




# Sound Body as Embodied Poetic Interaction

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**Abstract.** The Nucleo de Dança Redes at the State University of Campinas has been developing multimodal artistic research in mixed reality in an interactive, immersive, dialogical, and in nets. In this article we present some research focus of the group referencing two works “De uma Margem a Outra” and “Jardim das Cartas”. Researchers in the areas of dance, music and audio visual have been raising discussions about an “expanded sound body” that stems from the interaction between movement, sound, music, video and technology in a mixed environment. A body that extends in sound, and an embodied sound in movement in an expanded perspective of the body in “presence” with more complex contours.

Another point is in the observation and understanding of the event of multimodal improvisation in a mixed environment as a path and an interactive and connective articulation between the communication agent that participate in the net as an expressive path that is shown in the interactive exploration. Based on interactive practices and on the concept of net, we work methodologically towards a “poetic interaction” in the field of complexity. A fertile ground in which improvisation and composition become coordinated paths for the unfolding of a dance which starts from the connectivity and from the interaction between sound, body movement, image and technology.

**Keywords:** sound body embodied · interactivity · improvisation · multimodality

## 1 Sound Body: Extended Movement in Sound/Embodied Sound

Nucleo de Dança Redes<sup>1</sup> develops research which investigates the body and movement in creative processes in interaction with other languages and realities. Several artistic works were carried out in partnership with researchers in the areas of arts, especially in

<sup>1</sup> Núcleo de Dança Redes research group was created in 2012 by Associate Professor and researcher Daniela Gatti in Corporal arts Department of the Institute of Arts at the State University of Campinas BR. it is accredited by the CNPQ (National Research Center) linked to the graduate school program in Performing Arts. Formed by researchers in the areas of dance and performance with the objective of developing multidisciplinary artistic research and creative processes in nets integrating new digital technologies in the field of performing arts with emphasis on studies focused on improvisational and compositional processes in the field of complexity. Since 2012 the research group has already produced more than 40 artistic works and carried out scientific research in the field of creativity, interdisciplinarity and education.

the sound and musical field and in the multimodality with composers. Since 2013 the partnership between Gatti and Professor Jonatas Manzolli<sup>2</sup> has explored new poetic and aesthetic perspectives in the interaction between dance, sound language, multimodal, musical, computing and technological language.

It is worth mentioning that collaborations between artist composers and choreographers have been present in the western artistic historical context. With disruptive, innovative and avant-garde visions with an interest in investigating convergences and divergences in the forms and structures, practices and aesthetics of each language. Some partnerships between music and dance from the 20th century onwards were marked by experimentalism from a relational and interactive perspective like, e.g., George Balanchine and Igor Stravinsky, Martha Graham and Louis Horst, John Cage and Merce Cunningham; Thierry De Mey and Anne Teresa de Keersmaeker, which broke paradigms in compositional processes and in creation.

Highlighted in this article we rescue two artistic projects carried out as a result of the academic and artistic partnership in order to explore dance and sound integrated into computational systems and net from mediation by interfaces and use of accelerometers, sensors attached to the bodies of the dancers and also in their relationship with mobile phone devices. Both experiences followed a rhizomatic perspective in expecting the body to become extended in sound; and the embodied sound “embodied” in “sound-body”.

Sound Body concept can also be seen as Extended Body in sound or embodied. The idea of sound body merges with the term embodied which means an expression or giving tangible or visible form to (an idea, quality or feeling). Which can be seen as a body that extends to another condition:

1. To give a bodily form to; incarnate;
2. To represent in bodily or material form;
3. To make part of a system or whole; incorporate.

The embodied term presents its complexity as it permeates different areas of philosophy, psychology and sociology, with its specific meaning depending on the specific discipline. From a phenomenological perspective, the body is seen as the center of identity, inseparable from sensory experience and perception. Incorporation generally happens in and with the body and its interactive processes, which through the senses, assist, improve or interfere with human development. In the context of arts and multimodality, the emphasis is on the relationship between the experience of the body and

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multimodal resources, practices, media and social spaces and this entire relationship is interdependent. In the area of music for example, Leman [1] presents research on the relationship between body, movement and sound based on the idea of embodied.

