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Embodied Cognition and User Proprioceptive Processes in Artistic Virtual Reality Environments

Sanatsal VR Ortamlarında Somut Kavrayış ve Kullanıcı Özduyu Süreçleri

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ABSTRACT

This article explores the user sensory processes that emerge in contact with the virtual reality artwork. This is relevant because with virtuality technologies it is necessary to reevaluate the existing interpretation of the proprioceptive processes of the user. Different artistic creations and sensory processes detected are explored. This study concludes that through certain mechanisms of empathic connection between the user and the environment it is possible to expand sensorialities. Bodies connected to virtual environments receive and expand sensory information.

Keywords: Art, body, cognition, experience, metaverse, proprioception, virtual reality

ÖZ

Bu makale, sanal gerçeklik sanat eseriyle etkileşimde bulunma durumunda ortaya çıkan kullanıcı özduyu süreçlerini araştırmaktadır. Kullanıcı özduyu süreçlerinin halihazırdaki yorumlarının sanallık teknolojileri ile yeniden değerlendirilmesi gerekliliğinden dolayı bu durum araştırılan konuyla alakalı görülmüştür. Çalışmada farklı sanatsal yaratımlar ve buna yönelik tespit edilen duyuşsal süreçler araştırılmıştır. Araştırmada kullanıcı ve çevre arasındaki belirli empatik bağlantı mekanizmaları vasıtasıyla duyusallığı geliştirmenin mümkün olduğuna ve sanal ortamlarda olup bitenlerle bağlantılı olan bedenlerin duyusal bilgileri alıp geliştirdiği sonucuna varılmıştır.

Anahtar Kelimeler: Sanat, beden, algı, deneyim, üstevren, özduyu, sanal gerçeklik

Introduction

In recent years, the debate on artistic creation in new media has intensified. In relation to this debate, the poetics of art acquire different discourses that converge with the artistic proposals centered on new media. In particular, the artistic sensorial experience as a producer of subjectivity has been present in the discourses of contemporary art or mainstream art. Hegemonic theories linked to bodily representation have been updated by others related to sensorial experience. It is with the proliferation of virtual technologies that these discourses converge through immersive experiences. The emergence in the digital arts of discourses that are highly centered on the experience of users or active spectators converges with contemporary proposals that are far removed from the technological.

In this aspect, a link can be perceived between discourses on sensory experience and artistic-creative proposals that focus on the creation of individual subjectivity through the environment. In particular, the codes used differ slightly; however, virtual art has appropriated some of these creative and aesthetic codes of art. The concept of dematerialization of contemporary art and the emergence of embodied artistic manifestations are clearly linked to immersive creations that in turn enhance the mental connection with the body and the environment. Likewise, the sensory and bodily aspects that affect the recipients of the work and the interaction that takes place during these cognitive-bodily processes of the self present in the environment are examples of processes that share artistic experiences concerned with contemporary corporeality and virtuality. Thus, there is a hybridization between hegemonic discourses and new digital practices that converge in sensorial explorations of embodiment, including bodily interaction with the elements of space.

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The response of the arts to immersive and interactive technologies has been broad but is currently on the rise (Simó, 2019, p. 141). Through the suspension of disbelief, virtual environments (VEs) gain relevance through dimensions such as presence and empathic processes with the narratives employed (Bailenson et al., 2016; De la Peña et al., 2010; Slater, 2009, 2018). States of presence as well as illusions derived from presence in the VE affect states of embodied cognition (Biocca, 1997; Gibbs Jr, 2005; Shin, 2018).

