New Didactic Strategies: 3D Modeling and Virtual Reality as a Cataloguing Alternative of Light Environments and their Application in Museums and Art History Classrooms

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The new interactive digital aesthetic has replaced the traditional "subject/artwork" relationship with a new conceptual vision "user/artwork" where the participation of the subject becomes important. The presence of light as an aesthetic resource configures hybrid, performative, participatory, de-temporalized and disruptive spaces that require deep reflection as a subject. Virtual Reality allows us to propose an alternative prototype cataloging of light environments. The theatrical dimension of these interventions is the key, because we speak of a tool that amplifies communication through access to referential worlds based on reality. This approaches us to this type of manifestations helping us to understand and experience these sensations through 3D models. These strategies of representation allow us to value these spaces, learning directly in a simulated environment in which the physical body becomes a priority element. In this research, a reflection and application work is developed with practical cases from the perspective of the philosophy of art and aesthetics (50 artists selected and their works). In them we can observe the displacement of the artistic object to the idea: aesthetic dimension, experience and perception of the subject. In addition, its reception, dissemination and research within the museographic practice is analyzed. This will allow us to examine its discursive, philosophical and theoretical content. The aim is to increase the value of this type of intervention by proposing a cataloging alternative that improves the reception and production of knowledge of these interventions. This is an interdisciplinary project that uses 3D visualization and Virtual Reality, tools of the current immersive and interactive strategies of the new Vanguard Museography, and proves to be very useful for its accessibility and didactic value in the field of heritage dissemination in museums and classrooms.

INTRODUCTION

Light as an aesthetic and artistic material has a great expressiveness. Like a resource, participates in the construction of the space lived by the spectator subject and establishes relations between both. As an artistic fact, it needs a deep understanding from the philosophical, semiological and phenomenological perspectives. These areas will help us understand how the visual phenomenon occurs in front of it [Rinaldi 2018]

Light makes space visible and dramatizes it. In these three-dimensional spaces the body moves and is projected actively, because the subject not only contemplates, but co-creates through his own experience and completes the work. It is a generative process where the spectator's own sensitive body means the environment based on the evaluation obtained from the reception. The lighting element encourages the intervention of the spectator and, with this, an aesthetic dialogue is established where an interactive process of interpretation is formed [Sánchez Vázquez 2005].

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In the 60s and 70s of the twentieth century new discourses appear about the use of light as an artistic language, materializing these assumptions with various interventions in museums and galleries. Contemporary artistic Installation and environments from Light Art and Minimal Art movements introduce novelties around the concepts of construction and spatial perception. These less visual and more conceptual forms establish a play of relations work-spectator where the senses are intensified. It is necessary to experience them in situ to live the aesthetic charge and obtain a complete reception of its meaning as an artistic fact. Artists like Dan Flavin, Bruce Nauman or James Turrell will be the pioneers of these movements.
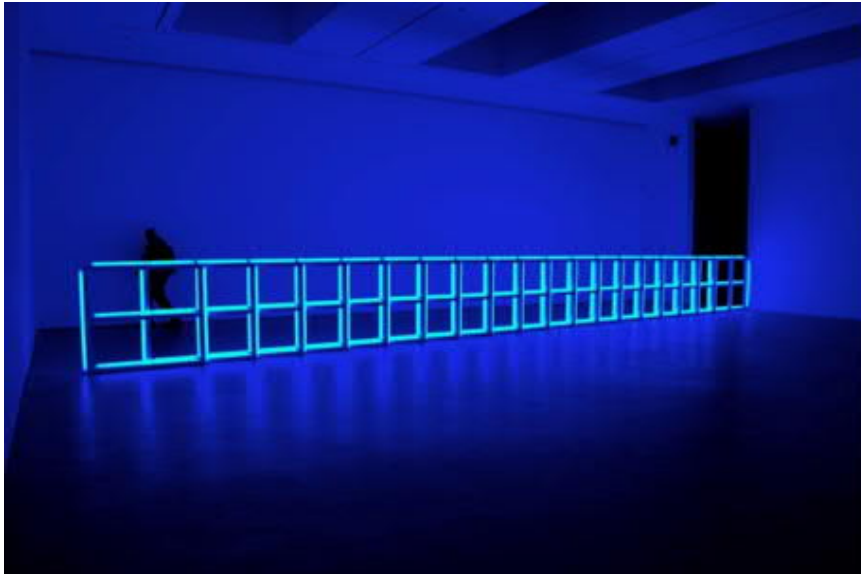
Fig. 1. Dan Flavin, Untitle (to Helga and Carlo, with respect and affection) – Installation view, 1974

