivity, namely acousmatic music: live captured sound, then reproduced and broadcast by a real-time interpretation via an orchestra of loudspeakers. It is a mediatized experience. This is where 'acousmatic art' is positioned: a way of expression close to the perception of a blind person; considered as 'an art of interpretation'. The idea of manipulating sound, creating new sounds, reproducing perceived sound reality, playing with speakers, synthesizers, microphones, manipulating a highly amplified voice, has always appealed to us. Indeed, an acousmatic work combines the filmmaking techniques of cinema with those of music, by bringing together artistic media and musical discourse. It is explored at the heart of the overlap between the technical, symbolic, artistic and aesthetic dimensions of these two disciplines. This article explores the links that exist between these two supporting arts 'cinema' and 'music' in

order to better understand this field and better guide others who would share the same concerns as us. Through a documentary research method, we have tried to provide a guide translating the different rules and theoretical and technical notions on which acousmatic music is based, while starting from a rich and critical terminological study.

Keywords: Acousmatic music, installation, spatialization, interpretation, immersion, sound art.

*** Introduction**

Recently, a tendency to want to reproduce reality perfectly has emerged. Like the 3D image, 3D sound has also appeared: sound captured live, then reproduced and broadcast. This is considered to be a form of virtual reality sound, which is defined as a mediated experience capable of evoking a sense of presence. (Bouvier, 1999). Certainly, sound does not need an image to recreate reality and stimulate the imagination of a listener. It is also possible to tell stories and stir up the imagination, only with the sound of the voice. Sound without images can then be considered as a vector of imagination and a carrier of narrative.

Our reflections have revolved around sound art, which is more important to us than the sound itself. This art is part of the field of "acousmatics", a term that is increasingly emerging to designate an "art of fixed sounds", an art that goes in parallel with cinema and music. It is considered "an art of interpretation", called: the "acousmatic art". Thus, the idea of manipulating sound, creating new sounds, reproducing perceived sound reality, playing with speakers, synthesizers, microphones, manipulating a highly amplified voice, has always appealed to us. We strongly believe in the magnificent potential offered by today's means of manipulating and organizing sounds.

Many questions resonated in our heads, concerning the names and disciplines that revolve around acousmatics: acousmatic music, acousmatic or cin-acousmatic cinema, concrete music... During our research, we noticed an important interdisciplinarity between them, so we undertook to explore the links that exist between these two supporting arts "cinema and music" in order to better understand and shed light on our own project design process and also to report on an approach that could guide others who share the same concerns as us.

*** WHY**

Through a documentary research method, we have tried to provide a guide translating the

different rules, theoretical and technical notions on which acousmatic music is based, while starting from a rich and critical terminological study. This is in order to answer our research question: -

*** Research question**

How can acousmatic music combine the technical, symbolic, and aesthetic dimensions in the field of sound-musical art?

*** Acousmatic**

1- Origin and terminology: The word acousmatic, from the Greek akousma, "refers to sounds that are heard, but whose source is not seen" (Chion, 1983, p.18). This concept was developed by Pythagoras who decided one day to create a new method to promote the concentration of his students: by exposing his speeches while hiding behind a black curtain. According to Pythagoras, not seeing the source of a sound emitted can ensure better observation and thus improve the skills and concentration of his students. According to Bayle (2007, ~ 2): "In his treatise on musical objects, published in 1966, Pierre Schaeffer (191 0-1995) uses the term acousmatics and links it to reduced listening: 'The tape recorder has the virtue of the Pythagorean tapestry: if it creates new phenomena to be observed, it above all creates new conditions of observation'." Where does the general definition of the word acousmatic come from as being a sound that is heard without seeing the source that is responsible, as also defined by the French dictionary: acousmatics "is said of a music or a sound that one hears without seeing who produces it". Deshays, a Parisian sound engineer, (1999, p.94) adds: «Acousmatic listening revolutionises our relationship with sound».

Phythogore, with his 'behind the curtain' method, inspired Pierre Schaeffer to come up with an original innovation aimed at combining electroacoustic techniques with the world of acousmatics: sound captured then broadcast; from microphonic recording to the invention of sounds, using synthesizers and sound manipulators, right through to listening to them via loudspeakers. This art form, the art of fixed sounds, was celebrated in the 1940s as acousmatic art under the name of 'musique concrète', a musical genre made possible by electroacoustic techniques, then developed by François Bayle in 1973 for its understanding as 'acousmatic music', sometimes he spoke to us of 'sound images' and other times of 'fiction of sounds'. So, for us, acousmatics is defined as any acoustic sound, concrete, captured, recorded,

broadcast or not, whose sound source cannot be seen, and which can stimulate the listener's imagination through an abstract mental image provoked by the real sounds captured and their so-called 'imaginary-abstract' surpassing: modelled, shaped, unreal sounds. We have seen that the integration of mediatisation has led to the distinction between two types of acousmatics, each distinguished from the other by the nature of the sound source «[...]either the origin of the invisible source is not mediated by any sound reproduction or amplification system, in which case it is said to be acoustic, or it is heard through a microphone, in which case it is mediated.» (SCHAEFFER,1966). So there is 'acoustic acousmatics' and 'mediated acousmatics'.

