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Sound-space: a listener's creative outcome through an acousmatic performance at the Spatial Sound Institute

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ABSTRACT

This research focuses on the invisible space built by sound as subject of study, developing through a practice-based methodology a creative process during a residency period in the Spatial Sound Institute (SSI), mainly to investigate the sound features of non-existing architectures. The process ended with a performance that invited listeners to experience a deeper awareness of perception for reaching spaces that exceed the limits of physical possibilities. In this sense, active listening becomes fundamental, not only for forming a personal interpretation of this expanded reality, but for creating sound-spaces from a performative experience.

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Introduction

The conformation of the spatial-sound phenomenon arises from a basic trilogy of emission (sound source), propagation (space), and hearing (perception), where propagation affects the meaning of the sound message, and in turn, the conception of spaces. To define sound-space, it becomes necessary to redefine the term "space," understanding it as a sequence of spatial sensations or a series of temporal events, where space unfolds in time.

Usually, the term "space" refers to a physical and static condition that encapsulates a dimension of matter. However, if we go deep into its origins, the term "space," which comes from the Latin "spatium," incorporates within the concept of space a temporal aspect. According to its etymology, "spatium" is defined as a spatio-temporal interval defined by a starting and an ending margin, delimited by some tangible or intangible entity. The indivisibility between space and time of the term "spatium" comes from the method of measuring a distance through the temporality with which an entity – a body, a matter, a wave, a motif – traverses a certain space. According to the spatio-temporal interval, the "spatium" is conditioned by a movement, a relational dynamic between the matter that defines the space, the matter that contains the space, the matter that frequents the space, that intervenes and receives it. When matter is affected by sound, a new dimension of space appears: the sound-space.

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Deleuze presents the concept of "spatium" as a possibility of possibilities that allows all the relations and existence of diverse spaces within it. It is a background that allows intensities to emerge freely. It is the zero point, the origin.

> This virtual continuum receives a variety of designations throughout Deleuze's corpus: 'intensive spatium' in Difference and Repetition,[1] 'ideal or metaphysical surface' in The Logic of Sense,[2] 'plane of consistency' in A Thousand Plateaus (written with Félix Guattari),[3] and 'plane of immanence' in What is Philosophy? (Equally co-authored with Guattari).[4] (Burchill 154)

The "spatium" holds a topological and relational nature of events that compose multiplicities without referencing itself to a metric system. It is a self-regulated system by a non-quantitative relational dynamic that organizes potential values. In Difference and Repetition, Deleuze describes the "pure spatium" as an intensive "spatium" and as an entity close to the "Body without Organs" (Deleuze and Guattari "A Thousand Plateaus" 155–172) a formless, intensive, sensitive, unstratified space. The "spatium" is characterized by a nature that cannot be explained in purely spatial terms, but in a dynamic that translates into a direct presentation of time.

The sound-space expresses a relationship between space and sound that is identified with Deleuze's concept of "spatium," as well as being faithful to its etymology. The sound-space is inserted in a temporal structure of relational intensities where sensibilities, affects, corporealities and topological manifestations converge. Within this relational intensity, two types of sound-spaces are recognized: the invisible space built by sound (space-of-sound) and the sound emitted by physical space (sound-of-space). Sound-space could be created and/or perceived in both ways. In both cases auditory perception is the cognitive access to spatial information, however, the space-of-sound is recognized from the sound experience of acousmatic listening, while the sound-of-space is recognized through the process of echolocation. For the objective of this research, we will explore exclusively the invisible spaces built by sound. This process of conceptualization will be accompanied by references that delineate it and that will allow us to trace a territory of ideas from a historical examination around acousmatic listening and sound spatialization.

Performance as method

The methodology of this research consists of two phases: theoretical and practical. The first phase consists of a bibliographic review and the conformation of a theoretical framework around the concept of sound-space based on the "invisible spaces built by sound" (sound-of-space) from an acousmatic approach, including reflections and categorizations from McLuhan and Carpenter, Schaeffer, Xenakis, Stockhausen, Leitner, Minard, Bayle, Vande Gorne, Smalley, Chion. The intention of this phase is to historically follow the development of sound and the acousmatic listening as an artistic input for performative outcomes that could build spaces through travelling sound. While writing this history I have engaged with a selection of artists, architects, and musicians that develop specific auditory operations with the spatial, performing with space and the perceiving body.

Sound's relational condition through spatiality propose a dynamic relationship between the sonic, space and the body that is brought here through a first phase of observations given by authors, and a second phase of creative experimentation by myself. Searching for a channel of access to the sound-space, the research explores the field of perception through the experience of a performance, stimulating sensations, emotions, feelings, sensorial impressions, affections, symbolisms, social/cultural constructions, and the internal universe of memory in a personal and collective sense, putting emphasis on the theories that connect the perceptual appreciation of sound with the storage mode of such information.

The main method of this research was a performance developed in the Spatial Sound Institute through the creative process of sound composition inside a spatialize room with 60 speakers monitored by the 4DSOUND system. At the end of the process, the performance was premiered and the public was invited to experience the performative outcome as a listening workshop. Bodies play an important role in the dynamic of the acoustical spatialization, as sound performs altogether with the bodies, through and for space. It structures socially building dynamic architectures, inhabiting several different places in one same physical space. It is boundless as site-specific.

