With Love: Electroacoustic, Audiovisual, and Telematic Music

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Abstract. This article discusses different approaches of music composition and performance with electroacoustic, audiovisual and telematics media. It provides different points of view for understanding the so-called electroacoustic paradigm which emerges from the use of apparatuses in the sound creation and production. From within electroacoustic music paradigm, we examine tendencies and visions of audiovisual and telematic music composition and performance. As illustrations we examine the pieces *Vega_S* (2019) by Kefalidis and *Mojave* (2021) by Chagas/Carrascoza. The telematic communication has the potential do convert discursive thinking into dialog and opens up new possibilities of artistic collaboration. The holistic potentiality of telematic art supports Ascott's metaphor of love in the telematic embrace.

Keywords: electroacoustic music, audiovisual music, telematic music, composition, performance, artistic collaboration, Flusser, Ascott.

1   Electroacoustic Music

What is electroacoustic? And what is electroacoustic music? From an evolutionary perspective, electroacoustic music represents a new paradigm in the history of music that carries on the tradition of vocal and instrumental music and extends it to include the use of apparatuses to produce and move sound around in spaces. From this historical point of view, it has emerged in a period of crisis represented by the disruption of the fundamental role tonal harmony has played as the established disciplinary matrix of music composition. This crisis triggered different responses leading to non-tonal textures in the music of composers such as Schoenberg, Webern, Stravinsky, Debussy, Bartok, Messiaen, and others. Moreover, it pushed composers to explore other constructive principles of musical organization focused on the physical reality of sound phenomena, and to emphasize sound qualities such as timbre and noise. Within the crisis of tonality as foundation, electroacoustic music was able to meet the demands of an aesthetic sensibility focused on this expanded consciousness of sound phenomena.

We find three different orientations in the development of electroacoustic music: *musique concrète*, *elektronische Musik,* and computer music.[1]

The *musique concrète* that came into existence in Paris after World War II, began with Pierre Schaeffer's experiments in recording techniques for capturing sounds of the acoustic environment. This approach engaged the persistent myth that the world is the primary acoustic space of music extending from the earth to the whole universe. The acoustic myth allows sound phenomenon to be isolated from the physical environment, be heard as a unique object and event, and eventually be disconnected from its material source and origin. Released from its cultural references, sound becomes a self-referential paradigm for composing new audible forms. At this point, composition took advantage of new technology for recording, manipulating, and reproducing sound. Drawing ideas from Edmund Husserl's phenomenology of time consciousness [2], the aesthetics of *musique concrète* developed notions such as *sound object* and *reduced listening*. These categories emerged through the interaction of sound material with technical apparatuses, most notably, the tape recorder. *musique concrète* provided electroacoustic composition with analytical and synthetic approaches to sound perception and composition.

The *elektronische Musik*, most closely associated with the electronic music studio of Cologne, pioneered the creation of sounds whose models are neither found in nature nor possess the qualities of instrumental or vocal sounds. Methods adopted by Karlheinz Stockhausen and other composers of *elektronische Musik* were used to invent new sounds building from the simple elements of technical apparatuses. The signal generator and the noise generator became the prototypes of electronic sound devices despite being designed to test equipment and not for making music. These apparatuses are both mathematical constructs; the signal generator explores the simplicity of a single harmonic motion such as the sine wave, while the noise generator explores the statistical model of all possible vibrations occurring randomly in auditive space. The aesthetics of *elektronische Musik* took advantage of electroacoustic technologies developed during the German Third Reich, which radically transformed the experience of listening while creating new logics to frame political activity. Radio broadcasting and sound amplification were interconnected technologies used for acoustic landscape control and organic synchronization of masses. Radio in particular activated the sonic experience of private intimacy and transformed the universe of telematic paradigm. However, radio also preserves the ancient magic of mythical worlds. As McLuhan [3, 299] notes, "The subliminal depths of radio are charged with the resonating echoes of tribal horns and antique drums."