Conscious experience is an interface that acts as an invisible medium that allows the organism to interact flexibly with itself. It functions by creating an internal user interface as if it were a (virtual) reality (Metzinger, 2019, p. 145). From Thomas Metzinger's point of view, this interaction takes place from a conscious being with itself. Thus, the individual and subjective experience is linked to the experience produced by sensory connections with the environment and with others. In this relational process, sensory connections are created that allow the user to connect experientially with what is in the immediate environment, so it can be said that through these relationships it is possible to create processes of interaction and enactive and embodied knowledge. The research is based on the assumption that bodily processes have a direct influence on how the environment is perceived, as some authors argue (Barrett, 2017; Damasio, 1999; Gibson, 2014), reaffirming that the process of interaction between users and environment is part of the artistic work and influences their subjective perceptions.

Proprioception is the ability to know the position of the body from the information captured. The proprioceptive system is responsible for reacting to what is happening around the user. In particular, the system is the one that perceives the location and movement of body parts, including muscles. These processes become relevant in immersive environments, where multiple body zones are activated. The body in these VEs is located in the center of a 360° environment. The environment is shown at a real scale surrounding the user who experiences it. In most cases the process begins after the placement of a VR device and the execution of a particular program or application.

In the immersive experience, the medium used becomes transparent, i.e., during the experience one loses the fact that one is using a virtual reality (VR) device and experiences the environment directly. This makes it possible to connect with the sensory experience in artistic works that use technological media, since there is a forgetting of the medium used. Bodily sensoriality is a common element in the pursuit of contemporary practices. Therefore, there is no distinction between the medium employed and it should not be created either since, as I will develop later, the medium together with the experience can become transparent. Transparency in the VR medium refers to the ownership of this medium so that the user can interact with it in an intuitive and natural way. This interaction process is placed in the background due to what happens in the VE.

Nowadays experimental artworks whatever their medium seek the emotion in the viewer by connecting with their own bodily experience and sensibility that emerges from the enactive and bodily practice. In these bodily practices it is possible to connect with what surrounds us regardless of the medium in which we are connected at that precise moment. It is in this process of bodily experimentation that this bodily sensitization to different structures emerges.

Methods

The purpose of this research is to address and explore the bodily processes of the user-visitor in immersive technological arts with a focus on spatial organization. This is possible through the analysis of the embodiment that invades general art by dissolving material dualities, specifically through immersive VR art environments, and to focus attention on the processes of interaction and sensoriality produced in contact with the work. This research explores the practices, methodologies, and experimental results that can be obtained from artistic and social reflection together with artistic practice. It is important to consider that immersive digital art practices contribute to the proprioceptive enhancement of a spatially located self and above all this artistic experience affects the social participation and individual social experimentation of the subject.

Results

In order to understand in depth the sensory processes that emerge in the contact between the user-visitor and VEs, it is necessary to look at different dimensions. On the one hand, how interactive processes give the user capacities similar to those of experimenters and how this in turn modifies the environment. This is where proprioceptive processes directly influence the narrative reading of artistic works, generating multiple readings conditioned by perceptual processes. Particularly, the processes of embodied cognition link the sensory experience giving importance to the body and therefore to its interaction with the environments of virtuality.

Performativity and Virtuality in the Contemporary Receiver: From Viewer to User

The body in the artistic work has had special relevance throughout the history of art; however, its use has been evolving and has consequently been modified in accordance with the new expressive currents. From ancient times with the pictorial representation through the artistic object to the present day with the creation of virtual avatars in the metaverse, both the body represented and the role of the artist and the receiving public have been modified. In effect, there has been an evolution in the works in which we start from the representation and capture of the essence of the artist's models to later use the representation of that body or even the artist's own body but also the corporeality of the receivers of the work. Contemporary art assumes the use of the artist's body as a close tool and means of expression, but also as a model for experimentation. Let us remember that, at the end of the 1960s, the performativity of the body was already being put into practice, leaving traces of bodily action in events or happenings, with creators such as John Cage, Allan Kaprow, or the Spaniard Esther Ferrer. The models used until then came to life and their live use was valued in art in front of the questioned "audiences" or receivers of the artistic work. In performance art, the artist's bodily expressions predominated, but its fundamental characteristic is the capacity to activate the audience present. This bodily change of the pictorial representation in which this bodily activation is used in the action seeks an empathic connection with these receivers of the work, since they are not mere spectators. It can be said that this corporeal use of the body is an attempt to raise awareness of the corporeality of the recipients of the work, emphasizing its empathetic nature with others.