Embodied music interaction manifests itself through activities with sounds (listening, playing, dancing), with other people (as in joint action), as well as with music instruments and within the body (as a mediator for music playing). The interactions are constrained, though, by acoustical structures (both in music and in the radiation of sounds), by cognitive activities (limitations of memory, attention, learning), and by body resonances, biomechanical, and metabolic and energetic restrictions. Many authors believe that musical constraints can be better understood by considering the timing of embodied interactions, such as the rhythmic coordination of the human body with external musical rhythms, given the nature of music as a temporal art form. This field of study started with experiments in which subjects were asked to tap their finger along with metronomes and with music. [1].

When it comes to sound body, the body merges with sound in an expanded sensorial experience. Le Breton [2] emphasizes the interaction of the body's senses in relation to its perception of the world. That is, this relationship naturally tends to break down boundaries in a correspondence existing between the body and the sound. One acts on the other in a kind of sensorial web in resonance, where the stimulations can happen in correspondence. The body's senses interact with the sound universe in a relational action.

From an anthropological perspective, the work *Sound in embodied practice* [15], corroborates the idea that every sensation experienced from sound is always incorporated, considering the vibrational idea and sound waves as a stimulus for affecting the entire body, and not just the ears. The authors consider sound not only as an interpretative approach but based on experience and multisensory sound study.

We find aspects of embodied cognition that emphasize interaction as an entanglement of bodily, environmental, and social components as embodied, extended, and active components of mind and cognition. [16].

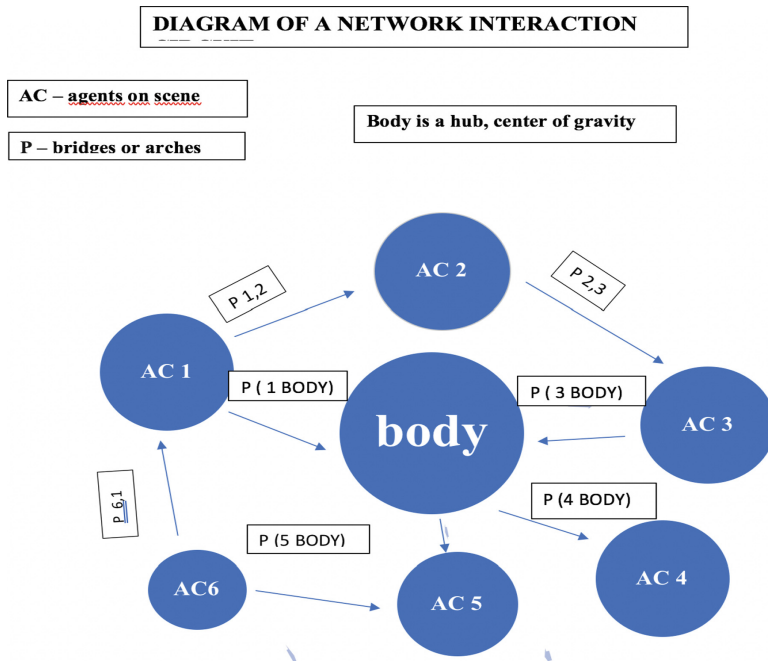
Leman presents the paradigm of embodied music cognition provides an interesting viewpoint on musical gestures. It assumes that music is based on a tight relationship between sounds and experiences that are mediated by the body [17] (see Fig. 1).

The paradigm of embodied musical cognition for example, is based in a series of concepts, related to: (i) the body as mediator, (ii) the gesture/action repertoire, (iii) the action-perception coupling and (iv) the link with the subjective experiences, such as intentions, expressions, empathy, and emotions. [17].

We can consider in the artistic works presented in this article a conceptual similarity with regard to poetic production that arises from embodied at the intersection between sound, body, image movement and technology as dynamic and complex system.

### 1.1 Network Poetry - De uma Margem a Outra

The multimodal performance “De uma Margem a Outra”<sup>3</sup> created in 2018 was based on, for investigation, the idea of “body” as a place of sound passage and displacement. The multimodal work had its agents “body, text, voice, metaflute, percussion, electroacoustic music, technological devices and pendular objects, integrated as a diagram, in an articulation of several elements in con(fluence) for a “dynamic musicoreographic” structure (Fig. 2).



