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Collaborative Dynamics in Electroacoustic Music Creativity: Telematic Dialogues Across Apparatuses

Dinâmicas colaborativas na criatividade musical eletroacústica: Diálogos telemáticos através de aparelhos

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Abstract: This paper investigates the dynamics of electroacoustic music collaboration within complex technological, social, and philosophical frameworks. Emphasizing the interplay between human creativity and technical apparatuses, it draws on theoretical concepts such as Vilém Flusser's telematic dialogue, Jacques Attali's notion of composition as resistance, Martin Heidegger's ontology of art and technology, and Niklas Luhmann's systems theory. Through historical examples—including the WDR Electronic Music Studio—and recent works by composer Paulo C. Chagas and flutist Cássia Carrascoza, particularly *Sound Imaginations: Telematic Immersion*, the paper examines how electroacoustic practices generate new forms of authorship, co-presence, and symbolic ritual. These practices challenge conventional boundaries between composer, performer, audience, and machine, proposing a participatory model of creative exchange instead. Ultimately, the study argues

that electroacoustic collaboration reshapes not only the process of music-making but also broader modes of technological engagement, cultural production, and social interaction in the digital era.

Keywords: electroacoustic music. collaboration. creativity. apparatus. telematic dialogue.

Resumo: Este artigo investiga as dinâmicas da colaboração em música eletroacústica no âmbito de complexos campos tecnológicos, sociais e filosóficos. Ao enfatizar a interação entre a criatividade humana e os aparelhos técnicos, o estudo emprega conceitos teóricos como o diálogo telemático de Vilém Flusser, a noção de composição como resistência em Jacques Attali, a ontologia da arte e da tecnologia em Martin Heidegger e a teoria dos sistemas de Niklas Luhmann. Por meio de exemplos históricos—incluindo o Estúdio de Música Eletrônica da Rádio WDR de Colônia, Alemanha— e de obras recentes do compositor Paulo C. Chagas e da flautista Cássia Carrascoza, em particular *Sound Imaginations: Telematic Immersion* [*Imaginações sonoras: Imersão telemática*], o artigo examina de que modo as práticas eletroacústicas engendram novas formas de autoria, copresença e ritual simbólico. Tais práticas desafiam as fronteiras convencionais entre compositor, intérprete, público e máquina, propondo, em seu lugar, um modelo participativo de troca criativa. Por fim, o estudo sustenta que a colaboração eletroacústica redefine não apenas os processos de criação musical, mas também modos mais amplos de engajamento tecnológico, produção cultural e interação social na era digital.

Palavras-chave: música eletroacústica. colaboração. criatividade. aparelho. diálogo telemático.

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1. Introduction: Toward a Collaborative Paradigm in Electroacoustic Music

In the contemporary digital age, the creative act in music has undergone a radical transformation. Electroacoustic practices, embedded in complex technological environments, have expanded the sonic vocabulary of music-making and redefined the nature of collaboration. This paper explores how the interplay between human intention and technical apparatuses fosters a unique form of collaborative creativity, drawing on philosophical, historical, and systemic perspectives.

Central to this exploration is Vilém Flusser's concept of *telematic dialogue* (FLUSSER, 2011), in which artists engage in recursive, game-like exchanges with machines. The apparatus, as Flusser notes, is both constraint and invitation—a black-box that can be subverted or played with to generate new aesthetic forms (FLUSSER, 2000). This tension reflects the ambivalence of technological creativity: while programmed, apparatuses can be creatively reconfigured to yield unexpected outcomes.

This framework aligns with Jacques Attali's vision of composition as a post-repetitive musical paradigm (ATTALI, 1985), privileging improvisation and real-time interaction over fixed structures. Collaboration thus extends beyond human agents to include the apparatus as an opaque yet active participant. The historical case of the WDR Electronic Music Studio in Cologne illustrates this model: composers, engineers, and machines engaged in a dialogical process of experimentation and improvisational response (CHAGAS, 2006).

Martin Heidegger deepens this framework by suggesting that art reveals truth (*Aletheia*) not through representation but through an opening—a clearing in which Being can emerge (HEIDEGGER, 1993). In electroacoustic music, this revealing occurs through, not despite, technology, as sound manifests in and through the apparatus itself. Niklas Luhmann's systems theory complements this by conceptualizing such collaboration as an autopoietic

process—a self-generating network in which improvisation introduces contingency, making space for emergent meaning (LUHMANN, 2000).

By situating electroacoustic music within this broader philosophical landscape, we understand it not merely as technical innovation but as a *techno-ritual*: an embodied, participatory process that redefines authorship and reconstitutes community in an increasingly disenfranchised world (CHAGAS, 2024). The apparatus here is not a passive tool but a co-creative partner—one whose logic must be understood, subverted, and transformed through play.

