

Space Resonating Through Sound

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Abstract — In this paper we will analyze how the conception of space in music is expanded by the repertoire of sound art, moving from the idea of space as a delimited area with physical and acoustical characteristics, to the notion of site in which representational aspects of a place become expressive elements of a work of art.

I. INTRODUCTION

During the last century, sound has followed two different paths within the arts. On one hand we have the musical route toward the creation of strategies and procedures to establish a self-referential grammar. This process culminates with the emphasis on the sound itself as a source and foundation of musical discourse as one can find in Pierre Schaeffer's *écoute réduite* [1] or in John Cage's transpositions of everyday sounds into music [2]. On the other hand we saw, especially outside the musical domain, a tendency to explore the contextual and representational potentiality of sound that is in the basis of an expressive part of what constitutes the repertoire of today's sound art. In the first case comes out the idea of musicalization of sounds [3]; in the second, it becomes manifest a direct connection of sound material with other aspects of culture and life.

As a consequence of this second instance, many artistic manifestations in which sound played a significant role have to shape new relations between sound and the referential world where sound takes place. This is the case, for example, of installation art, performance art and sound art. One of the references that emerge in this context is a notion of place that transcends the idea of geometric space as a measure delimited by geographical coordinates [4]. It incorporates perceptual, social, psychological, acoustical and visual characteristics of an ambient assigned by specific circumstances and occurrences.

Thus, site-specific becomes the conception shaping the work in which the notion of space embraces more than geometrical properties: materials as well as the history they can elucidate, architectural contexts, and even the cultural and social conventions that regulate the place of exhibition, they all became constitutive elements of the art work.

As Guy Lelong [5] points out, every art form needs a place to happen – the book, the gallery, the museum, the concert hall – and the relationship between the work of art and its place can lead to two types of reflection. In the first case, the place is the device intended to present the work. It can be understood as a frame that both draws up the boundaries of the work and restricts its existence. In the second case, there is the idea of art *in situ*, in which the site transcends the perspective of a frame that traps the work to become part of the work.

When the site becomes part of the artwork it is converted into a space that is more than the place where that artistic object is presented. It brings different aspects of the environment such as architectural features, social conventions, informational traces and curatorial characteristics to the compositional level of the work. This practice introduced a criticism regarding the modes of art diffusion and lead to a shift from a focus aimed at the object to a wider concern with the environment.

In the case of music, the concert hall is such a consolidate space that it became extremely difficult to project new musical environments and new forms of music presentation. Even some more sophisticated proposals of electroacoustic multitrack diffusion¹ did not break up with the formal configuration of a concert hall in which space serves as an enclosure where the music physically is constrained and the audience is confined.

When music crosses the boundaries of the concert hall in search of alternative spaces it is usually reconfigured in new formats such as sound art, sound installations and performances. The art gallery became an alternative space to host musical and sonic arts. But if the concert hall enforced its own ritual and traditions, the gallery also provided a new type of space with its own conventions. As in the concert hall, the gallery walls and rooms also impose a clear delimitation of what is inside and what is outside.

II. SPACE IN MUSIC AND SOUND ART

The art gallery has established itself as an almost neutral and aseptic space, but sealed (without windows), especially built to isolate the work of art from any external event: a white cube.

The ideal gallery subtracts from the work of art all the evidences that interfere in the fact that it is 'art'. The work is isolated from anything that might undermine its appreciation. This provides the room with a characteristic presence of other spaces in which conventions are preserved by the repetition of a closed system of values. Some of the holiness of the church, of the formality of the court, of the mystique of the experimental laboratory is joined to a fashionable design to produce a unique chamber of aesthetics [6, p: 3].

As formal institutions the white cube and other sites like the concert hall, clearly establish a separation between

¹ For example, in 1958 Edgard Varèse's *Poème Électronique* was diffused over more than 400 loudspeakers at the Philips Pavillion designed by Xenakis and Le Corbusier for the Brussels World's Fair; also, in 1970, at the Osaka Expo, Karlheinz Stockhausen performed electronic compositions at the German Pavillion, a spherical auditorium, equipped with over 50 loudspeakers in concentric rings around the audience.

the viewer / listener and the work, as well as establish the annulment of the body and of the presence of people:

Certainly the presence of that strange piece of furniture, your own body, seems to be superfluous, an intrusion. The site raises the idea that while eyes and minds are welcome, the bodies that occupy space are not - or are tolerated only as synesthetic dummies for future study [6, p: 4].