This materializing or objectualizing aspect of performance is a feature that has almost completely vanished and been eliminated in current practice. The technological revolution has contributed to this progressive suppression of materialisation and objectualization that occurred along with other artistic manifestations that intensely valorize the corporeal, such as land art manifestations. This dissolved material duality contributes to the arts in general to set aside materiality in favor of the enactive, situated, and subjective experience.

This change in the roles of the "spectator" is already assumed in today's contemporary arts and, therefore, in the new digital poetics. But it is in the latter, and more specifically in the new technologies of the continuum of virtuality (Milgram & Kishino, 1994, p. 282–292), that the role of the receiver of the contemporary work is particularly relevant. The artistic experience of the active user in VR art environments poses a shift in bodily creation and experimentation. The experimenters who access the work from their own corporeality will notice bodily resonances that invite them to connect with the space, as happened in the happening. The subject immersed in a VE is subjected to new parameters as a receiver and an active interaction is expected on their part for the activation of the contemporary work.

Although the artistic proposals of virtuality have a dimension that affects the techniques of production and creation of this artifact, their exhibition in artistic spaces gives them an atmosphere and prominence that would be difficult to achieve in any other way. In this way, the exhibition of VR works in museum spaces gives them a classification that they would not otherwise acquire; that is to say, the exhibition of this virtual product to be viewed in homes or museums affects the categorization of these works. The best of the most relevant cultural centers are focused on large-scale artistic productions in which large teams with digital profiles generally work and which are directed by one or several artists. These manifestations are contrasted with a large current of multimodal artists who use these technologies to transmit an idea and whose real possibilities differ from the large-scale creations through production studios. In the case of immersive VR works, there is a large stream led by notable production companies and multidisciplinary teams in the creative industry that overshadows some innovative artistic proposals by individual artists or small working teams.

As far as the place of visualization and its relation to the embodied aspect of the artistic experience is concerned, it can be said that it affects the way the VE is perceived but mainly due to the limitations in interaction derived from the place where it is visualized. However, the use of corporeality in immersive VR proposals highlights the creative processes more than the results obtained. Thus, a large majority of artistic proposals seek to facilitate an experience or process mediated by the proposal of a creator. The latter consequently gives rise to valuing the experience of the process together with the receivers of the work and sometimes also with the presence of the artist himself or actors designated to accompany the user. Specifically, performative experiences propose the experience of a joint experience that starts with the artist's body but also with the receivers of the work, who in these cases play a leading role.

In relation to this new role of the spectator, this privileged position is evidenced in the face of partial visions, therefore moving from a contemplative aspect to being an active part. In particular, this change in the relationship between the public and the artistic proposals is maintained in contemporary art today. The former spectator has evolved to become an active experiencer, leaving behind the emancipated spectator described by Jacques Rancière (Rancière, 2010) to enter the space of immersivity. In these cases, it is a receiver who activates the environment through interaction. However, this performative turn not only connects to performance creations but also relates to the capacities for activating the surrounding environment, since experimentation and connection from one's own body allows for the modification of interactions on a social level. Furthermore, the performativity of things is that faculty that allows the activation of different surrounding elements and that in a specific way is manifested in new currents centered on the experience with VR. Therefore, in artistic-immersive creations, interaction with the possibilities of the world is favored and not so much by its apparent materiality.