The composer of musique concrète or acousmatic music, the person who performs the work, works directly with the recorded sounds, which he shapes himself by listening to them through the loudspeakers, via the electroacoustic system of his sound studio: from the studio, to the finalisation of a sound work composed, edited, mixed... for a fixed duration, just like cinematographic art; considered, once completed, as an autonomous fiction. At a public concert, the darkness of the broadcasting room offers a blind listening experience that seems conducive to the generation of the imagination. But, of course, the term acousmatic does not preclude the diffusion of sound in light or darkness. As a result, an acousmatic work can be associated with visual elements: lights, plastic installations, scenery, etc., so that the listener can look at it or listen with his or her eyes closed. So the acousmatic performer is now essential for a coherent spatialization of the work: it is a multi-phonic writing describing the subtlety of sono-fixation; that is to say the spatialization of loudspeakers or 'sound screens'; with its sound projection console, which is generally located in the auditorium or, more rarely, on stage.

2- Linking acousmatic art, 'music' and 'cinema': Acousmatic art has a long history, dating back to its first festivals in 1992, 'Futura, festival international d'art acousmatique et des arts de support', founded by Robert Curtet, Denis Dufour and Jean-François Minjard in Crest in the Drôme. Very quickly, the founders wanted to bring acousmatics closer to other disciplines with a similar production approach, such as experimental cinema, photography and the visual arts. In fact, they believed that there were many

possible links and mutual gateways between practitioners of acousmatic art and those of other art forms, as well as their audiences, without, of course, straying too far from the concrete approach.

Thus, in the light of all the reasons mentioned above, the term ‘acousmatic music’, which generally encompasses all the definitions properly linked to ‘acousmatic art’, has been chosen to embody part of the concept of our approach by proposing to merge it with the term ‘cinema’, to describe what can be represented by immersive narratives of dynamic sounds in motion. Indeed, many articles have drawn parallels between a certain approach to acousmatic music under the name ‘cinema for the ear’. They proposed combining constructive elements of cinematographic language with acousmatic language in order to develop a better manifestation of the latter. Especially in terms of how to approach its development, in terms of scriptwriting, pre-production, production, post-production and broadcasting. Robert Normandeau (an electroacoustic music composer living in Montreal, Canada), in his book ‘Le cinéma pour l'oreille’ (1993, p.ll7), sought to bring acousmatic music closer to the notions of cinematographic language, under the name ‘acousmatic’, an art form according to him, he affirmed that «The term acousmatic is becoming more and more widespread to designate an art of fixed sounds closer to cinema or video, arts of temporal support, than to music, an art of interpretation.» ((Normandeau, Robert 1993); but still referring to music, he adds that «The main objection made to the cinema/acousmatic parallel relates to the narrative» (Normandeau, Robert 1992). This vision is important, because it is constructive for a new understanding of the term ‘acousmatic’, considered here as an independent art form in its own right, linking the narrative language of film with musical poetry; not just a type of music. Hence the immersion of the new term ‘acousmatic cinema’, which has just become established in the wealth of terminology noted in the field of acousmatics: musique concrète, acousmatic music, and also acousmatic cinema or cinacousmatics.

For us, this terminological mutation observed in the field of acousmatics leads to a broader, almost common definition, indicating that it is an art of fixed sounds, a temporal art, aiming to insert the: cinematographic language into acousmatic music, or musical

grammar into acousmatic cinema, while respecting a concrete approach to interpretation, accompanied or not by plastic installations. In fact, the absence of the image isolates it from cinema and audiovisuals, and the narrative aspect distances it from music, while the editing and mixing of sounds distances it from theatre. It is therefore an 'acousmatic art' form in the strict sense of the word, and the term cannot be used to describe its originality and identity. That, in our opinion, makes it original.

3- Acousmatic art: from sound to music: This new, lively, expressive musical genre often takes basic notions as its starting point: parameters of pitch, duration and intensity. They allow composers to draw on the material of sound to create their works, using an appropriate sound device, chosen and organised by going through several stages: Recording, sampling, transformation, sound synthesis (a set of transitions, articulations and sound movements), and finally meticulous work on spatialisation (staging the sound orchestra) for sound projection in concert (live performance work). In the following diagram, we have tried to outline the different stages in the creation of an acousmatic sound work : from acousmatic acoustics (capturing sound on film) to mediated acousmatics (in live concert).

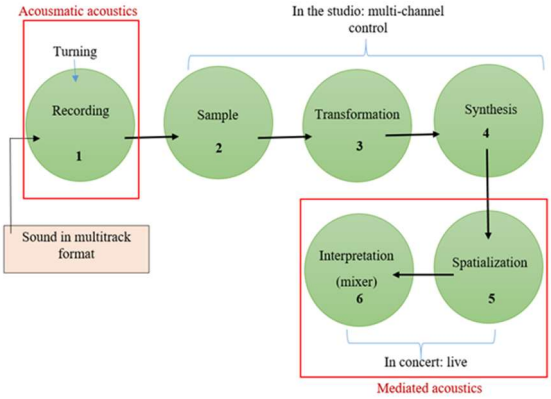

Figure 1: Stages in the implementation of an acousmatic sound design: from acousmatic acoustics to mediated acoustics

From the figure above, we can deduce that 'acousmatic' sound creation differs from studio sound creation (stages 1 - 2 - 3 - 4) in its interest in spatialisation and interpretation (stages 5 and 6), where the space of the room reinforces the expressiveness of the work. The word 'spatialisation' obviously refers to the location of an auditory stimulus - an audio signal - in space. It is naturally linked to spatial form. Spatialisation and interpretation are only possible with the help of audio supports (magnetic tape, computer file) which are already audible only through loudspeakers. We would therefore point out that a sound work is only said to be acousmatic if its performance in concert is produced live, where the composer-performer takes responsibility for its own spatialisation. As described by the

acousmatic composer and professor of electroacoustic composition Jonathan Prager «Making an acousmatic concert a real artistic event means attracting audiences with a show in its own right.» (Prager jonathan, 2014).

