Alejandro Armellini / Rosabel Martinez-Roig (eds.)

Trends in Innovation and Interdisciplinary Knowledge across Educational Settings

This book deals with various contributions on innovation and knowledge from an educational perspective. Throughout the various chapters, empirical research, reflections and bibliographical studies from different areas of education are presented. All of this is articulated with the aim of forming a compendium of studies based on the knowledge generated in today's society. In short, this book is an indispensable tool for educators, researchers and students interested in the latest trends in education, offering didactic guides, case studies and analysis of methodologies to promote meaningful learning.

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EnviroArt Project: Solving the Record of the Contemporary Intangible Light Phenomenon from the Immersive Technomuseographic Perspective

Abstract: The specific nature of contemporary light installations and environments, which require the presence of the viewer to establish a full understanding of the artistic event, raises several issues related to their documentation and cataloguing. These problems are exacerbated in environments that use light as an aesthetic resource because of its intangible, theatrical and performative character. This problem has compelled us to explore alternatives to traditional catalogues, both in printed and online versions. Hence, this text focuses on alternative modalities offered by virtual and immersive reality technologies. Virtual reality enables participation in simulated environments in ways similar to everyday reality, thus allowing us to obtain greater knowledge of the phenomenon of light and its influence on perception during the aesthetic reception of the subject in question *in situ*, which is impossible to experience without its presence. Art history needs to explain certain plastic phenomena that traditional cataloguing cannot because of its two-dimensional nature. Virtuality allows us to enter a built environment through our physical body, our movement and our appreciation of the artistic fact in a technologically equivalent space in which we can acquire a greater amount of information. This helps us fully understand these manifestations of art. The aim of this research is to propose an alternative method of cataloguing for this specific class of interventions, thus allowing for a comprehensive aesthetic experience through the interactive and immersive tools of 3D visualization and virtual reality, which are used in current museography.

Keywords: virtual reality, contemporary light art, new museography, immersive catalographic register, aesthetic.

1. Introduction

It is indisputable that digital technology has changed the way we deal with artistic facts. Moreover, digital technology has directly influenced cultural institutions, such as museums, galleries, alternative spaces and university spaces. Over time, these spaces have facilitated access to content using software, hardware and mobile and peripheral devices, thus enabling comprehensive learning experiences. Hence, the possibilities and opportunities for gaining communicational knowledge have increased, and this has led to the emergence

of new modes of the interpretation, production, dissemination and enhancement of a historical artistic heritage that is increasingly linked to the concept of subjectivity in a techno-smart society.

Therefore, when we speak of subjectivity, we focus on the break from the traditional objective and interpretive concept of artistic manifestation (Formal Stylistic qualities).

The role of the receiver is now key to meaningful learning from individual experiences. Hence, the active participation of the spectator requires an updated set of norms that are adapted to a new reception model, which is linked to Dewey's (2008, pp. 26–29) concept of experience, in which participation and interaction are essential parts of the perceptual encounter with a work. These activities establish a connection with the imagination, in which meanings and, therefore, unique relationships are extracted. These experiences are rhizomatic because they are dynamic and not finite (Deleuze & Guattari, 2002, pp. 8–33). This concept requires deep reflection because the internal situation of a subject is complex, both cognitively and emotionally. Moreover, it is interesting and enriching to understand the various parameters of individual behaviour in response to an expanded aesthetic event.

In certain artistic manifestations, situational, relational, three-dimensional spatial, temporal, cognitive, affective, intangible plastic, dual, material and immaterial organization require reception in the original context. This complexity presents a huge problem in cataloguing a work because the entire structure includes both the subject-viewer and the phenomena derived from the contemplation and interpretation of it *in situ*. This last idea is fundamental because it is the key axis of the argument of the chapter in question. The innovation that technological irruption has brought to the humanities, not only in terms of quantitative data analysis but also in the application of 3D techniques (e.g. virtual reality, augmented reality and mixed realities), has generated a network of knowledge that has democratized a culture in which intersubjectivity, in relation to individual identity, can provide mental states that reconfigure traditional ways of seeing. Hence, we are particularly interested in virtual reality as a configurator of possible virtual worlds based on the mental and physical qualities of immersion, participation and interactivity. Virtual reality is a useful tool in our difficult investigation of the understanding and possible registration – within limits – of the unique and unrepeatable receptive process of the spectator subject as a source of direct experiential information.