DEMATERIALIZATION AND PERFORMATIVITY AS A SPACE APPROACH: THE BODY SUBJECT

Questioning the artistic object as a material element opens new paths in contemporary artistic production. Marcel Duchamp already did it with the Ready Made offering other lines of execution for the work of art [Parcerisas 2007]. The space replaces the object and is presented as content interrogating the viewer who has to intervene to understand what happens there. The Minimal was looking for an expression of subjectivity, a new aesthetic concept of multiple and polisensorial work of art where the viewer involved their senses. Contemporary Installations and Environments of Light posed this; spaces of aesthetic stimulation in real time where the visitor could be involved walking inside them. The expressive potential of these interventions is enormous, since the dialectic between the visible and the invisible offers the possibility of articulating meanings in a performative way [Ring Petersen 2015].

Dematerialization indicates the value of the work, not of its materiality, but because of what it means as an idea. The limits are dissolved offering the possibility of establishing extra-artistic links with it. It breaks with the traditional notion of mimetic and formal art. These artistic facts are understood as metaphors that must be executed in movement, with the body, in the same place where they exist. Therefore, the viewer becomes a constituent element of the work and, with his experience, completes the work [Liñán Ocaña 2009].

The performative is also multiple. It is a new way of expression with a huge phenomenological and intersubjective character. It depends on the position of the spectator, and his bodily activity as a receiver of experiences. Performative action is an aesthetic strategy linked to these interventions that influences the emotional that is the focus of conscious significance acquired within the luminic space (Fig. 2). This process is the key to understanding how the experience develops in the spaces of light; the spectator walks within it and the movement of the body makes it possible to receive the signals grosso modo. The subject performs sensory and intellectual operations that help him to interpret the aesthetic event. Light does not stop being a linguistic resource with a semantic load that has

to be interpreted and perceived from the senses. Semiotics can explain this process in a much deeper way [Ring Petersen 2015].

The theatrical nature of these interventions offers us a type of aesthetic where the concept of set design expands. Light as a dematerialized aesthetic resource, together with the bodily presence of the obliged viewer in them, leads us to deal with the fact of the performativity of movement as an important part of the cognitive operations that take place in Contemporary Installations and Environments of light (Fig. 3).

Fig. 2. Example of James Turrell's Installation (left) and Lucio Fontana's Installation (right)
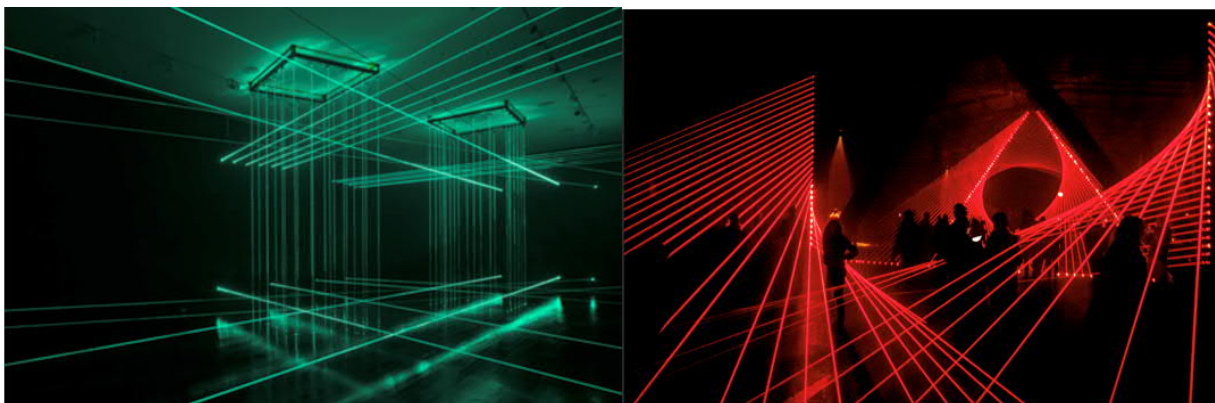
Fig. 3. Example of Li Hui's Installation (left) and Matthew Schreiber's Installation(right)

THE CATALOG AS A RESOURCE: NEW HORIZONS FOR AN IMPROVEMENT OF THE RECEPTION OF CONTEMPORARY ARTISTIC LIGHT ENVIRONMENTS AND INSTALLATIONS.