It is interesting to notice that in the case of installations, including sound installations, the institutions constituted around the concept of white cube (galleries, museums) are changed into a kind of black cube, a site composed by dark surfaces (walls). At the same time that it is set as an isolated environment the black cube eliminates the delimitations of space, transcending the sacredness of the white cube, and involving the viewer in an immersive manner [7]. Black cubes are inhabited by loudspeakers and screens, and the dark walls become invisible, providing the creation of a virtual space in which new perceptive modalities are stimulated.

The gallery's white walls lead to a contemplative attitude from the spectator, who, framed by social rules, keeps a relative distance from the work, establishing a relationship that is more rational than physical, corporal or sensorial [6, 7]. The contemplative detachment is clearly a remnant of an almost religious attitude, in which the aseptic white cube and the concert hall are part of an almost sacred conception of art.

The installation attempts to transform the "white cube" into a "black cube": as it weakens the idea of sacred, it brings the viewer to a closer relation with the work, and transforms the site into an involving environment [7]. Thus, the context becomes content and the viewer becomes part of the work, emphasizing the idea of immersion. Material elements and creative procedures are transformed.

In the installation, both music and sound art are released from the time of performance, even from the time of recorded performance. The time of the work becomes the time the spectator, who may decide when to start and stop paying attention to every aspect of work. This penetration in the space of the installation consists in a significant shift in the modes of music production.

The installation is configured as a new way of presentation of the work of art. The listener is not confined to a fixed position in space, but is invited to create his/her own spatial relationship with the work [7]. While the way of publishing music is traditionally achieved by performing it (or at least by recording its performance), installation art configures itself as "the possibility of publishing [the music] without performance" [8] in a way that the listener is free to establish his/her own relations with the time of the work and with the space where it happens.

One of the transformations operated by electroacoustic music in the mid-twentieth century was the appropriation of space as a musical element. However, in this process there was a reduction of the idea of spatialization to the concept of a projection of sounds in space. Thus, the electroacoustic project devoted a considerable attention to the development of strategies to create the perception of sound source localization (front/back, left/right) and of sonic planes (close/distant), as well as to produce virtual acoustic spaces (small/large, dry/reverberant). In this

sense, the acoustic space in electroacoustic music is mainly related to sound data and the aural perception of space lies upon source localization and room dimensions. It constitutes an *acousmatic* space [9] that does not correspond to the space where the music is diffused. This virtual space is constructed by the electronic devices hidden behind the curtain of loudspeakers.

In sound art, the real space where the work takes place is part of the work. Multimodal sensations are activated by acoustical elements and space resonates with sound, leading to sensorial images of dimension, color, texture, shape, and movement. Also, many of the references attached to a site can be triggered by sounds and become part of the work. The idea of space is translated into the idea of site, incorporating social, psychological, perceptive, acoustic and visual characteristics of a place. Space becomes a representational element in the artwork.

III. THREE INSTANCES OF SPACE IN MUSIC AND SOUND ART

Any art form that takes sound as its main material is a temporal art form since sound can only happen in time. In music and in other types of sound art, time can be associated with space forms in different levels of relevance. We can analyze some of the spatial aspects that can be put in resonance by sound in music and sound art, showing how they are explored in recent works. For this purpose we will establish three categories of spatial relationship with sound and analyze their role in the art. The three categories are: acoustical space; architectural space; and representational space.

A. Acoustical Space

Acoustical space embraces the perceptual acoustic characteristics of space, such as volume, reverberation and sound source localization. Acoustic phenomena are used to provide psychoacoustic impressions of a space. This instance is related to what is generally called spatialization in electroacoustic music or stereophonic image in the process of sound recording and mixing in a studio. Basically, it is related to the localization of sound sources and their movements in space. Also, the reverberant characteristics of a perceived sound allows the perception of some spatial aspects such as volume, shape and can even provide some hints about the type and position of surfaces constituting that space.