The historical opposition between *musique concrète* and *elektronische Musik* is emblematic of the diversity of the electroacoustic paradigm. After World War II, the activity of cultural institutions such as the radio studios of Paris and Cologne, promoted a shift of consciousness in electroacoustic music composition. *musique concrète* developed a poetics of *detachment* from the previous vocal and instrumental paradigms and *attachment* to the sound phenomenon; it disengaged sound consciousness from the models of traditional vocal and instrumental music while at the same time, moved

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[1] For an account of the development of electroacoustic music see [1, 103-158].

toward interactions with sound that revealed cultural values and identities. Meanwhile, *elektronische Musik* developed a poetics of *detachment* from the sound and *attachment* to the paradigm of music composition. By carrying on the compositional path of the previous vocal and instrumental paradigms, it disentangled consciousness from the representative background of sound as a meaningful artifact and focused on the musical relevance of sound phenomenon. *Elektronische Musik* explores differentiations of acoustical agency in the vibration-centered model of sensitivity.

The *heterogeneity* of sound material is an aesthetic foundation of electroacoustic composition. The opposition between recorded sounds (*musique concrete*) and synthetic sounds (*elektronische Musik)*, quickly dissipated as any kind of sound could become the object of musical composition. The electroacoustic paradigm not only integrated the musical puzzles of the previous vocal and instrumental paradigms but provided new ways for representing and manipulating sound. As the prototype of a reproduction apparatus, the tape machine was able to radically transform and manipulate recorded sound despite the fact that electromagnetic tape symbolizes linear thinking. On the other hand, digital systems of audio recording introduced non-linear representation in which sound is broken down into an atomic dot-like structures that disintegrate into a mosaic of numbers as the bond with temporal sound tissue dissolves. The fragmented granular structure of the sound, which can be manipulated by computers and artificial intelligences, replaces linear thinking and promotes a consciousness of the microstructure of any given sound.

As Pousseur observed, electroacoustic music articulates a continuous interaction between different levels of sound organization, so that it becomes difficult "to draw a precise boundary between internal composition of sound and higher levels of composition" [4, 82]. A myriad of sound poetics emerged within the electroacoustic paradigm such as soundscape composition, deep listening, live-electronics, and other musical distinctions involving vocal, instrumental, or electronic sounds. The electroacoustic paradigm extended sound perception and consciousness, especially in the way it relates to microscopic and macroscopic levels of sonic composition. The opposition of macro/micro sound, along with the methodic use of music apparatuses, is a signature of the electroacoustic paradigm symbolizing a desire for intensification of the living experience.

2   Sound Embodiment and Sound Space

Human *embodiment* can be seen as a mediator between technology and the world. In traditional acoustic music, gestures are made distinctive through specific features such as articulations, dynamics, timing, rhythm, meter, texture, and timbre. In electroacoustic music, the body's gestural interface – visual, acoustic, and tactile – facilitates new kinds of interactive and intersubjective communication. For both acoustic and electroacoustic music, gesture articulates not only the perception of nuance, cognition, and affect — but also negotiates the understanding of higher sound and musical structuring through internal synthesis and integration of elements.

Embodiment and *gestural* activity emerge as key concepts in discussions of space in electroacoustic music [5]. The increasing focus on the multiple connections between

sound, body, and listening reaffirms the notion of space as enacted experience. This represents a significant shift from the typological and morphological approaches of sound to new formulations based on more synthetic, phenomenological, and ecological categories. Nevertheless, a problem persists in the theoretical and analytical discussion, namely the distinction between "internal" and "external" sound space. The structural coupling of internal and external references, as pointed out by Luhmann [6] in the realm of his autopoietic theory of social systems, poses the question: How do artistic objects articulate and combine perception and communication?

In Luhmann's response, sound space must be defined not in terms of sonic qualities, but as a *mode of operation of consciousness that gives form to the perception of space within the acoustic environment*. Similar to the operation that produces polyphony, sound space is the form of the difference between *self-reference* (internal world) and *hetero-reference* (external world) in acoustic perception. This definition implies that consciousness has to establish the boundaries that connect and disconnect the perception of sound phenomena to the perception of space. The definition of sound space is a particular embodiment based on the possibility of perceiving sounds as meaningful elements.