*** Meeting the public**

The aesthetic choice of the performer's intervention: project, sound materials, structuring, internal space; is justified by several elements: Technical, perceptive, social and aesthetic. In fact, the concert requires several rehearsals, in order to take a step back from the work and test the possibilities of experimentation: implantation, filtering, playing at the console, etc. Jonathan Prager, in his book 'interprétation acousmatique' (acousmatic interpretation) proposed a specific practice for any interpretation of the acousmatic genre to be seen: * Diversification of listening points (by speaker pairs): to ensure good spatial distribution and the right balance of sound in real time. * Perfecting the new instrument: Acousmonuim, a set of loudspeakers controlled from a console via filters and amplifiers.* Tuning the instrument: depending on the acoustics of the venue, the chosen spatialization plan (implantation) and also the multiphonic work (multi-track)

1- Acousmatic interpretation: To interpret is to make clear, to transmit, to translate, even to edit. For the acousmatic interpreter, it's a question of an original, personal and sensitive rendering, with an emotional, intellectual and spiritual quality, enriched by the relationship maintained with the audience in real time. Guided by a 'graphic statement' or text (with chronometric reference points), the composer has the work 'in his head' and projects his concrete work in front of the audience through the projection device known as the acousmonium (sound encounters of different colours and powers or, on the contrary, unified and coherent according to the conception chosen by the performer). This is what is known as 'interpretation': the choice of location, sound spatialisation, tuning of intensities and colours, filtering, etc. This is the moment of the live performance, The figure below shows a summary diagram tracing the audio chain in acousmatic

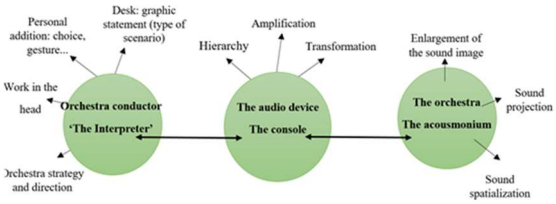

Figure 2: the audio chain in acousmatic interpretation

This concrete/live practice of what researchers used to call 'sound

projection' has now become widespread, initially in French-speaking countries (late 1970s and early 1980s), then in Europe and several Latin American countries, Japan, etc. One of the oldest acousmoniums is shown in Figure 3.

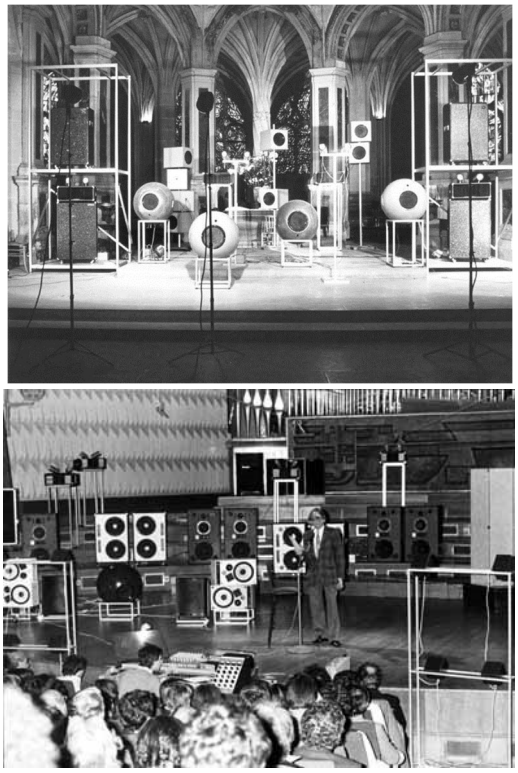

Figure 3: Pierre Schaeffer's acousmonium

2- Acousminium: Like a cinema film, an acousmatic work needs to be projected in order to be appreciated in all its spatial and imaginary dimensions. Immersion in the projection space plunges the listener into the heart of the expressiveness of the work, detailing it, revealing it, and enriching the audience's perception of a wider dimension, through the choices of location, the paths of sound in space, the layering of planes, the play on filtering and intensities defined by the performer in his acousmonium. François Bayle defined the term 'acousmonium' in 1974 as an instrument for staging the audible, a device consisting of a set of 'sound projectors' orchestrating the acoustic image, a far cry from the idea of sound reinforcement. A series of multiphonic 'sound screens', varied in size, distance and direction, and distributed throughout the acoustic space according to the conditions of the hall and the work: creating tutti and solos, nuances and contrasts, reliefs and movements. The performer at the desk becomes the designer of a living orchestration, responsible for specifying the nuances, contrasts and colours, the mass effects and solos, the relief and, of course, the spatial layout, with its kinetic effects, its near/far, left/right movements, and so on. This requires rehearsal, concentration and a perfect knowledge of the acousmatic work, which acquires a real second life in concert, impossible to reproduce by listening to a record alone.