The idea of performance as a method comes from a cognitive process raised from an "aesthetic conduct" (Arteaga 24). Performance as a human action shapes a specific cognitive function. As Arteaga states in his paper of Embodied and Situated Aesthetics, the aesthetic conduct is primarily enabled by our sensorimotor and emotional skills, as a form of exchange between our individuality and our surroundings. Aesthetic conduct is constitutively receptive and allows the spontaneous emergence of new "responses," but according with Arteaga, it doesn't produce knowledge, nor to the development of skills for the accomplishment of a particular task. Aesthetic conduct is no productive but conductive to understanding (Arteaga 24–25). Arteaga's ideas come from the reflections made by Maturana and Varela (1972), concerning the way living systems cognize the objective reality, shifting the focus from the external reality to the structure that permits the organism to operate adequately in the medium. For them an observer represents the interactions conducted by the organism regarding the changes triggered by the internal and the sensorimotor correlations. The listening workshop is the culmination of the methodology, which uses the listener description as a tool to manage its own cognitive domain, for expressing the creative interpretation of the sound-space, while embodying the relations given in the interactions within the performance. The methodology expects to arise the mobilization of cognitive power from the aesthetic practice, for building the terrain of emergence of knowledge through a sound spatialization performance that stimulates the phenomenological approach of the body for the understanding of invisible spatialities.

Invisible spaces built by sound

> Until writing was invented, we lived in acoustic space, where the Eskimo now lives: boundless, directionless, horizonless, the dark of the mind, the world of emotion, primordial intuition, terror. Speech is a social chart of this dark bog. Speech structures the abyss of mental and acoustic space, shrouding the voice; it is a cosmic, invisible architecture of the human dark. Speak that I may see you. Writing turned the spotlight on the high, dim

> Sierras of speech; writing was the visualization of acoustic space. It lit up the dark. (McLuhan 207)

McLuhan and Carpenter refer to the colloquial concept of "space" as that one which separates visible objects within an empty space. The sound-space described by the authors as "acoustic space" (McLuhan and Carpenter 65–70), is a full space (with sounds). They visualize space as a boundless sphere defined by sound. It is a dynamic space, omnipresent, in constant flux, self-producing moment by moment, perceived in 360° while visual space is a flat space perceived only in 180°.

The sound-space is built from a three-dimensional sound movement (invisible) that acquires volume from the sound spatialization by means of sound sources. From this conception, sound is heard in an indirect way (through speakers) without seeing or recognizing the causes from which it comes from. This process of auditory perception is called acousmatic, which has Greek origin akusmatikoi and comes from the pedagogical practices of Pythagoras who ordered his disciples to listen to his lessons behind a curtain, without seeing him directly, only listening to his voice (Schaeffer "Traité des objets musicaux" 47–60). A similar experience to Pythagoras' curtain happens today with the use of loudspeakers, where we do not see the sound source itself that produces the sound. Pierre Schaeffer uses acousmatic listening in his sound researches to dissociate sight from hearing and to isolate the contextual information of the sound source, in order to stimulate the listening of sonic forms as content analysis of our perceptions. Acousmatics favors the conditions for a "reduced listening" (Schaeffer "Traité des objets musicaux" 159–170), which is a concept developed by Schaeffer to focus attention on the aesthetic complexity of the sound itself and not on its relation to the sound source. The space-of-sound is created by acousmatics which transforms space into an infinity of spatial configurations led by the acoustic arrangement of sound spatialization. Schaeffer's approach to sound-space comes from music and designates the concept of "spatial music" ("In Search of a Concrete Music" 194) to the location of sound objects by means of speakers in a space. He defines two possible spatializations; (1) static spatialization that corresponds to the individual and continuous projection of a sound source, and (2) kinematic spatialization that refers to sound projections that move sound objects in space and time.

Iannis Xenakis, architect and composer, takes acousmatic listening to define space from a conceptual mixture of architecture and electroacoustic music. Xenakis considers the principles of sound spatialization to define the speaker as a point source of sound, when repeated through space could form a line and when expanded within an orthogonal network could define an acoustic plane. This acoustic plane could be three-dimensionalized as a smooth, straight plane or as a curved, ruled (double-curved) surface or a warped surface, resulting in two versions of sound-spaces that rely on Schaeffer's principles of "spatial music": "static stereophonics" and "kinematic stereophonics" (Xenakis "Towards an 'electronic gesture'" 226–231). In a static stereophonic, sound is emitted simultaneously throughout space. In a kinematic stereophonic, the sound is in motion passing from one sound point to another forming lines that draw spaces through the traveling sound.