Fig. 4. Dan Flavin's Catalog. Series and Progressions. David Zwirner Gallery, New York, 2009 (left) and Ann Verónica Janssen's Catalog. Experienced. Galería toni Tàpies, Barcelona, 2009/2010 (right)

The role played by the cataloguing in the artistic and patrimonial sphere is difficult to ignore (Fig. 4). It is a necessary instrument to obtain knowledge of the artworks or cultural assets that have been exposed. Despite being a tool with centuries of experimentation and having changed relatively thanks to new technologies, it still falls short in some aesthetic approaches. Precisely, the development of new technologies, affect the conception of the catalog and its narrative possibilities. Hypermedia produces narratives and digital discourses that can improve the understanding of certain interventions due to their experiential and phenomenological character [Bellido Gant 2016]. The aesthetic component requires the active participation of the viewer for its understanding, therefore, the two-dimensional catalog (whether on paper or digital) does not respond to the demands of understanding these artistic facts. The formal description must be completed by an immersive visual experience that allows viewers to understand this type of three-dimensional, desmaterialized, performative and theatrical-theatrical manifestation.

Mediation requires actions by institutions that bring the user closer to the works of art so that the message is received and a connection is established, in order to understand, reflect, experiment and interpret the content [Santacana Mestre and Martín Piñol 2010]. Currently, most museums, galleries and cultural institutions offer their catalogs online reasoned, even so, these do not fully respond to the needs posed by three-dimensional interventions. The personalized aesthetic experience requires platforms that allow interaction but, above all, immersion as an added value. The spectator as an active participant of the work must intervene in the space, walk in it, make an aesthetic visit as an explorer of meanings. In these hybrid light spaces, the reaction comes from the visualization of the environment and physical experience in it [Martínez Sellés 2012].

Museum's physical space offers content to the user as the recipient of the work. The environment becomes private when the work-viewer connection occurs. This place is inhabited and transited based on its symbolic and dynamic power. It is necessary to be able to live, meaning and multiply experiences by enhancing the imagination. The interaction, interpretation and physical involvement of the subject in the work produces the phenomenon of reception; body as a receptor intellectual element intensifies the symbolic qualities of artistic intervention by

establishing sensory relationships with the receiver [Aguilar 2010], "*…since it operates as an ambiguous territory where experience is versatile.*" [Merleau-Ponty 1945].

Light and color are the main features of works by artists such as Dan Flavin, Bruce Nauman, James Turrell, Keith Sonnier, Robert Irwin, Lucio Fontana, François Morellet, Christian Herdeg, Olafur Eliasson, Ann Verónica Janssens and others; complex proposals that are governed by sensation and perception. In these cases, the phenomenon requires the receptor and its experimentation in the place where its meaning occurs (the museum space). The perception of these elements refers to a concept or idea constructed by its scenery. Intangible references involve the visitor and invite him to travel through space in search of the construction of their own meanings in memory. It is something intimate and private, unique and subjective; a spacial and temporal dimension that is only perceptible by the subject himself, physically situated there.

The installation is in itself an artistic expression and has great spatial importance, since to transform the environment previously given by architecture [Maderuelo Raso 2003]. In addition, it has a temporal and psychological character and is determined by the interaction and the context of the viewer who enters it. They offer alternative and own symbolic words, new spatio-temporal dimensions, and meanings open to interpretation.

These works require, therefore, an active participation at a physical level and a deeper reading, not only of their formal elements, but of their meaning as aesthetic knowledge because they are places of experience [Abad Molina 2007]. This dimension, which the catalog can not pick up due to its two-dimensional character, means that the subject can not understand this artistic fact. Therefore, the catalog must be updated by using the tools that new technologies provide us.

WHY VIRTUAL REALITY?

Currently, we are immersed in a world with a large number of dimensions that we need to analyze. Minimal Art and, subsequently, postmodernism broke with the great stories opening the way to the multiplicity of meanings on which to reflect. The subject from the socio-cultural perspective seeks its identity through active participation in the construction of the global imaginary. Body acquires a fundamental role and, with this, it becomes a potential transmitter and receiver in communication [Soto Solier 2012].

Contemporary art transforms its procedures and offers new temporal and spatial configurations of experience. In these cases, the conceptual and formal limits are overcome, with great impact on the organization and perception of space. The action re-dimensioned artistic production and cognition becomes a key in the understanding of the artistic fact. Cognitive aesthetics no longer have to be linked to factual reality, but there is an ideal, in which the subject is capable of self-knowledge in the work [Marchán Fiz 2006]. New technologies help the subject to face it by expanding the doors of perception.