We also propose an alternative method of cataloguing and registration in virtual reality based on the doctoral research that I am currently developing on the use, presence and registration of light in contemporary aesthetic reception

processes. In this research, I focus on the imperative need to update or rethink registration strategies and techniques that respond to the problem of the intangible as an object of study.

2. A General Approach to Current Museography: Virtual Reality and Knowledge Management

2.1. Updating Modes to Meet the Challenges of the Future: The Catalographic Register as a Key Strategy in Museography

The catalogue continues to be an effective source of information linked to the concept of the exhibition. We have always known the catalogue to be a book that is edited and structured in precise ways. However, the progressive technification of society has forced us to further investigate the catalogue by appealing to its yet-to-be exploited narrative potential. Hence, the subversion of traditional strategies of artistic fact dissemination aims to develop possible mediation alternatives in the current social and cultural context.

We cannot forget, however, that cataloguing remains an available tool for museography. It comprises a set of techniques and practices that are used to enhance the content of an exhibition in its specific institutional spatial context – whether discursive or structural – based on the idea of creating knowledge and managing communication with a public who is likely to contemplate and experience a specific work. For this reason, rethinking the catalogue involves re-examining museum techniques to meet the challenges of the future [see Figure 1: https://drive.google.com/file/d/1CT5UzVnGMV9YS1JejdCmx_JipgfHs4EZ/view?usp=sharing].

Although in both cases (physical and digitalized catalogs), the catalogue has successfully adapted to changes in the digital age, there is still much to do. The digitized catalogue was the first step towards a new concept of accessibility and the democratization of content, compared with the distribution of a physical book, which is restricted economically and geographically. It seems that since 2012, when the Guggenheim Museum digitized and posted 65 out-of-print catalogues on its website (Vozmediano, 2012), many centres have adopted this modality. Among them, the National Museum of Asian Art now offers partial resources for its publications online, such as essays, introductions and images. The Seattle Art Museum has done the same with its collection of Chinese paintings and calligraphy, and the Art Museum of the County of Los Angeles (LACMA) now allows access to its digitized catalogues as part of the Archive.org initiative.

The Online Scholarly Catalogue Initiative of the Getty Foundation makes digital publications available to users based on the idea of updating query modes in collaboration with other institutions and art museums, such as the Art Institute of Chicago, the National Gallery of Washington, DC, the San Francisco Museum of Art, the Tate Modern, and the Walker Art Centre, among others. In addition, the website of the Juan March Foundation has included all its art catalogues of exhibitions since 1973 in PDF format, which can be consulted and downloaded in various editions and languages.

Digitization has solved many problems related to access to content, as we have already mentioned, radically opening the institutions of museums and galleries to society. This is one of the main pillars of current museography. However, we must understand that some pieces possess an intangible character, for which the catalogue, in either its physical or digitized formats, still does not meet the specific needs of a complex registration.

In this situation, new technologies offer the possibility of adapting the catalogue modality by using a direct approach to subjective experience derived from the individual's face-to-face participation within the artistic event itself in real time (Gere, 2009, pp. 13–15). The virtual reality recording is expected to be the definitive step on the path towards the contextual adaptation of the catalogue as a text-narrative diffusion entity. In dealing with problematic and immaterial plastic productions, whose spatial, three-dimensional, temporal, performative and processual qualities are not registrable using current modes in museography, virtual reality offers a solution. The following are examples of successful projects conducted in 3D virtual reality.

2.2. Updating Modes to Face the Challenges of the Future: The Catalographic Register as a Key Museographic Strategy

In relation to the foregoing discussion, it is essential to clarify the evolution and adaptation that the catalogue resource has undergone throughout history, including technological innovations in the 21st century. Just as experiential needs for art have changed in the contemporary context, exhibition processes have shifted in relation to their audiences. Virtual technology – both immersive and non-immersive – offers an interesting contradiction. It is a space without space and a "timeless" time, wherein there is a convergence of experiences that activate thought, participation, collaboration and co-creation in real time versus simulated rendering. We must understand the previous idea in the terms in which Baudillard described a "simulation", which refers to an environment that reproduces an equivalent of the factual world as both operative and a

representation or simulacrum that is true in the same terms as the objective real world, which is therefore "hyperreal" (1978, pp. 1–9). Faced with hyper-technological development, the perception of the artistic manifestation both evolves and is framed by "appropriation behaviour". This is closely linked to the new aesthetic approaches that have emerged from transgression as a means of questioning traditional approaches in comparison with digital ones. In the 21st century, immersion, interaction, co-creation and interpretation will influence the individual logic-generating axis of new aesthetic dialogic possibilities.