The formulations described here by Xenakis are a theoretical manifesto of his own practical work on sound-space studies. His trajectory in this field begins with the

"Philips Pavilion" commissioned by the Philips Company to Le Corbusier for the Brussels International Exposition in 1958. Le Corbusier delegates to Xenakis the architectural-multimedial design of the pavilion which consists of an architecture design for the spatialization of sound through 425 speakers and the projection of an audio-visual show. Xenakis' proposal considered a static architecture that housed a dynamic architecture of temporal spatialities continuously modified by sound. In parallel to the architectural design of the Philips Pavilion, Xenakis worked on his musical composition and orchestral work *Metastaseis*. In his creative process, Xenakis used the modulor (Le Corbusier) to project sound in time, just as he used it in his architectural works. The preliminary sketch for *Metastaseis* was in graphic notation and looked more like the architectural plan of the Philips Pavilion than as a musical score. It showed motion graphics of masses and *glissandis* as structural beams of the piece, with pitch on one axis and time on the other. In his musical-architectural projects he was interested in exploring the possibilities of how to join one point to another without breaking continuity. In *Metastaseis* this exploration led him to *glissandis*, while in the Philips Pavilion it led him to the design of hyperbolic paraboloids. The use of *glissandis* gives a temporal sound continuum to the work, which would later translate into a formal continuum between floor, wall, and ceiling of the Philips Pavilion.

Driven by this first experience, Xenakis then developed a series of works entitled "Polytopes," poly from polys which refers to "many" and topes from topos which refers to place.[5] These artworks were the creation of diverse spaces based on the multimedia possibilities of time. The polytopes, in their different versions, were architectures of light and sound that shaped multiple spaces from ruled surfaces. At the same time, they were considered sculptures, installations and technological performances, usually located in emblematic sites of great patrimonial and historical value. His first polytope was the Montreal Polytope for the French pavilion at the Montreal World's Fair. It consisted of a transparent architectural design with 200 steel cables with 1200 attached flashes, 800 white and 400 colored. The sound composition for the polytope proposes continuous music while the visual composition is discontinuous, generating a contrast between sound and light. Xenakis creates an interactive environment that transforms the static space into a dynamic one, where bodies not only attend the show, but also build the space and are part of it.

To build the polytopes, Xenakis was engaged with an architecture design that could condition the human body for a listening experience, where sound could command the geometric space. In the same logic, Stockhausen, serialist composer of electronic music, was one of the first to experiment with spatialized sound, breaking the tradition of the frontal scene. In 1958, inspired by the Philips Pavilion, he gave a lecture on "Music in Space" where he conceived the design of a spherical concert hall for sound spatialization,

> New halls for listening must be built to meet with demands of spatial music. My idea would be to have a spherical chamber, fitted all around with loudspeakers. In the middle of this spherical chamber, a platform, transparent to both light and sound, would be hung for listeners. They could hear music … coming from above, from below and from all directions. (Stockhausen 69)

In 1970, Stockhausen was invited by the German government to the World Fair in Osaka to develop a multimedia project, where he took the opportunity to materialize his ideas. Together with architect Fritz Bornemann, they created the design of a spherical concert hall with a raised platform in the center for the audience. The space was composed of fifty speakers that surround the platform. The show could be programmed or broadcast live through a 10-channel system that was designed by himself. In this multifocal scene, the spectator had different ways of receiving the sound information depending on the location, regarding also the affective reaction that is unique for each person. In that sense, the role of the audience is to connect the sensory events and build a complete coherence, which will depend on each individual interpretation. In both Xenakis' polytopes and Stockhausen's Music in Space, the spatialized movement of sound shortens the relationship between architecture and music, building invisible structures of sounds that form a space within a larger space that contains it.

Bernhard Leitner, architect, proposes a similar conception to Stockhausen's Music in Space and Xenakis' cinematic stereophonics, emphasizing that the three-dimensionality of sound-space is achieved through sound in movement (traveling sound), incorporating into the equation the temporal variable and the irreplaceable importance of the body as a listening system. According to Leitner, there is an exploration of the invisible space that is built only from the sound that travels, conforming spaces in constant transformation and defined by its evolution in time. Sound-space provides knowledge about time and the interaction of sound with the environment, which affects the type and quality of the sound experience.

Leitner developed a practical research that began in 1971, inside a space located in New York. He constructed a series of structures that were mounted to test the movement of sound in space. Two important aspects to consider emerge from his results. The first one has to do with the physical conformation of the sound-space based on the three-dimensional arrangement of speakers in a space that reproduces sounds in movement. The dynamism of sound becomes a basis for building the limits of this artificial space, using sound, its intensity, frequency, timbre, and type of movement (direction, speed, acceleration) as building materials of these acoustic architectures. The second aspect has to do with the spatial perception of this temporality. Leitner defines space as spatial sensations caused by sound. Space is not merely a physical entity, but rather a sensation. Sound information is absorbed by the whole body within an audio-physical experience, not only auditory-musical or auditory-sound. The body could have two different experiences according to a static or moving position. The first position is a passive (static) way of receiving spatial information, while the second position is an active attitude (movement) of perception-action through interaction with space (Leitner).[6]