**Fig. 1.** Diagram Creative Process - De uma Margem a Outra

In the performance “De uma Margem a Outra”, body, sound, voice and musical instruments were interconnected by devices and transducers (sensors and microphones attached to the musical instruments, to the dancers and the voice) where the signals were sent and processed by computational models created to establish the interactive environment. The dancers’ bodies were receivers of a circuit articulated in a network in which sound was generated by movement through sensors attached both to the dancers’ bodies

<sup>3</sup> Dance, music and technology multimodal performance created in 2017 and 2018 inspired by the literary work “Six proposals for the next millennium” by Italo Calvino with funding from the Culture Department of São Paulo State PROAC 2017. Directed by Daniela Gatti and Jonatas Manzolli. Dancers - Karina de Almeida and Tutu Morasi; Percussionists GRUPU (Percussion Group of Unicamp): Rodolpho Simmel, Otavio Antoniecci and Rafael Peregrini; Flutist - Gabriel Rimoldi; Laiana Oliveira – Mezzo Soprano; Danilo Rosseti – Electroacoustic Composer and Operator and software processing.



**Fig. 2.** De uma Margem a Outra - Karina Almeida (dancer); Gabriel Rimoldi (metaflute) Foto: Kassius Trindade

and to musical instruments (metaflute, percussion and voice) and also to scenic objects in pendulum movement in space. The musical and choreographic composition was designed from the perspective of movement being the passage to sound representation as an extended body and also in a poetics of interaction (Fig. 3).

The body research covered in its extension in sound was managed by the computational interference inducing the body of the dancers to explore the movements in a new and expanded territory regarding relations and attitudinal aspects.

Stimulating the exercise of interaction led the dancers to a more expanded perception on movements when connected to sound. An attentional relationship pointed:



**Fig. 3.** De uma Margem a Outra - Tutu Morasi (dancer); Laiana Oliveira (singer) and percussion. Foto: Kassius Trindade

- to the recognition and perception of a body in transit and dialogue in action (how to improvise in sound and net interaction).
- to the structures of the language itself (dynamics, directions, displacements, activation of body parts, rhythm).
- to the recognition of new models and gestural protocols triggered and recurrent during improvisation.
- to decision-making between acting, reacting and pausing in actions or situations - in the perception of convergences and divergences between the agents.

Such points were observed and raised during the experimental research in which we realized that musicians, dancers and a net computing environment built a dynamic and complex self-organizing system sharing their collective and own visions and practices. Thus, the complexity resides precisely in this arena in which all of them create realities together in a variability that demands adjustments, changes of routes, of choices and abandonment of ideas.

“De uma Margem a Outra” awakened to a self-organizing multimodal methodology from the interactive improvisational and compositional practice between dance, music, text and sound in more complex environments and integrated into multimodal and computational systems. A practice that develops in the anticipatory experience of the action and in the action itself, from a more expanded perception of the exercise of interaction. It is in action that integration and collaboration take place.

In line with the idea of expanded perception, Nhur [3] in her article *Do Movimento ao Som, Do Som ao Movimento: relações bioculturais entre dança e música*, (From Movement to Sound, From Sound to Movement: biocultural relations between

dance and music), brings important aspects about the levels of interaction which happen between sound and movement referencing the author Marc Leman<sup>4</sup> [4] in his reflections. The author analyzes two dance performances “Peças Fáceis” by the theater group Pró-Posição and “Z” by Alejandro Ahmed from Cia Cena 11 in which both integrate music and sound to conceptions of embodiment in a socio-environmental and cultural perspective. Nhur [3] highlights that the synchrony between action and perception rests on the hypothesis of body intentionality and points out the indissociability between perception and action, being considered as the responsible agent in the communication between sound and movement. And adds that.