Many museums have digitized most – if not all – of their content, which is now available to anyone in a non-immersive manner through the internet. In this text, we consider the epistemological turn towards the immersive as a strategic tool for the enhancement, dissemination and creation of knowledge concerning the artistic artefact. In 2020 and 2021, the Sars-Cov-2 pandemic forced us to rethink this work–spectator dialectic regarding the relevance of the individual's experience on cognitive and behavioural levels in the context of curatorial practice and content management. According to Santacana Mestre (2014, pp. 47–52), it is necessary to know how to select content according to the capacity that technology has to change our minds and develop our learning structures.

The immersive experiences that I consider most interesting are those that have occurred through the collaboration of museums and private companies. For instance, in collaboration with Samsung, the Archaeological Museum of Madrid (MAN) created the application *Vivir en…*, where viewers could experience the sensation of walking through streets and houses in the desired historical period. The Guggenheim Museum in Bilbao also collaborated on the *Bacon Room VR Project* produced by VR Maxina Audiovisual Studio, in which visitors entered Francis Bacon's studio. *Modigliani VR: The Ochre* was exhibited by the Tate Modern Gallery and offered a reconstruction of the artist's studio, an undocumented space that has once again emerged as an object of interest based on information obtained from oral sources. *Mona Lisa – Beyond the Glass* was created through the collaboration of the Louvre's curatorial team and the ViveArts company, in which case the visitor directly experiences a personal encounter with the painting. Other experiences in the creative field that are also interesting because of their pedagogical content are *Magritte VR* and *Bosh VR*, both of which were developed by the BDH company.

In terms of art content management, these examples are reformulations with the clear objective of promoting heritage productions and communication structures that appeal not only to collective knowledge, but also to individuals' sensations. The creation of spaces for virtual participation and interaction with

the audience allows for not only knowing the artistic artefact but also capturing, preserving and communicating human knowledge and its configurations.

Technological development and its application by tools such as immersive virtual reality in the field of museography have opened the way for new curation and preservation models. These models are expected to solve problems regarding the intangibility of a work, the need for the subject's presence within it and modes of aesthetic reception that enable a multiplicity of readings and, therefore, the documentation of questions that the traditional catalogue cannot answer or resolve successfully. These questions include the following: How do subjects deal with space? What is their route within it? Why does each subject have different positional coordinates? What do they look at first? What do they feel and how do they feel going through the simulated space? What feelings do they have and why? Therefore, it is necessary to consider the "aesthetic dimension of techno culture" (Fajardo, 2001, pp. 111–123) as a possible conduit for transformation in the field of knowledge, especially when we are faced with events or artistic phenomena of great sensitivity. One such case is explained and then shown below, which we are going to solve using 3D technology.

3. Contemporary Light Art: An Alternative to Cataloguing in Virtual Reality in a Complex Case Study

We must start with the fact that the installation, as a physical device, occupies a space in which a subject can establish a series of cognitive, sensory, spatial, temporal and affective relationships. In our case study, in addition to the concept of a physical environment occupied by the "x" structure, we added a plastic light element that was developed both environmentally and three-dimensionally in its evocative and intangible effects. Hence, the need for physical presence arises within the intervened place because it allows the viewer to directly appropriate the work through sensory data extracted from the experience. The organization of this information begins with a basic mental process of understanding in corporeity at the site of the installation. This is consistent with James J. Gibson's (1950, pp. 60–64) emphasis on the need to examine the active participation of subjects and their individual behaviour in "activities" that could offer multiple relative meanings, since the evolution of visual perception and stimuli is unique in each case.

These ideas are vital to our proposal. Contemporary light installations, or the light environment, require a direct presence in the three-dimensional space of experimentation. The actions and positional coordinates determined by the individual body of the subject cannot be correctly registered using only the

traditional 2D cataloguing methods provided by museography. Nonetheless, I do not reject the capacity of the traditional catalogue as a tool; instead, I try to find a way to update it according to the problems and needs that have arisen as a result of research in the field of aesthetic perception, which is linked to the study of these manifestations to preserve them correctly.