Robin Minard proposes two categories of sound-spaces similar to those proposed by Schaeffer, Xenakis, and Leitner, but in this case, they are approached from an ambient musical conception. The categories proposed by Minard of "conditioning and articulation" are analogous to the stereophonics or "static and kinematic" spatializations. The conditioning of space is a uniform, continuous, and homogeneous sound spatialization, with ambient electronic music that is characterized by generating a "sound state" of static diffusion. The articulation of space implies the movement of sound through the spatial separation of musical or sound elements, achieving effects of localization of sound

sources at different distances, generating perspective and spatial depth. Minard's musical conception of sound-space rotates the focus of the sound experience from the previous spatial-architectural experience to a musical approach. The case of the Acousmonium designed in 1974 by Françoise Bayle is pretty much connected with Xenakis and Leitner explorations, however the big difference is its orchestral intention. The Acousmonium can take many spatial forms shaping the art of acousmatics, and it is considered by Bayle as a perceptual art. Space is presented as a practice, as a phenomenon or as a representation (Bayle) that doesn't build only a single space of moving sound, but rather infinite possibilities that are subjective interpretations. "Thus the space, for not yet being -bodies, initially, by the effect of this distance- where the body is defined as that point which considers it – the space says- I, then joined the body" (Bayle "Mi-lieu" 137). Bayle develops the concept of i-son (image-of-sound) to represent the form of a spatialized sound and the perceptual interpretation through a sound image that is described by a metaphor or archetype. The i-son is broken down into three terms that deepen the definition of a sound object; im-son, di-son, and me-son (Bayle "Image-of-sound, or i-sound: Metaphor/metaform" 165–170), where the first one points to hearing and presentification, the second to listening and identification, and the third to understanding[7] and interpretation.

Anette Vande Gorne defines an acoustic relationship between music and architecture based primarily on the experience of the Acousmonium as a laboratory for the investigation of space, regarding space as a musical element in the process of composition and performance. Vande Gorne breaks down three spatial categories; "moving space," "geometric space," and "illusory space" (1–21). "Moving space" is opposed to the idea of static or fixed space, and is presented instead as a sonic displacement and movement of sound through time. The "space in motion" is broken down into two types of space; the "ambisonic space" and the "source space". The "ambisonic space" is a sound-space that is defined by an effect of ubiquity, where it is not possible to identify the sound sources. Vande Gorne cites the Philips Pavilion and the Spherical Concert Hall as examples of "ambisonic spaces". In opposition, the "source space" is the sound-space made up of defined and identifiable sound sources. The "geometric space" generates an invisible structure of multitrack sound, defined by lines, planes, and volumes that intersect in a three-dimensional way. The musical work of the "geometric space" is thought in terms of the composition of the space according to the number of speakers; mono, stereo, cuadrophonic, octophonic, etc. The "illusory space" is created by the illusion of perception. It is a phenomenological concept that arises from a virtual simulation of a space through spatialization.

Denis Smalley uses the term "spectromorphology" to understand the relationship between the sound spectrum and the forms it acquires as it unfolds in time; "A spectromorphological approach sets out spectral and morphological models and processes, and provides a framework for understanding structural relations and behaviors as experienced in the temporal flux of the music" (Smalley 107). From this arises the concept of "spectral space" capable of encapsulating diverse spatial experiences. "Spectromorphology" is the medium by which space can be explored and experienced. Spectral space itself contemplates two types of spaces; "composition space" and "listening space" (122), concepts analogous to Michel Chion's notion of "internal space" and "external space" (31–33). The first one considers the musical space composed in the studio and

the second one, the musical space at the moment of spatializing the sound in stage. The "internal space" would be the design of the space (composition space), and the "external space" its construction (listening space). A subtle difference with Chion is that Smalley's "composition space" can be heard within a personal-mental space or in a "listening space" (with speakers). "Spectromorphology" recognizes the changes of space from a perceptual conception; the result of spatial texture that redirect perceptual appreciation toward a spatio-spectral relationship, rather than using spectromorphology to identify spatio-morphological development.

The historical framework exposed in relation to the use of acousmatics during the twentieth century are redesigning the triad of the sound-spatial phenomenon – emission, propagation, and perception – towards a binary conception that merges emission with propagation in the same physical action. In the invisible spaces built by sound the equation is transformed to emission/propagation + perception, which is artificially manipulated by a technological and acousmatic multimedia space. The space-of-sound is made up of spatial sensations generated by sound in movement, capable of producing several simultaneous spaces according to the subjective and dynamic interpretation of perception. The sound-space can modify a certain space from the multiplicity of relations that it generates, giving rise to countless spaces within itself. It is affective, and defined from the intensities and sensibilities that emanates. In few words, the sound-space is time in a spatial manifestation.

Spatial Sound Institute

> Sound is intrinsically and unignorable relational: it emanates, propagates, communicates, vibrates, and agitates; it leaves a body and enters others; it binds and unhinges, harmonizes and traumatizes; it sends the body moving, the mind dreaming, the air oscillating. It seemingly eludes definition, while having profound effect. (Labelle xi)

In October 2021 I made a residency in the Spatial Sound Institute,[8] Budapest, where I worked with the 4DSOUND System. The Spatial Sound Institute is a research center for spatial sound technologies based in Budapest, Hungary. The institute has a large-scale 4DSOUND studio with 36 omnidirectional satellite speakers OmniDrive Pro, 8 4D Subwoofers, and 24 Bass Shaker Tactile Transducer Aura AST-2B-4 Pro. The 4DSOUND is an immersive system which allows a three-dimensional positioning of sound within the system's space and in the physical room, enabling the listener to experience spatial depth and dimensionality. Allows users to design virtual worlds through their interaction, to directly control the experiential reality of sound in space, enhancing the interactivity of spatial sound composition and performance. It works with different configurations of sound trajectories in space of live performances that are responsive to the behavior of listeners, creating different interpretations that come from perception.