What follows is an investigation of these collaborative dynamics through philosophical concepts, historical examples, and compositional case studies. We trace how the logic of games, improvisation, and dialogic interaction informs electroacoustic creativity and opens new pathways for rethinking the relationship between art, technology, and society.

2. Game and Dialogue: Flusser's Telematic Imagination

Vilém Flusser's conception of the telematic dialogue (FLUSSER, 2011) provides a foundational framework for rethinking creativity in the digital age, not merely as the execution of individual expression, but as a co-creative game between humans and apparatuses. For Flusser, the central task of artists in a post-industrial society is to play against the programmed logic of the machine, not by rejecting it, but by entering into a form of playful subversion—what he terms a risky game with the apparatus. This game is not metaphorical; it is structural, defined by recursive feedback and an ever-shifting rule set negotiated between the operator and the system.

In *Creativity with Apparatuses*, Paulo C. Chagas (2014b) builds upon Flusser's proposition of chamber music as a prototype for telematic dialogue, examining how this conceptual model has evolved within the context of electroacoustic practices. Tracing the transformation of chamber music from a pre-industrial,

dialogical form to a framework for digital collaboration, Chagas highlights its relevance for theorizing technologically mediated musical creativity. In both chamber music and telematic art-making, players—whether musicians or human-machine hybrids—are engaged in mutual attunement, where gestures and signals circulate within a networked system.

This shift from a soloist conception of authorship to a distributed model reflects a deeper epistemological change. In the telematic paradigm, as explored in *Sound, Truth, and Paradigm* (CHAGAS, 2021), the apparatus is characterized not simply as a tool but as a constitutive element in constructing artistic meaning. Apparatuses exist within technical, social, and aesthetic networks, and their black-box nature demands interpretive and improvisational engagement.

Originally proposed by Flusser, the concept of the game challenges traditional authorship, reframing the artist as a participant in a generative system—one who neither controls fully nor surrenders agency, but shapes outcomes through dialogical improvisation (FLUSSER, 2011). The apparatus thus becomes not only a site of constraint but a field of creative negotiation shared by human and non-human agents.

Chagas highlights the tension between programming and projection by contrasting pre-industrial ritual models—mythic and oral—with the *programmatic magic* of today's apparatuses, which operate through features and protocols. While the former built communities through embodiment, the latter risks isolating us. Yet through dialogic play—experimentation, hacking, and improvisation—the apparatus can be re-ritualized and infused with meaning and communal resonance.

The programmatic magic thus reshapes collaboration in electroacoustic music not as consensus but as negotiation across systems. Each participant—human or machine—brings affordances, constraints, and semi-autonomous behaviors. The creative act becomes one of modulation: listening and responding,

anticipating and adjusting. The game is an open system; form arises from interaction.

In the next section, we turn to a historical case study that exemplifies this mode of collaborative gaming: the WDR Cologne Electronic Music Studio, whose practices in the mid-twentieth century anticipated many of the dynamics now central to telematic music-making. There, composer, technician, and apparatus formed a tripartite ensemble—each decoding, interpreting, and reconfiguring the others in an ongoing dialogue that blurred the boundaries between roles, tools, and authorship.

3. WDR Cologne: Studio as Apparatus, Composition as Dialogue

The Westdeutscher Rundfunk (WDR) Electronic Music Studio in Cologne holds a pivotal place in the genealogy of electroacoustic music. More than a site of technological innovation, the WDR Studio functioned as a paradigmatic environment where collaboration, improvisation, and apparatus became entangled in the creative process. Emerging in the early 1950s under Herbert Eimert and later shaped by Karlheinz Stockhausen, the studio provided both the technical infrastructure and conceptual framework for a new kind of composition—one grounded not in the individual genius of the composer but in the co-presence of engineers, technicians, and machines.

Viewed through Flusser's lens, the WDR studio was a telematic chamber *avant la lettre*: a networked environment where creativity unfolded as a recursive dialogue between human agents and electronic systems. The composer did not "write" a piece in the traditional sense of producing a fixed notated score, but engaged in an iterative process of generating, analyzing, and assembling sound, often in collaboration with engineers whose technical expertise shaped the compositional outcome. The logic of the apparatus demanded a new kind of authorship: distributed, improvisational, and contingent (CHAGAS, 2014a, pp. 159–202).

This dynamic reflects Flusser's view that apparatuses are not neutral tools but programmed systems that configure reality according to hidden rules. Apparatuses create what he calls programmatic magic—a techno-mediated illusion that obscures its operations and renders critique difficult. In contrast to what Flusser describes as earlier forms of communal, ritual magic—embedded in embodied social practices—this new techno-mediated form mystifies the user, reducing them to a functionary. Creative engagement requires navigating and resisting this automated logic (CHAGAS, 2014a). As Flusser claims, we don't play with the apparatus, but against its automatic programming (FLUSSER, 2000).