In a hyperconnected society, the arts invade space with new creative formats. Today's mixed reality devices allow artists to create alternative realities through imagined environments or simulations of other spaces. For all these reasons, immersive environments are still being defined, not only in the arts but also in other fields. In general, the creation of immersive VR environments is booming along with the definition of appropriate esthetics for users whatever the genre and application of the designed environments. For these creative esthetics, art always provides the creation of novel systems and options that are sure to be embraced by other genres. In this sense, artistic responses to media such as VR are necessary to experiment with formulas of composition and interactivity with the environment itself, and are key to the experience of today's audiences. Experiences of virtuality are particularly relevant for the emergence of new sensorialities in audiences through novel proposals for interaction and sensorial connection.

In the relationship with the performative environment, new sensory connections emerge and empathic connections are also made with others. In particular, these situations of experimentation created by the artists in VEs aim to connect with our present selves in the created place. Through these corporealities, there is an approach to simulations of virtual worlds on the part of the users. These immersive virtual experiences attract a connected body that reflects its virtual avatar.

Perceptual Processes of Embodied Cognition

Immersive VR proposals suggest new forms of social relations while allowing for first-person experimentation. In particular, immersive digital art practices favor the creation of social relation practices that affect the experience of the artistic experience. These creations propose different bodily approaches that bring out sensorialities. With the changes in the appearance of the avatars, different corporealities are acquired that have repercussions on the ways of interacting. In particular, these artistic practices can also be explored from the practices of social interaction that emerge from educational contexts. Moreover, the use of technologies in art has evolved, making training and experimentation with other creative formats necessary.

From the cognitive sciences, it is understood that we react to what we perceive of reality. It is in this perceptual and emotional process that corporeality acquires a relevant role in the creation of models of organization of sensory information. These already-acquired patterns and models of interaction are called

into question by means of sensitive bodily practices, in particular through artistic practice, where these processes can be renewed through artistic creation itself. The creation of immersive artistic experiences allows the body's limits to be explored repeatedly through different stimuli. But also as the artist and theorist Simon Penny proposes, that from the postcognitive sciences new methods of validating and talking about the embodied intelligences of the arts are offered (Penny, 2013). Embodied cognition asserts that perceptual processes of bodily action are inseparable and that bodily reactions are interpreted on the basis of what is perceived of reality. In other words, both action and perception are linked and are constantly nourished in the experience of the world. Thus, sensory perceptions directly affect the way in which awareness of the world is acquired and during this process bodily actions are understood to have an influence on the understanding and creation of mental models. The enactive action proposal is aimed at the practice of bodily experimentation in the environment (Varela et al., 1997). It is in this experience of connectivity with what surrounds the user that subjectivities emerge independently of the materiality of the environment where they are present.

The bodily practice of relating to the environment links the recipients of the contemporary work with the environment (simulated or not) around them. In this sense, one cannot speak of the corporeal without mentioning the affect of the environment, nor vice versa. In the immersive virtual experience, the self or receiver of the work is connected to the VE that surrounds it and reacts through the emotions constructed. The bodily actions and therefore the interaction with VEs allow us to connect with these spaces from our own embodied and situated experience.

New cognitive paradigms address other dimensions of the spatial and embodied. These new dimensions increase the use of the body in the creation of meaning from practice. The situated, embodied, distributed, enactive, and extended approaches provide a framework for the theoretical–practical discussion of practices of the self. Therefore, it is understood that cognition is a mirror of perception where through mental frames it is possible to organize any idea; however, the mind is able to override perceptions (Tversky, 2019, p. 66–71). On the other hand, this is possible due to the intrinsic functioning of the brain and the process of creating mental models, for, in fact, as Thomas Metzinger comments:

> The human brain can be compared to a simulator in several respects. Like a simulator, it constructs, and constantly updates, an internal model of external reality using a continuous stream of input from sensory organs and using past experience as a filter. It integrates the sensory input channels into an overall model of reality, and this in real time. However, there is a difference. The global model of reality is constructed by our brain at such a speed and with such fidelity that it is not normally experienced as a model (Metzinger, 2019, p. 149).