Although we can cite some examples of use of spatialization in different periods of music history², space only becomes to be considered as a compositional element on the second half of twenty century. Electroacoustic music has included the use of spatial diffusion since its very beginning. Multi-channel recording and the positioning of multiple loudspeakers around the audience became an essential part of electroacoustic compositional agenda since the creation of the *Gesang der Jünglinge* (1955-56) by Karlheinz Stockhausen. As the composer remarks, "the function of space has been neutralized in our western music" [10, p: 101], but with electronic music the displacement of sound in space and the projection of sound in different planes of distance became as important as other compositional elements: "Building spatial depth

² For example, the contrapunctual distribution of choirs in the San Marcos' Cathedral by Giovanni Gabrieli (1557-1612); the placement of musicians behind the stage in Gustav Mahler's *Second Symphony* (1894); and the distribution of musicians around the concert hall in Charles Ives' *Unanswered Question* (1908).

by superimposition of layers enables us to compose perspectives in sound from close up to far away, analogous to the way we compose layers of melody and harmony in the two-dimensional plane of traditional music” [10, p: 106].

Following this perspective, in the last decades electroacoustic music has developed many systems and strategies to deal with sound spatialization. From the first experiences with multi-channel composition in electronic music in the 1950’s³ to the set up of large loudspeakers orchestras⁴ to the development of new spatialization techniques and protocols⁵, space got into the musical agenda.

In sound art, space has become the material that constitutes the essence of many works as they emphasize acoustic effects produced by the controlled projection of sound sources. Not only sound itself is perceived in relation to space, but also the acoustical and psychoacoustical characteristics of sound spatial dimensions are employed to emphasize the architectural characteristics of a particular place. In fact, many sound art works explore psychoacoustical aspects by focusing in the perceptual subtleties of sound events. They seek to stimulate the spectator to understand acoustical phenomena that usually are not taken into account, even in the processes of listening to music [7].

For example, in the installation *Fünf Felder* (*Five Fields*, 2002), Christina Kubisch takes advantage of the room’s architecture to organize the space in relation to sound. The room is divided into five fields defined by the window niches. Loudspeakers of different sizes are placed within these fields and diffuse sounds generated by 15 tuning forks covering a spectrum from 64 to 4096Hz. Loudspeakers are painted with a varnish that shines under ultraviolet light. The artist employs the reflection of light to put visible and audible structures in evidence. The perception of radiated lights oscillates between illumination and luminosity, highlighting areas and lines that float around the space of the room, enhancing the amalgam between audible and visual perception [11].

Plight (Anthony d’ Offray Gallery, 1985) is an installation created by German artist Joseph Beuys, well known by his ritualistic performances and by his participation in the Fluxus Group. In this installation one can notice the conceptual use of the acoustic space as it uses a highly sound-absorbent material to cover all the surfaces of a room. This material eliminates natural room’s reverberation and creates an extreme perceptive distinction between the external and internal acoustic space. Inside the room the sensation is as if all the sounds in the environment have been dragged by the covered surfaces. There is no need of playing specific sounds or music to perceive the acoustical changes: environmental noises or sounds produced by the visitor are sufficient to trigger the attention to the unusual acoustics. Inside the room a piano remains silent as if its sounds were also drawn by the absorbent surfaces (Fig. 1).



Fig 1: Details of *Plight* (1985), by Joseph Beuys

In *Stationen* (1992), Robin Minard creates an installation where “space itself becomes a musical instrument and architecture an acoustic event” [12, p: 99]. In this work, loudspeakers are placed around the stairwell and the bell tower of Berlin’s Parochial Church (Fig. 2). These loudspeakers reproduce natural and synthetic sounds that are integrated to the acoustics of the environment without disturbing it. Some of the sounds were produced and controlled by a computer and were reproduced by loudspeakers placed in positions of the building following a vertical organization in which the register of the sounds change gradually from low to high as one ascends the stairwell into the bell tower room. The filtering of higher frequencies and the integration of loudspeakers with the environment make it difficult to localize the sound sources providing a very diffuse sound reproduction. As the artist points out,

The overall dynamic range of the installation was adjusted to always retain the effect of a light, homogeneous spatial coloring which very gradually changed in register as one ascended the stairwell into the bell tower room. The dynamic levels and the harmonic content of separate components of this sound color also varied in real-time, with the aid of a computer, in relationship to the amplitudes and frequencies present in outdoor sounds [...] Through such accentuations of the space’s acoustic properties, combined with the spatial rather than temporal organization of sounds, the installation created an environment in which sound often drew the listener’s attention to *architectural* aspects of the space rather than solely to a specific musical content [12, p: 98-99].