At WDR, this meant composers subverted embedded programs—exploiting feedback loops, misusing equipment, and manipulating sonic material beyond intended design. Chagas refers to this as *subversion of the program*: a form of resistance that opens creative freedom within technical constraints (CHAGAS, 2006; CHAGAS, 2014a; CHAGAS, 2014b).

The studio's practice embodied a double movement: on the one hand, precision, planning, and systemic knowledge—the composer as engineer; on the other, experimentation, failure, and improvisation—the composer as performer within a machine ensemble. WDR anticipated the fluidity of roles seen in networked music environments, where composer, performer, technician, and system blur into a collaborative meshwork.

Luhmann's systems theory, particularly his concept of autopoiesis—a self-generating, self-regulating system—further illuminates this dynamic. In *Unsayable Music*, Chagas describes the WDR Electronic Studio as a "meta-apparatus" (CHAGAS, 2014a, p. 198), functioning as a network in which composers, technicians, and machines participated in a cybernetic process of dialog and feedback. The studio was not merely a collection of devices; it operated as a space that stored, processed, and generated information, allowing musical works to emerge through iterative exchanges between humans and machines. In this sense, the

studio developed into an self-productive model whose internal feedback loops shaped both artistic decisions and technological use. Improvisation introduced contingency—the emergent, unpredictable dimension of communication within this networked structure.

4. Composition as Emancipation: Attali's Vision of Creative Freedom

While Flusser offers a vision of telematic creativity as dialogical play with apparatuses, Jacques Attali frames the act of music-making as a political gesture—an act of resistance against dominant systems of control and normalization. In *Noise: The Political Economy of Music*, Attali (1985) charts the evolution of musical practice through successive regimes—sacrifice, representation, repetition, and finally, composition. Each phase reveals the deeper economic and social functions of music, suggesting that sound is never neutral but always entangled with power.

For Attali, the age of repetition—characterized by industrial mass production and the commodification of sound—results in a flattening of musical experience. Music is no longer performed or experienced; it is consumed. In this paradigm, listening becomes passive, and musical creation is subsumed under the capitalist logic of standardization and profit. The emancipatory horizon lies in composition: a return to music as an activity rather than a product, a process rather than a commodity. Composition, in this context, is not limited to professional composers; it represents a paradigm shift in which everyone becomes a potential creator, engaging with sound as a means of self-expression and communal connection.

The concept of composition thus echoes Flusser's telematic ideal: a society in which individuals are not mere recipients of programmed content but co-creators within dialogic networks. Attali's composition anticipates a world in which music reclaims its ritualistic and participatory functions—not as nostalgia for the

past, but as a forward-looking act of reclaiming agency in the face of automated cultural reproduction.

In this light, improvisation becomes not merely a stylistic choice but a political act. It introduces unpredictability and presence into systems designed for predictability and control. The electroacoustic medium is particularly fertile ground for this mode of composition. As digital technologies make sound increasingly malleable and portable, they also create spaces for distributed authorship—collaborative environments where the lines between performer, producer, listener, and machine are blurred.

Attali's notion of composition as self-design resonates with the way contemporary electroacoustic creators engage with apparatuses. In real-time processing environments, artists often construct custom tools that respond to gesture, sound input, or networked interaction. Here, composition is not the realization of a pre-determined structure but the emergence of form through interaction. It is, as Attali writes, "the creation of a unique and unrepeatable world" (ATTALI, 1985, p. 141). This uniqueness arises not from isolation but from entanglement—an interdependence among systems, bodies, and codes that can only be navigated through improvisational presence.

Furthermore, composition, as Attali describes it, is not only emancipatory for the individual but also for the collective. It reimagines music as a shared act of meaning-making—a space where community can be formed through sound. This is particularly vital in our digitally fragmented age, where attention is commodified, and relationality is increasingly mediated. Composition, in this expanded sense, becomes a strategy for reweaving the social fabric: not merely producing sound, but fostering togetherness, presence, and possibility.

This idea links back to the studio practices of WDR, where sound was sculpted through collective engagement with technical systems. But while the WDR model operated within a relatively closed system of institutional support and technical expertise,

Attali's composition projects this model outward—into homes, streets, laptops, and networks. It imagines a post-industrial sound culture where creation is ubiquitous and democratized, facilitated by tools that are increasingly accessible yet remain open to misuse, reinterpretation, and play.

Ultimately, Attali's composition is a call to action–a vision of a future in which music resists commodification by embracing risk, interaction, and lived experience. It urges us to see music not as a mirror of existing social orders but as a tool for imagining and enacting new ones. This aligns not only with Flusser's dialogical utopia but also with Heidegger's idea of art as *Aletheia*—a revealing of truths that cannot be accessed through logic alone.