This statement should be understood in such a way that not thinking about the existence of the mind as a process makes this model of reality transparent. In other words, the medium used for the assembly of this virtual model becomes transparent by losing the attention of the receiver of the artistic work and creating a direct connection between the immersive environment and the receiver of the work. Thus, sensory inputs are interpreted quickly, being able to react instantaneously to any perceived stimulus. It is in this process of interpretation of sensory inputs, then, that emotion is constructed. The very process of emotion construction is an individual interpretation made from analysis of perceptions (Barrett, 2017). Moreover, these processes are constant and filter the information perceived in real time so that the use of technologies in everyday life habituates users to the use of strategies and methods of interaction with VEs that affect the experience.

Technosocial changes have undoubtedly affected the corporeal condition of experience and the relationship with virtual spaces. Virtual environments immerse the user in individual situations and experiences where subjectivity emerges. Therefore, it is in these spaces of immersivity and artistic creation that it is possible to establish relations with the space itself through action. Likewise, the new immersive spaces enable the simulation of environments or the creation of imagined ones that favor situations of interaction and relationship between the receiver of the work with the environment and, occasionally, with other possible receivers who are present at the same moment. The immersive art of VR makes it possible to connect with artistic environments from one's own corporeality and thus interact and connect with the environment from the body with the benefits in the artistic experience that this entails. For example, through natural interaction with the immersive VE of VR, it is possible to experience a simulation or artistic creation on a real scale where the movements are very similar to those used in everyday life. The natural interaction used in VR spaces allows us to interact in a very similar way to how we normally act. For example, if we want to hold an object, it is possible through the same hand gestures, which in this case is done by pressing a button on the haptic control in our hand. These creations seek to achieve that virtual immersion in the environment specifically designed for the presence of the self. The rules of the nonimmersive metaverse revolve around the fundamental idea of allowing users to access the metaverse without completely merging their physical and digital worlds. Although the level of immersion is reduced, the rules governing this metaverse still emphasize interconnectedness, digital identity, and the ability to traverse diverse virtual spaces.

Bodily experience as art is a contemporary practice that is easily found in today's art circuits, not necessarily technological or immersive. Since John Dewey published "Art as Experience" (Dewey, 2005), it has been understood that there are other processes in contemporary works that are far removed from the conception of art as an art object and that approach a lived art. But with the advent of new methods of communication, bodily practices expand into immersive environments. These virtual spaces connect the present self with artistic environments designed to experiment with and from the body in this VE and stealthily invade contemporary circuits. In these processes fostered by artistic creation for virtual media, relationships of the self to the environment are established that affect the conception of the environment and the lived experience.

Experimental Terrain: Proprioceptive Processes in the Production of Subjectivity

Immersive and interactive artworks are able to bring out bodily sensations more intensely. The processes of creating such sensations through immersive artworks will be discussed here. This situation is manifested in a wide variety of works, a concrete example being Osmose (Davies, 1995). The immersive

experience proposes a vast natural terrain where visitors are in movement through the spatial terrain. There are many references to elements of nature, but the treatment, design, and use of the elements do not fully correspond to the treatment of these elements in the natural environment in a realistic way. Pau Alsina comments on this work as follows:

> [...] A spatio-temporal context is created in which to explore one's own subjective experience of being in the world as an embodied consciousness in a spatial environment where the boundaries between inside/outside, mind/body dissolve. (Alsina, 2007, p. 43).

This is especially relevant since the construction of the work is not a realistic simulation of everyday space but an imagined space where references to a Euclidean environment are lost. It is in this particular time and place that a bodily awareness and connection with the environment emerges, thus breaking down these dualities from the corporeal.

In particular, the immersiveness of digital artworks favors concentration on the visual stimulus and presence in the virtual world. This virtual experience is particularly enriching for encouraging interaction practices with the artistic work and also with others, if there are any. In addition, the reality of these immersive creations includes a rendering of three-dimensional dream spaces that place the user in unexpected environments as in works such as TRAUM (2018) by Christian Lemmerz. In this work the author uses the VE to simulate a trauma through different elements such as snakes. The user immersed in the space with almost no alternatives and being aware of being in a VR experience is subjugated by inhabiting the closed and dark space with snakes moving around his position. The inclusion of these immersive practices in learning spaces affects the bodily process and the relationship with the VE.