Dematerialization – that is a loss of physicality of the work – allows new media to create new forms of materiality (intangible) supported by information flows. With this, he liberalized the art world from its anchoring in reality [Fischer-Lichte 2011]. Now the viewer can experience the idea or concept in a self-sufficient and complete way in a new state of affairs. Performativity occurs with the action of the subject present before the work in its digital version.

Within the new technologies, Virtual Reality is conceived as a very direct means in terms of participatory experience. Its digital character, dematerialized as image (not real), theatrical and scenographic, as well as performative, is an enormously useful resource for the complete reception of all the formal and aesthetic elements of contemporary artistic environments and installations of light. Its processual, hypertextual, conceptual and open language is oriented to the interaction with the subject. In addition, its immersive capacity offers a perfect border crossing in which the perception merges with the device's own interface [Soto Solier 2012].

The Virtual Reality is able to configure communication spaces where the viewer can reconstruct senses from the semiotic point of view. The experience in the first person affects them (visually and corporally), giving them a greater capacity to understand the event lived in the present. The light fluxes of these interventions demand from the viewer perception strategies that establish connections in movement. That is to say, the corporal performative is constituted as a constant flow of understanding; the action converts the medium, in which it is, into discourse [Galanter 2003]. Presence is a type of phenomenon in which body-mind are inseparable from the signifier extracted during the process of experimentation of the place.

Spaces of light flows have an abstract and perceptive character not very different from the virtual space [Manovich 2013]. These new forms of representation with digital media and hybrid techniques, define types of behavior not far from what happens when the subject is placed within an Environment by Ann Verónica Janssens or a lighting installation by Yayoi Kusama, for example. There is an experiential and experimental level that configures visual and procedural forms within the projected three-dimensional stage design. The screen and the interface use information extracted from reality (encoded with algorithms and software codes) and imitate the experience of these interventions.

The virtuality does not stop being a visual metaphor of the reality where the subject looks for his identity.

The identity of the virtualized subject is fundamentally performative and extroverted, focused on the communicational process from which all value derives [...] the multiple discursive translations take a central value in a scene in which the subject conceives of himself as a vehicle of appearance, as a bearer of symbolic value.

[Deleuze and Guattari 2004].

From the perspective of the aesthetics of simulation that Claudia Giannetti [1997] presents us, interactive and immersive installations are created to a different degree, which introduces a dimension of subjectivity more in keeping with the 21st century.

The Virtual representation culminates the path of simulation throughout the History of Art in its extension as an experimental perceptive dimension. In it, the relativity of the observer is expressed [Weibel 2001]. Although it does not stop being a computational and algorithmic product, it can conceive creations without limits of space and time, since it helps to perceive this type of manifestations not only in museums, but also in the University classrooms of History of Art. Virtual reality is offered as a ubiquitous learning resource that helps to understand in a more profound way all the dimensions that these works possess, without falling into the strictly formal of the traditional catalog (dates, data, words, texts) facilitating the aesthetic experience total through the concept of presence.

The aesthetic experience of Virtual Reality creates unique experiences and develops new ways of apprehending the artistic object or fact [Carrillo Santana 2007]. It is about taking the imaginary of the techno-intelligent society to any area of its active life. New spaces of knowledge are opened, as well as forms of participation of art, democratizing access to culture and artistic education in general. It is the immersion of the Virtual Reality as a resource, one of the most extraordinary strategies when integrating the subject within the screen space, facilitating the mental and emotional reception of the representation, as well as the recognition of the scene as a charged place of meaning. The incorporation of the Light Art/Minimal Art manifestations into the field of the virtual screen makes it possible to reproduce reality completely, starting from a metaphor of representation that integrates the viewer, as they would in the 60s and 70s of the 20th century lighting installations of Dan Flavin, James Turrell or Olafur Eliasson, making him participate on site at any time and place where he is.