[...] the way an organism receives the sound energies of the environment and turns them into abstract actions or concepts depends on an ecological perspective, mediated by the resonance between natural and cultural domains. [3].<sup>5</sup>

We can consider that “extended” and/or “expanded” perception is always accessible to everyone as long as the agents are in a state of acute attention turning to the relationships and that are present in what is in the “between body”. That is to say, the place of the sound is in the movement itself and in the net simultaneously. A job that investigates the dialectic of action and reaction between sound, gesture and silence in an expanded space and in a mutual and complex correspondence.

Experiences from the creative process “De uma Margem a Outra” brought reflections on the body that becomes sound, movement, in net as a living hybrid organism. A dance that is reflected in a body which appropriates vibrations and sound waves, dissonances and harmonies, sound textures and pulsations. A body that stretches and unfolds from the “interaction” with itself, the sound, the movement and every technological apparatus with its supports and systems which mediate traveling in a new poetic path.

## 1.2 Extended Body

The term Extended Body refers to a new interpretative and poetic approach in dance borrowing from the musical sound field the idea of “extended technique” developed to musical instruments and voice.

At the beginning of the 20th century, musical composers began to develop and expand the vision of tonality seeking new horizons of possibilities on how to deal with the sound [5]. New compositional currents appeared such as serialism, twelve-tone music, atonalism, electronic music, random music, electroacoustic music, concrete music, among others. These compositional currents in Europe and the United States consolidated the

<sup>4</sup> Marc Leman is Methusalem research professor in systematic musicology and director of IPEM, the institute for psychoacoustics and electronic music at Ghent University. He holds MA degrees in musicology and philosophy, and did his PhD on computer modeling of tonality perception book (Embodied Music Cognition).

<sup>5</sup> Original text in portuguese: [...]o modo como um organismo recebe as energias sonoras do ambiente e as transforma em ações ou conceitos abstratos depende de uma perspectiva ecológica, mediada pela ressonância entre os domínios do natural e do cultural” [3].

idea of experimentalism which marked the 20th century with the arts. “Extended Techniques” came to be used in reference to instrumental exploration techniques in the search for new sounds” [6].

The voice also resorts to these techniques in the investigation of vocal resources in gestures that break the tradition of singing by including in the repertoire: screams; whispers; smiles; babbling; spoken voice; narrated voice; whispered voice; morphings; among many other ways of vocal emission [7].

The proposal to break with traditional models in the sound field provoked an expansion and potentiation of the elements and in the acoustic characteristics of the sound such as intensity, frequency, duration, sound wave, besides the timbre possibilities involved in the sound field.

Padovani and Ferraz [6] state that extended techniques in the musical field are those which are unusual within a given historical, social and aesthetic context.

Thus, borrowing the term extended technique used in the musical and sound area for dance may be a start for understanding an “extended body” as rupture movement to the sensory and perceptive field in the relationship of the body which dances with digital technology and different environments in expanded reality such as virtual reality [VR] mixed reality [MR] expanded reality [AR].

An extended body interacting with other environments can change paradigms already traditionally preconceived in relation to the movement that works with time and space in its biomechanical configuration. The body which dances in virtuality and in connection with technological and digital devices runs through other registers yet to be explored in their relationship with gravity, speed, simultaneity, duplication of bodies, non-physical presence, extension, etc. The hypothesis is that digital technology participates and is part of the extended body.

The idea of an extended body still requires studies in the field of body language and dance in the dimensions of virtual, mixed or expanded environments and of structuring elements of the language of movement itself. Appropriating the term extended technique to extended body can be a fertile field for exploration in the relationship of new poetics and perceptions of the movement.

### 1.3 Multimodal Installation *Jardim das Cartas*<sup>6</sup>

In this same investigative line that pursues the scope of complexity in dance in multimodality with interaction and computational processing, we proposed in 2022. The multimodal installation in mixed reality “Jardim das Cartas” developed through the project Poetics of sound and body in the interdisciplinary dialogue between art and technology: a research study of creation in Digital Humanities, boosting research in the interactive perspective. According to Milton Sogabe [8] Interactive installations have the necessary elements to characterize the space of interactivity being environment, public, interfaces, digital manager and devices. “In addition to physical elements, there are processes that take place in time: event, interaction and information processing with input and output signals.