5. Art as Disclosure: Heidegger, Technology, and the Unconcealment of Being

In contrast to Flusser's media-theoretical optimism and Attali's political reading of sound, Martin Heidegger offers a more ambivalent yet profound reflection on the relationship between art, truth, and technology. His notion of art as a site for the disclosure of Being—what he terms *Aletheia*—provides an ontological foundation for understanding why collaborative creation in electroacoustic music carries more than aesthetic or social significance. It opens a space for truth to appear.

In *The Origin of the Work of Art*, Heidegger (1993) argues that art is not simply a representation or reflection of the world but a site in which a world becomes visible, audible, and thinkable. The work of art, in its highest form, discloses a world; it sets truth into work by rupturing the habitual and revealing what is otherwise concealed. Art, in this sense, does not merely express pre-existing inner content or subjective states; rather, expression names the very process through which something comes into presence. As recent performance-based research on musical expression has emphasized (KRETZ, 2021), expression should not be understood as the transmission of a prior meaning, but as a performative

act that generates meaning in and through its unfolding. In this Heideggerian perspective, art makes something present that could not otherwise be encountered—not by adding representation, but by enacting disclosure.

This perspective is crucial for understanding the unique potential of electroacoustic music. In a field often critiqued for its technological determinism or abstraction, Heidegger helps us recognize how deeply such music can engage with the question of Being. By forging new sonic forms through recorded or synthetic sound, electroacoustic works bring to presence phenomena beyond the reach of traditional musical language. They reveal aspects of human experience that were previously unthinkable or inaudible.

But Heidegger also warns us: the same technological capacity that enables this revealing also carries the danger of *Gestell*—the enframing. In *The Question Concerning Technology* (HEIDEGGER, 1977), Heidegger describes how modern technology tends to reduce the world to a resource, a standing reserve (*Bestand*), to be ordered, optimized, and controlled. Under the rule of enframing, beings no longer appear in their own right; they are summoned only as useful or efficient. This is the risk of the apparatus when used without reflection—it becomes not a partner in a dialogical game, but a vehicle for the domination of all that exists.

Yet, Heidegger offers a paradoxical hope: it is precisely in the essence of technology that its saving power also lies. The danger of enframing calls forth the need for poiesis—the bringing forth of truth, which art alone can offer. Creative engagement with technology, when done thoughtfully, can resist the flattening logic of *Gestell*. Electroacoustic music, especially in its improvisational and collaborative modes, becomes such a site of resistance. It does not merely use technology; it interrogates it, subverts it, and plays with its limits to make new worlds audible.

Chagas draws on this Heideggerian insight in *Sound, Truth, and Paradigm* (CHAGAS, 2021), proposing a phenomenology of

electroacoustic music that treats the apparatus not as a neutral medium but as an ontological partner. In this view, collaboration is not merely a division of tasks—it is a disclosure of possible worlds. Sound becomes a mode of thinking, of world-forming, and of being-with. In Heideggerian terms, the work of music is the setting-into-work of truth.

Collaboration is crucial here. When music is created not by an isolated genius but through dialogical engagement with other humans, with apparatuses, with systems of code and feedback, the resulting form is not imposed but emerges. This emergence is grounded in attunement to the moment. Improvisational gestures, reactive coding, and acoustic feedback—all are sites where the technical becomes ontological, and the programmed gives way to the unexpected.

Such a perspective also challenges us to listen differently. If music is not merely sound but the appearance of a world, then listening becomes a form of witnessing. We do not just hear—we dwell in the sound; we inhabit its unfolding logic. Electroacoustic collaboration, especially in live or telematic contexts, becomes a form of co-dwelling—a shared space where human and non-human agents participate in the revealing of something otherwise inaccessible.

Rather than continuing or commenting on the work of Flusser and Attali, Heidegger belongs to an earlier philosophical moment—one that set the groundwork for thinking art and technology in ontological terms. While Flusser and Attali offer media and political frameworks within a digital and post-industrial context, Heidegger interrogates the fundamental conditions of revealing itself. His thinking is not superseded but rather reframed by these later thinkers, whose concerns about digital mediation, commodification, and dialogical structures can be seen as responses to the ontological challenges Heidegger posed. Understanding this lineage is crucial, and it invites further reflection on how different philosophical eras intersect and diverge in our current technological moment.

6. Rituals Reimagined: Electroacoustic Collaboration as Contemporary Communion

The emergence of electroacoustic collaboration does not occur in a cultural vacuum—it unfolds in the shadow of a broader social condition marked by disconnection, fragmentation, and the erosion of traditional forms of collective experience. In the late-modern or neoliberal context, where efficiency, productivity, and individualization dominate, ritual—once central to communal life—has lost much of its public and performative power. The disintegration of ritual forms has contributed to a widespread sense of existential detachment, leaving fewer cultural spaces where individuals gather not to consume or compete, but to dwell, witness, and co-create meaning together.