In opposition to instrumental and vocal sounds that are *tightly coupled* with the body and the objects that produced them, electroacoustic sounds can be seen as *loosely coupled* because they leave room for multiple combinations. The sound recording of a voice, instrument, or environment is an inscription and re-creation of sound waves that can be transformed in different ways and turned into something completely altered from the original sound. Luhmann introduced the opposition between *loose coupling* and *tight coupling* to account for the difference between media and form. Media is a loose coupling of elements, something more abstract and fluid — while form is a tight coupling of elements, something more stable and tangible. [6, 102-132]. Electroacoustic music is a disembodied entity as sound frees itself from the body. Therefore, electroacoustic composition requires a process of re-actualization of meaning in order to endow sounds with a bodily, spatial memory.

From the beginning, space has been a functional and operational category of electroacoustic composition. Sound space composition then became more fully realized with the introduction of multi-channel audio technology. Prototypes of multi-channel technology consist of the four-track tape recorder and the quadraphonic speaker system surrounding the listener: a stereo pair in the front and another in the back. Through the use of this technology in the late 1950s and 1960s, composers began to create pieces in which sounds were designed for specific positions in space. Once space became a parameter of composition, sound developed a "tactile" dimension. Similar to a body, it occupies a unique position in the space from which it can exclude other spaces.

3   Audiovisual Composition

Currently, the concept of audiovisual art is framed by the dominant role film and television play in our society, founded on technology of sound and image reproduction invented in the second half of the 19th Century. Cinematography, as an audiovisual art

that emerged from the movement of technical images, elevated film to the most popular artistic form in human history. With the supremacy of the moving image, especially during the silent film era, it was possible to cross borders and establish patterns of transnational communication. As the sound film quickly prevailed as a product of mass consummation, cinema, and later television, shaped the perception of sound and image until the end of the 1980s when digital technology set the stage for radical transformation. The popularization of personal computers, mobile devices, and networks of information and communication, began to reframe the creativity of audiovisual art. Technology propelled convergences of sound, image, space, and performance to create new architectures of collaboration giving rise to new kinds of transnational dialogues. As the traditional structures of creation and production of audiovisual art underwent this enormous change, new artistic forms of audiovisual composition began to emerge.

In the universe of electronic music, there has been a growing interest in audiovisual composition with more electroacoustic works being coupled with video, and mixed works combining electroacoustic sounds, live performance, and visual projection. Audiovisual composition has the potential to bring electroacoustic music to a broader audience, as it addresses a multimodal perception and sensibility. It reveals two important components: the convergence of fields and perceptions as well as the creation of a diversity and differentiation of forms. Composers of audiovisual works have much to consider. Based on their initial motivation to create a new piece, they are faced with the question of which will be more important – the music, the visuals, or the combination of the two? They must consider how the sound and image relate to each other as they attempt to intensify the immersive, sensorial experience and try to raise the consciousness of the interconnection between hearing and listening as a mode of being in the world. If they fail to achieve these objectives, should the audiovisual composition be considered just another distraction reinforcing the patterns of entertainment and diversion? As a society inhabited with myriad trivial objects and gadgets of audiovisual technology taking a hold on our existence, we have become saturated by the torrent of audiovisual impressions. Faced with this flood of information that can lead to a state of entropy, it is important to develop a critical reflection on audiovisual communication. We need a comprehensive account of the relation between sound and image beyond the conventional form of cinema in order to understand its full creative potential. It is necessary to deconstruct the hegemonic discourses and point out the broad spectrum of possibilities and diversity of forms within audiovisual composition.