AN ALTERNATIVE OF CATALOGUING IN VIRTUAL REALITY. A NEW STRATEGIE TO CREATE KNOWLEDGE AROUND CONTEMPORARY LIGHT ENVIRONMENTS AND INSTALLATION: THE CASES OF DAN FLAVIN & ANN VERONICA JANSSENS

In this research, a reflection and application work is developed with practical cases from the perspective of the philosophy of art and aesthetics (50 artists selected and their works, including Dan Flavin, Ann Veronica Janssens, James Turrell, Anthony Mccall, Bruce Nauman, Carlos Cruz-Diez, Li Hui, Yayoi Kusama, Julio Le Parc or Lucio Fontana). One of the first results obtained is that of the *Untitle installation (to Helga and Carlo, With Respect and Affection)* 1974 by Dan Flavin. The reconstruction process is carried out through the data from the data of Series and Progressions catalog of the David Zwiner Gallery in New York (mentioned above). This prototype, which is still in the first phase of development, has been shown to the public at the New Tech Observatory held in July 2019 in Malaga, Spain. The director of the Picasso Málaga Museum tested the same, understanding the need to bring the experiential character of these artistic interventions to the user. The next step is the implementation of the information related to characteristics and its analysis from the historical-artistic, aesthetic and philosophical perspective for the construction of the virtual reality cataloging alternative as a didactic resource in museums and classrooms.
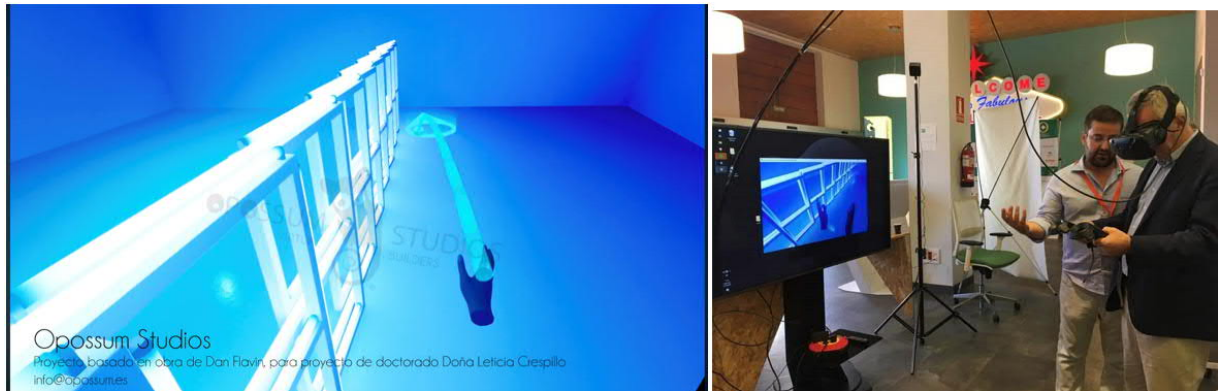
Fig. 5. Example of Virtual reconstruction of Dan Flavin's light Installation, Untitled (to Helga and Carlo, with respect and affection), 1974

Another prototype shown and developed is that of Ann Veronica Janssens, *States of Mind* (Fig. 6). The strategy of experimentation in situ and the presence of the spectator in these prototypes, seek only to improve the learning spectrum and creation of historical-artistic and aesthetic knowledge from the academic-scientific point of view. Art history needs to explain certain plastic phenomena that the traditional catalog cannot because of its two-dimensional nature. Therefore, among the didactic strategies offered through this doctoral research are: presence, movement in space, appreciation and aesthetic experience in situ, as well as complementary and scientific information that help to better understand the phenomenon of contemporary installations and light environments.

Some subjects who tested the prototype felt disoriented and terrified that they could not see, but they listened to other steps while walking through the installation. Others felt pleasure, calm and reflected on what was happening there. These experiences are also part of these manifestations. The subject must understand how he feels within them, to complete the descriptive information from his own unique point of view.

Fig. 6. Example of Virtual reconstruction of Ann Veronica Janssens's environments
(first phase of the Phd. Research – Software Maya/Unreal Engine 4 & Photoshop). July, 18-19 New Tech Observatory. Authors: Opossum Studios Virtual Builters

In them we can observe the displacement of the artistic object to the idea: aesthetic dimension, experience and perception of the subject. In addition, its reception, dissemination and research within the museographic practice is analyzed. This will allow us to examine its discursive, philosophical and theoretical content. The aim is to increase the value of this type of intervention by proposing a cataloging alternative that improves the reception and production of knowledge of these interventions. This is an interdisciplinary project that uses 3D visualization and

Virtual Reality, tools of the current immersive and interactive strategies of the new Vanguard Museography, and proves to be very useful for its accessibility and didactic value in the field of heritage dissemination in museums and classrooms trying to answer the questions that have prompted me to raise this investigation, trying to give answers to the different questions about the aesthetic experience.