<sup>6</sup> Jardim das Cartas official channel: [https://www.youtube.com/channel/UCy2WzV0o-Viw\\_tFkO74pL\\_A](https://www.youtube.com/channel/UCy2WzV0o-Viw_tFkO74pL_A) 2; Jardim das Cartas official website: <https://linktr.ee/jardimdascartasoficial>.

“Jardim das Cartas” was conceived from the beginning as an open work and brought together a complex information net in mixed reality with elements of dance, music, poetry, videoprojection sound, mobile phone devices, applications (Move Guitar), computational processing (Puredata) and database with 22 videos and voice recordings and software.

The work created virtual, face-to-face and telematic interactions where interactive liveperformances were proposed considering different audience environments.

The system, consisting of two programs implemented in Pure Data (Pd), a visual programming language developed by Pucket and TouchDesigner computer graphics platform, generates music and video in real time, respectively. Pure Data (Pd), widely used by musicians, and sound artists, is open-source project with a large developer base working on new extensions.

The TouchDesigner, developed by the Toronto-based company Derivative, and also used in Generative Art, is a node- based visual programming language for generating real-time interactive visuals. In live performance, these two programs allow the real-time interaction of audiovisuals with musicians and dancers and control a mixed-reality environment for virtual, presential, and telematic interactions [9] (Fig. 4).

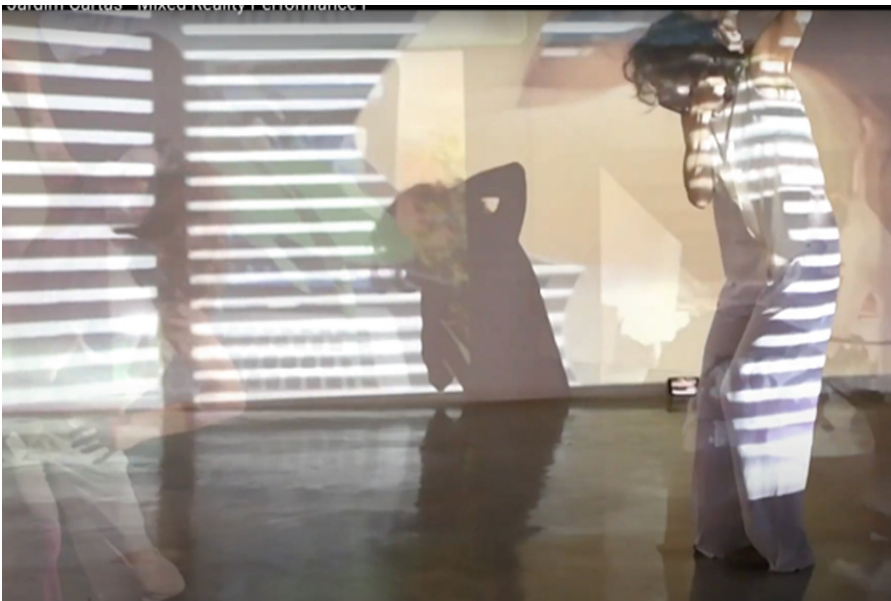


**Fig. 4.** Live performance installation Jardim das Cartas 2022 (improvisation– sax; dancers with mobile phone, video, and piano improvisation online, and computer sound)

The Jardim das Cartas multimodal installation promoted a cooperative creative arena in mixed reality. Immersive agents in both physical and digital/virtual environments explored interactions through improvisation. A dynamic generative installation with

possibilities of generating a corporeality from different divergent and convergent patterns. It is important to highlight that interactions in a cooperative state (multisensory space) could result in more dynamic responses to the stimuli received (see Fig. 5).

[...] Theorists of embodied cognition have already argued that one of the three dimensions of corporeality is intersubjective interaction (along with what they call “bodily self-embodiment”). Regulation” and “sensorimotor coupling”). Earlier constitutive “extended” features of the embodied structure, exploring the multi-sensory peripersonal space of musicians following a cooperative/non-cooperative (jazz) musical interaction [16] (Fig. 6).