³ For example, the *pupitre d’espace*, built in 1951 by Jacques Poullin at the studio of the Radiodiffusion-Télévision Française (RTF) for real-time quadrasonic spatialization; and the 400-loudspeaker system set in the Phillips Pavillon at the Brussels World’s Fair for the presentation of Edgard Varèse’s *Poème Electronique* in 1958.

⁴ Such as the *Acousmonium* developed at GRM in the mid 1970’s.

⁵ Ircam’s Spatializeur, Ambisonics system and wave field synthesis are representative examples.



Fig. 2: Detail of *Stationen* (1992), by Robin Minard, Parochialkirche, Berlin.

In both works space is put in evidence by the sounds. On another hand, sound material establishes a relationship of resonance with the space where they are produced. While in music the practice of spatialization remains attached to the idea of sound source localization and displacement, in sound art works space tends to acquire a more effective role by establishing more direct connections between sounds and the acoustic behavior of these sounds in a particular environment.

B. Architectural Space

Architectural space relates to the conception of aural architecture developed by Blesser and Salter [13] in which sounds are able to shape a sonic space that carries specific functions and representational potentialities. This conception leads to a close relation between the place where sounds are projected and the way one listens to it, creating a space of listening. In this sense it shares characteristics of both acoustical and representational spaces.

Differently from a soundscape, in which sounds are important in themselves, in aural architecture sounds illuminate space [13, p: 16]. In electroacoustic music the idea of spatialization focus on sounds themselves and on their movement across a virtual space: sounds are put in evidence by their movement. When we think of aural architecture, sonic sources are put to reveal space. In this context space is not taken only as a physical dimension, but also in its social, perceptual and experiential aspects.

According to [13], one can experience space in four modes: “social, as an arena for community cohesion; navigational, as local objects and geometries that combine into a spatial geometry; aesthetic, as an enhanced aesthetic texture; and musical as an artistic extension of instruments” [13, p: 64]. These modes can coexist and their relevance depends upon the cognitive strategies one adopts in a particular context.

Generally, music seldom directs the attention towards space in this sense, even when it incorporates spatial

aspects in the compositional process, as we have already mentioned regarding electroacoustic music. Of course, when one listens to a sacred piece inside a church or to an orchestral concert in a park on a Sunday morning, the ambient becomes part of the music and one can establish connections between contextual characteristics of those spaces and the music being performed, but these connections are more accidental than intentional. In this case, the relationship between music and space is more related to the particularity of a performance than to the compositional conception of the work and space is usually drawing attention to musical aspects.

In the field of sound art many works may invert this balance by using sounds and music to emphasize – or to illuminate as would say [13] – the space. Some artists will use sound to put space in resonance and use this resonance to amplify the referential potentiality of space. Robin Minard has created works for public spaces in which the function of music is redefined in relation to noisy environments. He creates a kind of spatial composition for public spaces that receive the artwork without losing their original functionality. Thus, Minard has “left the protected concert hall to deal with the actual acoustic space of urban world” [12, p: 27], shaping acoustic spaces to become works to be listened to. The use of public spaces requires the creation of strategies to guide the listener’s attention to the sounds that compose the natural and urban environment at the same time that the artist “deconstructs and recombines the acoustic material to create an oscillating effect” [12, p: 29] in which one can establish new connections in relation to the familiar sounds that inhabit a place.

In *Brunnen* (1994) one can note the resonance of these ideas. This installation consists of three rectangular blue acrylic boxes asymmetrically located on the floor (Fig. 3). Inside the boxes are loudspeakers that transmit a mixture of natural and synthetic sounds of water. Each of acrylic columns placed close to the speakers are tuned in intervals a quarter-of-tone apart, producing small frequency variations in the environment [12]. It is interesting to note that the work was installed at the entrance of the Mozarteum in Salzburg, whose traditional fountain has been replaced by the blue boxes, producing an interesting integration between the current space and the memory of the previous acoustic space. Moreover, there is a strong spatial relationship created by the formal similarity between the boxes and windows of the building that surround the plant [7].



Fig. 3: *Brunnen* (1994), by Robin Minard, Mozarteum, Salzburg.

Generally, in public spaces, the artist must deal with the fact that sounds and other elements of that space carry their own specific meanings, because sounds are attached to the context of their places of origin. In this type of work, Minard adds previously composed sounds to reach a perception that “hovers between identifying familiar phenomena and noting unexpected musical sounds” [12, p: 29].