4   The Electronic Music Video

The music video, which emerged in tradition of electronic music, is a contemporary form of audiovisual composition coupling electronic sounds with image projection that enjoys growing interest and is developing into a sub-genre of electroacoustic music. The music can be "heard" and "seen" at the same time. The audiovisual merge seems to have the potential to make the music more accessible to a broader audience. But here one has to raise the following question: Does the multimedia intensify the sensorial experience and make it thus more attractive, or does it simply provide a distraction that

reinforces the patterns of entertainment and diversion of the consume society? Whatever the answer may be, embedding the music into an audiovisual form provides the listener with an immersive experience that is functionally linked to the situation of the movie theater: the music is projected into the room through loudspeakers, the sound surrounds the bodies, while the image projected onto a screen—usually located in front of the audience—focuses the audience's attention on an illuminated surface.

The electroacoustic music video relating sound, image, and space is primarily an immersive experience that can be also integrated with other forms, such as the concert with live music performance (vocal, instrumental, and/or electroacoustic music); the performance with dance, acting, etc.; the installation; and so on. Traditionally, the audiovisual art is structurally coupled with the space both as physical and social medium. The immersive experience relates physical presence to social presence. By contrast, watching an electroacoustic music video on a computer, on internet, or on a mobile device is mainly an individual experience, in which the embodied experience is dispersed along a spectrum of possibilities emerging from the interaction with the technological environment.

As an illustration of audiovisual composition, we would like to examine the piece *Vega_S* (2019)[2] by the distinguished Russian composer Igor Kefalidis (b. 1941). Kefalidis' profound interest in electroacoustic music has resulted in a long period of composing pieces exclusively with electroacoustic sounds — most in combination with solo instruments, chamber music, and orchestra. His creativity reaches into the fields of dance and audiovisual composition and the relationship between sound and image plays a crucial role in his recent work, in which he has been collaborating with visual artists. Most recently, he has been adopting new tools to create synthetical images.

Vega_S (2019) – length 13'05" – for electronic sounds and video is a remarkable piece that represents a mature stage of Kefalidis' audiovisual composition style. Here, the electroacoustic music seems to bring forth the imagery, as though the sounds are endowed with visual symbolism. The visual composition by Andrew Quinn takes advantage of the imaginative character of the music and seeks to create an organic relationship through the use of a thin white vertical line in the middle of the screen that varies in brightness according to the music. The line turns into a narrow dark space separating two walls that constitute the main element of the visual composition. The walls are curved with a translucent and pixelated structure in black and white that continuously rotate in opposite directions, changing speed according to the sonic variations of the music. Figures appear and disappear in the narrow space between the walls and the spaces and on their left and right sides and the pulsing activity of these intermittent elements are in sync with the music. At 5'20", a strong beat punctuates the visual composition and the music speeds up and ascends in a pseudo–quotation of a short compelling rock guitar solo (8'35" – 8'48"). As the musical energy increases, colorful strips are introduced in the wall landscape, rotating ever faster and disrupting the visual symmetry to create a fragmented, fast-moving kaleidoscopic image to accompany the rock guitar. The electronic music creates the impression of fluid space as the sound objects and events seem to move closer and then farther away. The visual composition explores

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[2] Available at <https://youtu.be/QLGKroHIpaA> (accessed June 1, 2021).

the fluidity of the space by creating a kind of futuristic landscape that constantly moves without a clear direction. The audiovisual composition presents us with the ambiguity of experiencing a calculated universe while simultaneously allowing us the chance to move between the world of algorithms. Overall, it infuses us with energy and hope as it suggests the need to disrupt hegemonic structures of power to escape via beams of flight leading to unknown territories. *Vega_S* is an accomplished example of the synergy of sound and image. The multiplicity of connections between electroacoustic sounds and synthetic images portray the massive potential of audiovisual composition.

5   From Soundscape to Telematic Immersion

Telematic music is an attempt to make a synthesis of two different types of communication: (1) The communication of chamber music, which occurs in the physical medium with bodies producing gestures that are translated into sounds; (2) the communication of electronic music, which occurs in the virtual medium with apparatuses producing programs that are translated into sounds or images. Unlike traditional chamber music, which is structured as a succession of linear events such as themes and variations, telematic music creates a dialog that "occurs in simultaneous time and space, and all players in all places make decisions relating to themes and their variations all at once" [7]. Telematic music offers the possibility to reshape musical performance in virtual spaces by reconstructing the subjectivity with the *experience of presence*.