**Fig. 5.** Live performance installation Jardim das Cartas 2022

Articles published by the researchers on the work Jardim das Cartas performance aspects of the methodological and theoretical development of the process with reflections that involve the conceptual and aesthetic character of the work as for the perception of a “ecological presence” [10] that integrates natures in mixed environments. And develop the entire conception of presence based on Gibson’s affordances.

The concept of affordance is connected to the notion that Gibson constructs about “sense” or “feeling” in “The Senses Considered as Perceptual Systems” (Gibson, 1968). Considering the senses as perceptual systems is to say that the action of feeling is identical to perceiving. Perception cannot be distinguished from sensations derived from the act of interacting with the external world through the senses. The environment, then, plays a central role in the perceptual process. [10].



**Fig. 6.** Live performance installation Jardim das Cartas 2022 (dancers, piano online, video and sound computer online)

Presence is also a key-concept in the study of teleoperation, virtual reality (VR), virtualization of acoustic sources, games and image interaction. Since the early 1980s, a great effort of research focuses on establishing the parameters that rule the perception of Presence. For example, it has been found that detailed visual scenes are not so important, while multimodal convergence, representations of the body itself and environmental engagement, from sound and visual sources, increase the reported Sense of Presence [11].

The methodological assumption of both works placed the interactive practice as central in the research, improvisation and the self-organized process as a reflective and theoretical framework, where the reading of experiences in dynamic systems and the interweaving between agents produced a unique writing in the global, multimodal and interactive dimension between the different modes of communication in a complex rhizomatic perspective and in net.

It should be noted that one of the points of interest in net investigations with dance and other agents in mixed reality is the creative path that is unique, not constituting as a model to be followed and replicated but as a fluidic, dynamic and open methodology. The path problematizes procedural and systemic work of creation on the net opening up space for poetic interaction.

In 2023 in order to consolidate the methodological process of “Jardim das Cartas” we propose the ongoing project Expanded Sound Body (ESB): expanded spaces between sound, movement and technology in mixed reality<sup>7</sup> to direct the focus on the event of improvisation from the sound-body perspective. In this research we also enter the sphere

<sup>7</sup> Expanded Sound Body (ESB): expanded spaces between sound, movement and technology in mixed reality - project financed by FAPESP process -number - 2022/05935-7 researchers: Daniela Gatti; Jonatas Manzolli, Mariana Baruco Andraus; Alexandre Zamith

of multimodal creation, in which the assumption made is that the interaction of an agent or group of agents with an immersive space, using several interactive devices, indicates how these processes affect their expressive and poetic behavior and the meaning which is constructed by them.

The notion of interaction with which we work goes beyond the analytical dimensions only and will be linked to various perceptual modalities. Interactive narrative is seen as a result of processes, specifically from the interaction with all the agents that participate in the experience [11].

## 2 Improvisation in Mixed Reality and the Expanded Body in Presences

Interacting and improvising in dance are conjoined and complementary actions, as both reflect the same state of suspension that waits, listens and awaits the emergence of the apparent impulse of the action, movement and gesture. In this way, improvising and interacting are the perfect vias for creativity.

The term interact is a verb which derives from the noun interaction. It is a word which is formed by the prefix *inter* (meaning between) + noun *action*, i.e., it is characterized by an integrated action. Interacting is the same as being in mutual exercise with something, promoting changes in the development and/or state of both. It is in this dialogical context between action and non-action that we resort to improvisation as the event that mediates, connects and creates bridges for interactivity.

Improvise, which comes from the Latin *IN PROMPTU*, means: “in a state of attention, ready to act”, “in readiness”, from *PROMERE*, “to make arise”. The meaning of the word *readiness* is “to be available at any time, circumstance and environment to make decisions”.

The field of improvisation is per se the way of work that it proposes in its scope of investigation, the alternation of states of predictability and unpredictability, in random and autonomous processes. The agents who live the improvisational experience, reposition themselves at every moment of the action in a circularity between organization and chaos.