In *Silent Music* (1994), the artist uses about 400 piezo-electric loudspeakers fixed on walls and other surfaces. Attached to their wires the loudspeakers assume plant-like forms that resemble bioorganic structures [12]. The arrangement of the loudspeakers creates the impression that they search for the light as if they were real plants. The work is conceived for both traditional exhibition spaces and public areas such as gardens and parks. Sounds are composed by synthetic and natural sources and are specially conceived to be incorporated into the environment (Fig. 4).



Fig. 4: *Silent Music* (1999), by Robin Minard, Stadtgalerie Saarbrücken.

C. Representational Space

Representational space refers to images, contexts and concepts that are related to a specific site and can be triggered by sounds. It concerns more to the historical and contextual elements of a place than to its geometrical delimitation and physical configuration. While instrumental and electroacoustic music maintained a discourse based on abstract sound relations that are constructed through references to the musical discourse, sound art tends to generate a representational discourse full of references that point out to concepts and contexts that are external to the work itself. In music referentiality is inserted in the temporal discourse as a basis for the musical narrative. In sound art the referentiality is usually extra-musical, thus it can operate through other resources such as the physical or imaginary space where it is presented. If music tends to establish a linear discourse whose elements are deeply attached to musical grammar, by its turn, sound art uses sound in a more representational way. Thus, its discourse does not need to be strictly based

on temporal structures – as is the case of music –, but it can lead to other types of configurations in which conceptual ideas are referred by its sonic constructions.

For this reason time dimension in sound art is somehow condensed. Usually sound art works do not impose a linear temporal organization in which sound elements are strictly distributed in time. Many of these works do not provide a specific begin or end, allowing the spectator to enter and leave the work at any time. As the use of time becomes less imposing, it is possible to adhere to a spatial discourse, typical of the visual arts. In the same way that sound became essential to twenty-century music, space plays a central role in the repertoire of sound art.

An example of a highly representational use of space is the work *Zwölf Türen und zwölf Klänge* (*Twelve Doors and Twelve Sounds*, 2000) by Christina Kubisch. It is part of a series of installations entitled “*consecutio temporum*”. Works on this series are created for rooms that went through different historical changes. *Zwölf Türen und zwölf Klänge* was set at the second floor of the Opel Villa building in Rüsselsheim [14]. The place was constructed in 1930 and since then it assumed different purposes: it was originally used as a floor for servants, later as hospital and, during World War II, for military purposes (Fig. 5).



Fig. 5: Detail of *Zwölf Türen und zwölf Klänge* (2000), by Christina Kubisch.

The installation consists of twelve white lacquered doors in front of which are placed twelve white loudspeakers that are made fluorescent by ultraviolet lamps of high intensity. This illumination reveals traces of the building history by making visible some cracks and small marks. These details can guide the public through the past history that emerges from the architecture. It is

worth noting the metaphorical use of sounds in relation to the environment. Loudspeakers are placed as thresholds of each lacquered door and each door reflects both the image and the sound of the loudspeaker. The sounds are produced by electronic devices in twelve soundtracks. Their extremely high frequencies are close to the human hearing threshold and work as a tapestry that involves the space.

Regarding the particular Kubisch's conception of an archaeological space in this work, Carsten Ahrens, curator of the exhibition comments that:

In the luminous dark, the traces of time become visible. Fissures and wounds in the structure of the room's wall appear; our glance and our thoughts follow the patterns of their lines, tracing a journey into what is past. The history of the site becomes a history of question marks, an empty space our curiosity seeks to fill [14, p: 58].

D. Conclusion

In this paper we tried to describe some differences in the conception of space in works of music and sound art. We established three instances in which space is considered in these works: acoustical space, architectural space, and representational space. In these three instances there is a progression from a more objective conception of space to an abstract, referential one. If music repertoire tends to the first instance, sound art is more flexible and explores the potentialities of the three of them in an open manner. As [15, p: 7] points out, "the less musical activity is fixed or centered on the representational handling of representational objects, the more the quest for meaning shifts to the conditions of the social and spatial implications of situations and therefore, of course, space". This also indicates the musical bias toward self-referentiality since music usually employs space to enhance sound qualities. On another hand, sound art exploits referential and representational characteristics of space. Thus, space not only points to internal sonic structures of a piece, but also creates a web of connections among ideas, contexts and stories that lie outside the work.

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