Drawing on the philosophical insights of Byung-Chul Han, particularly his notion that rituals serve as "symbolic techniques for making oneself at home in the world" (HAN, 2019, p. 10), we can begin to articulate how musical practices—especially in their performative, participatory, and temporally structured dimensions—might function as a response to the symbolic erosion characteristic of neoliberal society. Han argues that the dominance of data and digital communication has dissolved the symbolic forms that once structured communal life, replacing them with a regime of connectivity that paradoxically fosters isolation. In his reading, the disappearance of rituals marks a broader crisis of resonance, in which individuals are increasingly alienated from shared temporal and symbolic frameworks.

Chagas builds upon this critique in *From Sacrifice to Telematic: On Music and Ritual* (CHAGAS, 2024), situating music as a privileged site for the reinvention of ritual in the digital age. He suggests that music—understood not merely as sound but as a semiotic and social system—retains the capacity to generate embodied knowledge, shared memory, and symbolic presence. Even within technologically mediated forms, such as telematic or algorithmic performance, music can instantiate new rituals of co-presence

and collective meaning-making. These emergent forms, while distinct from traditional or sacred rites, nonetheless cultivate a space of resonance, temporality, and mutual attention—qualities that become increasingly rare in a society oriented toward speed, efficiency, and fragmentation.

In this view, musical rituals are not anachronistic residues but contemporary practices of symbolic reconstitution. They offer a means of counteracting the isolating forces of digitized culture by fostering aesthetic forms of resonance that bind individuals into temporary but meaningful communities. As such, music—particularly when approached through collaborative and improvisational practices—can function as a site of resistance against the loss of shared symbolic experience and as a mode of reimagining ritual in a technologized world.

Electroacoustic collaboration, particularly when framed as improvisation or participatory performance, provides a powerful venue for this reclamation. These practices often challenge the clear separation of roles—composer, performer, and audience—in favor of fluid, responsive, and dialogical engagement. The studio, stage, and networked interface become gathering spaces—digital yet not disembodied, structured yet not rigid—where sound is not simply produced but shared, inhabited, and transformed collectively.

What distinguishes these acts from past rituals is not their lack of sacredness but rather their transformation of it. The sacred is no longer found in fixed iconography or inherited tradition; instead, it exists in the act of attentive presence, which critically reflects on the programmatic, automatizing reality of the apparatuses while synchronizing bodies and machines into a shared temporal and sonic field. This is not ritual as a reenactment but as an event—unrepeatable, situated, and intensely real. Here, improvisation functions as a ritual logic, maintaining a space for uncertainty, inviting risk, and demanding attunement.

In Heideggerian terms, this is a form of dwelling: a way of being-with others in a world disclosed through sound. The collaborative creation of music becomes a shared unfolding of Being—an event of presencing that resists both commodification and alienation. Unlike the repetitive rituals of consumption that structure much of daily life, these sonic rituals are generative, open-ended, and rooted in participation.

Furthermore, when viewed through Flusser's telematic paradigm, these practices suggest the possibility of networked rituals. In a society increasingly mediated by digital networks, telematic performance becomes a way to reforge communal bonds across distance—not by simulating presence but by constructing new forms of togetherness grounded in real-time responsiveness and co-creation. Artists and audiences become nodes in a living circuit of exchange. The apparatus is not a barrier but a medium through which the ritual becomes possible.

Such re-ritualization also democratizes authorship. As Attali envisioned in his concept of composition, music-making ceases to be the province of specialists and becomes a shared human capacity. In telematic and electroacoustic collaboration, the lines between creator and receiver blur. Participation itself becomes authorship, and the ritual is no longer about observing but about joining—a practice of collective world-building through sound.

This move toward communal presence through technology resonates with Agamben's reflections on the political and ontological dimensions of ritual (AGAMBEN 2005; AGAMBEN 2010). For Agamben, the erosion of ritual in modernity is not simply a loss of form but a crisis in how we relate to time, bodies, authority, and, ultimately, to each other. He challenges us to think of rituals not as obsolete forms but as paradigms—living frameworks through which meaning is enacted and shared.

Electroacoustic collaboration, in this view, becomes a contemporary signature of relation: a way of placing sound, technology, and presence into circuits of care, attention, and

co-becoming. These rituals are improvised, transient, often ephemeral—but they are no less powerful. They offer ways of listening that are also ways of being-together, resisting the isolating logic of neoliberal subjectivity through acts of shared presence and embodied responsiveness. Thus, far from being a disenchanted practice, electroacoustic collaboration—particularly in its improvisational, telematic, and community-driven forms—holds the capacity to ritualize again. Not by returning to a mythic past but by forging a present in which sound, technology, and human connection are entwined in new forms of collective attunement.