During my residency, I prepared the performance Space Dystopia[9] that worked with sound as an artistic medium that could sculp imaginary spaces through traveling sound. Space Dystopia investigates the sound features of non-existing architectures. It presents auditions of imaginary spaces that push the limits of our perceived reality. Dystopia arises a fictional reality that gives space an augmented version that mixes up with the real-time scene. Sound is used for shaping a parallel dimension through space manipulation of reality, corrupting the normal evolution of the cognitive process of space recognition.

Through dislocation of the room spatiality, the performance invites the public to focus in their active listening abilities, which become fundamental for evoking the spirit of the dystopian spaces and forming a personal interpretation of this expanded reality.

For the performance preparation, I explored a narrative process of unfolding spaces inside spaces, pushing the limits of the 4DSOUND in terms of spatialization of sound through movement as in spatialization of sound itself through reverbs. The base materials were impulse responses[10] collected inside industrial spaces with exacerbated acoustics and impulse responses created digitally, merging one into the other using convolution reverbs[11] and 4DSOUND SpatialVerb. The performance that results from the residency process is a journey that trespasses through different mutations that dissolves the boundaries of physical spaces into liquid spaces of dystopian scenarios. The listening practice invites the bodies to experience a deeper awareness of how space is perceived, directing attention not only to sounds, but also to the inner action of each one perception for reaching spaces that exceed the limits of physical possibilities.

The performance as method provides an input to activate the perception of spatial boundaries. Before performing I asked listeners to reinforce their active listening abilities in two different modes. The first one is the static mode which fixes a certain position inside space and receives the sound movements from one specific place. The person can lay down, sit or stand. The second one is the walking mode which expects the person to move around the place discovering the different sound sources distributed all around and moving itself while sound is doing so. These instructions create the listening score for the musical composition narrative that guided the experience along the whole performance, giving two different forms of confronting the sound events. Based on Maturana and Varela (1972) we can modify our perception by the embodiment of different relations given from the diversity of interactions between our internal and external reality;

> We can say that every internal interaction changes us because it modifies our internal state, changing our posture or perspective (as a functional state) from which we enter into a new interaction. As a result, new relations are necessarily created in each interaction and, embodied in new states of activity, we interact with them in a process that repeats itself as a historical and unlimited transformation. (Maturana and Varela, 39)

After the performance, everybody had a unique experience that came along personal interpretation from those individual interactions. Each one of the participants was asked to answer the following question:

> ¿Which space or spaces are evoking the sounds you hear spatialized in this room? Please describe the acoustic space in terms of memories, associations, shapes, textures, materiality, colors, sensations, feelings, emotions, architectures, elements, dynamics, time, etc.[12]

At the end, a discussion group is formed for sharing experiences and sensations. The openness of the question seeks creative stimulation at the moment of internally searching for the sensations experienced, without limiting access to the possibilities of the imagination.

Thirteen people participated in the post-performance workshop. Most of the answers expressed the idea of a dynamic space that wasn't static but mutant, and changing every time. Constantly morphing space;

> Sand spaces that were constantly building and demolishing. Over dimensional Spaces. Overlapping Spaces. Push and pull, close and far, personal and omnipresent. Different rooms, with different sizes, stories and sensations. The walls come close. A spacious space as the big bang. The space where the universe was born. An antigravity sensation, in between time and space. A transition from organic spaces toward mechanic environments, back and forth. Big empty spaces in a constant extension and contraction of space. The space was growing and shrinking. Atoms connecting to each other and changing in vibration. A futuristic city environment of space matter movement.[13]

Sound forms evolve around the concept of spatiality in relation to the listening experience of the performance. Questions around the presence of space through sound, perceived by the body, are thrown out by active listening. The answers show a dematerialization of space and a deconstruction of the static. This process has different outcomes where space unfolds in abstract morphing forms, as also feelings that are brought together through the experience. Several participants connected the performance to a spiritual ritual with emotional implications where the space became personal;

> a meditative space. A process where bad energies were swept away. A spiritual journey through different territories. Different relationships evolving between me and the space. All my inner chaos was projected outside, while being quiet inside in a calm space. Thoughts out loud. A dark place.

Sound stages the self to materialize spatiality through a spiritual subjective container. The body locates itself inside the mind-space of emotions, dragging the inner spaces of the most personal feelings to an auditory dialogue across the inside to the outside. However, the listener framework of sonic space experiences connected the emotional being with the singular object and material aspect of space. Nevertheless, associations to previous sound and/or space experiences, and imaginaries where the immediate expression that usually brought among the participants the image of;

> a cave, a place made of rocks, a factory building, metal walls, the presence of water, fire, earth and wind, waterfalls, underwater space, an old train, a highway, an airplane, a spaceship, interstellar space, water cistern, a tunnel, shooting stars, rain, big drops.