The practice with immersive artistic experiences and the experience of these contents from the first person contributes to corporal and artistic knowledge. It is important to include various digital techniques and formats without the obligation to conform to digital art visible through the computer, leaving aside training in visual creation techniques. The visualization of immersive VR experiences is especially important because of their sensory capacity and bodily involvement. Bodily and unconscious processes are part of the origins of cognition (Lakoff & Johnson, 1999). Furthermore, these cognitive approaches give insight into creative practice. Therefore, applying these ways of understanding thinking opens up new ways of connecting artistic practices regardless of the medium employed.

Social teaching and training takes on an important dimension in the knowledge of one's own body and forms of social relation. This social relationship is especially important in artistic or digitally mediated contexts where established norms are modified and adapted to virtual contexts. The virtual images surround the user and as avatars they enter new social and connected spaces. These spaces designed for interaction must be approached with care and have a careful mediation of the immersive and social journey that takes place through the avatar. The benefits of experiencing new creative VEs and interacting in them allow the user to experience the world. In particular this immersive social journey gives importance to the avatars and the social relationship between them. When interaction occurs through the corporeality of a new avatar, attitudes and modes of relationship are modified.

Marina Abramović's performative experience Rising (2018) proposes this bodily activation of the user that is enhanced by the presence of her own digitized avatar. In this sense, the immersive work allows us to connect and thus modify prefixed ideas. Artistic creations for the experience propose routes that allow emotion to emerge, so in this sense the role proposed by the artists has changed in search of an activation of the works.

Body Gravitation and Its Proprioception

The embodied experience through a VR device can appear to be a great bodily challenge. The construction of the environments is composed of different virtual elements that represent or are specifically placed to call for action from the receiver. In this sense, through empathic connections with others, proposals for bodily action seek to activate the body in a space mediated by the artist. In these cases, the virtual space becomes a space for bodily action and expression. Thus, immersive creation breaks with traditionally known spaces and introduces new perceptual challenges for bodily stability. The presence and solidity of the body crumble with the inclusion of unconventional spaces far removed from the physical structures known and learned in our experience of the world. These unstable structures seen on a digital screen travel to be experienced from the first person provoking a bodily affectation in the experience of the contemporary receiver.

An example of these structures in immersive art-making is the work Chalkroom (Anderson & Huang, 2018). In it the artist Laurie Anderson together with Hsin-Chien Huang have created an imagined world where objects and structures do not respond to a Euclidean logic. The experience invites an active audience to move through the three-dimensional environment in all directions by extending their arms in the direction they wish to move. Movement on the *xyz* axes gives total spatial freedom even more than when there is movement on a stable floor and where there is a limitation of two axes. The work exposes this challenge through the elimination of a stable floor and poses other bodily challenges through sensory perceptions of space. Hito Steyerl talks about the removal of a stable floor and the sensory experience of the viewer in a state of loss of gravity. Therefore, he comments:

> Paradoxically, while falling you may feel that you are floating, or even that you are not moving at all. Falling is relational: if there is nothing to fall towards, you may not even be aware of falling. If there is no floor, gravity may be of low intensity, causing you to feel weightless. [...] As you fall, your sense of orientation may begin to deceive you. The horizon churns into a maze of collapsing lines and you lose all awareness of what is above and what is below, what comes before and what comes after, you lose awareness of your body and your contours. [...] The disorientation is partly due to the loss of a fixed horizon. And with the loss of the horizon also begins the withdrawal of a stable paradigm of orientation that has established throughout modernity the concepts of subject and object, of time and space. As they fall, the lines of the horizon explode, rotate and overlap (Steyerl, 2014, p. 16-17).