Improvisation, as a singular expression within the field of contemporary dance, presents itself as a web of affections produced by the physical forces acting on bodies. It is a difficult experience to categorize within the current social representations, as it does not refer to itself as a “logocentrism”. Its transmission does not meet criteria for ordering and systematization; on the contrary, it presents itself as a way of experimentation: [12].<sup>8</sup>

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Almeida; Manuel Falleiros; Diogo Angeli; Elena Partesotti; Vania Eger Pontes; Guilherme Zanchetta Lalier Avila; Andrea Albergaria.

<sup>8</sup> Original text in portuguese: “A improvisação, como expressão singular dentro do campo da dança contemporânea, apresenta-se como uma trama de afetos produzida pelas forças físicas atuando sobre os corpos. Constitui uma experiência difícil de categorizar dentro das representações sociais vigentes, pois não se refere a si mesma como um “logocentrismo”. Sua transmissão não responde a critérios de ordenamento e sistematização; pelo contrário, se apresenta como uma forma de experimentação: [HARISPE, 2014: 35].

Improvisation happens in synergy with known and unknown elements, which allows them to be awakened and apparent, creating in this hybrid space of what is known and not known in informational sources, forms and materials, becoming fabric and texture for both the observer and the improvising agent.

In the sphere of multimodality in mixed reality, there is a multi-connective transmission, in net and dialogical among all the performative agents and languages which become connected during the improvisational event, including several coexisting communicational modes and expanded reality that may or may not be working simultaneously. It should be noted that what we call reality is not restricted to the concrete physical field, but reality as “truth while existence”; also is and happens in the mixed environment.

From meetings, failures to meet, alternations and suspensions, the event of improvisation lies on its own space of unpredictability and appears resulting from its own aesthetics. Improvisation in multimodality only happens with agents available to reconnect the communication where the process becomes autonomous while a state of presence.

In improvisational action in a mixed environment, the aim is to find embodied new strategies and methodological paths inferring in the aesthetic field a new perspective from the connections between reality and virtuality and implicit and explicit models that shuffle, suspend, cut, unite, juxtapose, alter, and separate communicative modes.

The game between virtuality and reality is complementary, as Levy [13] points out that the virtual is not opposed to the real, but to the current. Virtuality and reality are just two ways of being many different. The possible is already constituted and will be realized without that nothing changes in its determination or its nature. It is a latent real:

Multimodal improvisation is the act of dialoguing with, creating, reinventing or (trans)forming something in the present moment of realization, that is, it is an act of creation of open share. One of the characteristics of improvisation in the “arts of presence”-traditionally nominated for the performing arts (dance, theater and performance), is the sharing in its quality of the interaction between the performative agents, being agents the protagonists available and present at the meeting in the act of improvisation and, performative as the potency and strength of the action per se of the one who proposes it. An action that unfolds organically into others from what belongs to one and to the collective.

Often, the term “presence” explored in the performing arts bears out the idea of nets as intertwining and weaving, in which performative agents place themselves in “contagion zones”<sup>9</sup> so that sharing takes place between audience and artists.

Ferracini [14] in his article *A presença não é um atributo do ator*, expands the condition of presence beyond the corporal work of the actor, dancer, musician and performer, suggesting that the event of the scene is amalgamated by the agents in its complexity, and proposes:

The actor, as a poet of the action, should seek to build and rebuild his actions together WITH the public space and not accomplish something FOR a public space. Never a transcendent body, nor essentialist, nor solipsistic, nor endogenous

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<sup>9</sup> Term created by Ferracini inserted in his publications.

but a body traversed by forces that are territorialized in the between reality/fiction, interpretation/representation dualisms. [14].<sup>10</sup>

We understand, therefore, that the presence effect is constituted from existences given by encounters, failures to meet and interactions.

Expanding into the ground of virtuality, Joris Weijdom [15], in his book *Mixed Reality and the Theater of the Future Fresh Perspectives on Arts and New Technologies*, presents reflections on the terms presence and reality, recognizing and including other environments in the theatrical sphere and presential arts. The author considers mixed reality (MR) as a scale on the ‘continuum of virtuality’<sup>11</sup>, that is, this scale varies ‘[...] from the completely real environment’ up to ‘the completely virtual environment’ where “real environment” as the physical space our bodies are situated, where sensory entering offers a mental experience of what we consider reality. [15].