3- The main basics: The acousmonium is the instrument used for auditory projection and spatialization of acousmatic works in concert, and is made up of two main elements: the orchestra of loudspeakers (generally grouped in

pairs) and the spatialization (projection) console, see figure

Figure 4: Essential components of an acousmonium

Technically speaking, the system is pretty simple: the stereophonic signal coming from any audio support (analogue or digital), would be demultiplied into two channels, each with an independent channel on the console, processed and modified by a set of potentiometers and adjustment instructions (fader), and finally emitted through a pair of loudspeakers (after being amplified). It's the same logic as the mixing desk, but it should be noted that our spatialization console (sound projection) works in reverse: Obviously, the master fader is essential in order to be able to act very quickly on the total power of the acousmonuim when playing and the general contour of the dynamic variations (accentuation), as well as to correct technical hazards (saturation, level...), but in our context we're not talking about a classic master, rather the master must be installed in front of the signal input. So the mixers available on the market must be modified for use in an acousmonium; it's an instrument in its own right. In technical terms, we call the diffusion path the entire electro-acoustic chain from the physical input of the console slice to its corresponding loudspeaker. The following figure shows the electro-acoustic chain of an acousmonium containing two diffusion paths for a single stereophonic input signal, with two possible signal path circuits one via the auxiliary (the bus, the number of buses is limited depending on the console) and the other via the master (used only once as a bus).

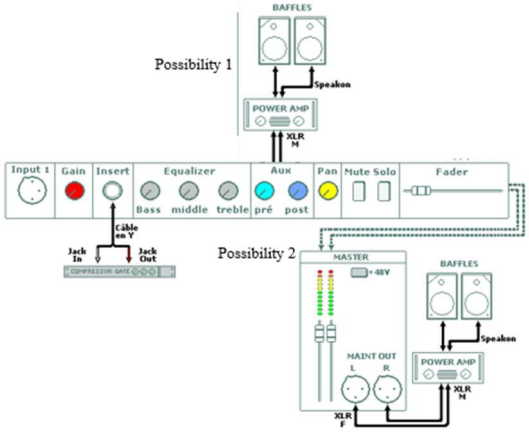

Figure 5: Electroacoustic chain of an acousmonium

* Geography of Spaces

1- The Speakers: To guarantee refined play, a large number of loudspeakers are required, as we mentioned earlier. So we need to explore the most important basic technical characteristics, namely: -

1- The power: varies according to the distance from the audience and the requirements of the work.

2- nuance: For a rich stereophonic performance, it is essential to have a wide variety of loudspeaker colours. There are two main categories: Les enceintes ‘large-bande’: reproduisent tout le spectre des fréquences.

Coloured' loudspeakers: broadcast a single part of the spectrum. They specialise in a given frequency band. We generally find : ‘bass’ (double bass from 10 to 400Hz in very wide stereo covering the whole field of the room or in the centre if there is only one subwoofer), ‘hollow midrange’ (from 250 to 1000Hz, fill the space), ‘clear midrange’ (400 to 3000Hz, responsible for maximum audibility, particularly the human voice), ‘brilliant midrange’ (3000 to 8000 Hz, reinforcing the presence and microscopic life of sound beings), ‘highs, and over-highs’ (8000 to 16000 Hz for better localisation of an ensemble placed far away) and we also find : infra-bass, low-midrange, high-midrange... The narrower the frequency band, the stronger the sound colours.

2- The implantation (in the concert space): We are talking here about the distribution and geographical positioning of the loudspeakers; many factors linked to the concert venue influence this distribution: size, volume, access to the hall; also the number and characteristics of the loudspeakers available. In his search for a ‘model’ for the most universal layout possible, Jonathan Prager has proposed: -

*** Crowns: Centred screens**

Like the traditional stereophonic listening model: two full-range loudspeakers aligned symmetrically in relation to the central axis of the room, on a linear listening plane. We distinguish between:

a- reference screen shots: frontal et à écartement modéré, permettant une reconstitution proche de l’écoute de studio

b- power screens: At different distances from the board, with the widest spacing, to obtain a sensation of spatial amplitude, with the greatest diffusion power (strong nuance).

c- local screen shots: Close enough to the listeners, with the smallest spacing, to create a contrast in distance with the previous ones.

With these two types of surround: large surround (power screen planes) and small surround (the first is just a special case of the third), we can play with the distance to the audience (approach / distance), reinforce spatial punctuality, highlight the sound design by choosing different geographical positions of the loudspeakers in

relation to the listeners: in front / to the side (lateral) / to the rear. The speakers can be used individually or in groups. It is preferable for them to be arranged side by side on the spatialization console.

*** Asymmetry**

Non-regular and slightly offset alignment, with a particular orientation of the loudspeakers on the same screen plane; this makes it possible to obtain the phase shifts necessary for good spatialisation. Hence the creation of virtual space.

*** Off-centre screens (effect1)**

Placed outside the listening axis, this placement provides surprise effects for the performer, which he may need for his composition.