The artistic experience of the sonic environment brings sound as a physical presence which leads first to the elements that compose stories of those sensitive environments; "I felt submerging in the ocean and constantly morphing. At first the space it's just sand, very dry and over time going down until reaching a rock ground and crushing. Suddenly, I felt winded out back to the surface and the ocean was gone … ," "In the beginning I was in the ocean, the coast was close and rocky, the scenario evolved to a space where sound existed … "

Composing spaces

The subjective interpretation of the performance by listeners places sound as a multiple, diverse, and expansive space, merging the personal space with the collective one. The phenomenology of the acoustic experience is determined by a mixed construction between the appearances of the lived situation, personal behavior, social schemes, and memories. The sound-space becomes a morphing being with several dynamic relations

between abstract and figurative holograms, material sensation with spiritual ones, previous experiences with futuristic imaginations. The sound-space is a field that mixes up philosophical, metaphysical, cultural, and phenomenological expressions, merging the symbolic with the concrete materiality of the real. It is a haptic and synesthetic experience that creates a new reality that offers the self a new set of codes for the creation of meaning. The performance here is a process of signification which seeks the audience as interlocutor, as a creative entity that shapes an invisible world of sound. The phenomenological input in the performativity of the bodies defines the art object as a temporal experience that creates simultaneous scenarios, " … performances are organized around 'post cognitive' understanding, creating work to be completed in the mind of the viewer/listener" (Labelle xv).

The creative process of composing the performance implies itself a personal and internal process of creative listening. The exploration of spatial forms through the use of sound enhances the perception of space. This way the compositional operations through sound spatialization use musical technics to enable the auditory and cognitive comprehension of space. The way of approaching the 4DSOUND and the spatialized room to stimulate perception, brought several challenges to the composition in terms of musical disclosure as in architectonic design. Scale was the first compositional item which expressed an eternal growing room, from an intimate and dry sensation to an abysmal magnitude which exceeded the physical understandings of closure into a void. The second part of the performance was dedicated to time produced by space, while denoting the reflections of different overlapping spatial configurations. The layering process reaches a peak which brings chaos into the scene and a third part of climax; a chaotic mass of different architectures converging and merging at the same time that finally dissolve themselves in an infinite space. These compositional strategies use spatialization for producing musical structures, using different sound locations and variation in harmonic content induced by the cinematic trajectories. The first part used static sound sources – but diverse ones – creating a forest of sound around the space while this one expanded more and more, turning the room into an environment, and this environment into an instrument capable of shaping different aesthetic orders into scene. The performative evolution of space has an impact on the senses of the audience unfolding an inner collective reality by activating an attentive and advanced listening attitude towards the spatial properties of sound. In this first part, the evocation to a mutant space emerged – constantly changing and growing in an over dimensional dynamic – contrasting the perceptual distances with the object of study through dry sources at the beginning and a wet environment at the end; "push and pull, close and far, personal and omnipresent". The space constantly expanding was perceived as "the big bang, the space where the universe was born". This first part finished with an immersive reverb effect which merged and blended all individual sounds from the dry static sources promoting the sense of ubiquity and omnipresence only through the extenuation of space reverb.

The second part used linear movements to highlight the reflection time of space. Time in architecture denotes the rhythm of its elements and the dimension of space. The time lapse structuring the piece becomes the spatial itself and is described by the Japanese concept "ma" as the in-between objects, in-between surfaces, in-between boundaries that built a space, in-between space. The piece, made up of impulse responses, left between one and another, a pause, a fragment of sound that dissolves in the silence.

These silences, the "ma," shapes the temporality that draws space. It's a dialogue between materiality and void, from where sound-space emerges. In this second part, space sensations were more accurate to real spaces association dragging to reality the antigravity states from the first part; "different rooms with different sensations, size and stories". The second part brought memories from previous experiences, undifferentiated from real *in-situ* situations, fantasy experiences, or even imaginary events brought from an oneiric overview of reality. The event, whether lived or not, was brought back to scene through memories and associations, connecting with different spaces; "a cave, a place made of rocks, a factory building, metal walls, underwater space, an old train, a highway, an airplane, a spaceship, interstellar space, water cistern, a tunnel, spacious space, shining space." Somehow this impulse response composition was constantly denoting one space after the other, mixing up different kind of spaces, with different sizes, bringing a whole repertory of space characters into scene. Time was translated into the physiognomy of space. Reflections drawing morphologies, quickly changing to one another. Transformation appears once again, not from dimensional changes but from overlapping time; "mutant spaces, in constant transformation, like sand spaces in a constant process of construction and deconstruction." While the first dimensional composition was transforming space from dry to wet, this second part was also devoted to mutation of space, but through time modeling of overlapping spaces.

The third part is a continuation of the second part. The composition of impulse responses begins to densify more and more, and within the sound densification process, the spaces begin to dry up, transforming the impulse responses into simple bits and rhythms. Suddenly the scene goes from a spatial sensation composition to a rhythmic activation, inducing a musical element into scene. Disorientation of the public arises – who was invited to leave behind their usual musical preconceptions for traveling through attentive listening inside the dimension of sound – in a moment, transported back to a recognizable and ordinary place of music inside a space. This third part was identified by the audience as a; "war situation between earth and the unknown … the climax was a bit disturbing, like something bad will happen, I felt I had to escape … the experience was chaotic, like a nightmare." The layering process of dried impulse responses brought chaos to a climax that was finally released by increasing the bpm and the reverb to form a dense mass in an accumulation process that finally dissolves in an infinite space, brining calm back to the scene for the final end; "eventually light and good energies won … it evoked deep emotions, a place where I could be quiet inside and all my inner chaos was projected outside." In this last part, the interpretation of sound-space was built essentially from the emotional, feelings that triggered psychological aspects from the audience. Associations with previous states of mind, emotional states, feelings, and passions.