These reflections must be understood from the unavoidable bodily experience of virtual worlds, particularly the full immersion in these spaces involves experiencing some of these factors from the first person. Immersive artistic environments such as Chalkroom show bodily potentialities of interaction with the non-traditional space or simulations of it. The work shows an artistic intervention where different methods of bodily interaction have

been sensorially worked on. For example, the possibility of displacement on its axes gives freedom of choice in spatial movement, thus affecting the bodily conception.

In this imaginary space, the objects and drawings made by the artist that we see on the walls reflect a specific idea in each room linked to spatial sound. In particular, each of the rooms created in this space works sensorially with the positioned and located body. Through sound, it invites the receiver of the work to move around, perceiving a sound spatially located at a specific point in the 360° space. This feature is not new in the daily relationship with the space; however, it potentially adapts this sensoriality by controlling auditory perceptions.

This voluntary movement through Euclidean space is directly related to the artistic methodologies of experimentation through doing and sensorial corporeality. In these bodily displacements there are different structured processes that allow the creation of unique nonlinear routes.

The material composition of these VEs seems to create divisions or borders between worlds when this should not be the case. There is no material duality but one and the same world with different possibilities of action, relation, and interaction. The things of the world are defined by their possibilities of action and not by their perceptible qualities that generally produce material dualities. Artistic sensory experience starts from the body and is internalized by the conscious self independently of the source of the stimuli. Although in some contemporary currents there is a division caused by the use of technology within the artist's creative process, virtuality is present in the experience independently of the materiality of the stimulus that produces it and therefore of the tools used. It makes no difference what material medium is used, as it equally affects the sensory experience of the work.

The emergence of these new materialities of the virtual creates multiple simulations of the same world imagined by the artist in which multiple possibilities and paths that bifurcate reality are offered. At the same time, posthumanist dematerialization is closely linked to artistic experimentation, and the latter has recently been given new value following the emergence of situated sensorial practices based on immersive technologies. In any case, sensoriality is perceived from the bodies that connect the user with the surrounding space, whatever its materiality. Thus, sensory perceptions construct meanings and provide real possibilities for action and interaction.

Above all, one of the challenges in artistic creation in VR is to connect users with the environments of the metaverse. It is particularly in this challenge that art has an important role to play through alternatives that allow reflection on this interaction. While this shift in the recipient of contemporary art affects contemporary art in general, the technological and immersive arts in particular explore the limits of such interaction with the metaverse, through challenging routes of connection. These spaces of virtuality enable the artistic creation of ways of connecting not only individually but collectively.

In 1968, the exhibition Cybernetic Serendipity (1968) showed representative works of digital art such as Tinguely's drawing machines or the Fluxus movement artist Nam June Paik with the Robot K-456; it should be said that the artists were concerned with the performative aspect of the work. This performative aspect is not exclusive to the genre of performance but has become a property and aspect of research into the processes of subjectivity of the contemporary receiver of the work. Since the Serendipity exhibition, digital art has evolved toward an integration of the users with the image, that is, with the creative work, and this entails a dissolution of the materialist distinction between the material and the virtual. This postmaterialist vision is widely integrated in most immersive creations, showing a dissolution between these concepts present in the modes of interaction. It could be said that objects are understood by the possibilities they offer and not by their material qualities. This is especially relevant when dealing with the process of connection with the environment.

It is in this interactive process that ways of knowing emerge through their properties and affordances (Gibson, 2014, p. 119-126). These affordances are those qualities of the objects that allow us to understand what the artist expects to happen, that is, their intentionality with respect to the work. In short, they indicate the possibilities of exercising actions with concrete and singular elements. These characteristics are typical of the immersive and, together with technologies, make it possible to bring these aspects to the foreground.