*** Soloists (effect2)**

In the front position, a pair of loudspeakers positioned extremely close together, or even a single, isolated loudspeaker, generally receiving a mono signal. They highlight the solo moments in a work. They are effective for a single voice or a world of sound.

*** Support speakers (coloured1)**

Coloured in the 'bass/midrange' section, arranged diagonally and oriented indirectly: this amplifies the 'fill' effect

*** Precision / presence speakers (coloured2)**

Sound projectors specialising in the 'high end' are used to reinforce the sense of presence and proximity; positioned fairly close to the audience.

*** Diagonal planes and crossing pairs**

Pair of speakers positioned diagonally (front/left, rear/right), reinforcing the sensation of virtual space. Technically, all you need to do is open a left speaker belonging to one screen plane and another for the right channel from a different screen plane.

To bring out the diversity of colour, direction and proximity, good management of the orientation and inclination of the loudspeakers is necessary, so it is important to tune the acousmonium 'spectral correction' by testing the acoustic reaction of the space, in a seated position and at different points in the room. In the following figure we have tried to put all the above theoretical points into practice, using an example of a real event: the Motus acousmonium for the Futura 212 performance course (August). The figures show successively: the layout of the acousmonium (55 sound projectors) and also the corresponding distribution of

channels at the spatialization console (48 broadcast channels):

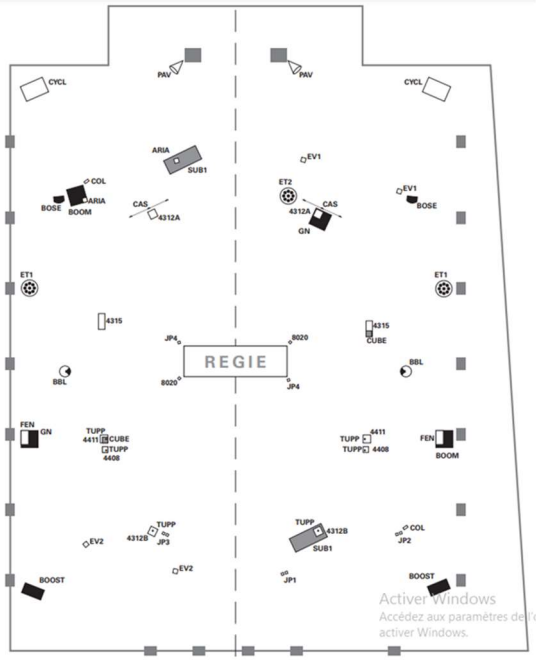

Figure 6: Implantation of the Motus acousmonuim, Futura 2012

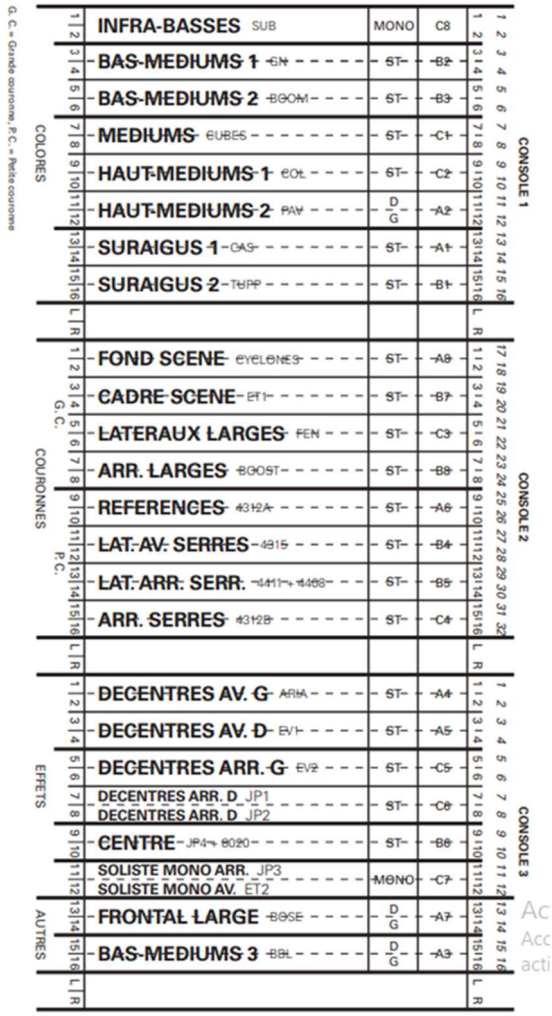

Figure 7: Channel allocation at the Motus Futura 2012 acousmonium projection console

Generally speaking, the left and right channels of the rack are systematically grouped by pairs of loudspeakers on the faders, regardless of their position in the room (except for the solo loudspeakers, which are an exception). After that, clearly registering the loudspeaker on the console, marking the coloured faders and grouping the loudspeakers into functional groups based on parameters (usefulness, frequency of

use...), makes performance much easier.

Assigning speakers to faders is generally done in the following way: -

1- large crown G.C.: most used, placed in the center of the control room (console), with faders grouped together (from 17 to 24)

2- Small crown P.C.: frequently used; placed to the right of the large crown (fader 24 to 32); faders grouped with the same pattern as the large crown.

3- 'Special effects': the off-center HP, placed to the right of the small crown, then we find the faders corresponding to the solo speakers (stereophonic and central or monophonic at the front or back)

4- Colorful: assigned to the first knobs of the console, distributed from the bottom to the top of the spectrum.