Why virtual reality? We should reflect again on the reasons for this choice. First, virtual experiences are similar to real ones when they are presented as a projection of the factual world – that is, the "real" everyday world. The worlds simulated and constructed using this technology allow viewers to immerse themselves within them and experience and understand concepts that may not have otherwise been possible. Immersion is precisely what solves the relational, situational and contextual problems of the subject within the work. Furthermore, interaction and co-creation – in the Umbertian sense – occur in these dimensions in ways that are both temporally and spatially determined by the positional coordinates of a particular user. Therefore, virtual reality is a content presentation system that opens a huge field of experimentation through the interface, supplying, as indicated by María Luisa Bellido Gant (2011, pp. 117–123), the apprehension of thought processes and, therefore, the understanding of sensitive phenomena derived from *in situ* exploration.

3.1. The EnviroArt Project: Prototype Based on the Results of the Data Analysis

Before unravelling the process of creating the prototype, which is still in a phase prior to its implementation, it is necessary to explain the types of lighting installations and environments used in this project. The study includes a series of interventions conducted in the 1960s and 1970s until the second decade of the 21st century. These artistic productions have the main plastic material of light in common.

The concept of "loss of visuality", which has been linked to the work of conceptual artists, led to the notion of art as an idea, attitude or behaviour. This idea entailed a process of dematerialization related to certain space–time, random and ephemeral phenomena typical of the experience of the subject in a particular place. Because this interest in light as a shaper of spaces developed in various ways over the decades, the installation was a complex production. In their concepts of space, Dan Flavin, Lucio Fontana, Robert Irwin, Anthony McCall, Julio Le Parc, Brigitte Kowanz, James Turrell, Olafur Eliasson, Ann Verónica Janssens, Matthew Schreiber and many others evoked special places in which viewers were invited to move and co-create according to their own

internal structures – including the social, cultural, biological and physiological – while completely bathed in light.

Therefore, with the aim of understanding how these concrete manifestations work at aesthetic and phenomenological levels, the research process began with the selection of 40 artists from a large group of candidates. Selected catalogues corresponding to individual exhibitions were obtained afterward. Some of these artists were not exclusively dedicated to working with light, so the choice of catalogues was made based on lighting works. A total of 386 texts extracted from 170 catalogues constituted a specialized corpus that was analysed, including essays, work comments, interviews and artists' reflections.

The analysis of this large volume of data offered us a general radiography that could also be viewed individually, which allowed for the exploration of how these structures worked with respect to the subject who experienced them. Because of the "conceptual concurrence" extracted from the corpus data using Voyant Tools, we are aware of the common aesthetic–plastic component that defined them as artistic facts. Subsequently, using Gephi visualization, we determined, through an example, the descriptive coincidence and conceptual relationship that existed between different selected artists and their interrelationships [see Figure 2: https://drive.google.com/file/d/16GI-IjUs5s4-6g5f4WEcyTPT4SY4pEsV/view?usp=sharing].

In this concurrence map, we can appreciate the constant repetition and relationships that emerge in different terms, such as experience, light, space, time, body, colour, perception, sense, physical, process, spectator, space, aesthetics and individuals, all of which are qualities that we will consider implementing in the final prototype. As we explained previously, this type of light, space–time and perceptual intervention requires that a subject be inside the environment to physically experience these qualities. Therefore, we are in a performative and procedural place that has a highly aesthetic character. All these qualities cannot be collected in a 2D format because they are experiential and signified by actions. Thus, we must think of a new format that provides these qualities and applies three-dimensionality to a simulated space that is equivalent to a real one.

If we analysed three of the most significant artists in these terms, we would find equivalent conceptual patterns that indicate a certain plastic criterion. In these three cases – Dan Flavin, James Turrell and Olafur Eliasson – we found allusions to experience, time, space, the viewer, the body, physical effects on the viewer and perception as the driving forces of experience. These patterns and allusions were valuable in the implementation of the catalogue presented to the viewer, who would participate in the immersive experience using the peripheral devices in virtual reality equipment. Regarding the action space, a

large, controlled environment was the most appropriate solution, so movement could be natural. The rest of the elements were addressed through the interface incorporated into the stereoscopic glasses [see Figure 3: https://drive.google.com/file/d/1sld1ycxcTaOKP-glwf_fmlGcgCF4biDS/view?usp=sharing].

The development of this virtual reality prototype, which is part of the EnviroArt project and the doctoral thesis, proposes an alternative to the traditional catalographic registry. It aims to improve the way in which these manifestations are received and experienced, as well as their preservation for the future.