7. Telematic Audiovisual Immersion: Exploring Distributed Presence

Building on the collaborative foundations explored in earlier sections, the project *Sound Imaginations: Telematic Immersion* offers a concrete realization of electroacoustic and telematic paradigms through immersive audiovisual composition. Developed between 2020 and 2024, the project integrates sound studies (STERNE, 2012), field research, audio-visual immersion, and telematic performance into a cohesive creative platform. Conceived in close collaboration with flutist Cássia Carrascoza, the work investigates ritual, presence, and technological mediation.

The theoretical framework of the project draws on media philosophy, phenomenology, and acoustic ecology, framing listening not merely as perception but as a cultural practice. Following Holger Schulze's reflections on listening cultures (SCHULTZ, 2015), sound is treated as a site of knowledge shaped by context, attention, and embodied engagement. In this perspective, the project seeks to reconfigure the experience of mediated sound—not as passive consumption but as participatory co-presence.

Fieldwork involved capturing ambisonic environmental recordings and 3D video in diverse locations, including the Mojave

Desert and Riverside, CA (USA); urban and sacred sites in Pune (India); and urban soundscapes in Brazil, Russia, and Germany. These materials were subsequently processed into immersive compositions and 360-degree visuals, merging ecological and human sound worlds into layered sonic topographies.

The project was first presented as a multichannel audiovisual installation (BALTAZAR, 2020; CHAGAS, 2023), where visitors encountered spatialized sound and synchronized video in a surround configuration. The installation foregrounded multisensory experience, inviting participants to navigate sonic textures, visual landscapes, and embodied memory within a temporally fluid environment.

The 77-minute film *Sound Imaginations: Telematic Immersion* brings together four works—*Mojave*, *I Hear You Breathe*, *Virtual Studies*, and *Sound Imaginations Improvisations*—into an immersive narrative of distributed presence. Rather than presenting these pieces as isolated compositions, the film articulates them as interconnected stages in an evolving artistic partnership, where processes of recording, improvisation, audiovisual montage, and live-electronics unfold as shared explorations of ritual, presence, and sonic imagination.

Each work reflects a different moment in the collaborative trajectory between Paulo C. Chagas and Cássia Carrascoza, underscoring how contemporary creativity emerges through entangled agencies of composer, performer, technology, and environment. *Mojave* marks the beginning of this partnership: the two artists traveled to the Mojave Desert, making field recordings that became the ground for electronically processed flute textures. This first encounter already redefined authorship, with Chagas explicitly recognizing Carrascoza's role in the creative process by attributing co-authorship. In *Virtual Studies*, Carrascoza took the lead in generating extensive flute recordings with multiple delay-based presets, which the duo assembled collaboratively in Pro Tools to form the electronic foundation for performance. *I Hear You Breathe* extended this dialogue through systematic research

on extended flute techniques, developed in close interplay with electronic processing and expanded by visual strategies: layered projections, facial painting, and video feedback in TouchDesigner shaped a multipresence that blurred bodily, sonic, and imagistic registers. Finally, *Sound Imaginations Improvisations* represents an advanced stage of co-creation, building on Attali's concept of composition as emancipation. Here, Carrascoza improvised across ambisonic soundscapes and 3D video footage recorded in São Paulo, Riverside, Moscow, and Pune, shaping a flexible yet consistent form that dissolves distinctions between composition and improvisation.

Taken together, these works exemplify how collaboration exceeds traditional hierarchies of composer and performer, demanding recognition of non-human partners such as software, instruments, and recording environments as co-actors in the creative process. The unfolding of *Sound Imaginations: Telematic Immersion* demonstrates that contemporary artistic practice is less about singular authorship than about distributed presence, where human gestures, technological apparatuses, and ecological resonances converge to generate symbolic and affective worlds.

These works function not only as compositions but as performative rituals—spaces of affective exchange where delayed signals, responsive gestures, and immersive environments foster new forms of relationality. As collaborative experiments, they also demonstrate how technologies such as Max/MSP, TouchDesigner, video cameras, and ambisonic microphones become partners in the process, enabling real-time interaction, environmental responsiveness, and spatial rendering of sonic experience.

The film also embraces latency as an expressive feature, transforming delay and disjunction into elements of poetic timing. This reframing of temporality echoes Flusser's concept of telematic dialogue (FLUSSER, 2011) and Nancy's notion of listening as relational resonance (NANCY, 2002). The project positions audiovisual ritual not as simulation but as transformation—not to

reconstruct presence, but to invent new ways of being-together through sound and image.