5- General potentiometer: It is a single, dual-channel fader, located at one of the two ends of the console (usually on the right).

Certainly, it is necessary to remember to locate the potentiometers by a very schematic sketch, placed above the potentiometers, to clarify their corresponding geographical location.

*** Acousmonium tuning and type of spaces**

*** Tuning**

Before starting the rehearsals, it is essential to finalize the tuning of the acousmonium, through the following adjustment steps: -

1- Filtering and spectral corrections: With the help of pink noise, the frequency of each pair of speakers is corrected, by spectral correction ('EQ)* Optimization of the signal-to-noise ratio. The reference sinusoidal signal (1KHz) is used to calibrate all the inputs of the console.

2- Balance the general power of acousmonium: It involves adjusting the level of the amplifiers, in relation to the pair of reference speakers with a broad-spectrum test signal (such as pink noise) and correlated with the faders in the nominal level position (number zero on the potentiometer). Reference excerpts from the work must also be tested.

3- Balancing, improvements: Have the freedom to slightly modify the initial placement of the speakers according to the playing needs (after the first attempts).

*** Categories of spaces**

1- Surround Sound Space: It is a space in which we cannot determine where the sounds come from: the listener is immersed in a diffuse atmosphere, it is his listening that

carries out the 'mixing' of the given events heard. For surround sound broadcasting, we find identical speakers with a relative equidistance between them so that there is no acoustic hole. This is done on all planes (the sphere is the ideal model), or on a single one: the circle.

2- Source space: Quite the opposite of the previous one, this type of space precisely locates the source of the sound: it can be mono, bi- or multi-track, but not stereophonic (it is the movements and the cues of the sound that matter). For this type of space we find a facade covered with loudspeakers all located on a single plane, in width and on several floors in height with total symmetry. For console assignment: The left channels are on the left and on the right channels are on the right. This arrangement allows for vertical or oblique mass or pointillist movements. As is the case in the acousmonium presented in the following figure: -

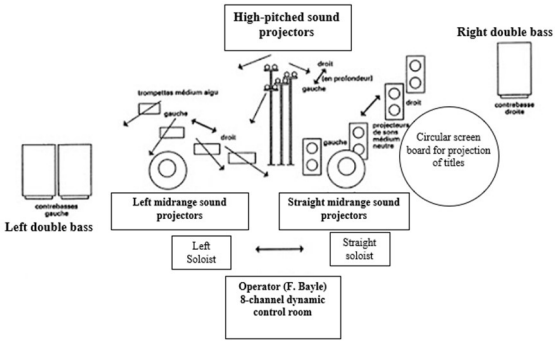

Figure 8: François Bayle's acousmatics, at the Espace Cardin in 1974 (The arrows on the drawing indicate the direction of the sounds).

3- Illusion Space: This is the illusion of depth of field through stereophony: respected from one end of the production line, then projected onto the 'phase screens' of the loudspeakers. There is therefore the creation of perspectives, by planes of depth which will be multiplied and highlighted by multiple phase screens (pairs of speakers). We are talking here about a stepped layout, close placement, medial, and a gauge of width differ, at least to very wide. The acousmonum Motus Futura 2012 (Figure 8) belongs to this type of space: The direction of the speakers in relation to the audience specifies or does not specify the contours, the crowns (large and small) are the leading edges of the sounds depending on whether they converge towards each other and towards the center, the presence of the audience, on the contrary, diverge according to whether they project the sound frontally; direct (HP. Directive:

projectors) or that they radiate sound towards reflective surfaces (HP. Indirect: radiators), they are aligned and symmetrical; responsible for the contour of the space (front, side, back). The special effects speakers are outside the axis of symmetry, neither aligned nor centered, they are distributed inside the sound frame of the crowns to give an effect of spatial illusion; the coloured speakers responsible for accentuation and presence with a non-linear repair (rarely centered and aligned, depending on the stakes of the work). The following figure shows an example of the distribution of colored speakers:

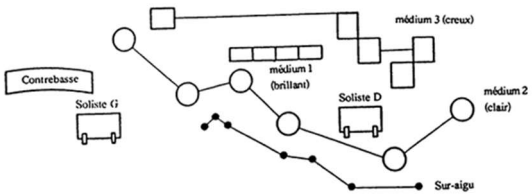

Figure 9: Nonlinear distribution of coloured encirclements

*** Acousmatic silhouette**

1- Analysis parameters: The analysis makes a point of observation and location for any acousmatic work, helps to determine the appropriate spatial arrangements and the necessary transitional functions. In our opinion, it is possible to identify two types of analysis: formal for all elements related to the space and general form of the work, and functional for transitional functions (functional partition)

a- Formal analysis: It is a question of tracing the general form of the acousmatic work, identifying the different zones (zoning), then the different articulations (transitions) desired. In his book 'Acousmatic Interpretation', Jonathan Prager described four broad categories of parameters of formal analysis: -

1- Nuance: Variation in intensity, dynamics, and sound power (volume)

2- Colour: Identify the particular area of the sound spectrum (wide/tight, low/mid/high)

3- Space: - Placement and relocation: mobility or not in the stereophonic plane

b- Distance: Stereophonic listening plan, frontal and distributed on either side of the listener. Use of several planes of different distances (illusion of depth)

c- Vertical density: Interplay between: single sound line / different sound layers.