Sound informs about the space. Through the state of listening, we are able to dissolve into space. Sound is a medium which can develop a sense and an emotional connection with space. The performance is a simultaneous method of research by creating new spaces through sound and exploring new ways of listening spatially. With this method there is a discovering process that stimulates our capacity to perceive space through the sonic, putting attention not only to the perception of the environment, but to perception itself. We become aware of our own senses developing an exchange of information, as sound informs us about space, at the same time listening informs us about our state of

mind and emotions within the sound-space, becoming aware of ourselves. The performance addresses a process of observation and embodiment, arising consciousness of our feelings, our sensations, our emotions, our body, our thoughts, and mental images.

At some point the listener's perception becomes the performance itself, the artistic action is not only coming from the performer, but from the audience who becomes the medium, developing awareness and cognitive capacities, opening new levels of interaction within the sound-space. This repertoire of interaction through different levels of awareness and cognitive approaches are triggered through a conjunction between the composition developed and listening disposition of the audience. The repertoire could be organized in; (1) corporal space sensations triggered in the first part of the performance, (2) memory space sensations triggered in the second part, and (3) emotional space sensations triggered in the third and last part. These three states are linked to a specific listening attitude that emerges with space disclosure.

Listening with the body

> We humans are endowed with five senses, five different channels through which we gather information about our ever-changing environment. Communicating between inside and outside, four of these sensory channels originate in facial orifices – eyes, ears, nose, and mouth – that open our bodies onto the world. The remaining sense, touch, is dispersed across the entire surface of the skin, an enveloping membrane that registers the minutest of stimuli. (Cox 174)

The presence of the sound-space through acousmatics, connects us to a phenomenon of transduced information about sound evolving in space. There is a temporal narrative of space messages that are communicated through sound. Listening gives us a primary and inducing sensation that activates a visual input of space that unfolds in time. During the live performance in the Spatial Sound Institute, people were encouraged to go inside the room with a weak blue light, creating on purpose, a dark ambiance that could close the visual sense and expand the auditory one. The desired effect on the audience was the visual representation of a nonvisual sensory phenomena, where a complete body reaction is activated for creating spaces from sound. The sound spatialization that evolved with the whole composition is making a sound stimulus that produces a spatial experience, and this spatial experience translates itself in a visual entity with a certain materiality and temporality that is coming from space sensations triggered by the body, by memories and emotions.

In sound-space experience, the sensory becomes unstable to the essence of perception which is used to understand the world with the entire body all at once. A synesthetic activation of space through the auditory features of the performance are promoting new forms of embodiment of spatial narratives. The audible architectures enhance the hearing senses from every sensation, bringing with them a unique interaction phenomenon between architecture and perception triggered by sound. The listener inside this phenomenon pays attention to the sound's inherent tactility that is coming from the body, from memories and emotions, to create the material reality of new spaces. During the performance, listening transforms the sound into natural or imaginary attributes of existing or non-existing environments and spaces. This perceptual tool can create cross-modal correlations between sound and space, connecting one with the other through our body, our memories or emotions, for creating the auditory experience of sound-space.

Schaeffer's "reduced listening" ("Traité des objets musicaux" 159–170) detaches sound from its moving image and location avoiding a possible engagement with the sonic matter but instead provoking a haptic effect of sound. For discovering the "sound object" as a scientific material for sonic analysis, Schaeffer cut sound in a way that rejects its visual forms that come from the source enabling the emergence of new visual entities. In that sense, sound amplifies the visual imaginary of the acoustic space. "Such experiences provoke a 'transcendental exercise of the faculties', revealing the limits of each sense and the differences and disparities that provide the very conditions of possibility for ordinary empirical experience" (Cox 212). The sensory experimentation of the artistic action in performative practices brings art to a metaphysical level while exploring transcendental intensities that can build parallel realities. As in the "electronic gesture" (Xenakis 134), that describes the duration of sound, its timbres, dynamics, and pitches connected in a geometrical way. Music here governs the abstract relations of space and become perceptible in a physical form through the ear. Using music as a bond of sensory relations, also Leitner characterized his sound installation as a combination of art exhibition and concerts, with sound as a sculping material for creating spaces. The immateriality of its sonic artworks becomes physical; "Here, a single sound does not necessarily fill the entire exhibition space. It is far more that each of these single sounds creates its own space in which the viewer/visitor must enter" (Leitner "P.U.L.S.E." 9). The spatial sensations caused by Leitner's installations relativizes the limits of the own "viewer" body, trespassing a synesthetic process from sound to the spatial as the viewer begins to perceive himself as part of the space. Leitner's sound installations invites the viewer into a state of solitary creative meditation, without adapting itself to the usual topology of the world, precisely because facilitates the world to be imagined and created, instead of received.

The listener oscillates between the different levels of perception triggered by sound, transcending physical understandings to phenomenal creative outcomes. The architecture's boundaries are not the physical walls, but invisible spaces created by the body while inhabiting this new space he is creating. The body with its memories and emotions, inhabits the space at the same time the space inhabits the body. This relational activity between subject and object becomes the basis for the formal definition of the sound-space. The phenomenology of space and its production through sonic experiences release a new concept of space as a sensory outcome.