This PhD project began in 2017, when I was working with the company Opossum Studios Virtual Builders. We made two reconstructions from the original catalogues. The next step was to implement the information in the catalogues (i.e. texts, images, work comments, etc.). Users will be able to incorporate themselves and circumnavigate within it while consulting the information that they consider relevant and moving freely through the environment. This conceptual construction will be accessible as a generative compendium of systematized knowledge on a later platform (postdoctoral research).

Prototypes created for this doctoral research:

- Dan Flavin, *Untitled (to Helga and Carlo with Tespect and Affection)*, 1974; taken from the series and progressions catalogue of the David Zwirner Gallery in New York [see Figure 4: https://drive.google.com/file/d/1AixgyE7MxkV9wgQra8-nrz0DEVx7pbK1/view?usp=sharing and Figure 5: https://drive.google.com/file/d/19_tHwuhUFu8okXiC4XBtNmkyNcMr9ODJ/view?usp=sharing].
- Ann Verónica Janssens, *Yellowbluepink*, 2015; extracted from the *Experienced* catalogue of the Toni Tàpies Gallery in Barcelona for its reconstruction.

Based on the textual and visual material compiled in 170 catalogues, 382 texts and 800 works, we will create a visual map of similarities and correspondences according to the type of work (i.e. initiation, environment or sculpture) and explore new spaces through computational techniques and artificial intelligence linked to deep learning. Doing so will allow us to face the challenges presented by infinite combinations of data and new immersive experimental spaces.

4. Conclusion

It is undeniable that the current state of culture is intimately linked to technology. Virtual reality is a valid starting point from the museographic perspective

because it can provide answers to new questions that arise in our social and technical contemporaneity. Hence, developing emerging discourses from the transversality of knowledge could help us communicate the complex information necessary to optimize the processes of image reproduction. Contemporary light installations and environments are artistic manifestations that require subversion in the modes of contemplation and experimentation linked to the possibilities of technological development. Initially, the application of data analyses and visualization techniques made it possible to simplify this complex phenomenon by extracting interesting information from items that far exceeded the 2D reproduction capacity of the common book format. This process of analysis enabled us to propose possibilities of displacement from the 2D image to the 3D image, thus increasing the options for individual and intersubjective encounters and improving our understanding of the aesthetic fact or event in conceptual terms.

The theatrical aspect is intrinsic in interventions that occur in a 3D space because they are supported by a physical space that functions as a stage. The subjective emotional charge of the viewer becomes the central axis of the virtual construction, thus subverting the roles and processes of traditional unifocal aesthetic reception. In such cases, the vanishing point is now the viewer.

In this space, materials are displayed in a supporting structure, converging with viewers who walk through the space, seeing their bodies completely covered in intangible chromatic luminosity. Because of the values of immersion, participation and interaction in a computationally three-dimensional constructed space, virtual reality is one of the great innovations to be implemented in the context of the communication and mediation of heritage.

The proposed alternative virtual and immersive catalogue provides perceptual, cognitive and realistic simulated environments that viewers experience in person and in real time, thus receiving an interactive and architectural unit of representation projected by their own subjectivity. Accordingly, we will be able to answer the questions that we asked at the beginning of this text. Specifically, we will be able to understand how subjects perceive space at the cognitive level through their incursion into a simulated structure. On performative and procedural levels, how do viewers move into a space? What place do they occupy? Which path do they travel based on their situational coordinates? What catches their attention with respect to other subjects who experience the same work about intersubjectivity and shared knowledge? What do they feel when they are inside? How do they feel space from physiological and somatic perspectives, such as sensations and perceptions that are translated and communicated in our language?

The proposed virtual catalogue will solve many problems that the registration of our object of study includes, particularly about direct experimentation, because of the enormous aesthetic and phenomenal components. Therefore, virtual reality can function as an enveloping ionosphere of referential knowledge, integrating the subject and their particular experiences in a pseudo-reality that can be recorded, compiled, disseminated, downloaded and relived. There will never be two identical experiences. Moreover, virtual reality can function as an open resource, thus democratizing access to and expanding the visual field in the prevailing techno-social post-aesthetic.

Generating knowledge and evaluating certain types of complex work through updating "museographic ways of doing" will help us understand not only the operation of these plastic devices but also their potential as agents of interaction.

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