As an illustration of telematic music, we will discuss *Mojave* (2021)[3] – length 8:53" – a collaborative work for flute, electronics and video that unfolds an aesthetics of audiovisual immersion with telematic performance. The work was developed on the basis of 3D video and ambisonics audio recordings on the desert of Mojave (California) in January 2019. Cassia Carrascoza created a performance for this specific site physically interacting with the landscape and improvising with sounds exploring extended techniques for flute and bass flute. Paulo C. Chagas composed a score for flute and live electronics exploring algorithms of delay and feedback, which create a universe oscillating between latencies and synchronies. Different versions of the piece were created for audiovisual media and live telematic performance. Mojave is a multilayered audiovisual composition that reflects on the presence and absence as vectorial forces of creativity. The contrast between the vast desert landscape and the confined telematic environment evokes the existential feelings of eternal and transitory, the finite and the infinite, and the anxiety we current experience between isolation and the opportunity to immerse ourselves into virtual worlds.

Conceptually, *Mojave* is part of the large-scale research project *Sound Imaginations*, which aims to investigate listening cultures and different categories of listening.[4] The emblematic notion of *soundscape* proposed by the Canadian composer and scholar Murray Schafer in the 1970s [8] is a key concept for observing the sonic environment, which includes not only the "natural" sounds but also the entire culture that

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[3] Available at <https://youtu.be/GB-KwDOImho> (accessed June 01, 2021).

[4] *Sound Imaginations* (2020) immersive surround sound and 3D video installation available at <https://ucrarts.ucr.edu/Exhibition/sound-imaginations> (accessed June 01, 2021).

characterizes the sonic environment of any specific space or object of study. Driven by Schafer's ideas, many scholars and artists have been pursuing the mapping of historical and contemporary soundscapes and observing the transformation of soundscapes in the industrial and digital societies. Many authors have criticized Schafer for having projected the problematic concept of "soundscape" borrowed from visual art into sound studies as it suggests a static perspective rather than the moving and surrounding characteristic of sound phenomena. Also, it implies a division between hearing and seeing, which is highly problematic in the contemporary world shaped by the connective reality of audiovisual and multimedia technology.

Feld [9], for instance, proposes the concept of acoustemology – the union of acoustics and epistemology – that investigates the primacy of sound as a modality of knowing and being in the world. Soundscapes are not just physical exteriors, they are perceived and interpreted by human actors and are invested with significance by those whose bodies and lives resonate with them in social time and space. As a cultural system, sound both emanate from and penetrates bodies; hearing and producing sound are thus embodied with competencies that situate actors and their agency in particular historical worlds.

The compositional concept of *Mojave* was elaborated on the basis of the semiotic square proposed by Hayles [10] that reconstructs the distinction between *randomness* and *pattern* in the so-called *posthuman* society while emphasizing the role of *embodiment* and *materiality* in the processes of constituting meaning. Hayles' semiotic square (Figure 1) has two axes: the main axis is the distinction between *presence* and *absence*; the secondary axis is the distinction between *randomness* and *pattern*. Two diagonals that connect these two axes trigger a dynamics of signification. The diagonal connecting presence and pattern conveys *replication*; the diagonal connecting absence and randomness signals *disruption*. The interplay between presence and absence shapes materiality; the interplay between randomness and pattern gives rise to information [10, 247-251].
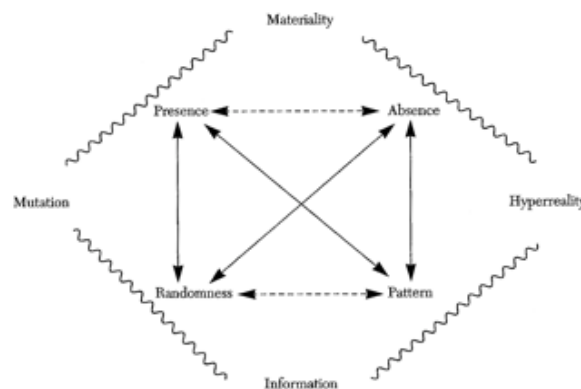

Fig. 1: Hayles' semiotic square of the posthuman society [10, 249].