4- Pulse: Horizontal density; Like the tempo, it gives a general idea of the speed of emission of the sound pieces.

At this level of analysis, it is therefore necessary to fix the general form of the work, identifying the desired transition-movements, the dynamics (volume), the nuance and

the colors to finally arrive at the distribution plan of the speakers (acousmonium) and the general tempo.

d- Functional analysis: To finalize a relevant functional analysis, it is essential to have in mind the different playing techniques corresponding to the different types of possible transitions (described in formal analysis) and the corresponding notations and symbols, in order to draw freehand a score symbolically grouping all the transitions while related to the axis of time.

*** Notations et symbols**

In this sense, the founders of this musical genre tried to describe the bases of notations leading the performers to a learned music with a system of symbolic notation allowing a better understanding of the relationships between the different elements. In the following figure we find a proposal for the notation of acousmatic music (p=profile): -

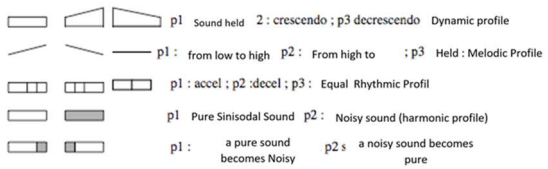

Figure 10: Proposal for acousmatic music notations

We can use this symbolic system sound by sound, it offers the same advantages as a score for musical analysis. Attached is an example of a handwritten acousmatic score:

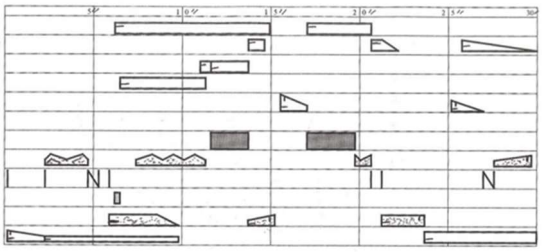

Figure 11: Example of a handwritten acousmatic score

We find that some sound units can have multiple functional roles at once. Let us summarize our point by stating that the listening score is a simple visual support that helps to identify functional units. It constitutes a pre-functional stage, a functional analysis of the work, by cutting perceptual structures in the sound spectrum (neutral level). Nevertheless, this functional partition must essentially be developed in direct relation to the level (volume).

In the following figure, we offer an example of a functional partition of an acousmatic work: -

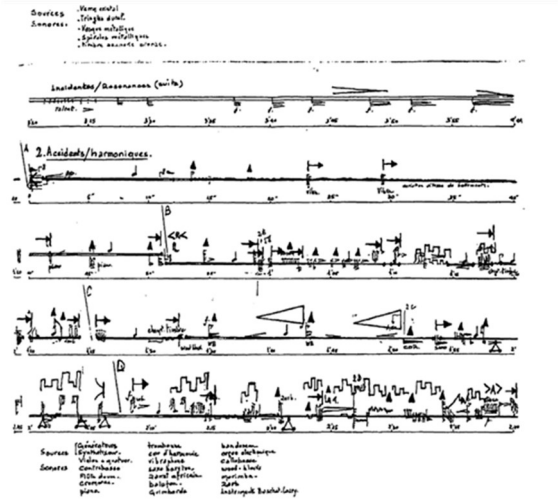

Figure 12: Pre-functional score for an acousmatic work

*** Playing techniques: Types of transitions and manipulations**

After structuring; The formatting of the work on the support (processing software: EXP Logic Pro), the performer is called upon to analyze and understand all the corresponding mechanical technical actions. Note that its mechanical access is the linear 'Fader' and the potentiometers

Figure 13: Mechanical tools of acousmatic interpretation: Faders and potentiometerspotentiometers

The electronic journal of the Centre d'Etude de Arts Contemporains – Université Lille 3, offers a list of possible transitions in acousmatic interpretation: -

1- The crossfade: Slow non-perceptible passage between two groups of speakers, without creating an acoustic "hole": gently raise the potentiometers of the speakers to be chained together before lowering the first ones until you find a point of balance. Musical function: Changing planes in depth or calibrating / tracing a path by successive fades (e.g. moving objects: plane, car, etc.)

2- Unmasking: Crossfade backwards: make the desired group heard by reducing the amplitude of a given mass or by removing the speakers. The gesture can be gentle or brutal (using mutes). Musical function: Reinforcing an unmasking that already exists in the medium / changing the shot in depth or caliber / imposing a sound path by successive unmasking with a starting situation is "tutti" (a mass that encompasses the audience)

3- Mass accentuation that includes the public): Highlight a very specific location, by the solo speakers or by a group of speakers forming a particular space: volume / by simply increasing the amplitude of the chosen speakers, without modifying the others. (The starting amplitude is necessarily granted at the beginning by the reference speakers (the main

ones), the pairs of speakers of the outer suburbs. This is done by slightly opening all the main potentiometers (providing the base) and then we accentuate well-targeted points according to the desired effect on the listener's perception by opening the potentiometers of the corresponding accentuation speakers. Musical function: Emphasis corresponds to a flexible and relaxed moment of playing on the console, also offers a more real perception.