To facilitate broader engagement, the project includes two shorter edits. The presentation version (12 minutes) condenses the full work and features captions that highlight key concepts, including mediated presence, spatial ambiguity, and cyclical temporality. A trailer was also produced to provide a concise overview of the film's aesthetic and conceptual scope. These resources allow audiences to engage with the audiovisual immersive content and theoretical framework of the project.

The complete film, presentation version with captions, and official trailer are available at the following links.

- Complete film (CHAGAS and CARRASCOZA, 2024a)
- Presentation version (CHAGAS and CARRASCOZA, 2024b)
- Official trailer (CHAGAS and CARRASCOZA, 2024c)

8. Conclusion: Rethinking Technology, Creativity, and Society through Electroacoustic Collaboration

The collaborative nature of electroacoustic music, as traced through the lenses of Flusser, Attali, Heidegger, and Luhmann, reveals far more than a technical or aesthetic evolution—it marks a paradigmatic shift in how we conceive creativity itself in relation to technology and the social world. No longer confined to the solitary composer, the creative act unfolds through systems of exchange, improvisation, and feedback, forming what might best be understood as an ecology of co-creation.

Flusser's concept of telematic dialogue underpins this new ecology: a society where creation emerges not from monologue but from responsive, networked play with apparatuses. His vision dissolves the boundary between human and machine, proposing instead a scenario in which both act as creative agents within systems of dialogical exchange. In this light, electroacoustic collaboration exemplifies the post-industrial condition—not a

loss of human authorship, but its radical reconfiguration through feedback, play, and shared technical imagination.

Attali extends this vision into the political. In his model, composition signals an emancipation from the structures of repetition and commodification that have dominated musical production since the rise of mass media. Electroacoustic collaboration, particularly when it embraces improvisation, open systems, and participatory models, enacts this emancipatory potential. It resists standardization not just in sound but in subjectivity—fostering ways of being and relating that challenge capitalist logics of control, isolation, and passive consumption.

Heidegger, while wary of technology's enframing tendencies, provides the ontological depth to understand why such practices matter. When electroacoustic music moves beyond functional manipulation and opens a space for Being to appear, it discloses truths otherwise concealed by technological rationality. In collaborative settings, this disclosure is magnified: the emergent, shared, and contingent nature of sound reveals not only musical structures but new modes of dwelling together in a technologically mediated world.

Luhmann's systems theory helps articulate the structural dimension of these processes. Creative collaboration in electroacoustic contexts can be seen as an autopoietic system—one that generates its own meaning through the recursive interplay of components. Within such systems, improvisation and communication introduce contingency: the moment when the unexpected appears, when the system can no longer simply repeat itself, but must reorient, adapt, and evolve. In this way, electroacoustic music models how complex societies might learn to generate novelty, not through command and control, but through openness, responsiveness, and relational intelligence.

Taken together, these thinkers help us understand electroacoustic collaboration not merely as a genre or compositional technique, but as a paradigm in the Kuhnian

sense—a disciplinary matrix that reconfigures how music is conceived, produced, and experienced. As Chagas (2021) notes, drawing on Kuhn's theory of scientific revolutions (KUHN, 1970), paradigms emerge not in a linear progression but through moments of epistemological rupture, responding to crises that render prior models insufficient. In this light, the electroacoustic paradigm marks a shift from hermeneutic and representational understandings of music toward a mode of knowledge rooted in cybernetics (WIENER, 1956), information theory, and systems of distributed cognition (KITTLER, 1993). In an era defined by technological saturation, ecological precarity, and social fragmentation, such practices propose an alternative trajectory: one in which technology ceases to function as an instrument of domination and instead becomes a medium of relational attunement, where creativity is not commodified as product, but enacted as a process of shared emergence; and where music regains its ontological force—as a site of truth, transformation, and symbolic communion.

Electroacoustic music, in its most radical forms, does not simply add new tools to the artist's repertoire—it reimagines the role of the artist, the audience, and the apparatus itself. It proposes new games, new rituals, and new dialogues in which we might participate, not merely as listeners, but as co-creators of meaning and presence. In doing so, it opens a space where society might hear itself anew—not as a system of fixed codes and roles, but as a living, sounding, improvising network of becoming.

References

AGAMBEN, Giorgio. **The Sacrament of Language**: An Archaeology of the Oath. Stanford: Stanford University Press, 2010.

AGAMBEN, Giorgio. **The Time that Remains**: A Commentary on the Letter to the Romans. Stanford: Stanford University Press, 2005.

ATTALI, Jacques. **Noise**: The Political Economy of Music. Minneapolis: University of Minnesota Press, 1985.