Conclusions

In the phenomenological approach of the performance in the SSI, the process of acquiring knowledge from the space through sound spatialization, was a transition from those sensations that the body received in a first place, to those mental structures that intervene the images held by the appearances, mixing up imagination with emotions, with motivations, with all previous beliefs from space and its sounds through memory. The materiality and formality of the sound-space can only be defined in a phenomenological approach, in terms of representation and signification. Our sensible intuition only can reveal us the phenomena which is not only appearances but an object created and organized by ourselves through experience.

Space Dystopia performance was a perceptual experiment of illusory spaces made by sound which, in a perfectly sensible mode, triggered inner elements from the self, not only sensations, but also emotions, impressions, feelings, and memories. The definition of the sound-space will always keep a veil of mystery and indeterminacy, as the process to access this knowledge will be through deduction of what our senses are offering. The evoked elements that the listeners introduce to their experience are part of the states of consciousness with which each one of them has. During the performance, the visual stimulus is reduced to the minimum, disactivating the background or context where the sound-space is presented as an object, forging a spatial and temporal experience focused in sonic perceptions. This phenomenon addresses the presence of the object in an invisible background, and as the object is invisible as well, the relationship between the elements is only present through personal images that we create individually and collectively. The sound-space is presented as a non-daily life experience, and as such, it situates itself in an origin point of the "first time" experience of something, without significations, without preconceptions, with no familiarity, as an entity close to Deleuze's Body Without Organs (Deleuze and Guattari, "A Thousand Plateus" 155–172), open to all possibilities of significations, all the power of desire, free of the organs that could reduce it to a "particular something." The sound-space is never a defined concept but instead a creative process of perception, an experience that teach us to observe our experience, a phenomenon that makes us doubt of everything we thought we knew, a shot of reality built by ourselves, a reflection of us.

The sound-space is a spatial perception of time. The temporal framework of the Space Dystopia performance is relative, which listeners could interpret on their own chronological terms. The performance, and consequently the sound-space, proposes an aesthetic relation between time and space through morphing spaces, a succession of different spatial sensations caused by sound. Space is not anymore, a physical entity, but a temporal one. Space has its own metrical frames given by its physical morphology, given by the "ma," turning the time of space to the space of sound. The composition for the performance avoids the musical structures, instead is presented as a process, as the production of temporal objects which contrast the space composition with the musical form. The spatial succession of sound becomes the dematerialization and deconstruction of the static space. The experience of time can unfold in a quantitative conception, as space has a specific dimension, and its extensive quality is inherently spatial, becoming time subordinated to space. However, the spaces built by sound evolve through a qualitative process, as an achronycal continuum, from its unstructured existence.

Time and space are two unchangeable concepts and a basis for changeable phenomenal elements. In that sense, time and space in ontological terms, are the necessary context for time and space in aesthetic terms. According to Kant, time can be simultaneous and successive, and all relational dynamics are also temporal relationships. But regarding its universal objectivity, time is still a subjective condition of human sensations. "Space and time are its pure forms; sensation is its matter" (Kant 55). In Space Dystopia performance the experience of time is the experience of duration, duration as things happening over time with a certain continuity, which places the performer and the listener in a wave that flows and changes, losing the chronological sense of time. This indefinite time is the temporal narrative development that schedules the performance in sections, mapping soundmarks that must be solved by the active listener. The

performance as research method depends on time which will influence the perception of reality through the understanding of things happening in sequence. A form of appearance that is moving, transitioning, building up our empirical consciousness to perceive the things in the world. As we already mentioned, sound-space is not a physical entity but a temporal one and exists as time. Is shaped through perception, as an outcome of active listening in three different forms; body listening, memory listening, and emotional listening. The apperception, the consciousness of what we are perceiving, is a creative process of signification for the perception-creation. The sound-space is not a universal element, but a creation of the listeners perception. The production of space, through sonic and spatial experiences, releases a creative outcome of space as sense, triggered by the body, the memories, and the emotional state.

The performance builds a dimension of reality that put together a unique sound through multiple sensory interpretations, listening states, and spatial outcomes as an artistic action that involves both, the performer and the listener, in an infinite phenomenological process of revealing mystery that will never be completely unveiled.

Notes

1. Deleuze *Différence et Répétition*.
2. Deleuze*The Logic of Sense*.
3. Deleuze and Guattari *Mil Mesetas*.
4. Deleuze and Guattari *Qu'est-ce que la philosophie?*.
5. Origin Greek.
6. Some of the morphological categories experienced and defined by Leitner are: sound cube, spatial grid, oscillating corridor, sound portal, sound ramps, sound corridor, sound waves, among others.
7. The categories used by Bayle are based on the four listening modes proposed by Schaeffer ("Traité des objets musicaux" 61–74): hearing (*écouter*), listening (*ouïr*), understanding (*entendre*), and comprehending (*comprendre*).
8. https://spatialsoundinstitute.com/Space-Dystopia-2021.
9. https://www.youtube.com/watch?v=5KURMDKGZZg.
10. Impulse Response is a method of acoustic analysis that consists on a brief input signal for measuring the sound reaction of space.
11. Convolution Reverb is the process through which an input signal is modified through a virtual acoustic space, usually created from an impulse response.
12. Main question of the listening workshop post-performance.
13. Collective interview developed during the listening workshop.

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