On the site of the desert of Mojave, Cássia Carrascoza developed a performance with flute and bass flute that articulates a dialectics of presence/absence emerging from the

auditory and visual perception of the soundscape/landscape. For instance, the presence the strong wind blowing through the vast space of the desert – which also autonomously activated flute sounds –, and the sounds produced by the crackling of small stones as one moves across the uneven desert ground, these are two elements that were integrated in the performance, along with long sounds and extended flute techniques. The 3D images move around Cássia as focal point, a central figure that captures the human presence in the emptiness of the desert landscape, which symbolizes void and absence. Starting from this focal point, the movements unfold edges, diagonals, curves, rotations, and circular movements that opens up a constant play of spiracle shapes, a vortex of 3D images that pushes things beyond the center, creating a path of decentering moving along both the axis of presence/absence and randomness/pattern. The musical composition associates visual imagery with the spherical sound perception of the ambisonics technology. It explores a vocabulary of sound shapes and colors, sound objects, events or movements that tease out the decentering of the listener, which is sometimes synchronized and sometimes out of sync with the visual.

Mojave is a collaborative work between a composer and a performer acting as equal partners that takes into account the new fields of creativity emerging through the convergence of sound, image, and the development of new architectures of collaboration. It addresses resources, approaches, and strategies of audiovisual composition in an environment where information is embodied in complex heterogenic and polyphonic structures of subjectivity. The piece exists in different versions including a real-time telematic performance.[5] As pointed out by Guattari [11] [12], subjectivity is no longer restricted to human consciousness, but incorporates the body of technology through what he defines as "machinic assemblages". Creativity no longer depends on personal identity and subjectivity but on the particular assemblage that happens in connection with technological bodies that extend the framework of cognition and meaning. The structure of the "machinic assemblages" can be defined as "polyphonic, as it articulates a multiplicity of human and non-human subjects bringing several simultaneous and independent levels of perception and meaning" [1, 106].

6 Conclusion: Telematic Embrace

As Heidegger [13] argues, modern technology has changed our sense of the world as it tends to reduce everything into mere resources, including human beings. The programmatic magic of technical apparatuses, including artistic apparatuses that produce synthetic sounds and images, tends to eliminate critical thinking, replacing historical consciousness with a second-order magical consciousness that reduces culture to its lowest denominator. With the technical apparatus, relations of power move from physical objects to a symbolic level of programs and operators.

The telematic paradigm embraces the communicative complexity that emerges from the convergence of telecommunications and information processing in today's society. Flusser [7] believes that telematic communication has the potential to radically

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[5] Available at <https://youtu.be/onuWdf92KrI> (accessed June 1, 2021).

transform the way we communicate. Telematics can reverse the natural tendency of entropy – the state of randomness in which information is unpredictable and therefore impossible – by converting historical and discursive thinking into dialog. In Flusser's telematic dialog, man and apparatuses act as partners devoting themselves to the systematic generation of information through a playful game. The telematic dialog embodies Flusser's utopia of freedom as a struggle against entropy, which emancipates man from the controlling functionality of the machine.

The possibilities of artistic collaborations between participants in remote locations, interacting via electronic networks, can facilitate interactive art and interdisciplinary, as Ascott pointed out in his seminal writing of 1960s [14, 109-156] The telematic paradigm involves not only the technology of interaction among human beings but between the human mind and artificial systems of intelligence and perception. It transcends the body, amplifies the mind into unpredictable configurations of thought and creativity, and can contribute to the emergence of a global consciousness. The holistic potentiality of telematic art supports Ascott's metaphor of love in the telematic embrace. Like gravity, passionate attraction draws together human beings an connects then. Global telematic embrace would constitute an "infrastructure for spiritual interchange that could lead to the harmonization and creative development of the whole planet" [14, 245].

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