BALTAZAR, Sandra. Connecting the World Through Images and Sound. 2020. **UC Riverside News**. Available at: https://news.ucr.edu/articles/2020/02/20/connecting-world-through-images-and-sound. Accessed: 25 Feb. 2025.

CHAGAS, Paulo C. Game and Dialogue: Composing with Machinery. In: TARASTI, Eero (ed.). **Music and the Arts**: Acta Semiotica Fennica III – Approaches to Musical Semiotics 10. Helsinki: International Semiotics Institute, 2006, p. 157–170.

CHAGAS, Paulo C. **Unsayable Music**: Six Reflections on Musical Semiotics, Electroacoustic and Digital Music. Leuven: Leuven University Press, 2014a.

CHAGAS, Paulo C. Creativity with Apparatuses: From Chamber Music to Telematic Dialog. **Flusser Studies**, n. 17, p. 2–15, 2014b.

CHAGAS, Paulo C. **Sound, Truth, and Paradigm**. In: CHAGAS, Paulo C.; WU, Cecilia (eds.). Sounds from Within: Phenomenology and Practice. Cham: Springer, 2021, p. 1–28.

CHAGAS, Paulo C. From Sacrifice to Telematics: On Music and Ritual. **Roczniki Humanistyczne**, v. 72, n. 12, p. 69–79, 2024.

CHAGAS, Paulo C. Sound Imaginations: Listening Cultures and Audiovisual Immersion. **Array**, n. 2023, p. 59–76, 2023. DOI: https://doi.org/10.25370/array.v2023.

CHAGAS, Paulo C.; CARRASCOZA, Cássia. **Sound Imaginations: Telematic Immersion – complete film – sequence 1**. YouTube, 2024a. 1 h 17 min 20 s. Available at: https://youtu.be/x4QsFAx6Yy8. Accessed: 25 Feb. 2025.

CHAGAS, Paulo C.; CARRASCOZA, Cássia. **Sound Imaginations: Telematic Immersion – presentation**. YouTube, 2024b. 12 min 16 s. Available at: https://youtu.be/G-O5lC3EQwY. Accessed: 25 Feb. 2025.

CHAGAS, Paulo C.; CARRASCOZA, Cássia. **Sound Imaginations: Telematic Immersion – official trailer**. YouTube, 2024c. 2 min 52 s. Available at: https://youtu.be/zvbV2y2q_iw. Accessed: 25 Feb. 2025.

FLUSSER, Vilém. **Into the Universe of Technical Images**. Minneapolis: University of Minnesota Press, 2011.

FLUSSER, Vilém. **Towards Philosophy of Photography**. London: Reaktion Books, 2000.

HAN, Byung-Chul. **Vom Verschwinden der Rituale**: eine Topologie der Gegenwart. Berlin: Ullstein, 2019.

HEIDEGGER, Martin. **Basic Writings**. San Francisco: Harper Perennial, 1993.

HEIDEGGER, Martin. **The Question Concerning Technology and Other Essays**. New York: Harper & Row, 1977.

KITTLER, Friedrich. Signal-Rausch-Abstand. In: KITTLER, Friedrich. **Draculas Vermächtnis**: technische Schriften. Leipzig: Reclam, 1993, p. 161–181.

KRETZ, Hans. **Wortaufschüttung**: exploring expression through performances and analyses of contemporary settings of twentieth-century poetry. Thesis (Doctor of Philosophy in Music) – School of Music, University of Leeds, Leeds, 2021. Available at: https://etheses.whiterose.ac.uk/id/eprint/29137/. Accessed: 25 Feb. 2026.

KUHN, Thomas. **The Structure of Scientific Revolutions**. 2. ed. Chicago: University of Chicago Press, 1970.

LUHMANN, Niklas. **Art as Social System**. Stanford: Stanford University Press, 2000.

NANCY, Jean-Luc. À **l'écoute**. Paris: Galilée, 2002.

SCHULTZ, Holger. Hörkulturen der Gegenwart: eine Anthropologie in acht Hörweisen. **Positionen**, n. 105, p. 15–18, 2015.

STERNE, Jonathan (ed.). The Sound Studies Reader. London; New York: Routledge, 2012.

WIENER, Norbert. **Cybernetics**: Or Control and Communication in the Animal and the Machine. 2. ed. Cambridge, MA: MIT Press, 1956.

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Authorship contribution

Paulo C. Chagas conceived the research project, developed its theoretical framework, conducted the primary investigation, and authored the initial draft of the manuscript. The study is grounded in his long-term research on electroacoustic collaboration, telematic creativity, and philosophical approaches to technology and music. Ivana Petković Lozo co-authored the manuscript, contributed to the structuring and refinement of its arguments, and provided critical revisions that enhanced the manuscript's conceptual clarity and overall coherence. Both authors reviewed and approved the final version of the manuscript.

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