Regarding the art-artist-documentation relationship, almost 200 written (physical) catalogs and about 700 essays collected in these catalogs are being analyzed that allow me to establish a link between the artist's intentions, the registration of works and its documentation from the prototype that is currently being carried out. The study continues and there is still documentation to analyze. It is necessary to understand that the purpose of this research is not to replace the original work (that would not be ethical or professional and it is imposible at all), but to try to offer tools through new technologies that improve the understanding of these artistic interventions from the didactic point of view both for the museology and for Teaching in the classroom. It is specifically another way to visualize the contents and document them, because the main purpose of this investigation is to improve the way that the contents are presented and registered for the future. We must not forget that art is also cultural, historical and artistic heritage.

MUSEUM & UNIVERSITY: ANOTHER WAY OF LEARNING THE CONTEMPORARY LIGHT ART

Since the mid-twentieth century, movements such as Light art or Minimal Art, along with many others, present productions with an ephemeral or intangible character. They question the concept of art but they develop until the 21st century [Hernández Hernández 2011]. Currently, this type of intervention continues with new materials and a highly developed aesthetic character. Therefore, the museography must value these manifestations, disseminate them and create knowledge about them. From the pedagogical point of view, the cataloging and documentation of artworks and artistic events has continued to innovate and adapt to the new times. However, the need for a more exhaustive record that captures the aesthetic characteristics of a type of manifestation such as the one we are dealing with here, for its transmission and conservation, remains a necessity and a pending task.

Virtual Reality, in our case, makes all these registration elements available; can meet needs from the formal point of view (data, text, essays, descriptions), but also from the aesthetic field. Virtual reconstruction offers us the environment that emulates reality and the possibility that the viewer can intervene in it, in the first person. These new practices are necessary from the museographic point of view, since they revalue the user's own experience, diversify and multiply the discourses, make the user participate and recognize the importance of the context from the elaboration of a stimulating discourse accessible and open to anyone, approaching them to a new aesthetics and museographic ethics [Gutiérrez Usillos 2012].

The Semiotics of communication in the museum is a decisive element, since it is the receiver that goes to meet the phenomena that happen within the architecture itself. The lighting interventions have their own language, are open and can be filled with new senses. We must reflect on the need to create a semantic field where the work requires the visitor to signify himself [Hernández Hernández 2011]. Only then, it is possible that it manifests itself as a significant element. In addition, the ephemeral nature of these works, not only because of the intangibility of their main material, but also because they are in many cases site-specific, requires experimentation in front of the plastic discourse, so that there is a co-creative process.

The educational and knowledge creation objective of the museum can be extrapolated to the Art History University classrooms, when they approach this type of manifestations as part of the resignification processes of contemporary art. The museum should promote the patrimonial and artistic values of culture, making society analyze, see, experiment, criticize, reflect and be creative. In this context, sensitive and perceptive experiences should be linked to aesthetic learning [Terradellas and Angrill 2007]. Art is a language and, as such, requires a study for its understanding. The interpretation is determined by the dialogue between the subject and the spectator, especially in intangible or intangible interventions. The new museography must be open to the classroom and must rethink in relation to the transmission and generation of knowledge in the line of shared and participatory learning

Virtual Reality as a learning tool stimulates and potentially means, establishing relationships between subjects of knowledge, works and aesthetic attitudes. Thus, contemporary Enviroments and Light Installations, as process aesthetic and performative-experiential practices, are completed by the screen and the possibility of direct experience of the viewer in situ. Therefore, this technique, together with virtual environments, allows users to enter into any possible and impossible reality by activating the senses in those artistic productions that need interaction,

immersion, body movement and cognition, providing meaningful encounter in a museum and, even, a classroom more in line with the needs of our time [Santacana Mestre and Martín Piñol 2010].

CONCLUSIONS

All these challenges posed by the current way of producing and consuming a visual culture so marked by context and always in constant change through strategies of hybridization, interdisciplinarity and technology, pose not only the configuration of new intellectual discourses, but also allow reinterpreting aesthetic constructions from other past times in an innovative way, achieving an unlimited expansion of our own knowledge and the contemporary exhibit tion field as "connectivity operator space", a concept he uses to refer to the new José Luis Brea museums in Simon's book Marchán Fiz referred to above and that places us squarely in the context of our immediate artistic and cultural contemporaneity.

ACKNOWLEDGEMENTS

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