The author [15] also comments that in the mixed reality environment, the terms physical and mental, or analogue and digital, are so intertwined in the experience of reality that it is difficult to make a clear distinction in a philosophical discussion between what can be considered completely real and what cannot.

We can consider that in multimodal improvisation in mixed reality, the experience of presence happens from the state of fusion between the environments, the languages and performative agents. The different environments coexist in the space of the creation and the time of realization. Sharing between environments, agents, knowledge and conditions generate impulses of action and reaction in a dialogical and spontaneous dynamic, and the measurements given and received during the path in which the experience shared takes place.

In this sense, the concept of presence in multimodal improvisation in mixed environment is expressed in this indeterminate continuum and which shows itself as the primary element of improvisation, where the confidence of readiness to cast dynamics of response creates instant collaboration that resonates intimately between agents becoming expanded presence.

Improvising in mixed reality is composing shared presences and exchanging materialities arising from analog (real) and virtual environments at the time of action, interconnecting realities in a process of perceptive and sensory expansion. The individualized and shared content of each performative agent body is part of a single flow, merging the perceptions of the collective and the environments, creating a reality of the action in the constitution of a whole of the work.

<sup>10</sup> Original text in portuguese: O ator como poeta da ação, deveria buscar construir e reconstruir suas ações junto COM o público espaço e não realizar algo PARA um público espaço. Nunca um corpo transcendente, nem essencialista, nem solipsista, nem endógeno mas um corpo atravessado por forças que estão territorializadas nos entremeios dos dualismos realidade/ficção, interpretação/representação. [Ferracini, 2014: 235].

<sup>11</sup> This concept developed by Paul Milgram and Fumio Kishino in 1994.

### 3 Reflective Synthesis

The partnership between researchers (dance and music) from the Institute of Arts at the State University of Campinas BR, promoted impulses to investigate the field of multimodality in the interaction between dance, music and cyberspace with digital technologies.

In an updated perspective of art inserted in contemporaneity, the researchers point out, above all, the emergency of investigating collaborative and multidisciplinary artistic processes and practices. Both recognize art as a “weave”, weaving in an integrated way its expression as a manifestation of the life embodied in its time. In this sense, art in the digital environment is a fertile ground to be explored in interactions with other areas of knowledge. Experience and practice are placed at the center of research, emphasizing the experimental and existential character of art. In this sense, the article discusses observed aspects of the interactive experiences between dance, sound, music and technology. One of the points of argument is in the practice of the interaction between the languages of the arts and the cyberspace, as a poetic interaction from which new methodological paths and expressive of the dancing body potentially emerge, echoing expanded movements in sound in a game between realities.

Through interactive practices there is coexistence between the communication modes in mixed environment so that the net can happen, requiring a connecting and extended body that is connected to devices and technological tools using a new body perception and movement in a creative state, unfolding and performing beyond its biomechanical limits.

In the view of the researchers, the methodology developed in the works Jardim das Cartas and “De uma Margem a Outra” is inserted in the field of complexity. Dynamic and emerging systems, self-organization and nets are the paths covered in those works. In each process, a new relational map is built or woven. The route becomes apparent (while presence) in events and poetic moments showing the importance of procedural uniqueness and articulation and interactive dynamics and dialogue between all agents. The work becomes potentially apparent in “presences” by the different states of action and levels of convergent and divergent interaction established by the agents.

Each map is constituted as a unique and complex living organism, creating its own organizational framework where interactions generate possible knots and fissures that unfold in apparent presences as condensed realities. Sound, movement and images intertwine into realities. Dance in mixed reality merges the body into virtuality and becomes “presence”.

In multimodal improvisation in mixed reality, agents share space and time in action; share information and exchange movements in sound or sound in movement; in the arena of improvisation, agents experience predictable and unpredictable situations and learn the game of generosity, availability and attention to deal with the risk.

The body that dances in the interaction with the sound in mixed reality repositions itself all the time in divergent and convergent spaces searching for the sound body. Improvisation as an autonomous modality of creation and a path to the life of intensions is, itself, the place of potency and the ultimate result.

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