4- Flicker: Rapid accentuation operations (also returning) by cascading a mass by a random play by modifying: the general amplitude in the acousmonium frame or the spectrum (by filtering), while maintaining continuity by open and fixed voices. Musical function: Digging into or accentuating slight dynamic or spectral fragmentations / Highlighting a pointillist moment of writing (micro-montage). open and steady voices.

5- Oscillation: Quick and regular alternation between two speakers or even two groups of speakers; dynamic (volume level) or spectral (frequency). This very fast regularity offers a "vibration" effect, but it is only possible on an automated console (an LFO can be used). Musical function: Agitation preparing an explosion that gives life to an expectation, a reflux.can be useful)

6- Swaying: Slow and gestural alternation between two speakers or even two groups of speakers; dynamic (volume level) or spectral (frequency). Musical function: Dialogue, lullaby, delimitation of spatial boundaries.

7- The wave: Round-trip journey treated by a set of crossfades or successive unmasking for a series of speakers in rows: example from the backstage to the front of the stage / all sides, or the back room and back. Musical function: Predictable moving/unidirectional mass effect.

8- Rotation: Circular path between four speakers on stage or around the audience through a slight crossfade between them. Musical function: Internal Sound Rotation / Motion Creation / Feeling Locked In

9- Spiral: Trajet circulaire avec une accélération ou décélération et un point d'aboutissement ailleurs. Musical function: Announcement or goal-oriented (or concluding) journey

10- The rebound: Rapid jump from one point to another in space; or from one group to another; from a soloist to a group; and vice versa. Through a fast alternation or mute at the console more effectively perceived for speakers further away. Musical function: Sound Trigger/Switch to

Another Spatial Area Without Transition

11- Insertion - Break: Abrupt passage or suspension by "demute" from one space to another space of different caliber or character (e.g., inserting a solo of narrow directional caliber into a wide and diffuse mass. Musical function: accentuation of the insert reading on the support / sudden deviation towards another state by the break.

12- The appearance – disappearance: Irruption – closure of a different spatial state, through the use of "mutes". Musical function: Magic, surprise

13- The explosion: Abrupt transition from a tightly packed, directional space to a wide, non-diffuse, environmental space. Musical function: Eruption, energetic characteristic.

14- Accumulation: Addition of shots on top of each other until we arrive at a spatial "tutti". Musical function: Progressive magnification of a frame.

15- The invasion: Rapid accumulation with a public-facing ride. Musical function: Subjective aggression effect, such as the arrival of the bus.

In this part, we observe a strong link between the implementation of analysis and the exploration of game and manipulation techniques. A careful analysis of the work can therefore help to identify the appropriate playing techniques and consequently the appropriate spatialization: hence the chain of interpretation / acousmatic spatialization (see the following figure:)

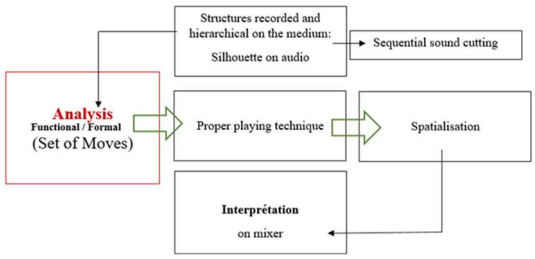

Figure 14: Chain of interpretation / acousmatic spatialization

* Conclusion

Acousmatic language is still a young field of research that needs to be developed. For a long time, there has been talk of musical and cinematographic writing, nowadays there would be a sound writing, with an author-performer. It starts with the sound recording: the act of 'handing over the microphone' to the concrete interpretation through the sound writing; the one that is defined as the seat of a reflection on the sound of reality 'real sounds': what is meant in space, as the main axis of creation. The sound writing persists throughout the creative process, it represents a 'conception of the author's sound realization': skeleton of the work followed by a hierarchy of sound objects, transitions, effects... With these elements; The sound

director can work to reconfigure 'the sound reality' in his own way, according to his intuitions, through complex electronic and electro-acoustic materials, while involving 'senses and sensations', which is the acousmatic work. As a conclusion, we proposed a summary map translating the different stages leading to the creation of acousmatic works, explored in the following figure: -

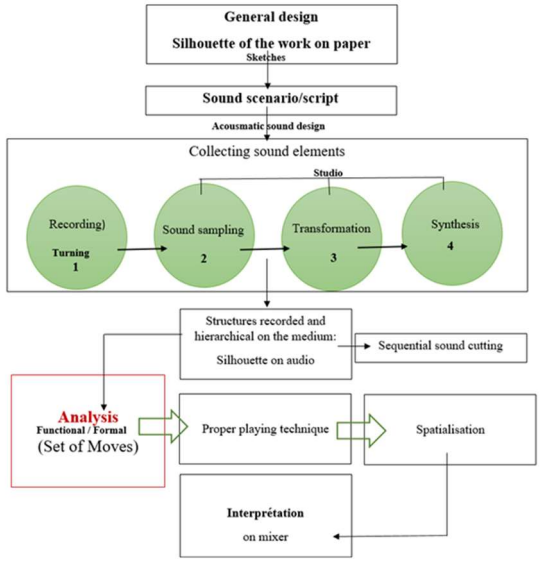

Figure 15: Acousmatic map 'Stages of production of an acousmatic work'

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