Art must favor the creation of subjective experiences in the receivers, and with these immersive formats this is possible. Nowadays, contemporary work is focused on creating experiences with a multitude of users through a single environment, where a single artifact creates multiple experiences. This corporeal integration of the receiver is what allows for a sensorial connection with the creative proposal. For example, interactive digital artworks allow the creation of connections from the very corporeality of the receiver of the work, with an environment activated by his or her presence. In these cases, the receiver accesses immersive environments accompanied by a new and singular bodily appearance due to the use of a virtual avatar that visually replaces his or her biological body as if it were a superficial mesh. Of course, virtual avatars are representations that simulate body movement and make it visible to other attendees, if any. These volumetric virtual representations are the bodies that connect with the receptors to amplify the sensory experience through bodily action. Thus, the interactions and activations of the environment facilitate the sensory perception of the specially created spaces. Therefore, from the bodily experimentation of these VR artistic proposals, these connections with their surroundings are created. However, the avatars combine with these active receptors by modifying and adapting them to different situations.

Discussion

In the achievement of the artistic experience, it is essential to use the body and the emergence of sensorialities to connect the body with the environment and its objects. Immersive spaces propose bodily approaches that bring the receiver closer to a more corporeal and experiential experience. In artistic manifestations, the body is given a relevant role from which to create artistic experiences with an attention to the sensorial, instead of directing the point of view inescapably toward material constructions or the use of technology in the achievement of the artistic experience.

Through empathic connection mechanisms between the user and the generated environment, individual and subjective sensoriality can be expanded. Not only does this linking of the connected body with the environment occur in natural spaces, but, as we have seen earlier, interaction with computer-generated

spaces also allows for these sensory connections. The processes of interaction with this virtual image are especially relevant when talking about the sensory processes that emerge in contact with the artistic work. In this sense, the properties of the virtual image have an impact on the interaction with the image and thus on the forms of relationship between user and technology. In particular, elements in the creative composition such as a stable ground affect the subjective experience in the same way that performative experiences affect the receiving audiences. Above all, metaverse environments are composed of other compositional elements that, through the same process, affect the reading of the experience and thus the attitude and interaction.

Conclusion and Recommendations

Above all, the boom marked by technological tools allows a breadth in their works that focuses the poetics of art on a small nucleus of the wide range of these artistic proposals. In this way, this work deals with a bodily practice that goes beyond the device and the media used. Taking into account the idea of interaction between the individual and the environment with the artistic work, it can be affirmed that the embodied practice in artistic creations sensorially connects the corporealities of the recipients and the environment. Concretely, it can be established that the environments of the continuum of virtuality (Milgram et al., 1995, p. 282–292) that modify or simulate new spaces allow them to be resignified through the embodied relationship between the individual and the environment. Therefore, body–environment interaction processes create enactive knowledge approaches (Froese & Di Paolo, 2011; Gallagher & Lindgren, 2015; Thompson, 2005) within embodied and immersive practices with VR technology. It is assumed that the simulation of virtual spaces can increase environmental stimuli and subsequently create user attention to processes. Particularly, the use of immersive for cinematic narratives influences the processes of narrative comprehension affected by interaction (Tikka et al., 2012). Artistic proposals that favor a sensory experience are facilitating a connection between the present of the self and the environment at that very moment.

The body and environment form sensory experiences that expand the way of understanding, experiencing and interacting from the connected body. The role of the spectator has changed and regardless of the medium of the work, there is a tendency toward situated connection. It is in social spaces that artistic proposals propose sensorial connections not only with the created environment but also with others through social avatars. In these cases, it should be noted that other social connections are taking place where group connections emerge and are created during the sensory experience, although, in another sense, this situation also affects the individual embodiment and sense of self, since the avatar is not always similar to the corporeality of the biological body. This situation affects the interaction and relationship with others, which is modified. In particular, this aspect of bodily affect through avatars can be addressed in future research, in particular how these new virtual corporealities affect the conception of the self and others through artistic experience and social interaction of the environment.

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